REPORT UAG-70

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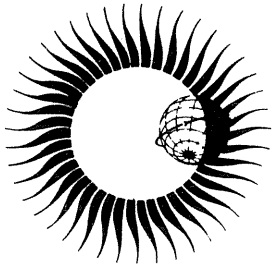
Solar-Terrestrial Physics

ANNOTATED ATLAS OF Hα SYNOPTIC CHARTS

for
Solar Cycle 20 (1964-1974)
Carrington Solar Rotations 1487-1616



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Space Environment Laboratory
National Oceanic and Atmospheric Administration
Boulder, Colorado, USA 80303

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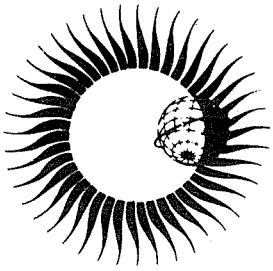

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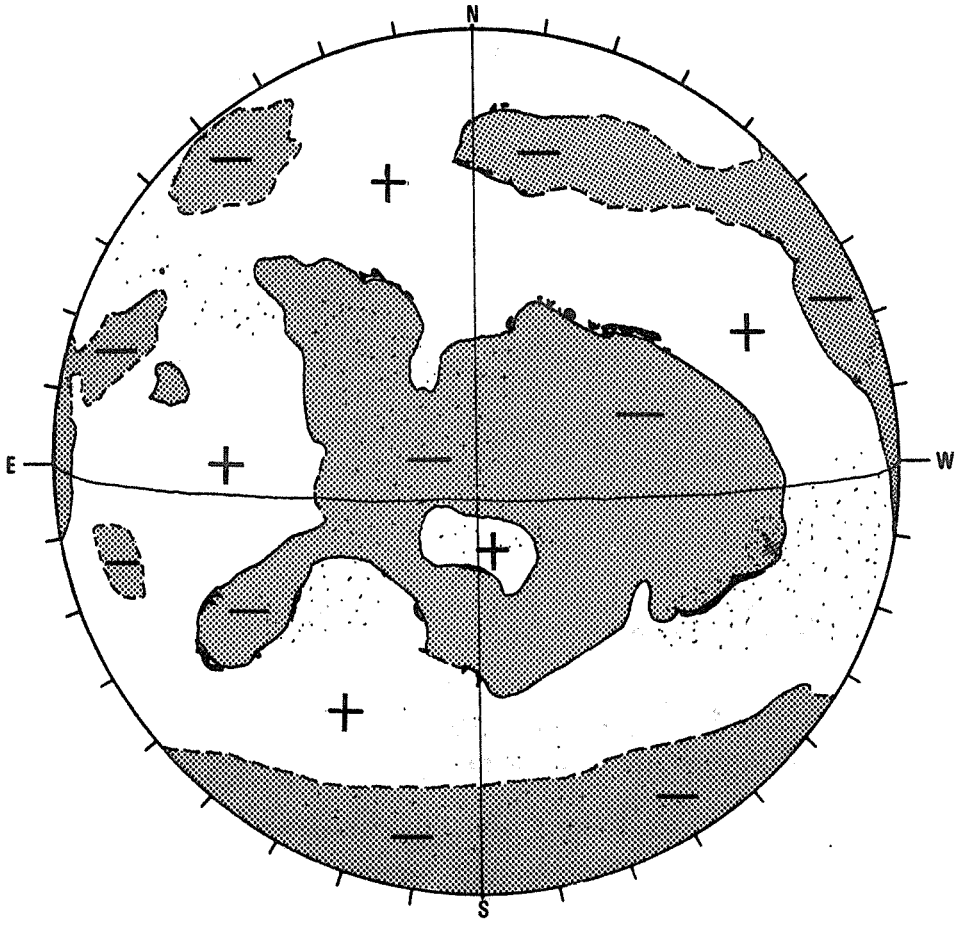

Pieces solis. The pattern of solar magnetic fields facing earth on 21 July 1973, as mapped from structures observed with an H-alpha half-angstrom filter.

PREFACE

The procedures for inferring solar magnetic fields from H-alpha observations were developed as an aid to the real-time solar flare predictions issued by the Space Environment Laboratory's Space Environment Services Center [McIntosh, 1969, 1970a, 1972a]. Daily use of these procedures for analysis of solar active regions gradually showed that the large-scale magnetic fields were also discernible in the H-alpha structures. Early papers on interplanetary magnetic sector structure were appearing in 1969 at the time the first provisional H-alpha synoptic charts were made. These inspired a search for the solar source of sector structure among the giant patterns of neutral lines [McIntosh, 1970b, 1972b]. Although preliminary studies were encouraging, they also indicated that any useful study required data on large-scale magnetic patterns for an entire solar cycle. Likewise, the early observations of dynamics and cellular organization of these patterns raised significant questions that could be answered only with a much larger data base.

I presented one of the first H-alpha synoptic charts before the Asilomar Solar Wind Conference in early 1971 and suggested that the large-scale neutral-line patterns represented the organization of the overlying large-scale coronal magnetic fields [McIntosh, 1972b]. In the audience was E.C. Roelof, who immediately recognized the value of the H-alpha synoptic charts to his unique attempts at tracing interplanetary energetic particle populations, interplanetary field polarity patterns, and solar wind streams back to their solar sources. The following year the first complete H-alpha synoptic charts, rotations 1523-1525, were constructed specifically for a period of satellite observations under investigation by Drs. E.C. Roelof and S.M. Krimigis. Little did we realize that a 7-year effort was beginning that would ultimately involve more than a dozen persons and yield an H-alpha atlas of Solar Cycle 20. The early excitement generated by the suspected association of interplanetary parameters with the global solar magnetic field was greatly heightened by the confirmation of these associations that this first set of H-alpha synoptic charts provided. The associations were shown to be borne out not only in the interplanetary medium [Roelof and Krimigis, 1973; McIntosh and Roelof, 1972; Nolte and Roelof, 1977], but also in the coronal X-ray images obtained from Skylab [McIntosh et al., 1976].

The initial successful correlations, the vision and energy shown by Dr. Roelof, and the excellent work of his colleagues at the Applied Physics Laboratory led to the decision to attempt the construction of an annotated atlas of H-alpha synoptic charts for Solar Cycle 20. Institutional support for this undertaking came from The Johns Hopkins University, the National Oceanic and Atmospheric Administration and the University of New Hampshire. Support for the cartographers was provided via a contract to and administered by Dr. E.C. Roelof from the Air Force Geophysical Laboratory (formerly the Air Force Cambridge Research Laboratories).

Many exceptional, gifted, and dedicated people worked hard to produce this volume. I have attempted to give credit in the Acknowledgments to all. Of this group, however, three were so outstanding in their contributions that I wish to acknowledge them in the Preface. These are Mrs. Susan C. Wayland, Mrs. Janice E. Leighton, and Miss Sharon L. Osborne. Not only did they produce nearly half of the 130 charts in the atlas, but they also aided in the development and codification of mapping techniques, maintained project organization, provided training for other cartographers, wrote progress reports, and produced some of the "real-time" synoptic charts for use by the NOAA Space Environment Laboratory's Space Environment Services Center. Their role was essential, and it has been a privilege for me to have worked with them in the production of this atlas.

Patrick S. McIntosh
Boulder, Colorado
October 1, 1978

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ANNOTATED ATLAS OF Hα SYNOPTIC CHARTS

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Space Environment Laboratory
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Boulder, Colorado 80303

Introduction

This volume presents a record of large-scale solar magnetic fields and solar activity during 130 solar rotations, from November 1964 through July 1974, in the form of H-alpha synoptic charts and accompanying descriptive notes. A new perspective on large-scale magnetic fields is provided by the inference of lines of polarity reversal from the systems of structures visible in H-alpha patrol filtergrams. These structures map the neutral lines in the radial component of solar magnetic fields [McIntosh, 1972a], thereby revealing details of the boundaries to large-scale magnetic fields that are not recorded in magnetograms sensitive to the longitudinal (line-of-sight) component of the fields.

This atlas testifies that neutral lines are of themselves important physical features in solar activity. They are associated directly with systems of physical structures. They form continuous lines that often encircle the entire sun. They have lifetimes in excess of 2 years. The neutral-line patterns normally predate, and survive, the occurrence of important centers of sunspot and flare activity.

The period of observations included in this atlas begins with solar minimum at the start of Solar Cycle 20 and continues to within 2 years of the next solar minimum. Charts for the first year of the solar cycle were constructed for study of Mariner 4 interplanetary observations [Nolte, 1974; McIntosh and Nolte, 1975; Nolte and Roelof, 1977], but the first charts to appear in a final, edited form were those for rotations 1523-1525 [Roelof and Krimigis, 1973]. The last chart in the atlas coincides with the commencement of regular publication of edited preliminary synoptic charts in *Solar-Geophysical Data*.

Synoptic Chart Format

These H-alpha synoptic charts are identical in format and method of construction to those published for the period of Skylab observations [McIntosh, 1975] and for the first year of Solar Cycle 20 [McIntosh and Nolte, 1975]. Each chart is a map of the solar globe during one solar rotation (27.2753 days), much like the Cartes Synoptique prepared by the Meudon Observatory. Patterns are mapped by accumulating positions of features on daily H-alpha filtergrams and are interpreted as magnetic field structures according to techniques previously described [McIntosh, 1972a, 1972c]. The latitude range is ±70°. Solar longitudes are indicated at the bottom and are those tabulated in *The American Ephemeris and Nautical Almanac*, and based on the mean rotation rate for sunspots derived by Carrington. Each chart includes an overlap of 60° with the preceding and following chart. The serial number of each solar rotation is the Carrington number in the series, which commenced November 9, 1853. The dates of central meridian passage at the top are for the solar longitudes directly beneath the date interval. The month and year appearing in the upper-right and upper-left corners of the chart refer to the first and last date, respectively, in the series of central meridian dates. The date in the lower-right corner (e.g., 8/9/74) is the date of preparation of this final version of the synoptic chart to distinguish it from preliminary versions. Initials in the lower-right corner of each chart identify the solar cartographer responsible for the basic work on that chart (see Acknowledgments). All charts were thoroughly reviewed and revised by the author.

The following data are shown on the charts:

(1) distinct neutral lines (solid lines)
(2) estimated neutral lines (dashed lines)
(3) disappearing neutral lines (lines crossed with hachures)
(4) filaments (cross-hatched areas)
(5) major sunspots (large solid dots)
(6) H-alpha plage (stipple, density roughly representing brightness)
(7) magnetic polarities.

An explanation of these data appears with the discussion of Cartographic Methods.

Each synoptic chart appears at a scale to fill a full page, and its descriptive notes are on the page opposite. This scale, 0.55 mm/degree, is identical to the scale of previously published charts [McIntosh, 1975; McIntosh and Nolte, 1975]. All but two of the charts appear a second time at reduced scale in panels of four to a page; areas of negative polarity are shaded so that the large-scale patterns are emphasized. These panels show the persistence of patterns from one solar rotation to the next, and begin to reveal the nature of proper motions and evolution of large-scale magnetic patterns. The uniform shading indicates a dominance of negative polarity in these patterns. High-resolution magnetograms have shown that small-scale areas of opposite polarity always are present in any given unipolar magnetic pattern.

Polarity signs are missing within the small-scale, cellular features in order to make the charts more legible. The polarity of these regions is always opposite the surrounding area, as confirmed by comparing the full-page charts with their corresponding shaded versions at the end of the atlas.

Cartographic Methods

The construction of each H-alpha synoptic chart proceeded through at least five different stages: (1) mapping of conspicuous neutral-line structures (solid lines), (2) addition of more subtle detail that permits interconnections among distinct neutral lines, (3) inference of magnetic polarities, (4) completion of patterns by the addition of "estimated" neutral lines through consideration of the gross distribution of polarities in adjacent areas and, more importantly, of the continuity of large-scale patterns with previous and subsequent solar rotations, and (5) a careful editing through comparison with synoptic charts of measured magnetic fields. These five stages were assigned to a staff of solar cartographers. Two additional rounds of editing were performed by the author: a careful check for general consistency in style and polarities, and a tedious check of every detail while compiling the descriptive notes. Each synoptic chart consumed more than 120 hours of effort. Recent use of computers to digitize and plot the charts has made the process more efficient; but, the majority of effort still requires experienced interpretations and manual integration of information from many images.

Distinct Neutral Lines. The distinct neutral lines (solid lines), indicating magnetic polarity reversals, are mapped from various structures visible on once-daily photographs, or filtergrams, taken with patrol telescopes equipped with a birefringent filter tuned to the 6562.8Å line of hydrogen (H-alpha). Filaments, filament channels and plage corridors (Figure 1) are readily identified on low-resolution patrol filtergrams and are the basis for mapping most of the large-scale magnetic patterns. The ability to map more complete magnetic patterns than any previous synoptic chart comes primarily from the recognition of the filament channel as an extension of, and often replacement for, the filament. The filament channel had been described in the literature for number of years, but with different terminology [Kiepenheuer, 1967; Nolan et al., 1970; Rust, 1970], although it was first identified by McIntosh [1970b, 1972a] as a neutral-line structure interconnecting filaments and active regions.

Inference of neutral lines through young and complex active regions requires identifying arch-filament systems [Bruzek, 1967] and "iron-filing" patterns of fine fibrils adjacent to the active region (Figure 2). Detailed discussion of the nature of these structures and a comprehensive referral to published studies of their relationships to magnetic fields are presented by McIntosh [1972a, 1972c].

Positions of all structures lying on and over neutral lines were measured from 12-cm-diameter prints by overlaying the prints with Stonyhurst grids marked with heliographic latitude and central meridian distance in heliographic degrees. Positions of neutral-line structures were manually transferred to graph paper marked with the heliographic coordinates. Computer digitization and coordinate transformation were not available until late in the mapping program. An average of 25 features was measured from each of the approximately 3600 daily photographs. Repeated mapping of identical features from several different photographs provided a thorough check on positional accuracy. The accuracy of coordinates is a function of the nature of the structure, and is usually within 2 heliographic degrees of the correct position.

The patterns are mapped by accumulating the positions of features from a series of daily H-alpha filtergrams. An important observation underlying this atlas is that large-scale H-alpha neutral lines are never completely visible on a single photograph. Only rarely does a filament completely outline a magnetic pattern. More often a neutral line is covered by a series of disconnected filament fragments, or is evident only by the subtle pattern of fine fibrils that form the filament channel. The filaments and filament fragments are constantly changing, disappearing and reforming, so that it is necessary to integrate observations from a complete disk passage in order to detect the complete neutral-line pattern. A filament symbol is placed over a solid line if a filament were observed at that position at any time during the disk passage. Neutral lines mapped by filaments are generally the most accurately mapped neutral lines.

Whenever possible, the H-alpha patterns are the forms seen when the particular features were near W40° on the visible solar hemisphere. This bias permits integrating observations for at least 10 days, including all the days of best visibility of a particular feature.

Whenever a pattern undergoes a conspicuous change from the time of first visibility near east limb to the time at W40°, the former neutral-line position is depicted as a line crossed with hachures (disappearing neutral line). Such changes usually result from the emergence of an active region near a neutral line, or from the merging or splitting of large-scale patterns. Many of the disappearing neutral lines are subjects of discussion in the descriptive notes.

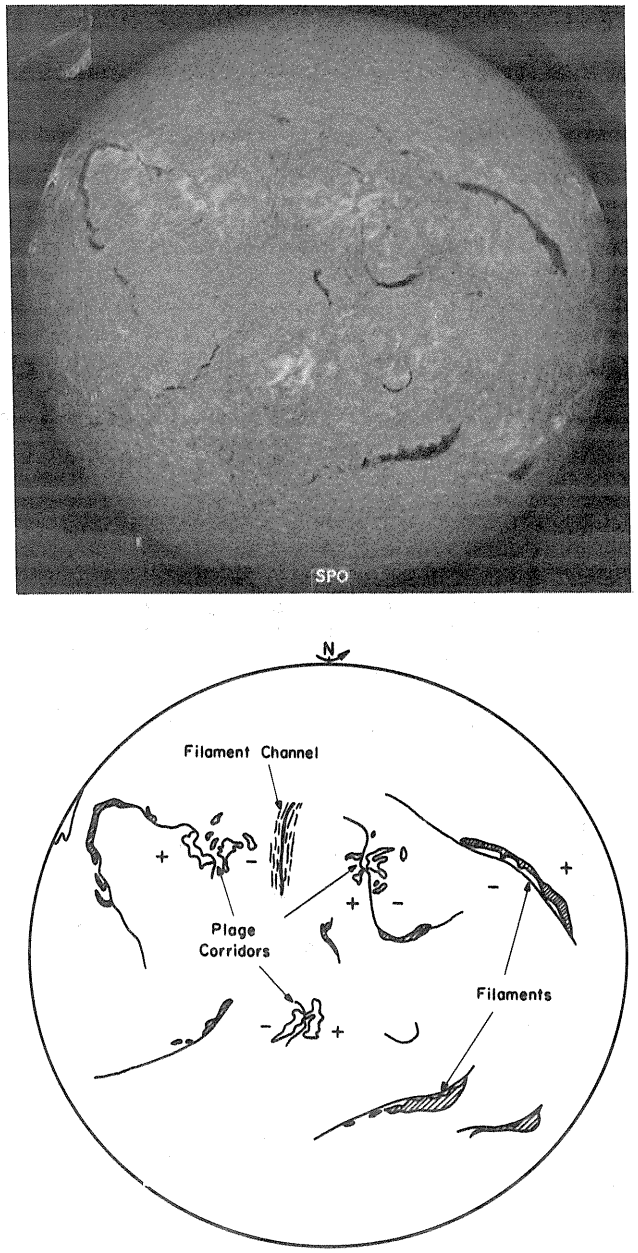

Fig. 1. Representative H-alpha features that map lines of magnetic polarity reversal. See synoptic chart for rotation 1542, left end, for the complete magnetic patterns that are only partially visible in this single photograph. Patrol filtergram for 2 January 1969 from Sacramento Peak Observatory, Air Force Geophysics Laboratory [from McIntosh, 1972a].

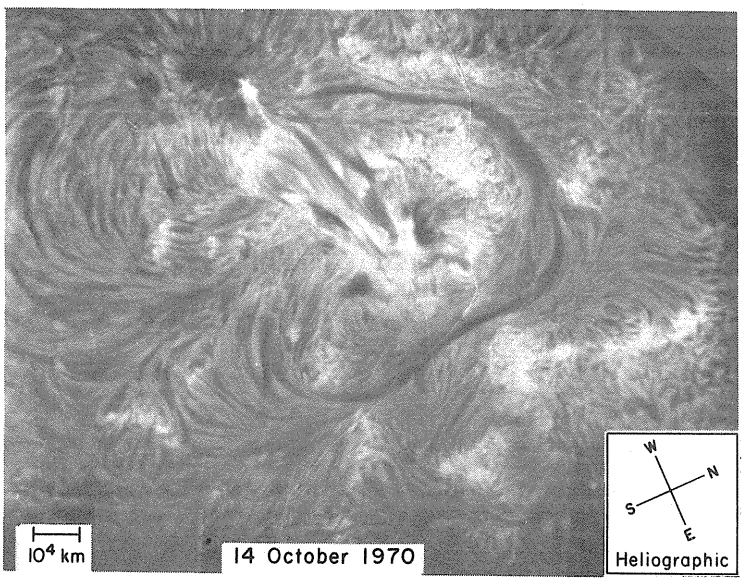

Fig. 2. Inference of the radial-component neutral line in young active regions depends on identifying arch-filament systems (spanning between sunspots upper left to center) and an "iron-filing" pattern of fibrils adjacent to the region (left). The semicircular filament fills a narrow plage corridor and is said to be embedded in the plage. Filtergram obtained with Sacramento Peak Vacuum Tower Telescope at 50-cm aperture.

Active regions are depicted as they appeared at the time of their greatest development. Sunspots are shown only if they were visible in the photographs taken in the center of the H-alpha line. The scale of these synoptic charts is not large enough for detailed mapping of the complex form of neutral lines within active regions, and it is better to use daily, rather than 27-day, charts for active region studies. Here the bright active-region plages are depicted schematically by dense areas of stipple, with the density roughly proportional to brightness. Their inclusion in the H-alpha synoptic chart serves to permit study of associations between large-scale structures and the time, place and magnitude of active regions.

Polarity Inference. Plus and minus polarities are assigned by identifying leader sunspots and leading-polarity plage in simple, isolated bipolar plage regions. In Solar Cycle 20, the leading portion of active centers in the Northern Hemisphere was minus (south, inward-directed) polarity and plus (north, outward-directed) in the Southern Hemisphere. Leader sunspots are typically the largest spots in the region, lie at the western end of the group, and are symmetric and long-lived. After assigning polarities to leader spots and plage, polarities are alternated with each inferred radial neutral line. The alternations should occur such that proceeding from one leader spot to another should give the same leading polarity. If an apparently normal bipolar group should receive an assignment of reversed polarities by alternating polarities from an adjacent region, it is likely that an error or omission has occurred in the number of neutral lines inferred. (True reversed polarity regions do occur, but rarely.) Polarity assignment forms an additional check on the accuracy of inferred magnetic patterns.

Inference of magnetic polarities becomes much easier once a series of synoptic charts has been established, for then the persistence of most of the neutral lines from one solar rotation to the next permits carryover of the associated polarities regardless of the presence of active regions. Most active regions form on, or near, a long-lived neutral line that has an established polarity arrangement, providing a ready means of assigning polarities to the new region.

The first and last years in the period of this atlas occurred near times of solar minimum when active regions from the preceding and following solar cycles were present concurrent with Solar Cycle 20 regions. Active regions from those overlapping cycles had polarity arrangements opposite to those in Solar Cycle 20. They can be distinguished in most cases by a distinct difference in solar latitude. Regions of a "new" solar cycle normally occur in the latitude range 25-40°, while the concurrent regions of the "old" cycle occur near the solar equator.

The low level of solar activity during the first 2 years of this solar cycle left large areas of the sun void of structures for inferring magnetic patterns, especially in the sun's Southern Hemisphere. Polarities were assigned only if the structures were clearly associated with an active region or could

be identified as a persistent feature. Polarities are uncertain beyond about 15 heliographic degrees from neutral lines adjacent to large areas void of H-alpha structures. The areas of shading in the small-scale charts have boundaries parallel to the chart coordinate grid where the shading extends toward an area of unknown polarity (see rotations 1488-1511). Mt. Wilson magnetograms provided little assistance for completing the magnetic patterns because they were incomplete and of low sensitivity during this period.

Estimated Neutral Lines. A critical and time-consuming stage of the synoptic mapping is the inference of estimated neutral lines that interconnect the distinct neutral lines. This inference is best accomplished after polarities have been assigned wherever possible. The pattern of the polarities will suggest that many of the isolated lines can be connected. In most cases, the re-examination of the H-alpha photographs in the areas of inferred connections revealed subtle structures overlooked in the initial mapping, and provided confirmation of the connection and an accurate position for the neutral line.

A large number of the estimated neutral lines are added after careful study of a time series of synoptic charts preceding and following the chart in question. Continuity of large-scale magnetic features is apparent in any sequence of charts in the atlas, and so it was apparent after the first charts were constructed that the charts themselves were a tool for inferring neutral lines where none had been observed before. Estimated neutral lines were added if there had been a distinct line in its position on earlier charts, and especially if a distinct line formed in its position on a subsequent chart. Only charts for earlier solar rotations were available during the initial work on a chart; therefore, no chart was considered to be in its final form until at least one subsequent chart had been completed and compared with it. For this reason, the initial and final charts in this atlas may undergo further revisions if charts are made for rotations earlier and later than the period of this atlas.

Some estimated neutral lines were added without confidence that the connection or the position of the line was correct. Choices were rather subjective, and based on continuity and upon creating patterns that appeared "typical" for their environments.

It can be seen from the above discussion that the methods for compiling H-alpha synoptic charts require some experience in interpreting solar images as well as care in making measurements. This work testifies that the human mind and senses still perform some perceptual and analytical functions better than present automated systems. Only the first of the five stages of chart construction can be performed with computer assistance and without extensive experience. The remaining four mapping stages require recognition of complex patterns, familiarity with the great variety of forms each neutral-line structure can possess, and experience in dealing with the evolution of these features. Even with careful instruction, each cartographer worked for at least 3 months before successfully completing all five stages of mapping. Temperament, discipline and integrity were important aspects of mapping ability. None of the mapping staff had an understanding of solar physics or the discipline of professional scientific training, so the author performed the final editing and quality control.

Descriptive Notes

The descriptive notes accompanying each synoptic chart compensate for the compromise that 27-day charts must make in depicting a dynamic sun. The charts include filaments and active regions no matter where they formed on the visible solar disk and with no indication of how long they were visible. The notes document the dates of formation, disappearance and significant evolution of these features. The times of changes are limited by the use of once-daily photographs, except for dates when there were images at different times from more than one observatory. The notes are listed in decreasing order of solar longitude, which is approximately the order of increasing time. The coordinates are for the centers of the features.

The maximum development of active regions is signified by the classification of their associated sunspot groups, using the revised Zurich classification system [*SGD*, 1972]. Small and short-lived active regions are not described unless their evolution is unusual. Daily Boulder sunspot drawings were reviewed for information on the active region evolutions and sunspot classifications.

Solar flares and limb events are mentioned only if outstanding or if the event happened to be recorded on the daily photograph used for the solar mapping. No attempt was made to be comprehensive. Proton-producing flares are frequently mentioned since the author has published a number of descriptive studies of their associated sunspot groups. This atlas would be more useful had there been a complete review of daily prominence exposures, both for use in inferring neutral lines and for commentary on limb activity. Such a review was not possible with the available resources.

These notes also serve as a forum for recording structures and evolutions that were unusual from the author's perspective, and for speculating on interrelationships among various patterns and events. It is particularly appropriate that this atlas include such commentary, since the tedious process of compiling these charts involved so thorough a review of every feature on the sun for a 10-year period. Much of what is recorded in these notes has not been recorded before. Many things were noticed that

appeared to be related either spatially or temporally to another structure or event. Some comments occur repeatedly and, therefore, suggest some truth to the speculated associations. The discussion that follows includes several examples of frequently occurring notes.

Active region evolution includes spot motions and the merging of spot groups that form closely in time and position. We have noted these important aspects and how they led to the development of the configurations that distinguished outstanding active regions. Many aspects are noted as unusual, or extreme, examples of region evolutions. We have not presented numerical evidence for the degree of departure from normal.

Other comments hint at physical associations between active regions and nearby filaments and between widely separated filaments. Such large-scale associations suggest that specific, small-scale events may be part of a larger-scale evolution, and that large-scale processes should be examined for the source of energy release in such events.

A frequent comment records the association of disappearing filaments with the birth and/or growth of nearby active regions, a relationship that has been often noted before. A new causal agent for disappearing filaments is suggested by filament disappearances occurring between large-scale patterns prior to the merger of those patterns. Large-scale convergence may force major adjustments in large-scale solar magnetic fields. Such convergence is readily apparent by study of the time sequences of shaded synoptic charts.

Some comments record the sense of twist in vortical fine structure or relative sunspot motions, and carefully note the association of solar hemisphere with the sense of twist. These notes confirm the statistics of Hale [1927] and Richardson [1941] that most active regions with vortical development have clockwise motions in the Southern Hemisphere and counterclockwise motions in the north. The observations point to large-scale processes influencing fine structure and evolution within active regions.

One of the most significant observations to come from this atlas is apparent variability of solar rotation with time and longitude, confirming early impressions of the motions of large-scale neutral-line patterns [McIntosh, 1972b]. These variations are surely the superposition of a pattern of global solar circulation upon the mean differential solar rotation (variation of rotation rate with latitude). The notes mention specific anomalous "rotation rates" of active regions and associated large-scale neutral lines, and suggest that the active regions shared the rate of motion of their associated large-scale patterns. Such evidence conflicts with the prevailing idea that the large-scale magnetic fields are but the remnants of active-region fields that have been scattered by random-walk diffusion. It is hoped that these notes will stimulate a fresh examination of relationships between active regions and large-scale solar magnetism.

Reliability

The reliability of these charts as magnetic patterns has been challenged because of connotations attending the word *inferred*. There should be little reason to suspect the veracity of the distinct neutral lines inferred from structures with long-established relationships to solar magnetic fields. The repeated mapping of details from sequences of daily photographs provided confirmation of positions and verification of true neutral-line structures as separate from transient, filament-like features. The methods for inferring polarities provided a thorough system of checks and balances on polarity accuracy.

Significant confirmation of the reliability of H-alpha-inferred neutral lines came from comparisons between these data and the X-ray coronal structure observed from Skylab [McIntosh, et al., 1976]. The fit between neutral lines and arcades of X-ray arches (which appear to outline three-dimensional magnetic fields) is so detailed that it should be possible to infer three-dimensional coronal arcades from the H-alpha observations. This study confirmed the interpretation of H-alpha patterns as coronal structures that resulted from studies of interplanetary phenomena [Roelof and Krimigis, 1973].

All H-alpha synoptic charts were compared with synoptic charts of measured photospheric magnetic fields provided by the Mt. Wilson Observatory. The detailed agreement between the H-alpha neutral lines and magnetograms in Figures 3 and 4 is typical of the agreement found throughout the atlas. Daily, full-disk magnetograms were used when questions arose concerning activity near the solar limbs, since the synoptic magnetic maps use central-meridian measurements whenever possible. The use of the magnetic field maps hastened analysis of the polarity situations during the initial stage of constructing the H-alpha charts. The measured data were especially useful within complex active centers and in areas of extensive dashed-line neutral lines.

The sensitivity of the magnetograms was normally insufficient to give data in just those areas that were void of H-alpha structures, as if the lack of chromospheric organization were directly related to the very low strength of the magnetic fields. There were some areas, however, where a distinct filament channel could be observed in an area without appreciable signal on the Mt. Wilson magnetograms. These instances probably reflect the inability of the magnetograph to record the transverse magnetic-field component that is most likely responsible for the patterns of fibrils making up the filament channel.

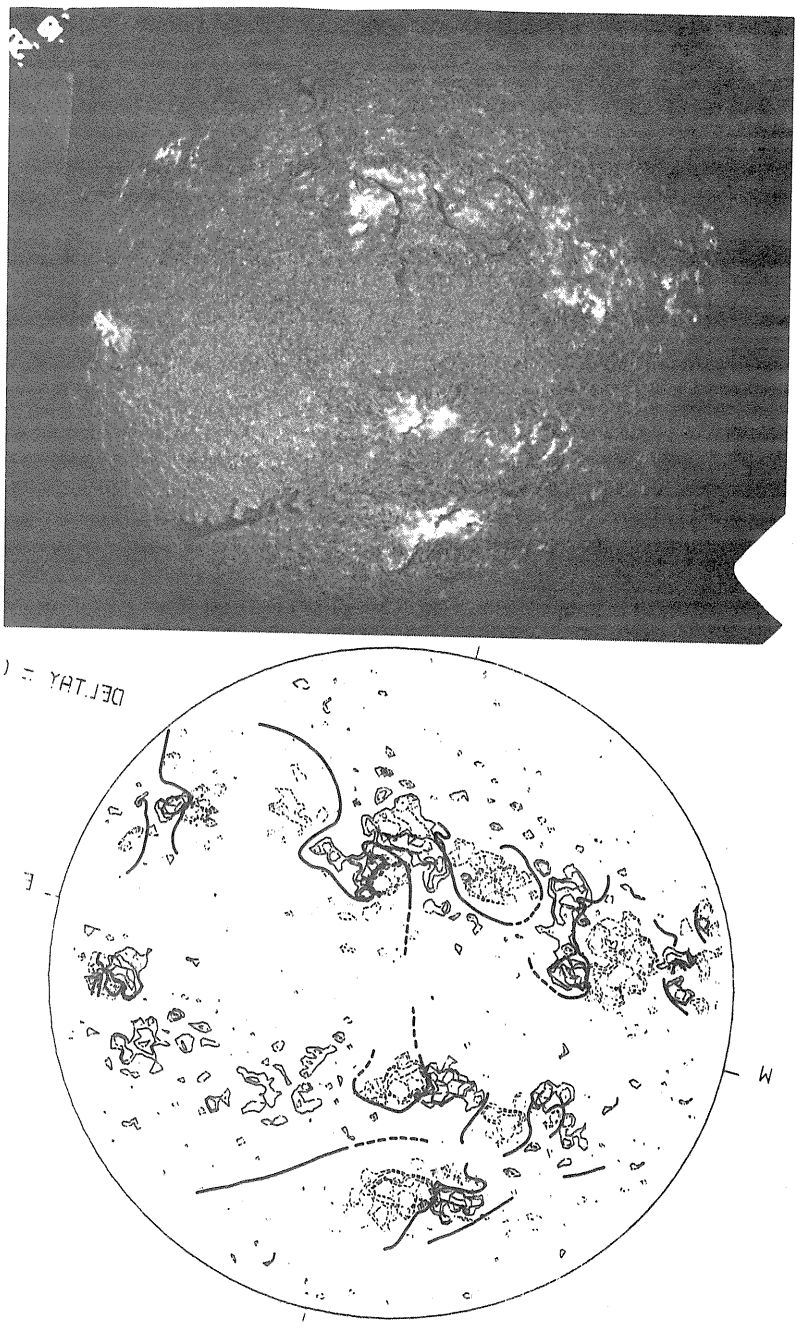

Fig. 3. Above: H-alpha filtergram for 4 June 1968 at 1359 UT from the NOAA solar observatory, Space Environment Services Center, Boulder, Colorado. Below: A low-resolution magnetogram from Mt. Wilson Observatory for the same date superposed with inferred lines of polarity reversal derived from the filtergram. Contours of positive polarity are solid lines and contours of negative polarity are broken lines [from McIntosh, 1972a].

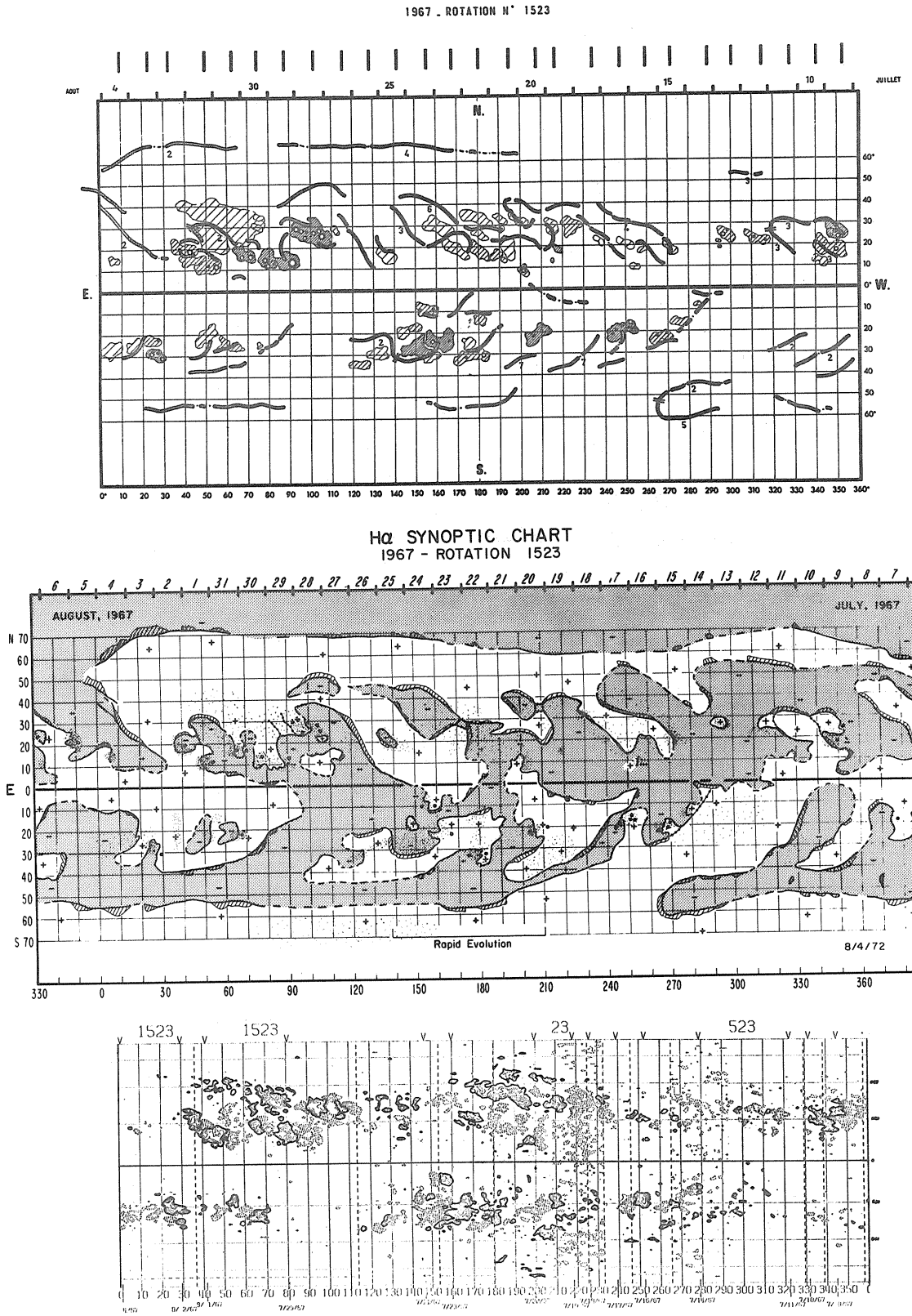

Figure 4. Comparison of an H-alpha synoptic chart with Carte Synoptique (top) from the Meudon Observatory and with a Mt. Wilson synoptic chart of photospheric fields (bottom) for the same solar rotation.

The thorough intercomparison of H-alpha and magnetic charts revealed examples of measured data that were in error or excessively noisy. The limitation to measuring only the line-of-sight component of the magnetic field gave neutral-line patterns in regions near the solar limb that were inconsistent with the inferred patterns, and inconsistent with the measured patterns at disk center for the same active areas. Especially complex active regions occasionally were measured with a pattern inconsistent with the inferences, probably reflecting the presence of significant transverse field components in such regions. Other magnetogram errors appeared as errors in data processing, such as shifts in positions of features or reversal of polarities from measurements made on adjacent daily magnetograms. This intercomparison confirmed that most of the discrepancies between measured and inferred magnetic fields can be resolved in favor of the inferred data [McIntosh, 1972a].

Maps of photospheric neutral lines have been derived recently from solar mean field measurements at Stanford University. Comparisons of these maps with preliminary and incomplete H-alpha synoptic charts was very favorable, especially in areas containing distinct neutral lines (mapped from conspicuous structures) [Duvall et al., 1977]. Dashed lines were erroneous in position in about half the cases, but the interconnections they represented were almost always correct. Inasmuch as the Stanford measurements correlate closely with interplanetary sector structure [Scherrer et al., 1972], we anticipate that this atlas of neutral-line charts will offer a fresh perspective for the study of the solar origin of interplanetary magnetic sectors.

Further evidence that the methods for adding dashed lines are valid was provided by Nolte and Roelof [1977]. Their correlation between H-alpha-inferred and interplanetary polarities was divided between definite H-alpha polarities (defined by solid lines on the charts) and estimated polarities (defined by dashed lines). There was no significant difference in the correlation coefficients from the two data sets. The degree of the correlations is at least as good as those derived from use of solar magnetogram polarities [McIntosh and Roelof, 1972].

Uses for H-alpha Synoptic Charts

We conclude this text with a brief summary of uses for H-alpha synoptic charts in solar-terrestrial research and services. The following qualities give the charts special value in these applications:

1) high-resolution of boundaries to large-scale magnetic patterns

2) accurate delineation of neutral lines in areas of weak magnetic fields

3) correlation of neutral lines with arcades of magnetic arches in the low corona [McIntosh et al., 1976]

4) correlation of H-alpha-inferred polarities with both the solar mean field and the interplanetary magnetic field [Duvall et al., 1977; Nolte and Roelof, 1977; Roelof, 1974]

5) correlation of "gaps" in the polar-crown neutral lines with high-latitude coronal holes [McIntosh, 1976]

6) uniform quality and complete coverage for an entire solar cycle, including nearly all the Space Age

7) potential for inferring solar photospheric magnetic fields, solar coronal magnetic fields, and interplanetary magnetic fields from H-alpha photographs back to the beginning of the century

8) ability to obtain these charts in "real-time" for use in solar-terrestrial monitoring and predictions

9) availability of H-alpha observations to institutions without budgets for solar magnetographs.

The foremost motivation for producing this atlas was the desire to understand the morphology and dynamics of the large-scale magnetic patterns so clearly seen in the early synoptic charts. The series of shaded synoptic charts is worth prolonged study to appreciate the relative movements, mergers, divisions and expansions of individual, long-lived features. These movements will be analyzed as rates of solar rotation as functions of latitude, longitude and time to give a detailed history of large-scale solar circulation through a complete solar cycle. This information will be examined for correlations with the rise and fall of sunspot activity, for reasons differences exist in solar activity levels between Northern and Southern Hemispheres, and for clues to the nature of the polar polarity reversal that occurs about 2 years after solar cycle maximum. The relationships between centers of flare activity and these large, long-lived patterns are of particular interest to NOAA's Space Environment Services Center, as they may provide the first capability for long-range solar activity predictions. There is a strong sense of order among these large-scale evolutions, promising predictability and the development of the first empirical, dynamic model of the solar cycle.

We have already alluded to the successful correlations between portions of this atlas and the measurements of interplanetary magnetic fields. Analysis of the complete atlas should provide

fundamental insights into the origin and evolution of the sector patterns in the interplanetary fields, and from this understanding will come improved predictions of the several geophysical responses to the sector boundaries passing by the earth. This understanding will stem from analysis of specific physical structures that appear to be the sector boundaries on the solar surface, a significant advance over previous studies that were statistical in nature.

Support to produce this atlas came as a result of successful use of early synoptic charts in investigations of the solar sources of energetic particles, interplanetary magnetic fields and solar wind [e.g., Roelof and Krimigis, 1973; Nolte, 1974; Roelof, 1974; Krieger et al., 1975; Roelof et al., 1975; and Nolte and Roelof, 1977]. These investigations established that all these parameters are strongly controlled by the coronal structures that conform to the large-scale patterns of neutral lines. This atlas, and the preliminary synoptic charts now appearing regularly in *Solar-Geophysical Data*, will provide a means for examining solar particle behavior over an entire cycle and possibly will lead to new interpretations of many of the important past particle events.

The H-alpha synoptic charts have proven useful in studies of the nature of filaments and the significance of filament disappearances [Serios et al., 1978; Webb et al., 1978]. Entries in the descriptive notes suggest that the relative motions of adjacent, large-scale magnetic patterns have an influence on the formation and eruption of filaments.

The ease with which these charts can be made in "real-time" with patrol photographs that are readily available enables the regular publication of preliminary H-alpha synoptic charts in the weekly *Preliminary Report and Forecast of Solar-Geophysical Activity* and in the more definitive monthly *Solar-Geophysical Data*, both produced by NOAA. The initial "quick-look" versions are generated for daily use in the Space Environment Services Center. They are used in combination with solar mean field data from Stanford University, coronal hole data from Kitt Peak National Observatory and geomagnetic indices from the USGS magnetic observatory at Fredericksburg, Virginia, to make long-range forecasts of geomagnetic activity and to serve as a record of all active regions. The forecasting operation anticipates use of the charts in future numerical prediction methods involving daily analysis of the large-scale dynamics of solar magnetic patterns.

Future Solar Mapping

Whether H-alpha synoptic charts are made in the future depends on the continuation of H-alpha full-disk patrols. At the time of this writing there is serious doubt about their continuation. These observations have been increasingly ignored because they have suffered under the misnomer of "flare patrols," implying simply a detector of flare events. This atlas is evidence of the rich material on active and inactive fine structures contained in these patrol films. While these fine structures are better recorded in the high-magnification images from the larger telescopes, the mapping of their coordinates must be done from full-disk patrol images. The mapping of complete magnetic patterns, and the use of such maps for daily solar-terrestrial services, depends on the constant availability of observations only a global network of observatories can provide.

The adoption of improved, fine-grain films sensitized for H-alpha marked the beginning of a new era in H-alpha patrols in 1965, permitting the routine recording of the fine structure of filament channels and active regions upon which H-alpha synoptic charts depend. Films and measuring methods have continued to improve, yet decreasing interest has allowed these patrols to remain at the quality achieved 15 years ago. Inferred magnetic patterns could be measured with a precision greatly exceeding the material in this atlas. Daily positions of neutral-line features with high precision could reveal a host of dynamic phenomena of importance to solar physics. Current synoptic charts are produced with a simple computer digitizer and plotter. High-resolution mapping of solar magnetic patterns will require more sophisticated equipment, with measurements directly from films instead of photographic prints, as in the present system. Improvements in the quality of the full-disk H-alpha patrol films would enhance their use as an economical means of monitoring the sources of interplanetary and terrestrial disturbances.

A part-time effort has begun at NOAA to digitize this atlas so that intensive analysis can be performed by computers. It is intended that these data files will be available to everyone through the services of the NOAA World Data Center A for Solar-Terrestrial Physics.

Acknowledgments

Dr. E.C. Roelof of the Applied Physics Laboratory of Johns Hopkins University was the first to share my recognition of the many uses for H-alpha synoptic charts, and his unflagging dedication to this project in terms of financial and personnel assistance made it possible to undertake this large task. Drs. M.A. Shea and D.F. Smart of the Air Force Geophysics Laboratory expressed great trust and faith through repeated contract renewals in spite of seeing only portions of finished work.

The process of tediously transferring photographic detail into synoptic charts was borne by a dedicated staff consisting of: Janice E. Leighton (JEL), Sharon L. Osborne (SLO), Susan C. Wayland (SCW) and Susan A. Andrews (SAA), with additional help from Anna Marie Robb (AMR), Philip Townsend (PVBT), Robert E. Gold (REG) and William Van Orman (WVO). Dr. Jerome T. Nolte (JTN) did the major part of the mapping for the first 12 solar rotations as part of his Ph.D. thesis. The initials following each of the preceding names are those that appear in the lower-right corner of each chart. Some of the descriptive notes were contributed by J.T. Nolte, Ann Hardgrove, William Flowers, and Susan Wayland.

Mrs. Leighton and Mrs. Wayland were invaluable for maintaining the project organization, performing initial training for some of the other cartographers and writing progress reports. Mrs. Leighton also produced the preliminary "real-time" synoptic charts for the NOAA Space Environment Services Center during 1975-1976. These assists beyond the duties of solar mapping made it possible for me to carry on my responsibilities to the Space Environment Laboratory and concentrate on management and editing aspects of the mapping project.

My wife, Judy, contributed patience and moral support and even some detail on some of the synoptic charts! I am grateful for her understanding and for sharing in the excitement of discovery.

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Dean Eicher of the U.S. Department of Commerce drafting department in Boulder, Karen D. Runkles of The Johns Hopkins University and Janet Varney of the University of New Hampshire demonstrated unusual dedication and skill in transforming the original synoptic charts into their final forms. Their contributions exceeded the requirements of their assignments.

This atlas is derived from the extensive collection of daily H-alpha photographs acquired by the NOAA Space Environment Services Center (formerly Space Disturbance Forecast Center of ESSA) since 1965. Images from 1964 through 1969 came from the Sacramento Peak Observatory (U.S. Air Force Geophysics Laboratory) at Sunspot, New Mexico; 1967 to the present from the NOAA observatory in Boulder and 1970 to 1974 from the U.S. Air Force solar observatory at Ramey Air Force Base, Puerto Rico.

Dr. Robert Howard of the Hale Observatories kindly provided synoptic magnetograms from Mt. Wilson Observatory prior to their publication. Magnetograms for the period 1964-1966 came from Howard et al. [1967].

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APPENDIX A

Annotated Full Scale Synoptic Charts

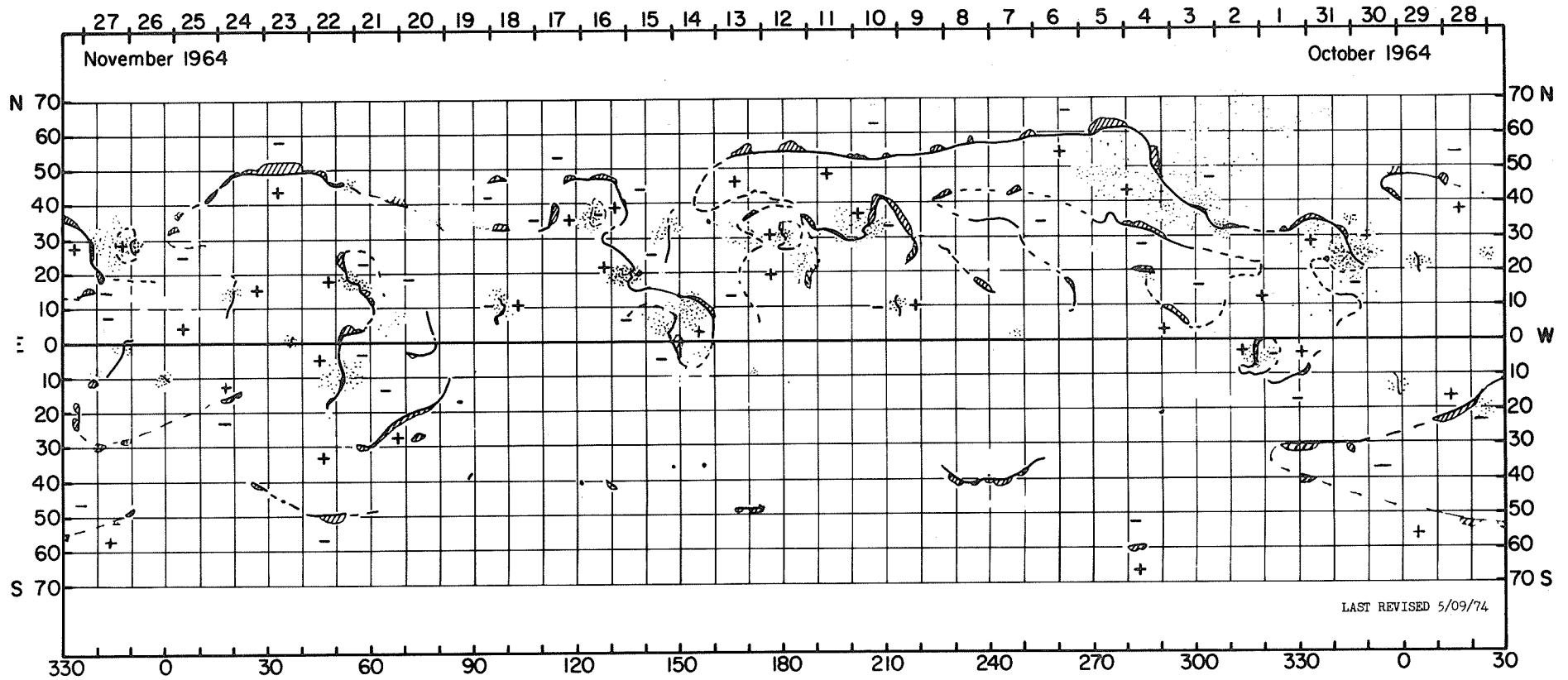
Hα SYNOPTIC CHART
1964 - Rotation 1487

°Long.	°Lat.	Date	Descriptive Notes
25	N25	10/27	Birth of short-lived plage; dissipated on 29 October.
17	S20	10/27	Filament disappeared. It gradually re-formed and became visible as a prominence by 4 November.
5	N20	10/30	Birth of faint plage, with spot group visible for 1 day.
345	N34	11/3	Birth of bipolar plage with spot group visible only this day.
335	N34	11/5	Large filament developed near west limb.
318	S06	10/31	Birth of bipolar plage with spot group.
295	N07	11/2	Filament disappeared.
285	N32	11/4	Filament disappeared.
	N18	11/7	Birth of bipolar plage 31 October. Small filament formed this day only.
240	S40	11/9-10	Filament disappeared.
215	N09	11/14	Birth of bipolar plage with spot group.
206	N37	11/14	Filament disappeared.
205	N34	11/4	Birth of bipolar region; spots formed by 7 November.
180	N30	11/12	Birth of bipolar plage with spot group.
150	S05	11/9-10	Filament disappeared.
135	N20	11/15	Birth of bipolar plage; formed type C spot group. Most important active center of this rotation.
125	N37	11/19	Birth of bipolar plage with spot group.
70	S20	11/18	Filament disappeared.
52	N23	11/22	Filament disappeared.
51	S10	11/21	Filament disappeared.
37	Equator	11/23	Birth of small bipolar plage.
35	N50	11/21	Filament disappeared.
20	N17	11/28	Birth of bipolar plage with spot group.

Note: Days without H-alpha photographs were 13, 18, and 29 October and 9, 11, 18, and 26 November 1964

Hα SYNOPTIC CHART

1964- ROTATION 1487

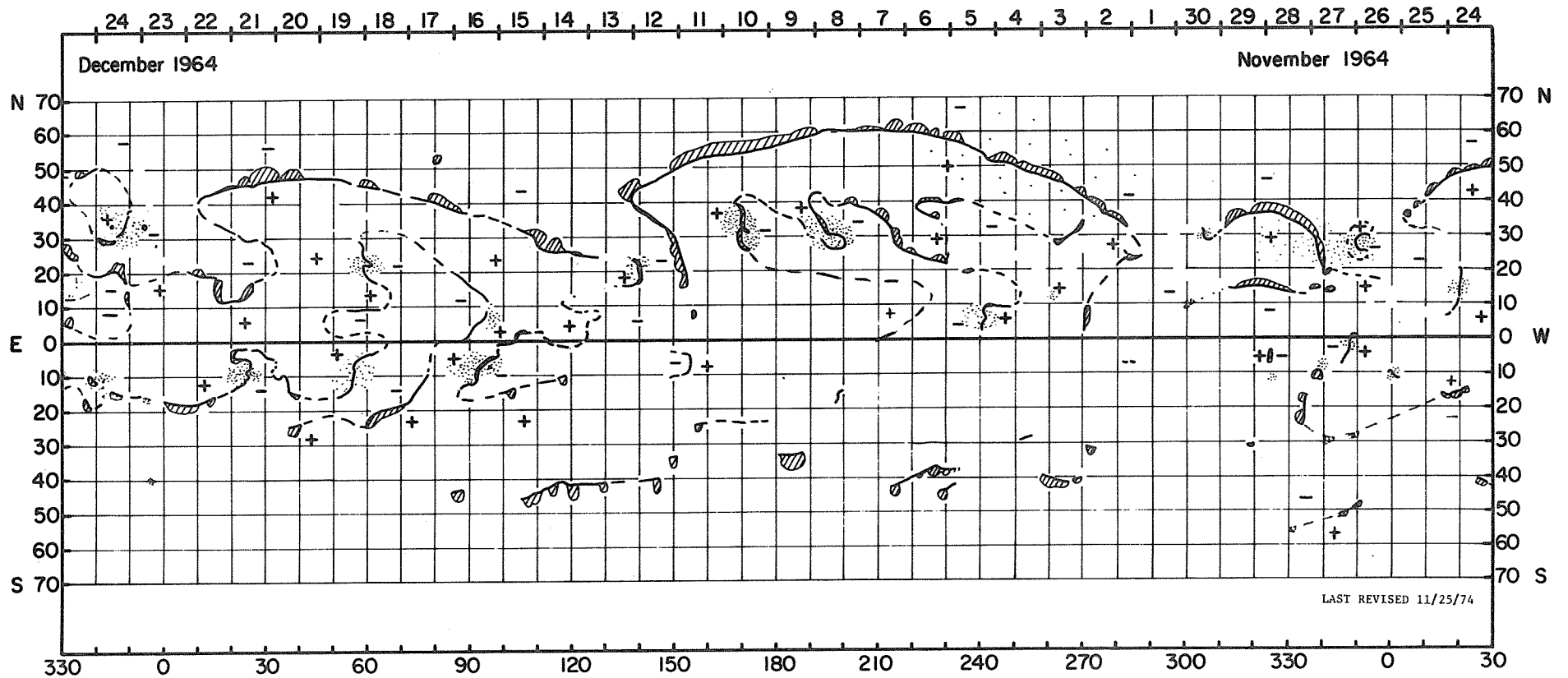


Hα SYNOPTIC CHART
1964 - Rotation 1488

°Long.	°Lat.	Date	Descriptive Notes
351	N27	11/24	Birth of bipolar region with spot group; additional growth on 1 December.
305	N30	11/29	Birth of small plage; gone by 1 December.
140	N22	12/13	Birth of bipolar region.
110	S42	12/16	Filament disappeared.
97	N07	12/19	Birth of bipolar region.
58	N23	12/15	New growth in small, old active region.
22	S10	12/14-15	Bipolar region probably born near east limb.
15	N15	12/18	Filament disappeared.

Note: Days without H-alpha photographs were 26 November and 2-5, 8, 16, 18 and 22 December 1964.

Hα SYNOPTIC CHART
1964 – ROTATION 1488

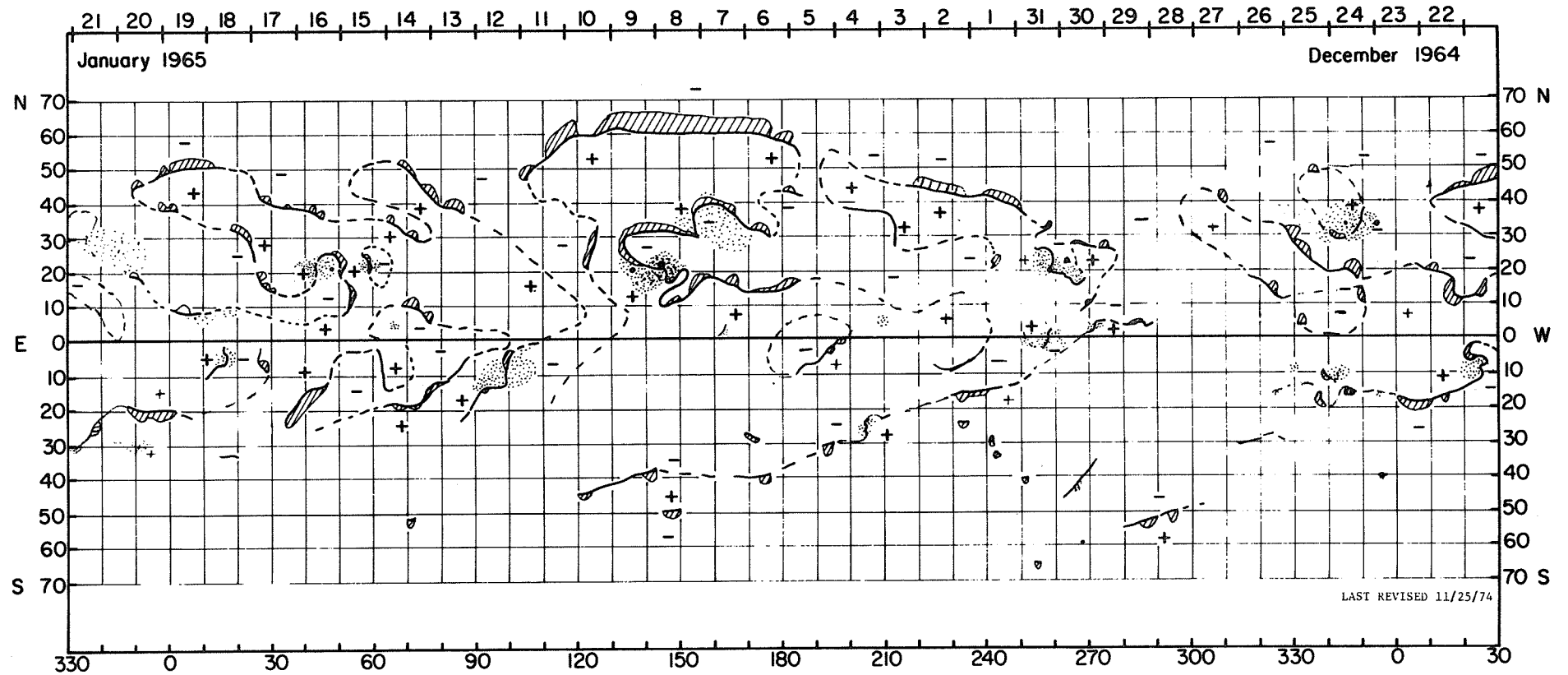


Hα SYNOPTIC CHART
1964-1965 - Rotation 1489

°Long.	°Lat.	Date	Descriptive Notes
340	S10	12/19	Birth of active region.
271	N02	12/28	Birth of bipolar region.
260	N22	12/28	Birth of bipolar region with spot group; additional growth on 31 December.
255	S01	12/26	Probable date of birth of bipolar region with spot group.
245	N40	1/3	Filament appeared only on this day.
225	N45	12/29	Filament disappeared.
210	N05	1/3	Birth of short-lived, faint plage.
205	S27	1/5	Birth of bipolar region with spot group visible for 1 day.
178	N14	1/10	First appearance of filament.
162	N03	1/9	Only appearance of small bipolar region with bright plage.
135	N28	1/5	Filament disappeared; re-formed by 8 January.
125	N25	1/8	Filament faintly appeared, completely visible by 9 January, and possibly disappeared at west limb 14-15 January.
45	N20	1/13	Birth of bipolar region with spot group; additional growth on 17 January.
40	S15	1/14	Filament disappeared.
20	S04	1/18	Mt. Wilson magnetogram noise level approximately same as the strength of this plage.
18	N16	1/17	Birth of small, short-lived, bipolar region.
16	S04	1/16	Birth of bipolar region.
10	N16	1/17	Birth of small, short-lived, bipolar region.

Note: Days without H-alpha photographs were 22, 25, 27 and 31 December 1964 and 1, 6-7, 12, 14 and 20 January 1965.

Hα SYNOPTIC CHART
1964, 1965 - ROTATION 1489

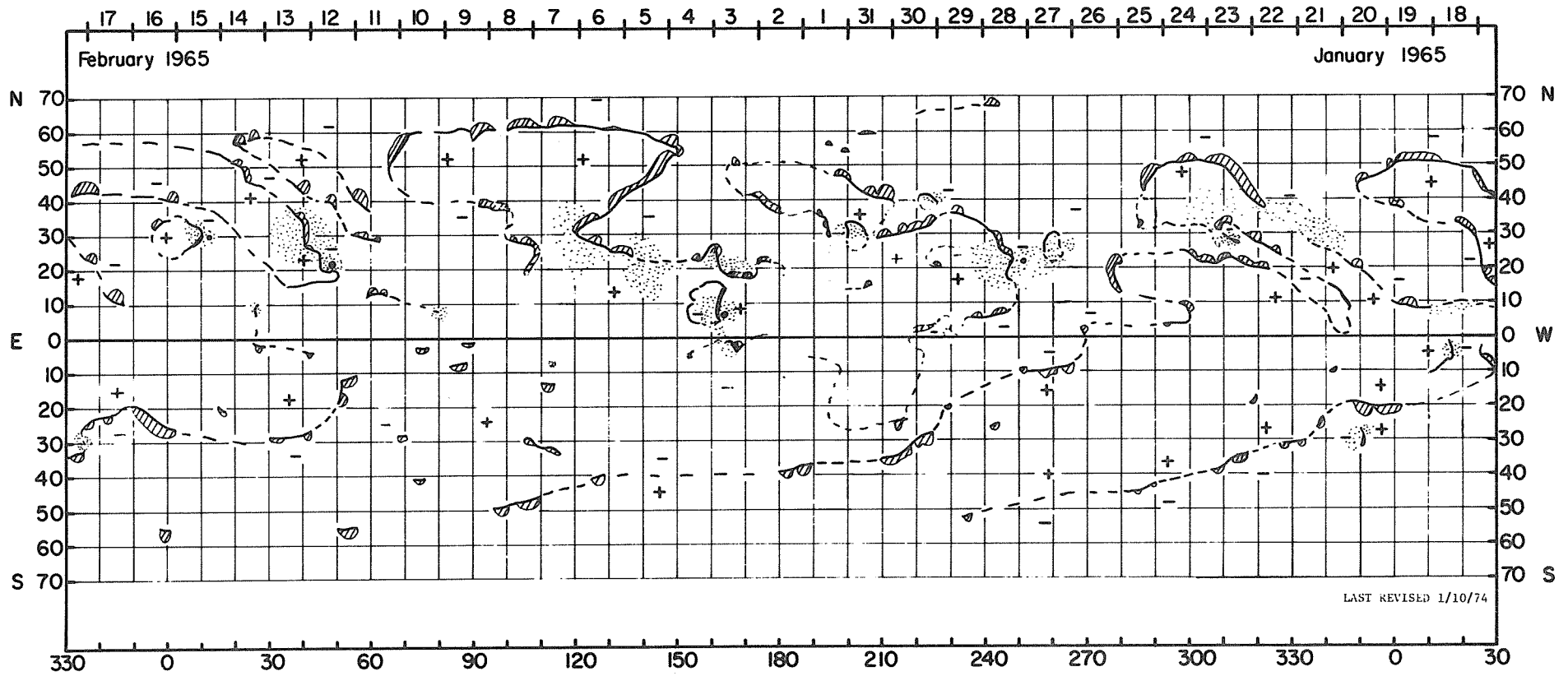


Hα SYNOPTIC CHART
1965 - Rotation 1490

°Long.	°Lat.	Date	Descriptive Notes
355	S20	1/17	Filament disappeared.
350	S30	1/23-24	Birth of bipolar region.
314	S35	1/25	Small filament disappeared.
311	N29	1/18	Birth of bipolar region with spot group; additional growth on 26 January.
280	N20	1/22-27	Variable filament; disappeared on 27 January.
264	S08	1/29	Small filament disappeared.
202	N31	1/27	Birth of bipolar region with spot group.
175	N41	1/28	This filament appeared only on this day at east limb.
162	N07	2/5	Two-ribbon proton flare followed disappearance of filament within small, declining spot groups; one of last active regions of Solar Cycle 19.
160	N22	2/6	Birth of small bipolar region with spot group.
105	N25	2/4	Filament disappeared.
78	N08	2/12	Birth of bipolar region with spot group.

Note: Days without H-alpha photographs were 23 January and 1, 7-10 and 15 February 1965.

Hα SYNOPTIC CHART
1965 – ROTATION 1490



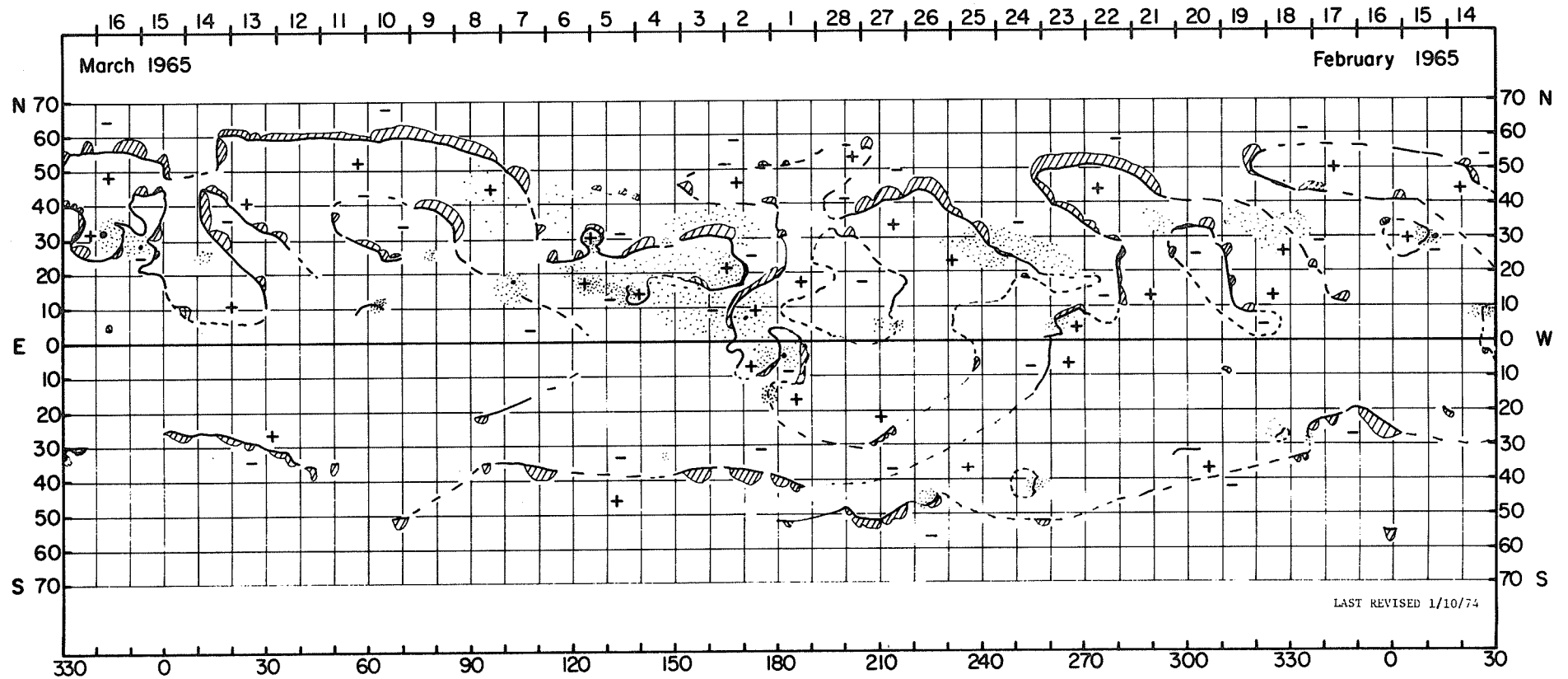
Hα SYNOPTIC CHART
1965 - ROTATION 1491

°Long.	°Lat.	Date	Descriptive Notes
355	S25	2/17	Most of filament disappeared.
335	S27	2/19	Birth of bipolar region
327	S27	2/19	Birth of bipolar region.
265	N08	2/20	Filament started to appear, became completely visible by 21 February, and disappeared by 22 February.
	N38	2/21-22	Filament gradually disappeared.
225	N40	2/26	Filament disappeared.
178	S15	2/27	Birth of bipolar region.
135	N13	3/5	Birth of bipolar region with spot group.
125	N30	3/4	Birth of bipolar region with spot group.
60	N10	3/14	Birth of bipolar region.
13	N25	3/13	Birth of bipolar region.
5	N08	3/18	Filament fragment disappeared.

Note: Days without H-alpha photographs were 23 and 26 February and 2-3, 9-11 and 16 March 1965.

Hα SYNOPTIC CHART

1965 – ROTATION 1491



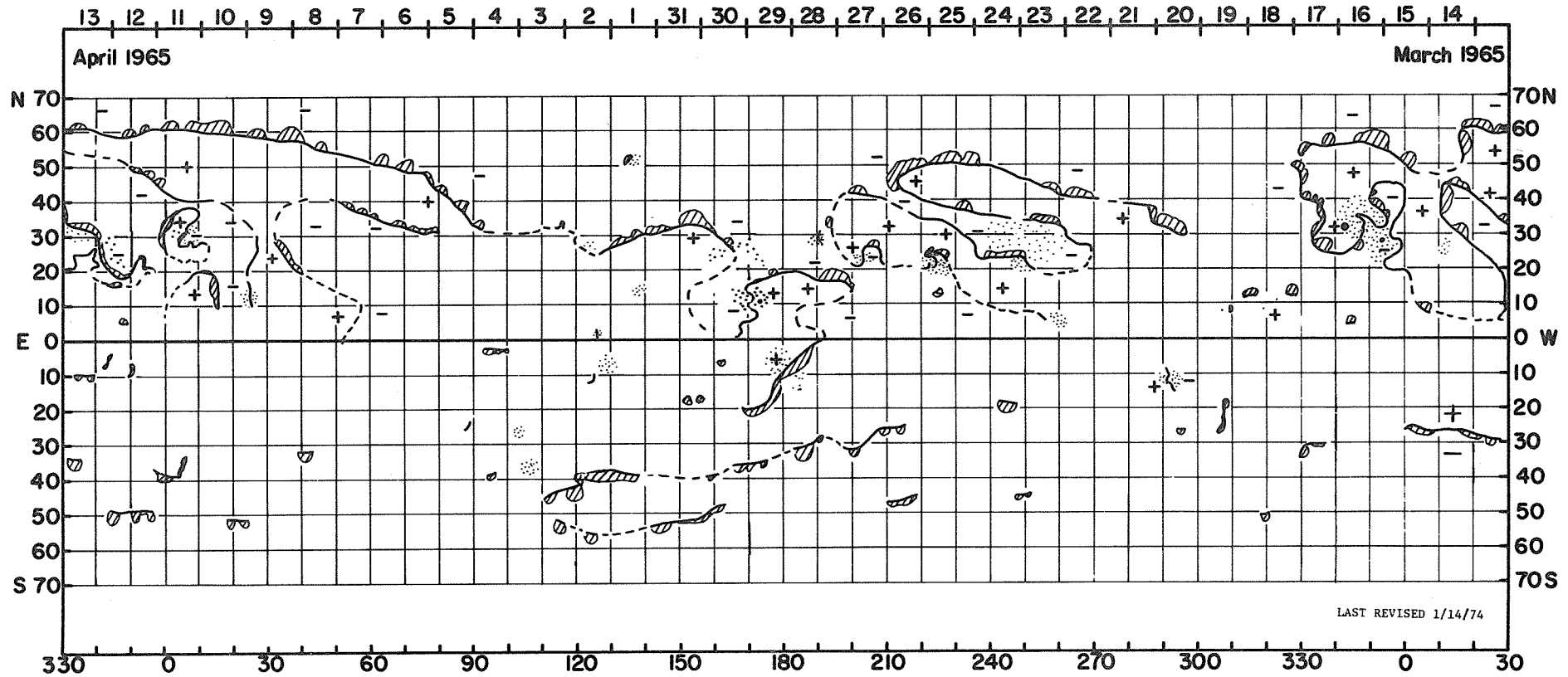
Hα SYNOPTIC CHART

1965 - Rotation 1492

°Long.	°Lat.	Date	Descriptive Notes
350	N26	3/18	New growth of region.
292	S12	3/17	Birth of bipolar region.
270	N40	3/18	Filament disappeared.
262	N06	3/26	Birth of bipolar region.
260	N33	3/18	Filament disappeared.
203	N23	3/25	Birth of bipolar region with small spot.
195	N17	3/27	Filament disappeared.
190	N29	3/27	Birth of bipolar region.
180	S08	3/28	Almost all of filament disappeared; reappeared 31 March.
125	S37	4/1	Filament disappeared.
108	S36	4/6	Birth of bipolar region.
38	N24	4/7-8	Filament disappeared.

Note: Days without H-alpha photographs were 16 March and 7 and 12 April 1965.

Hα SYNOPTIC CHART
1965 — ROTATION 1492

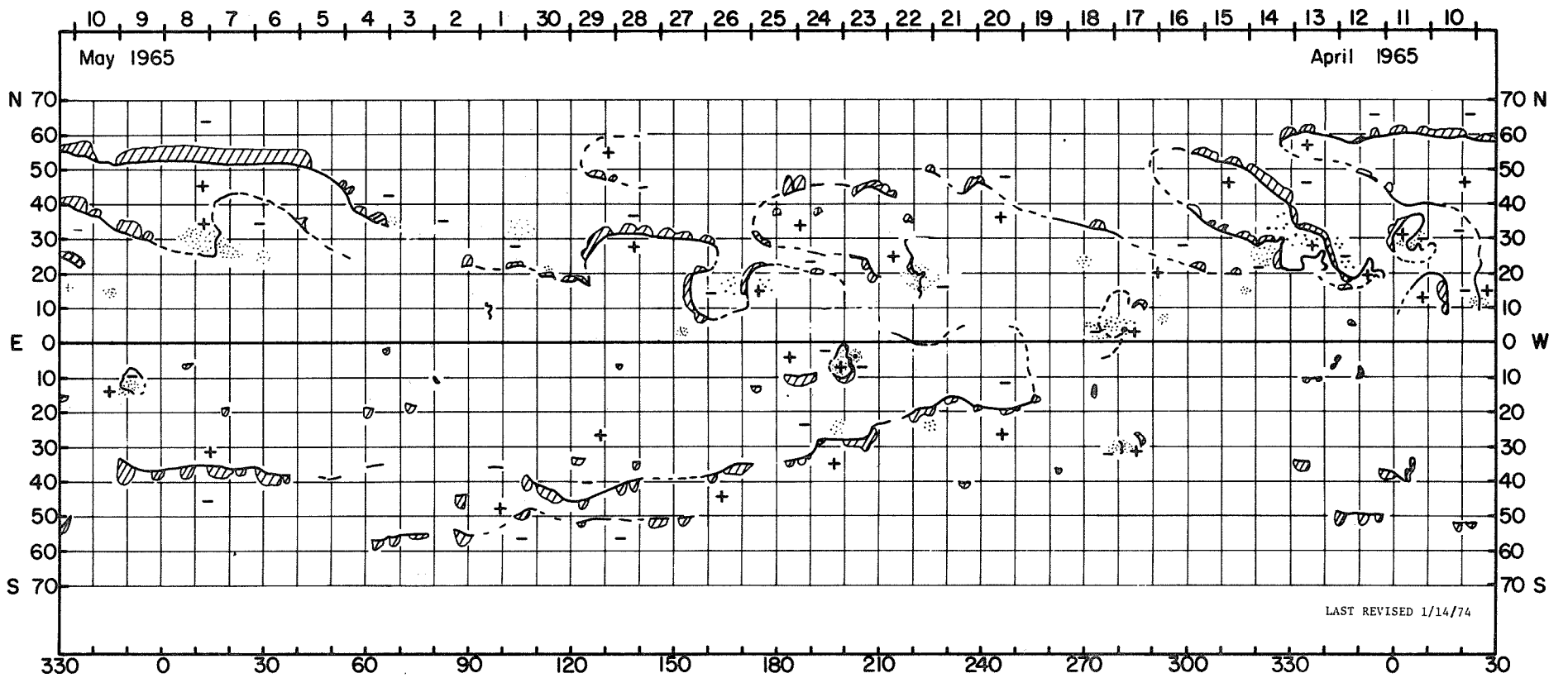


Hα SYNOPTIC CHART
1965 - Rotation 1493

°Long	°Lat.	Date	Descriptive Notes
282	S31	4/13	Birth of bipolar region.
270	N22	4/21	Birth of bipolar region.
240	N47	4/19	Small filament disappeared.
223	S23	4/29	Birth of bipolar region.
220	N16	4/21	Significant region growth.
210	N44	4/22-23	Filament disappeared.
200	S05	4/25	Birth of bipolar region with spot group.
172	N07	4/28	Filament disappeared.
145	N30	4/28-30	Filaments along 40° neutral line gradually disappeared, partially reformed 30 April, and disappeared 3 May.
80	N33	5/2	Birth of bipolar region.
70	N35	5/7	Birth and major growth of bipolar region.
17	N28	5/1	Probably born less than 2 days before east limb passage on 1 May.

Note: Days without H-alpha photographs were 12 and 22 April and 4 May 1965.

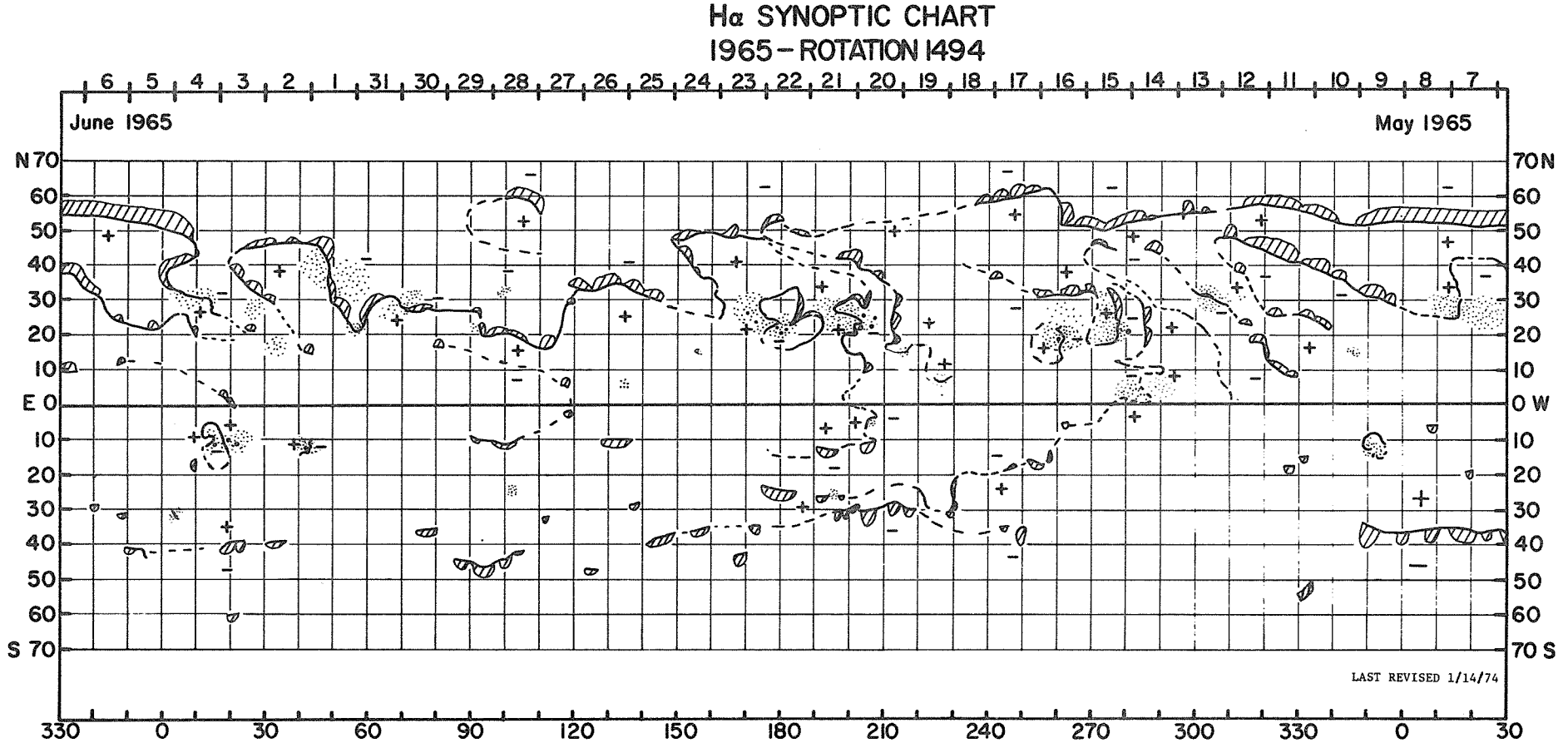
Hα SYNOPTIC CHART
1965- ROTATION 1493



Hα SYNOPTIC CHART
1965 - ROTATION 1494

°Long.	°Lat.	Date	Descriptive Notes
351	S13	5/11	Birth of bipolar region.
347	N13	5/13	Birth of bipolar region.
340	N40	5/9	Filament disappeared.
276	N22	5/15	Major growth of region and spot group.
270	N32	5/15	Filament disappeared.
260	N18	5/17	Birth of bipolar region with spot group.
228	N08	5/19	Birth of bipolar region.
214	N14	5/20	Birth of bipolar region.
210	N21	5/15	Birth of active region near west limb.
202	N23	5/19/23	Conspicuous proper motions among spots in this large class D spot group. Apparent source of major new pattern in large-scale magnetic fields, visible for many subsequent rotations.
161	N41	5/27	Birth of small bipolar region.
135	N07	5/30	Semicircular filament disappeared.
105	S26	6/3	Birth of active region near west limb.
55	N25	5/30	Semicircular filament disappeared.
43	S12	6/2	Birth of bipolar region with spot group.
34	N16	5/28	Birth of weak bipolar region.
28	N27	6/6	Birth of bipolar region.
20	S12	6/1	Birth of bipolar region with complex spot group.
1	S31	6/5	Birth of bipolar region.

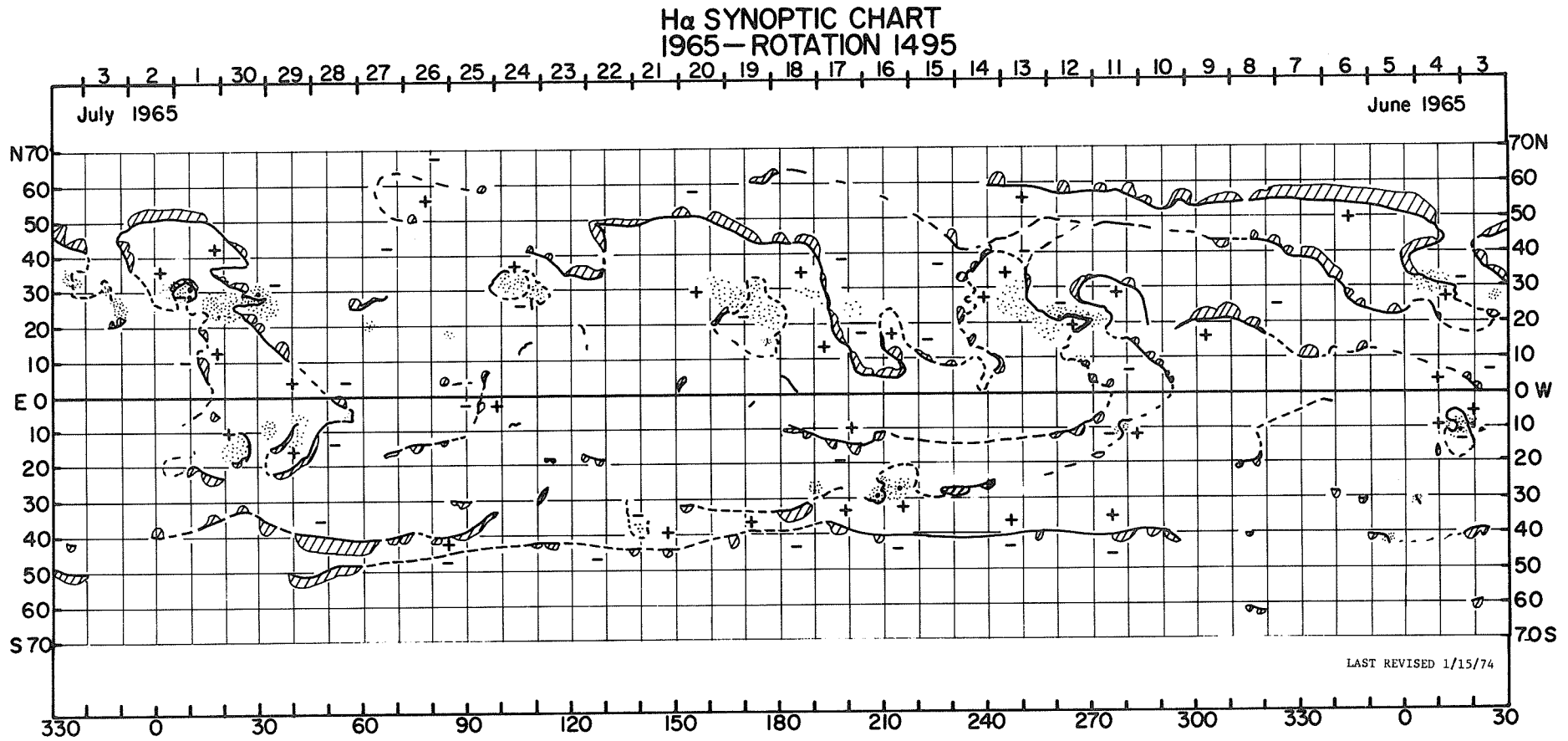
Note: Day without H-alpha photographs was 16 May 1965.


Hα SYNOPTIC CHART
1965 – ROTATION 1494
6 5 4 3 2 1 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7
June 1965
May 1965
N 70
60
50
40
30
20
10
E 0
10
20
30
40
50
60
S 70
70 N
60
50
40
30
20
10
0 W
10
20
30
40
50
60
70 S
LAST REVISED 1/14/74
330 0 30 60 90 120 150 180 210 240 270 300 330 0 30

Hα SYNOPTIC CHART
1965 - Rotation 1495

°Long.	°Lat.	Date	Descriptive Notes
340	N55	6/11	Filament disappeared 10 or 11 June.
330	N38	6/11	Filament disappeared 10 or 11 June.
210	S28	6/16	Birth of active region that developed class D spot group--the most important region of this rotation. Apparent source of a large-scale magnetic pattern that continued for many subsequent rotations. This was the first persistent feature in the Southern Hemisphere in Solar Cycle 20. Note the coincidence in longitude, and near-coincidence in time, of formation of new large-scale pattern in the Northern Hemisphere, also following the emergence of an important active region [see rotation 1494, (202,N23)].
190	S28	6/14	Birth of bipolar region.
177	N15	6/18	Birth of bipolar region.
141	S36	6/22	Birth of bipolar region.
125	N33	6/23	Filament disappeared.
90	S40	6/24	Filament disappeared.
86	N18	6/28	Birth of bipolar region.
62	N20	6/29	Birth of bipolar region.
58	S04	6/29	Birth of bipolar region.
50	S40	7/2-3	Disappearance of filament fragments.
5	N30	6/27	Renewed growth of region and spot group.
1	N28	7/4	Birth of bipolar region.

Note: Days without H-alpha photographs were 10 June and 3 July 1965.


Hα SYNOPTIC CHART
1965—ROTATION 1495
3 2 1 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3
July 1965
June 1965
N70
60
50
40
30
20
10
E 0
10
20
30
40
50
60
S 70
70N
60
50
40
30
20
10
0 W
10
20
30
40
50
60
70S
LAST REVISED 1/15/74
330 0 30 60 90 120 150 180 210 240 270 300 330 0 30

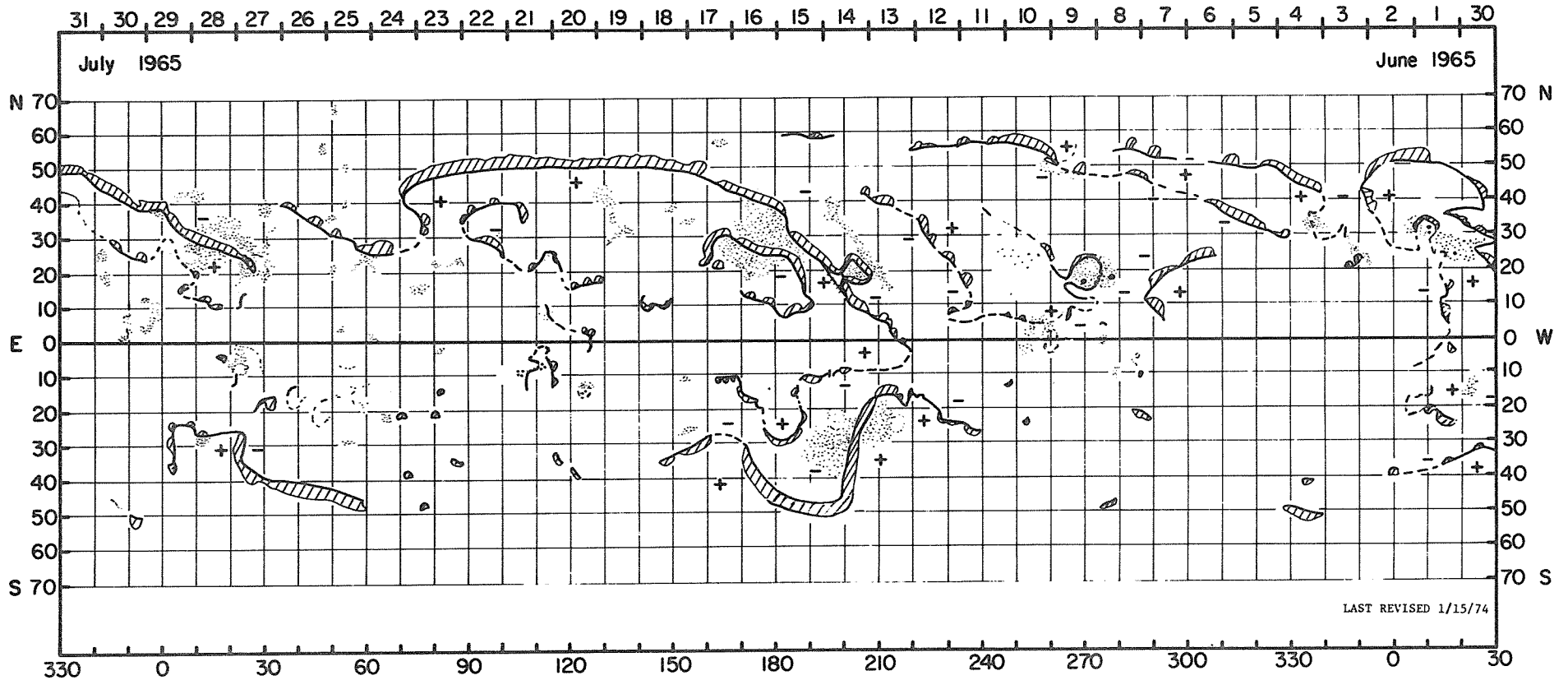
Hα SYNOPTIC CHART
1965 - Rotation 1496

°Long.	°Lat.	Date	Descriptive Notes
350	N25	7/3 7/4	Birth of bipolar region.
337	N33	6/30	Birth of bipolar region.
315	N35	7/7-8	Filament disappeared.
290	N10	7/9	Filament disappeared.
273	N18	7/6	Birth of bipolar region with type D spot group.
258	N35	7/10	Filament disappeared.
256	N01	7/11	Birth of bipolar region.
205	N20	7/8	Probable birth of bipolar region with spot group, the follower portion of which seems to have been incorporated into larger positive area to east by 17 July.
200	S40	7/13	North-south portion of filament disappeared.
195	S45	7/16	Portion of filament disappeared.
114	N08	7/20	Birth of small bipolar region.
12	S26	7/26	Birth of bipolar region.

Note: Days without H-alpha photographs were 21-22 and 28 July 1965.

Hα SYNOPTIC CHART

1965- ROTATION 1496

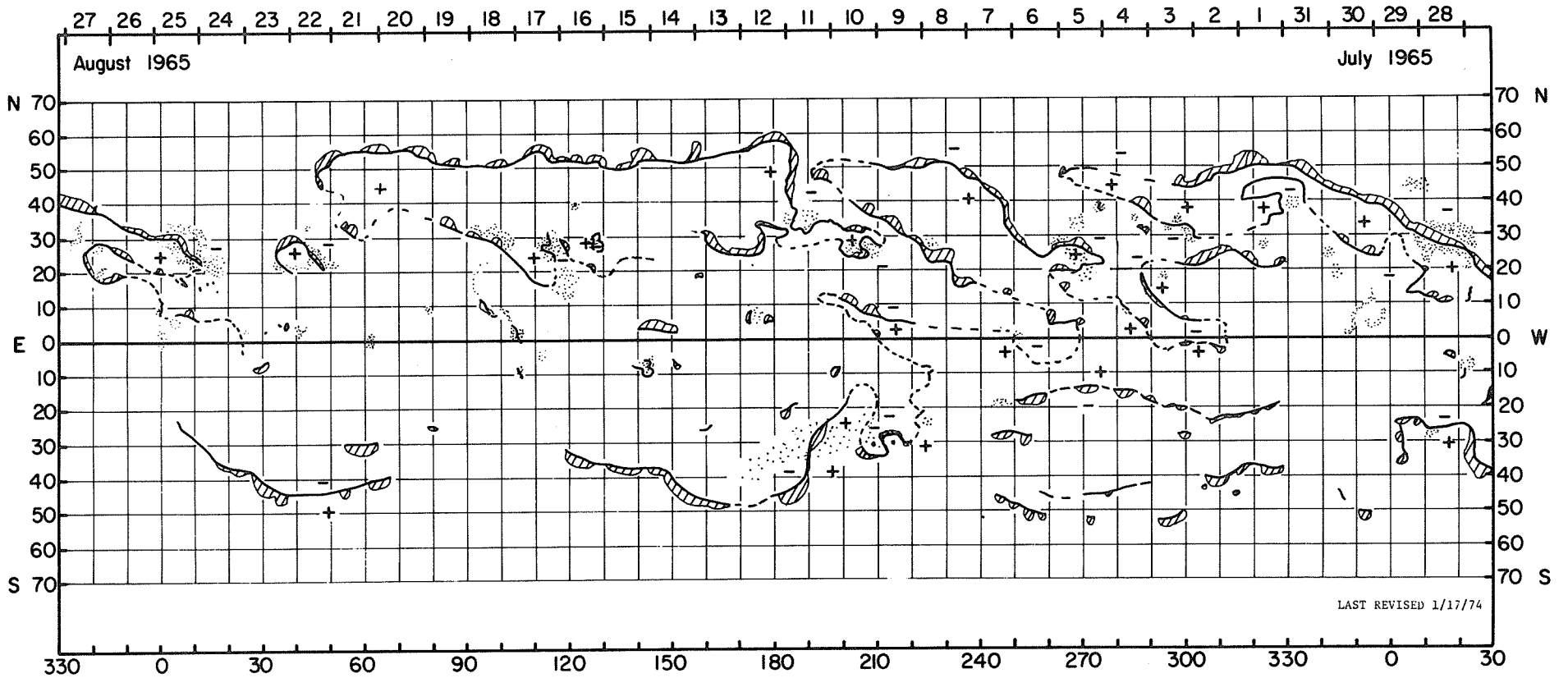


Hα SYNOPTIC CHART
1965 - Rotation 1497

°Long.	°Lat.	Date	Descriptive Notes
301	N31	7/29	Birth of bipolar region.
290	N13	7/31	Only appearance of filament.
276	N38	8/3	Birth of bipolar region.
203	N09	8/11	Filament disappeared.
128	N28	8/13	Birth of small bipolar region.
113	N27	8/12	Birth of bipolar region.
105	N01	8/18	Birth of small bipolar region.
95	N09	8/17	Birth of bipolar region.
79	N09	8/18	Birth of small bipolar region.
1	N10	8/22	Birth of bipolar region.

Note: Days without H-alpha photographs were 28 July and 6-7 and 20 August 1965.

Hα SYNOPTIC CHART
1965-ROTATION 1497

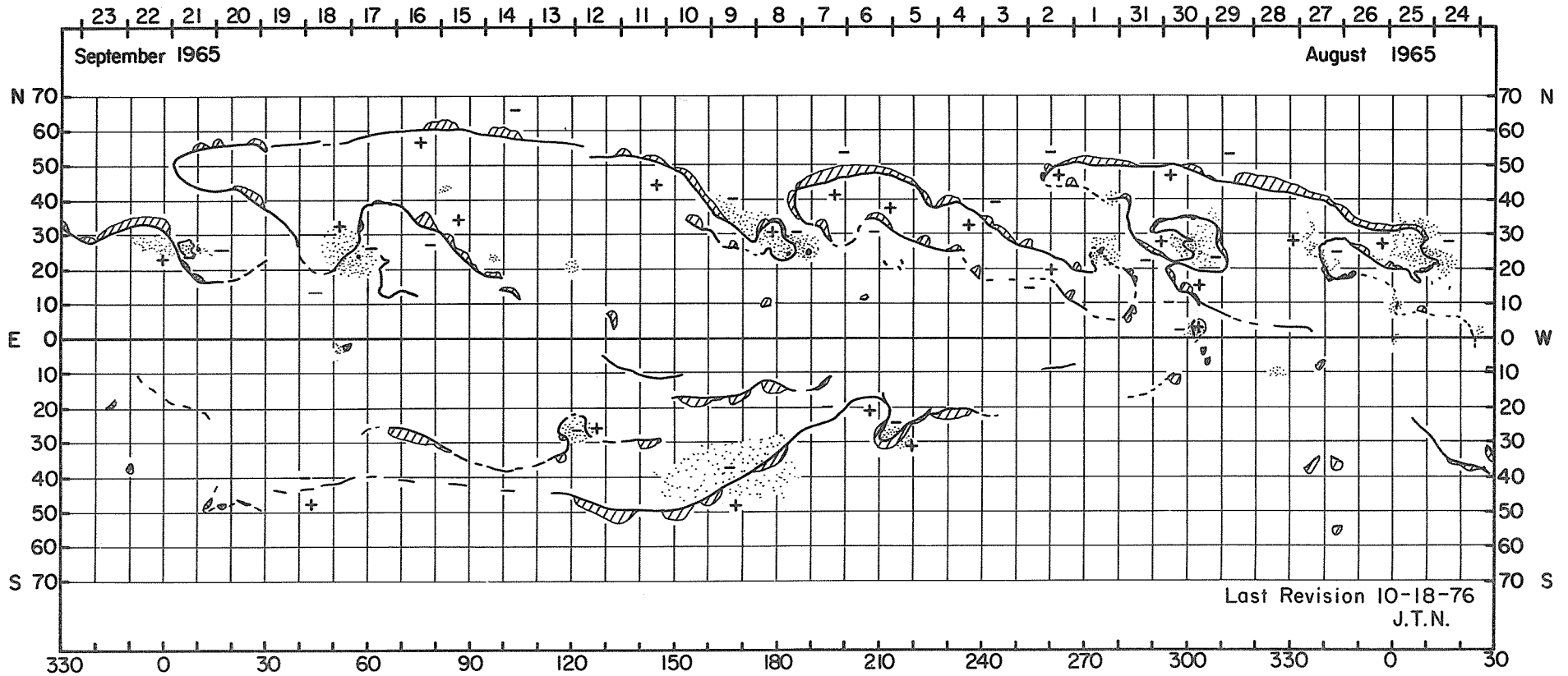


Hα SYNOPTIC CHART
1965 - Rotation 1498

°Long.	°Lat.	Date	Descriptive Notes
340	N22	8/27	Filament disappeared.
320	N43	8/24	Filament disappeared.
310	N24	8/29	Filament disappeared.
303	N26	8/24	Birth of bipolar region with spot group.
302	N03	8/29	Birth of bipolar region with spot group.
279	N40	8/27	Birth of bipolar region.
212	S25	9/8	Filament disappeared.
200	N45	9/6-7	Filament disappeared.
194	S12	9/8	Filament appeared only on this day.
185	N25	9/2	Birth of bipolar region with spot group.
160	S18	9/9	Filament disappeared.
120	N20	9/11	Birth of bipolar region.
90	N20	9/14-15	Filament chain from N10-30 disappeared.
83	N44	9/16	Birth of small bipolar region.
70	S25	9/14	Filament appeared, disappeared 16 September.
8	N26	9/23	Birth of bright active region with spot group.

Note: Days without H-alpha photographs were 2, 6 and 10 September 1965.

Hα SYNOPTIC CHART
1965 – ROTATION 1498



Hα SYNOPTIC CHART

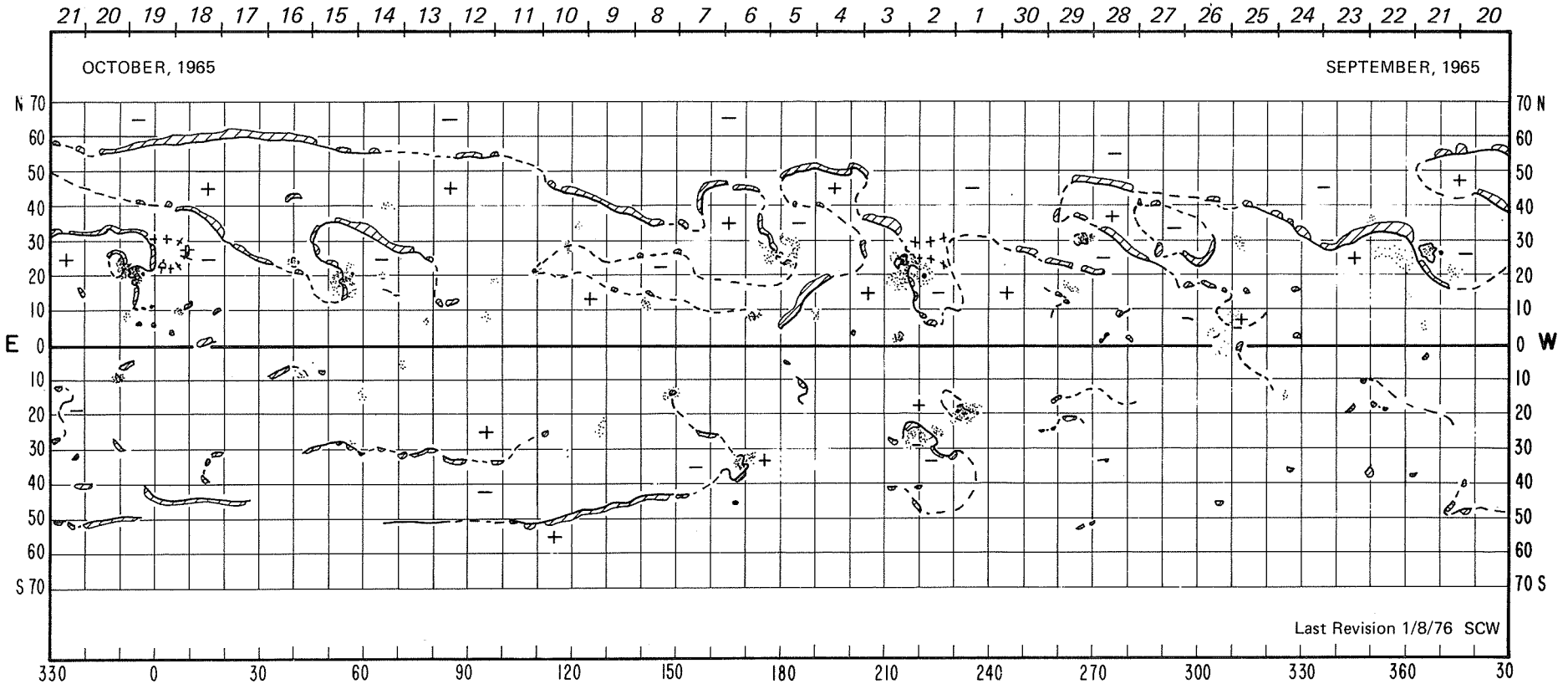
1965 - Rotation 1499

°Long.	°Lat.	Date	Descriptive Notes
350	N32	9/24	Filament disappeared, reappeared 25 September.
266	N30	9/27	Birth of small bipolar region.
230	S20	10/2	Birth of spot-producing region.
207	N19	10/1	Peak development of complex class E spot group notable for its rapid evolution, high spot count and multiple flares of importance 2.
185	N10	10/3	Filament disappeared.
120	S49	10/9	Filament disappeared, partially reappeared 10 October.
50	N24	10/16	Series of filaments along a common meridian disappeared.
10	N60	10/21	Large filament gradually disappeared 21-22 October.

Note: Days without H-alpha photographs were 30 September and 5-7 October 1965.

Hα SYNOPTIC CHART

1965 – ROTATION 1499



Hα SYNOPTIC CHART

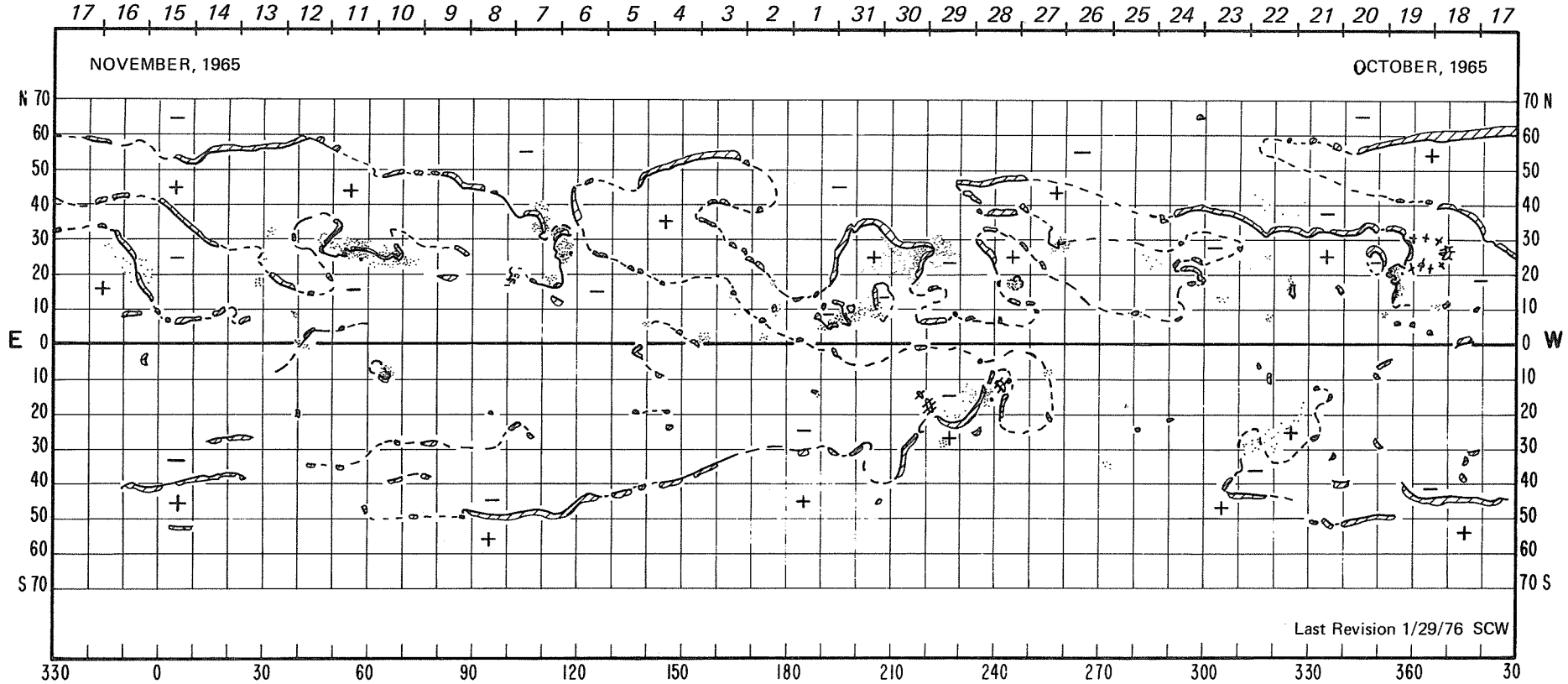
1965 - Rotation 1500

°Long.	°Lat.	Date	Descriptive Notes
355	N21	10/18	Small region born 18 October. Attained maximum size with small class C spot group on 21 October.
352	S05	10/15	Only appearance of small filament.
350	N23	10/14	East limb passage of faint region with inferred reversed polarity arrangement.
		10/17	Filaments within the faint plage and north of the region disappeared same day.
		10/19	Birth of new active region in position of the faint plage, which had disappeared by this date.
		10/21	Maximum development of new region with moderate size class C spot group. Only minor decrease in plage by west limb passage 25-26 October.
315	N33	10/24	Long row of filaments most prominent on this day.
258	N18	10/24	Small region born.
255	S08	10/31	Tiny plage born.
245	N17	10/23	Small region born.
240	N48	10/26	Filament disappeared.
230	S22	11/2	Large filament within large, faint plage disappeared near west limb.
205	N12	10/30	Filament in small, old active region gradually disappeared.
198	N10	10/31	Birth of active region which reached maximum 3 November with small spot group.
195	N25	10/31	Filament disappeared 31 October, reappeared 1 November, and developed rapidly into a continuous filament along the neutral line to north and west. Filament continued to enlarge and elevate until west limb passage 6 November.
150	N50	11/4-9	Filament was highly variable. First distinct 4 November, re-formed 7 November and disappeared 9 November.
114	N26	11/5	Rapidly developing region appeared adjacent to decaying region. Large type E spot group reached maximum size 7 November.
108	N33	10/31	Active region with small spot group was apparently just past maximum size at east limb on 31 October. It slowly decayed until 6 November and rapidly decayed thereafter, as if rapid growth of nearby large region influenced its demise. Region contained complex magnetic pattern that was not clearly discernible in H-alpha.
65	N25	11/5	Birth of active region near east limb; reached maximum with very small spot group by 7 November. Decayed rapidly, especially after formation of a strong new region a few degrees east.
	S08	11/10	Birth of small region, which disappeared by 13 November.
55	N25	11/9	Birth of active region, which grew rapidly to small type D spot group by 11 November. Spot group nearly gone by west limb passage 17 November.
41	Equator	11/10	Birth of small bipolar region on equator, which only grew slightly and disappeared on 13 November.
36	N17	11/11	Filament disappeared.
20	S12	11/14	Small filament appeared only on this day.

Note: Day without H-alpha photographs was 15 November 1965.

Hα SYNOPTIC CHART

1965 – ROTATION 1500



Hα SYNOPTIC CHART

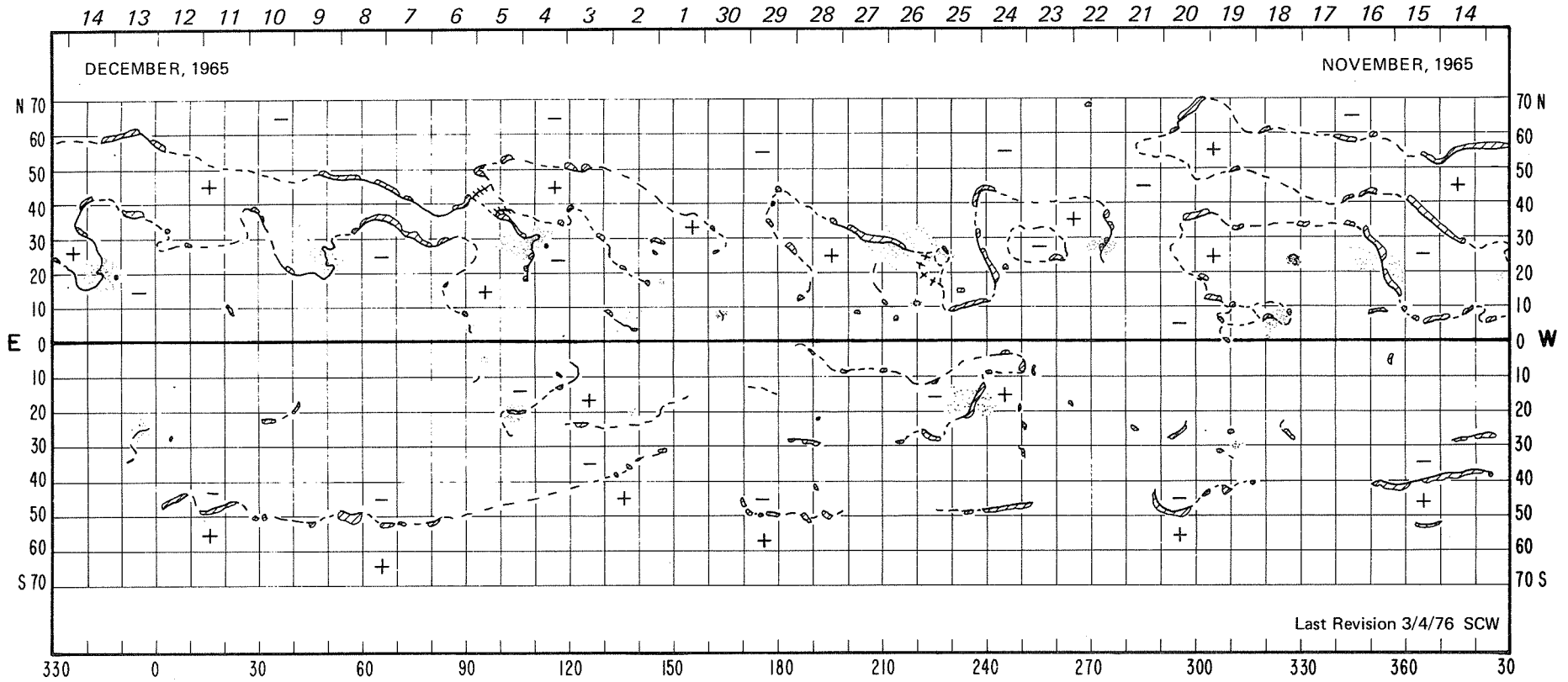
1965 - Rotation 1501

°Long.	°Lat.	Date	Descriptive Notes
295	S27	9/22	Filament appeared.
240	N25	9/24	Filament appeared, disappeared 28 November, reappeared 29 November.
236	S16	9/26	Filament within old extended plage disappeared, re-formed next day, then disappeared again on 28 November.
227	N24	9/22	Tiny plage emerged, reaching maximum size and brightness 25 November.
208	N29	9/25	Filament developed within old extended plage. Somewhat active between 28 November and 3 December, i.e., between central meridian and west limb.
122	N49	12/3	Filament appeared.
103	S20	11/29-12/7	Small plage was bright and compact near east limb on 29 November. Steady decay throughout disk passage accompanied by filament formation within the region on 4 December. Region disappeared by 7 December.
97	N40	12/6	Negative polarity fields merged as filaments disappeared at (90,N40).

Note: Days without H-alpha photographs were 9-11, 13 and 16 November 1965.

Hα SYNOPTIC CHART

1965 – ROTATION 1501



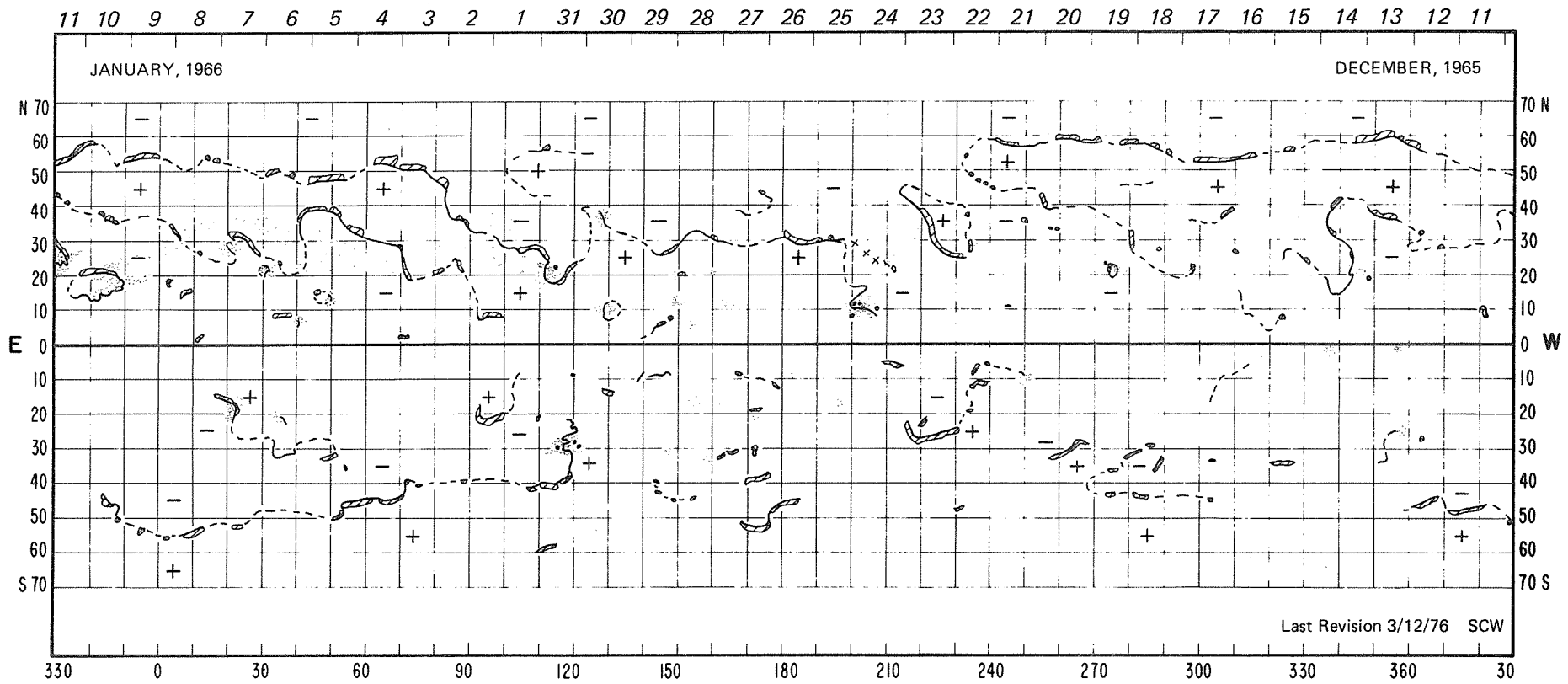
Hα SYNOPTIC CHART
1965-1966 - Rotation 1502

°Long.	°Lat.	Date	Descriptive Notes
344	N20	12/8-20	Region born near east limb 6-8 December, first reached peak development on about 10 December, and decayed until strong redevelopment on or before 18 December when type D spot group was visible.
277	N21	12/19	Birth of small region that grew on 21 December.
263	S30	12/20	Filament disappeared.
204	N10	12/24	Birth of very active spot-producing bipolar region. Leading portion was incorporated into negative region to the west by 28 December. Complex magnetic structure.
118	S29	12/27	Birth of active region with peak development to a small type D spot group by 28-29 December.
50	N13	1/7	Birth of small bipolar region.
32	N22	1/7	Birth of small bipolar region.
20	N28	1/12	Birth of small bipolar region.
20	S15	1/10	First appearance of small filament.

Note: Days without H-alpha photographs were 15-17, 22-23 and 30-31 December 1965 and 8 January 1966.

Hα SYNOPTIC CHART

1965 – 66 ROTATION 1502



Hα SYNOPTIC CHART

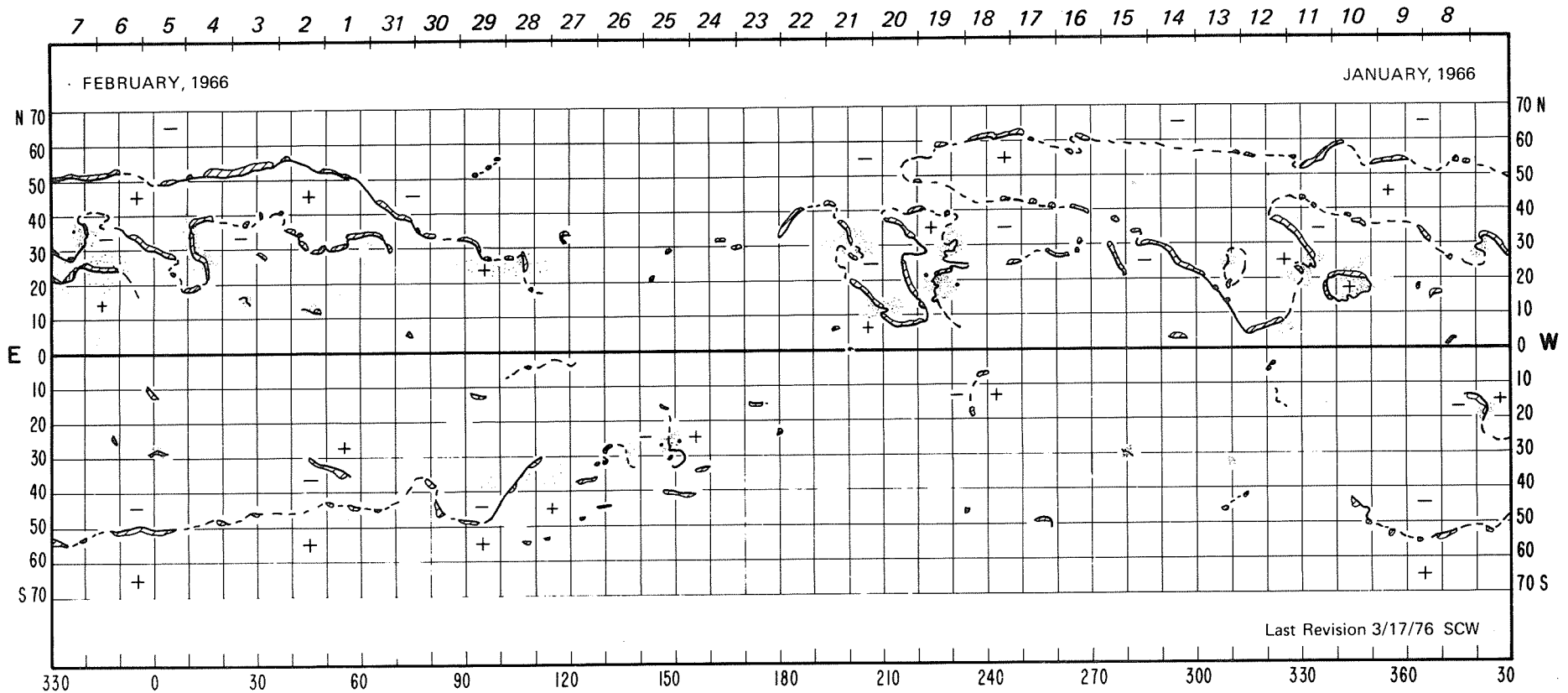
1966 - Rotation 1503

°Long.	°Lat.	Date	Descriptive Notes
330	N30	1/11-12	Filament disappeared.
320	N06	1/10-11	Filament disappeared.
280	S30	1/16	Birth of small bipolar region.
225	N19	1/19	Peak development of class E spot group that was most important region of this rotation. Member of activity complex of four regions, including remnants of most important region of previous rotation.
210	N10	1/23	Large filament within old active region disappeared.
150	S25	1/22	Birth of region that reached peak development 24 January with type D spot group.
136	S28	1/29	Birth of active region with small spot group. Peak development reached within 24 hours.
20	N53	2/2	Large filament disappeared.
11	N30	2/2	Filament within old spotless region disappeared with a resultant flare ∿ 1600 UT.
		2/7	Regenerated filament again disappeared.

Note: Days without H-alpha photographs were 11, 18, 21 and 31 January 1966.

Hα SYNOPTIC CHART

1966 – ROTATION 1503



Hα SYNOPTIC CHART

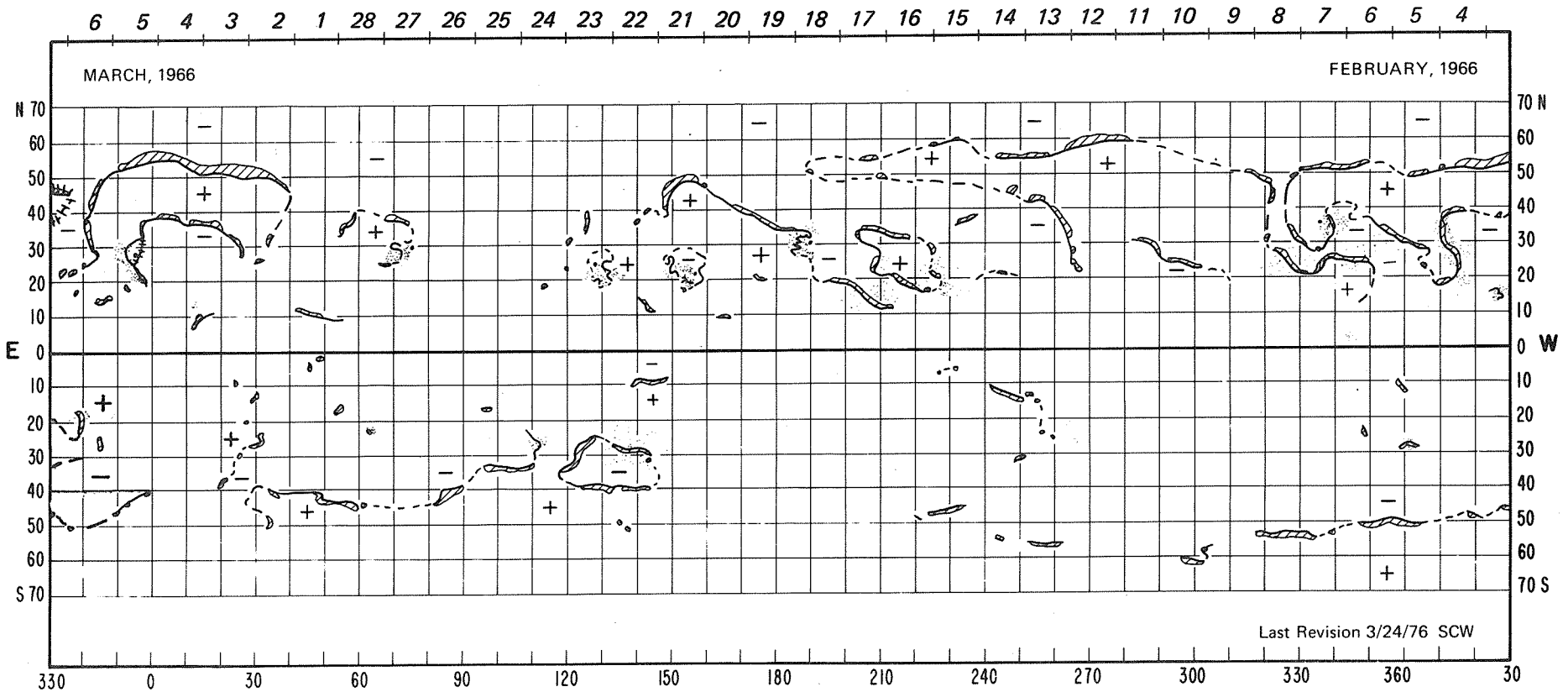
1966 - Rotation 1504

°Long.	°Lat.	Date	Descriptive Notes
359	S12	2/2	Filament fragment visible this day only.
	N30	2/4	Filament in faint, scattered plage plainly visible this day only.
338	N35	2/1	Region formed at east limb.
		2/2	Sunspots first observed. Attained maximum as follower-dominant type C group by late 3 February.
		2/10	Minor additional spot growth.
	N25	2/3	Curved filament disappeared.
327	N23	2/7	Filament in faint plage disappeared.
325	S53	2/11	Filament disappeared.
290	N25	2/8	Filament formed.
210	N22	2/16	Filament disappeared, associated with extensive faint plage.
195	N20	2/17	Filament disappeared.
187	N30	2/12	Birth of active region at east limb. Reached maximum as small type C group by 18 February. Greatly diminished by west limb passage 24 February.
175	N36	2/20	Filament disappeared.
152	N22	2/17	Birth of significant active region at longitude 149, 7° east of small spotless plage. Growth and motion of region eliminated all traces of small older region by 22 February. New region attained maximum on 21 February as a type D group with numerous spots.
135	S28	2/21	Filaments disappeared along northern boundary of large-scale cell of negative polarity that represented the remnant of a small active region from the previous solar rotation.
132	N23	2/20	Birth of significant active center.
		2/24	Formation of additional bipolar spot group at follower end of earlier region; the two groups merged to form a single and increasingly complex region as west limb passage occurred on 28 February. An extremely large, complex, active region appeared on Rotation 1505 between the center noted here and the region at longitude 152.
70	N28	2/22	Birth of active region at east limb. Reached maximum next day as small type C spot group.
53	S43	3/6	Filament disappeared.

Note: Days without H-alpha photographs were 9 and 25-26 February 1966.

Hα SYNOPTIC CHART

1966 – ROTATION 1504



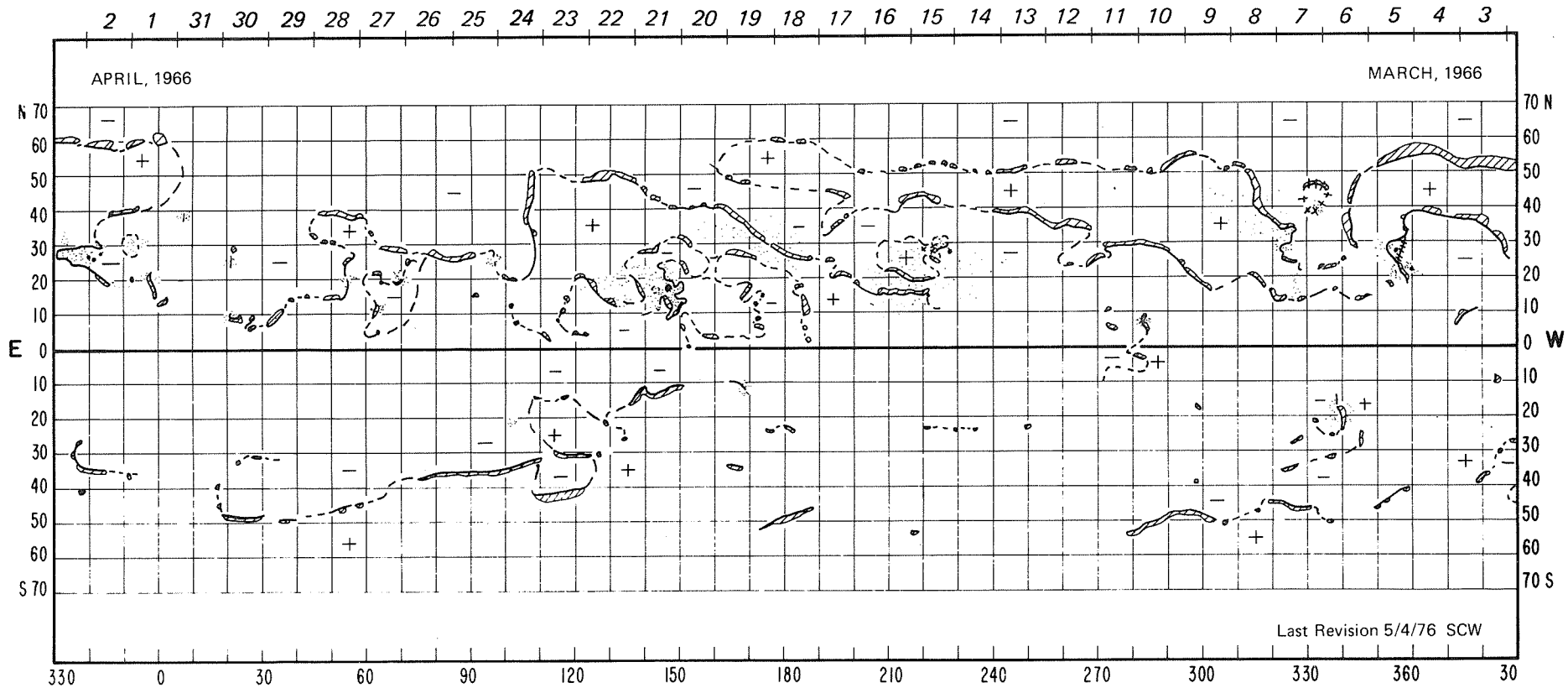
Hα SYNOPTIC CHART
1966 - Rotation 1505

°Long.	°Lat.	Date	Descriptive Notes
357	N22	2/27	Birth of active region at east limb. Reached maximum next day as small type C spot group. Note that this was another in a series of active regions that formed at, or near, east limb during February 1966. (See notes for Rotation 1504.)
352	N27	3/4	Region born that affected neutral line to its west; reached maximum 6 March as a type B spot group, but developed H-type leader after follower spots disappeared.
		3/9	Important new spot growth near west limb. Returned next rotation as a great region.
342	N30	3/3	Filament disappeared.
		3/4	Filament reappeared; active region formed near southwest terminus.
330	N45	3/4	Filament disappeared.
315	N45	3/4	Filament disappeared at east limb.
		3/6	Filament re-formed and was active next 2 days.
		3/9	Filament disappeared.
285	N29	3/9	Filament disappeared.
283	N07	3/5	Small filament, dark and elevated above small bright plage; plage faded and filament became much smaller next day.
205	S47	3/5	Filament disappeared.
		3/7	Filament reappeared.
		3/11	Filament disappeared again.
185	N12	3/15	Filament visible this day only.
		3/20	Filament formed; only partially visible next 2 days.
145	N18	3/15	East limb passage of the first great flare-rich region of Solar Cycle 20. The large, bright, complex plage contained a large, round, rapidly evolving sunspot group with strong "delta" magnetic configuration. The configuration of the neutral lines near the sunspot may not be correct as mapped here, although the large-scale magnetic environment is correct. Approximately 200 flare events were reported during the disk passage, including proton emission.
	N30	3/25	Especially large filament formed before west limb passage.
115	S42	3/18	Filament disappeared.
97	N25	3/28	Birth of small active region with tiny spots. No spots were observed the next day.
85	N25	3/22	Filament disappeared.
63	N22	3/29	Birth of bipolar region with spots. Decayed steadily from this day to west limb passage on 1 April.
21	N26	4/3	Birth of tiny bipolar region.
7	N39	4/4	Birth of very small active region near west limb.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1966 – ROTATION 1505



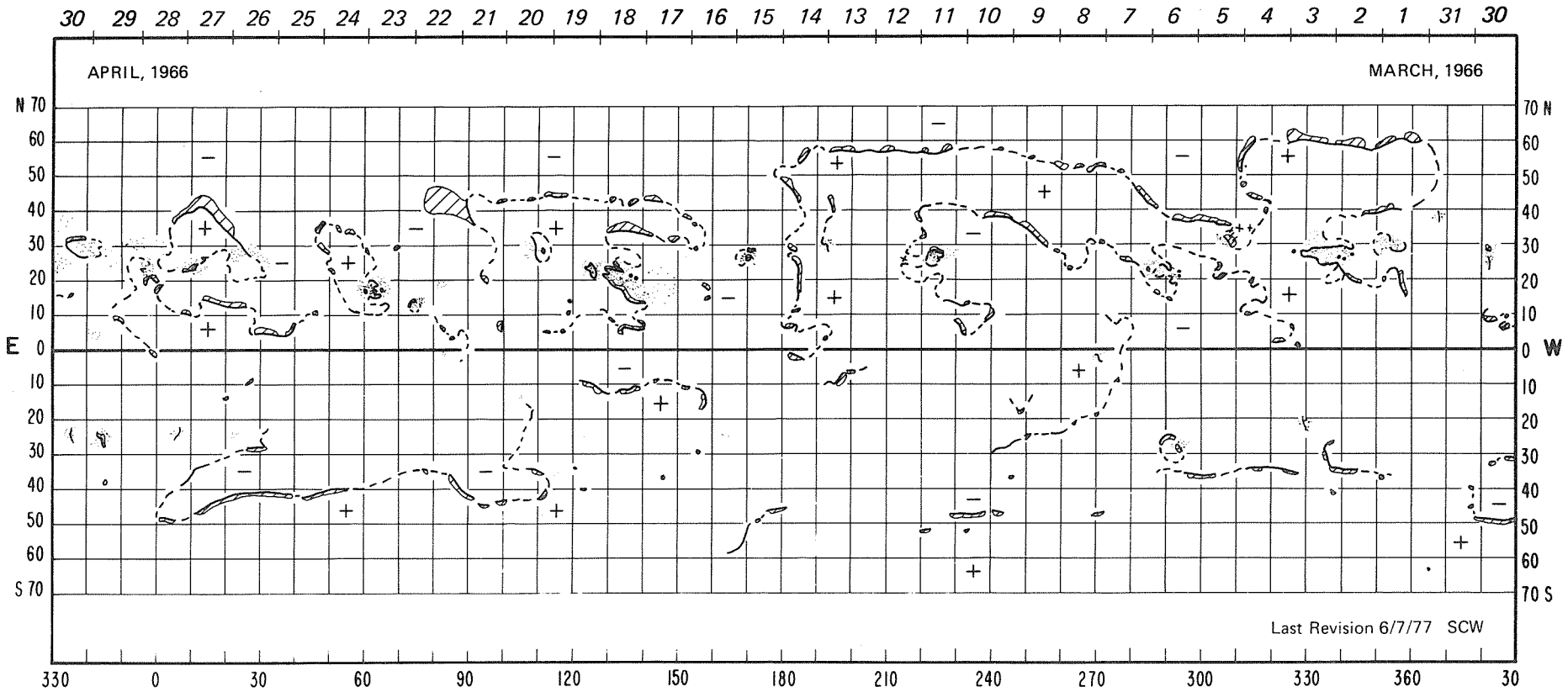
Hα SYNOPTIC CHART
1966 - Rotation 1506

°Long.	°Lat.	Date	Descriptive Notes
354	N28	4/3	Birth of active region.
		4/6	More rapid growth and spot development, which continued at west limb passage 7-8 April.
350	N39	3/29	Filament disappeared.
340	S35	3/31	Filament disappeared.
335	N26	3/27	East limb passage of great active region that apparently formed just before rotating into view. Located almost on opposite side of sun from great region that was completing west limb passage on this date.
		3/27-4/2	Period of significant growth of spots and important relative proper motions among the spots. The region behaved as two overlapped bipolar groups with significant differences in their rates of solar rotation. The largest leader and follower spots rotated faster than neighboring small spots, leading to a merger of like-polarity spots by 1 April. The region greatly simplified after central meridian passage on 3 April.
329	S21	4/4	Birth of tiny active region that disappeared 2 days later.
314	N17	3/30	Filament disappeared.
307	N32	4/5	Birth of active region, which reached maximum by 8 April as a small type C spot group.
303	N37	4/7	Filament disappeared.
293	S27	4/1	Birth of small active region.
290	N22	4/3	Minor plage growth in small region and appearance of first sunspots.
		4/5	Beginning of more rapid growth.
		4/8	Maximum sunspot development as type E spot group, but areas of additional spot growth appeared daily until west limb passage 12 April.
271	S02	4/9	Birth of tiny plage, which disappeared by 11 April.
270	N52	4/3	Filament disappeared. Gradually re-formed during disk passage.
225	N28	4/16	Plage growth (without reported spots) within extensive faint plage.
219	N37	4/10	Filament disappeared.
185	N15-55	4/13	Development of filaments along this meridian marked formation of important large-scale boundary that could be identified for next 3 solar rotations.
135	N35	4/15	Filament disappeared.
125	N23	4/19	Small isolated cell of negative polarity in trailing part of large aging region disappeared by this date.
108	N28	4/22	Birth of active region, which reached maximum 24 April as type D group with numerous spots. West limb passage was 25 April.
90	N40	4/23	Large and very active filament disappeared.
75	N12	4/24	Birth of tiny active region.
		4/26	Additional minor growth.
63	N17	4/20	Birth of moderate active region, which reached maximum 24 April as type D group with numerous spots.
30	S41	4/23	Filament disappeared.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1966 – ROTATION 1506



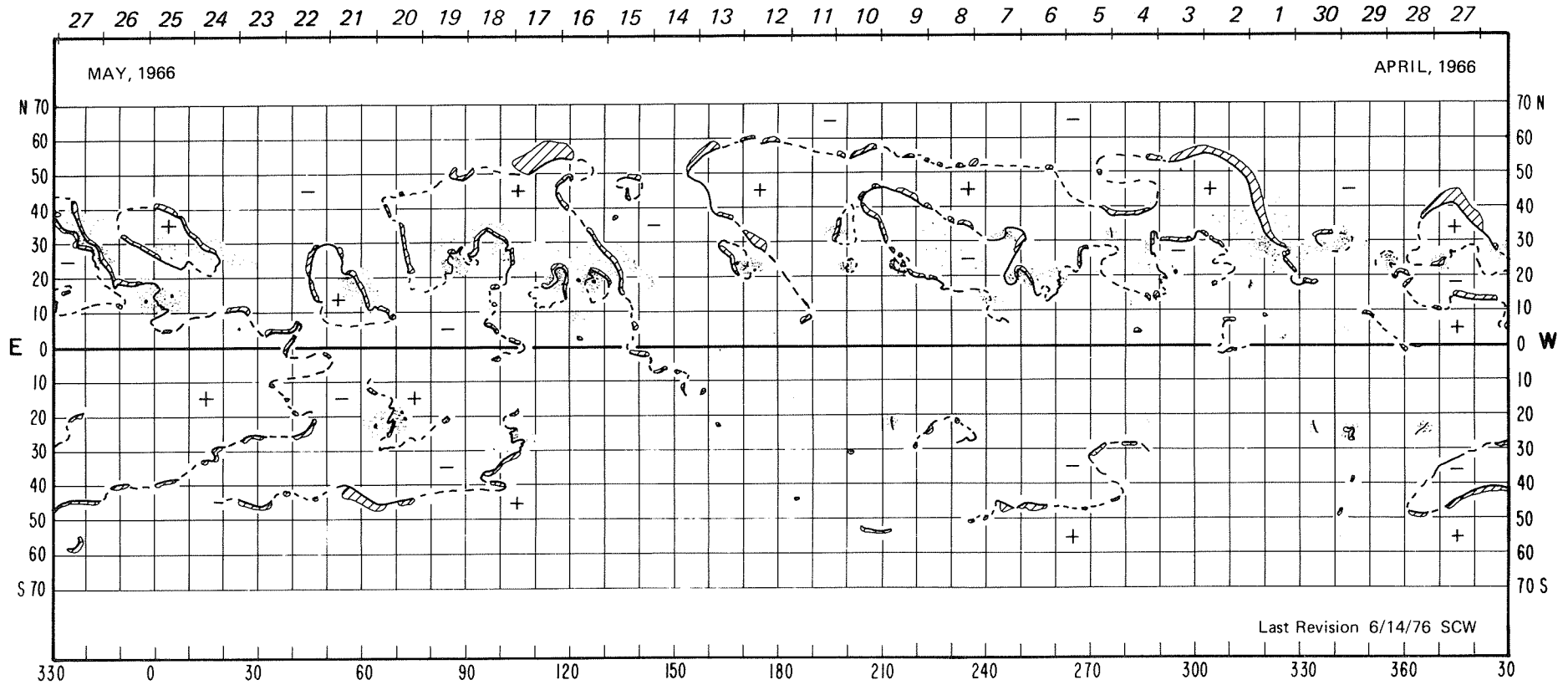
Hα SYNOPTIC CHART
1966 - Rotation 1507

°Long.	°Lat.	Date	Descriptive Notes
357	N23	4/30	Birth of active region with small spot group, which grew slowly to maximum by 3 May, 1 day before west limb passage.
355	N28	5/2	Birth of small active region.
345	S25	4/23	East limb appearance of tiny bright plage, which faded during next 2 days.
334	S23	4/28	Birth of small region with tiny spots, which grew slowly to maximum area by 2 May.
325	N02	5/2	Birth of tiny plage, which disappeared by 6 May.
290	N17	4/29	Filament disappeared.
290	N21	5/6	Minor new spot growth in region that had returned for second disk passage 27 April with a large single leader spot. Plage was primarily in the follower portion of the region when at east limb. Plage formed gradually near leader spot during the disk passage, culminating in the spot formation on 6 May. Large leader spot decayed more rapidly after this date.
275	N32	5/10	Birth of small active region.
248	N20	5/2	Birth of small active region, which began to decline next day with very small spots. Blended with faint plage to west by 3 May.
		5/5	Semicircular filament formed within and between this region and region to the west.
245	N31	5/3	Birth of small active region.
241	N12	5/5	Birth of small active region that dissipated by 10 May.
240	N29	5/3	Filament disappeared.
		5/4	Filament reappeared.
		5/7	Filament disappeared.
		5/9	Filament reappeared.
213	S22	5/15	Birth of very small region just before west limb passage.
200	N23	5/12	Birth of small active region.
170	N23	5/13	Birth of active region that reached maximum on 15 May as class D spot group.
	N35	5/15	Filament disappeared.
125	N19	5/19	Birth and rapid growth of active region that reached maximum on 21 May as a follower-dominant class D spot group.
117	N20	5/19	Semicircular filament began to disappear gradually in apparent response to the growth of a nearby active region.
100	S33	5/16	Filament began to form and reached fullest development 19 May.
		5/20	Filament disappeared.
68	S19	5/18	Small sunspots formed within large faint plage.
		5/20	Rapid spot growth began; region reached maximum on 23 May as a class E spot group.
10	N34	5/24	Filament disappeared. Filament gradually reformed and became exceptionally large by 29 May, just before west limb passage.
2	N14	5/19	East limb passage of complex region, which may have formed just a few days earlier. Region grew to maximum on 21 May as class E spot group.
		5/22	Rapid decrease in sunspot area began.
		5/30	Sunspots entirely gone.

Note: Day without H-alpha photographs was 10 May 1966.

Hα SYNOPTIC CHART

1966 – ROTATION 1507



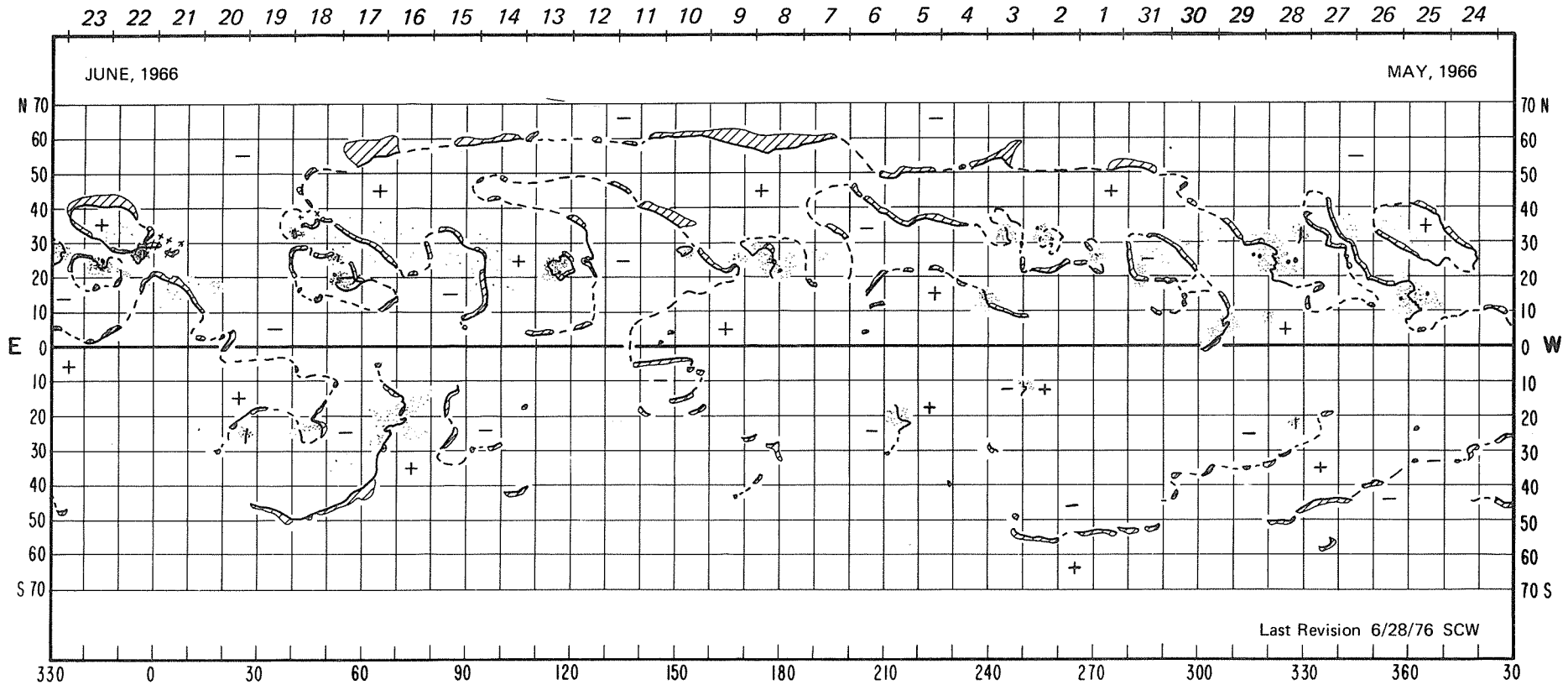
Hα SYNOPTIC CHART
1966 - Rotation 1508

°Long.	°Lat.	Date	Descriptive Notes
358	N28	5/24	Filament disappeared.
344	N28	5/25	Filament disappeared.
335	S35	5/24	Filament disappeared.
331	N12	5/24	Small filament disappeared.
329	N33	6/3	Birth of active region at west limb.
327	S22	5/28	Birth of tiny active region.
325	S31	5/25	Faint filament disappeared.
322	N25	5/24	Birth of large active region at position of filament visible on 23 May. This coordinate also marks remnant plage of a great active region visible 2 solar rotations earlier. New region reached maximum on 27 May as a class E spot group.
307	N05	5/25 5/27	Birth of active region. Reached maximum as a class B sunspot group.
284	N21	6/4	Birth of small active region. Growth continued during west limb passage 6 June.
280	N50	5/28-29 6/1	Filament disappeared. Filament reformed.
	N28	6/3	Filament disappeared.
270	S55 N25	5/31 6/3	Filament began to form. Birth of small active region, reached peak growth by 5 June.
256	N32	5/31 6/1	Small active region formed within a faint scattered plage. Reached maximum as class D spot group.
252	S12	6/2	Birth of very small region.
249	N25	5/31	Filament disappeared.
245	N32	5/30	Birth of small active region that reached maximum by 1 June.
242	N55	5/29-31	Filament was exceptionally large near east limb.
240	N14	6/4	Filament began developing within faint region. It reached its maximum on 7 June.
220	N37	6/4	Filament disappeared.
210-235	N21	6/5	Significant growth of filament fragments.
203	N45	6/5	Filament disappeared.
177	N28	6/12	Filament formed within a decaying active region.
153	N27	6/14	Birth of a small region 2 days before west limb passage.
135	N46	6/9	Filament disappeared.
122	N37	CMP 6/12	Filament intermittently visible during disk passage.
118	N23	6/11	Significant growth of plage and spots near an existing large sunspot.
95	N25	6/12 6/17	Large filament partially disappeared. Filament redeveloped at N15.
64	N28	6/18	Filament disappeared.
55	N25	6/16	Filament disappeared in response to region developing nearby.
54	N19	6/15	Birth of region that developed follower-dominant class D group by 18 June.
46	S20	6/17-18	Filament was present these 2 days only.
45	N27	6/20	Filament reformed.
43	S24	6/16	Birth of small active region.
26	S25	6/26	Birth of tiny region near west limb.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1966 – ROTATION 1508



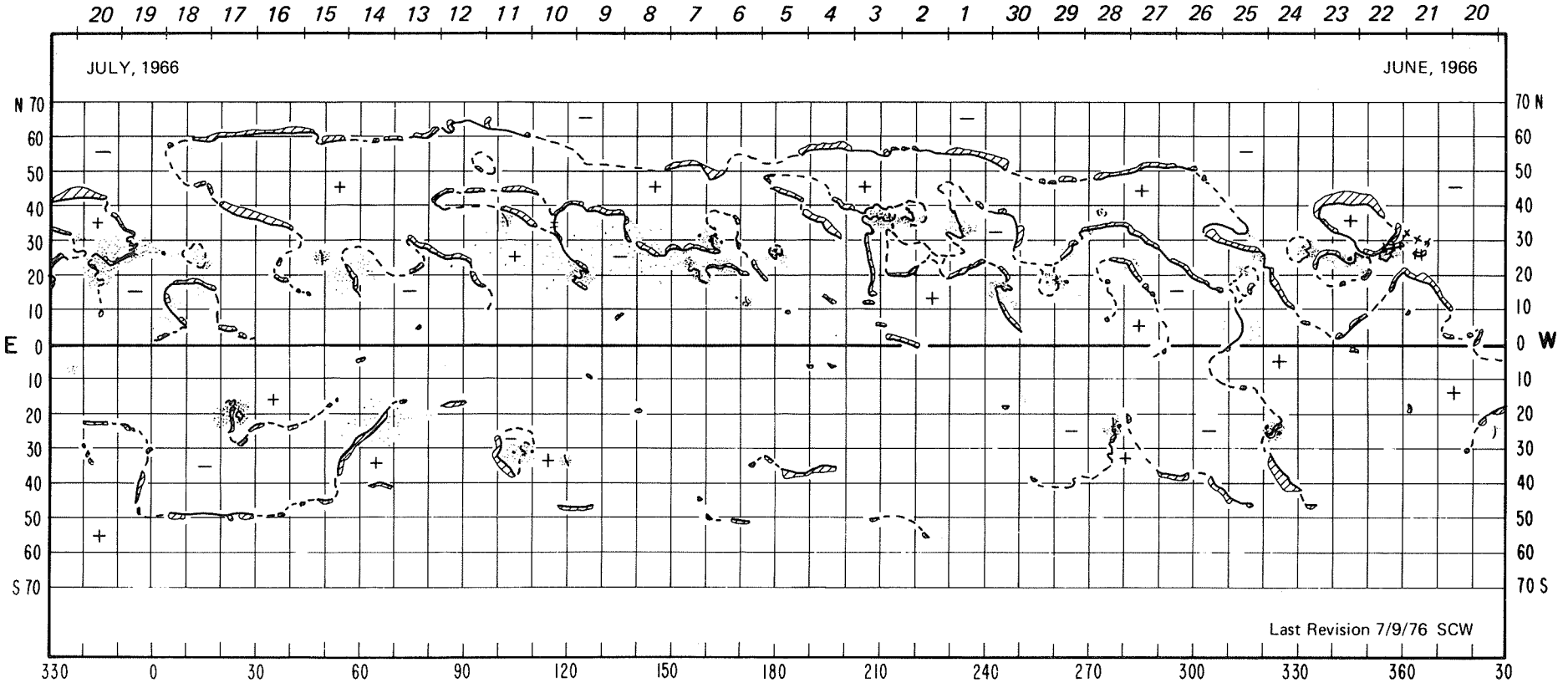
Hα SYNOPTIC CHART
1966 - Rotation 1509

°Long	°Lat.	Date	Descriptive Notes
357	N30	6/24	Filament disappeared as region developed nearby.
356	N26	6/23	Birth of active region, which reached maximum by 25 June with numerous small spots.
348	N35	6/22	All filaments bordering circular cell of positive polarity disappeared, in apparent response to nearby developing active region.
345	N05	6/22	Faint filament disappeared.
340	N23	6/23	Birth of new region within follower plage of old active region with Hsx leader spot. Old spot decayed more rapidly as new spots grew. New group did not exceed class B.
338	N26	6/23	Filament disappeared gradually within old active region, as new growth of spots and plage began nearby.
332	N28	6/20	Birth of active region, which grew to class D spot group by 22 June.
326	S24	6/26	Birth of small active region, which reached maximum next day as small class C group.
325	S38	6/22-23	Filament disappeared south of developing region.
324	N14	6/26-27	Filament disappeared.
323	S25	6/22	Birth of small active region, which grew to maximum by 26 June as class D spot group. Notable for increasingly negative inclination of group axis as region approached west limb. Follower spot was at lower latitude than leader.
		6/29-30	New plage growth at west limb passage.
300	S38	6/28	Filaments formed along this neutral line.
290	N28	6/23	Filament disappeared; intermittently and partially reformed during remainder of disk passage.
285	N18	6/24	Filament disappeared.
263	N26	6/29	Birth of tiny plage, which had nearly disappeared by 2 July.
		7/4	Minor new growth of plage just before west limb passage.
261	N18	6/29	Birth of active region, which reached maximum 2 July as small class D spot group.
248	N30	7/3	Filament disappeared.
		7/4	Filament reappeared.
		7/5	Filament disappeared again.
246	N17	6/29	New growth within faint old plage resulted in distinctive new convolution of neutral line through the region. It had an east-west orientation where the plage was brightest. An unusual spot group developed with most of the small spots within a small penumbra that spanned the magnetic neutral line.
		7/1-2	Spot and plage decay.
		7/3	New spot and plage growth.
		7/5	Distinct region decay at west limb.
246	N07	7/3	Large filament developed south of active region.
		7/5	Filament disappeared.
235	N22	7/1	Filament slowly disappeared.
210	N34	6/30	Birth of proton-flare active region studied under the international Proton Flare Project (flare of 7 July 1966).
		7/3	Birth of second principal bipolar region to east of first; merger of the two created the complex Dkc spot group with classic delta configuration and east-west neutral line.
		7/7	First major proton flare and probable peak in spot development. Both growth and decay occurred after this date.
206	N25	7/2	Filament almost complete, otherwise highly variable.
200	N39	6/29	Filament disappeared.
		7/6	Filament reappeared for 1 day.
179	N26	7/7	Birth of small active region.
		7/10-11	Additional growth at west limb passage.
172	N11	7/7	Birth of tiny region, which disappeared by 10 July.
164	N22	7/8	Filament disappeared.
161	N30	7/6	Birth of moderate active region, which attained maximum as a class D group by 9 July.
155	N24	7/11	Birth of small active region, which was still growing at west limb on 13 July.
153	N27	7/8	Filament disappeared.
150-240	N55	7/4	Entire northern polar-crown filament disappeared on day when great proton-flare region began most rapid growth at the longitude centered on the filament.
122	N20	7/7	Birth of active region within old filament channel remaining from great active region that crossed the central meridian on 21 March 1966.
		7/9	Peak development as class B group.
		7/12-13	Minor new growth within the faint and decayed plage.
120	S33	7/7	Birth of tiny region, which disappeared by 9 July.
116	N35	7/7	Filament disappeared.
107	S31	7/10	Birth of moderate active region, which attained maximum next day as small class C spot group.
103	N33	7/15	Birth of small active region, which was still growing at west limb on 17 July.
85	N25	7/12	Filament disappeared.
49	N25	7/16	Birth of small active region.
24	N04	7/14	Filament disappeared.
14	N23	7/14	Birth of small active region, which remained bright until 21 July.

Note: Days without H-alpha photographs were 26 and 27 June 1966.

Hα SYNOPTIC CHART

1966 – ROTATION 1509



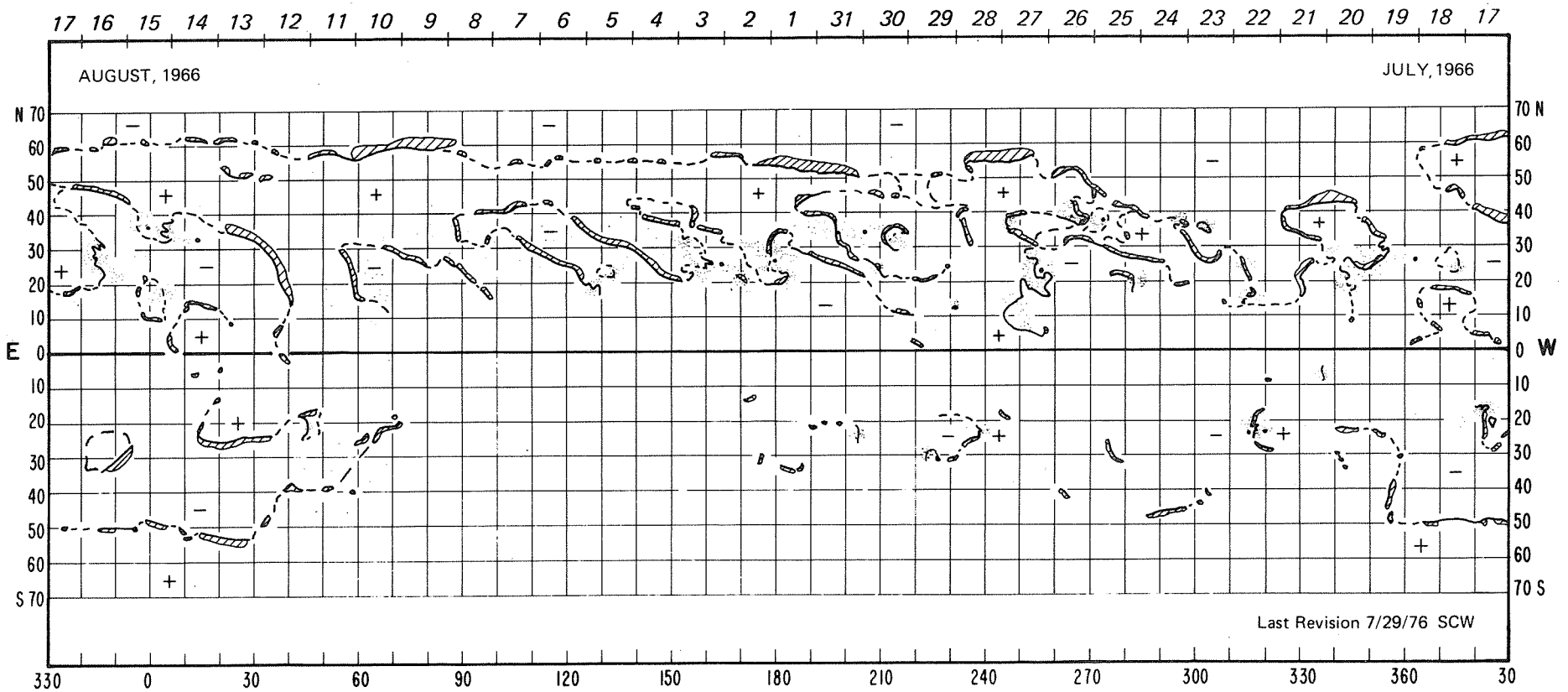
Hα SYNOPTIC CHART
1966 - Rotation 1510

°Long.	°Lat.	Date	Descriptive Notes
356	S40	7/22	Filament disappeared.
344	N20	7/19	Birth of small active region.
340	N43	7/23	Filament disappeared.
336	S07	7/21	Birth of small active region.
314	N24	7/20	Birth of small active region.
303	N36	7/24	Birth of small active region, apparently associated with filament disappearance south of this location.
302	N25	7/24	Curved filament disappeared.
300	N37	7/20	Rapid disappearance of plage.
285	N20	7/29	Birth of tiny active region near remnants of earlier small region.
282	N20	7/23	Birth of small active region near southern end of filament, which disappeared same day.
278	N28	7/23	Filament disappeared in apparent response to regions developing at both its ends.
275	N44	7/24	Filament disappeared in apparent response to developing region south of this location.
269	N38	7/21	Birth of moderate active region that grew to maximum by 25 July as class E spot group. Growth of region apparently led to filament disappearances adjacent to the region and facilitated major rearrangement of large-scale magnetic fields.
265	N52	7/28	Filament disappeared.
234	N35	7/27	Filament disappeared.
223	S30	7/27	Birth of tiny active region.
213	N12	8/3	Birth of tiny plage.
209	N25	8/3	Birth of small active region.
203	S24	8/2	Birth of small active region.
197	N35	7/28	Major flare occurred in extended faint plage that was the return of the great proton-flare region of July. Nearby filament disappeared by next day. Eastward motion of this region led to convergence with large-scale patterns to the east and south. Formation of important new active regions on this and the next solar rotation might be a consequence of this convergence.
187	N52	7/29	Filament disappeared.
178	N30	8/3	Filament disappeared within bright plage. Active region to south had peculiar spot group with "delta" configuration. Region decayed more rapidly after this date.
170	N22	7/27-8/1	Plage area with very active absorption feature visible this period only.
159	N26	7/28	Birth of unusual active region on this or previous day at east limb. Rapid relative motions among the spots, which reached maximum 31 July as a small class E group.
155	N38	8/3	Complex system of filaments formed and continued their development to west limb.
133	N22	8/1	Birth of peculiar small region near another existing small region with which it merged. Spot group never exceeded class B, but showed rapid variations in count from day-to-day.
92	N21	8/5	Filament disappeared, but re-formed next day.
45	S22	8/13	Birth of active region near site of small region, which had disappeared by this date. New region may have reached its peak size on 15 August as a small class C spot group.
5	N35	8/10	Birth of active region that had unusual amount of divergence between leader and follower spots. The follower apparently shared the rotation rate of high latitude features that merged with low latitude features east of this region after this region formed. Reached maximum on 13-14 August as class E spot group.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1966 – ROTATION 1510



Hα SYNOPTIC CHART

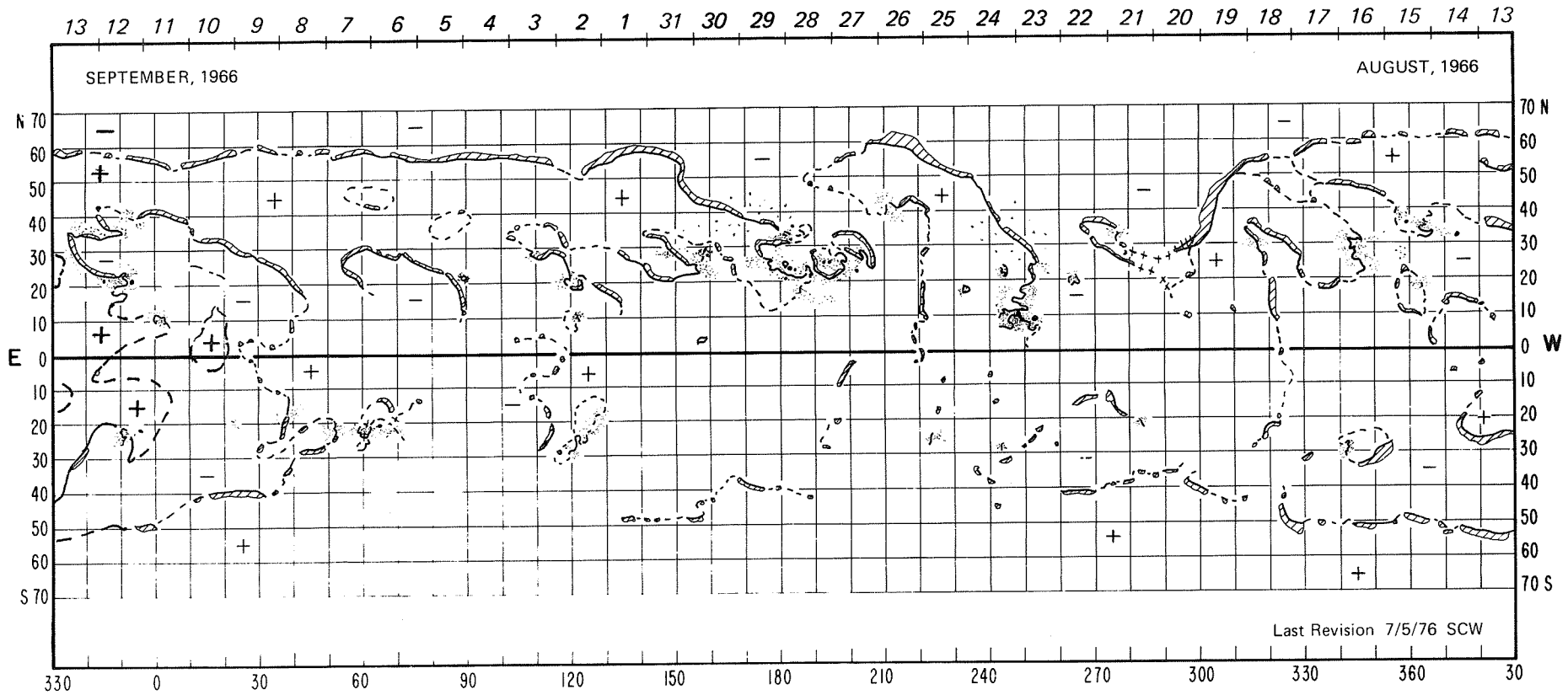
1966 - Rotation 1511

°Long.	°Lat.	Date	Descriptive Notes
358	N27	8/11-12	Region of faint plage devoid of spots developed and expanded during remainder of disk passage. This example indicates that magnetic flux does emerge in addition to flux within active spotted regions.
		8/17	Filament disappeared.
350	S30	8/15	Formation of filament in apparent response to nearby developing region.
345	N47	8/13	Filament disappeared in response to nearby developing region. Re-formed 15 August.
342	S29	8/13	Birth of small active region.
320	N15	8/15	Filament disappeared as region formed at northern end.
316	N30	8/15	Birth of small active region, which had disappeared next day.
305	N40	8/23	Filament became exceptionally large during last 3 days of disk passage.
283	S21	8/18	Birth of tiny active region that disappeared next day.
272	N34	8/26	Semicircular filament disappeared.
264	N20	8/24	Birth of small active region.
248	N09	8/23	Birth of important active region, which emerged on a major preexisting north-south neutral line. Growth continued until 28 August; when near west limb, it had developed into a class E spot group. The leader sunspot became exceptionally large and dark and returned for 5 additional solar rotations, becoming the longest lived sunspot of this solar cycle.
223	S25	8/24	Birth of tiny active region.
220	N55	8/23-24	Gradual disappearance of filament.
199	S05	8/24	Filament disappeared.
197	N25	8/22	Birth of moderate active region that attained maximum as a class D spot group 23-24 August. Rapid dissolution of this group thereafter was accompanied by rapid growth of a major proton-flare region immediately east of its position.
		9/1	Disappearance of spots occurred simultaneously with the disappearance of spot north of the nearby proton-flare region.
182	N23	8/22	East limb passage of peculiar sunspot group that may have formed just the previous day. Umbrae within the small round penumbra rotated in counterclockwise manner about some common center during the first half of the disk passage.
		8/27-28	Apparent acceleration of relative spot motions and rapid growth of new spots and penumbra south of the original spots. Class 3B proton flare occurred at about 1530 UT on 28 August: the subject of numerous detailed reports as part of the Proton Flare Project. Note (1) that the remnant plage and sunspot from the proton flare region of 2 rotations earlier had drifted eastward so that these two regions shared the same solar longitude at the time of peak activity, and (2) that the older spot disappeared near the time of peak activity in the new region.
		8/28-9/2	Spots grew and darkened until date of second and stronger of the two proton flares in this region.
158	N28	9/4	Birth of small active region that was still growing at west limb passage on 6 September. A significant region was at this location on the next solar rotation.
150	N28	9/2	Filament within faint plage disappeared.
145	N21	8/31	Filament disappeared.
122	N10	8/31	Birth of tiny active region.
120	N20	8/28	Birth of small region under small filament.
		8/29	Filament disappeared over growing plage.
115	N28	9/3	Filament disappeared.
		9/6	Filament re-formed by this date.
		9/7	Filament disappeared.
60	S22	9/4	Birth of active region that grew slowly for first few days of its life.
		9/9	Rapid growth of spots and plage.
52	S23	9/5	Birth of active region, which also grew slowly for first few days.
		9/9	Rapid growth of spots and merger with region immediately to west. Peak development for this complex occurred 10 September.
38	S18	9/10	Minor growth of plage and first sunspots within faint region that was visible previous 7 days.
2	N10	9/12	Birth of small active region.

Note: Days without H-alpha photographs were 19 and 22 August 1966.

Hα SYNOPTIC CHART

1966 – ROTATION 1511



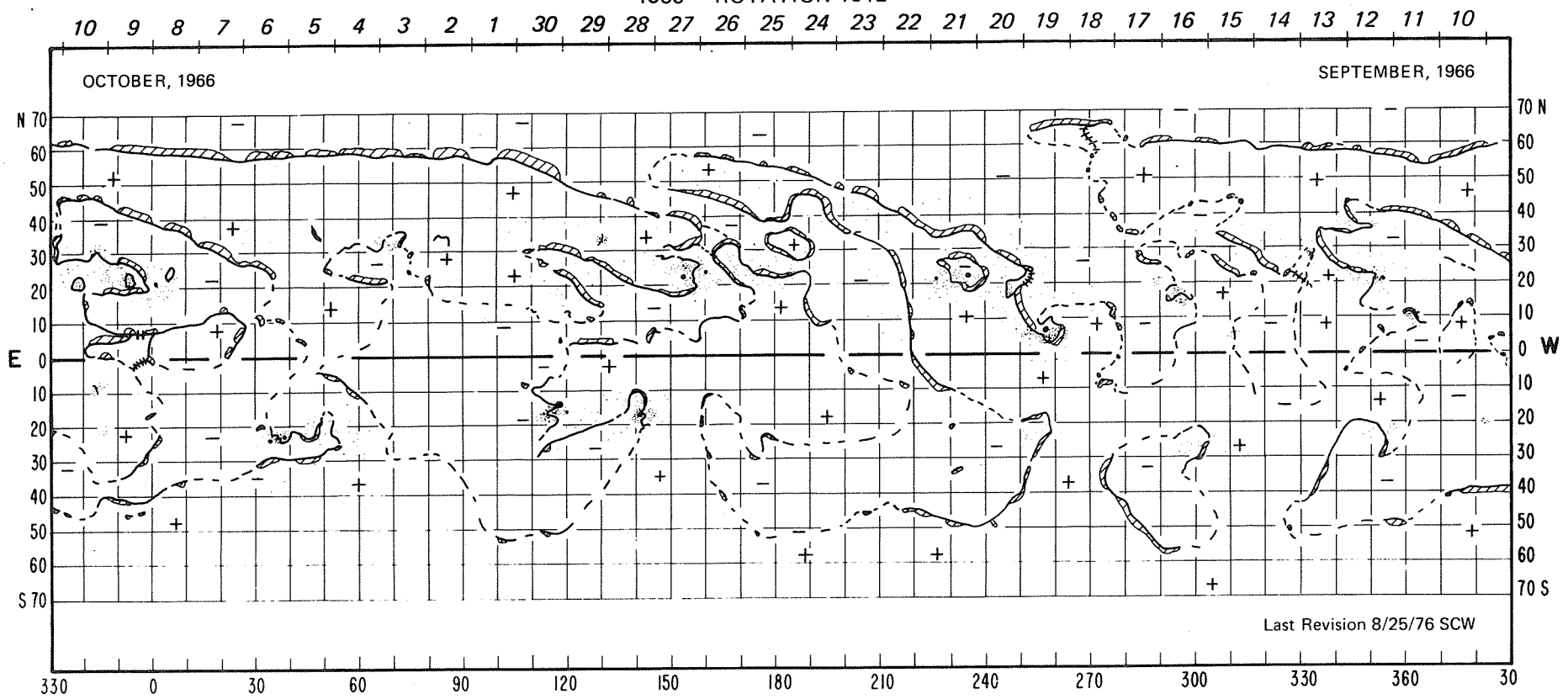
Hα SYNOPTIC CHART
1966 - Rotation 1512

°Long.	°Lat.	Date	Descriptive Notes
333	N27	9/12	Small region born; faded next day.
311	N05	9/17	Small region born.
307	N25	9/12	Filament disappeared.
295	N17	9/18	Birth of region that became brightest 22 September at west limb.
257	N07	9/13	Second disk passage for longest-lived sunspot of Solar Cycle 20.
247	N18	9/24	Birth of small region near filament.
230	N22	9/15	Birth of small active region with moderate size type D sunspot group.
		9/18-19	Filament encircling leader sunspot entered sunspot and also interacted with large filament to the west.
218	N30-S10	9/20	Large filament disappeared.
163	N45	9/30	Almost all of filament disappeared.
162	N34	9/30	Merger of two peninsulas of positive polarity with rearrangement of neutral lines.
		10/2	All nearby filaments disappeared.
158	N35	9/22	Two filaments disappeared. Partially re-formed during the remainder of disk passage.
157	N23	9/29	New growth on northern border of large bright region with follower-dominant spot groups.
144	N14	9/23	Filament visible this day only.
142	S17	9/27	Birth of small active region, which grew slowly until 2 October.
130	N33	9/27	Birth of very small region.
126	N14	9/23	Filament visible this day only.
120	N30	9/27	Part of filament disappeared.
		9/29	Entire filament disappeared.
116	S17	9/30	Birth of small active region with spot group at maximum on 2 October.
110	N55	9/22-10/5	Filament very large and active.
		10/6	Filament disappeared.
46	S23	10/2	Birth of small region.
37	S23	10/5	Birth of region with maximum sunspot development on 8 October.
25	N27	10/12	Disappearance of large filament, which formed rapidly after 6 October.
10	N37	10/6	Almost all of long filament disappeared.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1966 – ROTATION 1512



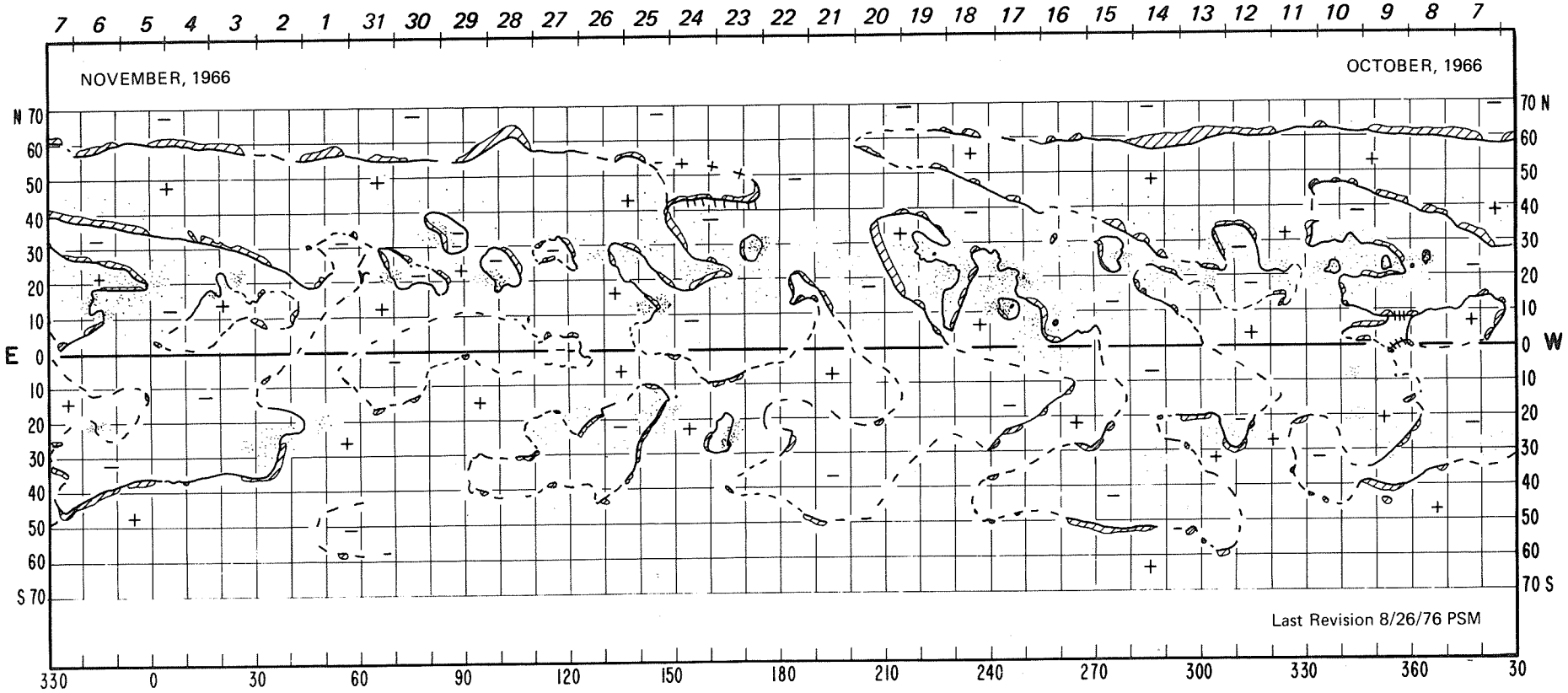
Hα SYNOPTIC CHART
1966 - Rotation 1513

°Long.	°Lat.	Date	Descriptive Notes
353	N23	10/3	Small negative-polarity island connected to neutral line south of this position.
		10/9-10	Island gradually disappeared and neutral line took original form to south. Leader sunspot simultaneously disintegrated into cluster of very small spots.
337	N22	10/9	Small new region formed in following portion of large new region.
332	N32	10/8	Small filament disappeared.
305	N18	10/18	Birth of small active region near west limb.
278	N26	10/10	Birth of small active region, which dissipated after 11 October.
277	N34	10/12	Filament disappeared.
259	N07	10/10-22	Third disk transit of longest-lived sunspot of Solar Cycle 20. Neutral line notably concentric to sunspot.
246	N22	10/13-17	Rapid growth of region that formed near east limb 2 days earlier. Growth on 15 October suggested a second region emerging south of the first. Growth on 16-17 October suggested yet another (third) region emerging southwest of leader of first group.
243	N13	10/18	Birth of strong active region, which developed type E spot group. It was still growing at west limb on 23 October.
210	N25	10/21	Large filament disappeared.
175	N30	10/22	Birth of small active region.
166	S25	10/24	Birth of small active region with sunspot.
155	S09	10/21	Filament disappeared.
150	N35	10/25-31	Filament grew to large height, while wave pattern in neutral line to north disappeared.
145	N13	10/19	Birth of moderate active region, which reached peak development 21 October as a type D spot group.
120	N30	10/22	Filament disappeared.
107	S30	10/25-26	Small filament disappeared.
97	N20	10/28	Birth of small region.
69	N22	10/28	Birth of small region.
36	S30	11/3	Large active filament formed in aged active region.
0	N37	11/6	Large filament disappeared.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1966 – ROTATION 1513



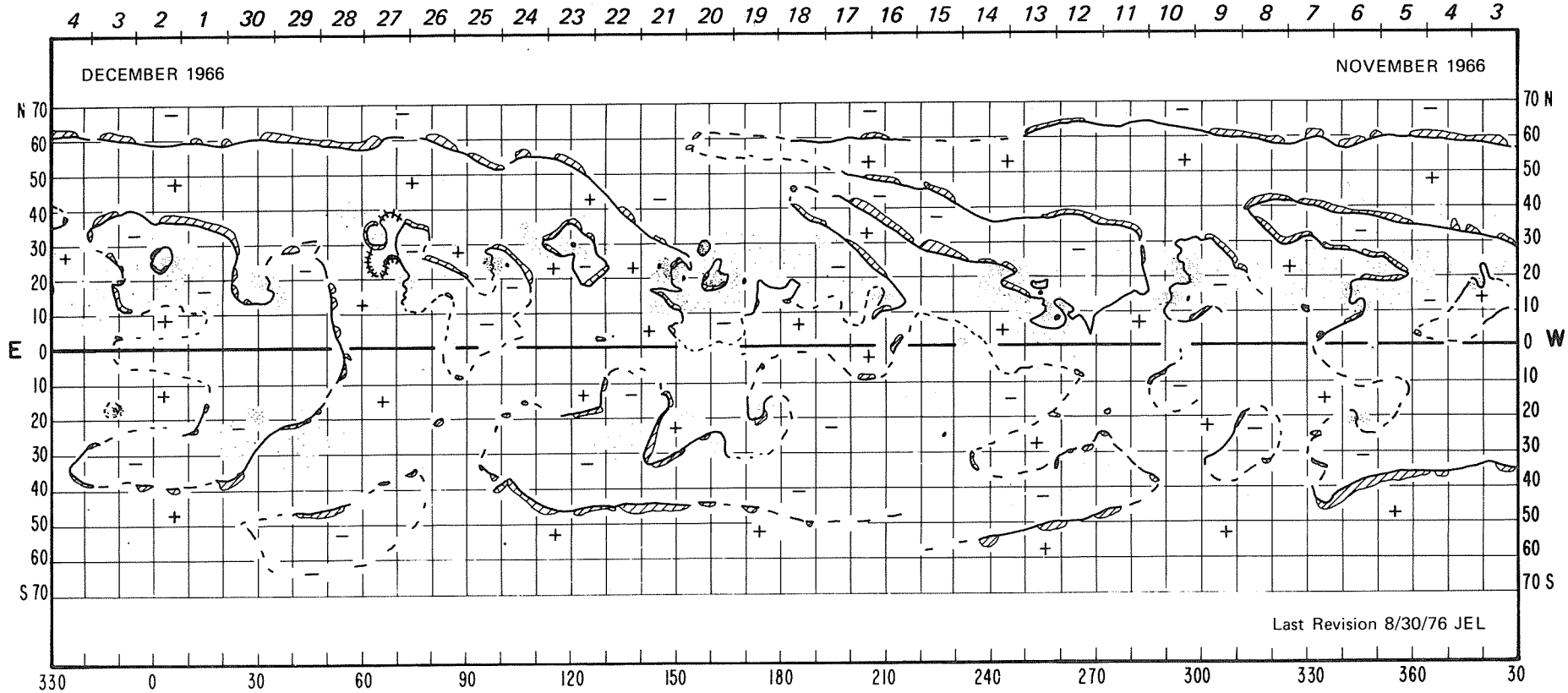
Hα SYNOPTIC CHART
1966 - Rotation 1514

°Long.	°Lat.	Date	Descriptive Notes
353	N24	11/5	Filament disappeared within faint plage.
335	N38	11/6	Large filament disappeared.
296	N18	11/5	Birth of small active region, which reached largest size next day as class B spot group.
		11/6-7	Group blended with larger new active region directly north of its location.
294	N23	11/6	Birth of active region, which grew to class C by 8 November and blended with older region south of its position.
292	N14	11/9	Birth of moderate active region, which grew to a large class C spot group by 12 November.
270	N36	11/8	Large filament disappeared.
255	N12	11/11	Formation of new bipolar plage and spot group between 2 large old leader sunspots.
253	N17	11/10	Formation of new spots and plage on northern edge of old leader sunspot.
253	N07	11/13	Important growth of new plage and spots near eastern edge of large spot, which had returned 6 November for its fourth solar rotation.
		11/18	Maximum size of spots and penumbra in complex configuration.
226	N27	11/13	Formation of large filament.
		11/20-21	Filament disappeared near west limb.
225	N43	11/14	Filament disappeared gradually.
209	N14	11/19	Birth of small active region.
205	N24	11/12	Filament disappeared near east limb.
175	S18	11/20	Birth of small active region.
165	N19	11/14	Birth of active region at east limb, which grew to maximum 18 November as class C spot group.
		11/19	Began more rapid dissolution, as strong new region developed immediately east of this location.
150	N21	11/19	Birth of major active region, which grew to complex class D spot group by 22 November. It emerged on major north-south neutral line that was continuous to the northern polar crown.
145	S27	11/22-23	Large semicircular filament disappeared.
135	N38	11/18	Large filament disappeared near east limb.
125	S18	11/25-26	Filament disappeared.
110	S45	11/22-23	Filament disappeared.
97	N25	11/27	Birth of moderate active region where filament and faint plage existed before. Became class D spot group next day.
62	N33	11/28	Filament disappeared.
34	N14	12/4	Birth of small, new region within remnant leader-polarity plage of region born 23 November. Growth may have continued to west limb passage 6 December.
33	N17	11/23	Probable date of birth of moderate active region at east limb. Attained maximum 25 November as class D follower-dominant spot group.
30	S20	12/4	Birth of tiny active region.
5	N26	11/28	Birth of small active region.

Note: Days without H-alpha photographs were 7, 22-23 and 25 November 1966.

Hα SYNOPTIC CHART

1966 – ROTATION 1514



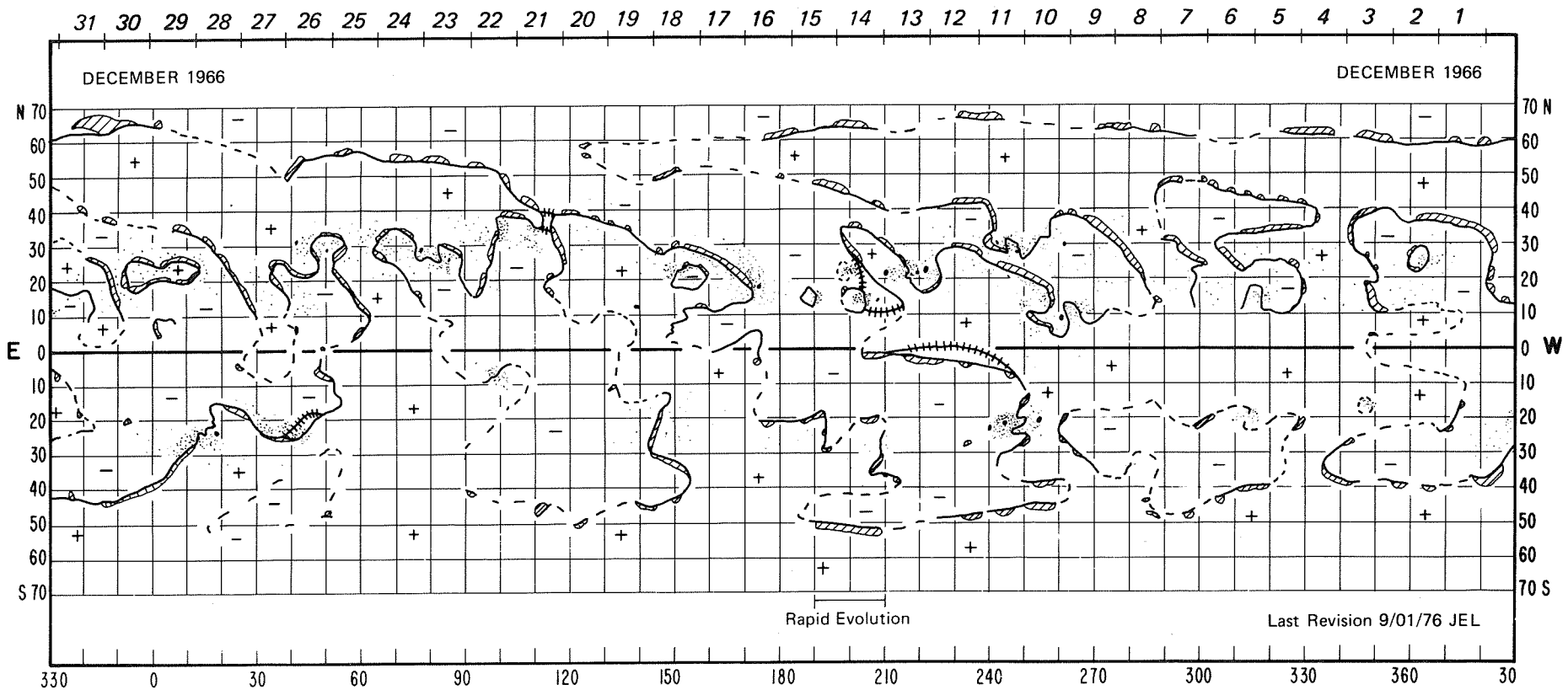
Hα SYNOPTIC CHART
1966 - Rotation 1515

°Long.	°Lat.	Date	Descriptive Notes
346	N09	12/8	Birth of active region with small spots.
278	S33	12/11	Birth of active region.
270	N35	12/4	Filament disappeared.
266	N13	12/4	Birth of active region.
247	S22	12/6 12/12	Birth of major active region. Maximum development as F-type sunspot group, largest in Southern Hemisphere thus far in Solar Cycle 20.
245	N30	12/8	Birth of active region that formed a D-type sunspot group.
233	N28	12/8	Semicircular portion of large filament disappeared.
216	N22	12/5-6 12/12	Birth of region at east limb. Maximum development as E-type sunspot group.
215	Equator	12/9	Large filament disappeared.
204	N16	12/14	Birth of active region.
200	N22	12/18	Birth of active region.
198	N28	12/18	Filament disappeared with birth of region.
190	S50	12/17	Filament disappeared.
188	N17	12/17	Birth of active region.
125	N37	12/17	Semicircular portion of large filament disappeared.
100	S06	12/20	Birth of active region.
98	N25	12/20	Filament disappeared; re-formed next day.
78	N25	12/24	Birth of active region; became D-type group.
44	N28	12/20	Birth of active region at east limb.
39	S23	12/29	Minor growth of plage within faint region.

Note: Days without H-alpha photographs were 7 and 24-26 December 1966.

Hα SYNOPTIC CHART

1966 – ROTATION 1515



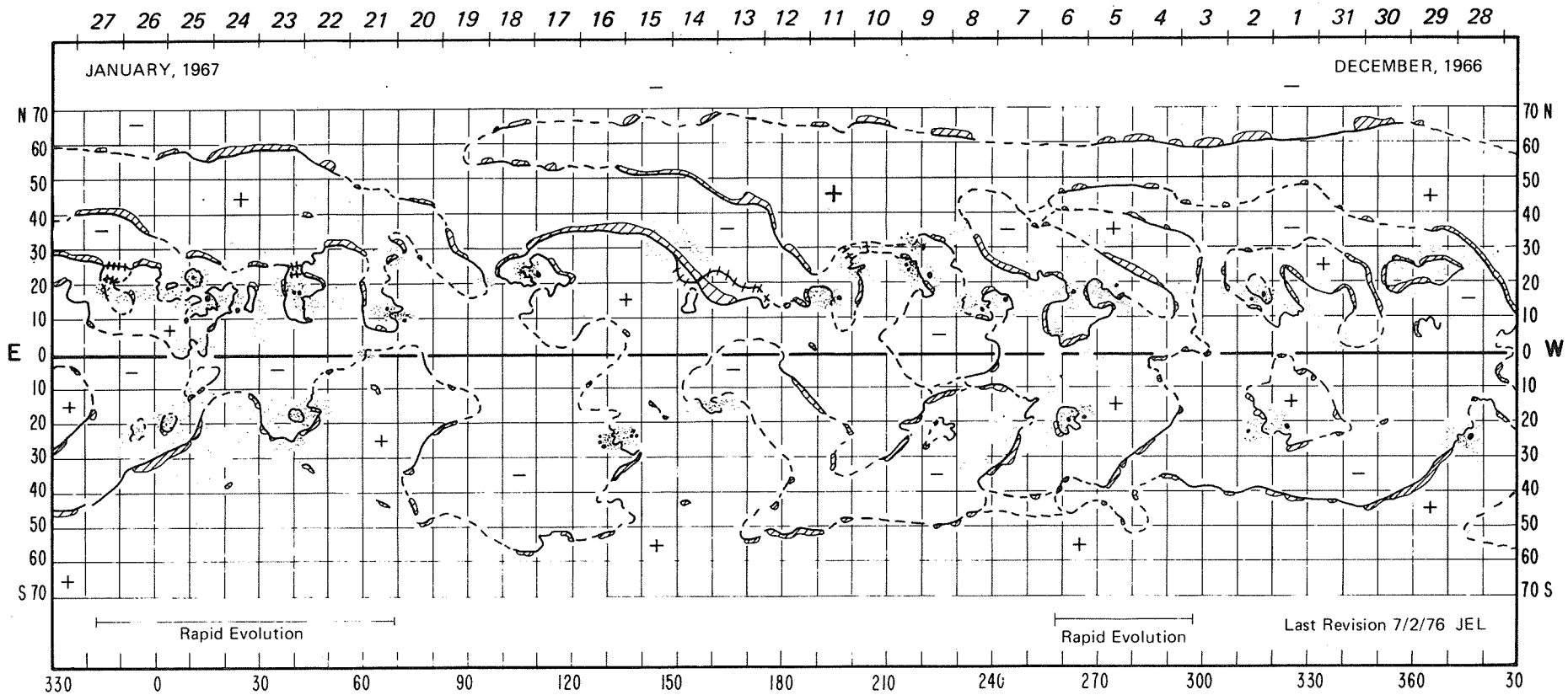
Hα SYNOPTIC CHART
1966-1967 - Rotation 1516

°Long.	°Lat.	Date	Descriptive Notes
355	N22	12/31	Semicircular filament within faint plage disappeared.
318	S22	12/29	Birth of large active region that reached class E spot group by 3 January. Developed large dark surges extending west of the very large leader spot.
316	N16	1/2	Birth of region that attained class D spot group by 3 January.
300	N60	1/7-8	Polar crown filament disappeared.
280	N23	1/7-8	Filament disappeared.
263	S19	1/2	Birth of active region on leading border of large faint plage. Grew to maximum as large class D spot group by 6 January.
261	N19	1/2	Birth of active region that developed class D spot group by 3 January.
255	N09	1/2	Filament on eastern border of small active region disappeared near east limb.
245	S28	1/11	Large filament disappeared from within faint, extensive plage.
240	N13	1/8	Birth of active region on leading border of small region that formed 3 days earlier. Grew to maximum as large class D spot group by 11 January.
232	N14	1/5	Birth of small active region.
219	N24	1/5	Birth of major active region that grew to maximum by 10 January as large class D spot group.
192	N16	1/10	Birth of active region that grew to maximum as class C spot group by 14 January. Leader spot continued to develop through west limb passage 17 January. Returned next rotation as very large spot.
155	N49	1/12	Large filament disappeared.
132	S24	1/10	Birth of major active region near east limb. Grew to maximum size as class E spot group by 14 January.
115	N34	1/14	Portion of large filament disappeared, in apparent response to developing active region southeast of this location.
		1/20	Filament re-formed.
107	N23	1/12	Probable date of birth of active region at east limb that grew to class C spot group by 15 January.
95	N20	1/21	Birth of small active region.
69	N11	1/18	Birth of moderate active region that grew to maximum as a small class D spot group.
42	N23	1/22	Plage near neutral line brightened, perhaps coinciding with rearrangement of neutral lines to include large region to south.
	N17	1/22	CMP of peculiar follower-dominant class D spot group, which was past maximum development when first observed at east limb on 16 January. Developed numerous additional spots when near central meridian. Appeared to be blend of two active areas closely spaced in latitude.
41	S18	1/20	Birth of small active region on following border of large, faint plage.
17	N14	1/20	Birth of active region near east limb, between two existing regions. These three regions blended to form one of the first major activity complexes of Solar Cycle 20. Maximum sunspot development 27 January after an irregular trend of growth.
14	N02	1/26	Birth of tiny active region.
12	N22	1/22	Birth of active region on northern border of activity complex. Irregular growth to maximum by 28 January as class D spot group that blended with group of similar scale south of this location.
11	S20	1/27	Portion of filament disappeared within faint plage.
10	N02	1/25	Birth of tiny active region.
3	S20	1/21	Birth of very small active region near east limb.

Note: Days without H-alpha photographs were 4, 5 and 7 January 1967.

Hα SYNOPTIC CHART

1967—ROTATION 1516



Hα SYNOPTIC CHART

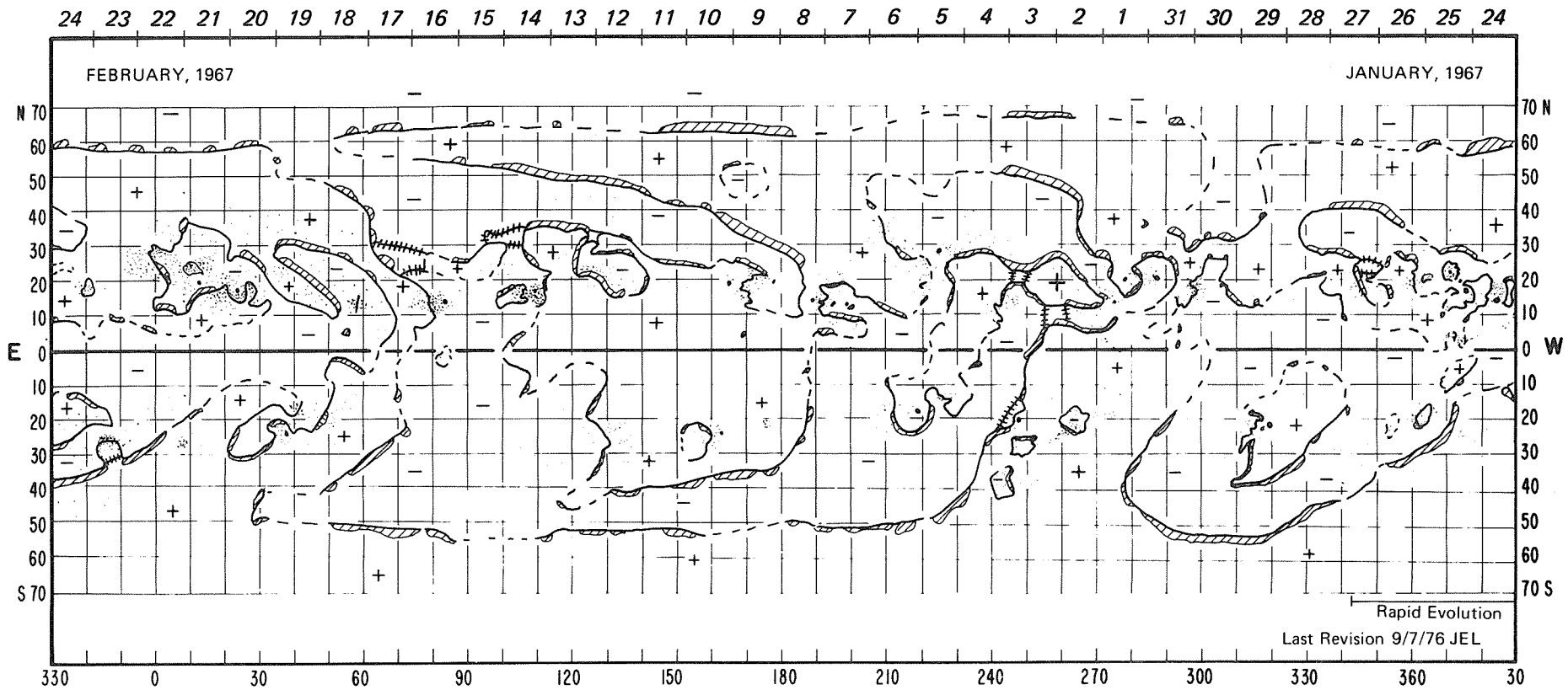
1967 - Rotation 1517

°Long.	°Lat.	Date	Descriptive Notes
353	S22	1/27	Birth of small active region.
349	N40	1/30	Filament disappeared.
339	N28	1/29	Filament disappeared, possibly related to filament disappearance on same neutral line to north on 30 January.
315	S54	2/1	Large southern polar crown filament disappeared same day as similar filament disappearance along northern polar crown.
300	N31	1/28	Filament disappeared; reappeared 30 January.
271	N13	1/28	Probable date of birth of active region near east limb. Maximum development by 1 February as class C spot group.
263	N23	2/2	Filament disappeared that had been associated with extensive area of faint plage.
258	N47	2/1	Large filament disappeared almost the same time as similar filament disappearance near south pole.
248	N23	2/5	Filament disappeared from within extensive area of faint plage.
246	S20	2/1	Birth of small active region near large filament. A portion of the filament disappeared 3 February as the neutral line incorporated this new active region.
220	S22	2/5	Semicircular filament disappeared; associated with large, single sunspot.
216	S14	2/2	Birth of small active region.
192	N14	2/6	Birth of important active region on existing neutral line of large old region with great leader sunspot. Rapid decay of the old spot accompanied growth of new spots. Maximum development of new region by 9 February as class D spot group.
175	S35	2/5	Filament disappeared near east limb.
	N20	2/12	Great filament disappeared near west limb.
171	N19	2/3	Probable date of birth of significant active region at east limb. Grew to class E spot group by 7 February.
165	N63	2/9	Polar crown filament disappeared.
162	N28	2/6	Birth of small active region.
152	N25	2/6	Filament disappeared at east limb; re-formed 8 February.
130	N49	2/13	Portion of large filament disappeared directly north of developing filament within large old plage.
122	N21	2/14	Large S-shaped filament disappeared within large extensive plage. Eruption occurred at 1747 UT previous day, preceding one of the largest H-alpha flares (in area) during this solar cycle. Sunspots were very small or absent on flare day in a region that had been declining since east limb passage. This filament, and filaments north of the active region, were active for several days before the flare.
110	N12	2/10	Filament disappeared.
109	N15	2/13	Birth of new plage and spots in leading portion of existing active region. New spots grew to class D spot group by 16 February.
79	N13	2/10	Probable date of birth of small active region at east limb. Maximum development by 12 February as small class C spot group.
65	S52	2/17	Filament disappeared.
	N25	2/20-21	Filament disappeared; had been highly variable for previous 5 days.
62	S30	2/16	Filament present this day only.
59	N15	2/19	Birth of small active region.
55	S03	CMP 2/18	Filament intermittently present and especially active.
46	N18	2/18	Filament disappeared from within large area of faint plage.
41	S18	2/21	Birth of very small active region.
23	S30	2/24	Semicircular filament disappeared from within small faint plage. Re-formed next day.
13	N16	2/19	Filament disappeared; associated with large, old active region.
8	S26	2/27	Birth of small active region near west limb.
3	S25	2/19	Portion of filament disappeared.

Note: Day without H-alpha photographs was 20 February 1967.

Hα SYNOPTIC CHART

1967 – ROTATION 1517



Hα SYNOPTIC CHART

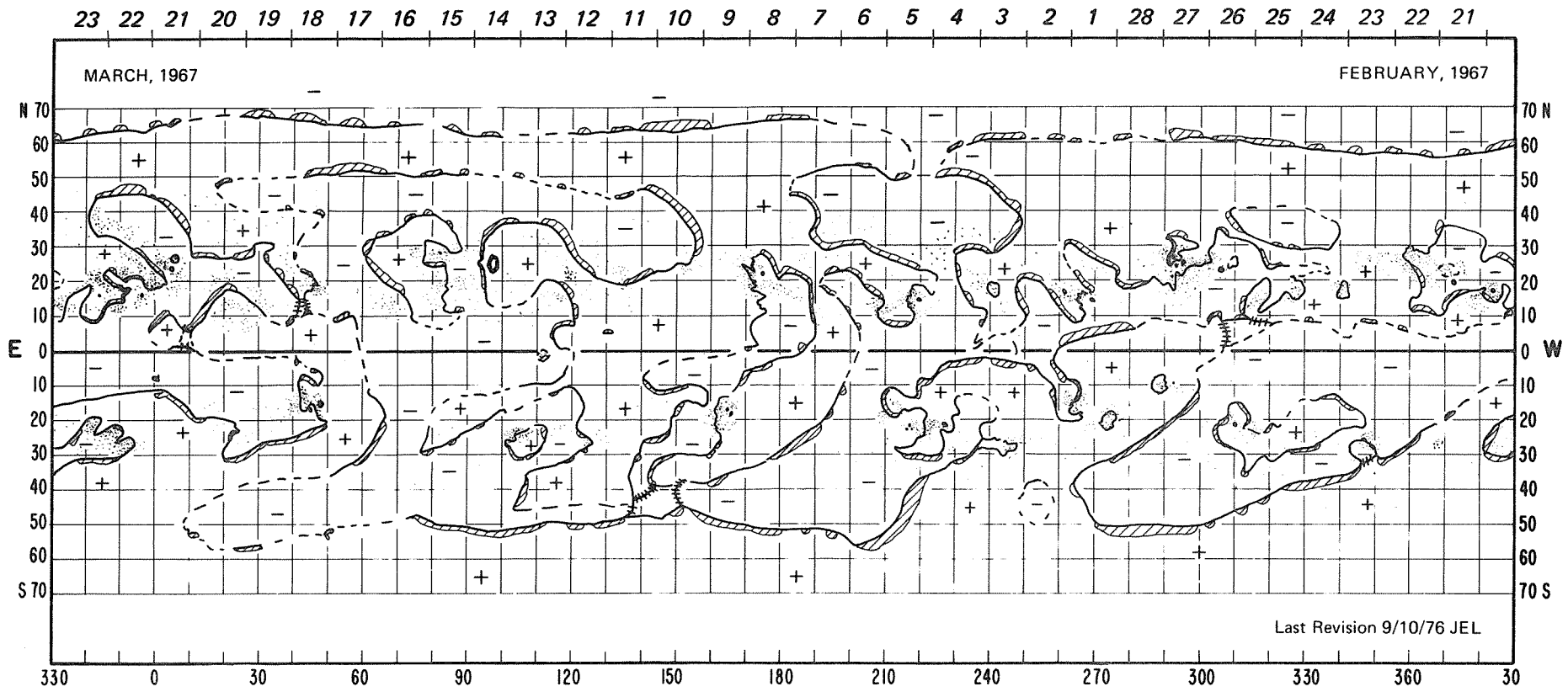
1967 - Rotation 1518

°Long.	°Lat.	Date	Descriptive Notes
340	N19	2/20-21	Birth of small active region.
310	S21	2/26	CMP of symmetric sunspot surrounded by marked vortical structure with a clockwise sense of twist.
300	N22	2/25	Peak development of giant class F spot group that extended approximately 20° in longitude. This was the largest spot group since 1960.
290	S10	2/28	Birth of small active region.
276	S19	2/26	Birth of small active region.
270	N05	2/26-27	Filament disappeared, in apparent response to growth of active region north of this location.
265	N15	2/27	Birth of active region that grew to maximum 2 March as large, simple class E spot group.
264	S14	2/26	Birth of small active region.
246	S27	2/27	Birth of small active region.
240	S03	3/3	CMP of filament that was very active and intermittently visible throughout disk passage.
222	S21	3/3	Peak development of class E spot group that displayed complex, rapid evolution. Associated filaments complex and active.
216	N15	3/1	Birth of active region in northern portion of old plage that consisted of two regions with declining small spots groups. New spots grew to maximum 4 March as small class E spot group.
215	S45	2/28	Large filament disappeared at east limb.
165	S49	3/14	Filament disappeared near west limb.
162	S20	3/6	Peak development of class D spot group with large spot count, with penumbra encompassing entire group, and with group axis inclined to the solar equator at an unusually large angle.
150	N39	3/9	Almost all of large filament disappeared.
145	S35	3/12	Several filaments disappeared, in apparent response to rearrangement of neutral lines.
120	N28	3/15	Filament disappeared.
	N24	3/17	Birth of small active region near west limb.
104	S24	3/10	Birth of small active region.
		3/14	Small filaments that were associated with this plage disappeared.
97	N25	3/11-12	Small circular filament disappeared.
88	N29	3/10	Birth of small active region near east limb.
84	N19	3/10	Birth of small active region near east limb.
78	N28	3/13	Birth of small active region that grew to class C spot group on 15 March.
55	N51	3/18	Filament disappeared.
46	N18	3/16	Birth of small active region with unusually slow growth. Small class B spot group persisted for almost all of disk passage.
45	S17	3/15	Growth of new spots near center of small class E spot group created complex region with high spot count. Maximum development by 17 March.
		3/22	Additional spots and plage formed at following end of region.
8	S15	3/21	CMP of filament that was especially active.

Note: Days without H-alpha photographs were 26 February and 11 March 1967.

Hα SYNOPTIC CHART

1967 – ROTATION 1518



Hα SYNOPTIC CHART

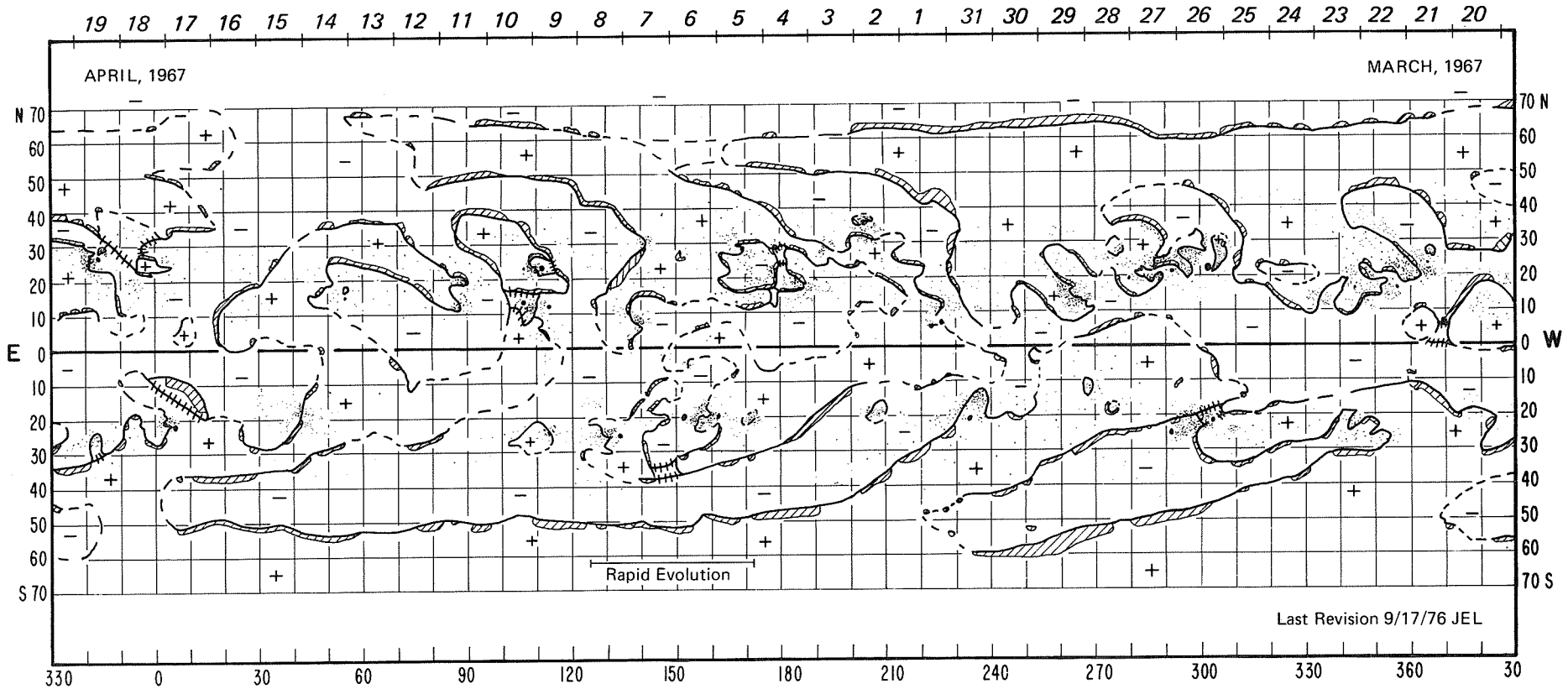
1967 - Rotation 1519

°Long.	°Lat.	Date	Descriptive Notes
347	N20	3/20	Birth of small active region north of and near follower spot of old, small class E spot group.
334	N12	3/21	Birth of small active region.
298	S22	3/27	Birth of major active region with rapid growth to class E spot group. Reached maximum 30 March.
285	N20	3/21	Probable date of birth of major active region in trailing portion of a great plage that had returned for its second disk transit. New spots attained maximum as class E on 30 March. Important growth and spot motions evident each day of disk passage.
206	S19	4/2	Birth of small active region.
205	N36	4/3	Birth of small active region.
172	S21	4/8	Birth of small active region.
158	S20	4/6	Birth of active region that grew to class E by 10 April. Neutral line pattern in vicinity greatly altered by region's growth.
144	N15	4/7	Filament disappeared.
130	S25	4/4	Birth of active region. Maximum development occurred next day as class C spot group with high spot count.
113	S21	4/5	Birth of small active region.
110	N12	4/13	Birth of active region that was still growing during west limb passage on 15 April. By 15 April it had attained a class D spot classification.
109	N23	4/7	Birth of active region with maximum development on 11 April as class D spot group.
78	N17	4/10	Part of filament disappeared.
65	N37	4/9	Filament disappeared at east limb.
55	N16	4/17	Birth of new region at position of small spot that had appeared at east limb on 8 April and that had disappeared by 16 April. New spots never exceeded class B.
45	S30	4/9	Filament disappeared near east limb.
20	S37	4/12	Filament disappeared at east limb.
	N12	4/19	Filament disappeared after exhibiting great activity for previous 7 days.
10	S10	CMP 4/17	Filament very active. Proper motion to northwest during disk passage.
3	S21	4/16	Birth of active region with little growth during first 5 days.
		4/19	Beginning of more rapid growth with maximum on 22 April as class C spot group.

Note: Days without H-alpha photographs were 26 and 29-31 March and 11 April 1967.

Hα SYNOPTIC CHART

1967 – ROTATION 1519



Hα SYNOPTIC CHART

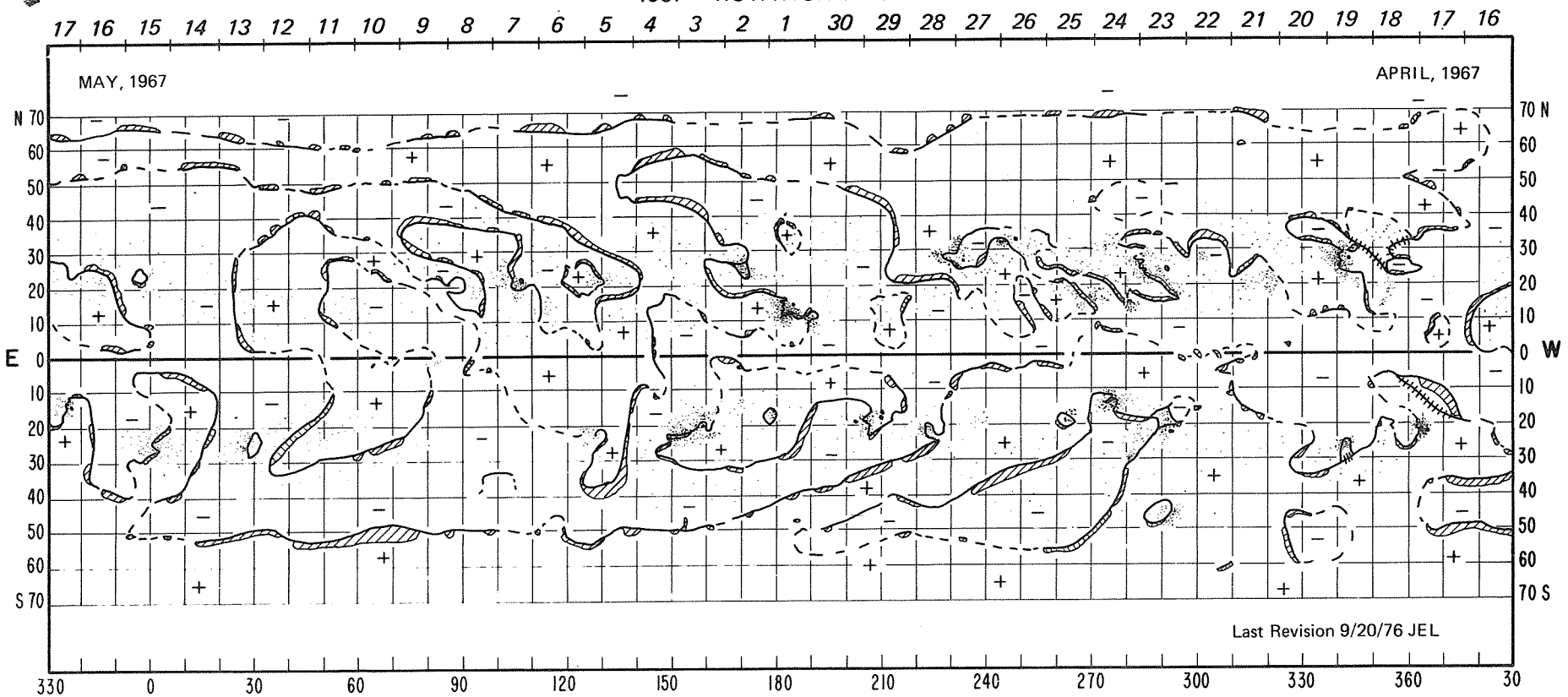
1967 - Rotation 1520

°Long.	°Lat.	Date	Descriptive Notes
342	N28	CMP 4/19	Active region appeared at east limb 13 April with almost all of plage in following portion of region and with neutral line curved concentric to a large leader sunspot. The plage nearly disappeared by west limb passage, although the leader sunspot remained. This spot had an unusually slow rate of solar rotation for its latitude, shifting 16° to the east by rotation 1521. The associated large-scale neutral-line pattern continued this rate of motion into rotation 1522.
	S26	4/23	Birth of small active region.
295	N39	4/21	Large filament disappeared as neutral-line pattern north of aged active center simplified.
293	S45	4/21	Birth of small active region.
275	S45	4/24	Large filament disappeared in apparent response to slowly growing active region west of this location.
264	S19	4/22	Birth of small active region.
252	S32	4/29	Large filament disappeared.
246	N33	4/27	Birth of small active region.
230	N28	4/24	Birth of new plage and spots in following portion of existing small spotted region. Older spots quickly decayed as new spots developed. Maximum development occurred on 27-28 April as class D spot group with irregular penumbrae containing mixed polarities. Spots and plage had disappeared before west limb passage on 3 May. This location generated a great activity complex by the time it returned to east limb 2 weeks later.
212	S22	5/1	Birth of small active region.
205	S18	4/24	Birth of active region at east limb.
		4/27	Beginning of rapid growth to maximum next day as class D spot group.
190	N09	5/4	Birth of small region on southwest border of active region.
187	S22	4/30	Partial disappearance of large filament.
183	N13	4/29	Beginning of growth within small faint plage.
		5/2	Maximum development as simple, class D spot group.
180	S17	5/6	Birth of small active region.
165	N18	5/5	Filament disappeared.
154	N43	5/5	Filament disappeared.
137	S25	5/8	Large curved filament disappeared.
135	N17	4/30	Filament disappeared near east limb.
130	N30	5/4	Filament disappeared.
104	N27	5/9	Large filament disappeared near large, symmetric sunspot.
65	S49	5/9	Large filament disappeared.
43	S20	5/11	Large filament disappeared within extensive faint plague.
25	S50	5/14	Filament disappeared.
24	N10	5/14	Filament disappeared.

Note: Days without H-alpha photographs were 16 and 17 May 1967.

Hα SYNOPTIC CHART

1967 – ROTATION 1520

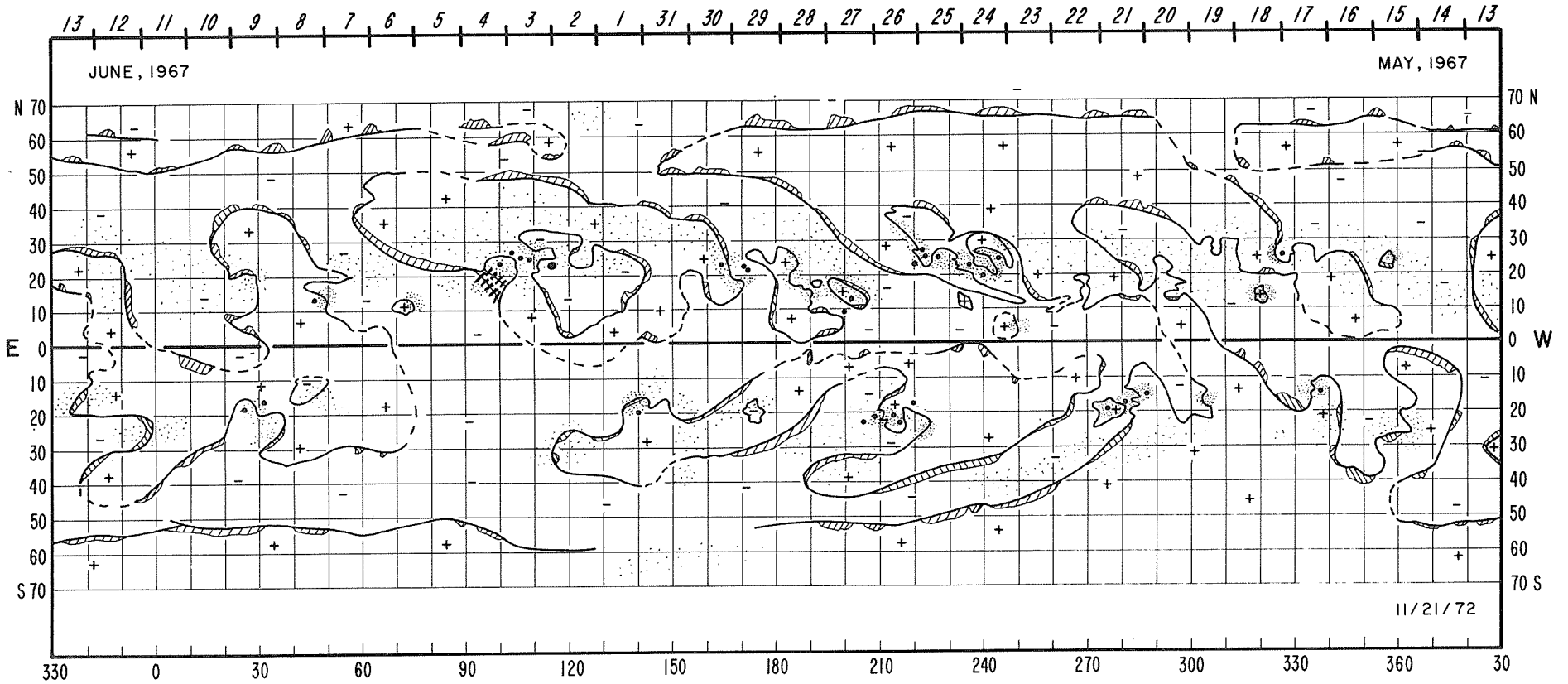


Hα SYNOPTIC CHART
1967 - Rotation 1521

°Long.	°Lat.	Date	Descriptive Notes
335	S14	5/12	Birth of active region near east limb.
326	N26	5/18	CMP of single, large sunspot with large-scale neutral line closely concentric to the spot. Rotation rate for this spot abnormally slow for its latitude (moved 16° east in one rotation) as if the passage of slowly-rotating large-scale features north of this position affected the spot. Very similar patterns, evolutionary sequence, and relationship between sunspot and high-latitude features occurred in 1971 during rotations 1569-1571 at (300,N20).
	S18	5/19	Birth of small active region.
278	S19	5/17-18	Birth of active region at trailing boundary of older region; attained class D spot group by next day.
		5/21	Additional growth of numerous small spots.
263	S21	5/21	Filament disappeared in apparent response to growth of nearby active region.
252	S44	5/21	Partial disappearance of large filament.
250	N04	5/24	Birth of small active region.
243	N27	5/25	Birth of small active region on northwest border of great activity complex, forming the fifth member of the complex.
236	N11	5/24	Birth of small active region.
235	S01	5/25	CMP of especially active filament.
232	N24	5/18	East limb passage of one of the greatest activity complexes of Solar Cycle 20. Composed of three overlapped spot groups at time of first appearance, two of which were growing.
		5/20	Birth of fourth spot group on southern border of complex. Westward relative motion of this group, with respect to large spots to the north, may have contributed to conditions for great flare of 21 May in center of complex.
		5/21	"Collision" between central and western members of the complex, as growth and expansion of central member moved its leader spot into the follower plage of the western member. Large flare occurred over the neutral line between the groups.
		5/23	"Collision" and merger of leader of easternmost member with follower of central member, creating large "delta" magnetic configuration. Closest separation between the opposite-polarity spots coincided with great white-light, proton flare at 1840 UT (see *UAG Report 5*). These spots moved in a rotary pattern with respect to one another during 21-26 May.
		5/28	Additional great flare over the "delta" configuration.
227	N37	5/20	Filament disappeared near east limb with resultant chromospheric brightening; re-formed next day.
		5/22	Filament disappeared again.
223	S25	5/24	Intensification of leading portion of old, faint plage with the appearance of small spots on the next day only.
211	S22	5/24	Birth of active region on trailing border of old plage; maximum development on 27 May as class D spot group.
200	N13	5/23	Birth of active region near east limb and close to northern edge of large single spot. Slow growth to maximum on 28 May as class D spot group.
		5/27	Dark, circular filament developed around leading portion of the (200,N13) region.
179	N10	5/25	Filament disappeared near east limb.
171	N22	5/30	Leader sunspot divided and components rapidly diverged and decreased in size after this date.
170	N18	5/24	Birth of active region near east limb and on southern border of large, mature, active region. New spots reached maximum 27 May as small class D spot group.
145	N39	6/2	Filament disappeared.
126	N25	5/27	Probable date of birth at east limb of small active region.
120	S25	5/29	Filament disappeared at east limb.
108	N23	6/3	CMP and maximum development of great class F spot group that was composed of three blended, smaller groups. Leader spot became especially large and dark after this date.
75	N22	6/8	Partial disappearance of large filament.
74	N11	6/2	Birth of small active region.
50	N13	6/4	Birth of active region that developed follower-dominant class C spot group by 6 June.
	S12	6/4	Birth of small active region.
29	S18	6/7	Intensification of small, faint plage and appearance of small spots.
		6/11	Second phase of growth, reaching maximum next day as class C spot group.
13	S29	6/9	Filament disappeared.
11	S05	6/9	Filament disappeared.

Note: Days without H-alpha photographs were 16-17 May 1967.

Hα SYNOPTIC CHART
1967 - ROTATION 1521



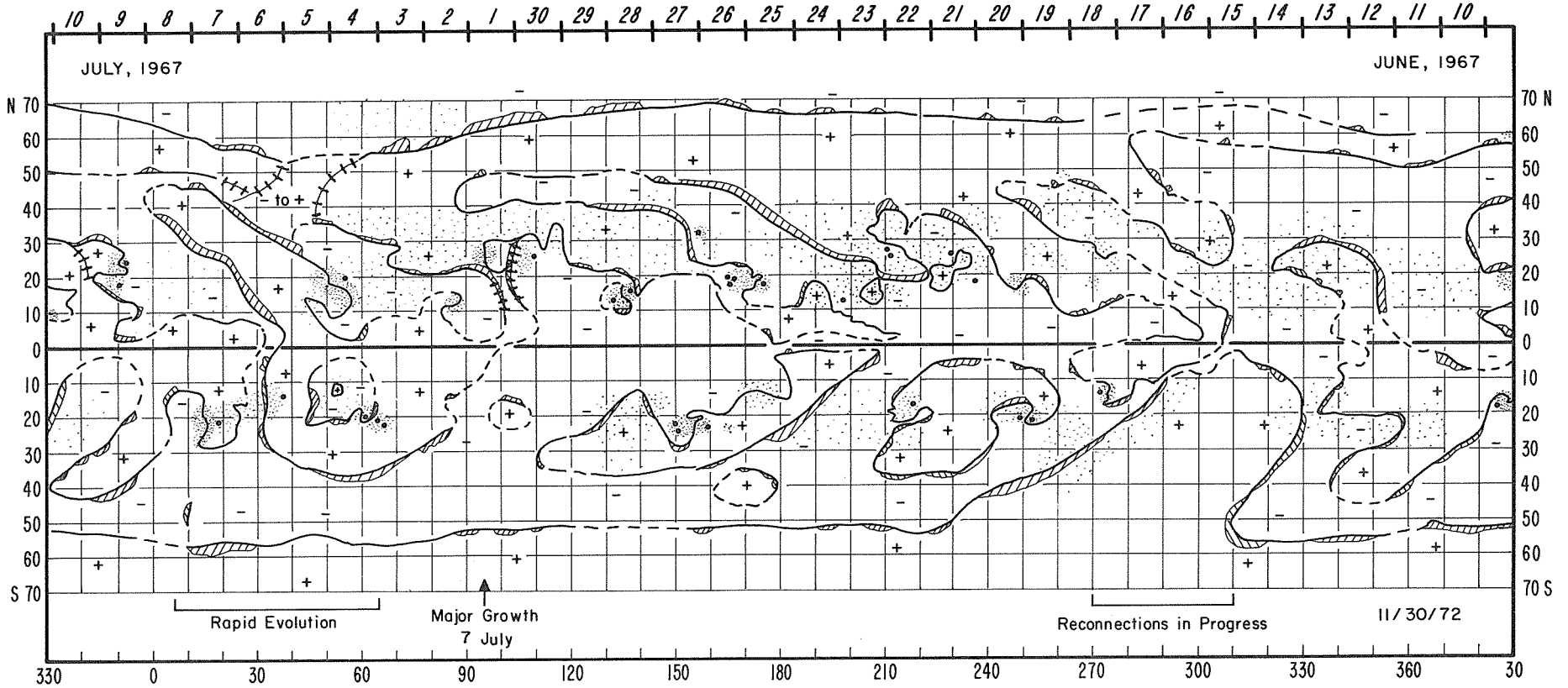
Hα SYNOPTIC CHART

1967 - Rotation 1522

°Long.	°Lat.	Date	Descriptive Notes
352	N15	6/11	Filament disappeared.
336	S15	6/16	Filament disappeared.
315	N25	6/15	Separation between large-scale areas of positive-polarity at former position of sunspot with abnormally slow rotation rate on previous solar rotations. Evidence for large-scale divergence at this location.
309	N33	6/14	Small filament disappeared.
273	S13	6/16 6/21	Birth of small active region with slow rate of growth. More rapid growth for 1 day, followed by rapid fading.
271	N27	6/23	Birth of small active region at west limb.
260	S35	6/21	Large filament disappeared.
250	N17	6/18 6/24	Birth of small active region. Intensified just before west limb passage.
198	N11	6/24	CMP and beginning of rapid dissolution of single spot that returned from previous disk transit with virtually no attendant plage.
190	S17	6/24	Large filament disappeared.
175	N36	6/23	Large filament disappeared.
170	N19	6/22	Maximum development of large class D spot group.
163	S23	6/28	Birth of small active region near western edge of leader spot; no spots appeared.
156	N32	6/30	Birth of small active region near filament.
155	S23	6/22	Birth of active region at east limb that grew to maximum by 25 June as simple class D spot group.
153	N32	7/2	Filament disappeared near west limb, in apparent response to growth of nearby active region.
142	S19	6/26	Filament disappeared.
135	N15	7/1 7/2	Birth of small active region in filament channel. Large and active filament developed over the new region.
95	N26	7/6	Birth of important active region near east limb and in following portion of remnant of great region from previous disk passage. This new region returned next rotation as a large and very active region.
87	N13	6/29	Birth of small active region.
62	S21	6/30 7/2	Birth of active region with slow initial growth. Rapid growth, with maximum development by 4 July as class D spot group; contained "delta" magnetic configuration.
30	N33	7/6	Large filament disappeared as large-scale areas of positive-polarity merged to form great unipolar region observed on next rotation.
10	N29	7/10	Portion of large filament disappeared.

Note: Day without H-alpha photographs was 25 June 1967.

Hα SYNOPTIC CHART
1967 - ROTATION 1522

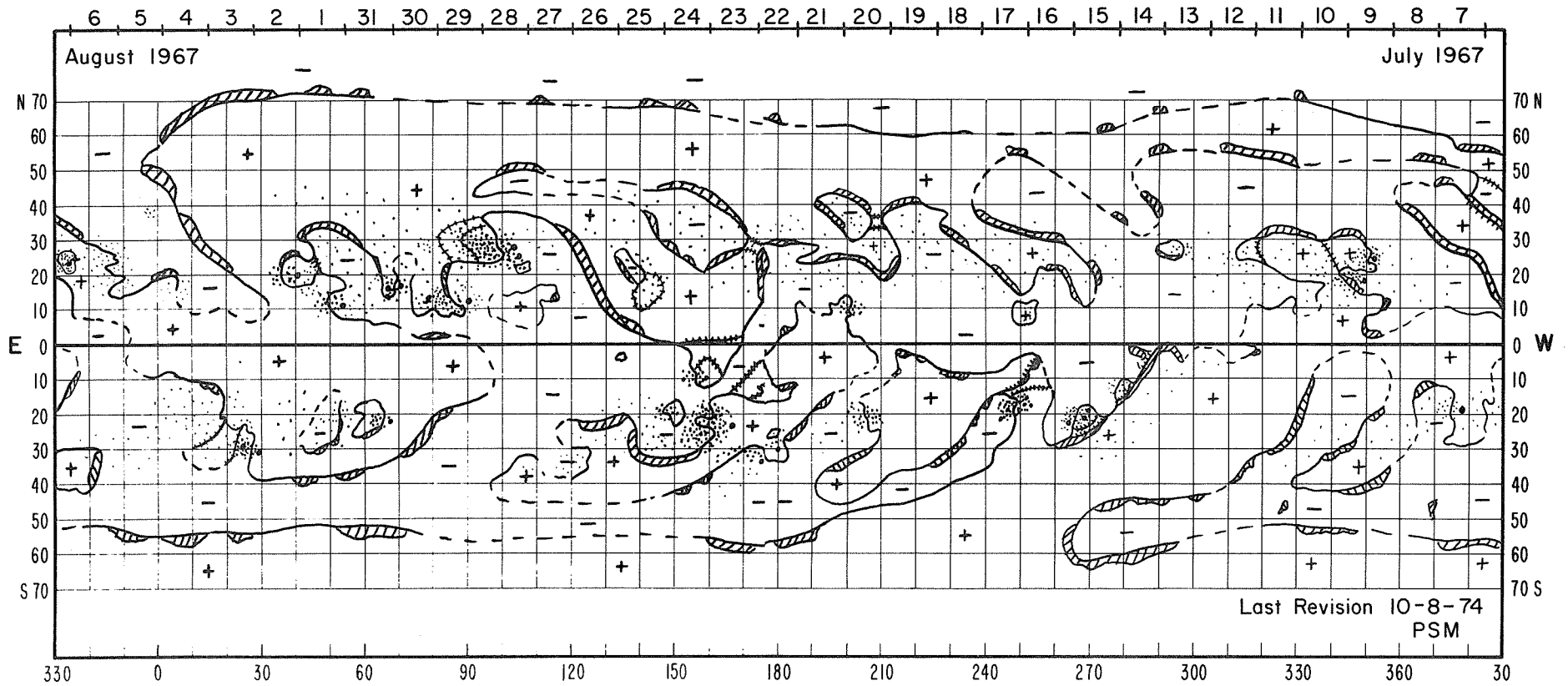


Hα SYNOPTIC CHART
1967 - Rotation 1523

°Long.	°Lat.	Date	Descriptive Notes
351	N25	7/3	Birth of small active region at east limb and north of old region.
		7/7	Second phase of growth with maximum next day as class C spot group.
		7/11	Third phase of minor growth.
		7/14	Fourth, and more substantial, phase of growth just before west limb passage; became class D spot group.
335	N30	7/8	Filament disappeared in apparent response to growth of nearby active region; re-formed by 10 July.
		7/11	Filament disappeared again.
321	N21	7/9	Large curved filament disappeared, as neutral lines to its west rearranged to connect new active region with remnant plage. Filament possibly affected by growth of nearby region.
320	N53	7/9	Filament disappeared near east limb.
313	N25	7/7	Birth of small active region near east limb.
296	N27	7/11	Birth of small active region.
287	N39	7/12	Small filament disappeared in apparent response to growth of small, nearby active region.
282	S12	7/12	Filament disappeared in apparent response to growth of nearby active region.
278	S13	7/10	Birth of small active region near east limb.
268	S27	7/16	Filament disappeared in apparent response to growth of nearby active region.
265	S21	7/10	Birth of active region at east limb that reached maximum 17 July as class B spot group.
255	N07	7/15	Birth of tiny active region.
248	S18	7/11	Birth at east limb of active region that reached maximum 15 July as class D spot group.
225	S06	7/17-18	Filament disappeared.
208	N34	7/20	Rearrangement of neutral lines isolated negative-polarity cell from large-scale neutral line to its west. This area was the remnant of the great activity complex of rotation 1521.
207	N22	7/18	Partial disappearance of filament.
177	S32	7/17	Birth of active region near east limb and in filament channel. Became small class D spot group by 20 July.
170	S30	7/28	Birth of active region at west limb; returned as large region next rotation.
156	S10	7/20	Birth of small active region.
150	S32	7/29	Large filament disappeared at west limb from boundary of large, faint plage.
99	N27	7/29	CMP and maximum development of a great class F spot group with spot count exceeding 100 and area >1500 millionths of the solar hemisphere.
85	N12	7/24	Maximum development of open class E spot group.
69	N17	7/26	Birth of active region that reached class D by 29 July. Flares occurred on neutral line separating this region from the large class E spot group to its west.
50	N30	8/6	Curved filament disappeared near west limb.
46	N22	8/1	Neutral lines rearranged to incorporate isolated active-region neutral line into the large-scale pattern west of the region.
27	S30	8/1	Birth of active region. Reached maximum 5 August as class D spot group with negative slope to spot group axis, i.e., with leader spot at higher latitude than follower.
25	S21	7/29	Birth of active region.
10	N30	8/2	Partial disappearance of large filament.
		8/4	After this date filament re-formed and became especially large for rest of disk passage.

Note: Days without H-alpha photographs were 13 and 31 July 1967.

Hα SYNOPTIC CHART
1967-ROTATION 1523



Hα SYNOPTIC CHART

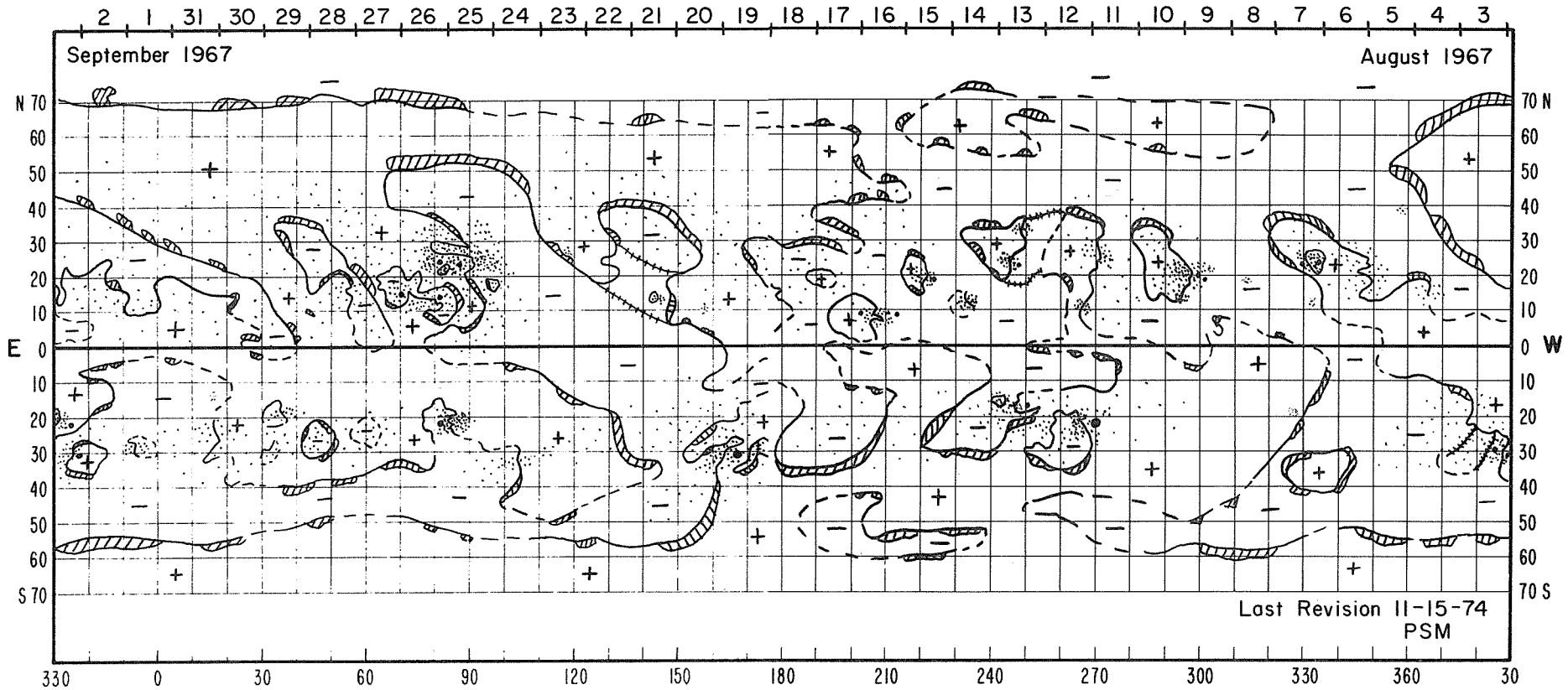
1967 - Rotation 1524

°Long.	°Lat.	Date	Descriptive Notes
357	N39	8/4	Birth of tiny active region near large filament.
342	S35	8/10	Filament disappeared near west limb.
333	N12	8/9	Birth of small active region.
332	N23	8/10	Birth of active region that became a large class D spot group by 12 August, just before west limb passage.
330	N36	8/5	Large, curved filament partially disappeared.
		8/9	Remainder of filament enlarged and then disappeared.
	S20	8/7	Filament disappeared; small region formed here next day.
327	S19	8/8	Birth of small active region.
313	N19	8/6	Birth of small active region.
310	S58	8/9	Filament disappeared.
300	N19	8/8	Large leader spot divided, and the components diverged after this date.
296	N19	8/8	Maximum development of large, compact class D spot group.
294	N13	8/13	Birth of small active region on southern border of large region.
266	N11	8/7	Birth of small active region.
	S21	8/8	Maximum development of large class D spot group.
	N34	8/13	Filament disappeared north of large active region.
250	N18	8/8	Filament disappeared at east limb.
249	N33	8/17	Birth of small active region near west limb.
245	N24	8/13	Birth of active region that grew to maximum 17 August as bright, compact plage but with only a class B spot group. First of three strong regions that formed a day apart and sequentially eastward.
233	N12	8/19	Birth of small active region near west limb.
221	N19	8/14	Birth of second active region in sequence of three, with maximum 16 August as class C spot group.
207	N09	8/16	Birth of third region in sequence of three, with maximum 19 August as class E spot group. This series of three regions also formed a progression in size at maximum development.
200	S31	8/13	Large filament partially disappeared at east limb.
		8/19	Filament disappeared a second time, having grown to very large size since previous disruption.
196	N33	8/17-18	Filament disappeared.
167	S31	8/19	CMP of large sunspot surrounded by active absorption features. Notable for rotation rate slower than normal for its latitude, as if its close association with a high-latitude neutral-line pattern affected its motion.
150	N33	8/25	Western portion of filament disappeared.
145	N13	8/21	Birth of small active region and small filament west of it. Filament and region disappeared next day.
140	N24	8/18	Filament on lower border of large-scale cell disappeared, as underlying neutral line rearranged to connect with large-scale neutral line southeast of this position.
134	S28	8/26	Partial disappearance of filament near west limb.
131	N31	8/26	Small filament disappeared.
125	N12	8/17	Great filament disappeared at east limb--an apparent precursor to rearrangement of underlying neutral line and to its incorporation of large-scale cell north of this position.
120	S15	8/20-21	Filament disappeared.
	N24	8/27	Birth of small active region near west limb; slow growth continued at west limb passage on 29 August.
100	N50	8/21	Large filament partially disappeared at east limb.
85	N22	8/23	Maximum development of an outstanding class E spot group with "delta" magnetic configuration, high spot count and its largest and most numerous spots of follower polarity. Great flares occurred over a small isolated area of leader polarity in the center of the spot group. This group formed at trailing border of an equally large spot group of the previous rotation, which had in turn formed at the trailing edge of a large group during rotation 1521.
84	S22	8/23	Birth of active region that grew to maximum 28 August as follower-dominant class D spot group.
75	N12	8/22	Small filament-like dark feature formed over the center of large, complicated, remnant plage that contained a small spot group.
		8/24	Filament enlarged and moved west at the apparent rate of 3°/day (0.4 km/sec), passing over plage and neutral line structures west of this location.
		8/30	Filament disappeared; last observed 20° west of its original location.
70	N08	8/22-23	Small filament disappeared south of great activity complex.
50	S29	8/27	Filament disappeared.
48	S38	8/26	Filament disappeared.
35	S19	8/27	Birth of small active region.
		8/30	Second phase of growth began and continued slowly through west limb passage on 3-4 September.
16	S21	8/28	Birth of small region in old, faint plage.
	S14	9/5	Small region formed at west limb.
15	S29	8/26	Birth of small active region near east limb.
		9/4	Second region emerged near west limb.

Note: Days without H-alpha photographs were 11 and 31 August and 1 September 1967.

Hα SYNOPTIC CHART

1967 - ROTATION 1524



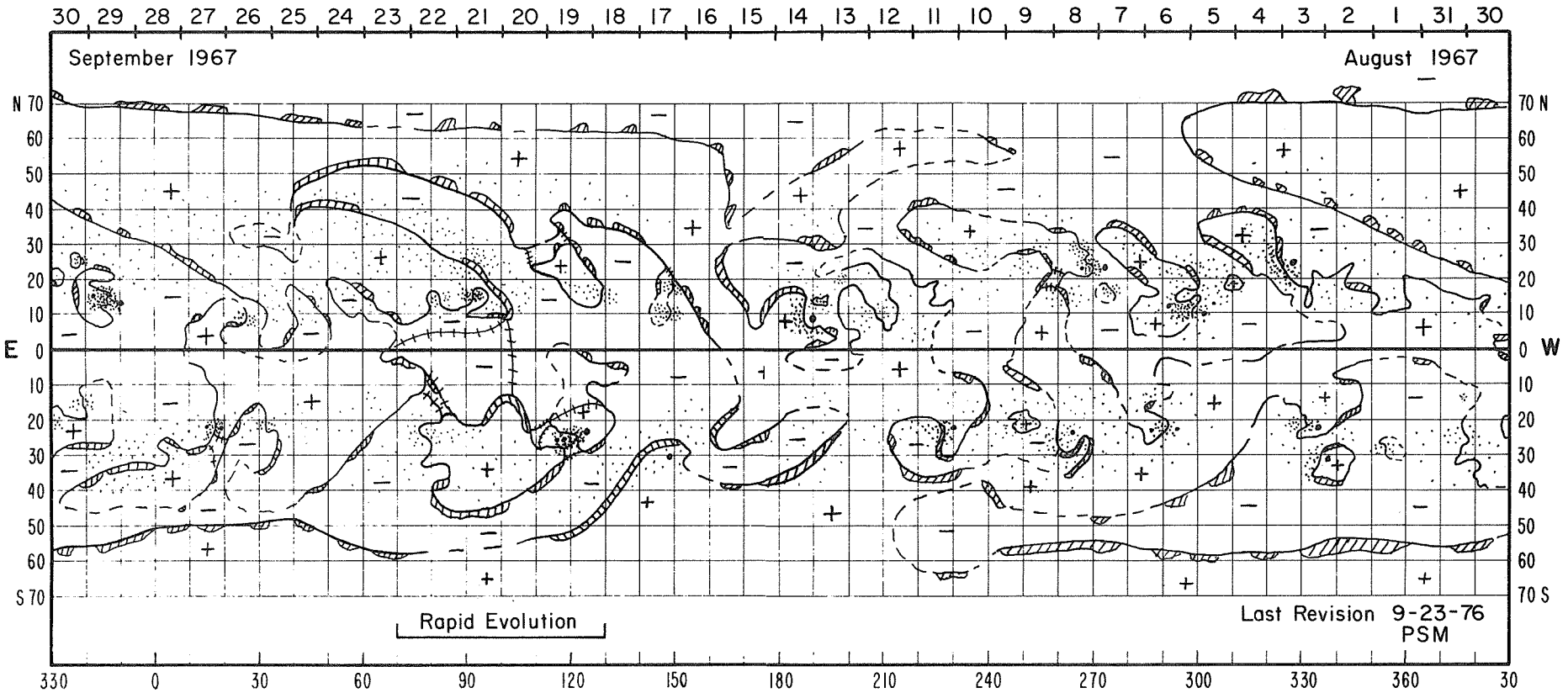
Hα SYNOPTIC CHART
1967 - Rotation 1525

°Long.	°Lat.	Date	Descriptive Notes
331	S20	8/31	Birth of active region that maximized as small class D spot group by 2 September.
312	N18	9/6	Birth of small active region.
300	N20	9/3	Birth of small active region.
297	N10	9/2	Maximum development of small class E spot group.
291	S21	9/1	Probable date of birth of small active region near east limb.
275	N17	9/11	Birth of small active region near west limb.
270	N22	9/3	Birth of small active region near east limb.
		9/8	Rapid growth began.
		9/11	Maximum development as class E spot group.
268	S28	9/8	Partial disappearance of filament.
		9/10	Remaining portion disappeared.
263	S29	9/11	Filament disappeared.
262	N12	9/11	Filament disappeared; small new plage formed in its position.
256	N25	9/7	Filament disappeared.
251	S09	9/9-10	Filament disappeared.
220	N35	9/12	Filaments disappeared that formed eastern border of large-scale positive-polarity feature; re-formed next day.
188	S32	9/15	Great filament disappeared.
187	N09	9/14	CMP of active region notable for its counterclockwise vortical structure surrounding large leader spot and for its neutral line curving concentric to the spot; almost all of the plage lay on the following side of the neutral line. Produced major flare with proton emission.
165	N50	9/12	Filament disappeared at east limb.
160	N30	9/14	Filament disappeared.
155	N10	9/19	Filament present 1 day only, just before region formed near this location.
150	N18	9/21	Birth of small active region near west limb.
149	S26	9/15	Filaments disappeared near and surrounding north side of large sunspot on second disk passage.
		9/18-19	Filaments re-formed, as great filament developed along same neutral line southeast of the spot.
		9/20	Filaments disappeared together with the great, high-latitude filament on same neutral line.
	N10	9/20	Birth of small active region.
132	S40	9/20	Great filament disappeared; associated with sunspot at S30 that showed an abnormally slow rotation rate, as if the high-latitude area bounded by the filament was coupled to the spot and slowed its motion.
130	N35	9/16-18	Filaments disappeared.
121	S25	9/16	Birth of active region that grew to maximum by 18 September as class D spot group. Expansion of region appeared to cause numerous neutral-line rearrangements nearby.
102	S15	9/21-23	Filament material formed progressively from west to east along this curved neutral line.
		9/25	All filament material disappeared.
92	N42	9/23	Partial disappearance of large filament.
	N15	9/23	Birth of active region within extensive remains of great activity complex of previous two rotations. This region continued growing to west limb passage, attaining a small class D spot group. Growth apparently led to disappearance of peculiar moving filament south of this location.
90	N08	9/16-24	Peculiar filament moved progressively westward 15° during this period, passing over underlying plage and neutral-line structures. Filament very similar to the unusual absorption feature observed near these coordinates during the previous solar rotation. The filament disappeared the day a new region formed just west of this position.
	N63	9/21	Partial disappearance of filament.
82	N15	9/23	Birth of small active region.
34	S30	9/29	Filament disappeared.
27	S22	9/30	Birth of small active region; slow growth continued to west limb passage 3 days later.
26	N08	9/27	Birth of small active region.
20	S50	9/27	Filaments disappeared.

Note: Days without H-alpha photographs were 31 August and 1 September 1967.

Hα SYNOPTIC CHART

1967 – ROTATION 1525



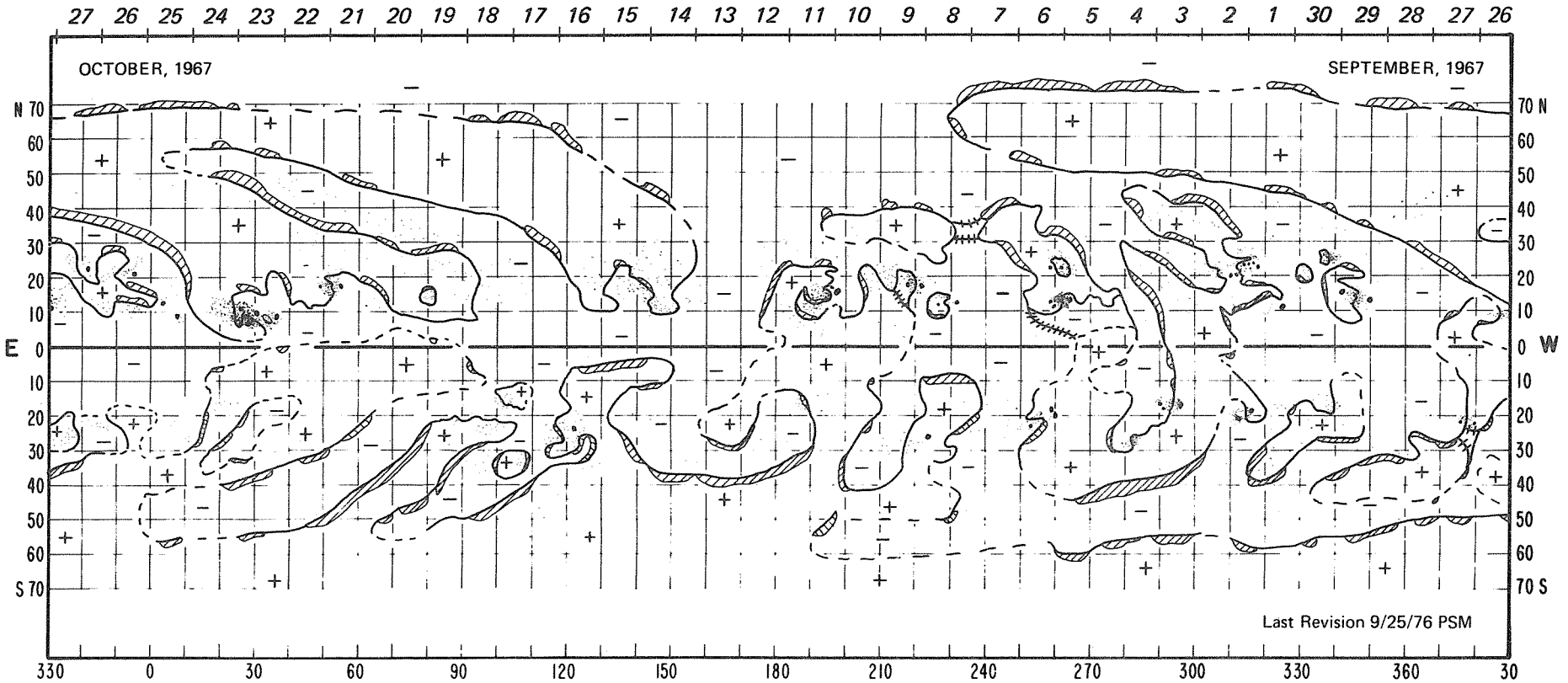
Hα SYNOPTIC CHART
1967 - Rotation 1526

°Long.	°Lat.	Date	Descriptive Notes
345	N15	9/28	Birth of active region that grew to maximum 2 October as class D spot group.
343	N22	10/1	Small filament disappeared north of growing active region.
338	N25	10/3	Birth of small active region.
319	S39	10/1	Curved filament disappeared; completely re-formed by 5 October.
312	N22	10/3	Birth of small active region within extensive remnant plage, and near location of small spot group present from east limb. Maximum development next day as class C group.
294	S17	10/1	Formation of plage and new, small spots near leader spot of small class C spot group.
		10/4	Rapid growth began, reaching class D spot group with "delta" magnetic configuration by 6 October.
285	N15	10/1-2	Curved filament disappeared.
	S38	10/6	Large filament disappeared.
275	S28	10/2	Filament disappeared.
270	S58	10/7	Filament disappeared.
263	N12	10/8	Birth of active region that reached maximum as class D spot group by 11 October at west limb.
260	N05	10/1	Large filament disappeared near east limb.
		10/4	Filament re-formed and was very active for next 2 days.
		10/7	Filament disappeared day before birth of strong active region near this location.
	N23	10/10	Birth of small active region near west limb.
250	N65	10/11	Filaments on both upper and lower borders of this slow-rotation polar pattern disappeared.
235	S21	10/4	Filament disappeared.
228	N12	10/3	Birth of active region with slow growth to maximum by 7 October as class C spot group.
220	N18	10/11	Birth of active region on leading border of small region. Grew to small class D spot group on 13 October.
214	S20	10/3	Birth of small active region.
210	N19	10/9	Birth of small active region.
195	N15	10/8	Birth of active region that grew to maximum 12 October as class D spot group with large leader spot.
		10/15	New phase of growth near west limb. Group axis had slightly negative inclination, i.e., leader spot at higher latitude than follower.
180	S35	10/11	Large filament disappeared.
124	S26	10/16	Formation of plage and small spots near leader spot of small active region.
95	S22	10/14	Birth of small active region.
90	S30	10/16	Filament disappeared.
52	N18	10/18	Birth of active region that grew to maximum 20 October as class D spot group.
40	N38	10/23	Filament greatly enlarged from previous days.
		10/24	Great filament disappeared.
35	N55	10/22	Filament disappeared.
30	N08	10/20	Formation of bright plage and beginning of new spot growth within moderately large old spot group. New growth quickly complicated the magnetic configuration.
		10/24	Second phase of even more rapid growth commenced.
		10/27	Maximum development near west limb as class F spot group with strong "delta" configuration in the center of the region.
0	N30	10/27	Great filament disappeared.

Note: Day without H-alpha photographs was 22 October 1967.

Hα SYNOPTIC CHART

1967 – ROTATION 1526



Hα SYNOPTIC CHART

1967 - Rotation 1527

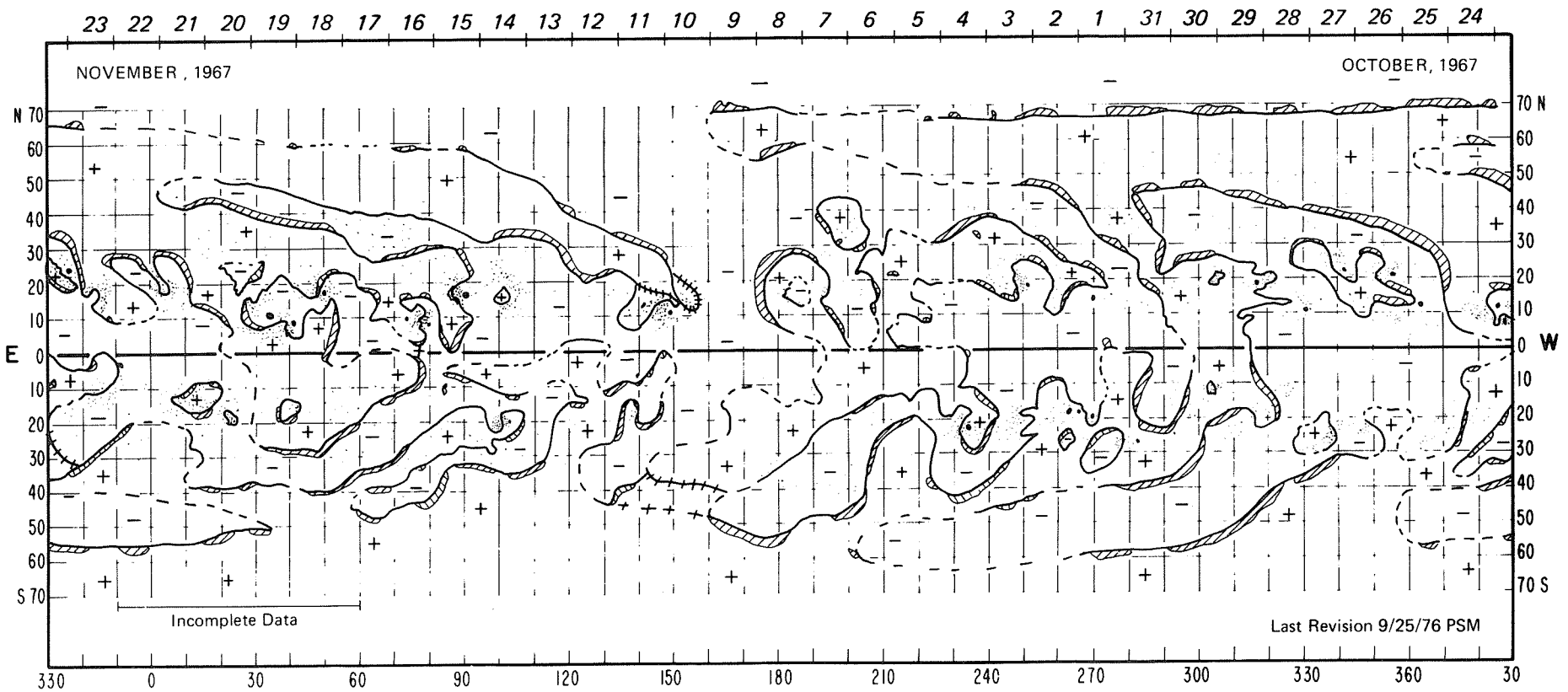
Long.	Lat.	Date	Descriptive Notes
353	N20	10/23	Birth of active region with spot group.
350	N35	10/27	Filament with 60-degree length disappeared.
325	S16	11/2	Birth of active region with weak plage.
320	N18	10/26	Birth of active center with follower-dominant spot group.
	S12	10/27	Filament disappeared.
315	N20	10/29	New plage with spots appeared at east end of group born on 26 October.
		11/2	Important spot growth north of old follower-dominant spot; continued into 3 November.
305	N18	10/25	Birth of active center with small spot group.
304	S11	11/2	Birth of region with small spot group occurred simultaneously with birth of region at (325,S16).
295	S38	10/31-11/02	Almost all of filament disappeared.
282	S15	10/28	Semicircular filament disappeared with resultant large flare, in apparent response to new active center southeast of filament.
277	S30	10/27	Birth of active center with small spot group. Region later developed circular filament surrounding portion of follower polarity.
268	S20	10/29	Birth of region with follower-dominant spot group 5° west of large symmetric spot. New group developed follower spots directly north of old spot.
	S20	11/4	Additional spot growth.
		11/6	Additional spot growth.
263	S27	11/2	Birth of small active center with short-lived spot group.
255	N23	11/7	Filament disappeared with resultant flare.
240	S40	11/5	Filament disappeared.
234	S22	11/2	Large symmetric sunspot divided into two parts that drifted apart 3° in latitude by west limb passage.
		11/10	Large flare and/or major growth at west limb, preceded by emergence of new spot group SE of this position.

°Long.	°Lat.	Date	Descriptive Notes
226	S26	11/9	Birth of active region with small spot group. Increase in activity of adjacent old region next day at west limb.
182	N27	11/13	Northern half of curved filament disappeared.
145	N10	11/10	Birth of active center that developed large type D spot group by 13 November.
123	S14	11/12	Birth of active center with weak spot group.
105	S19	11/18	Birth of small active center simultaneously with one at adjacent position (100,S22).
103	N17	11/15 11/19	Birth of active center with spots. Major spot growth.
100	S22	11/12	Birth of active center with small spot group.
		11/18	New bipolar plage emerged through old plage simultaneously with new region adjacent at (105,S19).
83	Equator	11/12	Equator-crossing filament disappeared.
76	N08	11/16	Birth of active region that maximized by 20 November as class E spot group.
55	N02	11/15	Equatorial filament began slow disappearance; gone by 17 November.
39	S16	11/20	Birth of active center with weak spot group.
35	N39	11/24	Large filament disappeared.
12	N15	11/17	Filament disappeared with resultant flare, apparently as response to small new region immediately east of filament.
4	N18	11/17	Birth of small new region.

Note: Day without H-alpha photographs was 21 November 1967.

Hα SYNOPTIC CHART

1967 – ROTATION 1527



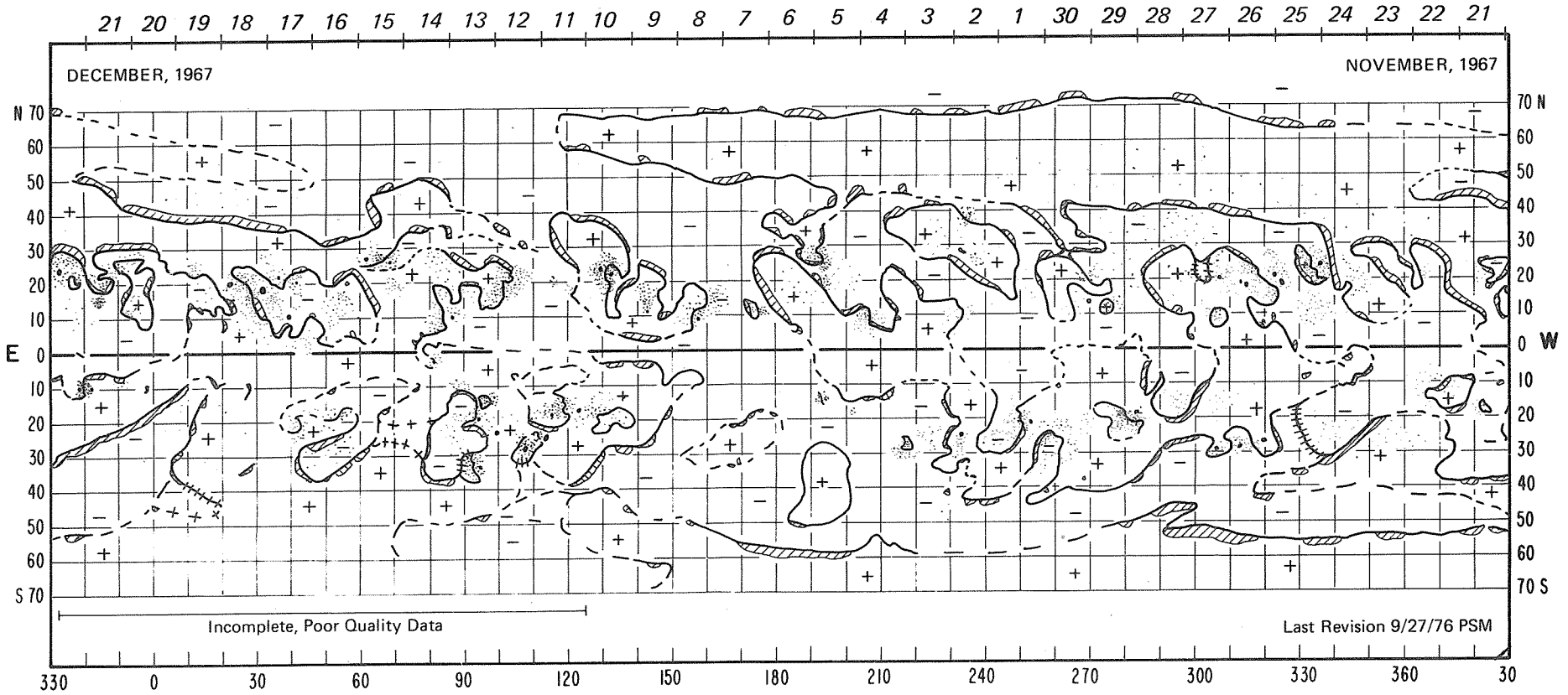
Hα SYNOPTIC CHART
1967 - Rotation 1528

°Long.	°Lat.	Date	Descriptive Notes
334	N25	11/25	Birth of active region with rapid growth to maximum 27 November as class E spot group near west limb. Leader and follower spots had high rate of divergence from one another.
320	N20	11/20	Probable date of maximum development of large class E spot group with open structure. Leader spot divided and components diverged after this date.
316	S28	11/26	Birth of small active region that merged with region to its east to form complex active area. Maximum development 29-30 November near west limb as class E group; contained "delta" magnetic configuration where leader of first group merged with follower of this group.
315	N09	11/23	Birth of small active region.
310	S29	11/24	Birth of small active region.
300	S53	11/30	Filament disappeared at west limb.
299	S15	11/29	Filament disappeared.
295	N40	11/26	Filament disappeared.
291	S27	11/24	Filament disappeared in apparent response to birth of nearby active region.
285	N20	11/28	Filament disappeared.
280	S19	11/25	Maximum development of small class D spot group.
		11/26	New plage and small spots developed near leader spot.
276	N12	11/25	Birth of small active region near western edge of isolated leader sunspot.
270	N20	11/29	Birth of small active region.
258	N35	11/26	Filament disappeared.
237	N25	12/2	Birth of small active region.
235	N20	12/4	Filament disappeared.
219	S37	12/6	Birth of small active region near west limb.
206	N08	11/28	Birth of small region near east limb.
202	S18	12/2	Birth of tiny active region.
195	S14	11/29	Birth of small active region near east limb.
193	N27	12/1	Birth of small active region.
		12/11	New plage growth at west limb.
177	N15	12/8	Large filament disappeared in apparent response to growth of new active region nearby.
175	N11	12/7	Birth of small active region.
160	N13	12/1	Birth of small active region near northern edge of large single sunspot.
145	N12	12/11	Birth of small active region within extensive faint plage.
142	N54	12/6	Filament disappeared.
130	N23	12/4	Birth of active region near east limb that grew to maximum 8 December as class D spot group.
119	S18	12/8	Peak development of class D spot group.
116	N20	12/7	Birth of small active region.
110	S25	12/10	Birth of active region that grew to maximum 14 December as class E spot group. Merged with following portions of region to northwest.
97	S14	12/11	Birth of small active region that merged with older plage southeast of this location.
93	S20	12/7	Birth of small active region at east limb.
	S33	12/14	Probable date of birth of active region containing class C spot group with large leader spot.
85	N35	12/8	Filament disappeared at east limb.
80	S02	12/11	Birth of tiny active region.
66	N26	12/14	Birth of active region in which spot group grew to class D by 17 December; had diminished little by west limb passage on 20 December.
65	N40	12/11	Large filament disappeared near east limb.
60	N20	12/17-18	Filament disappeared.
	N13	12/20-21	Birth of small active region at west limb.
57	S32	12/11	Filament disappeared near east limb.
42	S22	12/14	Birth of small active region.
39	N21	12/11	Probable date of birth near east limb of active region that grew to maximum on approximately 16 December as class D spot group.
30	N15	12/13-14	Filament disappeared within extensive faint plage, in apparent response to rapid growth of region at the northern end of the filament.
28	N19	12/12	Birth of great active region that grew to maximum by 19 December as class F spot group. Formed in trailing portion of plage remaining from large, active region of previous rotation.
0	N39	12/20-21	Partial filament disappearance.

Note: Days without H-alpha photographs were 9, 13-14, 17 and 20 December 1967.

Hα SYNOPTIC CHART

1967 – ROTATION 1528



Hα SYNOPTIC CHART

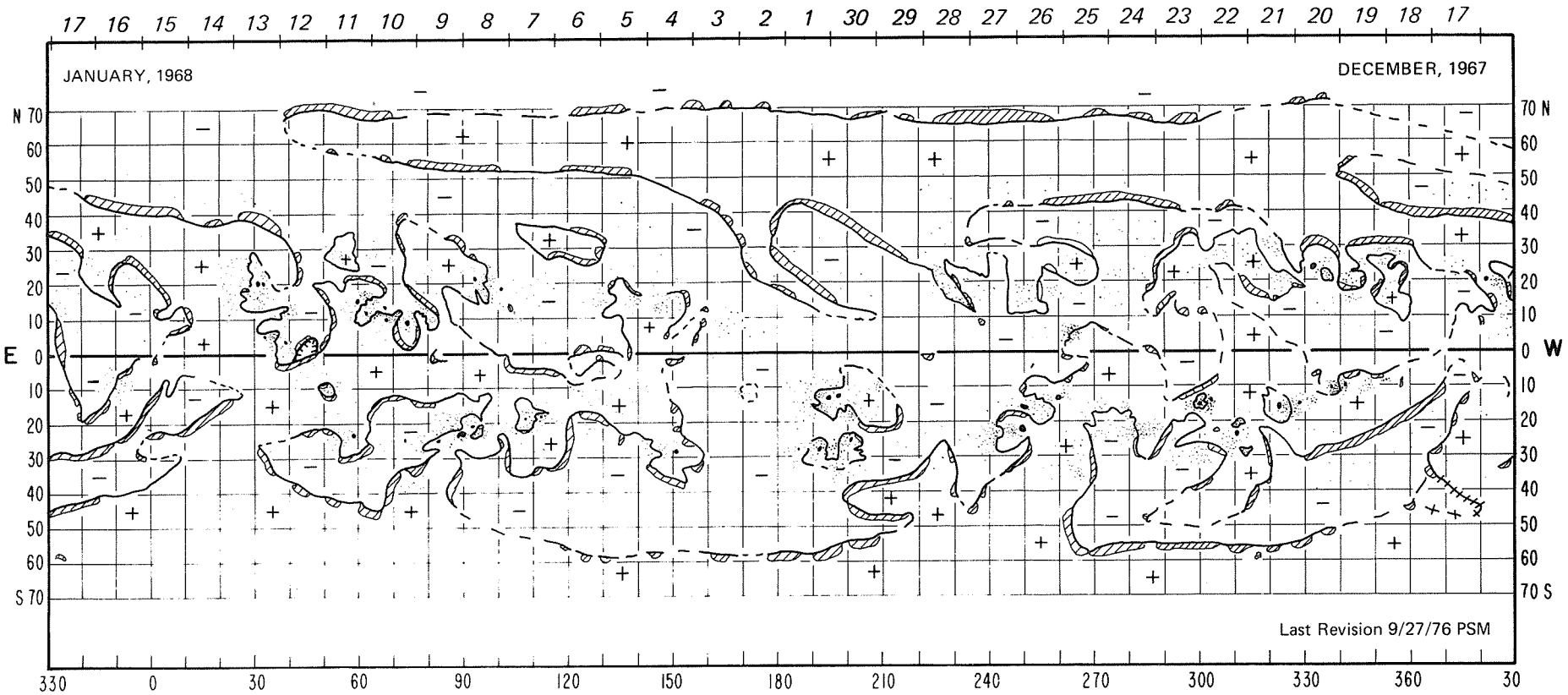
1967-1968 - Rotation 1529

°Long.	°Lat.	Date	Descriptive Notes
344	N15	12/23	Birth of small active region.
340	N28	12/24-25	Disappearance of large, complex filament that had been enlarging and becoming more active for previous 3 days.
339	S11	12/24	Birth of active region that had grown to small class D spot group by west limb passage on 26 December.
325	S16	12/20	Birth of active region that grew to maximum next day as class D spot group.
302	S14	12/28	Birth of active region that grew to small class D spot group before west limb passage on 30 December.
300	S10	12/22	Filament disappeared.
275	N43	12/23	Large filament disappeared near east limb.
265	S55	12/27	Filament disappeared.
255	S15	12/24	Birth of active region on northwest border of large returning active region. New region grew rapidly to class E spot group with maximum on 28 December. Both leader and follower spots became large and very dark before west limb passage on 2 January.
249	S30	12/27	Filament disappeared.
210	S22	1/2	Filament disappeared on western boundary of activity complex.
202	S19	12/26	Birth of small active region on western border of large, growing active region near east limb.
200	N35	12/29-30	Large filament disappeared.
197	S26	12/26	Probable date of birth at east limb of active region that grew to class D by 29 December. Leader and follower spots had rapid rate of divergence from one another.
190	N19	1/4	Filament disappeared.
170	N28	1/5	Filament disappeared.
110	S18	1/1	Probable date of formation of moderate active region that grew to maximum as class D spot group by 5 January.
96	N20	1/2	Probable date of formation of active region at east limb.
		1/7	Maximum development as class E spot group.
90	S20	CMP 1/8-9	Complex of two active regions. Large spot on southern border of complex moved east relative to spots and plage to north, indicating a conspicuous amount of shear between the spot groups. The northern spots appeared to have formed just before their appearance at east limb, and had disappeared by west limb. The larger spot had returned from the previous rotation and endured for the next. Its position was significantly shifted eastward on each succeeding disk passage, even though at this latitude spots should be stationary in Carrington longitude.
76	N09	1/6	Birth of small active region.
70	N10	1/11	Important spot and plage growth near leading edge of complex region. Maximum size of new spots occurred on 13 January.
63	N20	1/11	Formation of active filament.
62	N12	1/5	Significant new growth of plage and sunspots within large spotted region at east limb.
		1/8	Growth reached maximum with old and new regions blending to form "delta" magnetic configuration in large class F spot group with many spots.
59	N15	1/9	Birth of small active region on southern border of large returning region. Became small class D spot group by 12 January.
53	S10	1/8	Birth of tiny active region.
42	N25	1/7	Birth of small active region on northern edge of large returning active region.
36	N08	1/13	Birth of moderate active region that attained maximum 15 January as class D spot group.
25	N38	1/18	Filament disappeared.

Note: Days without H-alpha photographs were 20, 24 and 29-30 December 1967.

Hα SYNOPTIC CHART

1967 – 1968 – ROTATION 1529



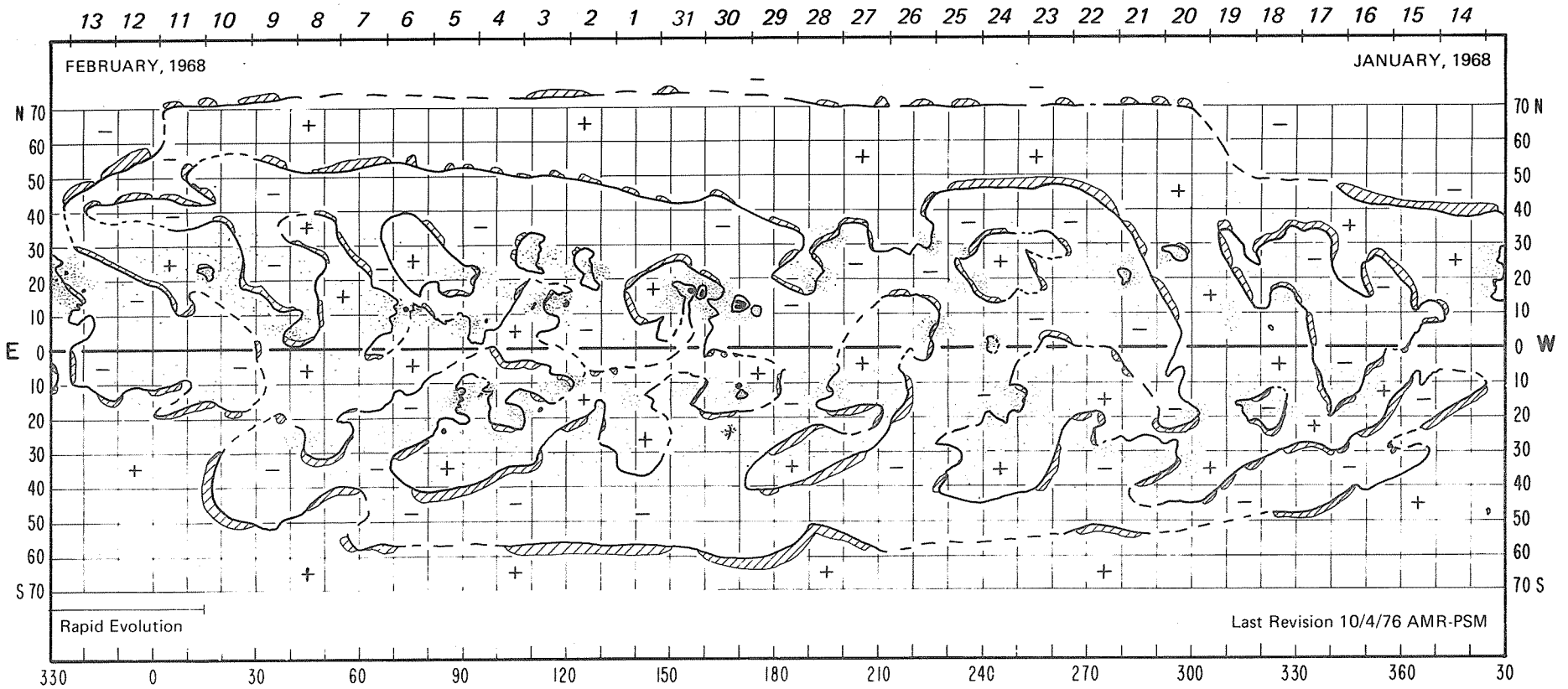
Hα SYNOPTIC CHART
1968 - Rotation 1530

°Long.	°Lat.	Date	Descriptive Notes
294	N28	1/23 1/25	Birth of small active region. Significant additional growth just before west limb passage.
288	N20	1/23	Large filament disappeared.
241	N01	1/25	Birth of small active region.
175	N38	1/26	Large filament disappeared.
171	S13	2/2	Birth of moderate active region near old leader spot of large decaying region.
167	S24	2/2 2/5	Birth of small active region omitted from this chart. Significant brightening just before west limb passage.
165	N13	1/30-31	Central meridian passage of largest sunspot group of Solar Cycle 20. Activity within this region was less than its size would have indicated, probably because its magnetic configuration was a simple bipole. Some complication of the configuration occurred after 29 January, as a new region formed near the trailing end of this group.
152	N15	1/29	Birth of moderate active region that merged with great region to its west by 31 January. Peak area was reached by 1 February.
127	N23	1/26	Region at east limb may have just formed. Reached maximum growth as small class D spot group by 30 January.
121	S11	1/29	Birth of moderate active region that slowly developed to maximum by 2 February.
107	S18	2/1	Birth of moderate active region at western end of east-west filament. Reached maximum 3 February as class D spot group.
105	S04	1/30-2/8 2/8	Filament extremely active throughout disk passage. Filament became especially large.
90	S14	1/30	Birth of moderate active region that reached maximum 3 February as class D spot group.
70	N12	2/9	New spots and plage formed within old extensive plage and near small old leader spot.
38	S28	2/11	Birth of small active region.
17	S40	2/8 2/11	Large curved filament disappeared. Filament re-formed.

Note: Days without H-alpha photographs were 20 and 27-28 January 1968.

Hα SYNOPTIC CHART

1968 – ROTATION 1530



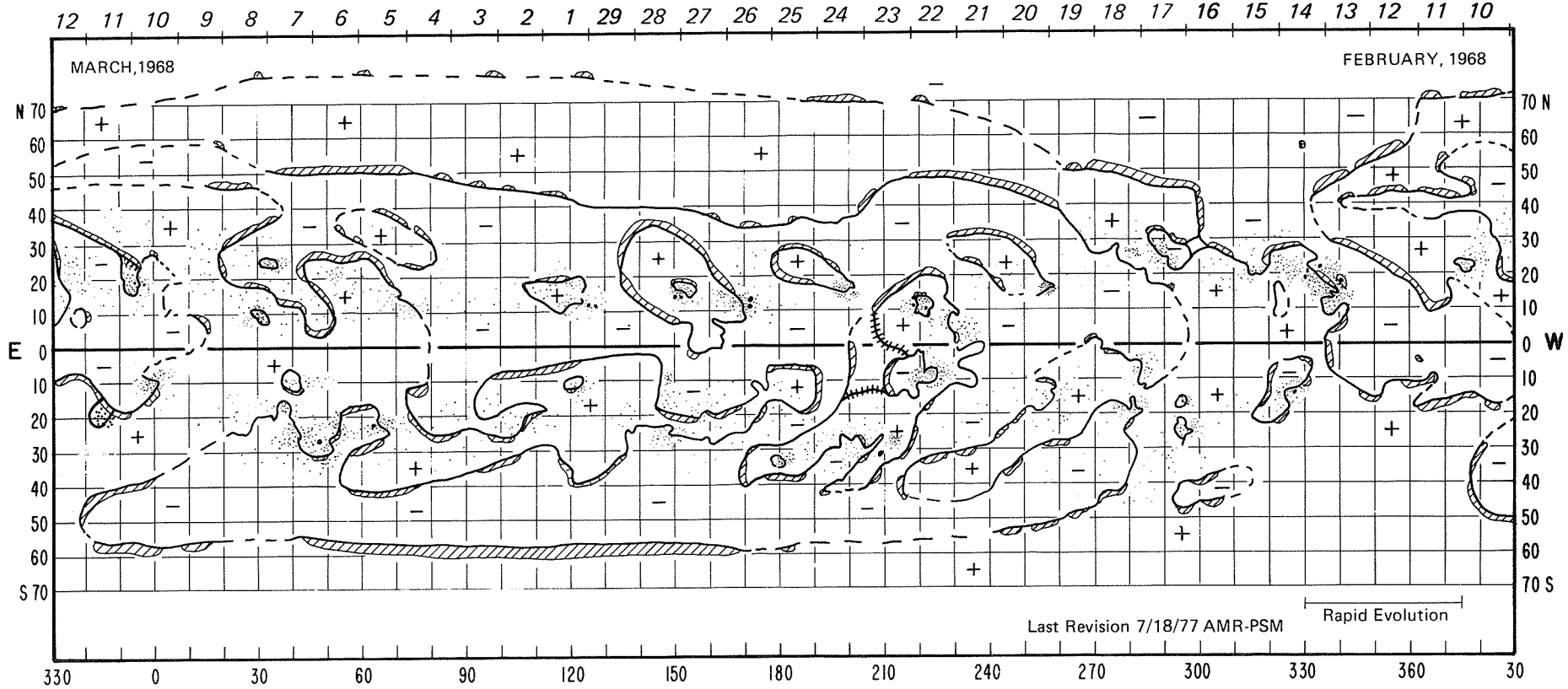
Hα SYNOPTIC CHART
1968 - Rotation 1531

°Long.	°Lat.	Date	Descriptive Notes
335	N19	2/7	Small bright plage at east limb suggested this was date of birth of region that grew rapidly to become a complex class E spot group with "delta" configuration by 11 February. Source of proton event. Possible source of new interplanetary sector of negative polarity, which enlarged from this date through the remainder of 1968. Region was located on a major neutral line connecting to polar crowns in both hemispheres.
298	N45	2/19	Remainder of large filament disappeared.
296	S25	2/14	Birth of small active region.
	S17	2/19	Birth of small active region.
290	N31	2/16	Filament on northern border of small negative-polarity cell disappeared.
280	N48	2/17	Partial disappearance of large filament simultaneous with disappearance of filament at longitude 240, N46.
	N26	2/20	Birth of new small region on eastern border of faint plage.
258	N25	2/24	Birth of small active region near west limb.
240	N46	2/17	Filament disappeared near east limb.
220	N10	2/23	Birth of active region, which grew to maximum 25 February as class D spot group.
217	S27	2/24	Filament disappeared in apparent response to growth of small region east of this location.
212	S27	2/23	Birth of small active region near leading edge of small plage.
201	N21	2/26	Birth of small active region.
200	S15	2/21	Filament disappeared.
190	N27	2/23	Filament disappeared.
181	S32	2/26	Birth of small active region.
158	S20	3/2	Filament disappeared within scattered faint plage north of significant region.
150	S25	2/25	Peculiar plage developed to maximum and contained a peculiar class E spot group with a high spot count.
149	S10	3/2	Birth of small active region.
140	S55	2/25	Partial disappearance of large filament.
123	N14	2/27	Maximum area of peculiar, compact class D spot group.
122	S10	3/2	Birth of tiny active region.
117	N22	3/5	Brightening of plage on north side of filament associated with moderate decaying active region.
100	S32	2/29	Filament disappeared.
66	S22	3/6	Birth of small active region within remnant plage of region that had lost its sunspots just hours earlier.
52	N21	3/2	Birth of tiny active region.
	N10	3/6	Partial disappearance of large S-shaped filament in apparent response to nearby developing active region.
42	S10	3/7	Birth of small active region.
35	N25	3/5	Birth of active region that was apparently associated with nearby disappearing filaments.
30	N34	3/6	Filament disappeared north of developing active region.
	N09	3/11	Birth of small active region.
2	S10	3/9	Birth of small active region.

Note: Days without H-alpha photographs were 12-13 February and 9-10 March 1968.

Hα SYNOPTIC CHART

1968 – ROTATION 1531



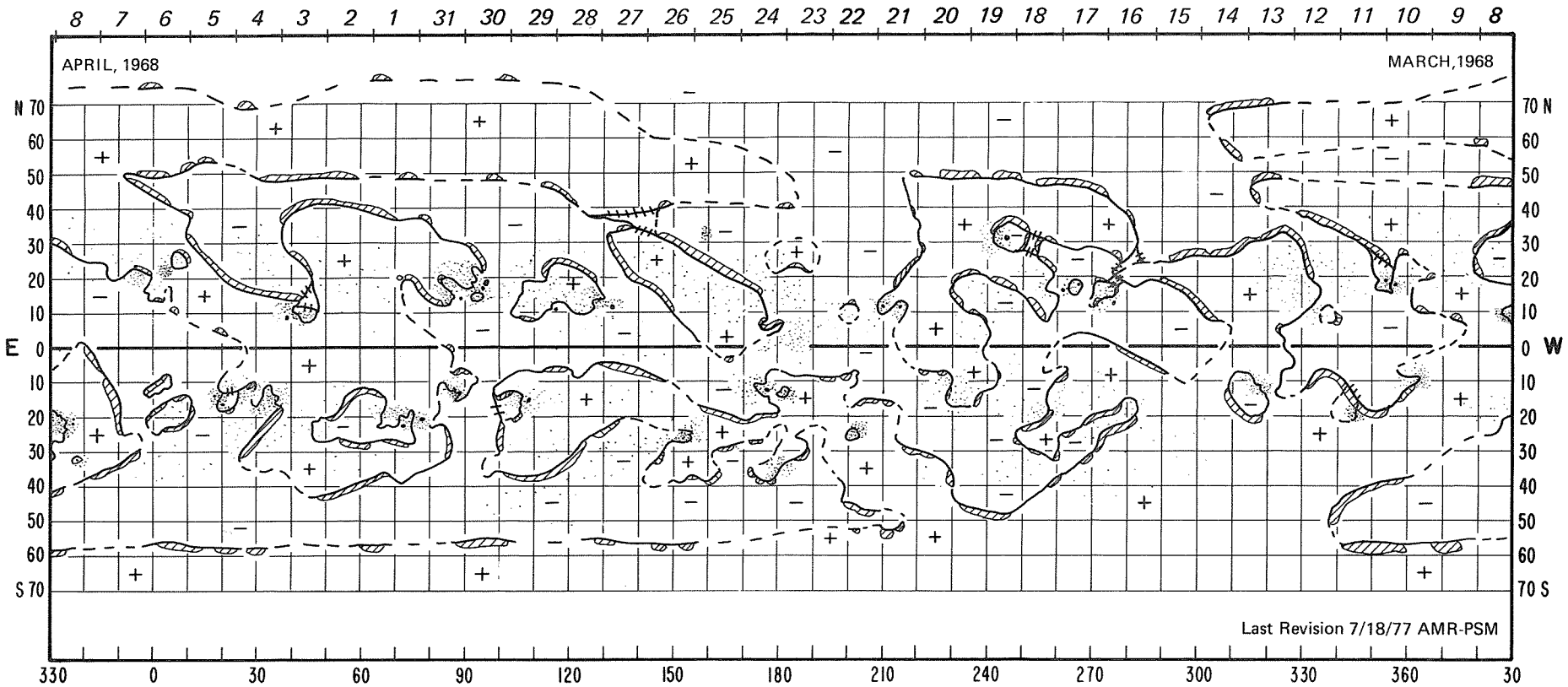
Hα SYNOPTIC CHART
1968 - Rotation 1532

°Long.	°Lat.	Date	Descriptive Notes
355	N19	3/8	Birth of moderate active region that caused rearrangement of old neutral line to north.
350	N18	3/6	Large dark filament at east limb disappeared.
	S56	3/8	Filament disappeared.
345	S20	3/14	Birth of active region at location of large S-shaped filament, which disappeared.
275	N13	3/16-18	Unusually rapid disappearance of plage near small leader sunspot.
265	N17	3/16	Birth of small active region between two rapidly decaying regions.
252	N30	3/22	Neutral lines as marked by filaments rearranged to create small isolated negative-polarity cell centered on large leader sunspot. This spot had an abnormally slow rate of rotation, returning on the next solar rotation more than 20° of longitude to the east. This motion may have led to divergence from magnetic features to the west and, therefore, to this rearrangement of neutral lines.
245	N30	3/19	Central meridian passage of large sunspot with plage only in follower polarity fields until 19 March. Plage formed surrounding the spot as the neutral lines to the west underwent a rearrangement.
	N18	3/20-21	Filament disappeared.
217	N20	3/21	Filament disappeared in apparent response to rapid formation of active region to south.
212	N11	3/21	Birth of moderate active region.
208	S15	3/24	Filament disappeared.
203	S25	3/24	Birth of small active region.
		3/27	Important additional growth at west limb.
175	S12	3/20	Birth of small active region in trailing portion of older small plage.
		3/23	Rapid new growth created class C group with large leader spot.
170	N18	3/26	Filament became double this day only, suggesting a temporary condensation above the original filament.
160	N33	3/31	Birth of small bright plage at west limb.
128	N13	3/25	Spot group that formed before east limb passage reached maximum as a follower-dominant class D group. Leader spot became dominant after 26 March.
116	S15	3/26	Birth of active region, which developed slowly throughout the disk passage, but never exceeded the size and complexity of class C spot group.
	N11	3/29	Faint scattered plage began to appear near isolated leader sunspot that had been without attendant plage since east limb passage on 22 March. This marked the apparent return of a significant region 15° farther west than during the previous solar rotation -- a degree of eastward motion representing an exceptionally slow rotation rate for this latitude.
100	S25	3/26	Filament disappeared in apparent response to birth of active region just west of this location.
93	N15	4/2	Birth of small active region near large double region. Old decaying leader spot to north exhibited counter-clockwise rotation during disk passage.
86	S27	3/27	Filament disappeared in apparent response to birth of significant active region east of this location. Gradually reformed after 29 March.
75	S21	3/25	Probable date of birth of significant region at east limb. Reached maximum 30 March as large class D spot group.
63	S12	4/5	Partial disappearance of filament.
60	S28	3/31	Partial disappearance of filament.
42	N10	4/3	Birth of small active region, which developed into peculiar follower-dominant group by 5 April. No plage near follower spot.
40-70	N20-40	3/30	Large S-shaped filament disappeared near east limb.
30	S13	4/7	Birth of small active region within follower plage of large old region.
20	S15	4/8	Birth of small active region.
		4/9	More rapid growth that continued to west limb next day. Spots did not exceed small class C group.
5	N21	4/12	Significant bright region born at west limb.
0-10	N25-50	4/4	Filaments disappeared.

Note: Days without H-alpha photographs were 9-10 and 20 March 1968.

Hα SYNOPTIC CHART

1968 – ROTATION 1532



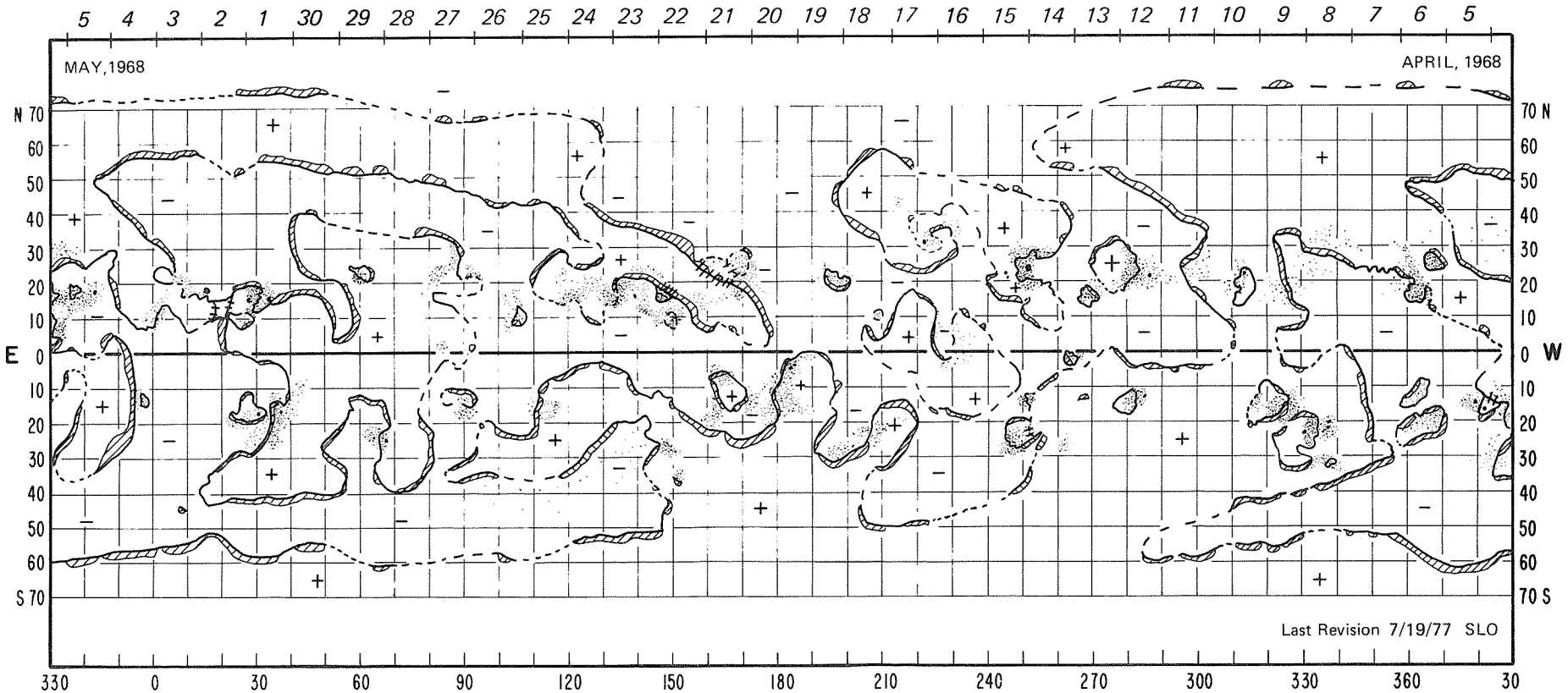
Hα SYNOPTIC CHART
1968 - Rotation 1533

°Long.	°Lat.	Date	Descriptive Notes
350	Equator -S25	4/7	Central meridian passage of north-south neutral line along which filaments formed and disappeared daily. Filaments were almost entirely gone on 10 April.
315	S42	4/6	Filament disappeared.
300	S58	4/7	Partial disappearance of filament.
296	N25	4/12	Filament disappeared.
290	N42	4/11	Large filament disappeared.
283	N23	4/6	Compact plage at east limb may have formed on previous day. Reached maximum about 10 April as class D spot group.
282	S13	4/12	Birth of small active region.
252	S14	4/14	Birth of small active region.
248	N24	4/11	Peculiar large region. Near peak development it became a compact class D spot group with a very large leader spot. Region possessed almost no leader plage. Neutral line nearly encircled the leader spot, suggesting strong vortical development in the region.
246	S26	4/15	Central meridian passage of region with small decaying sunspots; associated with filaments, which were active during most of the disk passage, to the north and south of this location.
230	N30	4/11	Filament disappeared near east limb; located near isolated old leader spot with exceptionally strong vortical structure surrounding it.
222	N32	4/17	Central meridian passage of remarkable sunspot. One of strongest cases of vortical fine structure in H-alpha. Virtually no plage near the spot. Exceptionally slow rate of rotation moved the spot 22° east of its longitude during previous solar rotation. Filaments to south and east of the spot active throughout disk passage.
218	S22	4/21	Filament, exceptionally active throughout its disk passage, became especially large just before west limb passage.
209	N10	4/16	Birth of tiny plage.
206	S23	4/15	Minor plage growth near exceptionally active filaments.
196	N20	4/19	Birth of small active region.
173	S25	4/24	Exceptionally large, dark filament disappeared.
155	N12	4/26	Filament disappeared in apparent response to two nearby developing regions.
151	S35	4/25	Birth of small active region.
	N10	4/26	Birth of small active region.
150	N30	4/27	Filament disappeared at west limb; became exceptionally large and dark during previous 4 days.
147	N17	4/23	Birth of small active region near large, dark filament. Division of filament occurred on 25 April.
134	N17	4/24	Birth of small active region at eastern end of filament.
115	N27	4/23	Filament disappeared.
105	N10	4/23	Birth of minor plage.
55	N10	4/29	Filaments disappeared bordering conspicuous peninsula of negative polarity.
40	N30	5/4	Filament disappeared, which had become very large and dark during previous 2 days. Activity may be related to growth of large region to east.
31	N16	4/28	Birth of significant active region near east-west filament. Filament disappeared as region emerged.
		5/1	Rapid region growth.
		5/3	Peak development as large class D spot group.
28	S18	4/27	Birth of small active region in follower plage of old region.
20	N10	4/29	Filament disappeared in apparent response to region developing to west.
1	N09	4/29	Birth of small active region.

Note: Day without H-alpha photographs was 30 April 1968.

Hα SYNOPTIC CHART

1968 – ROTATION 1533



Hα SYNOPTIC CHART

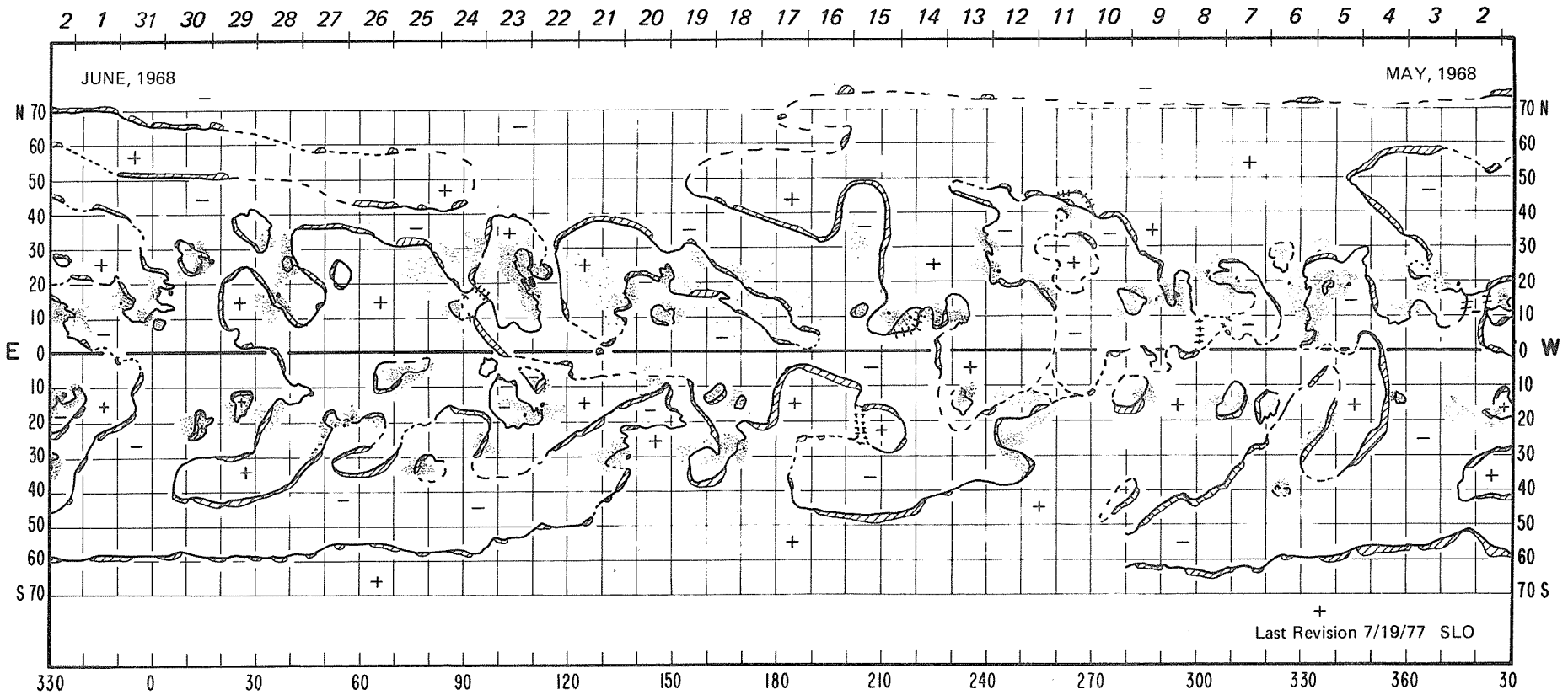
1968 - Rotation 1534

°Long.	°Lat.	Date	Descriptive Notes
357	S13	5/6	Birth of small region very near north-south filament; filament disappeared next day.
354	S15	5/7	Filament disappeared.
335	N19	5/2	Maximum development of class F spot group with few spots in the interior of the region. By 4 May, plage corridor became exceptionally wide, implying a low magnetic field gradient.
324	S40	5/3	Small plage visible this day only.
306	N20	5/4	Maximum development of class E spot group with weak "delta" configuration in the leading cluster of spots.
305	S40	5/7-8	Large filament disappeared.
294	N16	5/4	Birth of moderate active region, which reached maximum 6-7 May as a class D spot group with a high spot count.
		5/9	"Collision" with new region to east.
285	N14	5/8	Birth of moderate active region, which collided with older region to west next day. Reached maximum 10 May as simple class D spot group.
282	S15	5/5	Filament near east limb disappeared.
		5/11-12	Filament re-formed weakly.
278	N38	5/11	Filament disappeared.
233	S11	5/8	Birth of small active region.
228	N10	5/8	Birth of small active region.
		5/13	Maximum development as class D spot group.
216	N10	5/16	Birth of moderate active region that caused rapid rearrangement of magnetic patterns in its vicinity. Reached maximum 18 May as class D spot group.
204	N11	5/16	Birth of small plage and tiny spots.
180	S12	5/14	Large S-shaped filament disappeared.
169	S28	5/12	Small, compact plage at east limb may have formed on previous day.
		5/16	Maximum development as class D spot group.
160	N16	5/15	Filament disappeared.
148	N10	5/18	Birth of small active region.
	S10	5/20	Filament disappeared after being very active during previous 5 days.
140	N22	5/19	Curved filament disappeared.
112	N24	5/24	Significant growth of isolated positive-polarity pole bordering northwest corner of great leader spot of major active region. Small spots and bright plage with very active filament structures remained visible until 28 May, just before west limb passage.
98	N02	5/22	Equatorial filament enlarged and became very active from this date until west limb passage 29 May.
77	S33	5/21	Birth of small active region.
76	N31	5/22	Filament near east limb disappeared.
55	S20	5/26	Birth of moderate active region.
		5/30	Maximum development as bright plage with numerous small spots.
50	N36	5/31	Filament near west limb disappeared.
40	N26	5/27	Birth of tiny plage that resulted in rearrangement of neutral line to west.
35	S40	5/31-6/1	Filament gradually disappeared.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1968 – ROTATION 1534



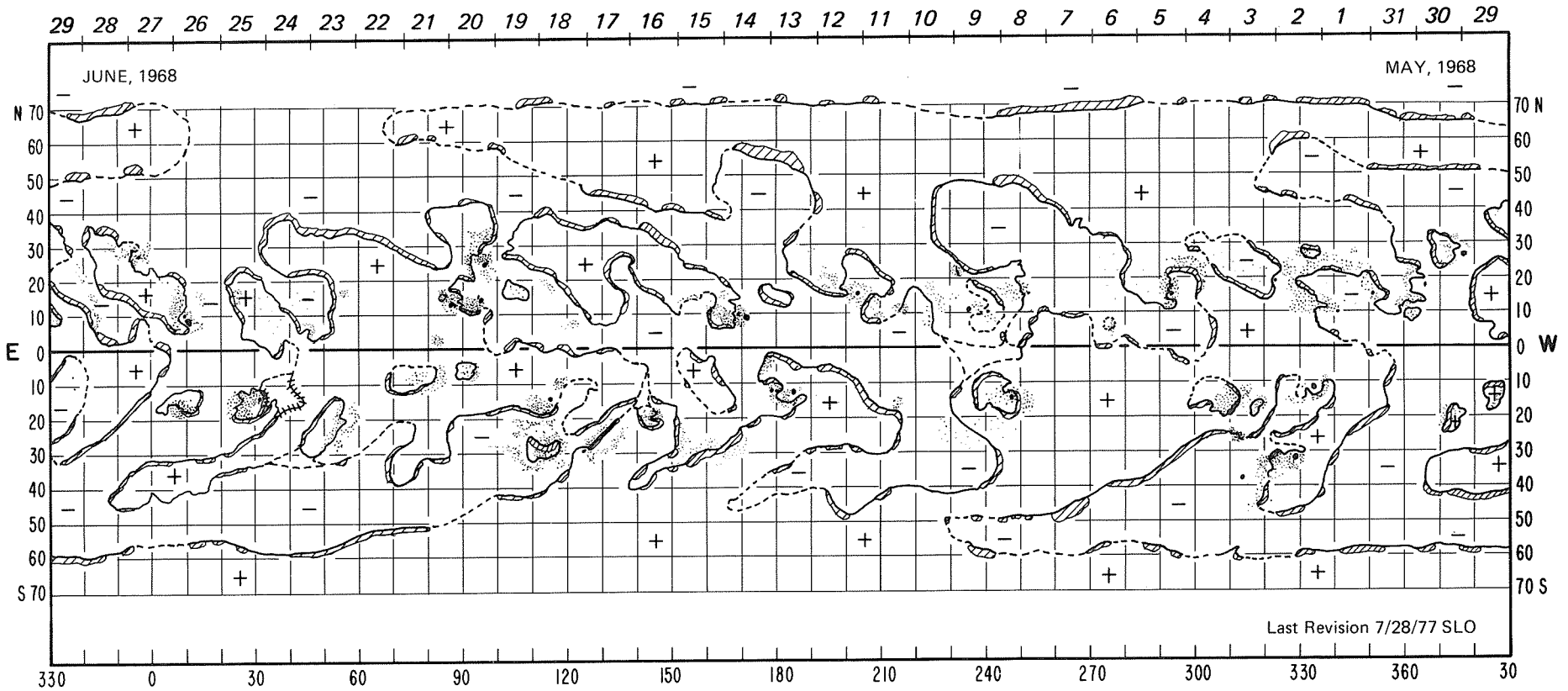
Hα SYNOPTIC CHART
1968 - Rotation 1535

°Long.	°Lat.	Date	Descriptive Notes
358	N11	5/28	Birth of small active region.
350	N40	6/2	Filament disappeared.
336	N11	5/28	Birth of active region.
		5/31	Maximum development as class D spot group.
	S12	5/30	Plage formed on west side of isolated large sunspot.
329	S30	5/29	Filament north of large leader sunspot disappeared and plage began to form in its place. This growth continued through much of the disk passage, accompanied by a simultaneous dissolution of the leader sunspot.
	S32	6/5	Leader sunspot became a small spot without penumbra.
328	N58	6/2	Filament disappeared, possibly simultaneous with and for same reasons as filament disappearance at longitude 350, N40.
325	S34	6/5	New growth began in interior of large active region.
318	S17	6/6	Birth of small active region.
312	S26	6/5	Birth of small active region. Growth was continuing at west limb 9-10 June.
298	N21	6/7	Filament within plage disappeared with resultant two-ribbon flare.
290	S35	6/8	Filament disappeared.
248	S12	6/8	Peculiar sunspot group appeared at east limb 2 June as irregular class D group, rapidly lost penumbra, and exhibited large relative proper motions among its spots. By this date a small delta configuration was present with an active dark filament passing between the opposite polarity spots. The filament disappeared followed by a 1b flare that was the first to be photographed with a rocket borne imaging X-ray telescope flown by American Science and Engineering, Inc.
		6/9	Class 2b proton flare occurred.
245	N43	6/6	Large filament disappeared.
238	N10	6/6	Birth of moderate active region, which reached maximum as class D spot group by 10 June.
232	N22	6/11	Birth of small active region.
216	N11	6/15	Birth of small active region near west limb.
215	N35	6/12-13	Filament disappeared.
	S16	6/12	Birth of very small active region.
206	N26	6/12	Filament formed.
		6/15	Filament disappeared.
205	S12	6/11	Filament disappeared that had been exceptionally large and dark since east limb passage 6 June.
		6/12	Filament reformed.
193	S38	6/12	Filament disappeared.
190	N40	6/16	Filament disappeared.
182	S12	6/9	Birth of moderate active region that apparently caused filament disappearance 11 June at longitude 205, S12. Reached maximum 12 June as class D spot group with large penumbral area.
179	N13	6/12	Filament disappeared.
148	N30	6/12	Large filament near east limb disappeared.
145	N40	6/13	Filaments disappeared.
144	S20	6/16	Birth of small active region.
114	S17	6/20	Plage and small spots formed near large isolated spot with strong vortical pattern to surrounding fibrils. Plage in this old region had been confined mostly to an area of follower polarity south of the east-west filament that lay south of the spot.
93	N26	6/17	Filament within scattered plage disappeared; it had been associated with large symmetric sunspot with strong vortical pattern to surrounding fibrils. Filament disappearance may have been consequence of rapid growth of strong active region to southeast.
	S06	6/16	Birth of very small active region.
92	N13	6/16	Birth of major active region very near old leader sunspot that had returned from previous rotation. Rapid growth to compact class E group. Relative motion between old spot and leader of new group.
		6/24	Maximum sunspot area approximately 1500 millionths of the solar hemisphere.
83	N02	6/23	Birth of small active region.
71	S12	6/18	Curved filament disappeared between 1400 and 1900 UT.
65	N33	6/21	Large filament disappeared.
40	S17	6/24	Filament disappeared in apparent response to slowly developing region to the east.
28	S25	6/26	Filament disappeared.
25	S15	6/21	Birth of moderate active region, which slowly developed to maximum by 27 June as a very extended class C group with numerous spots.
8	S17	6/25	Birth of small active region. Maximum 28 June as rudimentary class D spot group.
	N11	6/26-27	Central meridian passage of large, complex class C spot group with counterclockwise rotation of spots in leading cluster.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1968 – ROTATION 1535



Hα SYNOPTIC CHART

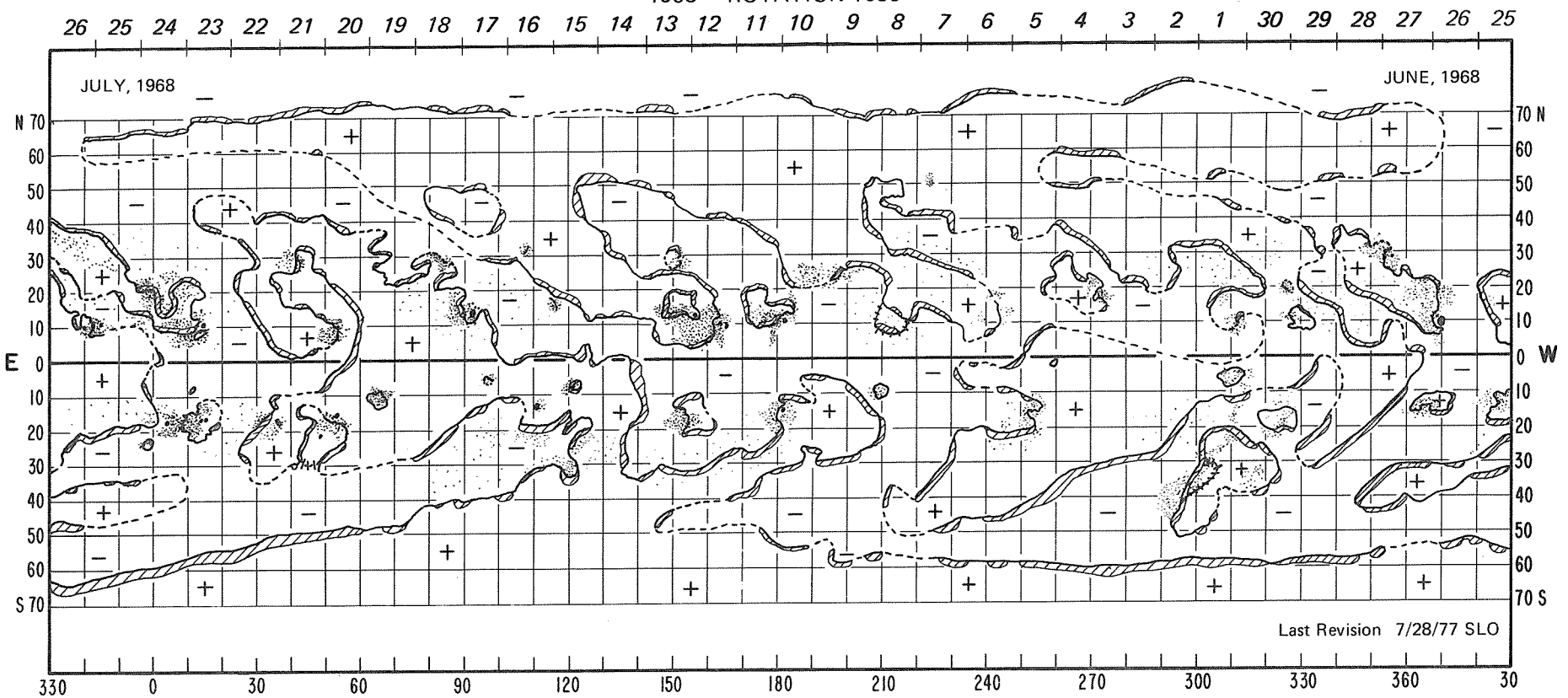
1968 - Rotation 1536

°Long.	°Lat.	Date	Descriptive Notes
354	N29	6/26	Birth of moderate active region that reached maximum 28 June as class D spot group.
328	N11	6/25	Birth of small active region.
326	N19	7/3	Birth of small active region.
313	S05	6/25	Small compact plage at east limb suggested this date as birth of small active region.
312	N09	6/27	Birth of small active region.
	S12	6/29	Filament disappeared.
308	N18	6/29	Curved filament disappeared.
307	N17	7/5	Birth of small active region at former position of curved filament.
300	S35	7/2	Central meridian passage of large remnant plage whose neutral line evolved conspicuously from an S-shape to a straight line through the plage.
272	N07	7/4	Birth of small active region.
265	N48	7/1	Filament disappeared.
250	S43	7/7	Filament disappeared.
248	S21	7/8	Filament bordering remnant plage disappeared.
235	S07	7/3	Filament disappeared.
225	N27	7/2	Filament partly disappeared.
		7/7	Filament disappeared; gradually re-formed during remainder of disk passage.
224	N14	7/8	Formation of filament.
209	S10	7/8	Birth of small active region.
206	N26	7/11	Formation of filament.
205	S13	7/8	Filament disappeared in apparent response to birth of active region west of this location.
181	S14	7/9	Isolated leader sunspot rapidly diminished after this date. Associated filament to the southeast also disappeared on this date.
170	S26	7/9	Filament disappeared.
		7/10	Filament slowly re-formed during this and next 2 days.
		7/14	Filament disappeared.
156	N14	7/12-13	Central meridian passage of leader sunspot of region that had emerged and blended with larger region to the west to create a large and very active complex. This spot had merged with follower spots of western region to form a "delta" magnetic configuration over which several strong flares occurred early in the disk passage, followed by a proton event. This area redeveloped on the next solar rotation to produce additional large solar flares.
154	S17	7/12	Birth of small active region.
		7/16	Additional growth in region; original spots had disappeared before this date.
152	N28	7/12	Birth of small active region accompanied by formation of dark filament southeast of this location. Region maximized next day and filament continued large and active for remainder of disk passage.
140	S15	7/12	Filament material north and south of this location disappeared, leaving the central portion large and active. This section slowly enlarged throughout remainder of disk passage.
124	N45	7/16	Filament disappeared.
122	S23	7/12	Filament within faint plage disappeared.
		7/19	Second disappearance of filament after gradually re-forming.
120	S30	7/15	Birth of small active region within filament channel. Nearby filament section became very active for remainder of disk passage.
	S08	7/16	Birth of small active region.
118	N17	7/12	Filament disappeared; re-formed next day.
		7/17	Filament disappeared again.
116	N16	7/19	Birth of small active region that was still growing slowly at west limb on 21 July.
109	N31	7/16	Birth of tiny plage and spot.
100	N45	7/16-18	Filaments on western boundary of this cell slowly disappeared.
97	S05	7/19	Birth of small active region.
66	S10	7/18	Birth of small active region.
58	N05	7/23	Equator-crossing filament nearly disappeared after being very active for previous 9 days.
51	S18	7/22	Rapid growth within plage that had been slowly evolving with small spots for previous week.
		7/25	Maximum development as class E spot group with group axis steeply inclined from normal east-west orientation.
11	N11	7/25	Birth of moderate active region within remnant plage. Growth to class D spot group by 27 July and possibly some growth continued through west limb passage on 29 July.
10	S18	7/19	Birth of large active region, which developed to maximum by 24 July as class E spot group.

Note: Day without H-alpha photographs was 24 July 1968.

Hα SYNOPTIC CHART

1968 – ROTATION 1536



Hα SYNOPTIC CHART

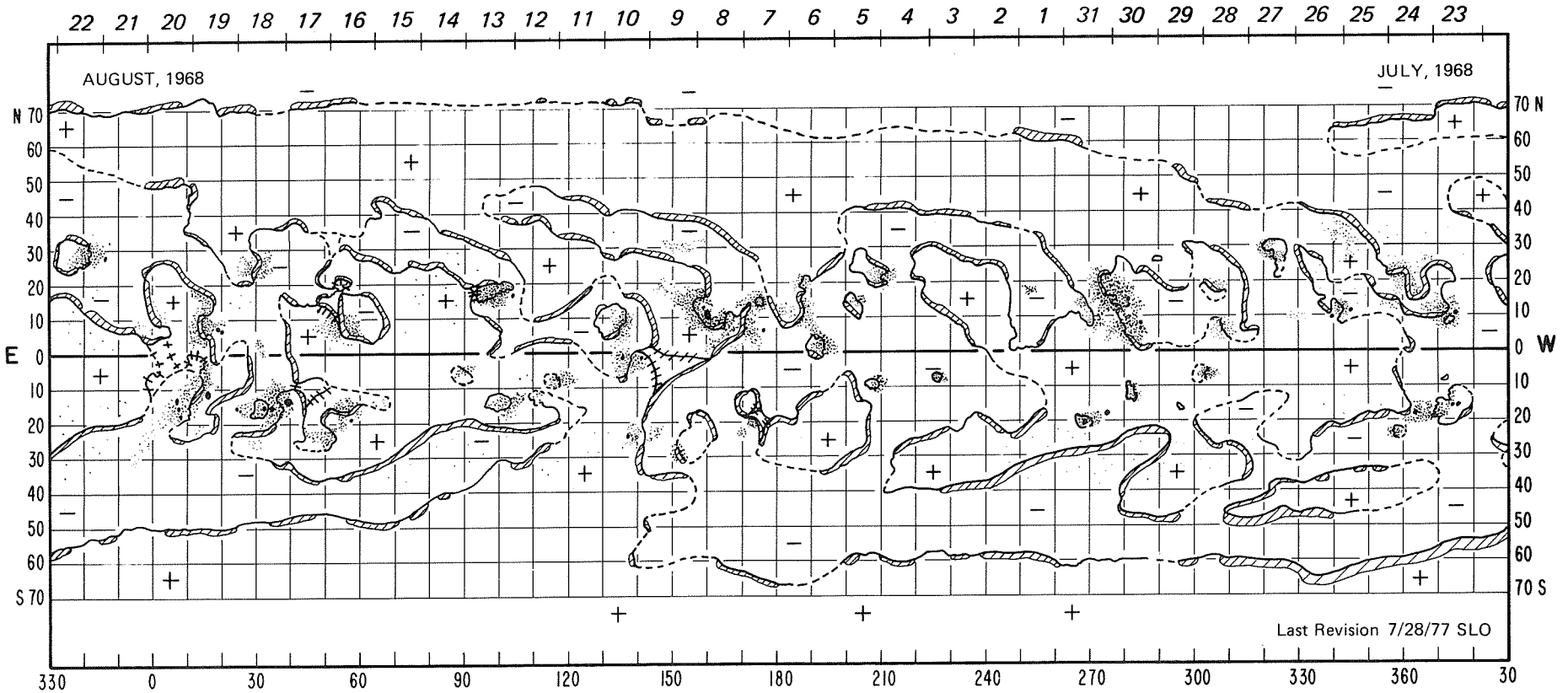
1968 - Rotation 1537

°Long.	°Lat.	Date	Descriptive Notes
358	S23	7/25	Birth of small active region.
348	N34	7/23	Filament within faint plage disappeared.
		7/27	Filament reformed.
		7/28	Filament disappeared.
342	N11	7/26	Birth of moderate active region, which attained maximum 29 July as a small, simple class D spot group.
323	N27	7/25	Birth of small active region, which reached maximum 28 July as class B spot group.
314	N20	7/30	Filament disappeared in apparent response to active regions developing nearby.
308	S07	7/29	Birth of small active region.
286	S22	7/29	Filament disappeared.
	S47	7/28	Filament disappeared, possibly associated with filament disappearance next day at lower latitude along same neutral line.
282	S12	7/26	Birth of small active region, which remained faint and spotless.
280	N08	7/27	Birth of important active region on southern boundary of large returning active region.
		7/31	Maximum development as class E spot group, while another region emerged between it and the older region to the north.
271	S21	8/2	Birth of small active region, which developed small class D spot group by next day.
260	N25	7/28	Filament disappeared.
		8/3	Filament reformed.
253	N18	8/2	Birth of tiny plage.
226	S08	8/6	Birth of small active region.
209	S10	8/5	Birth of small active region.
202	N13	8/7	Birth of small active region.
193	N02	8/4	Birth of small active region.
190	S12	8/2	Filament disappeared.
176	N15	8/7	Birth of tiny region between two remnant plages.
164	N10	8/9	Filament disappeared.
160	N12	8/8-9	Central meridian passage of large, round spot group with strong "delta" configuration that produced major flares.
152	S07	8/9	Filament formed as a continuous structure across the solar equator and into the large active region.
		8/10	Filament disappeared, probably as neutral lines rearranged.
142	S15&30	8/7	Filaments disappeared.
	S24	8/13	Just before west limb passage important active regions emerged simultaneously 5° east and west of this neutral line, completing a complicated chain of developments at this longitude--developments associated with major restructuring of the magnetic patterns near the solar equator.
137	S02	8/8-11	Rapid variations in faint plage before emergence of major region at this location.
		8/12	Birth of important active region, which reached maximum 14 August as class E spot group.
136	N09	8/8-11	Rapid variations in plage without sunspots occurred during interval of neutral line rearrangements west of this location.
116	S07	8/14	Birth of small active region.
102	S13	8/15	Birth of small active region.
100	N17	8/11	Birth of moderate active region, which reached maximum by 14 August as extended class C spot group.
		8/17-19	New plage growth before west limb passage.
95-120	N05	8/11	Filaments along this neutral line disappeared, as new active region emerged at northern end of filament chain.
89	S04	8/15	Birth of small active region.
75	S45	8/15	Filament disappeared for 1 day only.
66	N10	8/12	Filament disappeared; gradually reformed and stayed active throughout remainder of disk passage.
62	N27	8/20	Filament disappeared near west limb.
52	N10-20	8/17-18	Filaments disappeared, as neutral lines rearranged.
44	S14	8/18	Filament formed between active regions.
39	N02	8/14	Filament aligned along meridian disappeared.
		8/16	Filament reformed.
		8/19	Filament disappeared.
		8/22	Filament reformed near west limb.
	S17	8/18	Central meridian passage of small spot south of very large leader spot of complex region. This small spot probably represented the region remnant from the previous disk passage.
30	S16	8/12	Birth at east limb of moderate active region, which grew rapidly and "collided" with trailing spots of large region to its west. The developing leader spot combined with the strong follower spot of the older region on 15 August to form a "delta" magnetic configuration. Combined regions had appearance of large class F spot group.
	S25	8/19	Birth of small active region south of filament.
		8/21	Filament north of region disappeared.
28	S05	8/15	Filament formed.
12	S14	8/18	Peak development of class E spot group that was growing when first observed at east limb on 14 August.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1968 – ROTATION 1537



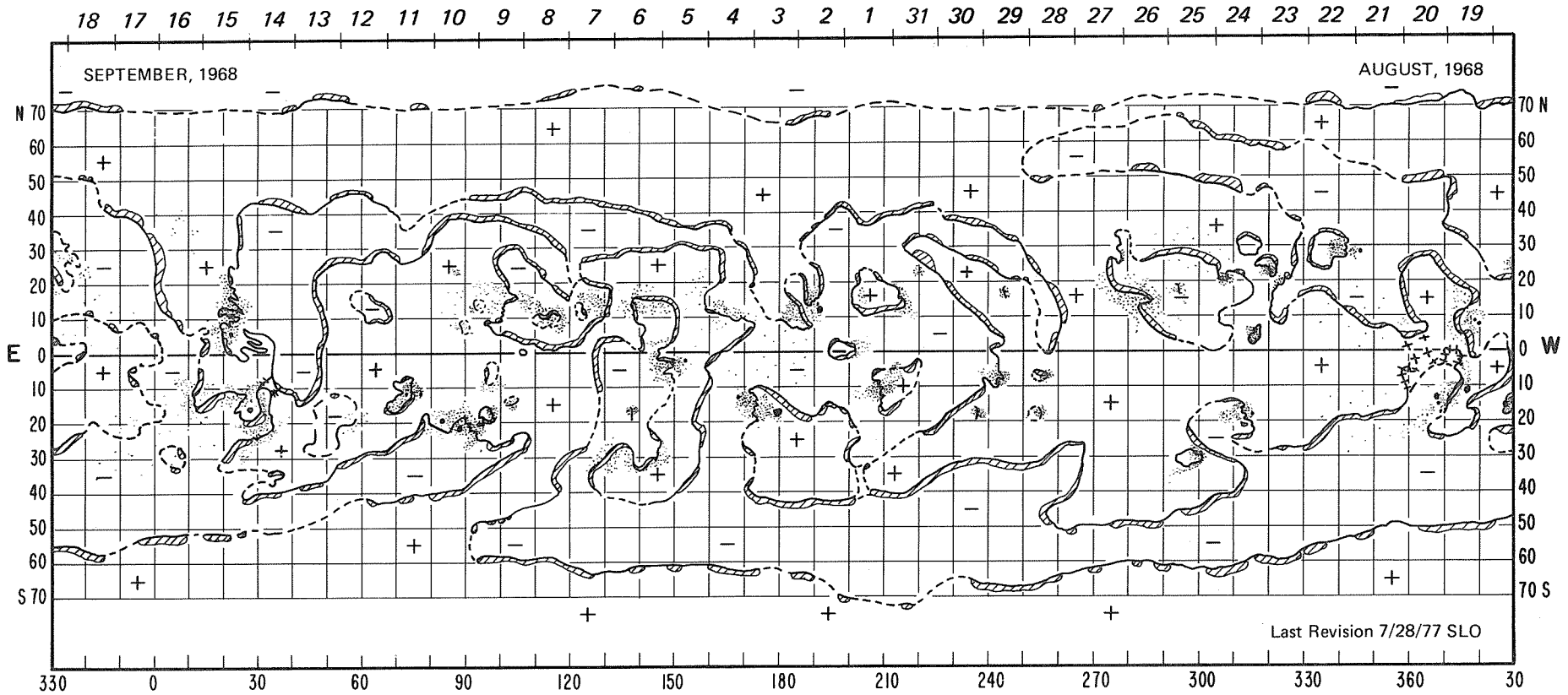
Hα SYNOPTIC CHART
1968 - Rotation 1538

°Long.	°Lat.	Date	Descriptive Notes
342	N29	8/17	Birth of small active region.
		8/22	Additional rapid growth occurred to make this moderate size region.
		8/24	Maximum development as class D spot group.
323	N09	8/22	Filament disappeared that had been very active during previous 3 days.
		8/24	Filament reappeared 1 day only.
320	N23	8/25	Birth of small active region.
316	N05	8/21	Birth of small active region near active filament.
313	S18	8/19	Birth of moderate active region that reached maximum 23-24 August as class D spot group.
307	N20	8/26	Birth of small active region.
305	S30	8/24-25	Filament disappeared in apparent response to birth of active region.
		8/26	Filament re-formed.
300	S30	8/22	Birth of small active region near filament.
294	N18	8/31	Birth of active region near west limb that continued to grow 01 September. It returned 2 weeks later as a spotted region.
280-310	N45	8/21	Filaments disappeared.
265	S40	8/28	Filament disappeared.
260	N10	8/25	Filament disappeared.
		8/28	Filament re-formed.
		9/2	Filament disappeared at west limb.
256	S06	8/27-28	Birth of small active region.
255	S17	8/30	Birth of small active region.
245	N17	9/3	Birth of active region near west limb.
237	S17	9/3	Birth of active region near west limb.
235	S13	8/29	Formation of filament.
230	N20	9/3	Filament disappeared in apparent response to region developing west of this position.
220	N25	9/3	Birth of tiny region.
210	N40	8/28	Filament disappeared near east limb.
		9/4	Filament re-formed.
203	N18	8/28	Filament within faint plage disappeared near east limb.
186	N12	8/28	Birth of moderate active region at east limb.
		8/31	Maximum development as class D spot group.
		9/6	Filament embedded in plage disappeared.
182	N17	8/29	Filament near east limb disappeared in apparent response to developing active region.
	S15	9/2	Large filament disappeared in response to growth of major active region near its eastern end.
173	S16	8/31	Birth of major active region that grew to class E spot group by 3 September. Leader spot continued to enlarge for remainder of disk transit, returning for the next 3 solar rotations. Proton flares occurred during the next 2 solar rotations.
		9/8	Growth of bright plage and new spots north of leader spot just before west limb passage.
150	N08	9/9	Filament in faint plage disappeared.
145	N29	9/4	Large filament disappeared.
		9/7	Filament partially re-formed.
138	S16	9/3	Birth of tiny active region that disappeared by 7 September.
129	N19	9/6	Filament disappeared.
123	N05	9/9	Active equatorial filament disappeared.
116	N10	9/7	Birth of small active region at leading border of faint plage.
		9/12	New bright plage formed after first plage had become very faint.
103	S15	9/12	Birth of small active region.
100	N25	9/7	Filament formed.
		9/10-14	Filament became especially tall and dark.
98	S16	9/6	Birth of small active region that had disappeared by 10 September.
95	N38	9/10	Faint filament disappeared; filament nearby at lower latitude then became especially large and dark.
93	N13	9/13	Birth of small active region.
91	S21	9/6	Birth of moderate active region that reached maximum development as class E spot group by 11 September.
89	N07	9/14	Birth of small active region.
86	N22	9/5	Birth of tiny plage that disappeared by 8 September.
82	S21	9/9	Birth of small active region that merged with nearby region to the west.
74	S12	9/7	Birth of moderate active region that developed slowly with only small spots until 12 September.
		9/12	Rapid growth occurred that reached peak as class D spot group by next day.
55	N26	9/16	Filament disappeared.
		9/17-18	Filament re-formed.
31	S21	9/17	Birth of small new region within remnants of old plage near west limb.
23	S27	9/14	Filament within faint plage disappeared.
22	N22	9/14	Filament north of faint plage disappeared.
0	N25	9/16-22	Filament enlarged and darkened throughout this period. It was exceptionally tall by the time it reached west limb.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1968 – ROTATION 1538



Hα SYNOPTIC CHART

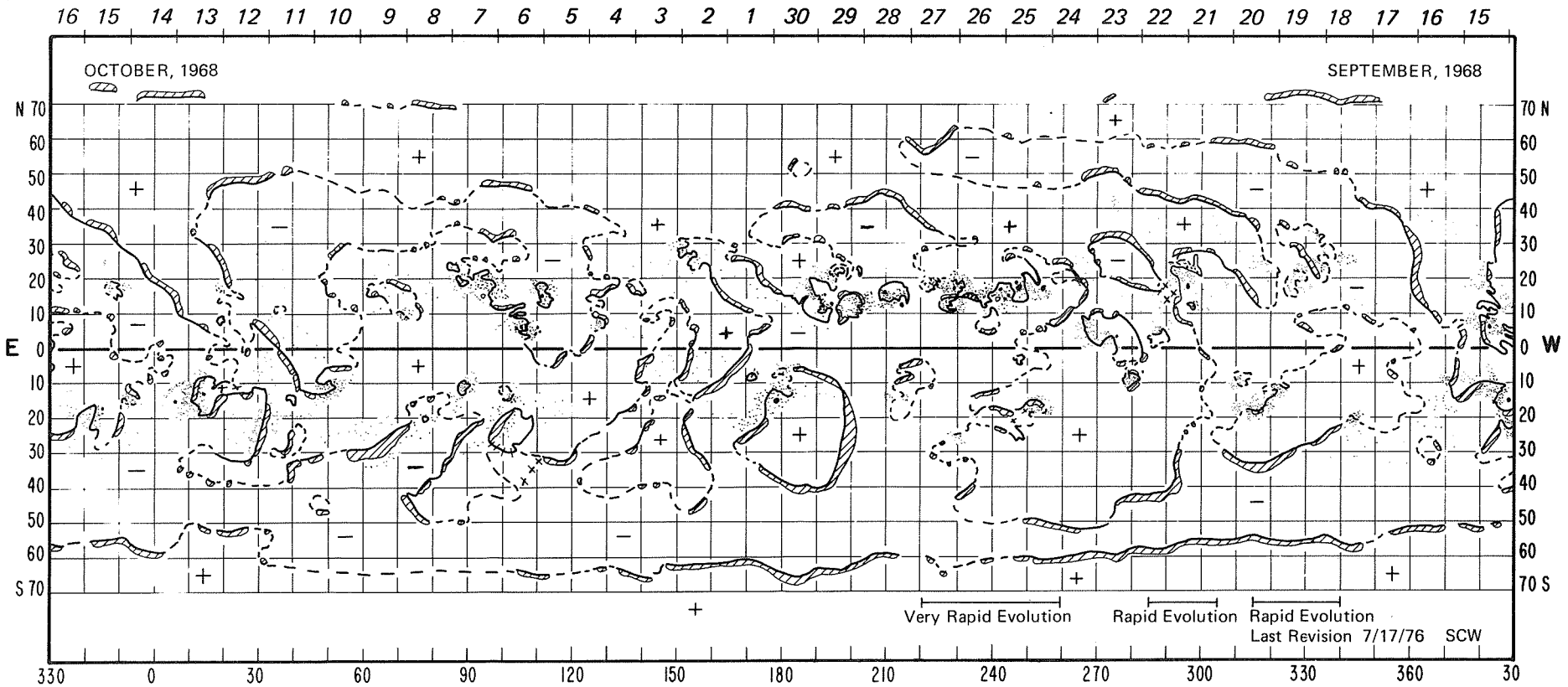
1968 - Rotation 1539

°Long.	°Lat.	Date	Descriptive Notes
328	N28	9/22	Filament disappeared.
313	N16	9/22	Filament disappeared.
310	S10	9/20	Birth of small active region.
		9/24	Second growth phase continued until west limb passage 26 September.
298	N05	9/24	Filament enlarged.
297	N12	9/19	Birth of small new region.
	N23	9/24	Birth of small active region north of old leader sunspot.
294	N16	9/22	Filament within faint plage near sunspot disappeared.
290	N16	9/21	Rearrangement of neutral lines isolated negative-polarity cell east of this location.
280	N17	9/18	Filament disappeared near east limb.
		9/19	Filament re-formed.
	S08	9/18-19	Birth of small active region.
	N29	9/24-25	Filament disappeared.
		9/27	Partial reappearance of filament.
275	N29	9/24	Filament disappeared.
272	N02	9/19	Birth of small active region on western border of small plage.
255	S18	9/22	Birth of small active region.
252	N18	9/22	Probable maximum of large class E spot group that had large, simple leader and follower spots early in disk passage.
		9/24	Numerous new spots and bright plage developed in following portion of region, simultaneous with growth of three new regions east of this region.
240	N17	9/25	Birth of moderate active region, which contained numerous spots, within position of small old region. Reached maximum 27 September as small class D spot group, and its plage began to merge with large region to its west. This western region began a rapid decay after the merger.
235	S18	9/28	Birth of small active region.
228	N12	9/24	Birth of small active region that formed part of large activity complex.
224	N19	9/23	Birth of moderate active region that formed part of extensive activity complex.
215	N40	9/28	Filament began gradual disappearance over the next 4 days.
213	N16	9/25	Birth of moderate active region near small sunspot. Reached maximum 27 September as class D spot group and merged with bright plage to the east to form part of a major activity complex.
200	N23	9/30	Birth of small active region.
197	S25	9/30	Large filament disappeared.
196	N22	9/22	Probable date of birth of small active region at east limb.
173	S24	9/28	Filament in old plage near large single spot disappeared with resultant major flare.
		10/4	Filament again disappeared after gradually re-forming and again a flare of major proprotions occurred. This spot represented the return of the leader of an important region--one that returned with major activity during rotation 1540.
172	S08	9/28	Birth of small active region.
162	N15	10/3	Filament disappeared in apparent response to growth of active region near its northeastern end.
155	N27	10/2	Birth of moderate active region that reached maximum 4 October as small class D spot group.
117	S32	10/6	Filament disappeared.
113	N16	10/3	Birth of small active region.
106	N06	10/3	Birth of major active region that grew to maximum by 6 October as class E spot group with a high spot count. Region was isolated from other strong regions and was relatively simple in structure.
103	S16	10/11	Birth of small active region near west limb.
99	S22	10/3	Curved filament in faint plage disappeared.
96	N17	10/1	Probable date of birth of small active region that reached maximum 3 October with peculiar class C spot group. Formed part of compact cluster of at least three active regions. Marked the third major activity complex to form from the merger of multiple regions during this solar rotation.
90	S11	10/5	Birth of small active region.
		10/11	Rapid region growth continued to west limb 13 October.
87	N20	10/5	Bright plage contained conspicuous circular plage corridor.
		10/6	Large number of new small sunspots with little apparent organization.
		10/9	Plage and spots rapidly disappeared after this date.
72	N10	10/5	Birth of small active region.
65	S27	10/11	Large filament disappeared.
29	N25	10/15	Filament disappeared.
18	N18	10/11	Birth of small active region, which coincided with increased activity in nearby filament to the west.
11	S15	10/7-8	Large class D spot group, probably near maximum development, appeared at east limb.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1968 – ROTATION 1539



Hα SYNOPTIC CHART

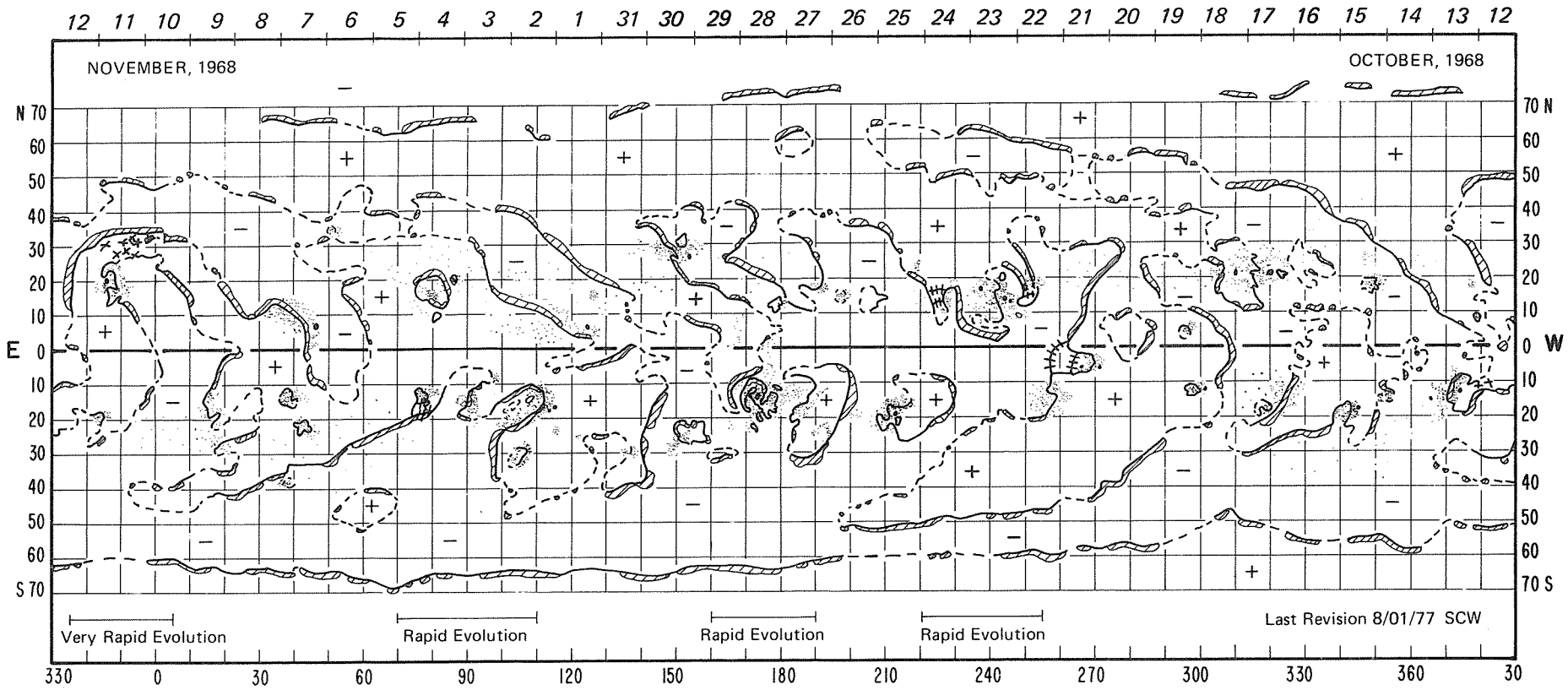
1968 - Rotation 1540

°Long	°Lat.	Date	Descriptive Notes
353	S14	10/13	Birth of small active region at northern end of small filament.
350	N18	10/19	Birth of small active region 2 days before west limb passage.
349	S22	10/13	Filament disappeared in apparent response to two developing active region nearby.
342	S19	10/12	Birth of small active region that reached maximum 16 October as class C spot group.
325	S25	10/19	Large filament disappeared.
315	N20	10/14-15	Large class E spot group reached maximum size.
	N47	10/15	Large section of filament disappeared.
307	N30	10/14	Filament disappeared.
299	S12	10/19	Birth of small active region.
		10/23	Additional growth just before west limb passage.
298	N10	10/16	Part of filament disappeared.
296	N05	10/13	Probable date of birth of small active region at east limb.
285	N04	10/18	Filament disappeared.
282	S32	10/17	Filament disappeared near east limb.
269	S05	10/23	Birth of moderate active region that reached maximum as class D spot group late next day.
242	N16	10/20	Maximum development of complex and active class E spot group. Large relative proper motions of sunspots.
235	N03	10/18-23	Filament exceptionally active.
		10/26	Western portion of filament disappeared.
230	S12	10/20	Filament partly disappeared.
		10/21	Filament re-formed.
		10/22	Filament completely disappeared.
227	N13	10/25	Birth of small active region within area of faint plage and near active filament.
212	S18	10/23	Maximum development of peculiar class C spot group with numerous small spots north of group's large symmetric leader spot. These smaller spots moved west relative to the large leader spot. The former might have been a separate bipolar group that emerged later than the large leader spot.
		10/27	Emergence of new bipolar plage and spots in trailing portion of this region.
206	N36	10/24	Filament disappeared.
198	S15	10/31	Partial disappearance of filament.
188	S31	10/27	Southern portion of large filament system disappeared.
173	S14	10/22	Loop prominences, coronal rain and yellow-line corona accompanied east limb passage of one of the greatest active regions of the solar cycle. Third disk passage for the large central sunspot. New spots formed surrounding old spot in a sequence of at least five additional bipolar sets.
		10/25	Large filament disappeared within this large plage.
		10/29-31	Important new spot growth occurred west and east of the very large and central sunspot. Major flares with proton emission occurred during this growth and during movement of the large spot toward the new spots in the region's western portion. (see "Data on Solar-Geophysical Activity October 24-November 6, 1968," *Report UAG-8*, Parts 1 and 2, completed by J. Virginia Lincoln, World Data Center A, Upper Atmosphere Geophysics, ESSA, March 1970)
157	N07	11/3	Filament disappeared near west limb.
152	N29	10/28	Emergence of new spots within leading portion of old region. Growth continued only through next day and did not exceed a class B spot group.
145	N19	10/24	Filament disappeared at east limb. Gradually reformed during disk passage and extended north through decaying active region.
		11/1	Filament disappeared again.
130	S03	11/3	Almost all of active, equatorial filament disappeared.
127	N16	11/5	Birth of small active region.
105	S30	11/5	Birth of small active region.
100	S17	11/1-3	Important growth of new spots within large old region.
		11/8	Additional spot growth at west limb.
98	S35	11/1	Filament disappeared.
93	N29	10/30	Filament disappeared at east limb.
84	N15	10/31	Almost all of filament disappeared.
82	N21	11/3	Filament within faint plage disappeared.
80	N14	11/9	Birth of small active region near west limb on lower border of negative-polarity cell.
78	S13	11/3	Birth of small active region.
75	N20	11/4	Remaining portion of filament disappeared.
52	N35	11/10	Birth of small active region.
45	S22	11/9	Birth of small active region.
40	S13	11/4	Birth of small active region.
26	S24	11/7	Filament disappeared.
6	N16	11/7	Filament disappeared.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1968–ROTATION 1540



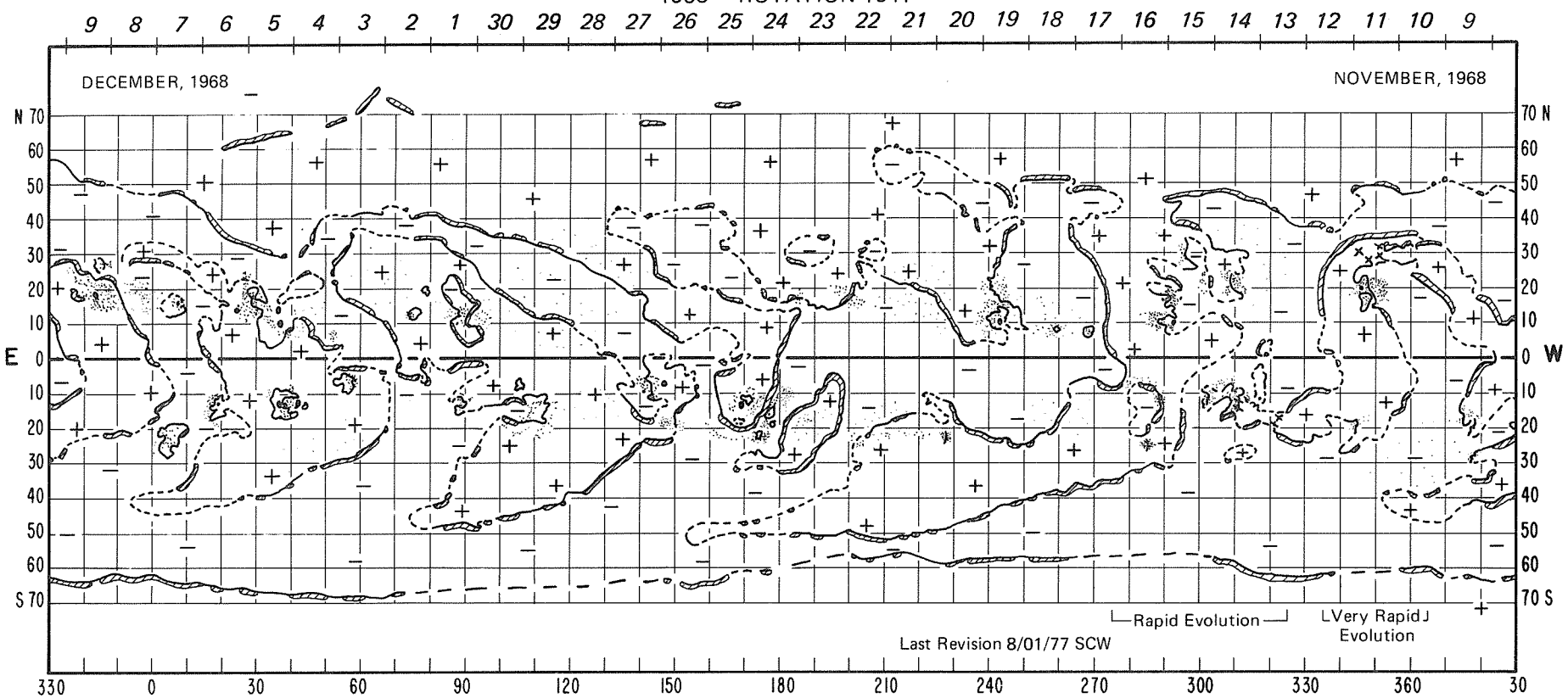
Hα SYNOPTIC CHART
1968 - Rotation 1541

°Long.	°Lat.	Date	Descriptive Notes
348	N19	11/7	Simultaneous birth of two bipolar regions within an existing faint plage. The more northern of the two new regions grew rapidly to form a follower-dominant, compact class D spot group with strong "delta" configuration. Spots within the common penumbra exhibited conspicious counterclockwise motion about a common center (see "Data an Cosmic Ray Event of November 18, 1968 and Associated Phenomena," *Report UAG-9*, compiled by J. Virginia Lincoln, World Data Center A, Upper Atmosphere Geophysics, ESSA, April, 1970.)
		11/18	Great limb flare produced one of the largest proton events of the solar cycle.
347	N15	11/15-16	Complex absorption features on boundary of small negative-polarity cell were especially large and active.
335	N25	11/10	Filament formed and remained active for remainder of disk passage.
		11/17	Filament disappeared near west limb. This event appeared as part of major rearrangement of magnetic patterns north of the proton-flare region. The filament disappearance preceded by 1 day the great limb event of 18 November and may have been a precursor to that great flare.
310	S12	11/10	Maximum plage development of the blend of two bipolar regions.
		11/15-16	Rapid dissipation of plage.
		11/17	Active small filaments within remnants of these regions.
303	N21	11/15	Small active filament within extensive faint plage disappeared.
296	N38 and N47	11/16	Filaments disappeared.
292	N17	11/16	Birth of small active region that reached maximum 19 November as small class D spot group.
285	S25	11/19	Birth of small active region.
269	N08	11/14-15	Birth of tiny active region that disappeared by 18 November.
260	N09	11/14-15	Birth of small active region that disappeared by 19 November.
250	S24	11/19	Filament disappeared.
240	N11	11/18	Maximum development of peculiar class D spot group with large leader spot that later divided into several parts.
227	S22	11/25	Birth of small active region near west limb.
196	S18	11/20	Large curved filament disappeared. Similar filament on same neutral line made sudden disappearance on previous solar rotation.
178	S05	11/22	Filament disappeared; gradually re-formed during remainder of disk passage.
		11/27-29	Section of filament crossing equator became especially large. May have disappeared 29 November.
175	S22	11/26	Birth of small active region within remnants of great active region and between two large active filaments.
169	S14	11/25	Central meridian passage of large sunspot on its fourth disk passage. Site of extreme activity during previous rotation. Irregular configuration of this class E spot group suggestive of at least two blended bipolar regions. Previous disk passage displayed blend of at least 6 bipolar units.
150	S20	11/21	Birth of small active region that had nearly disappeared by 28 November.
		11/30	New region growth 2 days before west limb passage.
145	N25	11/25	Small filament disappeared.
143	S07	11/22	Birth of moderate active region near east limb.
		11/26	Maximum region development as compact class D spot group.
135	S30	11/25-27	Sections of very large filament disappeared on each of these days.
		11/30-12/3	Filament became exceptionally large again last 4 days of disk passage.
90	S12	11/27	Birth of small active region.
87	N06	12/4	Small filament within faint plage disappeared with resultant two-ribbon flare.
74	N12	12/4	Birth of tiny plage.
57	S06	12/2	Birth of small active region.
38	S13	11/30	Birth of moderate active region that reached maximum 2 December as class D spot group with large symmetric leader and follower spots.
30	N12	12/2	Maximum development of major class E spot group, which formed near east limb ~ 28 November.
		12/7	Region greatly enlarged by formation of new region on northern border.
		12/8-9	Maximum development of complex of two class E spot groups near west limb.

Note: Days without H-alpha photographs were 14 and 29 November 1968.

Hα SYNOPTIC CHART

1968 – ROTATION 1541



Hα SYNOPTIC CHART

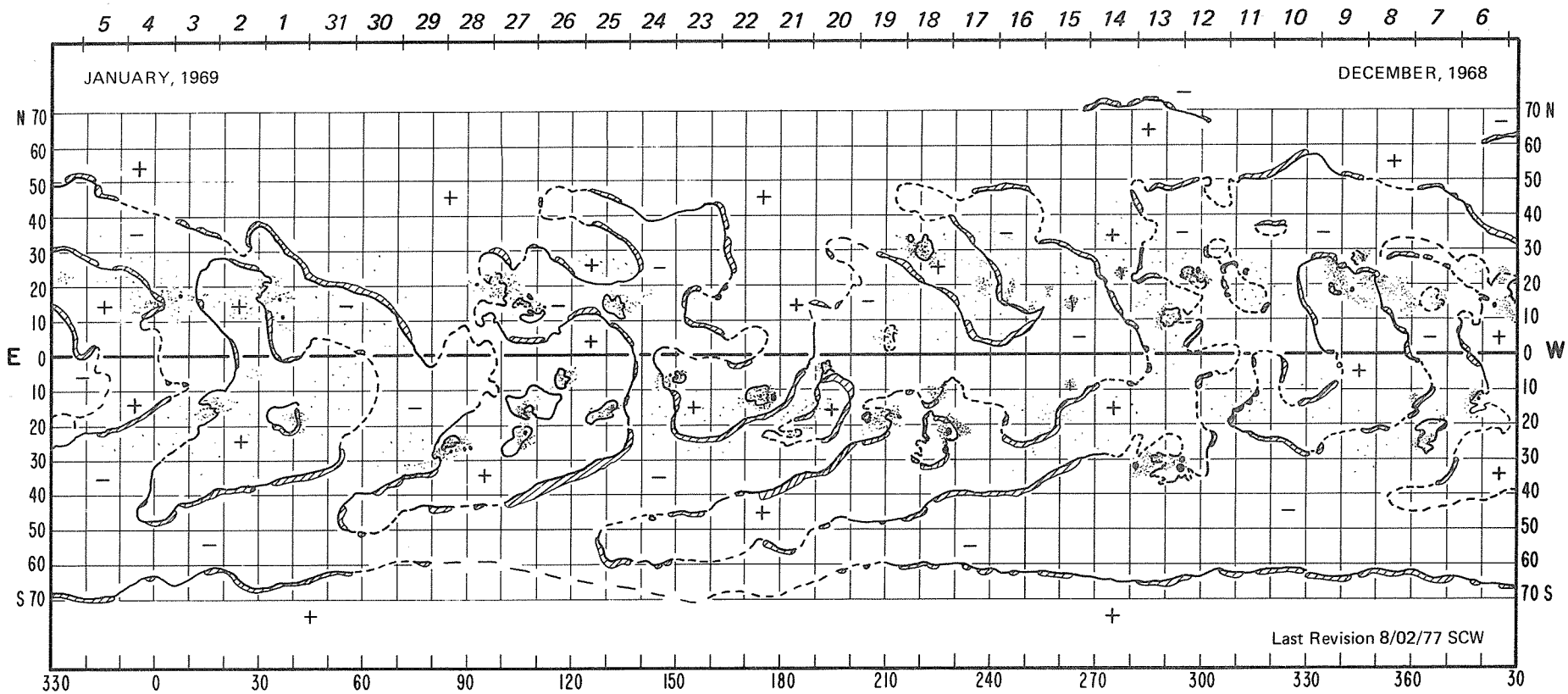
1968-1969 - Rotation 1542

°Long.	°Lat.	Date	Descriptive Notes
358	N18	12/11	Birth of small active region in leading portion of remnant proton-flare region.
354	N10	12/4	Large filament, associated with large remnant plage from proton-flare region of previous disk passage, disappeared.
350	N19	12/2	Large limb event with protons occurred in returning region that produced proton flare 18 November.
320	S24	12/9 12/12	Large filament disappeared. Second disappearance of filament after gradual re-formation.
297	N23	12/14	Birth of moderate active region that grew to class D spot group with brilliant plage by 17 December; it may have been still growing at west limb passage 18 December.
290	N10	12/8	Birth of small active region.
288	S31	12/12	Maximum development of class F spot group, which may have formed 6 December just before appearing at east limb.
281	N42	12/14	Disappearance of small filament.
277	N23	12/10	Birth of very small active region.
264	S10	12/20	Birth of small active region at west limb.
252	S24	12/19	Portion of large S-shaped filament disappeared.
232	N35	12/21	Filament disappeared near west limb.
220	N30	12/17	Birth of small active region.
210	N05 S18 12/18	12/14 12/17	Birth of small active region near east limb. Birth of moderate active region. Rapid region growth to class D spot group.
195	S30	12/17	Long large filament disappeared near east limb in apparent response to developing region at S18 and just west of filament.
	S08	12/21	Filament disappeared on northern border of positive-polarity cell.
192	S03	12/19	Birth of tiny plage.
191	N15	12/21	Small filament disappeared.
185	S22	12/22	Birth of very small region that disappeared by 24 December.
176	S13	12/23	Rapid formation of major active region that maximized 25 December as class D spot group.
170	S20	12/24 12/25	Large filament disappeared in apparent response to rapid growth of nearby active region. Filament re-formed.
150	S07	12/20	Formation of new plage and small spots near old leader sunspot. Plage especially bright 22 and 24 December.
135	N07	12/28-30	Filament formed and became very active last 3 days of disk passage.
134	N14	12/19	Birth of small active region at east limb.
125	N12	12/22	Filament disappeared along same neutral line as filament that disappeared in southern hemisphere on same day.
120	S35	12/22	Large filament disappeared near east limb.
118	S06	12/23	Birth of small active region.
105	N04	12/27	Filament at central meridian was especially active throughout its disk passage.
101	N19	12/22	Probable maximum development of class F spot group near east limb.
70	S25	12/29	Filament disappeared.
54	S45	12/30	Filament disappeared.
45	S34	1/4	Filament disappeared.
38	Equator	1/1	Central meridian passage of especially active filament. Most filaments paralleling the solar equator appeared more active than normal.
28	S40	1/1	Filament partially disappeared.
22	Equator	1/2	Central meridian passage of small, especially active filament.

Note: Days without H-alpha photographs were 26-27 December 1968

Hα SYNOPTIC CHART

1968 – ROTATION 1542



Hα SYNOPTIC CHART

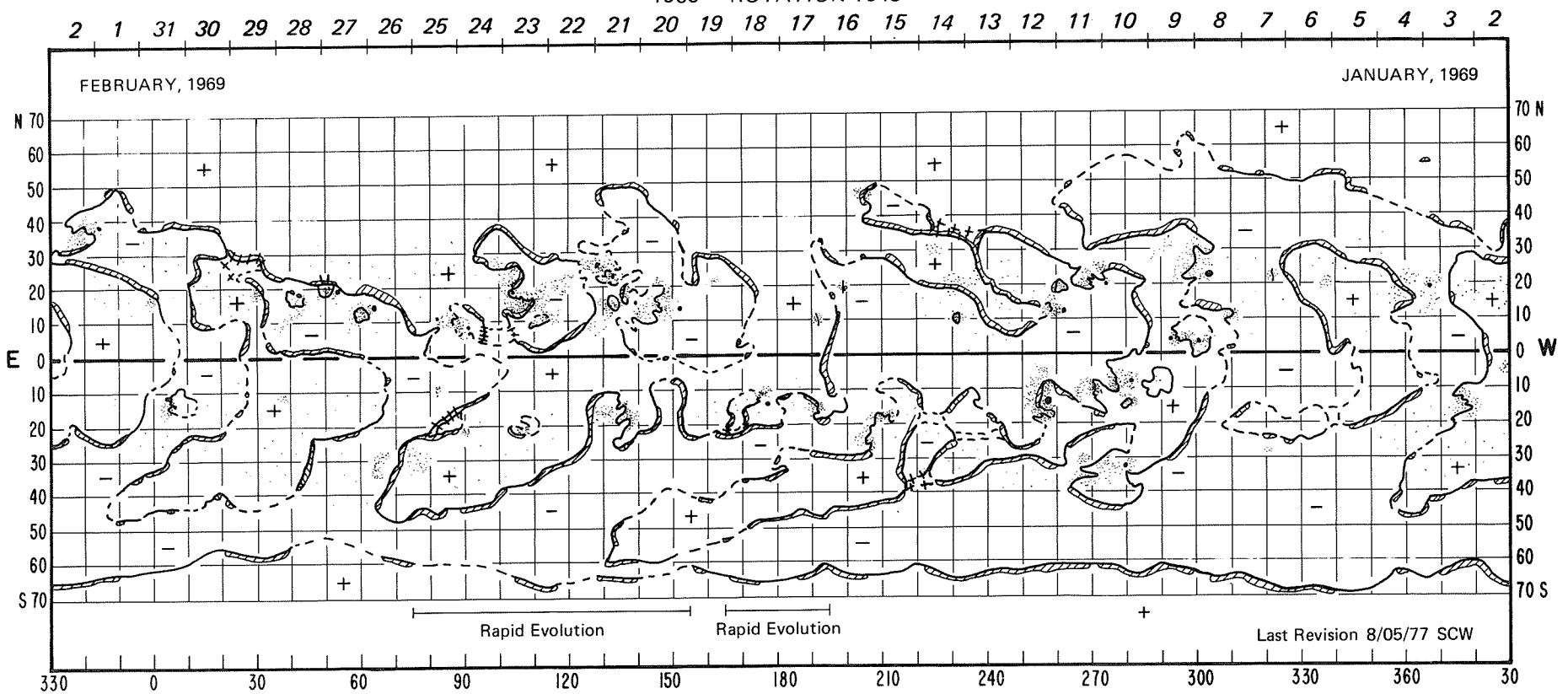
1969 - Rotation 1543

°Long.	°Lat.	Date	Descriptive Notes
322	N11	1/12	Birth of small active region at west limb.
310	N11	1/11	Birth of small active region, which was brightest 13 January just before west limb passage.
304	N11	1/4	Filament disappeared near east limb in apparent response to developing region south of this location.
297	N04	1/3	Birth at east limb of moderate active region that reached maximum 7 January as class E spot group.
281	S09	1/11-12	New plage growth around leader sunspot.
280	S14	1/12	Small plage visible this day only.
272	S44	1/14	Filament disappeared.
258	N12	1/14	Birth of moderate active region that reached a small class C spot group before west limb passage 17-18 January.
255	S15	1/5	Probable date of birth of major active region just before it crossed east limb.
		1/10	Maximum area of compact class D spot group with exceptionally large leader penumbra.
232	N10	1/14	Birth of small active region.
	S13	1/15-16	Filament disappeared.
220	S38	1/12	Part of large filament disappeared as neutral lines underwent major rearrangement.
215	N36	1/18	Filament disappeared.
	N26	1/19	Filament disappeared.
198	N20	1/16	Birth of tiny active region that disappeared by 20 January.
192	N10	1/13	Birth of small active region that disappeared by 18 January.
170	S22	1/18	Rearrangement of neutral lines isolated follower-polarity area of old active region and formed a large, continuous filament where formerly two separate filaments existed. Old leader sunspot north of the filament dissipated rapidly after this date.
168	N24	1/20	Filament disappeared.
150	S15	1/21	Filaments east and west of this location disappeared together with simultaneous enlargement of filament at (125, S20) on same continuous neutral line.
145	N13	1/20	Formation of new spots and plage in center of large old region with open class F spot group.
132	N15	1/23	Birth of small active region at trailing boundary of large active region.
131	N34	1/15	Probable date of birth of moderate region at east limb. Grew to small class D spot group by 18 January.
122	S28	1/20	Filament partially disappeared.
		1/23	Complete disappearance of major section of filament.
		1/24	Filament re-formed and became especially large through west limb passage 28 January.
96	N10	1/21	Birth of major active region that grew to class E by 27 January.
95	N35	1/28	Filament disappeared.
68	N16	1/22-23	Large filament disappeared near east limb in apparent response to nearby developing active region. Gradually re-formed after central meridian passage.
66	S40	1/22-23	Large filament disappeared near east limb and south of faint plage.
62	N12	1/25	Birth of small active region.
		1/29	Rapid new growth produced small class D spot group by next day.
55	S22	1/28	Filament disappeared.
51	N20	1/31	Birth of small active region that attained class D spot group and may have continued to grow after west limb passage 2 February.
45	S30	1/28	Filament disappeared, simultaneous with, and on same neutral line as, filament disappearance at (55,S22).
43	N16	1/24	Birth of small active region.
40	N22	1/30	Filament disappeared.
38	S11	2/3	Small plage formed at west limb.
11	N20	1/29	Filament disappeared; gradually re-formed during remainder of disk passage.
	N38	1/30	Filament disappeared.
5	S13	1/29	Birth of small active region.
0	S32	1/28	Filament disappeared near east limb.

Note: Days without H-alpha photographs were 10, 15 and 22 January 1969.

Hα SYNOPTIC CHART

1969 – ROTATION 1543



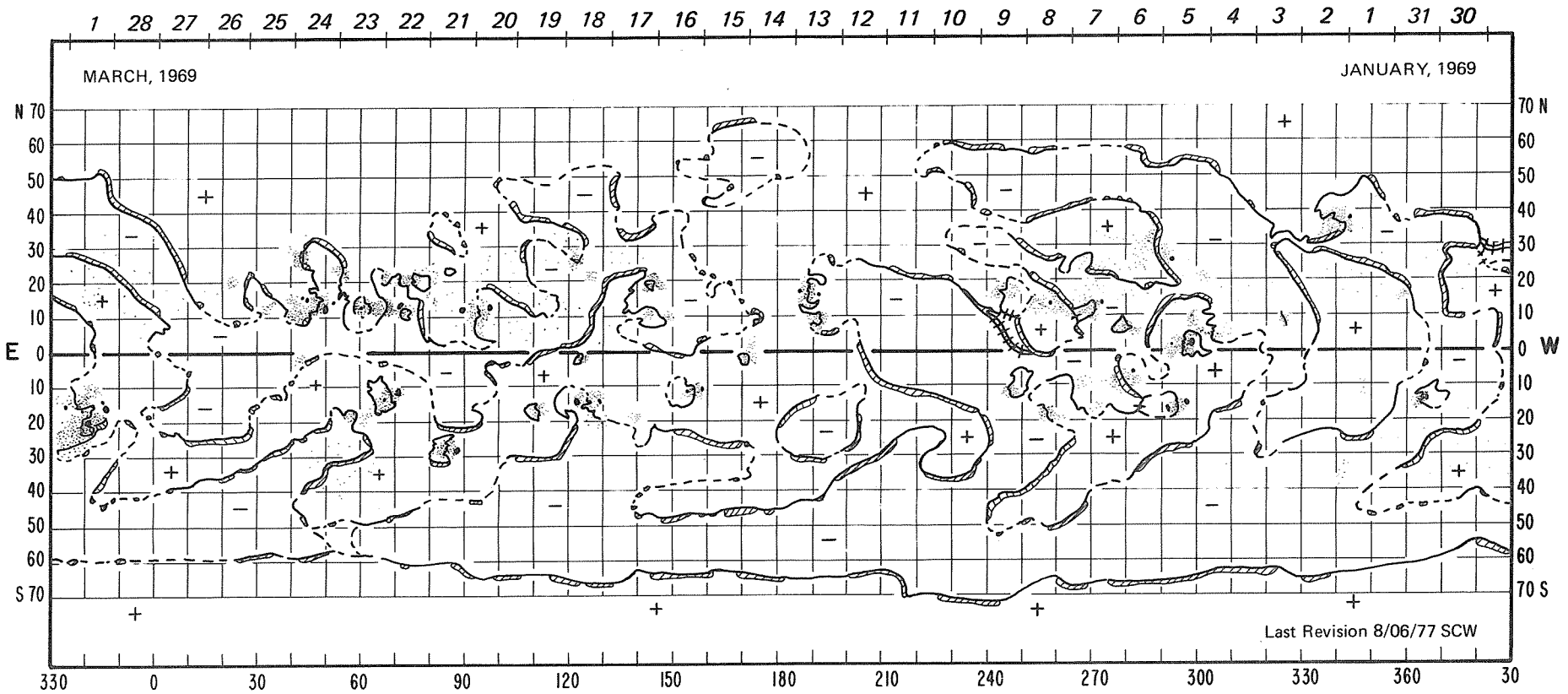
Hα SYNOPTIC CHART
1969 - Rotation 1544

°Long.	°Lat.	Date	Descriptive Notes
347	S10	1/30	Small plage visible this day only.
345	S25	1/31	Filament disappeared.
325	N08	2/7	Small bright region formed near west limb.
296	N01	1/31	Probable date of birth of active region that grew to maximum 6 February as large class D spot group.
295	S15	2/9	Birth of moderate active region that grew to class D spot group by 10 February and began to diminish by west limb on 11 February.
293	N27	2/8	Central meridian passage of leader sunspot that had returned for third disk passage.
290	S29	2/8-9	Large filament disappeared in apparent response to rapid growth of nearby active region.
280	S10	2/3	Filament disappeared.
		2/4	Filament re-formed.
		2/10	Filament disappeared again near west limb.
	N06	2/6	Birth of small active region.
270	N13	2/10	Birth of moderate active region near west limb that attained small class E spot group before west limb passage 13 February. Formed within area of extensive plage of moderate intensity.
257	S19	2/7	Birth of small active region within faint plage.
240	N10	2/9	Portion of large filament disappeared following formation of wave in filament and rearrangement of neutral lines previous day. Filament re-formed during remainder of disk passage. This filament, and filament portions south and northeast, became especially large and active by west limb passage.
225	S13	2/10	Central meridian passage of large and active filament with orientation in latitude opposite the usual for large quiescent filaments.
205	S32	2/15	Filament disappeared on same neutral line as filament disappearance of previous day at (170,S45).
203	S25	2/15	Filament disappeared simultaneously with filament southwest of this position.
188	N17	2/12	Birth of moderate active region that reached maximum 14 February as class D spot group. Greatly diminished by west limb passage 19 February.
170	S45	2/14	Filament disappeared.
165	S26	2/14	Partial disappearance of filament.
156	S11	2/16	Birth of small active region that maximized next day as small class D spot group.
125	S14	2/12	Probable date of birth at east limb of moderate active region that developed follower-dominant class D spot group; it reached maximum size 17 February.
123	S02	2/14	Birth of very small active region.
120	S25	2/15	Filament disappeared; gradually re-formed during next 5 days.
111	S18	2/15	Birth of small active region.
107	N38	2/20-23	Filament especially large and active.
98	S05	2/17	Equatorial filament disappeared.
85	S29	2/19-20	Birth of small active region.
		2/24	Rapid growth to small class D spot group in compact and brilliant plage.
75	N20	2/20	Birth of small active region on northwest boundary of great activity complex.
73	N11	2/21	Birth of major new area of spots and plage on southern border of old leader sunspot. Growth during next 3 days accompanied by major flare activity.
		2/24-25	Maximum development as complex class D spot group with "delta" magnetic configuration. Spot group to east moved to closest separation by this time. Major proton flare on 25 February occurred near point of contact between these two regions.
72	N20	2/19-20	Filament disappeared at north border of activity complex, as two small active regions emerged underneath the filament.
70	S47	2/17	Filament disappeared at east limb.
	S60	2/17	Filament disappeared at east limb.
69	S13	2/19	Birth of small active region.
68	N20	2/20	Birth of small active region that added only a minor addition to the great activity complex.
65	N12	2/21	Important new growth of spots within existing group greatly enhanced activity within the center of this great complex.
		2/25-26	Spots attained greatest size, and leader spots "collided" with complex group to the west. Spots in both areas greatly diminished by west limb passage 28 February.
		2/28	Additionally minor proton event from large flare at west limb.
58	S20	2/19-20	Birth of very small active region.
55	S31	2/19-20	Large filament disappeared at east limb; re-formed by 25 February.
	N22	3/1	Birth of small bright region at west limb.
48	N14	2/18	Possible date of birth at east limb of major active region at trailing end of great activity complex.
		2/23	Maximum development as complex class D spot group with a high spot count.
30	N18	2/25	Filaments bordering negative-polarity cell disappeared.
		2/27	Filaments re-formed.
		2/28	Filaments disappeared again.
6	N26	2/26-27	Part of large filament disappeared.

Note: Days without H-alpha photographs were 8, 19 and 26 February 1969.

Hα SYNOPTIC CHART

1969 – ROTATION 1544



Hα SYNOPTIC CHART

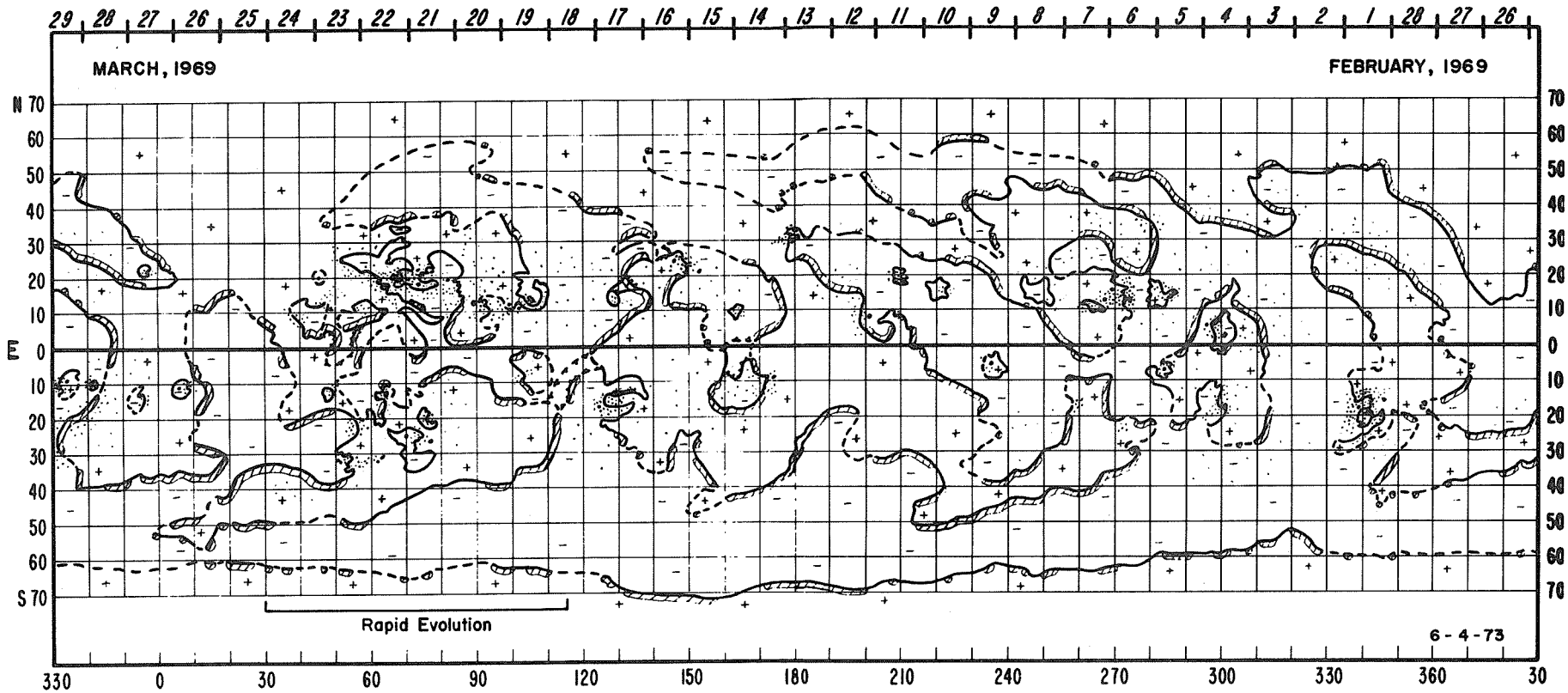
1969 - Rotation 1545

°Long.	°Lat.	Date	Descriptive Notes
355	N40	2/28	CMP of especially large and active filament.
345	N25	3/1	CMP of especially large and dark filament.
	S35	3/1	Filament disappeared.
342	S18	2/28	Maximum development of complex of two large spot groups that appeared to develop along a common meridian. A "delta" magnetic configuration developed near the center of the complex.
326	N21	3/1	Filaments disappeared.
315	N45	3/4-5	Filaments disappeared on eastern border of this negative-polarity bay.
302	N14	3/6	Filament disappeared.
297	N05	3/5	Plage growth and filament darkening.
285	N15	2/27	Probable date of birth at east limb of small active region in leading edge of large, faint plage.
272	N13	3/5	Birth of active region that developed class D spot group by 8 March.
		3/12	"Collision" between this group and one growing to the east coincided with large, proton-emitting limb flare. This area returned 2 weeks later as one of the largest spot groups of the solar cycle.
266	N22	3/5	Filament within faint plage disappeared, in apparent response to growth of nearby active regions.
265	N11	3/2	Birth of small active region.
		3/9	Important new region growth.
		3/12	"Collision" with group to the west at time of large west limb flare.
	S36	3/10	Filament disappeared.
255	S25	3/7-8	Filament disappeared.
245	N11	3/9	Large filament disappeared in apparent response to active regions developing to the west.
210	N20	3/7	Birth of small active region.
205	N02	3/14	Filament disappeared. Formed boundary to vortical pattern surrounding sunspot to the north.
203	N43	3/10	Filament disappeared.
201	N09	3/12	CMP of sunspot with strong counterclockwise vortical development of fibrils radial to the spot.
190	N16	3/15	Filament disappeared. Nearby sunspot showed accelerated dissolution after this date.
180	S28	3/13	CMP of large and especially active filament.
149	N23	3/15	Birth of small active region.
148	N15	3/16	Filaments southeast of this point disappeared in apparent response to growth of nearby region.
132	N15	3/17	Large filament disappeared in response to growth of nearby active region. Re-formed next day in pattern such that neutral line looped through the new active region before resuming original position.
130	N13	3/15	Birth of small active region east of and slightly under a large dark filament. Plage visible through filament. Filament moved slightly west, then disappeared 2 days later.
	S15	3/20	New growth within large, complex remnant plage.
111	S25	3/20	Filament disappeared.
105	N12	3/17	Plage and spot growth near large sunspot on its second disk passage, and leading one of great activity complexes of the solar cycle.
103	S08	3/16	Birth of small active region.
95	N12	3/14	Birth at east limb of major active region that became complex class E, then F, spot group. An interaction between it and the major region immediately west formed the western half of this great activity complex. Spot group was follower-dominant.
85	S06	3/20-21	CMP of extremely active filament.
73	S26	3/17	Birth of active region that maximized 19 March as simple class D spot group.
72	S36	3/19	Semicircular filament disappeared in apparent response to nearby growth of active regions.
69	N20	3/22	CMP of point of "collision" between two great sunspot groups. Leader spot of eastern region was especially large and dark, and it merged with follower spot of western region by 24 March. Great flares with proton emission occurred in this area on several days of the disk passage.
		3/31	Great west limb event presumably originated from this area. Notable for magnitude of eruptive prominence from a position at least 20° beyond the limb, for great expanding radio bursts, and for particles detected throughout the solar system for the next 2 weeks.
67	N36	3/20	Active filament disappeared.
		3/21	Filament re-formed.
		3/22	Filament disappeared again.
64	S11	3/23	New plage and spot growth on northern border of large spot in region on second disk passage.
55	S32	3/16	Birth at east limb of small active region.
		3/20	Rapid growth began; region reached maximum 23 March as follower-dominant class E spot group.
50	S12	3/25	Birth of small active region.
37	N10	3/27	Birth of very small active region near west limb.
22	S35	3/29	Part of filament disappeared near west limb.
13	S11	3/25	Filament disappeared in apparent response to birth of small active region east of this position.
7	S10	3/25	Birth of small active region.

Note: Days without H-alpha photographs were 7 and 22 March 1969.

Hα SYNOPTIC CHART

1969 - ROTATION 1545



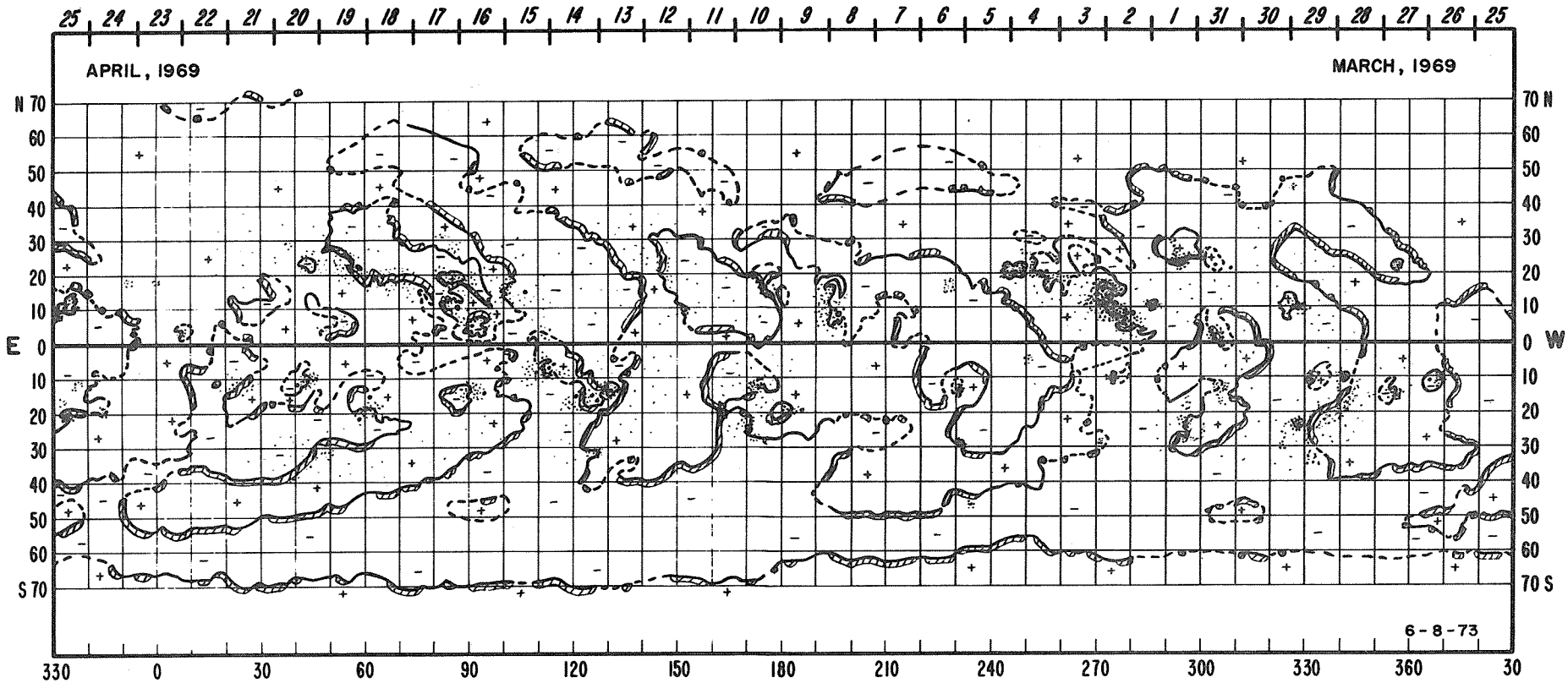
Hα SYNOPTIC CHART
1969 - Rotation 1546

°Long.	°Lat.	Date	Descriptive Notes
359	N26	3/28	Large filament disappeared, in apparent response to growth of small nearby active region.
357	N22	3/27	Birth of small active region.
342	N23	3/29	Almost all of large filament disappeared.
341	S10	3/31	Birth of tiny active region.
332	S10	3/28	Birth of moderate active region that reached maximum 30 March as rudimentary class C spot group with numerous spots.
328	N10	3/27	Minor growth within small active region.
325	N25	4/3	Large filaments on eastern border of large, positive-polarity bay disappeared near west limb. Intercomparisons of this area on rotations 1545-1548 suggest that the series of filament disappearances along this S-shaped neutral line may have been a consequence of the large difference in rotation rates between features north and south of the N25 latitude.
303	N25	3/30	New growth of plage and spots north of leader spot of extended class C spot group.
275	N32	4/1	Filament disappeared.
273	N10	4/2-3	Central meridian passage of one of the largest spot groups of the solar cycle. Notable for its slow rate of evolution and lack of major flares, in contrast to the rapid evolution of small spots on its previous disk passage and the great limb event of 12 March.
248	N20	4/1	Birth of small active region at trailing end of large plage complex.
245	N38	4/11	Small bright plage formed at west limb.
222	S18	4/3	Filament disappeared.
220	S11	4/7	Filament disappeared.
195	N09	4/8	Central meridian passage of large and very stable active region with large leader sunspot and few, very small follower spots.
179	N26	4/13	Birth of small active region near filament that disappeared when region emerged.
178	N30	4/10	Small filament disappeared.
175	N15	4/13	Filament disappeared in response to birth of nearby active region.
173	S13	4/6	Birth of small active region.
161	N03	4/13	Equatorial filament disappeared.
140	S40	4/18	Filament disappeared near west limb.
135	N20	4/15	Large filament disappeared.
123	S16	4/8	Birth at east limb of moderate active region that reached maximum 11 April.
112	S07	4/14	Significant new growth in center of mature and complex class D spot group that tripled its area. No basic change in configuration.
102	S27	4/17	Filament disappeared.
95	N16	4/18	Filament within activity complex disappeared.
92	N38	4/15	Filament disappeared.
90	S14	4/16	Birth of moderate active region that reached maximum 18-19 April as class D spot group with simple structure.
89	N05	4/11	Birth near east limb of moderate active region south of large sunspot that had returned for its third disk passage. New spots reached maximum 17 April and formed a complicated configuration in combination with the older active region.
88	N19	4/13	Birth of moderate active region on northern border of large, remnant plage of great activity complex of previous solar rotation. Attained maximum 15 April as class D spot group.
86	N22	4/21	Birth of additional moderate active region within remnant plage of region born 13 April. Attained class C spot group this day; no significant growth noted 22 April at west limb.
82	N18	4/17-19	Small and very active absorption feature developed over neutral line between young spot group and remnant plage of older activity complex.
61	S19	4/17	Birth of small active region south of isolated sunspot with well-developed vortical fibril pattern and clockwise sense of twist.
53	N27	4/21	Filament, associated with large sunspot on its third disk transit, disappeared with resulting major flare. No significant proton event followed this flare despite the proton-emitting history of this region on previous solar rotations.
45	S19	4/17	Birth of small active region at trailing end of large activity complex.
44	S10	4/20	Birth of moderate active region at position of small plage present since east limb. Developed follower-dominant class C spot group with maximum on 22 April.
28	S39	4/24	Large portion of filament disappeared.
10	S53	4/26	Filament disappeared near west limb.
7	N03	4/19	Birth of tiny plage that disappeared by 23 April.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1969 - ROTATION 1546



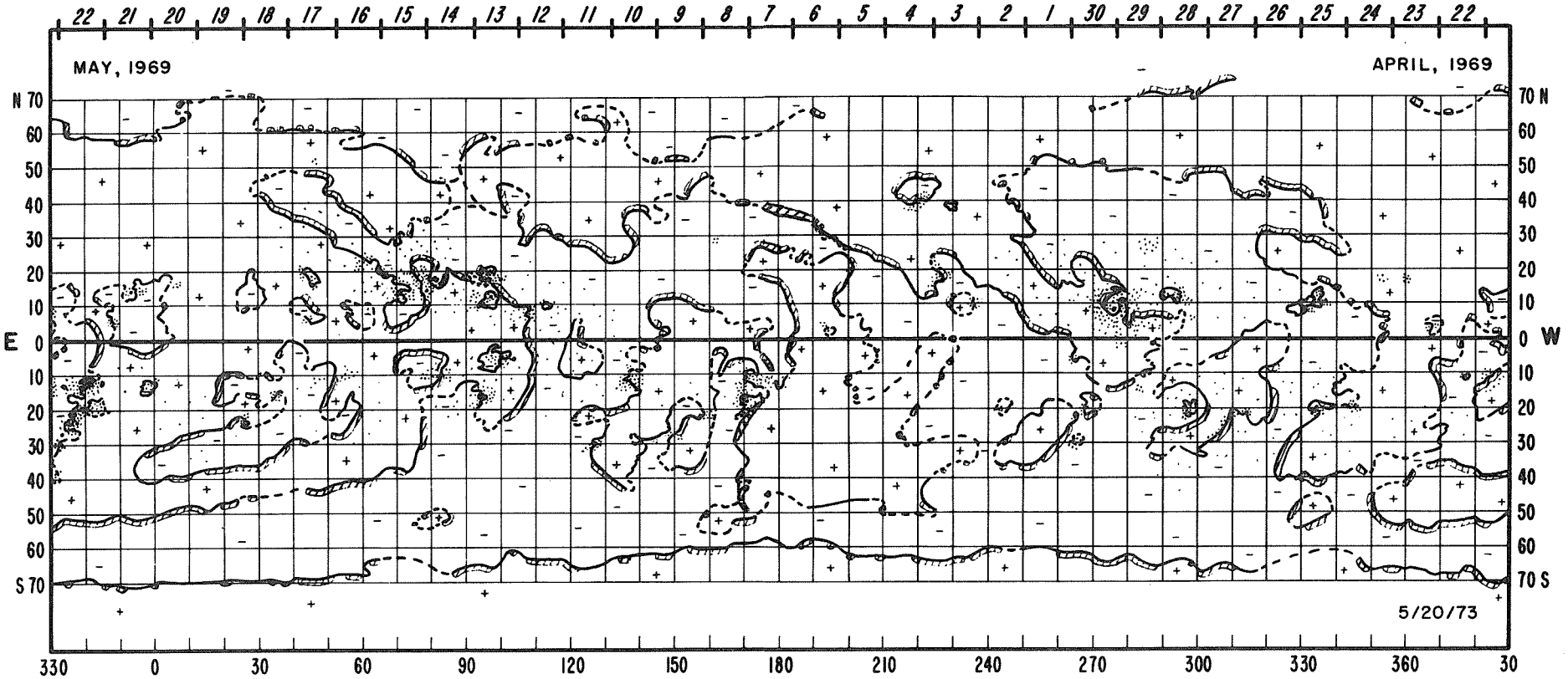
Hα SYNOPTIC CHART
1969 - Rotation 1547

°Long.	°Lat.	Date	Descriptive Notes
360	N19	4/21	Birth of tiny plage that disappeared by 23 April.
352	N08	4/25	Small filament disappeared.
335	N10	4/25	Birth of small active region. Combined with nearby region to southeast to form plage with embedded filament by 28 April.
333	N40	4/24	Filament disappeared; re-formed after 26 April.
331	N08	4/22	Birth of small active region.
330	N29	4/25	Filament disappeared, completing the disappearance of all filaments bordering this high latitude, negative-polarity feature. A similar series of filament disappearances occurred surrounding this same feature on the previous solar rotation. Re-formed after 26 April.
325	S31	4/24	Filament disappeared.
321	N20	4/23	Filament disappeared.
308	S26	4/26	Filament disappeared from within faint plage.
303	S20	4/29	Filament near faint plage disappeared.
295	N12	4/23	Probable date of birth of small active region at leading edge of large returning region.
		4/29	New growth began.
278	N08	4/27	Small peninsula of positive polarity became isolated from principal neutral line within large remnant of the great region of previous rotation.
272	N18	4/28	Filament formed within remnant plage of very large active region of previous rotation.
		5/4	Filament disappeared at west limb.
269	S20	5/1	Birth of very small active region.
250	N06	5/1-2	Central meridian passage of large, dark filament.
242	S20	5/4	Birth of small active region near west limb.
237	N11	5/4-5	Birth of small active region in position of faint plage from region born 30 April.
236	N10	4/30	Birth of very small active region.
216	N18	4/28	Birth at east limb of small active region.
195	S48	5/1	Filament disappeared near east limb.
183	N36	5/3	Filament disappeared near east limb.
	N10	5/9	Large filament formed.
173	S11	5/4	Maximum development of class E spot group.
170	S22	5/9	Filament south of large active region disappeared, as new small region formed near trailing edge of the region.
169	S18	5/9	Birth of small active region near trailing plage of large active region.
168	S45	5/6	Large filament disappeared near east limb.
150	N11	5/7	Filament disappeared; gradually re-formed during remainder of disk passage.
136	S11	5/3	Probable date of birth of small active region 1 day before east limb appearance. Reached maximum 5 May as class C spot group.
130	S39	5/15	Filament disappeared.
126	S30	5/4	Birth at east limb of small active region.
123	Equator	5/8	Small filament disappeared.
113	N10	5/12	Birth of small active region.
108	S10	5/13-14	Large filament formed within large filament channel.
107	N08	5/10	Birth of small region within extensive faint plage and on large-scale, equator-crossing neutral line.
100	S05	5/11	Birth of moderate active region in position of very small plage visible since east limb passage 4 days earlier.
		5/14	Second growth phase, maximizing next day as class C spot group.
	N13	5/15	Filament formed between developing active regions this day only.
98	N18	5/14	Birth of moderate active region that reached maximum 16 May as class D spot group.
95	N12	5/13	Birth of moderate active region that reached maximum 16 May as class D spot group.
80	N18	5/10	Birth at east limb of moderate active region within remnants of a great activity complex completing its second disk transit.
77	N13	5/15	Large and dark filament formed within large bright plage that lay between two mature, active regions.
71	N15	5/10	Birth near east limb of moderate active region within remnant of great activity complex.
55	S41	5/15	Filament disappeared.
50	S68	5/15	Large filament disappeared near east limb.
44	N18	5/17	Birth of small active region.
42	N33	5/20	Large, active filament disappeared at west limb.
26	S23	5/18	Birth of very small active region.
08	S39	5/22	Filament disappeared.
03	S30	5/24	Filament disappeared.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1969 - ROTATION 1547



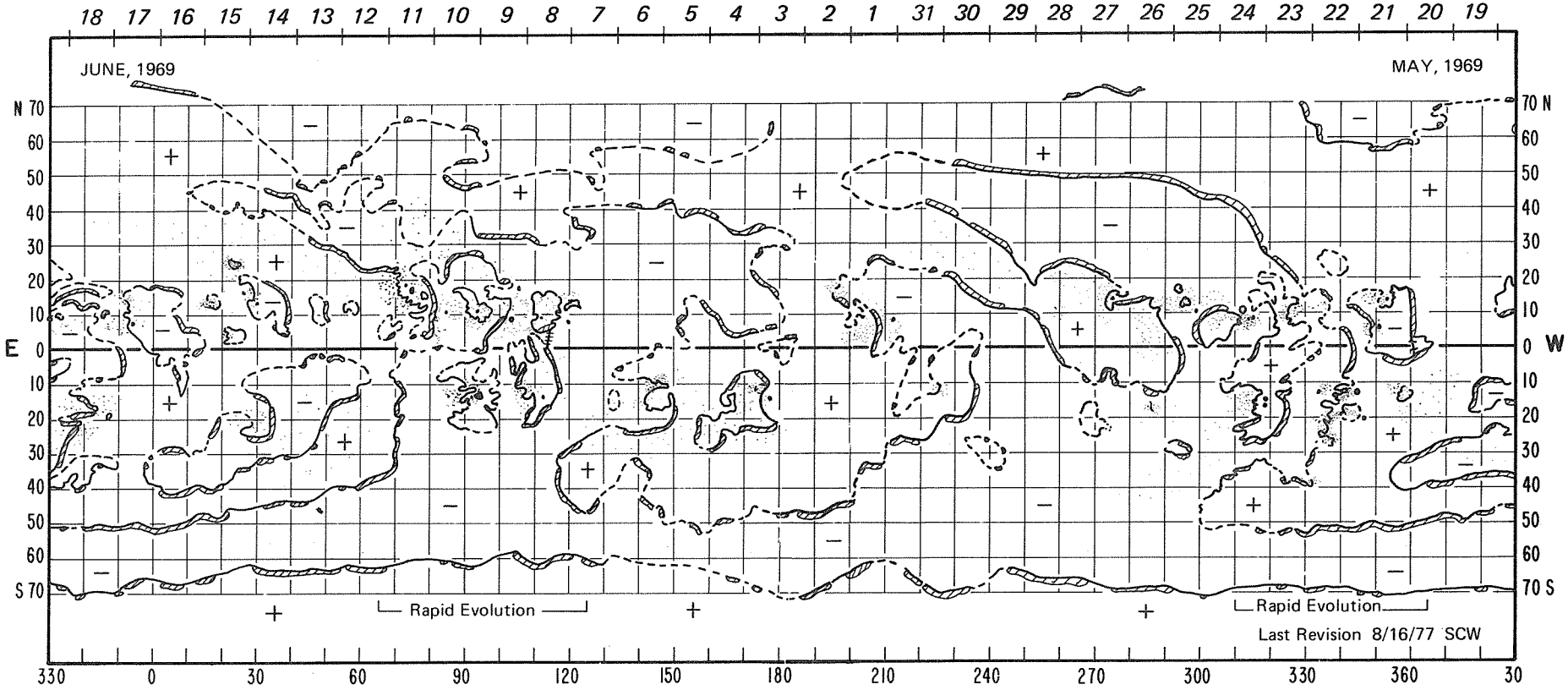
Hα SYNOPTIC CHART
1969 - Rotation 1548

°Long.	°Lat.	Date	Descriptive Notes
358	N08	5/21	Large filament disappeared in response to growth of active region nearby.
357	S12	5/20	Birth of small active region.
351	N13	5/21	Birth of small active region associated with disappearance of large filament. This new region and another to the southeast produced major changes in this area's large-scale magnetic pattern.
348	N05	5/23	Birth of moderately small active region that developed class C spot group.
340	S19	5/21	Birth of moderately active region that evolved complexly.
		5/24	First maximum development as class E spot group.
		5/26	Important additional spot growth in following portion, as merger took place with complex group to the southeast. "Delta" magnetic configuration continued to west limb 28 May.
339	S12	5/17	Birth of major active region near east limb.
		5/22-23	Maximum development as large class E spot group.
336	S21	5/22	Birth of small, complex, active region that merged with nearby larger and more active region.
332	S39	5/22	Birth of tiny plage.
325	N10	5/19	Birth of moderate active region that reached maximum development 23 May as class D spot group with many spots.
	N22	5/21	Filament disappeared in response to birth of active region south of this position. Re-formed after 24 May.
323	S22	5/19-28	Filament bordering important active region especially active throughout its disk passage.
315	S26	5/21	Filament disappeared; re-formed 24 May.
		5/27	Filament disappeared.
294	S29	5/22	Filaments bordering small positive-polarity cell partially disappeared.
		5/25	Filaments completely gone.
287	S17	5/30	Birth of small active region near west limb.
280	N12	5/28-6/1	Filament especially dark last 4 days of disk passage.
274	N13	5/27	Central meridian passage of spot and large faint plage -- a region that was on its fourth disk passage and one that had been active during the previous three solar rotations. Sunspot returned 4° higher in latitude than previous disk transit.
256	N02	6/1	Filament disappeared.
243	S30	5/26	Small filaments disappeared.
235	S15	6/2-3	Filament disappeared.
214	S12	5/27	Birth of tiny active region.
200	S65	6/2-3	Filaments disappeared.
198	N12	5/28	Small filament disappeared near east limb.
172	S15	6/1	Several small filament fragments disappeared from boundary of large cell. Faint region with small leader sunspot was situated on western border of cell.
		6/6	Several small new areas of plage formed within the faint plage.
	S10	6/3	Birth of small active region within old faint plage.
145	S10	6/2-3	Formation of additional area of faint plage on northern boundary of extensive faint region.
117	S35	6/10-11	Filament disappeared.
115	N09	6/5	Birth of major active region within moderately bright and complex older plage.
		6/9	Maximum development of class E spot group with numerous surrounding small spots in the older plage. Formed leading member of a great activity complex, which was regenerated for a fifth consecutive disk transit.
107	S12	6/9	Birth of small active region in trailing portion of faint plage.
90	S14	6/3	Probable date of birth at east limb of great active region that developed compact class F spot group by 9 June. Growth continued until 13 June, when the area exceeded 1500 millionths of a solar hemisphere.
	N11	6/7	Maximum development of class F spot group notable for neutral line encircling the large leader sunspot. Bright plage occurred mostly in the area of follower-polarity, forming an outer border to the circular neutral line. This plage gave the appearance of a bow of encounter between this region and the older, fainter region to the west.
73	N18	6/8	Maximum development of great, complex, single spot with accompanying plage almost totally confined to the following portion of the region. Only after decay of the spot did plage develop on the western side of the neutral line; it became visible after central meridian passage 11 June.
27	N15	6/13	Birth of small active region that developed small class D spot group by 15 June.
23	N23	6/15	Birth of small active region that merged with region to the south.
21	N04	6/10	Birth of small active region near east limb.
18	N10	6/20	Birth of small region at west limb.
9	N05	6/18	Small filament disappeared.

Note: Day without H-alpha photographs was 2 June 1969.

Hα SYNOPTIC CHART

1969 – ROTATION 1548



Hα SYNOPTIC CHART

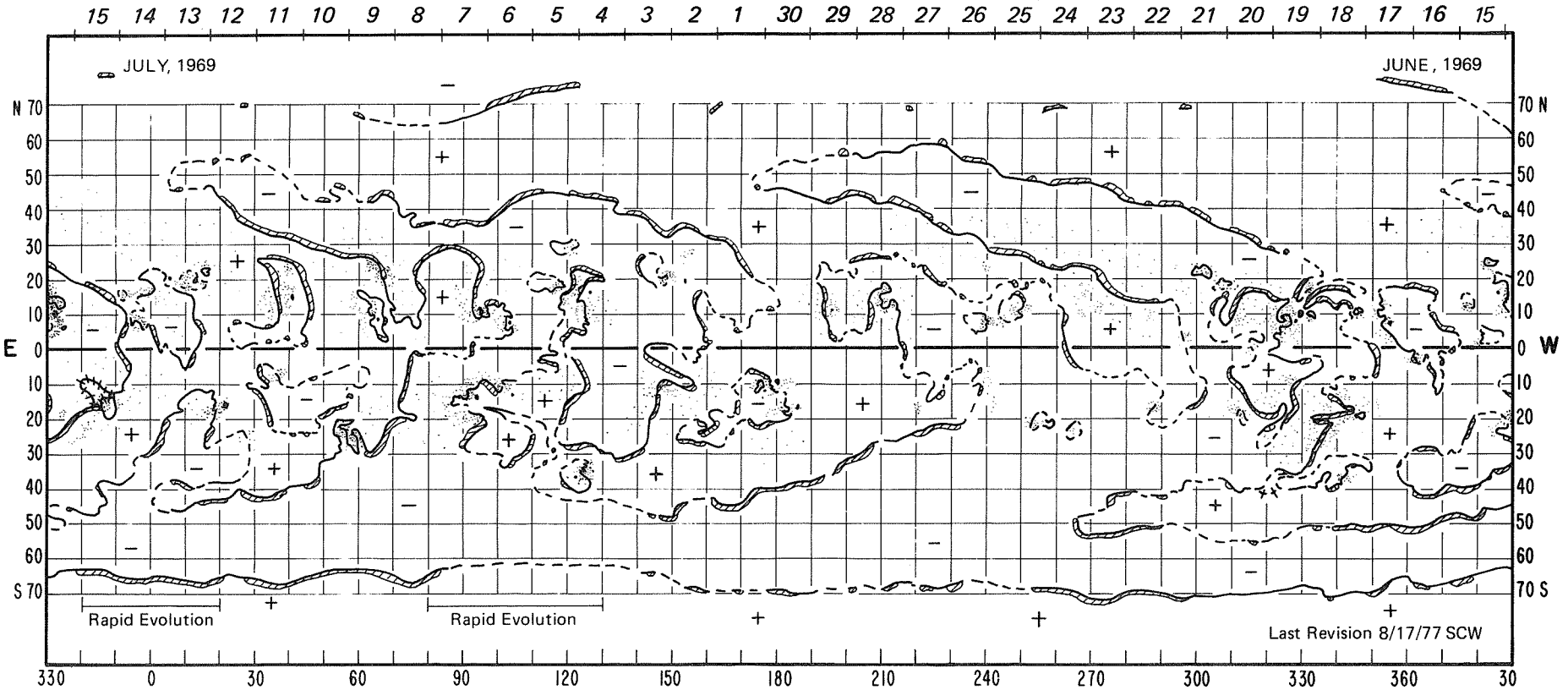
1969 - Rotation 1549

°Long.	°Lat.	Date	Descriptive Notes
352	N15	6/21	Birth of small active region near west limb.
328	S10	6/15	Birth of small active region that had disappeared by 19 June.
325	N08	6/18	Birth of moderate active region on southern border of large region returned from previous disk passage. The two regions were aligned so as to share a common neutral line and to have leader sunspots along single meridian.
323	N03	6/19	Birth of small region on southern border of region that had formed previous day. It shared the same neutral line as the two regions north of this position.
319	S12	6/24	Birth of small active region just before west limb passage.
296	N02	6/23	Birth of small active region.
288	S17	6/24	Birth of small active region.
265	S22	6/30	Birth of small active region at west limb.
252	S20	6/22	Birth of small active region.
240	N08	6/23	Birth of small active region.
210	N16	6/28	Birth of small active region within faint plage.
	N41	6/29	Large filament disappeared.
183	S17	7/2	Birth of moderate active region on neutral line common with complex pair of regions to north of this location. Maximum development 3-4 July as large class C spot group.
178	S10	6/30	Maximum development of large class D spot group that grew slowly from east limb on 24 June.
175	S11	7/1	Birth of small active region on trailing border of moderate active region with which it merged, forming a complex active area. Maximum development 3 July.
165	S30	7/2	Filament steadily enlarged from this date to west limb passage 7 July.
150	S09	7/1-2	Pair of filaments on convoluted portion of neutral line disappeared, as if the line simplified in form.
149	N20	6/30	Birth of small active region with class C spot group.
144	S20	7/5	Filament disappeared; re-formed next day in larger form.
125	S35	7/3	Birth of small active region.
	S11	7/6	Filament especially large from this date to west limb passage 10 July.
103	N08	6/30	Probable date of birth at east limb of small active region near remnant of the great activity complex of previous five solar rotations.
92	S10	7/10	Birth of small plage at northern border of great region on second disk passage. This plage gradually brightened during west limb passage 13 July.
91	S14	7/7	Central meridian passage of great spot group that returned for second disk transit. This passage marked by extraordinarily large and complex leader spot with a high count of small attendant spots. Appreciable decay after crossing central meridian.
		7/8	Additional spots in follower portion of region.
		7/11-12	Important new spots formed in following portion of region last 2 days of disk passage.
40	N14	7/15	Birth of small new region within leader portion of faint plage. Growth continued to west limb passage 17 July.
36	S08	7/8	Birth of small active region.
	N18	7/16	Filament disappeared near west limb, in response to growth of nearby active region.
33	S15	7/8	Filament disappeared, in apparent response to birth of small active region nearby.
31	N23	7/13	Part of filament disappeared.
30	N34	7/8	Portion of large filament disappeared.
	N22	7/12	Birth of tiny plage near filament.
10	N20	7/12	Birth of active region that formed in faint plage and reached maximum 14 July as class D spot group.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1969 – ROTATION 1549



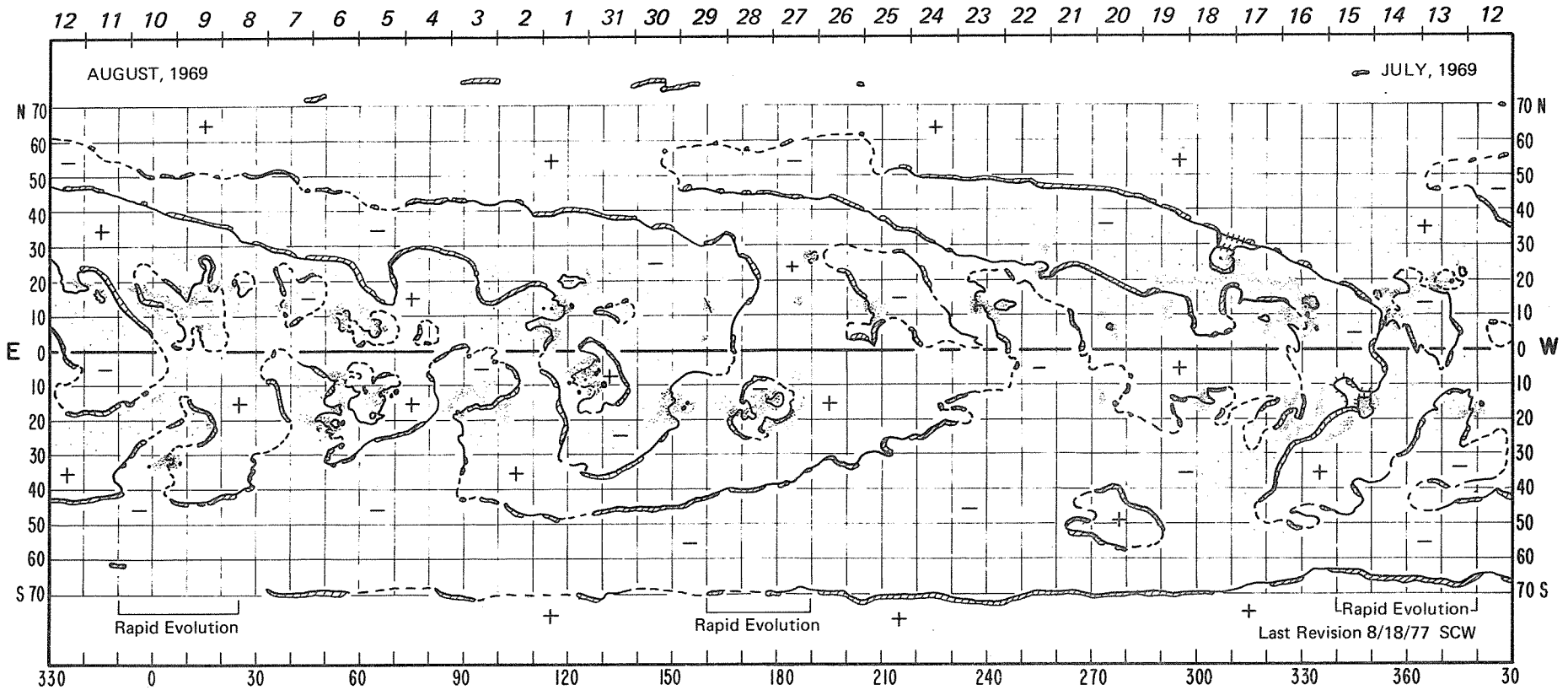
Hα SYNOPTIC CHART
1969 - Rotation 1550

°Long.	°Lat.	Date	Descriptive Notes
352	N16	7/17	Birth of tiny plage.
350	S16	7/10	Birth of small active region.
		7/17	Neutral line rearranged to join with filament channel east of region.
345	N15	7/13	Filament disappeared.
332	N13	7/16	Birth of small region near northern edge of large leader sunspot on its third disk passage.
330	S15	7/16	Filament disappeared within faint plage.
310	N25	7/18	Birth of small active region. Neutral line was incorporated into large filament channel to north by next day. Follower-dominant spot group.
302	S16	7/20	Birth of small active region.
280	S50	7/24	Filaments bordering large cell disappeared near west limb.
275	N07	7/20	Birth of tiny plage; disappeared 22 July.
		7/24	New plage growth.
273	N10	7/25	Birth of small active region near west limb.
265	N23	7/24	Part of large filament disappeared.
240	N10	7/19	Maximum development of small, follower-dominant class D spot group.
220	N02	7/27	Small filament disappeared.
210	N37	7/23	Filament disappeared.
206	N12	7/22	Birth of small active region.
205	N03	7/22	Filament disappeared, in apparent response to birth of small region nearby.
203	N17	7/28-31	Large filament developed north of active region.
190	N27	7/30	Birth of small active region.
178	S15	7/30	Birth of small active region within large, complex and faint plage.
170	S25	7/28	Curved filament disappeared with resultant flare in faint plage at S18. Possibly related to emerging new region at (178,S15).
160	N13	8/1	Birth of very small active region.
150	S16	7/27-28	Minor new growth, in mature, active region with complex class C spot group and double leader spot.
133	N12	7/29	Small filament disappeared.
	S05	8/2	Large filament disappeared that bordered field of fibrils emanating from great active region.
126	S12	7/31	Birth of major region on southern border of major active region. Merged immediately with older spots to form a great sunspot group.
124	S08	7/25-26	Probable date of birth of major active region at east limb.
		7/31	Maximum development as compact class D spot group with complex structure.
118	N13	7/31	Birth of moderate active region that reached maximum 4 August as class D spot group with large leader spot.
115	N05	7/31	Birth of small active region. Developed brilliant plage containing small class C spot group by 2 August, but quickly dissipated.
70	N29	7/31	Part of filament disappeared at east limb.
	N26	8/12	Large filament disappeared at west limb.
66	S12	7/30	Probable date of birth at east limb of large active region that reached maximum 2-3 August as class E spot group.
65	N08	8/9	Birth of new small region within center of old faint plage.
54	S17	8/6	Birth of small active region at trailing end of faint plage.
51	S22	8/1	Birth of active region that reached maximum by 5 August as class C spot group with large leader spot.
		8/7	Additional small spots formed; leader no longer large.
		8/9-12	Spot growth and plage brightening during last 4 days of disk passage made region increasingly complex.
26	N25	8/10	Filament formed for 2 days, then disappeared.
11	N15	8/3	Birth of small active region at east limb within extensive area of faint plage.
5	S32	8/8	Birth of small active region that reached maximum 11 August as class D spot group.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1969 – ROTATION 1550



Hα SYNOPTIC CHART

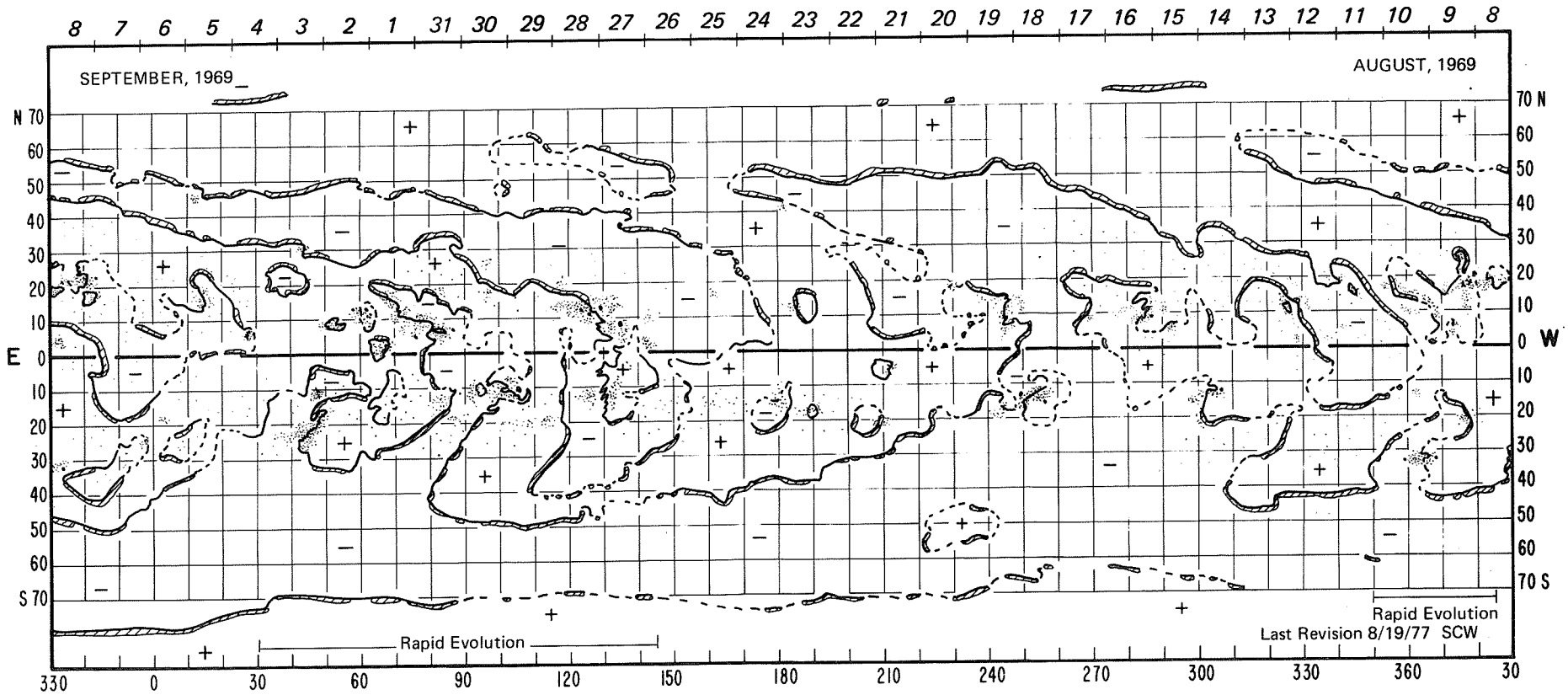
1969 - Rotation 1551

°Long.	°Lat.	Date	Descriptive Notes
344	N16	8/14	Birth of small region.
341	N19	8/15	Birth of small region.
325	N12	8/12	Birth of small region; disappeared 15 August.
320	N27	8/16	Filament disappeared.
304	N08	8/12	Filament disappeared; re-formed 18 August.
280	N20	8/19	Filament disappeared.
256	S15	8/17	Maximum development of class D spot group with numerous small spots.
245	S17	8/16	Birth of small active region.
230	N19	8/19	Birth of small plage that lasted only 1 day.
215	N04	8/21	Filament disappeared in apparent response to growth of small region south of this location.
212	S06	8/20	Birth of small region; disappeared 25 August.
200	N48	8/27	Filament disappeared.
190	S18	8/21	Birth of small active region.
185	N13	8/22	Birth of small region. Maximum development as class C group on 24 August.
181	N41	8/25	High latitude plage development with one-day life span.
175	N10	8/20	Filament disappeared near east limb.
145	S28	8/28	Partial filament disappearance.
130	N13	8/25	Maximum development of complex E group. Region showed signs of decay by 29 August.
105	S50	8/31	Large dark filament began to disappear slowly.
100	N19	9/4	Filament disappeared.
95	S10	9/2	New class C spot group developed in trailing portions of plage.
90	S15	9/6	Birth of region at west limb.
80	N08	9/1	Class E spot group began rapid decay; declined to class B group by 3 September.
80	N08	9/4	New class D spot group developed in southwest portion of plage. Previous spots had disappeared by this date.
75	S23	9/4	Large filament disappeared.
60	N11	9/4	Class B spot group developed and grew to moderate-size class C spot group by 6 September.
55	S12	9/4	Filament disappeared.
28	N06	9/6	Birth of tiny active region.
11	N02	9/4	Filament disappeared.
10	N17	9/4	Filament disappeared.
0	N40	9/7	Filament disappeared.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1969 – ROTATION 1551



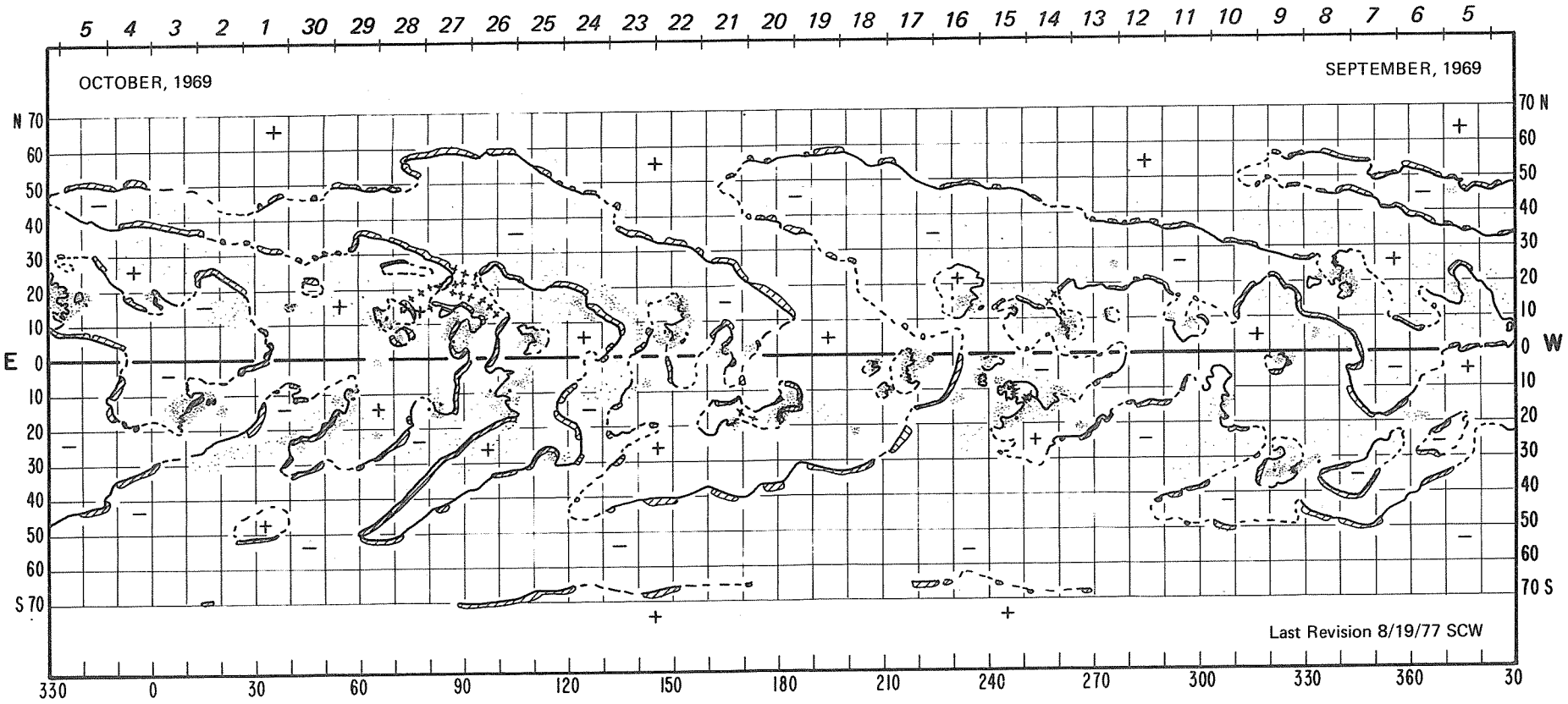
Hα SYNOPTIC CHART
1969 - Rotation 1552

°Long.	°Lat.	Date	Descriptive Notes
358	N08	9/6	Small filament disappeared.
340	N22	9/4	Birth of region that grew rapidly 6 September; by next day it had became a moderate-size class D group. Small region south of this group decayed rapidly after 9 September.
322	S37	9/6	Short circular filament disappeared in apparent response to birth of rapidly growing region at this location. Spot group reached class F by 10 September.
320	S04	9/6	Birth of small active region.
308	S50	9/9	Filament disappeared.
275	N19	9/10	Filament disappeared.
262	N03	9/14	Birth of active region that reached maximum as class D spot group on 17 September.
245	S10	9/12	Birth of small region that developed to class D spot group by 13 September and disappeared by 19 September.
239	N13	9/13	Rapid growth of spot group from small simple class C to moderate-size class D.
211	S10	9/18	Birth of small active region.
208	S05	9/17	Birth of small active region.
185	S15	9/24	S-shape filament in faint plage disappeared.
180	N15	9/16	Large filament disappeared at east limb.
165	N09	9/22	Narrow filament disappeared.
150	N05	9/22	Birth of region that developed gradually to class E spot group by 27 September.
	S41	9/23	Filament disappeared.
120	S15	9/23	Filament disappeared.
116	S29	9/19	Probable date of birth of small active region at east limb.
110	S32	9/23	Filament disappeared.
100	N05	9/20	Probable date of birth of small active region at east limb.
90	N10	CMP 9/27	Large extended region, which was composed of at least two active regions, returned from the previous solar rotation. The numerous small sunspots exhibited conspicuous relative proper motions, and the neutral line and plage became more complex and convoluted during the first half of the disk passage. An importance 2b flare on 27 September was followed by a low-energy particle event.
		9/29	Developed "delta" magnetic configuration.
85	N58	9/28-29	Polar-crown filaments disappeared.
82	S13	CMP 9/27	Peculiar small active region that developed most of its bright plage south of the main leader sunspot. Strong vortical structure of clockwise sense of twist surrounded the sunspot.
80	S25-50	9/26	Southern portions of filament disappeared.
56	S12	9/26	Birth of small active region that maximized as small class D spot group by 28 September.
41	N16	9/27	Birth of tiny active region.
		10/2	New birth of bright plage and small spots.
23	N22	10/1	Filament disappeared.
20	S14	9/26	Probable date of birth of small active region at east limb. Grew to maximum intensity 2 October as small class C spot group.
12	S12	9/30	Birth of major new area of plage and spots within existing small region. Developed to maximum as class E spot group by 3 October.
1	N19	10/2	Birth of small active region.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1969 – ROTATION 1552



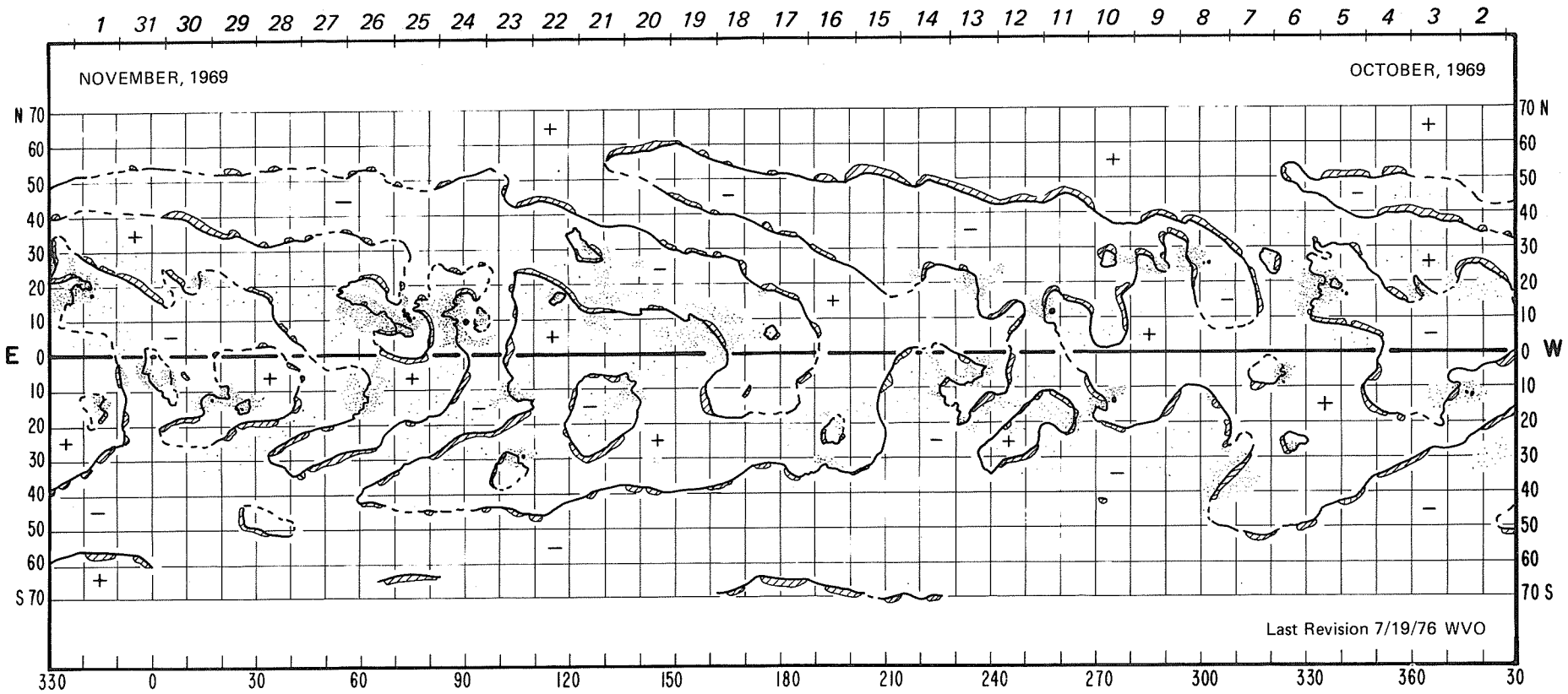
Hα SYNOPTIC CHART
1969 - Rotation 1553

°Long.	°Lat.	Date	Descriptive Notes
334	N18	10/1	Birth of major active region near east limb.
		10/5	Major new growth of spot and plage.
		10/8	Maximum development as large class E spot group with a high spot count.
322	S06	10/4	Intensification of small faint plage.
315	N20	10/2	Large filament disappeared near east limb, in apparent response to birth of nearby large active region.
308	S20	10/7	Filament disappeared.
297	N26	10/2	Probable date of birth of moderate active region at east limb. Reached maximum 6 October as class D spot group.
291	S15	10/12	Filament disappeared.
287	N24	10/6	Birth of small active region.
278	N13	10/7	Large filament disappeared.
275	N27	10/9	Birth of small active region.
255	N10	10/5	Probable date of birth at east limb of active region with polarities reversed from normal for Northern Hemisphere in Solar Cycle 20. Reached maximum by 8 October as class C spot group with large leader spot.
244	S05	10/13	Filament disappeared within extensive faint plage, in apparent response to growth of active region to the east.
238	S05	10/13	Birth of active region within existing faint plage. Reached maximum 15 October as class C spot group.
219	N22	10/19	Birth of small active region near west limb. Returned in November as large active region.
191	S31	10/16	Birth of small active region that grew to maximum by 19 October as small class H spot.
175	N18	10/22	Birth of small active region.
143	S31	10/23	Birth of tiny active region.
138	S11	10/21	Birth of small active region.
125	S29	10/21	Curved filament disappeared in apparent response to growth of active region east of this position.
118	N20	10/21	Large filament in faint plage disappeared.
105	S30	10/20	Birth of small active region.
88	N09	CMP 10/24	Large, but simple, bipolar region that featured large leader spot and almost all of its bright plage in the follower-polarity portion. Leader-polarity plage area and intensity increased throughout disk transit. Small areas of plage with follower-polarity formed west and northwest of main spot.
70	N10	CMP 10/26	Great class F spot group with several "delta" magnetic configurations, very strong radio emission, and counterclockwise relative motions of the leader spot umbrae.
		11/2	Produced, after west limb passage, one of the greater x-ray and particle flares of Solar Cycle 20.
40	N35	10/23	Large filament disappeared near east limb.
32	N19	10/28	Filament disappeared.
28	S14	10/29	Birth of small active region.
15	N36	10/30	Large filament disappeared.
13	N22	10/23	Probable date of birth of small active region at east limb.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1969 – ROTATION 1553



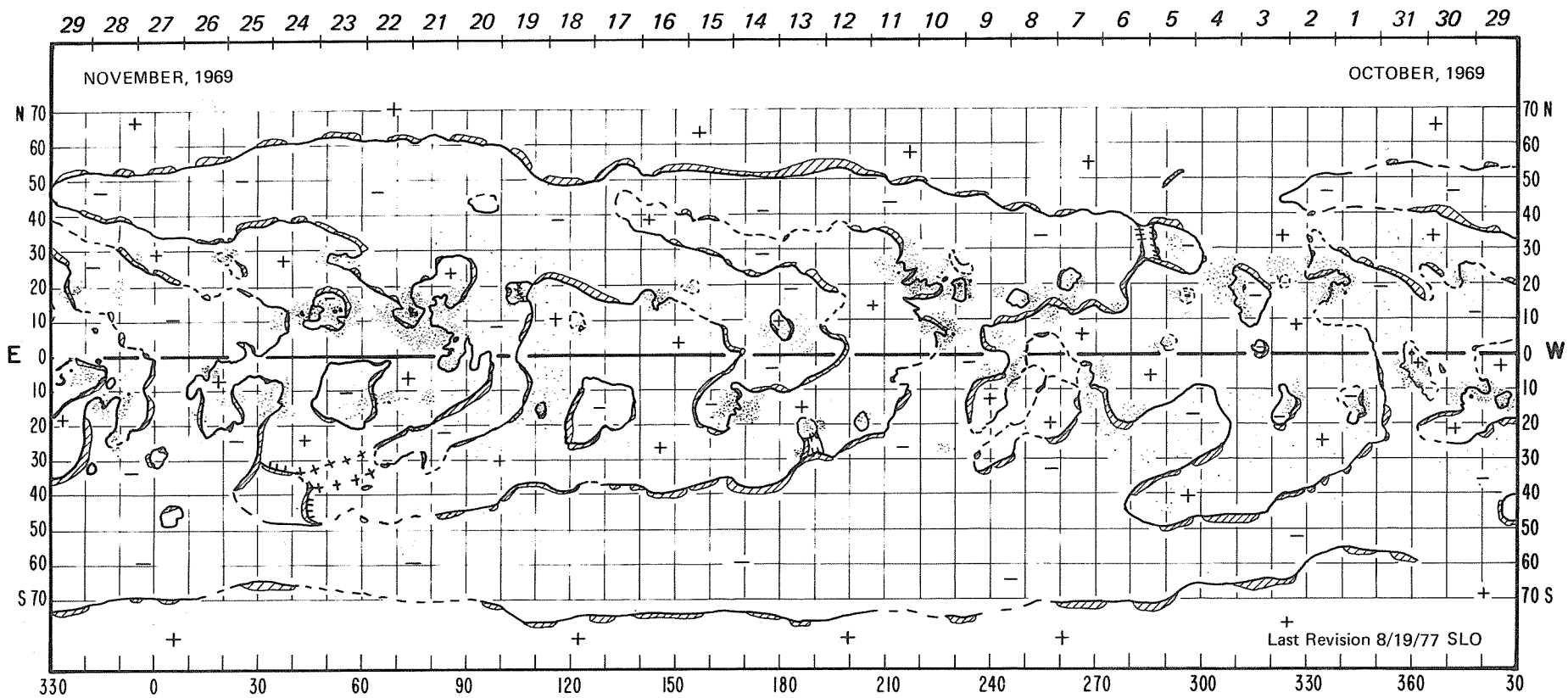
Hα SYNOPTIC CHART
1969 - Rotation 1554

°Long.	°Lat.	Date	Descriptive Notes
312	N21	10/31	Filament disappeared; reappeared 1 November.
297	N18	11/3	Birth of small region. Maximum development on 5 November as class D spot group.
290	N02	11/5	Birth of small region. Class B spot group had 2-day life span.
280	N25	11/4	Filament disappeared; partially re-formed 5 November.
270	N13	11/7	Western third of filament disappeared.
262	N20	11/8	Birth of region that reached maximum as class D spot group on 10 November.
260	N16	11/12	Birth of region with maximum development as class D spot group by 15 November.
184	S21	11/16	Birth of small region with class C spot group.
180	N55	11/12	Portion of polar-crown filament from central meridian to east limb disappeared.
169	S11	11/15	Filament disappeared.
157	S10	11/12	Filament disappeared; reappeared 13 November.
145	N18	11/18	Birth of region with maximum development as class B spot group on 20 November.
120	N20	11/20	Eastern portion of large filament disappeared and western portion became narrow and less distinct until 22 November.
75	N11	11/15	Return to east limb of great class F spot group. Major new area of spots developed north of follower spot, creating a strong "delta" magnetic configuration where major flares occurred.
62	S18	11/25	Filament disappeared.
45	N13	11/19	Birth of major region that attained a class E spot group by 22 November.
29	N38	11/25	Filament partially disappeared; reappeared 26 November.
20	N28	11/28	Birth of tiny bright plage.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1969 – ROTATION 1554



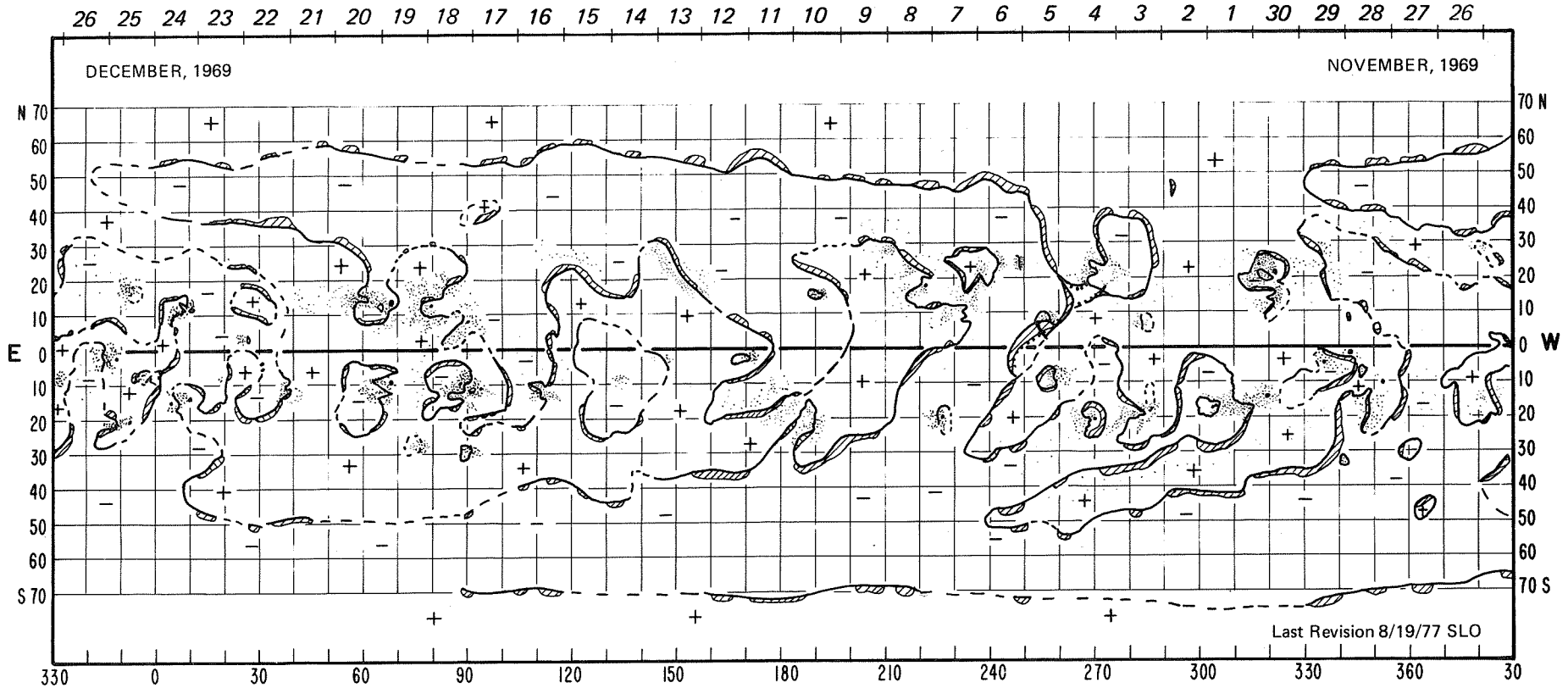
Hα SYNOPTIC CHART
1969 - Rotation 1555

°Long.	°Lat.	Date	Descriptive Notes
320	N05	11/29	Plage became compact and additional small spots developed west of the main spot group.
	N23	12/3	Filament grew faint and partially disappeared.
305	S29	12/2	Western half of filament disappeared.
284	S19	12/3	Leading portions of faint plage became fainter, while trailing portion became circular, compact and bright.
262	N10	12/7	Filament became broad and very dark; southern half disappeared 8 December.
255	N08	12/7	Birth of small region with maximum development to class B spot group on 8 December.
250	N05	12/2	Large dark filament disappeared.
249	N25	12/10	Birth of small region.
231	N20	12/6	Plage brightened in apparent response to disappearing filament.
229	S18	12/9	Rapid development of class D spot group.
220	S05	12/7	Filament disappeared.
190	N18	12/15	Birth of small region with small class A spot group by west limb passage.
180	N20	12/12	Filament partially disappeared.
175	S18	12/15	Eastern portion of filament disappeared.
168	S05	12/14	Scattered faint plage became compact and bright.
147	N30	12/10	Filament disappeared.
122	S20	12/15	Southern portions of circular filament slowly disappeared.
114	S01	12/15	Filament disappeared.
111	S10	12/19	Filament disappeared.
110	S10	12/12	Probable date of birth of new region near east limb. Maximum development to class C spot group on 15 December.
80	N32	12/16	Filament began slow disappearance.
	N15	CMP 12/18	Vast area of scattered plage and relatively simple spot groups.
65	S08	12/18	Birth of new region with maximum development as class D spot group by 21 December.
10	S10	12/19	Tiny region near east limb began rapid growth and reached class D spot group by 21 December.

Note: Days without H-alpha photographs were 4-5, 24 and 26-29 December 1969.

Hα SYNOPTIC CHART

1969 – ROTATION 1555



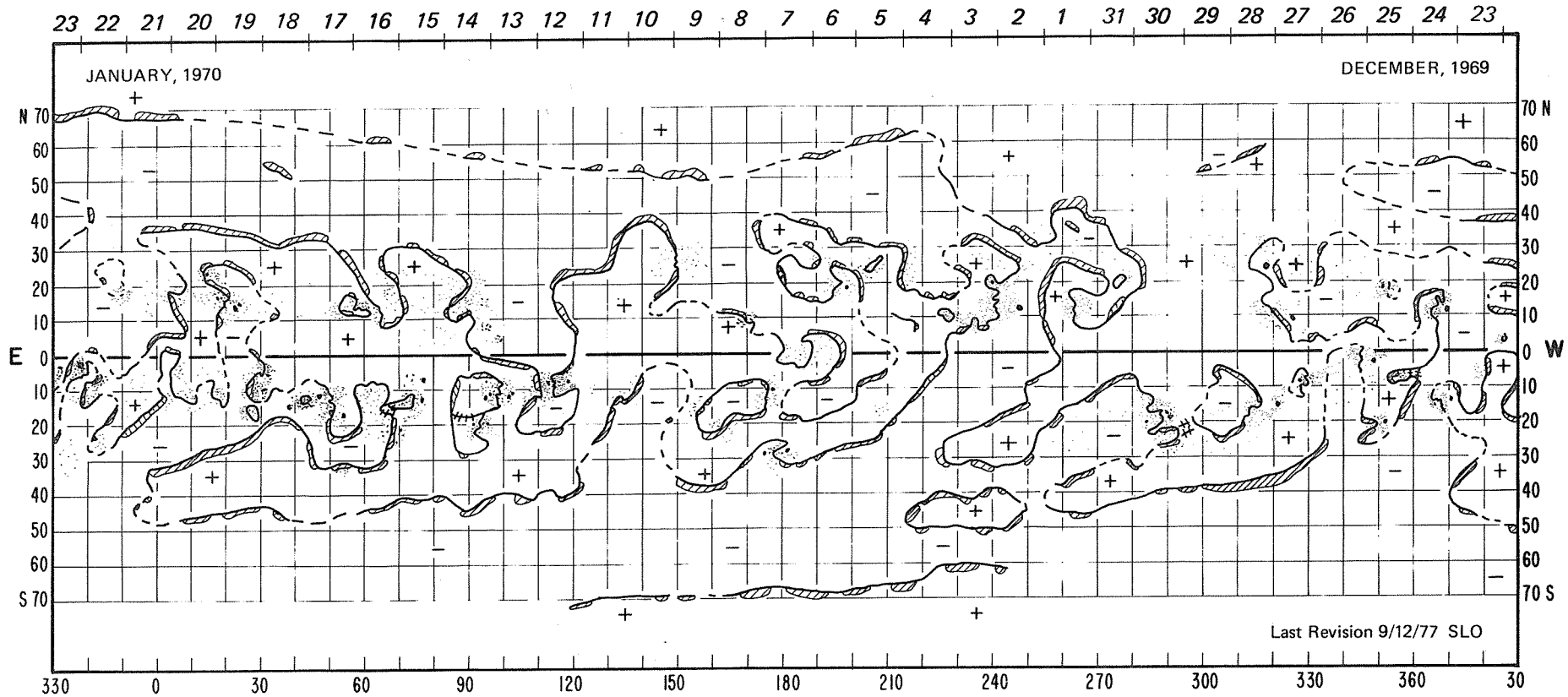
Hα SYNOPTIC CHART
1969-1970 - Rotation 1556

°Long.	°Lat.	Date	Descriptive Notes
355	S08	12/21	Birth of small active region.
345	S01	12/25	Maximum development of region with class C spot group.
342	S21	12/21	Birth of active region near east limb with slow initial growth.
		12/25	Maximum development as class D spot group.
330	S07	12/28-29	Birth of active region with maximum development near west limb on 31 December as follower-dominant class D spot group.
321	N10	12/25	Maximum development for small class D spot group.
320	S35	12/26-30	Large filament disappeared.
287	S18	12/26-27	Birth of active region that grew to maximum by 31 December as large class D spot group.
275	S08	1/3	Filament disappeared.
256	N20	1/5	Large curved filament disappeared.
241	N12	12/27	Probable date of birth of active region near east limb that grew to maximum by 2-5 January as large class D spot group.
240	N30	1/5	Filament disappeared.
229	N10	12/27	Probable date of birth of small active region near following edge of large active region.
221	S08	1/1-2	Filament disappeared.
211	N30	1/6	Partial disappearance of filament.
195	N03	1/6	Filament partially disappeared; western portion re-formed next day.
		1/9	Remaining portion of filament disappeared.
185	S03	1/10	Birth of small active region in following portion of very faint plage.
180	N21	1/10	Filament disappeared.
179	S29	1/8	Birth of active region near convolution in large-scale filament channel. Grew to maximum by 12 January near west limb as class E spot group in bright plage.
170	N10	1/3	Birth of small active region.
168	S18	1/6	Filament disappeared.
158	S38	1/10-11	Filament disappeared in apparent response to growth of nearby active region.
148	N19	1/12	Filament disappeared from southern border of faint plage.
114	S08	1/8	Birth of active region near east limb; maximized by 13 January as small class D spot group with numerous spots.
113	S22	1/10	Filament disappeared in apparent response to growth of nearby active region.
99	N04	1/18	Birth of small region near west limb.
98	S11	1/8	Birth of active region near east limb that grew to maximum by 12-15 January as class D spot group.
96	N09	1/10	Birth of very small plage within extensive faint plage.
95	N16	1/18	Birth of small region near west limb within extensive faint plage.
92	S16	1/12	Birth of active region that grew to maximum by 14 January as small class C spot group.
		1/16	New growth simultaneous with rapid development of new region a few degrees south of this location.
	S20	1/16	Birth of class D spot group that blended with older small region north of this location. Began to decline next day. The addition of this region formed a complex of three active regions joined by a common neutral line lying approximately north-south.
74	S13	1/12	Birth of active region between, and overlapping, two faint active regions. New region grew to maximum next day as small class D spot group.
70	S42	1/17	Filament disappeared.
67	S22	1/18	Active filament disappeared on southern border of activity complex.
66	N23	1/20	Part of filament disappeared near west limb.
	S23	1/20	Birth of active region that grew to class D spot group by next day, just before west limb passage. This region was fourth in a series to form on the same neutral line.
55	S22	1/20	Filament disappeared in apparent response to birth of nearby active region.
50	S11	1/14	Maximum development of large, follower-dominant class D spot group on common neutral line with small class D spot group 5° to the south.
42	S14	1/17	Birth of active region near large follower spot of class D spot group. Grew to maximum by 21-22 January as large class D spot group that crowded into the complex of regions to its west.
20	N16	1/18	Maximum development of simple, large class E spot group.
	S26	1/20	Large filament disappeared.
5	N05	1/22-23	Active filaments disappeared.

Note: Days without H-alpha photographs were 24 and 26-29 December 1969 and 1 January 1970.

Hα SYNOPTIC CHART

1970 – ROTATION 1556



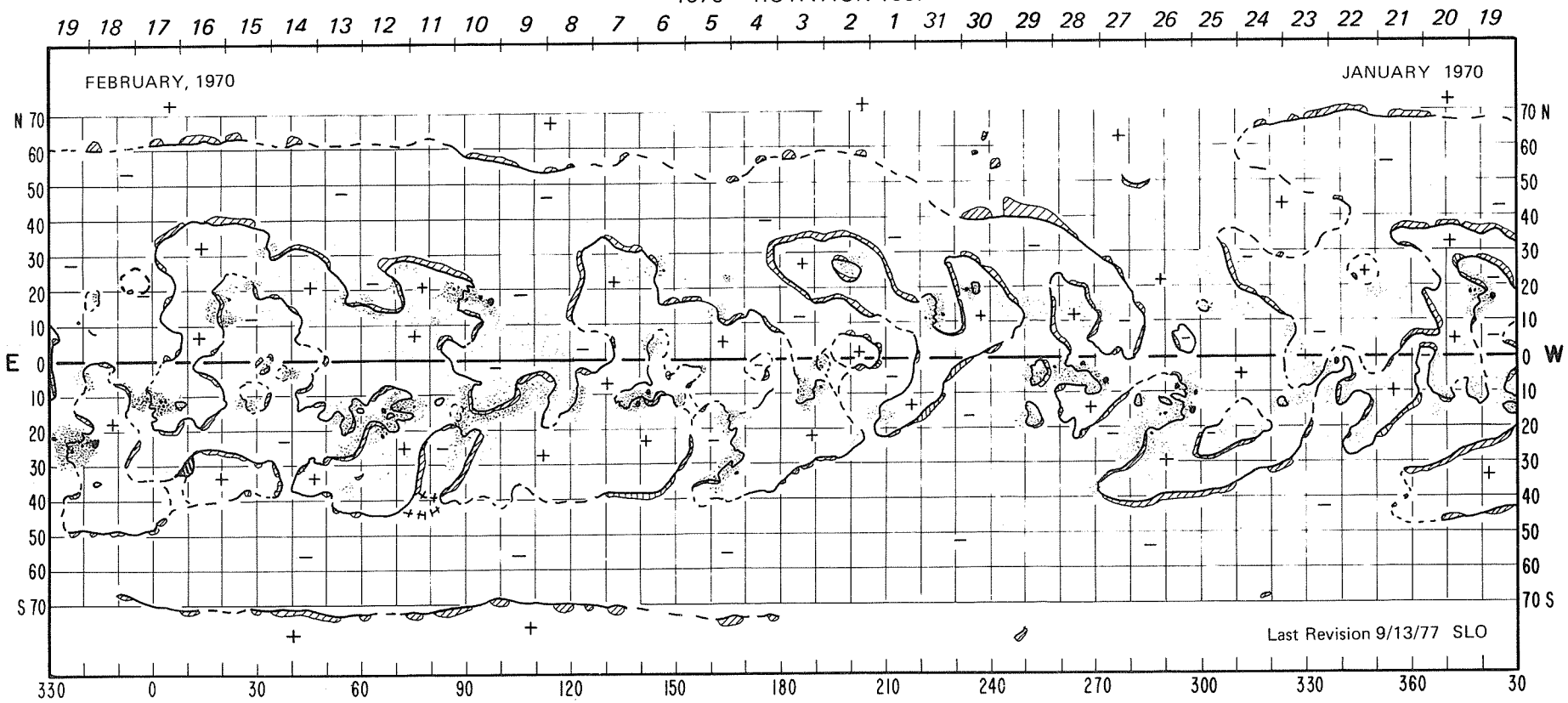
Hα SYNOPTIC CHART
1970 - Rotation 1557

°Long.	°Lat.	Date	Descriptive Notes
347	S15	1/26	Small filament disappeared.
295	S10	1/23	Birth of active region that grew to maximum by 26 January as class D spot group.
	S14	1/24	Birth of major active region that grew rapidly to class E spot group by 28 January. Formed between large complex of two aged regions and a strong, growing region to form series of four regions centered on a common neutral line and arranged nearly on a common meridian. This great spot group had rapid proper motions of small spots that coalesced to form the large leader and follower spots.
275	S14	1/28-29	Filament gradually disappeared.
270	S08	1/25	Birth of second region of activity complex. Grew to class D spot group by next day.
263	S02	1/24	Probable date of maximum development for large class D spot group around which developed large complex of active regions during the disk passage.
260	S07	1/27	Birth of active region on southern border of activity complex. Grew to maximum by 31 January as class D spot group.
256	S04	1/26	Birth of active region near eastern border of activity complex. Grew to maximum by 28 January as class C spot group.
252	N19	1/31	Birth of small region with single spot. Spot and plage gone next day.
251	S19	1/30	Birth of active region that grew to maximum by 1 February with class B spot group.
250	N39	1/29	Large filament disappeared.
235	N19	1/31	Birth of active region that grew to maximum by 2 February with follower-dominant class D spot group.
232	N10	2/1	Filament disappeared in apparent response to growth of active region northwest of this position.
224	N12	1/25	Probable date of birth at east limb of active region that grew to maximum by 30 January with follower-dominant class C spot group.
209	S16	1/30	Birth of small active region.
200	N25	2/3	Circular filament disappeared.
191	S02	2/3	Birth of small active region.
189	S10	2/1	Birth of active region that grew to maximum by 7 February as class C spot group.
178	N30	2/6	Northern portion of large curved filament disappeared and southern portion enlarged near west limb.
168	S27	2/3	Small filament disappeared within faint plage.
165	S18	1/30	Probable date of birth near east limb of active region that grew to maximum by 2 February as class C spot group with group axis inclined to solar equator at steep angle. The large-scale neutral line through the region was oriented northeast-southwest, opposite to normal for Southern Hemisphere large-scale patterns.
	N22	2/3	Birth of tiny plage.
162	N13	2/3	Birth of small active region.
155	S35	2/1	Filament disappeared.
154	S22	2/3	Small filament disappeared.
145	S08	2/3	Birth of small active region.
143	N04	2/5	Birth of small active region at position of small faint plage.
		2/10	Second period of minor growth near west limb.
141	S11	2/5	Birth of active region at trailing border of small faint plage, grew to maximum by 7 February as class D spot group with exceptionally steep angle of inclination for the group axis. Neutral line oriented east-west instead of normal northwest-southeast. Polarity reversed from normal for Southern Hemisphere.
135	N31	2/8	Filament disappeared.
125	S01	2/5	Birth of tiny plage.
114	S10	2/3	Probable date of birth near east limb of small active region with irregular slow development.
		2/13	Embedded filament disappeared.
102	S13	2/7	Minor growth in faint plage.
90	N19	2/7	Birth of major region centered on old active region that had crossed east limb with a single, small leader spot. Rapid growth to maximum by 11-12 February as exceptionally complex class E spot group.
	S29	2/12	Filament disappeared.
70	S13	2/10	Birth of active region that grew to maximum by 12 February as a large, follower-dominant class D spot group. Formed between two faint plages that were attended by a large sunspot.
63	N16	2/14	Birth of small active region.
40	S03	2/8	Probable date of birth at east limb of small active region.
38	N17	2/17	Filament disappeared in apparent response to birth of nearby active region.
33	S01	2/7	Small filament disappeared.
29	N21	2/17	Birth of active region that grew to maximum by 18 February with class C spot group.
5	S19	2/14	Filament disappeared in apparent response to growth of nearby region. Flare occurred with the disruption.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1970 – ROTATION 1557



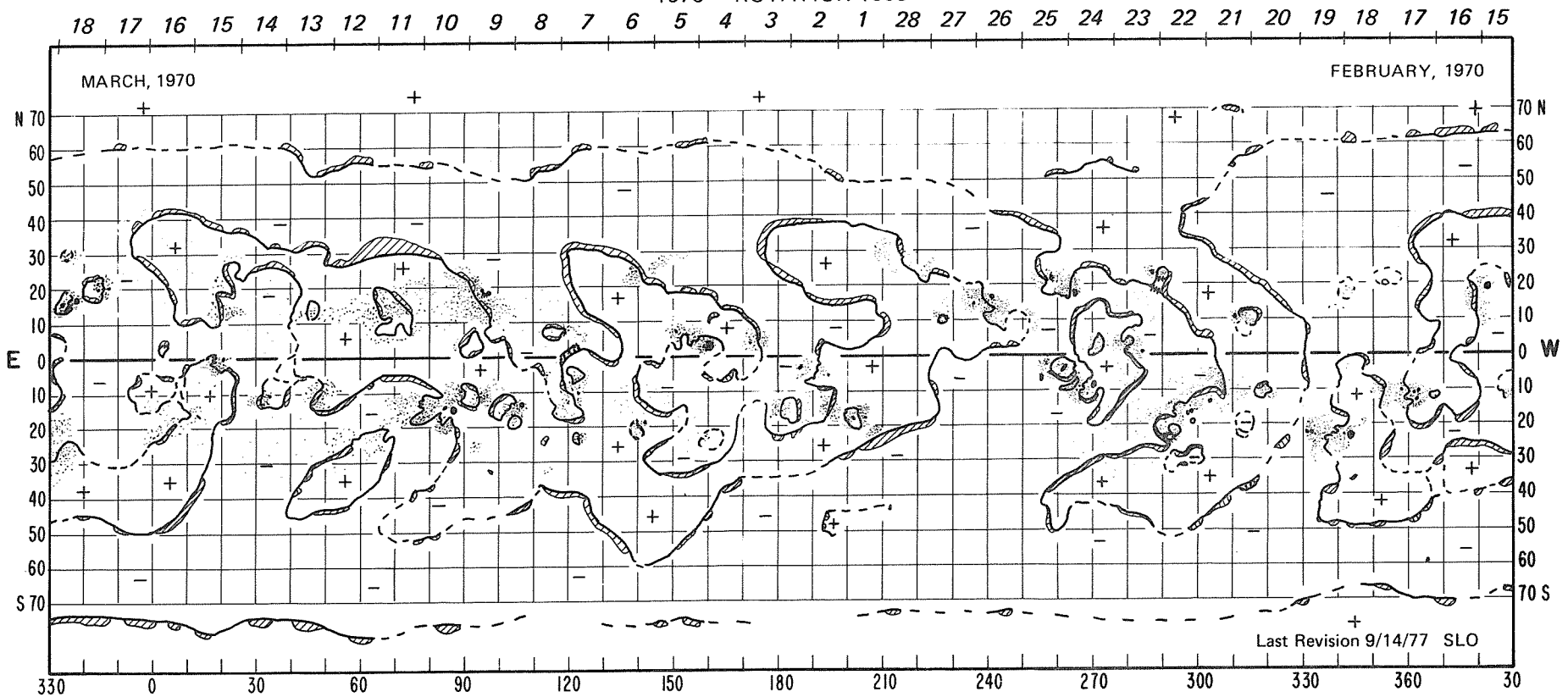
Hα SYNOPTIC CHART
1970 - Rotation 1558

°Long.	°Lat.	Date	Descriptive Notes
360	S11	2/10	Probable date of birth at east limb of active region that reached its first maximum on 14 February as class D spot group with numerous spots.
		2/18-19	Additional growth enlarged the group to class F with rudimentary penumbra and an exceptionally large spot count.
338	S22	2/15	Maximum development of simple class E spot group with large leader and follower spots.
330	S05	2/17	Small filament disappeared.
315	N20	2/20	Filament disappeared in apparent response to birth of nearby active region.
311	N11	2/20	Birth of active region that reached maximum next day as small class C spot group.
310	S40	2/17	Filament disappeared near east limb.
295	N12	2/21	Large filament disappeared in response to birth of active region near northern end of filament. Re-formed and remained active after 23 February.
292	S24	2/22	CMP of large active region in which an outstanding example of neutral line rearrangement occurred. On 22 February a convoluted portion of the line formed a small cell, isolated from the main neutral line.
290	N22	2/21	Birth of active region near large filament channel. Grew to maximum by 24 February as class D spot group.
275	N11	2/23	Filament disappeared.
270	S06	2/22	Birth of active region near leader spot of complex of two aged regions. Grew to maximum by 25 February with complex, embedded absorption features and class D spot group.
265	N20	2/19	Birth of active region at east limb that grew rapidly to class D spot group by 21 February and attained maximum area by 24 February.
	S33	2/20	Filament disappeared with resulting parallel-ribbon flare; re-formed same day and gradually enlarged throughout remainder of disk passage.
252	N37	3/1	Filament disappeared near west limb.
251	N10	2/26	Birth of small active region.
238	N16	2/24	Maximum development of complex class E spot group; evolved rapidly throughout its disk passage.
		3/1	Important new growth near follower spot continued through west limb passage, creating "delta" configuration with steep magnetic field gradient. Proton flare occurred on 6 March from beyond the limb, followed by a great magnetic storm on 8 March.
207	S19	3/7	Small region formed at west limb.
203	S13	3/2	Birth of small active region.
196	N50	2/28	Filament disappeared.
195	N25	3/6	Almost all filament bordering this cell disappeared.
192	S03	2/25	Birth of active region near east limb that grew to maximum by 27 February as class D spot group. Formed northern member of complex of three minor regions.
174	N05	2/25	Probable date of birth at east limb of small active region.
155	N07	3/3	Maximum development of class E spot group. Large spot that formed near region's center moved westward and merged with initial leader spot to form exceptionally large spot by this date.
145	S25	3/6	Filament disappeared.
140	S20	3/7	Birth of small active region that grew to maximum by 10 March as small class D spot group.
125	S40	3/7	Filament disappeared.
123	S23	3/7	Birth of small active region.
122	S10	3/7	Birth of small active region at location of leader spot of old region. New spots and diminishing old spot became indistinguishable by next day. New region attained maximum by 9 March as small class D group.
121	N01	3/3	Filament disappeared; re-formed next day.
		3/8	Filament disappeared again.
116	N07	3/8-9	Small circular filament disappeared.
113	S14	3/5	Birth of active region that grew to maximum next day as small class C spot group.
80	S13	3/4	East limb passage of mature class E spot group with large leader spot.
		3/11	Birth of new spot group within northern portion of region and centered on existing neutral line. New spots developed to compact class D by 12 March and decayed rapidly before west limb passage.
75	S07	3/12	Filament disappeared.
70	N30	3/12	Great filament disappeared.
30	N13	3/11	Birth of small active region.
23	S10	3/18	Filament disappeared.
18	S01	3/12	Birth of active region that grew to maximum area by 15 March as small class D spot group. Leader spot became especially dark and symmetric after 15 March.
		3/18	Plage developed to encircle leader spot.
		3/20	Large active filament developed south of the region near west limb.
12	N40	3/14	Great filament disappeared.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1970 – ROTATION 1558



Hα SYNOPTIC CHART
1970 - Rotation 1559

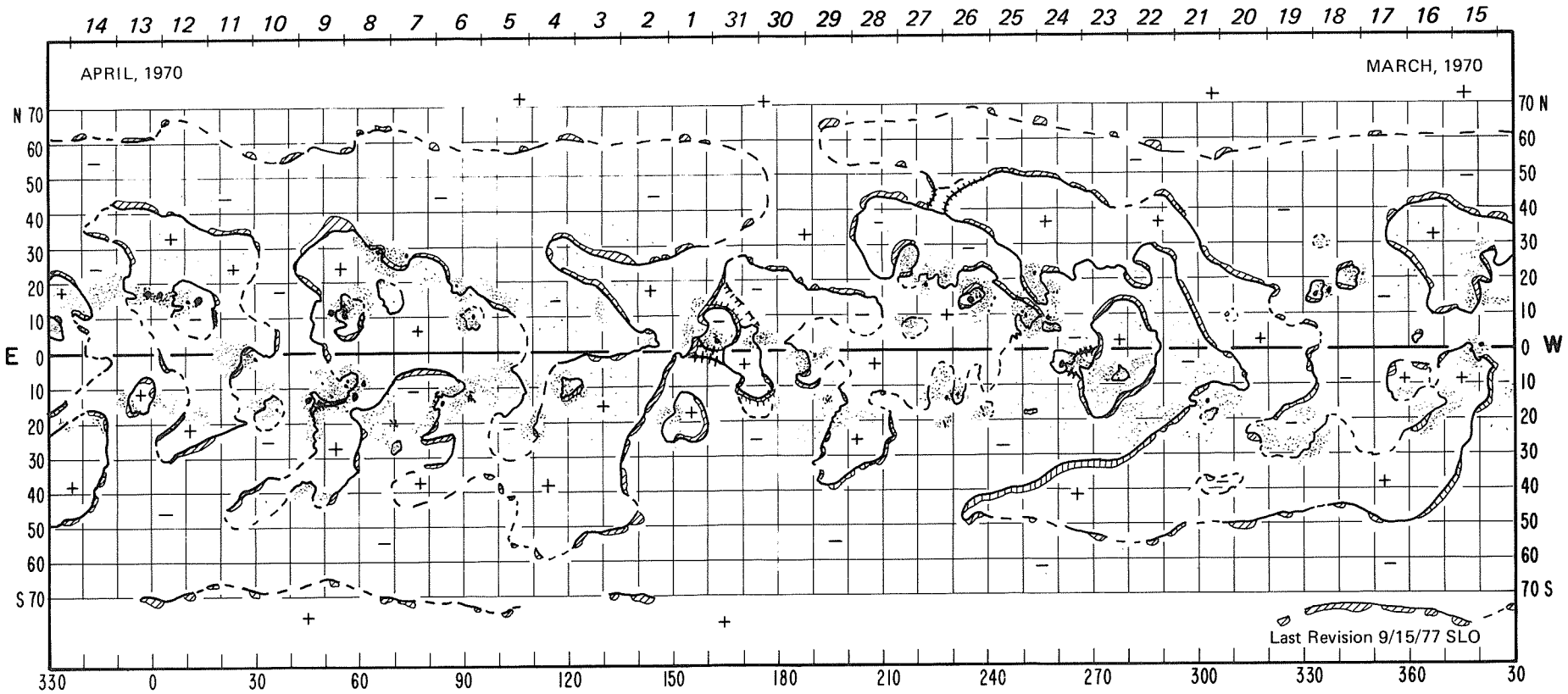
°Long.	°Lat.	Date	Descriptive Notes
345	N20	3/12 3/18	Birth of small active region near east limb. Circular filament enclosing follower polarity disappeared. New active region formed nearby on same day.
335	N17	3/18	Birth of active region that grew to class E spot group by 23 March near west limb.
312	S49	3/19	Filament disappeared.
310	N20	3/18	Filament disappeared.
294	N38	3/21	Filament disappeared.
277	S08	3/23	Birth of small active region within extensive area of faint plage.
268	S15	3/24	Filament disappeared from area of faint plage; reformed by 26 March.
264	S03	3/24	Birth of small active region near northwest edge of large single spot.
262	N17	3/24	Significant diminution of leader sunspot on same day as disappearance of filament that had pointed to this spot during the previous 5 days of disk transit. Filament channel beneath the filament clearly rearranged after this date, indicating disappearance of that portion of the neutral line near the spot.
260	S34	3/26	Large filament disappeared.
256	N19	3/20	Birth of major active region within old plage with small leader spot. Grew in a complex fashion to maximum by 23 March as class E spot group. Overlapped with significant region south of this location to form large activity complex.
255	N10	3/23	Maximum development of simple class D spot group that grew simultaneously with large region on its northern border. Appeared as new growth within small region visible at east limb passage.
242	N20	3/24	Filament disappeared within major activity complex.
238	N14	3/23	Beginning of new growth within remnant of proton flare region of 6 March. Developed follower-dominant class D group with maximum on 25-26 March. Notable for small, circular neutral line encircling large follower spot; for proton flare on 29 March; and for reversed polarity arrangement.
230	S12	3/26 3/29	Birth of small active region with slow initial growth. Rapid growth to small class D group.
225	N20 N39	3/25 3/29	Birth of small active region near a leader spot. Filament bordering northern edge of large-scale cell disappeared.
220	N20	3/29	Birth of small active region within faint plage and at eastern edge of small complex of two small regions.
217	N25	3/27-28	Circular filament within faint plage disappeared, in apparent response to growth of nearby active region.
195	S12	4/1	Birth of small active region in northern portion of large, faint plage.
189	S02	3/28	Birth of new active region in center of small plage with small leader spot. New region grew to maximum by 30 March as small class D spot group. Original leader spot disappeared as new spots reached maximum.
173	N03	3/31	Birth of active region in center of small faint region. New region grew to maximum by 2 April as class D group with small spots.
172	S13	3/29	Filament formed same day as disappearance of filament nearby. Very active for remainder of disk passage.
165	N20	3/30	Filament disappeared in apparent response to major rearrangement of underlying neutral lines. Re-formed after 2 April closer to large region south of this location.
160	S20	3/29	Filament disappeared; partially re-formed after 1 April.
		4/5	Disappeared again near west limb.
	N07	3/31	Birth of new region precisely on neutral line following large sunspot that was surrounded by outstanding counterclockwise vortical fibril pattern. New spots formed peculiar class C group very near the old spot by 2 April. Both old and new spots diminished rapidly before west limb passage.
145	S10	4/3	Filament disappeared in apparent response to rearrangement of underlying neutral line.
130	N18 N10	4/3 4/6	Partial disappearance of large filament. Birth of small active region.
91	S09	4/8	Birth of active region with rapid growth to maximum as large class D spot group next day. Group axis inclined at negative angle, i.e., leader spot lay at higher latitude than followers.
90	N18	4/6	Birth of active region within extensive area of faint plage and near very active filament. Grew to maximum by 8-9 April as reversed-polarity class D spot group with unusually steep inclination of group axis to solar equator.

(Continued)

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1970 – ROTATION 1559



Hα SYNOPTIC CHART

1970 - Rotation 1559 (Continued)

°Long.	°Lat.	Date	Descriptive Notes
87	S12	4/1	Maximum development near east limb of complex of three active regions. Two large symmetric spots, returned from previous disk passage, plus a small class D group to the north and between the large spots formed the complex.
70	S20	4/10	Birth of small active region in following portion of extensive, faint plage. (Position in error on synoptic chart).
67	N19	4/4	Maximum development of simple class D spot group.
61	N08	4/12	Filament disappeared near complex active region.
53	S12	4/2	East limb passage of class F spot group with very large leader and follower spots and with appearance of younger, class D spot group superposed on the northern border of the region, much like the region at (87,S12). The spots on the northern border of the region emerged, disappeared and moved rapidly from day-to-day, tending to dissipate by 9 April.
		4/9	Major new region formed north of the great leader spot, giving the appearance of a rejuvenation of the spots discussed above. This third superposed group reached maximum on 11 April as compact class D.
	N11	4/4	Birth of active region that grew to maximum by 11 April as compact and complex class D spot group. Became complex through emergence of additional bipolar areas north of the original spots on 8 April and south of the original spots on 10 April.
46	S36	4/4-5	Small spots visible these days only, in small plage at exceptionally high latitude for this part of solar cycle. (Latitude in error on synoptic chart).
36	N02	4/12	Active filament formed.
		4/14	Filament disappeared.
26	S02	4/11	Filaments disappeared from within faint plage following single, symmetric sunspot. Re-formed next day.
		4/14	Filament became large and dark this day only.
18	N11	4/15	Filament formed just before west limb passage.
6	N17	4/7	Probable date of birth near east limb of active region that grew to initial maximum by 10 April as class E group. Large rate of divergence of leader from follower spot.
		4/9	Dark surge emanated from leader spot.
		4/11	Birth of new spots in center of region, forming a group within a group. New leader moved westward relative to surrounding spots until it merged with original leader spot to form exceptionally large spot.
6	N17	4/14	Birth of a third region near southern edge of leader spot. Maximum growth of these spots on 16-17 April, just before west limb passage.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1970 - Rotation 1560

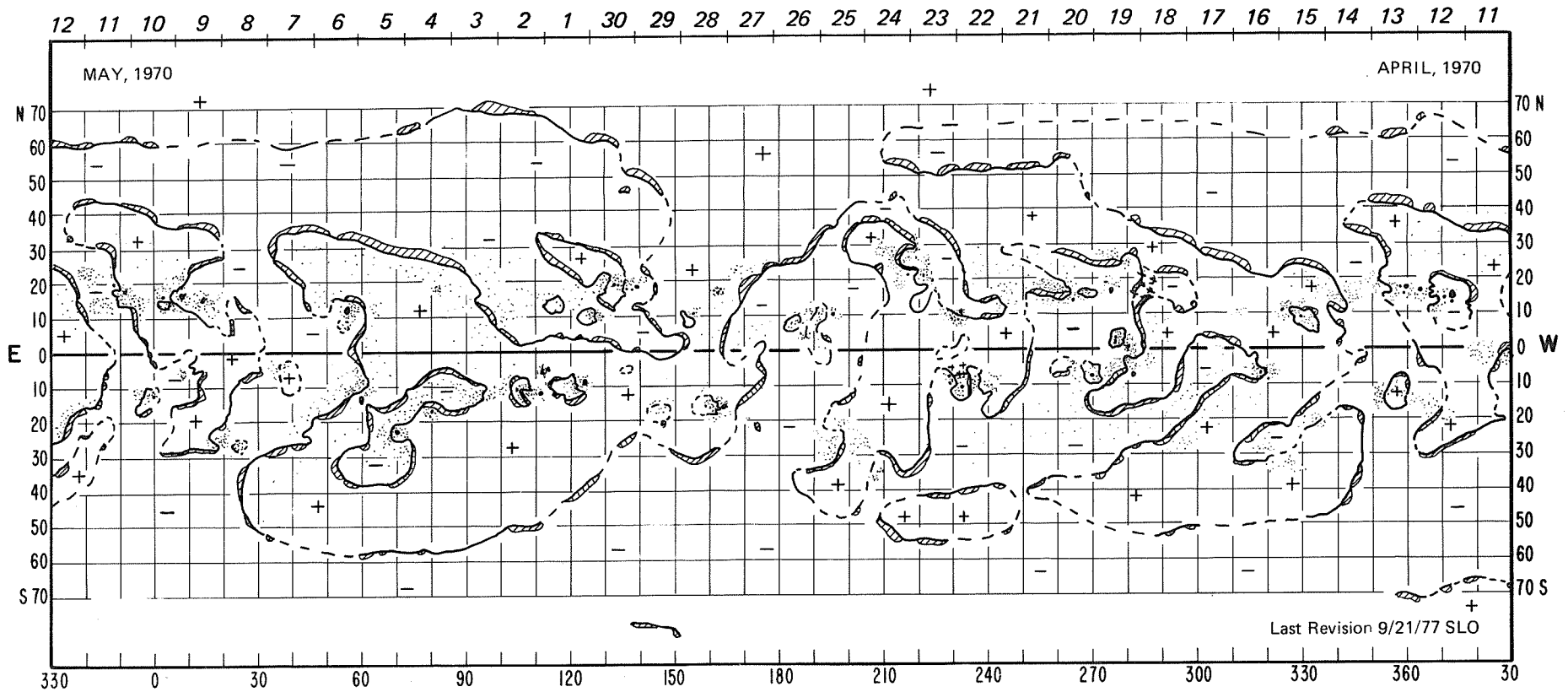
°Long.	°Lat.	Date	Descriptive Notes
332	N09	4/13	Small filament bordering faint plage disappeared.
327	N10	4/16	Birth of small active region within small faint plage. Grew to maximum next day as small, follower-dominant class C spot group.
320	S08	4/11	Birth of active region that grew to maximum by 14 April as small class D spot group. Formed precisely on long-lived, large-scale neutral line that was visible late in the disk passage as a long filament.
293	N21	4/14	Filament disappeared near east limb.
290	N25	4/21	Active filament to the east of this position and large filament to the west disappeared on the same day, probably as part of rearrangement of neutral lines as large-scale areas of negative polarity merged (see rotation 1561 at this location).
279	N01	4/21	Birth of active region that grew to maximum by 24 April as follower-dominant class E spot group near west limb.
276	N17	4/19	CMP of small single sunspot that was unusually far from plage or neutral line.
265	N18	4/19	Birth of small active region within extensive faint plage.
		4/26	Region brightened at west limb as if new growth occurred.
250	S10	4/25	Filament disappeared near west limb.
233	N20	4/19	Filament disappeared; re-formed next day.
		4/21	Filament disappeared.
231	N10	4/23	Birth of small active region.
	S10	4/20	Birth of active region that grew to maximum by 22 April as follower-dominant, small class D spot group.
		4/23-24	Additional spot growth created complex configuration.
219	N21	4/21	Maximum development of small class C spot group with two leader spots.
218	S55	4/27	Filament disappeared.
215	N25	4/20	Filament disappeared on northern border of growing active region.
193	N10	4/24	Birth of small active region within small faint plage.
188	N03	4/27	Birth of small active region that disappeared by 29 April.
175	S10	4/28	Active filament disappeared in apparent response to birth of nearby active region.
164	N16	5/2	Birth of small active region near west limb.
162	S17	4/28	Birth of active region within small faint plage. Grew to maximum by 1 May as small class D spot group.
155	S30	4/29	Filament disappeared in apparent response to growth of nearby active region; re-formed as large, active feature on 1 May.
	N09	4/28	Birth of small active region.
		5/2	New growth with maximum next day as class C spot group near west limb.
135	N19	4/23	Probable date of birth at east limb of active region with exceptionally slow and long period of growth. Reached maximum by 2 May as class E spot group.
130	N29	4/29-5/1	Filament gradually disappeared as nearby active region grew to maximum.
127	N10	4/25	Birth of small active region near east limb.
121	N09	5/1	Minor plage and spot growth in following and southern portion of active region with single large leader spot.
		5/5	Birth of new region in following portion of region, creating spot group next day with double leader spots, one of which was original spot.
117	N23	5/5	Filament partially disappeared.
112	S07	4/28	Maximum development of small class D spot group between two larger regions. Spots rapidly dissipated after flare in this area next day. No evidence of the region by 4 May.
107	S10	4/29	Maximum development of class D spot group that formed eastern member of activity complex.
94	S11	5/4	Birth of small active region within area of extensive faint plage.
81	N16	5/9	Birth of small active region near west limb.
75	S19	5/8	Birth of small active region near site of single spot which had disappeared just hours before. That spot had returned from previous disk passage.
70	N28	5/5	Great filament disappeared after becoming elevated from neutral line on previous day.

Note: There were no days without H-alpha photographs.

(Continued)

Hα SYNOPTIC CHART

1970 – ROTATION 1560



Hα SYNOPTIC CHART

1970 - Rotation 1560 (Continued)

°Long.	°Lat.	Date	Descriptive Notes
69	S22	5/2-6	Filament formed within plage near large sunspot and moved vertically during this period to a very great height above the neutral line. This feature appeared to move across the sunspot and was last seen at longitude 74°
60	S12	5/5-6	CMP of very large single sunspot that formed a giant bipolar pair with a great sunspot of equal size at (56,N12). These spots of opposite magnetic polarity shared the same neutral line. They had formed on the previous disk passage at nearly the same time and had reached their maximum development on the same day (see notes for rotation 1559). The large-scale +/- boundary with which they were associated was the solar source of a long-lived interplanetary sector boundary of the same polarity.
59	N05	5/6	CMP of exceptionally active filament.
56	N12	5/6	CMP of northern member of giant bipolar pair of spots. This spot was partially encircled by a very active filament and was surrounded by an outstanding example of vortical fibril pattern with counterclockwise sense of twist. Faint plage and small spots formed intermittently near the large spot throughout the disk passage.
55	S28	5/3	Filament disappeared.
53	S17	5/6	Filament disappeared from within large, faint plage. Re-formed to become large filament by 10 May near west limb.
36	S04	5/8	Birth of small active region.
22	S27	5/10	Birth of small active region.
15	N26	5/8	Filament associated with large active region disappeared; re-formed next day.
		5/10	Filament disappeared again; re-formed gradually during next 3 days.
10	S28	5/12	Filament disappeared.
9	S07	5/9	Birth of small active region.
5	N17	5/7	Maximum development of unusual, large class E spot group. It apparently developed as two superposed groups, forming two leader spots separated by 5° of longitude. A small third group emerged on the southeast corner of the complex.

Note: There were no days without H-alpha photographs.

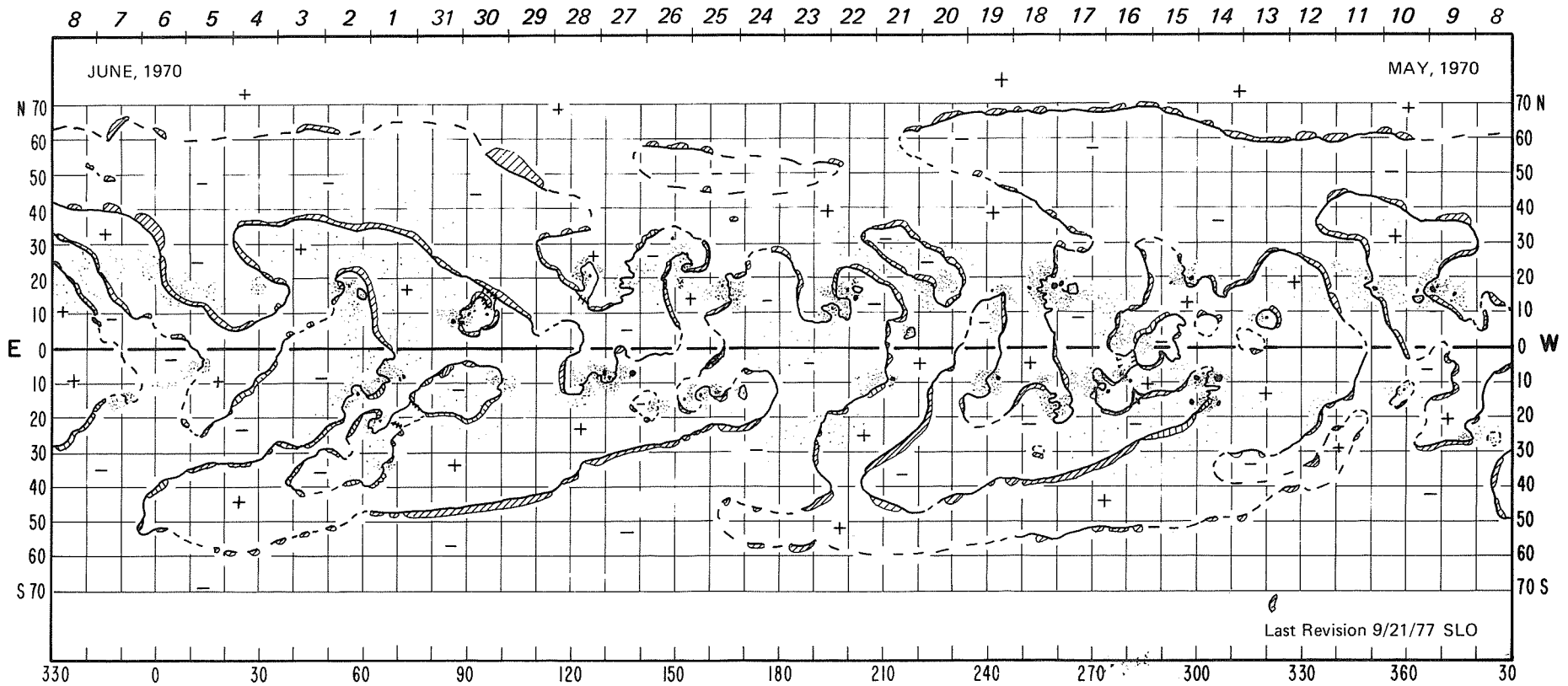
Hα SYNOPTIC CHART
1970 - Rotation 1561

°Long.	°Lat.	Date	Descriptive Notes
357	S11	5/9	Birth of small active region.
333	S33	5/10	Filament disappeared.
323	N08	5/15	Filament disappeared.
317	N09	5/10	Birth of small active region.
303	S09	5/10	Birth of active region near east limb that grew to maximum by 15 May as compact, complex class E spot group. Formed on long-lived neutral line that had been site of a number of significant regions during the previous solar rotations.
	S15	5/16	Birth of yet another region on this long-lived neutral line, forming due south of great active region which was at its maximum development. New region grew to maximum by 29 May as class D spot group, just before west limb passage.
297	N19	5/11	Maximum development of simple, class D spot group.
288	S13	5/14	Filament disappeared.
285	S05	5/13	Filament disappeared.
261	S07	5/14	Filament disappeared near east limb.
256	N18	5/13	Maximum development of great class E spot group.
241	S09	5/17	Birth of small active region that reached maximum next day as large class B spot group.
		5/21	New spot growth slightly south of original spots. Reached maximum next day as small class D spot group.
218	S25	5/23	Large filament disappeared.
216	N04	5/20	Birth of small active region.
210	S01	5/17	Filament disappeared near east limb, in apparent response to birth of nearby active region.
	S09	5/17	Birth of small active region near east limb.
		5/24	New growth to class C spot group by next day.
	N19	5/26	Large filament disappeared near west limb, in apparent response to growth of nearby active region.
202	N17	5/24	Birth of small active region with group axis steeply inclined to solar equator. Formed near twin leader spots of moderate active region that had been slowly declining throughout its disk passage.
190	S30	5/25	Active filament disappeared in apparent response to growth in nearby active region.
184	N24	5/22	Filament disappeared.
168	N20	5/29	Birth of small active region near west limb.
165	N16	5/19	Probable date of birth of active region at east limb. Grew to first maximum on 22 May as small class C group.
		5/24	Minor new growth in following portion of plage. Accompanied by formation of active filament on southern border of the region.
165	N16	5/28	Active filament disappeared.
161	S02	5/23	Filament disappeared in apparent response to birth of nearby active region.
158	N22	5/27	Filament disappeared within faint plage.
156	S14	5/22	Birth of active region that grew to maximum by 26 May as compact class D spot group.
151	N19	5/30	Birth of small active region within faint plage near west limb.
145	S17	5/22	Birth of small active region that dissipated rapidly during next 2 days.
133	S08	5/23	Birth of active region near east limb and near northern edge of small returning leader spot. New group grew in complex manner, forming compact class D spot group by 24 May with group axis steeply inclined to equator. Growth continued until 30 May when group was class E.
124	N20	5/28	Birth of active region in following portion of large, faint plage. Grew to maximum by 1 June as simple class D spot group. Arc of bright plage formed west of leader spot where it moved into area of faint plage.
118	S05	5/27	Filament partially disappeared; re-formed by 29 May.
		6/1	Filament disappeared again.
115	N22	5/27	Filament disappeared in apparent response to birth of nearby active region; re-formed 1 June.
105	N49	5/31	Large filament disappeared.
100	N14	5/26	Filament disappeared; partially re-formed next day.
		5/30	Filament disappeared again, in apparent response to rearrangement of neutral line to include nearby active region.
88	S12	5/26	Filaments on both north and south border of large-scale cell disappeared near east limb. Both had re-formed by 29 May.
		5/30	Northern filament disappeared again; re-formed by 2 June.
	N09	5/29	Birth of small active region on southern boundary of faint plage.
		5/31	Birth of additional region slightly west of the region mentioned above. Grew to maximum on 2 June as class D spot group.
64	S20	5/29	Birth of small active region on northern border of single sunspot that had returned from previous solar rotation.
62	N10	6/2	CMP of equator-crossing filament channel with active filaments intermittent along its entire length.
54	N18	5/29	Maximum development of small class D spot group near active filament.
30	N21	6/4	Large filament disappeared.
22	N06	6/1	Filament disappeared near east limb.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1970 – ROTATION 1561



Hα SYNOPTIC CHART

1970 - Rotation 1562

°Long.	°Lat.	Date	Descriptive Notes
359	N35	6/5	Filament became especially large after this date.
356	S45	6/10	Filament disappeared near west limb.
351	S14	6/7	Birth of small active region with very slow development to maximum on 11 June as small class B spot group.
338	N15	6/10	Filament disappeared.
	N14	6/13	Birth of small active region in filament channel at west limb.
316	N16	6/6	Filament disappeared; re-formed by 9 June.
		6/11	Filament disappeared again, in apparent response to new growth in nearby plage.
312	N17	6/5	Birth of small active region near east limb. Rapidly faded after 10 June.
	N25	6/10	Filament became active same day as disappearance of filament on same neutral line at (338,N15).
311	N11	6/7	Birth of small active region that merged with small region north of this location.
		6/11	Minor growth.
		6/13	Stronger growth with maximum on 14 June as small class D group.
295-315	S10-20	6/10-11	CMP of complex of two old active regions that had formed on the same longitude and 7° apart in latitude during the previous solar rotation. By rotation 1562, the regions had separated 15° in longitude, indicating an unusual amount of shear. An east-west filament formed between them and equatorward of the large leader spot of the more southerly region.
297	S12	6/9	Birth of small active region in following portion of large faint plage. Disappeared by 12 June.
290	N17	6/8	Birth within faint plage of active region with small spots. New spots grew to maximum by 10 June as complex D group. Dissipated rapidly.
286	N36	6/14	Filament present this day only.
	S06	6/15	Birth of small active region at end of small, curved filament and in position of older faint plage.
262	N19	6/10	Birth of small active region between two large leader spots of old regions on a common neutral line, giving the appearance of a class F spot group.
		6/13	Birth of fourth active region within this complex, as spots formed on northern border of the large western leader spot. When the new spots had grown to maximum on 14 June, the new leader and original large leader spots had merged.
240	N16	6/14	Maximum development of class D spot group with high spot count. Formed between two very large and active regions.
235	N10	6/15	Large filament formed between closely-spaced active regions.
218	N19	6/15	Maximum development of great class F spot group that evolved from three separate groups merged end to end.
211	S20	6/16-17	Filament disappeared.
210	N20	6/13	Birth of active region at trailing end of great class F group. Grew to maximum by 15 June and merged with the larger region. Great flare occurred 14 June at point of merger.
200	S15	6/23	Filament disappeared near west limb after steady growth for previous 5 days.
198	N16	6/22	Filament disappeared.
192	S07	6/16-17	Filament disappeared.
190	N26	6/19	Filament disappeared; re-formed next day.
		6/22	Filament disappeared again.
183	N21	6/16-17	Filament disappeared.
157	S13	6/21	Birth of active region centered on small faint plage. Grew to maximum next day as class C spot group.
		6/25	Minor growth on northern edge of leader spot.
142	N04	6/25	Northern portion of equator-crossing filament disappeared. Re-formed next day.
131	N23	6/24	Filament disappeared within area of faint plage.
110	N10	6/29	Large filament disappeared near west limb.
100	N29	6/22	Filament disappeared in apparent response to growth of nearby active region. Re-formed by 24 June.
		6/26	Filament disappeared again; re-formed next day.
96	N11	6/22	Maximum development of complex class D spot group. Appeared to consist of a young spot group that emerged near the old leader spot which had returned from the previous disk passage.
	S05	6/30	Semicircular filament disappeared.
95	N22	6/22	Maximum development of follower-dominant C spot group.

Note: There were no days without H-alpha photographs.

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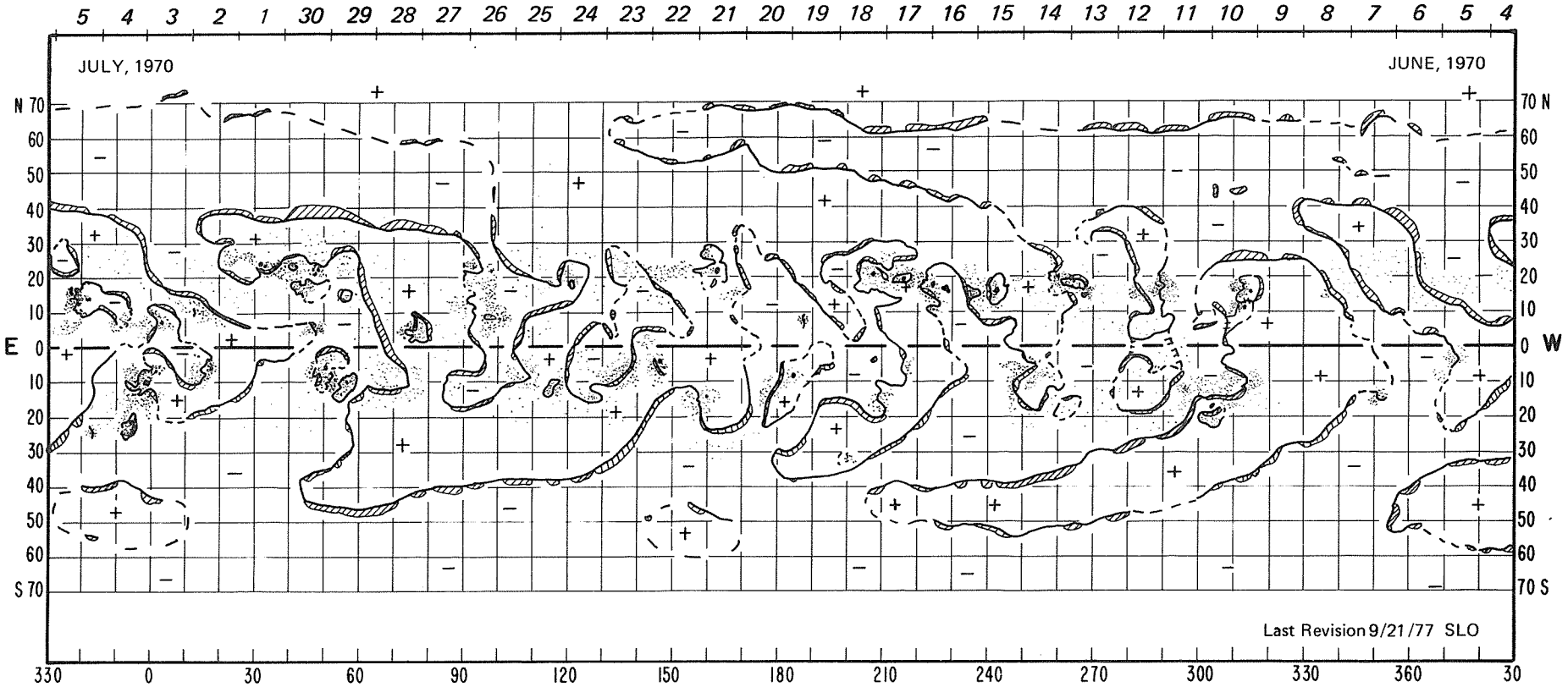
Hα SYNOPTIC CHART

1970 – ROTATION 1562



Hα SYNOPTIC CHART

1970 - Rotation 1562 (Continued)

°Long.	°Lat.	Date	Descriptive Notes
75	N05	6/26	Birth of small active region within small faint plage.
		6/29	New growth began with maximum on 2 July as small class D spot group. Axis inclination slightly negative, i.e., leader spot at higher latitude than follower.
	N34	6/29	Portion of large filament disappeared.
58	N15	7/1	Birth of small active region near large filament.
56	S10	6/28	Birth of small active region near class D spot group.
		6/30	More rapid growth to maximum as small class D spot group.
50	N36	7/2	Large filament disappeared; partially re-formed next day.
48	S08	6/28	Maximum development of simple, small class D spot group.
46	N05	6/27	Birth of small active region.
40	N22	6/24	Probable date of birth at east limb of active region that grew to maximum by 29 June as class F spot group.
20	S18	7/4	Filament disappeared.
15	S03	6/26	Probable date of birth at east limb of active region that grew during almost all of its disk passage. Maximum occurred on 4 July as class D spot group with high spot count.
12	N10	7/5	Birth of small active region.
5	N10	7/1	Filament disappeared in response to growth of nearby active region.
1	N07	6/28	Probable date of birth near east limb of active region that grew to maximum by 2 July as class D spot group.
		7/2	Birth of new region on northern border of leader spot.

Note: There were no days without H-alpha photographs.

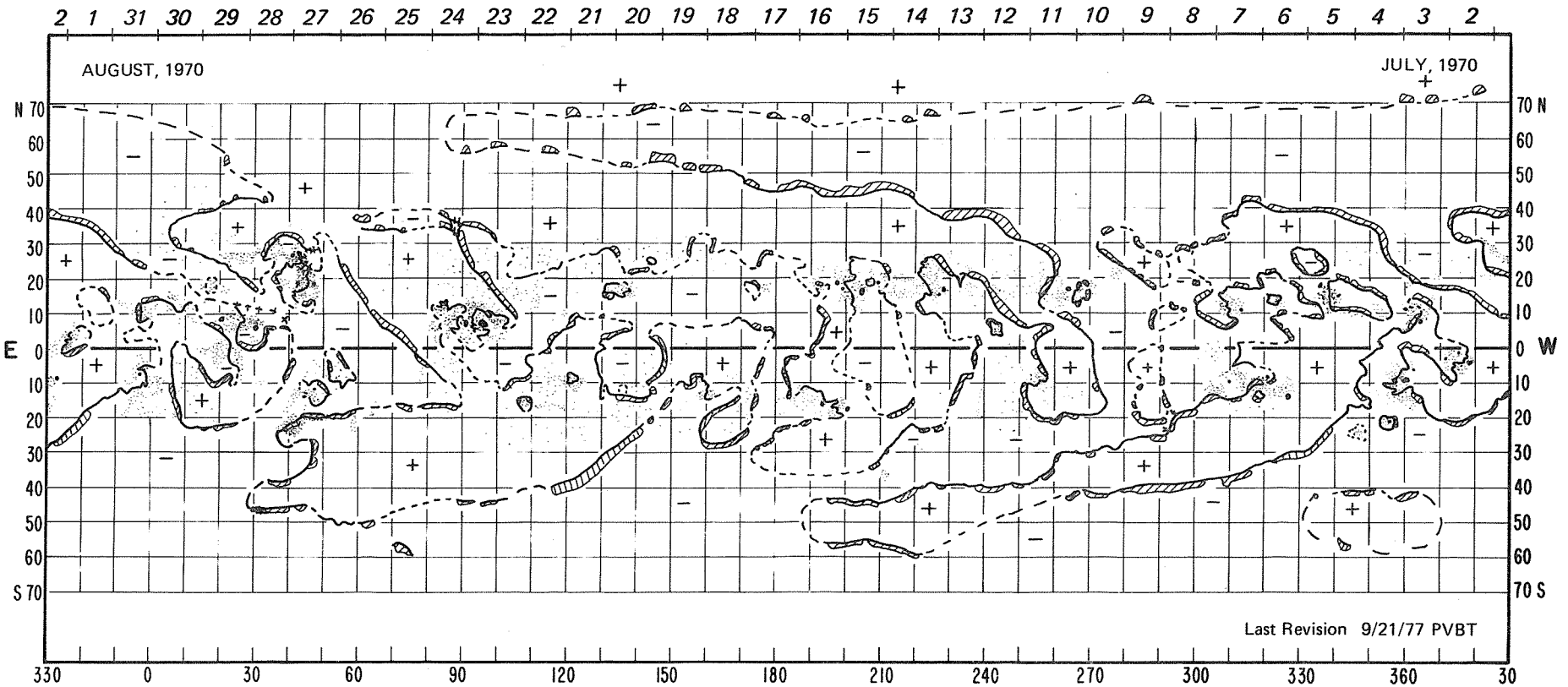
Hα SYNOPTIC CHART
1970 - Rotation 1563

°Long.	°Lat.	Date	Descriptive Notes
359	S08	6/28	Birth of active region on northern border of large single leader spot near east limb. Growth of new region led to merger with large spot, creating great circular penumbral area containing spots of both polarity ("delta" configuration). Maximum spot area on 2-3 July.
355	S21	7/4	Birth of small active region.
347	S24	7/5	Birth of small active region.
345	N36	7/7	Large filament disappeared.
338	N15	6/30	Birth of active region near east limb that grew to maximum by 4 July as small class D spot group.
337	N24	7/5	Filament disappeared; re-formed next day.
		7/7	Filament disappeared again.
325	N05	7/8	Small filament disappeared; replaced by small plage this day only.
320	S10	7/4	First maximum in development of class F spot group.
		7/5	Formation of small bipolar group of spots on northern border of follower spot.
		7/6	Growth of spots on northern border of leader spot.
		7/8	New spots formed in center of region.
		7/10	Another area of new spots formed north of follower spot.
310	N11	7/3	Maximum development of small class C spot group.
305	N07	7/13	Filament disappeared near west limb.
288	N08	7/8	Filament disappeared simultaneously with filament disappearance north of this location.
281	N21	7/8	Filament disappeared.
278	N21	7/12	Birth of small active region.
266	N17	7/6	Birth of small active region on western border of large, single sunspot that had returned for third disk passage.
260	S20	7/16	Filament disappeared near west limb.
255	S01	7/8	Filament partially disappeared.
		7/11	Remainder of filament disappeared.
243	N05	7/16	Birth of small active region.
240	N37	7/13	Filament disappeared.
202	N18	7/12	Maximum development of class D spot group.
		7/16	Birth of small active region at position of declining leader spot. Maximized 18 July.
		7/18	New growth in center of region continued until west limb passage on 21 July.
196	S18	7/12	Maximum development of open class D spot group with axis at negative inclination to solar equator, i.e., leader spot at higher latitude than follower.
193	N09	7/12	Filament disappeared near east limb.
183	S09	7/18	Filament disappeared from within faint plage.
175	N15	7/13	Birth of small active region.
166	S27	7/21	Filament disappeared.
147	S03	7/16	Filament disappeared near east limb; re-formed by 18 July.
138	N17	7/19	Birth of small active region in center of old, faint plage.
133	N28	7/18	Small filament disappeared; re-formed 21 July; gone next day.
122	S10	7/19	Birth of small active region.
110	S17	7/18	Birth of small active region.
106	S09	7/25	Filament disappeared.
93	N08	7/17	East limb passage of great complex sunspot group.
		7/21	Maximum development of class E spot group with strong "delta" configuration in leader spots, compact form and high spot count.
90	N29	7/29	Filament disappeared near west limb.
85	S17	7/23	Filament disappeared.
83	N10	7/22	Birth of small active region on following border to great active center.
		7/25	New growth brought area to maximum next day as peculiar class C spot group.
61	N37	7/24	Filament disappeared as nearby neutral lines rearranged; re-formed 29 July.
		7/31	Filament disappeared again near west limb.
58	N18	7/23	One half of large filament, located midway between great active centers, disappeared. Re-formed by 29 July.
50	S11	7/30	Small filament disappeared that encircled leader spot.
45	S13	7/24	Maximum of simple class D spot group.
	N18	7/24	New growth within old plage of moderate intensity led to complex class D spot group next day. The D group formed complex with remnants of region north of it that had been a great class F spot group during previous rotation.
38	N32	7/23	Filament disappeared near east limb; re-formed by 26 July.
		7/30	Filament disappeared again.
37	S46	7/26	Large filament disappeared near east limb.
30	Equator	7/30	Active filament formed southwest of leader sunspot.
		8/1	Filament disappeared with large flare in active region.
29	N18	7/28	Birth of small active region.
25	N06	7/25	Birth of active region near east limb that grew rapidly to maximum by 28 July as class E spot group.
19	S10	8/2	Filament disappeared.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1970 – ROTATION 1563



Hα SYNOPTIC CHART
1970 - Rotation 1564

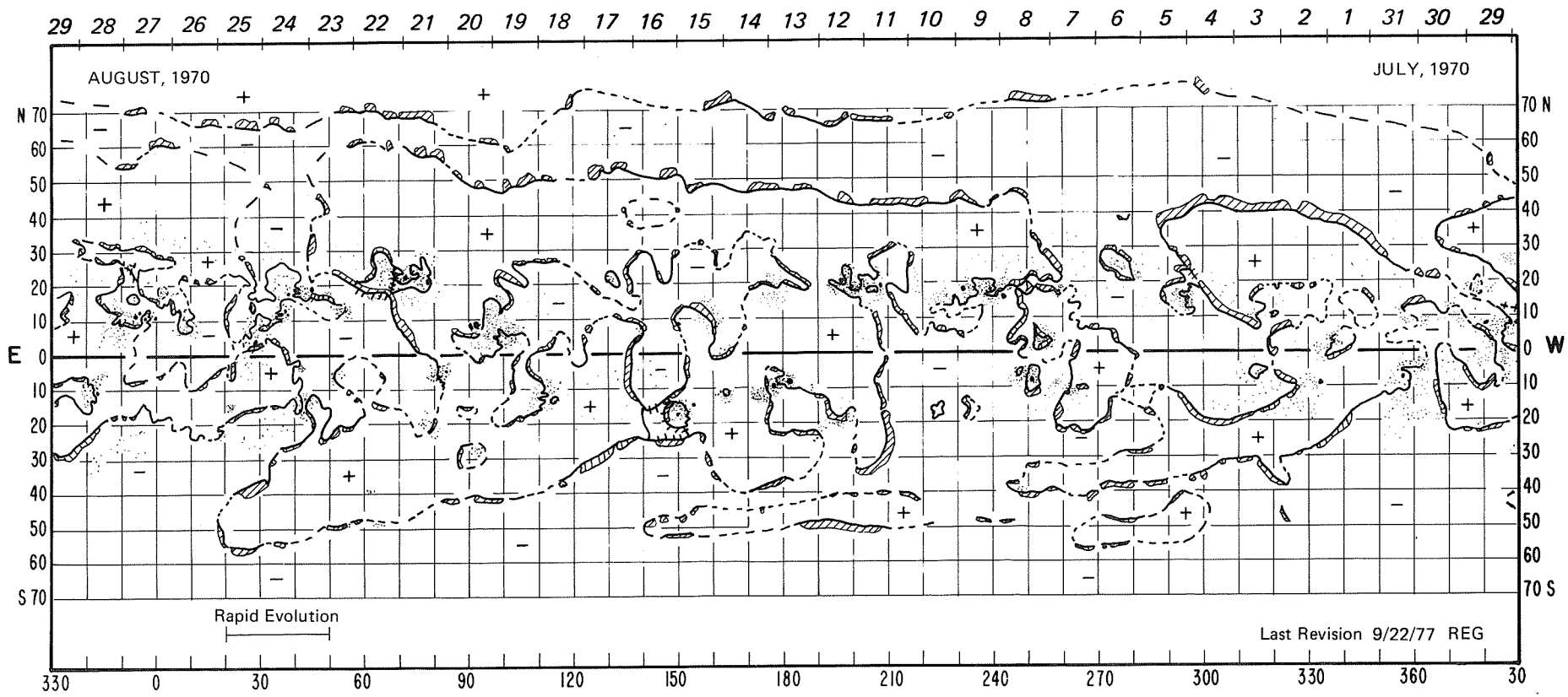
°Long.	°Lat.	Date	Descriptive Notes
358	S08	7/29	Maximum development of complex plage and small spots on northern border of large leader spot returned from previous disk passage.
340	Equator	8/2	Gradual disappearance of small filament in apparent response to growth of nearby region.
336	N03	7/31	Birth of small active region.
330	N38	8/6	Large, long filament disappeared near west limb.
296	S15	8/1	Part of large, curved filament disappeared.
295	N14	7/30	Probable date of birth at east limb of small active region that grew slowly to maximum on 4 August as class C spot group. Spots and plage underwent significant variations on each day of disk transit.
290	N39	8/2	Part of large, long filament disappeared.
	S40	8/2	Large filament disappeared near east limb.
275	N02	8/2	Filament disappeared near east limb; re-formed 8 August.
		8/9	Filament disappeared again.
	N23	8/4	Filament disappeared within faint plage; re-formed by 8 August.
		8/11	Filament disappeared near west limb.
260	S22	8/3	Filament disappeared near east limb. Began re-forming next day and continued active throughout disk passage.
	S11	8/7	Birth of small active region in filament channel.
257	N25	8/5	Filament disappeared; re-formed 8 August.
		8/12	Filament gradually disappeared.
250	S06	8/6	Birth of active region that grew to maximum by 8 August as class D spot group.
248	N07	8/10	Active filament disappeared.
238	N18	8/3	Birth at east limb of great active region that grew to first maximum on 8 August as follower-dominant class E spot group.
		8/9	Birth of new region in center of large spot group. Grew throughout remainder of disk passage.
		8/14	Maximum observed development as compact, complex class F spot group at west limb.
208	S03	8/15	Equatorial portion of long filament disappeared.
203	N20	8/7	Birth of important active region near east limb in center of faint plage. Grew to first maximum on 10 August as follower-dominant class D spot group with large symmetric leader and follower spots and with group axis strongly inclined to solar equator.
203	N20	8/12	Birth of two regions near center of and near leader of this large group and formation of active filament embedded in the original plage.
		8/13	Neutral line became highly convoluted as it rearranged to include new areas into the principal neutral line.
200	S60	8/9	Large filament disappeared.
185	S23	8/16	Filament disappeared in apparent response to growth of nearby active region.
179	S09	8/12	Birth of active region that remained very small until 15 August.
		8/14	Beginning of rapid growth, reaching maximum on 17 August as simple class E spot group.
176	S12	8/16	Filament between active regions disappeared.
173	S12	8/15	Birth of small active region near follower of class E spot group.
163	S14	8/18	Birth of small active region near leader of large spot group.
158	N10	8/17-20	Filament active last 4 days of disk passage.
152	S16	8/14	Birth of active region that grew to maximum by 17 August as follower-dominant class D spot group. Formation and growth were in unison with development of nearly identical region 30° to the west.
145	S15 & S25	8/15	Two filaments disappeared simultaneously in response to birth of nearby active region and to alteration of their underlying neutral lines, which incorporated the new active region into the large-scale magnetic pattern.
136	S05	8/20	Partial filament disappearance.
130	S28	8/17	Large filament disappeared.
	N21	8/17	Birth of small active region.
		8/23	Second and stronger region born at this location at west limb.
102	N20	8/22	Active filament disappeared.
94	N10	8/13	East limb passage of great active region which was at peak on previous disk passage. Characterized this rotation by large and complex follower spot with "delta" magnetic configuration. Leader spots were very small and short-lived.

Note: There were no days without H-alpha photographs.

(Continued)

Hα SYNOPTIC CHART

1970 – ROTATION 1564



Hα SYNOPTIC CHART

1970 - Rotation 1564 (Continued)

°Long.	°Lat.	Date	Descriptive Notes
81	S05	8/19	Birth of active region in a filament channel and at southern end of large, active filament. Born same day as another important region near northern end of same filament. Grew to maximum by 23 August as class D spot group.
75	N21	8/19	Birth of active region at northern end of large filament and near a large convolution in the filament channel extending from the filament. Growth of this region led to significant restructuring of the filament channel so that the large-scale neutral line incorporated the new active region. Reached maximum on 21 August as follower-dominant class D spot group.
65	N18	8/22	Large active filament disappeared in apparent response to growth of two active regions at opposite ends of the filament. Re-formed 24 August.
62	S40	8/25	Birth of small active region.
53	N13	8/21	Peak development of small class C spot group.
41	N19	8/20	Birth of active region that reached maximum on 23 August as class C group with high spot count.
35	N13	8/23	Birth of small active region within extensive complex of faint regions.
29	N05	8/25	CMP of single, symmetric sunspot surrounded by vortical fibril pattern with counterclockwise twist.
28	N17	8/20	Birth of small active region on eastern edge of minor activity complex.
22	S17	8/28	Birth of small active region within filament channel.
21	N12	8/23 8/26	Filament disappeared; re-formed 25 August. Filament disappeared again.
10	N08	8/29	Birth of small active region.
5	N25	8/23	Filament disappeared near east limb in apparent response to merger of large-scale areas of positive polarity.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART
1970 - Rotation 1565

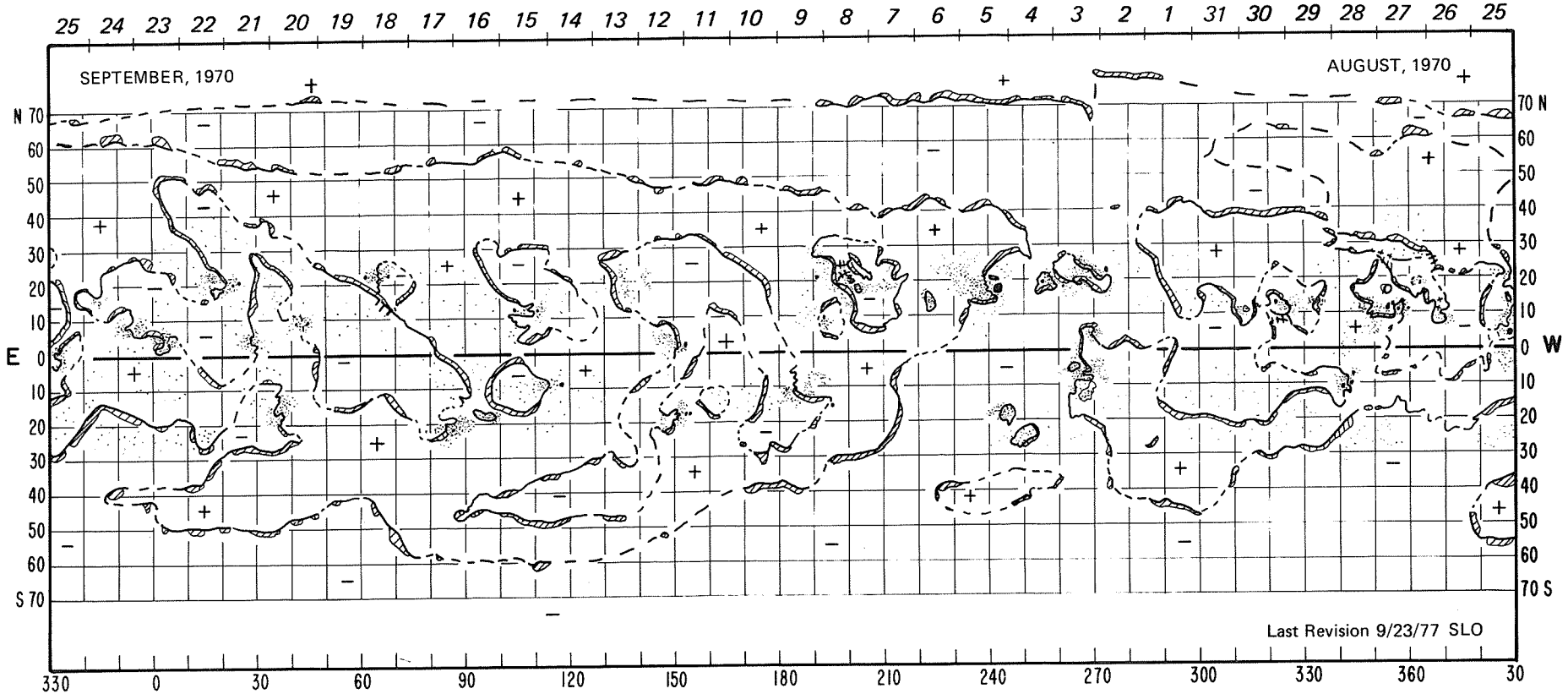
°Long.	°Lat.	Date	Descriptive Notes
358	N11	8/26	Birth of small active region on southern border of large leader sunspot.
355	N15	8/31	Birth of small region on northern border of old leader sunspot.
352	N20	8/23	Curved filament north of active region disappeared; re-formed next day.
		8/28	Filament disappeared again; re-formed 30 August in two parts over new configuration of underlying neutral line. New pattern resulted from merger of active region pattern with large-scale area that had moved eastward.
349	N11	9/2	Birth of small active region near west limb.
346	N10	8/28	Birth of small active region in trailing edge of large region.
342	S07	8/23	Birth of active region near east limb that joined with new region on its southern border next day to form single region. Became class C spot group by 25 August.
	S10	8/24	Birth of active region on southern border of, and perfectly aligned with, region of identical size and 3° to the north. The regions formed a single plage with double spot groups. Newer spots reached maximum by 26 August as class C group.
338	S26	8/26	Almost all of large filament disappeared near east limb.
333	N12	8/31	Birth of small active region on western border of existing active region.
325	N13	8/27	Maximum development of follower-dominant class C group.
	N38	8/28	Part of large filament disappeared.
315	N11	8/31	Birth of small active region near trailing edge of existing active region and at position of faint plage that had nearly disappeared by this date. This birth created complex chain of three small active regions at the same latitude.
312	N10	9/2	Birth of fourth small active region at eastern end of chain of three small regions.
295	S18	9/5	Filament disappeared near west limb.
287	N22	8/29	Filament disappeared; re-formed at lower latitude by 3 September.
280	N01	9/2	Filament disappeared.
270	N21	8/29	Maximum development of class E spot group with large leader spot but small followers.
270	N21	9/5	Filament disappeared that was embedded in center of region.
	N04	8/30	Birth of small active region.
	S21	9/5	Filament disappeared.
268	S13	9/4	Birth of small active region.
265	S05	8/31	Birth of small active region within trailing portion of plage with small class C spot group. New region's growth coincided with rapid decay of older spots.
		9/6	Birth of third active region in this location, which grew to small class D by next day, just before west limb passage.
258	N21	8/31	Birth of small active region that dissipated rapidly with birth next day of stronger region just south of this location.
	N19	9/1	Birth of active region that grew to class D by 4 September and merged with large region to its west. Growth continued intermittently until west limb passage.
250	S25	9/5	Birth of small active region.
244	S18	9/5	Birth of small active region.
238	N18	9/5	CMP of great active region on second disk transit with class E spot group. Very large and complex leader spot exhibited counterclockwise rotation.
		9/8	Large active filament disappeared from northern edge of region.
225	N40	9/2	Filament disappeared near east limb.
214	S18	9/8	Large filament disappeared.
202	N40	9/4	Filament disappeared at east limb.
195	N05	9/2	Filament disappeared near east limb.
	N21	9/4-6	Active filament suspended far above neutral line in large, old region with decaying class E spot group.
192	N10	9/8-11	Fibrils surrounding isolated leader spot formed counterclockwise vortical pattern these 4 days only.
190	S08	9/5	Small active region formed north of region that just passed maximum development and contained very small spots.
188	S13	9/8	Filament disappeared from moderately bright plage with single small sunspot.
		9/11	Formation of two new spot groups in western and southern portions of this region. Neither exceeded class B by next day. Plage bright and complex at west limb passage.

Note: There were no days without H-alpha photographs.

(Continued)

Hα SYNOPTIC CHART

1970 – ROTATION 1565



°Long.	°Lat.	Date	Descriptive Notes
187	N45	9/7	Filament disappeared.
165	N10	9/9	Filament disappeared.
150	N03	9/8	Birth of active region that reached maximum next day as class C spot group.
132	N18	9/13	Filament disappeared from faint plage.
115	S35	9/18	Filament disappeared near west limb.
109	N11	9/13	Birth of active region within extensive faint plage. Grew to maximum by 15 September as small class D spot group.
		9/18	New growth began that produced complex, but small, class D spot group by next day.
105	N25	9/16	Filaments on northern and eastern borders of this large-scale feature disappeared same day.
97	S18	9/18	Birth of active region that grew to class C at west limb on 21 September.
84	S21	9/13	Birth of active region that grew to maximum by 15 September as class C spot group.
70	S15	9/20	Filament disappeared.
66	N22	9/20	Birth of active region that grew rapidly to class D spot group in brilliant plage by next day.
60	N20	9/20	Filament disappeared with birth of nearby active region.
58	S15	9/19	Filament disappeared.
47	S05	9/16	Filament disappeared.
43	N09	9/21	Birth of active region that grew to maximum by 23 September as class D spot group.
30	N04	9/19	Birth of small active region.
	N20	9/23	Filament disappeared in apparent response to growth of nearby active region.
20	N20	9/16	Birth at east limb of active region that grew to compact class E spot group on 21 September. Proper motions of leader spots led to their coalescence into large single spot by 24 September.
15	N47	9/23	Filament disappeared; re-formed 26 September as part of large semicircular filament on border of large-scale, negative-polarity area.
2	N03	9/19	Birth of small active region.
1	N07	9/24	Filament disappeared from complex, faint plage.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

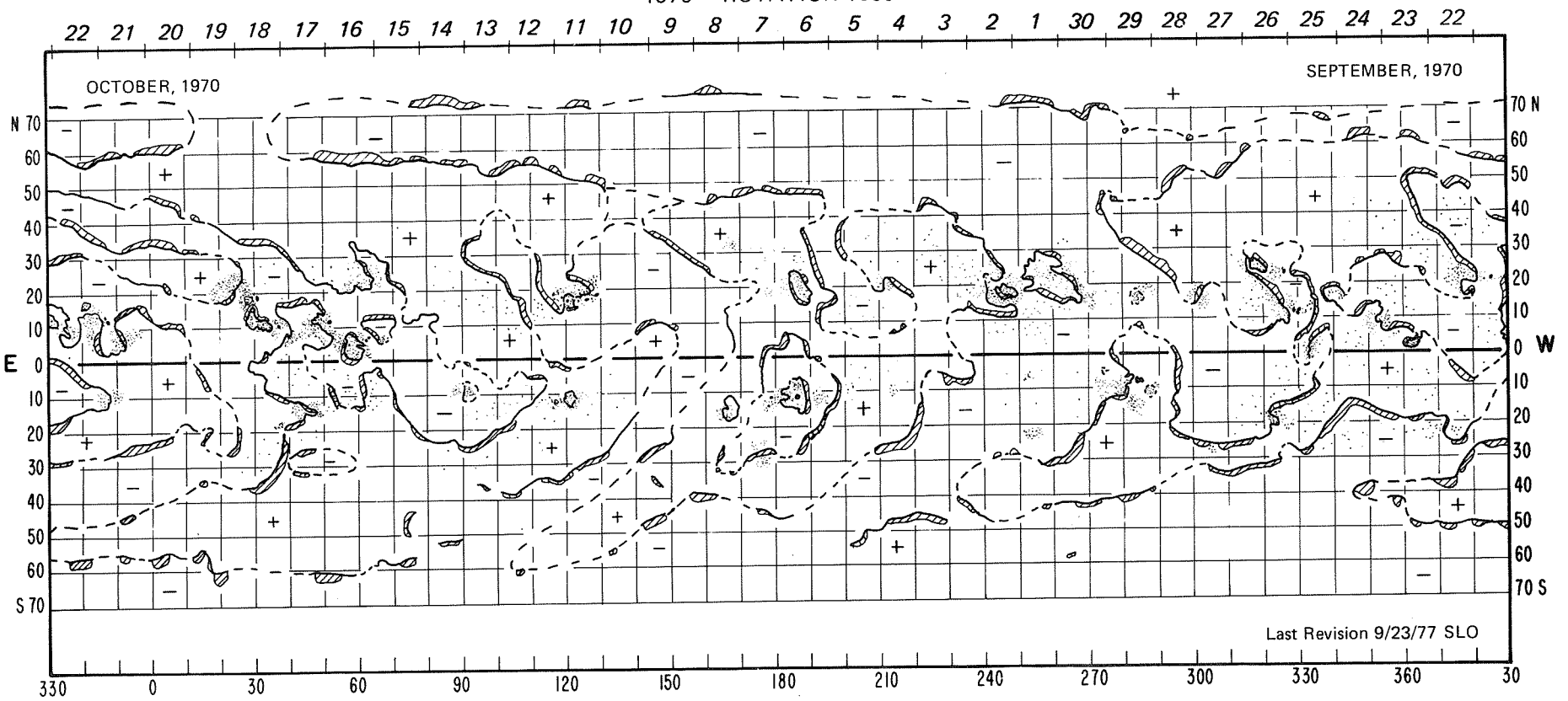
1970 - Rotation 1566

°Long.	°Lat.	Date	Descriptive Notes
326	N11	9/24	Maximum development of class D spot group on southern border of large, faint plage.
322	N23	9/24	Birth of active region on northern border of large, faint plage. Grew to maximum by 26 September as class E spot group with structure resembling two overlapped bipolar areas.
	S20	9/24	Birth of small active region.
321	N11	9/30	Birth of small active region in trailing portion of large, old plage.
320	N07	9/25	Filament disappeared on southern border of activity complex.
288	S12	9/29	Small active region formed south of large leader sunspot.
	N17	10/3	Large active filament disappeared near west limb.
287	N08	9/28	Birth of small active region on western edge of small, faint plage.
285	N17	9/25	Birth of small active region.
	N05	10/2	Birth of active region near sites of two small regions that recently had disappeared. Grew slowly during last 3 days of disk passage, but did not exceed class A spot group.
265	S27	9/30	Large filament disappeared.
254	S08	10/6	Birth of small active region.
245	N18	10/3	Birth of active region in center of extensive, faint plage that was remnant of great active center of previous 2 solar rotations. Grew to maximum by 5 October as class C spot group with primitive penumbra.
218	S23	10/5	Large filament elevated and became tenuous for remainder of disk passage.
194	N14	10/7-8	Filament disappeared.
191	N16	10/4	Filament disappearance in faint plage followed by parallel-ribbon flare.
190	S22	10/9	Large filament disappeared, associated with old plage that was merging with large, younger active region.
183	S11	10/1	Probable date of birth near east limb of active region in trailing portion of large, faint plage. New region grew to maximum by 5 October as complex class D spot group.
		10/7-8	New growth in center of region led to second and larger maximum on 9 October as complex class E group.
175	S29	10/3	Birth of small active region.
		10/11	Filament disappeared that had formed after plage disappeared.
167	N32	10/8	Birth of small active region.
143	N09	10/6	Filament disappeared.
122	N17	10/4	Probable date of birth at east limb of active region that became class D spot group by 6 October with large leader spot but with few and very small followers.
		10/9	Birth of second active region in northern portion of plage. New spots grew to maximum by 11 October.
		10/9	Birth of third small region near the following edge of plage. These spots also grew to maximum by 11 October, so that the combination of these three overlapped sunspot groups formed a class E spot group with small spots.
	S11	10/6	Birth of small active region at east limb that persisted for the entire disk passage. Maximum development occurred on 11 October with follower-dominant class C spot group.
117	S12	10/7-8	Birth of small active region between small, young region and faint plage of older region. Disappeared by 12 October.
113	N18	10/15	Curved filament, associated with active region, disappeared.
106	N15	10/11	Half of large filament disappeared; re-formed after 14 October.
90	S10	10/13	Birth of small active region.
70	N57	10/17	Long filament disappeared.
60	N05	10/12	Birth of active region within complex, faint plage. Grew to maximum by 15 October as class D spot group. By this date it formed leading portion of activity complex that included another young region.
53	S10	10/13	Filament disappeared near east limb in apparent response to growth of nearby active region.
47	N11	10/14	Birth of new active region centered on plage from earlier region. Grew to maximum by 17 October as class D spot group. Merged with extensive faint plage and with strong region centered at (60,N05).
45	S13	10/12	Birth of small active region near east limb.
37	S19	10/20	Birth of small active region.
36	S30	10/15	Filament disappeared.
35	N10	10/14	Birth of active region.
		10/17	Beginning of rapid growth. Reached maximum on 18 October as class D spot group. Bordering structures were in contact with active regions north and west of this location.

Note: Day without H-alpha photographs was 7 October 1970.

Hα SYNOPTIC CHART

1970 – ROTATION 1566



Hα SYNOPTIC CHART
1970 - Rotation 1567

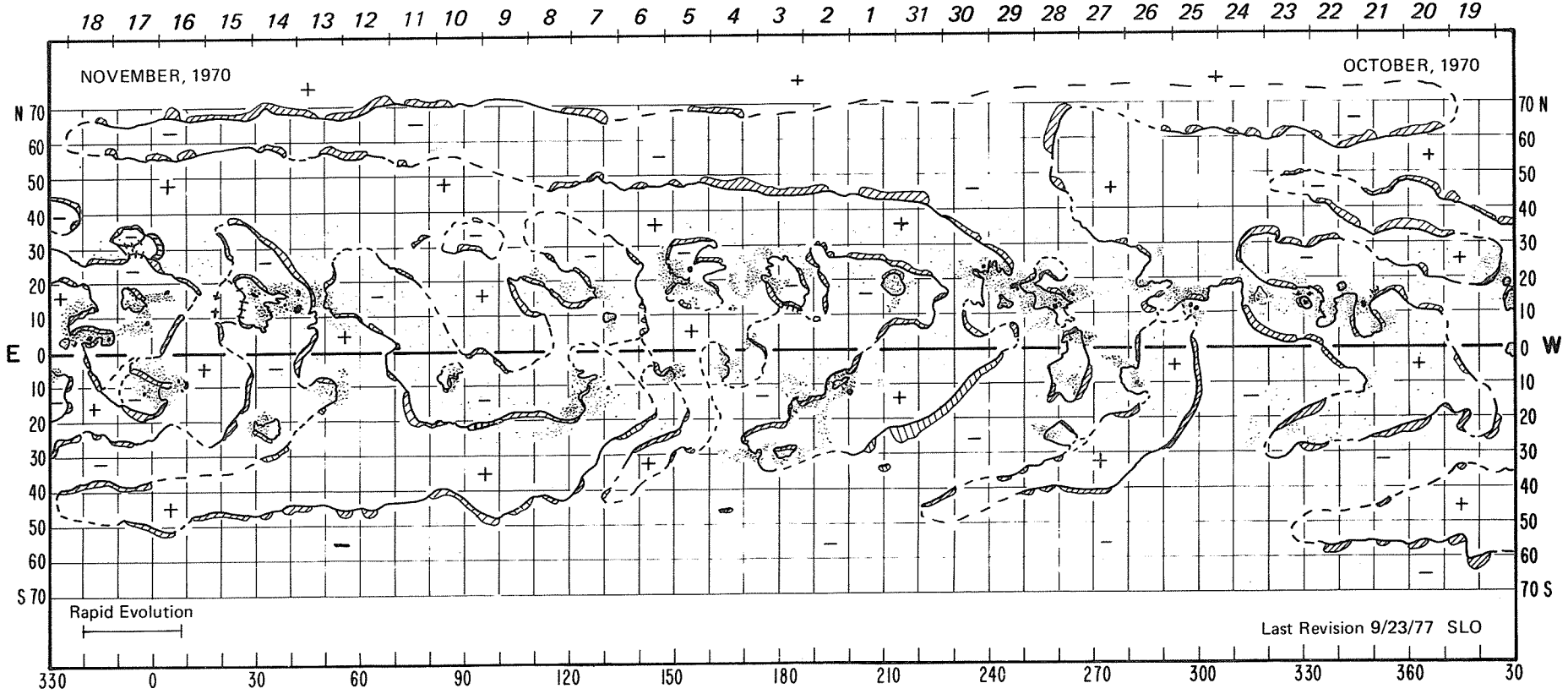
°Long.	°Lat.	Date	Descriptive Notes
352	N15	10/25	Birth of small active region near former position of leader spot of old active region. Growth continued until west limb passage on 27 October, but region had not exceeded class B spot group.
344	N11	10/23	Birth of new region in center of old region with large leader sunspot. Growth of new spots coincided with rapid decay of leader spot until it nearly vanished within 24 hours. New spots did not exceed class B spot group.
342	N36	10/19	Part of filament disappeared.
330	S18	10/24	Filament disappeared; re-formed next day.
	N02	10/27	Large filament disappeared near west limb, in apparent response to growth of nearby active region.
325	N17	10/24	Filament disappeared within faint plage. Re-formed next day, while large filament along same neutral line northeast of this location disappeared.
316	N14	10/25	Birth of active region that grew to small class C spot group before west limb passage on 30 October.
315	N32	10/25	Large filament disappeared.
283	Equator	10/24	Filament disappeared.
	N19	10/27	Birth of small active region.
281	N29	10/27	Filament disappeared in apparent response to birth of nearby active region.
	S10	10/28	Birth of small active region.
266	N03	10/28	Birth of active region with exceptionally fast growth to maximum next day as moderate-size class D spot group.
262	N15	10/25	Maximum development of large class D spot group that formed leading member of major activity complex. Growth represented rejuvenation of activity complex of 2 rotations earlier. Group axis was inclined to solar equator at strong negative angle, i.e., leader spot was at higher latitude than follower.
		10/26	Birth of new region on southern border of leader spot. Maximum development occurred on 29 October.
260	N60	10/28	Large filament disappeared.
245	N14	10/24	Birth at east limb of small active region on southern border of large leader spot in great class E spot group. Maximum development by 25-26 October.
242	N19	10/25	Maximum development near east limb of great class E spot group with axis steeply inclined to solar equator. Formed trailing member of major activity complex on large-scale neutral line that was apparent source of a sector boundary in interplanetary magnetic fields.
235	N05	10/29	Filament disappeared.
230	S15	10/30	CMP of exceptionally large filament.
215	N43	11/04	Large filament disappeared.
193	S12	10/26	Major eruption at east limb in progress at 1435 UT from large, old active region just beyond the limb.
		10/31	Formation of small new region on northeast border of leader sunspot.
190	N45	11/5	Western end of long filament disappeared.
183	N19	11/4	Filament disappeared; re-formed 6 November.
		11/7	Filament disappeared again.
180	S30	11/3	Birth of small active region.
175	Equator	11/2	Filament disappeared.
172	N02	11/5	Birth of small active region.
167	N11	11/7	Birth of small active region.
155	N31	11/5	Filament disappeared.
153	N19	11/2	Birth of small active region in center of southern section of large plage associated with single leader sunspot.
152	N17	11/8	Birth of another active region in southern border of this activity complex. Grew to small class D spot group by west limb on 11 November.
150	S07	11/4	Birth of active region with first maximum on 6 November as class C spot group with primitive penumbra.
145	S25	11/4	Filament disappeared.
140	S22	11/5	Filament disappeared in apparent response to birth of active region north of this location.
132	N09	11/6	Birth of small active region.
127	N16	11/6	Birth of small active region within center of faint plage and on existing large-scale neutral line.
123	S13	11/5	Large plage that formed from merger of two active regions before east limb passage was source of major proton flare on this day. The two spot groups, aligned nearly north-south from one another, were small at this time. Plage continued large, compact and bright for almost all of disk passage, but with very small spots.

Note: There were no days without H-alpha photographs.

(Continued)

Hα SYNOPTIC CHART

1970 – ROTATION 1567



°Long.	°Lat.	Date	Descriptive Notes
123	S13	11/12	Dark filament formed within northern proton of this region near west limb. An additional large active region arose at this location before the next rotation.
100	S20	11/8	Large filament disappeared in apparent response to growth of active region northeast of this location.
86	S08	11/7	Birth of small active region.
55	S06	11/16	Birth of small active region.
53	S12	11/9	Birth of small active region.
45	Equator	11/11	Filament disappeared in apparent response to growth of nearby active region.
38	N26	11/13	Filament disappeared in apparent response to growth of nearby active region; re-formed next day.
		11/15	Filament disappeared again.
35	N16	11/11	First maximum of large class E spot group.
		11/12	Birth of major new region within northern half of existing region. Grew to maximum by 17 November as one of largest and most complex class F spot groups of this solar cycle.
32	S21	11/13	Birth of small active region.
3	S10	11/16	Maximum development of small class E spot group.
0	N16	11/14	Birth of active region at northwest border of large activity complex. Slow initial growth.
		11/17	Region began rapid growth. Maximum next day as class D spot group.

Hα SYNOPTIC CHART

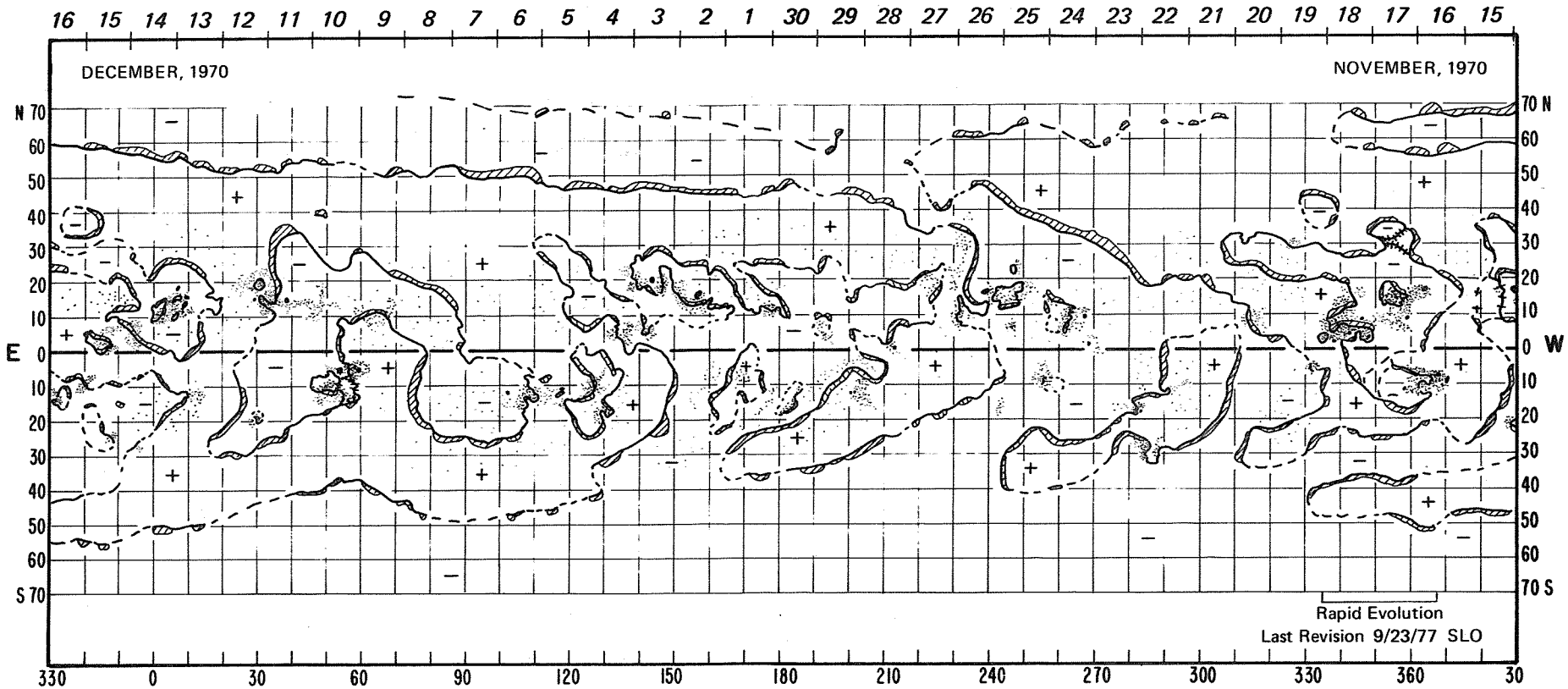
1970 - Rotation 1568

°Long.	°Lat.	Date	Descriptive Notes
358	S17	11/17	Active filament south of active region disappeared after having formed previous day. Re-formed 20 November.
		11/21	Filament disappeared again near west limb.
343	N05	11/18	Simultaneous birth of strong new regions on both the northern and southern edges of a large, complex region that already contained two complicated spot groups. Maximum development next day as class F group(s) with many spots.
		11/21	Birth of small fifth region at N15 on border of the complex.
331	S05	11/17	Birth of small active region that disappeared next day.
312	N09	11/22	Birth of small active region.
	N23	11/23	Half of filament disappeared.
310	Equator	11/17	Portion of large filament disappeared near east limb.
308	S15	11/20	Remaining portion of large filament disappeared.
282	S18	11/22	Birth of small active region.
280	S24	11/24-25	Filament disappeared.
269	N02	11/24	CMP of single sunspot without accompanying plage.
260	S25	11/25-26	Filament disappeared.
	N35	11/27-28	Great filament disappeared.
	N14	11/28	Filament disappeared same day as large filament disappearance north of this location.
255	S09	11/27	Birth of small active region at site of faint plage that had disappeared during previous few days.
248	N14	11/23-24	Birth of active region just west of large leader sunspot that remained from great activity complex of previous rotation. New region grew to maximum by 28 November with small class C spot group.
247	N08	11/29	Birth of small active region.
243	S16	11/28	Birth of small active region
234	N61	11/23	Filament disappeared.
233	N16	12/1	Filament disappeared within faint plage near large single sunspot that lay close to west limb.
213	N05	11/29	Filament disappeared.
197	S09	11/28	Active filament within faint plage near sunspot partially disappeared; re-formed next day.
		12/1	Partially disappeared again; re-formed next day.
		12/3	Disappeared again near west limb.
179	N16	12/5	Filament disappeared near west limb.
178	N09	12/6	Birth of small active region near west limb.
159	N14	11/29	Maximum development of small active region on southern border of large leader spot that had returned from previous disk passage.
152	N15	11/30	Birth of small active region near center of old plage associated with large leader sunspot.
147	S15	12/5	Large, active filament disappeared; re-formed 7 December.
143	N06	12/2	Birth of small active region.
140	N46	12/7	Almost all of small filament sections along polar-crown neutral line disappeared this day. Judging from its elevated form, the author suspects that the remaining large section may have disappeared next day.
133	N05	11/29	Birth of small active region near east limb. Grew to maximum by 2-3 December with class B spot group.
129	S17	11/30	Birth of active region near east limb among complex faint plage and filaments. Grew slowly first 3 days.
		12/4	More rapid growth, reaching maximum next day as small class D spot group.
116	S09	12/3	Formation of small area of complex plage and absorption material on northern border of leader spot of large, old class F spot group. Similar formation near follower spot as well, but only leader area persisted for next few days.
58	S11	12/7	Maximum of small class C spot group.
56	S05	12/9	Birth of active region near northern edge of complex of two small regions. New region grew to maximum by 14 December as large class D spot group near west limb.
55	S11	12/6	Birth of active region near following end of small region. New group grew to class D by next day and declined thereafter. The two regions blended after 8 December.
35	N20	12/12	Large filament associated with large, old active region that was especially active throughout the disk passage.
30	S20	12/14	Birth of small active region.
12	S12	12/16	Small active region emerged almost centered on small faint plage.
		12/19	Associated filament disappeared at west limb.
5	N13	12/12	Maximum development of complex of two class D spot groups with numerous small spots and rapid variations from day-to-day. Complex quickly dissipated during remainder of disk passage. Neither region was associated with a large-scale neutral line.

Note: Days without H-alpha photographs were 24 and 26 November and 8-10 December 1970.

Hα SYNOPTIC CHART

1970 – ROTATION 1568



Hα SYNOPTIC CHART

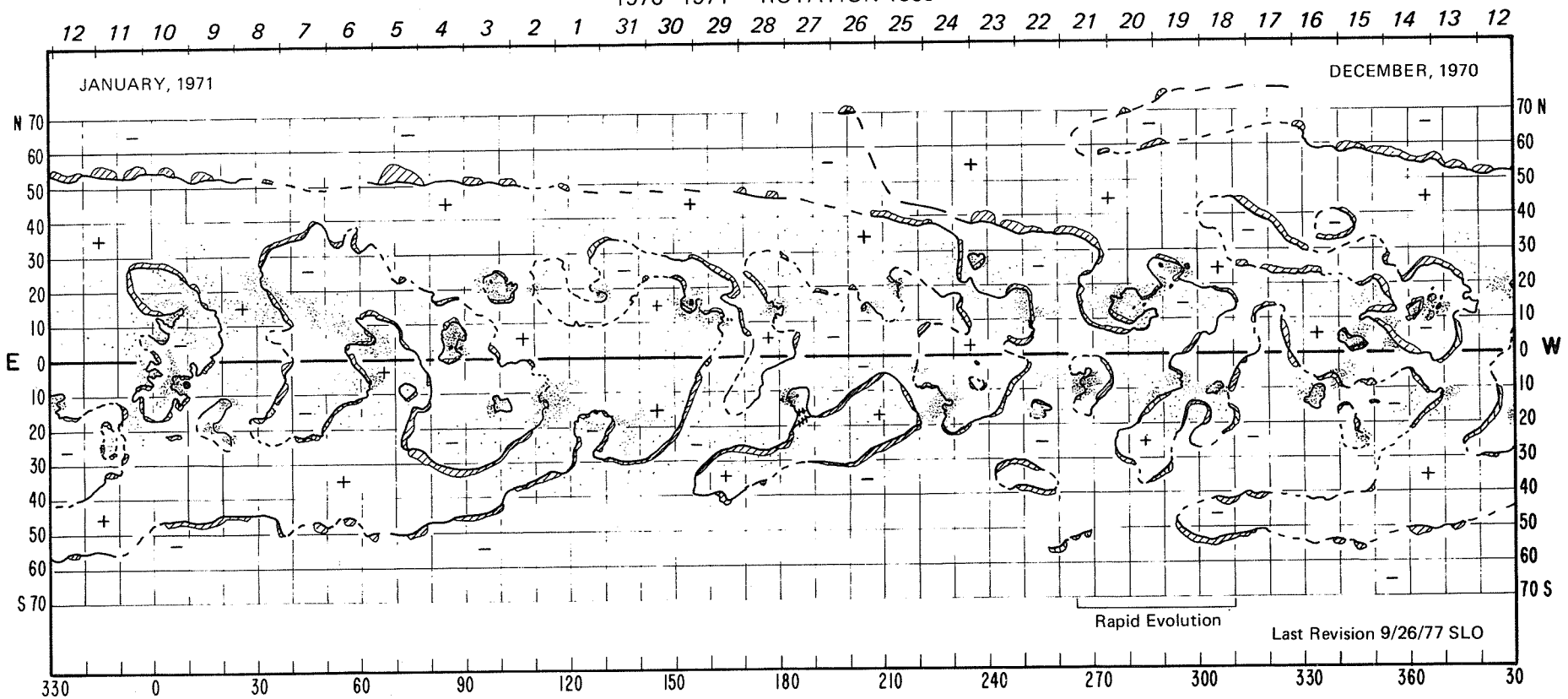
1970-1971 - Rotation 1569

°Long.	°Lat.	Date	Descriptive Notes
350	N20	12/12	Filament disappeared; re-formed next day.
310	S18	12/21	Filament disappeared.
306	S11	12/18	Birth of small active region.
294	N25	12/18	Birth of large, reversed-polarity active region that reached maximum 21 December as class D spot group. Formed large activity complex with two large decaying regions southeast of this position.
238	N27	12/21	Birth of small active region.
220	S20	12/29	Filament disappeared.
183	S12	12/28	Birth of active region that grew to maximum 31 December as a simple class E spot group.
179	N14	12/25	Birth of small active region.
175	S27	12/31	Large filament disappeared, in apparent response to growth of active region northwest of this location.
164	N11	12/25 12/29	Birth of active region. Important additional growth; maximum 31 December as class D spot group with large leader spot.
153	N21	1/4	Large filament disappeared at west limb; associated with old active region that had large single spot for almost all of disk passage.
129	N32	12/29	Partial disappearance of filament.
98	N23	12/28-30	Plage bright and close to leader sunspot along east-west neutral line north of the spot -- an unusual active-region configuration.
87	N03	12/29	Birth of active region at east limb that reached maximum by 1 January as class D spot group.
73	S26	1/8	Large filament disappeared near west limb.
22	S22	1/12	Birth of small active region.
18	S20	1/9	Birth of small active region.
6	S06	1/5	Maximum development, near east limb, of class E spot group with exceptionally large leader spot.

Note: Days without H-alpha photographs were 8-10 December 1970.

Hα SYNOPTIC CHART

1970–1971 – ROTATION 1569



Hα SYNOPTIC CHART

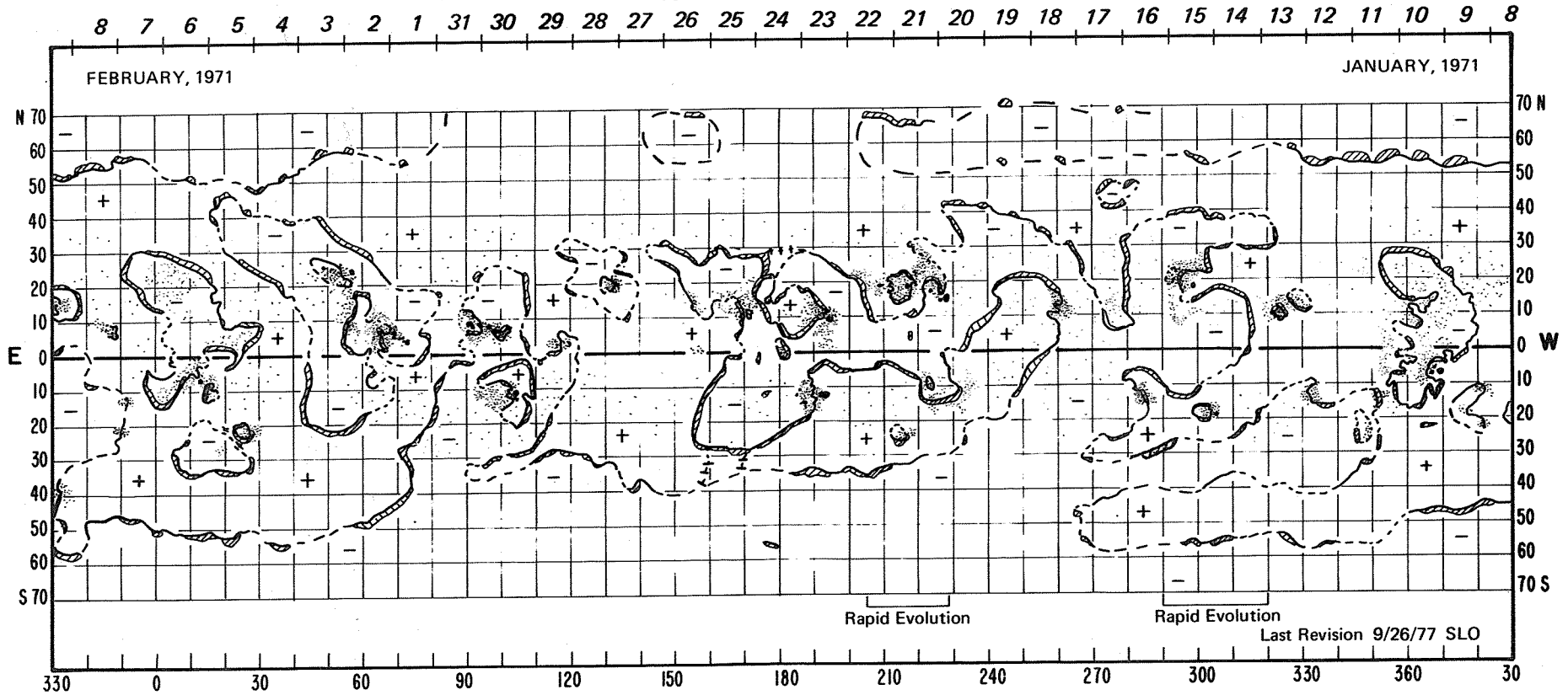
1971 - Rotation 1570

°Long.	°Lat.	Date	Descriptive Notes
332	S13	1/9	Birth of small active region.
327	N12	1/13	Birth of small active region.
		1/15	Reached maximum as class C spot group and merged with adjacent region.
325	N10	1/14	Birth of small active region that merged with older region to the west.
303	S18	1/11	Birth of active region that reached maximum by 13 January as class C spot group.
299	N19	1/15	CMP of large, single sunspot with polarity opposite to usual leader spots of Northern Hemisphere. Possibly return of reversed-polarity region of previous solar rotation but with latitude decreased by 5°.
295	N18	1/15	Semicircular filament disappeared from within plage near large, single spot. Neutral line formed semicircle concentric to the spot.
254	N20	1/23	Filament disappeared near west limb.
222	S09	1/21	Birth of very small active region.
	N27	1/21	Birth of small active region.
215	S06	1/19	Filament disappeared.
212	N19	1/19	Birth of significant region on trailing border of a great class F spot group.
		1/24	Collision and merger between the (212,N19) group and the great region to its west on same day as major flare and proton event within the larger region. During the day preceding the collision, the leader and follower spots of the newer group rotated through 90°.
192	N10	1/21	Maximum development of class D spot group that formed before east limb passage.
190	N12	1/27	Birth of small region in following portion of large, decaying region.
173	N15	1/27	Large filament formed; enlarged during the remaining 2 days of disk passage.
158	S12	1/26	Filament became especially large and active after central meridian passage.
133	N19	1/27	Birth of small active region.
116	N02	1/26	Birth of small active region.
100	N05	1/31	Area of faint plage became enhanced for 1 day only, as if responding to rapid growth of active region a few degrees east of this location.
94	N09	1/28	Birth of active region that reached maximum 31 January as class D spot group.
66	N08	1/27	East limb passage of class F spot group with double leader spots.
		1/30	Additional growth began in the central portion of the region.
		2/2	Maximum area and spot count of this compact class F group.
55	N24	2/4	Birth of active region that maximized 7 February as class D spot group near west limb.
30	N23	2/6	Large filament disappeared, in apparent response to rapid growth of active region to the west. Filament had been exceptionally active throughout the disk passage.
15	S34	2/5-6	Filament disappeared.
9	N27	2/11	Large filament disappeared at west limb.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1971 – ROTATION 1570



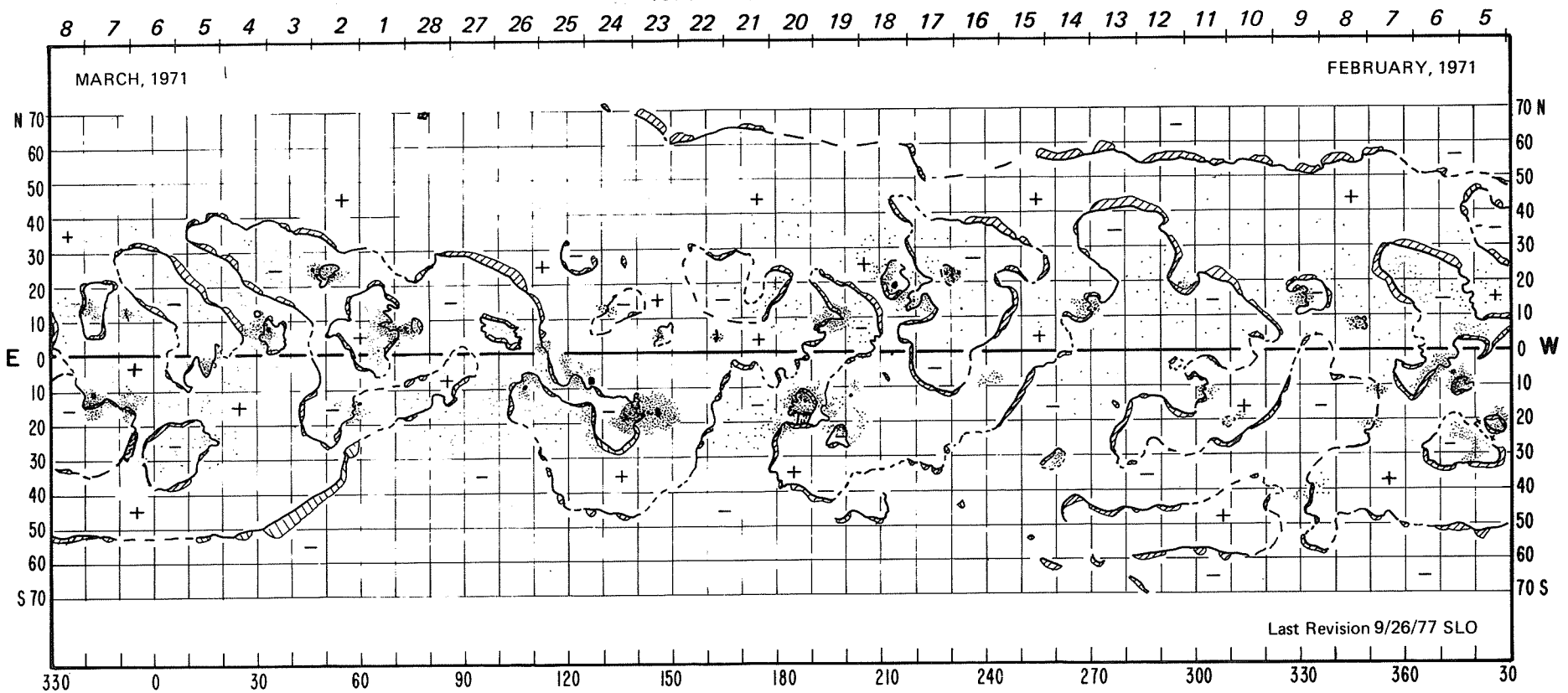
Hα SYNOPTIC CHART
1971 - Rotation 1571

°Long.	°Lat.	Date	Descriptive Notes
352	S11	2/11	Birth of small active region.
351	S21	2/11	Birth of small active region.
346	N07	2/6	Birth of small active region.
332	N15	2/6	Birth of small active region with slow growth to maximum 9 February as small class C spot group.
		2/13	Additional growth to class D spot group just before west limb passage.
311	S20	2/11	Birth of small active region.
303	S12	2/10	Birth of small active region.
295	N20	2/9	Filaments over the neutral line to northeast and southwest of this spot began to elevate and became active from this day, continuing to enlarge until west limb passage 7 days later. This was third disk passage for unusual reversed-polarity region with neutral line concentric to the spot. Region showed an abnormally large spot proper motion to the east, as if associated with slow rotation of large-scale pattern north of the spot.
280	S20	2/17	Filament disappeared.
269	N12	2/13	Birth of active region that reached maximum 16 February as class D spot group with large leader spot.
252	N20	2/13	Overlying filament disappeared from neutral line pattern that had rearranged during previous solar rotation--rearranged in apparent response to passage of slow-rotating patterns north of this location.
		2/17	Further rearrangement of pattern occurred; convolution evolved into a simple curve, becoming more like the pattern at this location on rotation 1572.
251	N22	2/19	Birth of active region that reached maximum as class D spot group 21 February, just before west limb passage.
249	S13	2/15	Filament disappeared.
213	N19	2/18	CMP of large sunspot surrounded by strong, counterclockwise vortical pattern. This was second disk passage of region that interacted with large spot group at time of major flare on 24 January. Remnant plage and leader spot of that great region lay west of the (213,N19) spot on this rotation.
192	S12	2/19	CMP of large isolated sunspot that had moved westward 10° since previous solar rotation (an abnormally rapid rate of solar rotation for this latitude).
190	S13	2/23	Large curved filament disappeared as circular neutral line in old plage rearranged and connected with large-scale neutral line to west and south of this location.
183	N20	2/17	Large filament in semicircular pattern disappeared.
		2/24	Filaments disappeared for second time, having re-formed gradually since 18 February.
163	N05	2/25	Birth of small active region.
146	N05	2/23	Birth of small active region.
140	S17	2/19	Maximum development of compact class F spot group.
134	S28	2/24	Partial disappearance of curved filament near large active region.
131	N13	2/23	Birth of very small active region.
113	N02	2/28	Birth of small active region.
108	S12	2/27	Formation of new area of plage on southern boundary of large, single sunspot.
		3/2	Disappearance of plage accompanied by rapid dissolution of the sunspot.
105	N03	2/26	Birth of very small active region.
71	N09	3/1	CMP of peculiar spot group composed of a cluster of large leader spots with relative proper motions describing a clockwise circular pattern.
57	S14	3/1	Birth of small active region.
50	S39	3/3	Great filament disappeared in apparent response to growth of nearby active region.
49	N23	3/1	Birth of small active region on southern border of large single spot.
48	N35	3/6	Filament disappeared near west limb.
12	N18	3/9	Large filament disappeared near west limb.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1971 – ROTATION 1571



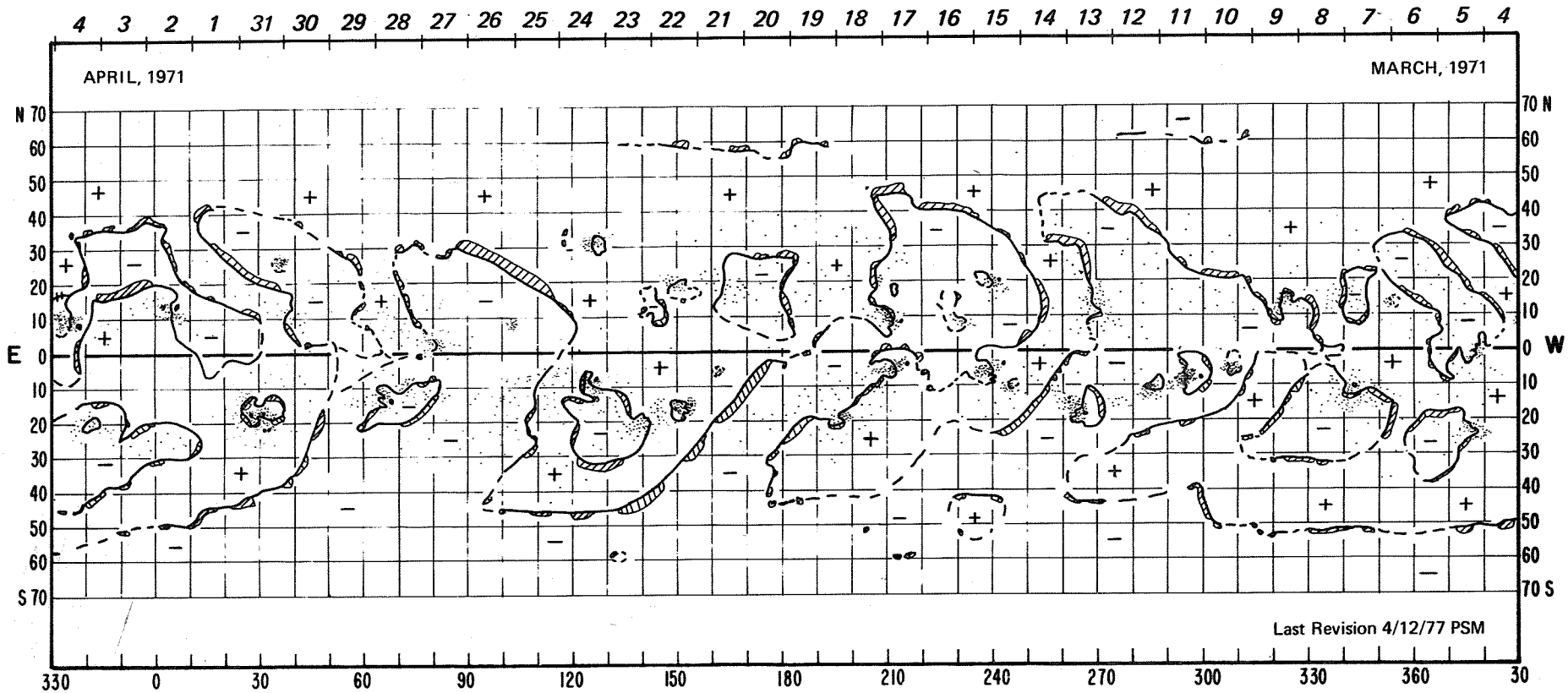
Hα SYNOPTIC CHART
1971 - Rotation 1572

°Long.	°Lat.	Date	Descriptive Notes
353	N13	3/2	Birth of tiny active region without spots.
	S18	3/2	Filament disappeared.
344	N30	3/10	Filament disappeared.
335	N01	3/10	Filament section visible this day only--the same day that filaments disappeared around adjacent large-scale feature in the Southern Hemisphere.
323 & 330	S17 & S32	3/10	Simultaneous disappearance of filaments bordering south and east portion of a large-scale cell of negative polarity.
307	S05	3/11	Birth of small active region.
295	S07	3/8	Birth of moderate active region. Maximum development on 10 March with numerous small spots.
285	S11	3/13	Birth of small active region.
265	S15	3/7	East limb passage of moderate active region with large class D spot group and unusual negative slope to group axis; leader spot was at higher latitude than the follower. The axis slope became more extreme during the disk passage, with the large symmetric leader spot moving from S14 to S18. The follower spots diminished during this time, and became almost due north of leader on the day of last visibility (16 March). Occasionally dark surges occurred south of the leader sunspot.
	N30	3/10	Large filament disappeared.
245	S11	3/16	Birth of small active region.
240	N20	3/12	Minor growth of existing active region with class C spot group.
239	S04	3/16	Birth of moderate active region that grew rapidly to maximum size as class C spot group with large leading sunspot.
232	N08	3/12	Birth of small active region without spots.
208	N30-45	3/19	Large filaments on northeast corner of large-scale negative-polarity cell disappeared together.
206	N22	3/16	Portion of filament temporarily formed high above neutral line, giving the appearance of two closely-spaced neutral lines.
184	S21	3/21-24	Filament became large and elevated toward end of disk passage.
152	S16	3/18	Birth of moderate active region that attained maximum as a small class D spot group by 21 March.
150	N20	3/22	Birth of small active region.
126	N31	3/21	Birth of small active region.
100	N25	3/20-31	Filament especially large and elevated throughout disk passage.
36	N26	3/31	Birth of tiny active region that nearly vanished by 2 April.
	S15	3/30	Filament encircling negative-polarity cell disappeared.
30	S18	3/25	Birth of peculiar and highly active region at east limb. Region developed two large symmetric spots of opposite polarity along a common meridian and separated by 4°. The northern member was of follower (negative) polarity and was encircled by a filament during almost all of the disk passage.
26	S14	3/29	Birth of small active region on corner of negative-polarity cell involved with peculiar active region at (30,S18).
25	S18	4/5	Birth of additional active region on border of cell involved with peculiar active region.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1971 – ROTATION 1572



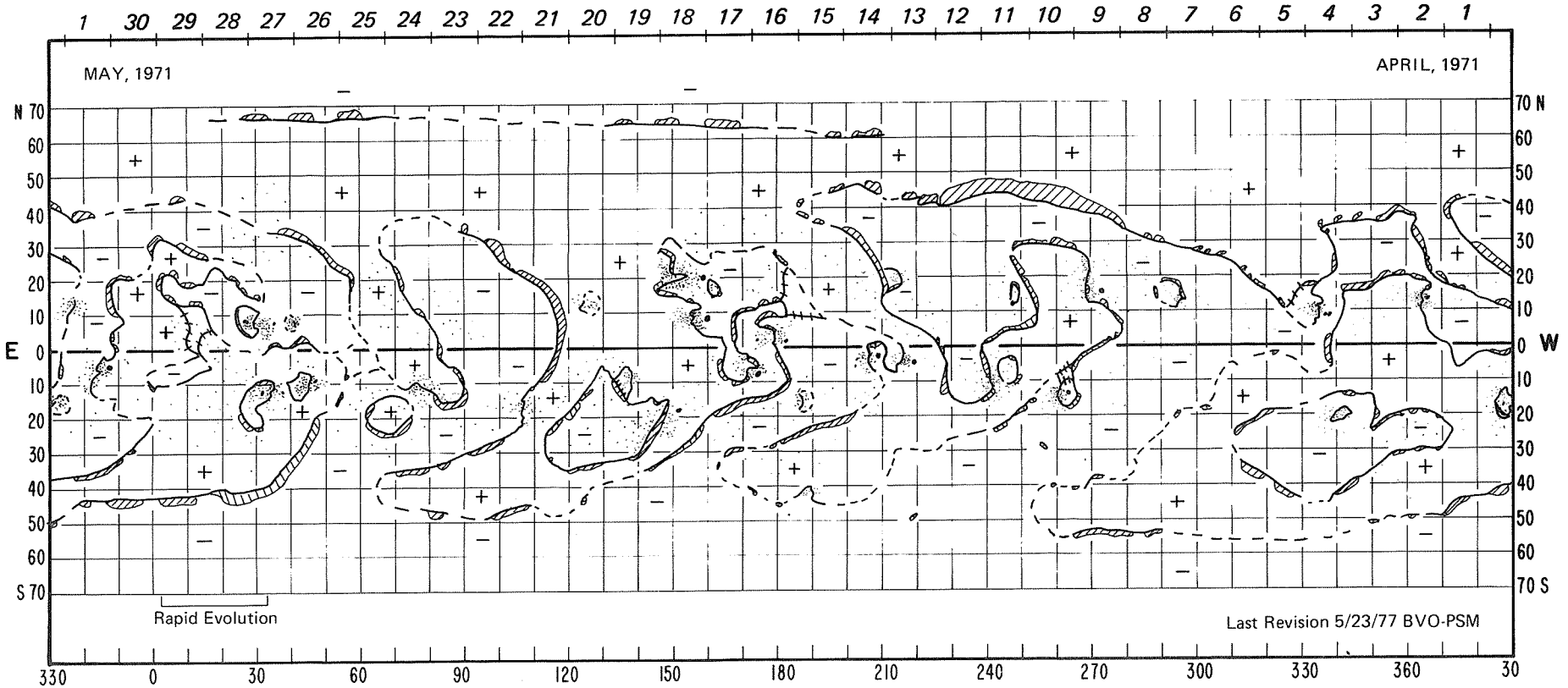
Hα SYNOPTIC CHART
1971 - Rotation 1573

°Long.	°Lat.	Date	Descriptive Notes
261	S15	CMP 4/10	Active region intermittently isolated and combined with large positive-polarity cell to its north. Leader sunspot was at S14 latitude, having moved from S18 since the previous disk passage (see notes for rotation 1572).
		4/11	Leader sunspot disappeared.
253	N15	4/15	Filament disappeared.
248	N15	4/11	Small circular filament disappeared.
228	S11	4/9	Filament disappeared.
220-290	N40	4/12	Great filament disappeared.
216	S04	4/13	Birth of active region 10° west of developing region. New region attained class D spot group by 14 April.
215	N21	4/19	Birth of small active region just before west limb passage.
210	N20	4/19	Large filament disappeared as small region formed 5° west of this location.
206	S03	4/11	Birth of active region that reached maximum development on 14 April as a class D sunspot group.
192	S22	4/13	Filament disappeared.
190	S42	4/19	Faint plage visible this day only.
187	S15	4/14	Birth of small active region that dissipated by 19 April.
171	S08	4/16	New growth within large active region with simple spot and plage structure. Relative motion among leader spots exhibited pattern of rotation through 90° during 3 days before this new growth.
		4/17	Plage developed surrounding leader sunspot and leader spots dissipated. Merger of this new plage with existing plage extended neutral line along a curved path that paralleled the rotary motion of the leader spots. Follower spot of region to the north and on opposite side of the solar equator dissipated simultaneously with leader of this region. The spots were of the same polarity.
168	N10	4/20	Filament disappeared.
	S19	4/20	Filament south of active region disappeared.
160	N20	4/18	Plage developed around leader sunspot.
		4/19	Leader sunspot rapidly decayed.
		4/20	Plage and small spots developed near site of old spot.
150	N19	4/13	Active region embedded in the trailing portion of a large, inactive region, appeared young and growing at east limb.
		4/20	Major flare (2b) with x-ray burst of class X occurred on this day. This region had the highest flare index for month of April (*Solar-Geophysical Data*).
138	S08	4/21	Small region born that modified adjacent neutral line. Spot group did not exceed class B.
124	N13	4/19	Birth of minor active region that reached maximum on 20 April with small spot; nearly dissipated by 24 April.
116	N10	4/18-26	Great filament developed during almost all of the disk passage along a large-scale +/- neutral line that coincided with a +/- sector boundary in the interplanetary magnetic field.
95	S28	4/19	Filament disappeared.
79	S11	4/18	Small active region probably born near east limb on, or the day before, this date. Complex active filament associated with the region on this date. Region dissipated throughout the disk passage. Spots were very small and visible first 4 days only.
		4/28	Associated filament became especially large.
45	S10	4/23	Birth of active region that attained maximum on 25 April as a small class D spot group.
41	N07	4/25	Birth of tiny region that disappeared by 28 April.
35	S37	CMP 4/27	Filament was especially large during entire disk passage, becoming extremely elevated west of central meridian.
34	S12	4/24	Birth of active region within remnants of complex region of previous solar rotation. Maximized as small class D spot group and encountered plage of region to its west on 26 April.
30	N07	4/24	Birth of active region that reached maximum on 28 April as a moderate class D spot group.
25	N06	4/30	Semicircular filament formed around follower sunspots.
10	N02	4/26	Filaments disappeared, as neutral line underwent rapid motion and rearrangement.
	N19	4/29	Filament disappeared.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1971 – ROTATION 1573



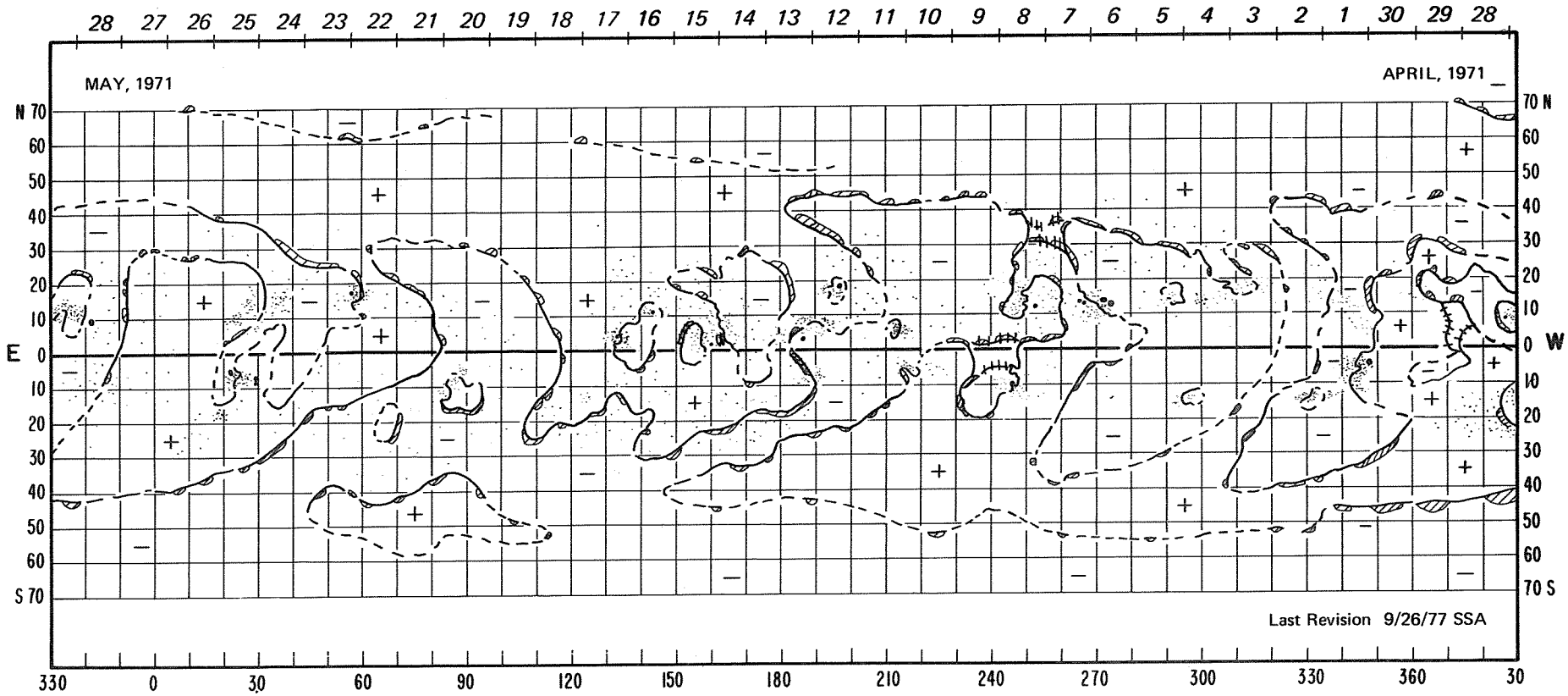
Hα SYNOPTIC CHART
1971 - Rotation 1574

°Long.	°Lat.	Date	Descriptive Notes
344	S04	4/25	Probable date of birth of active region at east limb that grew to maximum on 27 April as class D spot group.
342	S12	4/29	Birth of tiny active region south of large region.
335	N39	5/1	Filament disappeared.
320	N18	5/1	Birth of small active region in leading portion of faint plage.
301	N15	5/3	Birth of small active region.
270	N13	5/1	Probable date of birth of major active region at east limb. Grew to maximum by 7 May as complex class E spot group. Developed two widely separated leader spots that moved together and merged to form large single spot by 9 May.
262	N27	5/10	Filament disappeared as neutral lines in vicinity rearranged to form pattern observed near this location on next solar rotation.
213	N06	5/13	Birth of small active region.
195	N19	5/12	Birth of small active region.
190	S08	5/15	Birth of small active region beneath large filament was followed by eruption of the filament.
185	S03	5/11	Filament disappeared near following portion of active region. Distinct vortical development with a clockwise twist surrounded this region's follower spot.
183	N18	5/18	Filament disappeared near west limb.
157	N16	5/12	Filament disappeared near east limb.
150	S29	5/18	Filament disappeared.
140	N11	5/15	Birth of small active region.
134	N04	5/14	Maximum development of peculiar class D spot group with main spot in center of compact cluster of small spots.
110	S14	5/18	Filament disappeared.
70	S22	5/18	Filament disappeared.
60	N18	5/20	Large active filament developed within small active region.
		5/21	Filament disappeared, followed by rapid dissolution of the active region during next few days.
45	N25	5/26	Partial disappearance of large filament.
32	N16	5/19	Probable date of birth of small active region at east limb.
25	S07	5/26	Birth of large active region that reached maximum on 28 May as class E spot group.
19	S18	5/30	Birth of small active region near west limb.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1971 – ROTATION 1574



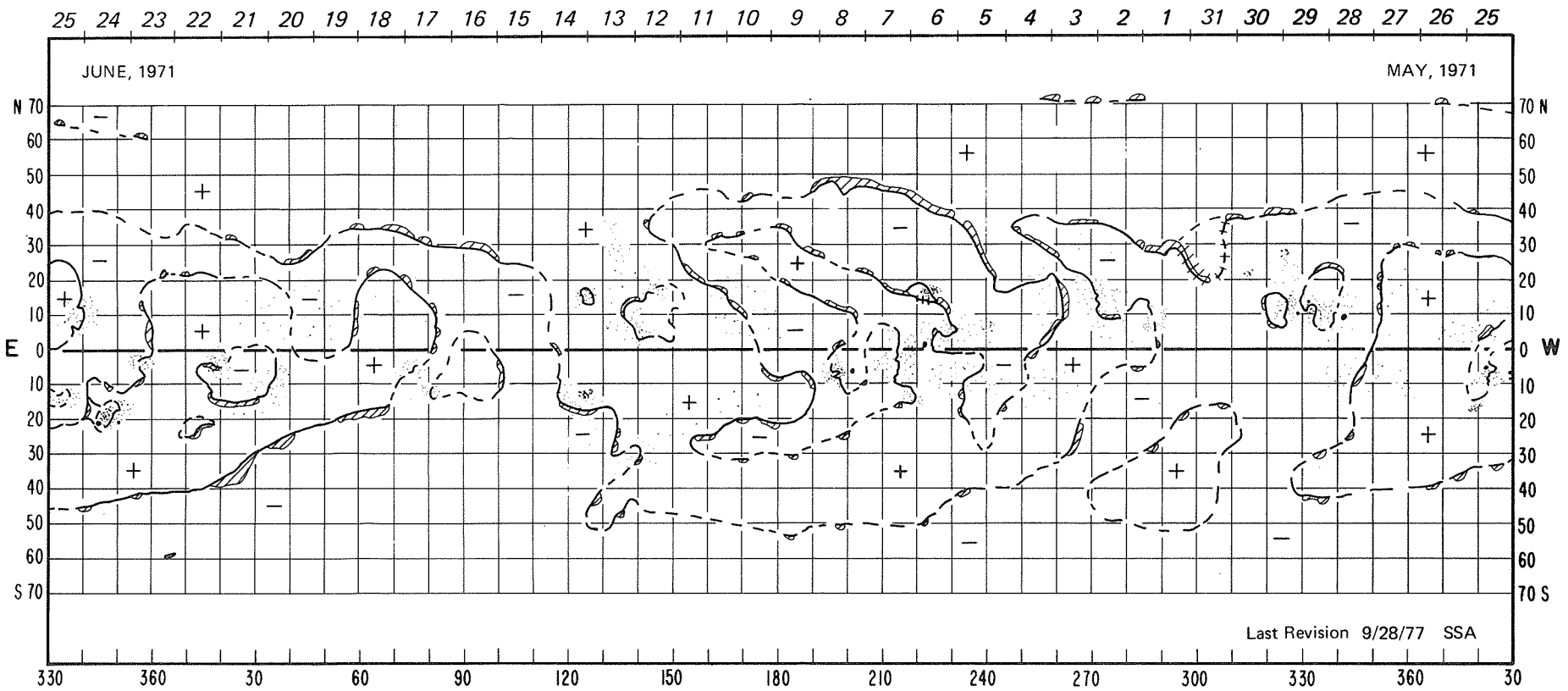
Hα SYNOPTIC CHART
1971 - Rotation 1575

°Long.	°Lat.	Date	Descriptive Notes
336	N11	5/24	Birth of active region near east limb; reached maximum as an open class E spot group with large leader spot.
325	N10	5/28	Birth of small active region at trailing edge of large active region.
320	N10	5/30	Filament formed on trailing boundary of growing active region.
260	N07	6/6	Filament disappeared.
228	N13	6/3	Filament disappeared; re-formed 5-6 June.
		6/8	Disappeared on day of birth of nearby active region.
224	N17	6/8	Birth of small active region.
220	N40	6/10	Great filament disappeared near west limb.
219	S14	6/7	Birth of small active region.
160	S25	6/8	Filament disappeared.
145	N18	6/11	Birth of small active region.
125	S12	6/14	Birth of small active region.
124	N15	6/17	Birth of small active region.
101	S08	6/14	Filament disappeared.
80	S12	6/16	Birth of tiny active region.
		6/20	New region emerged at same coordinates.
		6/22	Reached maximum as class D spot group with bright plage last day of disk passage.
75	S06	6/16	Birth of small active region.
60	N35	6/20	Filament fragments disappeared.
59	N09	6/18	Filament disappeared.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1971 – ROTATION 1575



Hα SYNOPTIC CHART

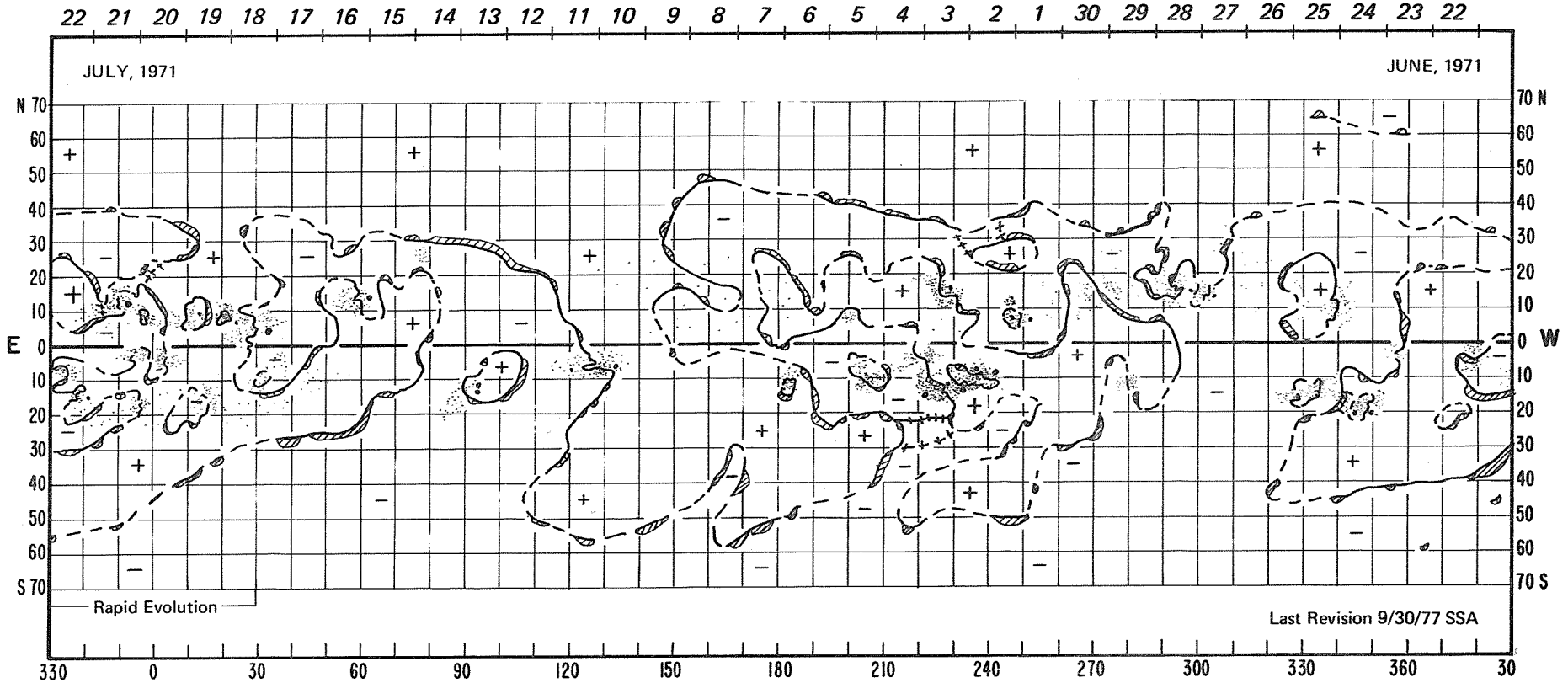
1971 - Rotation 1576

°Long.	°Lat.	Date	Descriptive Notes
357	N05	6/22	Partial disappearance of filament.
356	S02	6/23	Birth of tiny active region.
350	S19	6/18	Birth at east limb of small active region.
347	S20	6/24	Birth of active region on southern boundary of follower plage of small active region. Maximum development next day as class D spot group.
339	N10	6/28	Minor growth of small spots in center of large old region.
328	S15	6/23	Birth of small active region.
302	N14	6/25	Birth of small active region on western border of large active region.
293	N16	6/22	Probable date of birth at east limb of active region that developed to maximum by 26 June as class D spot group with small spots.
280	N32	6/26	Filament fragments disappeared.
	S11	6/27	Birth of small active region.
275	N10	6/27	Filament disappeared; reappeared next day.
		6/30	Filament disappeared again.
262	N01	6/27	Filament disappeared; re-formed next day.
		7/5	Filament disappeared again.
249	N08	6/29	Birth of active region that reached maximum 1 July as small class D spot group.
247	N12	7/5	Birth of small active region.
228	S14	7/4	Maximum area and spot count for class E spot group that formed in southern portion of activity complex.
225	S12	6/28	Birth of small active region at east limb that blended with the complex of three large spot groups west of this position.
206	S12	7/1	Birth of small active region.
200	N40	7/1	Filament disappeared near east limb.
190	S20	7/5	Filament disappeared in apparent response to growth of nearby active region.
183	S11	7/4	Birth of small active region.
177	N01	7/5-6	Filament disappeared.
128	S07	7/6	Peak development near east limb of peculiar, large region with numerous small spots and a neutral line oriented predominantly east-west.
		7/10	New growth of plage and small spots in center of old region; peak area and spot count on 12 July.
90	S12	7/13-14	CMP of active region near large filament; region disappeared by 18 July.
78	N26	7/15	Birth of small active region near large filament; region disappeared by 18 July.
58	N14	7/12	First peak in region's development as large class C spot group.
		7/15	New growth in central part of region led to second maximum next day as class D spot group with high spot count.
30	N07	7/14	Peak development of simple, large, class E spot group.
	S10	7/14	Birth of small active region.
22	N09	7/18	Birth of small active region that collided and merged with class E spot group to the west next day.
13	N30	7/15	Filament disappeared near east limb; intermittently present remainder of disk passage.
3	S04	7/15	Birth near east limb of small active region.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1971 – ROTATION 1576



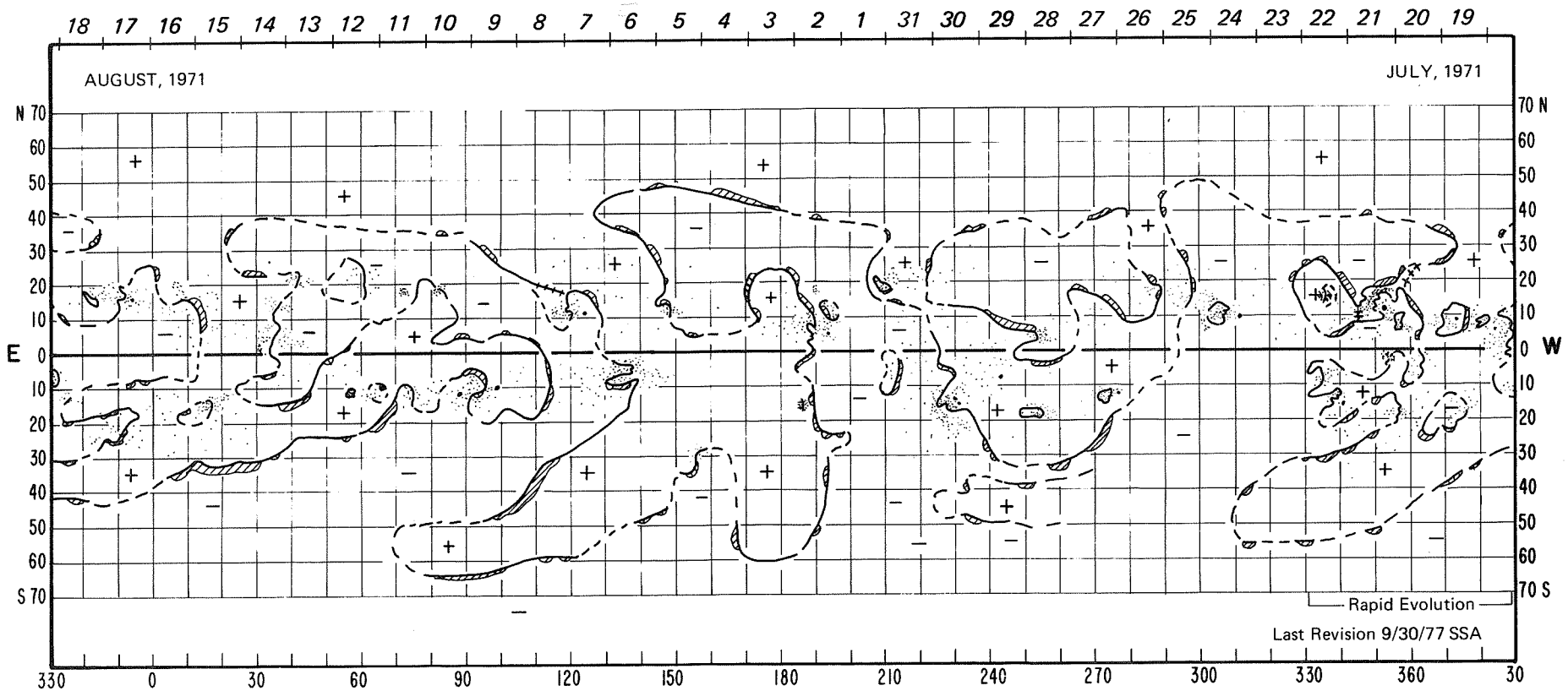
Hα SYNOPTIC CHART
1971 - Rotation 1577

°Long.	°Lat.	Date	Descriptive Notes
357	N07	7/19	Birth of small active region on western boundary of growing region.
356	S19	7/23	Birth of small active region.
355	S02	7/21	Birth of small active region.
350	N12	7/18	Birth of active region within faint plage and on existing neutral line. Reached first maximum next day as small class D spot group with numerous spots.
		7/23	Rapid additional growth, attaining class E with large leader spot by next day.
		7/24	Growth of complex plage and active filaments north of region during last 3 days of disk passage.
342	N17	7/19	Filament disappeared in apparent response to growth of nearby region.
341	N05	7/20	Filament disappeared in apparent response to growth of nearby active region.
338	S14	7/22	Birth of small active region.
335	N16	7/20	Birth of small active region.
334	S09	7/17	Probable date of birth of small active region at east limb.
316	N10	7/21	Birth of active region that reached maximum on 26 July as class D spot group.
297	N20	7/24	Birth of small active region near filament channel in faint plage.
276	N11	8/1	Filament disappeared at west limb.
274	S12	7/25	Birth of small active region with slow development to maximum on 30 July as small class C spot group.
272	S23	7/27	Filament disappeared.
255	S19	7/23	Birth of small active region near east limb.
252	N04	7/23	Probable date of birth of small active region at east limb.
245	N07	7/27	Partial disappearance of filament.
243	S08	7/29	CMP of isolated large sunspot returned from previous disk passage minus its follower-polarity plage.
240	S29	7/27	Filament disappeared.
211	N19	7/29	Birth of small active region.
195	N11	7/30	Birth of small active region within area of faint plage and at leading edge of small class C spot group.
190	N18	7/27	Birth of tiny active region at east limb.
187	S15	8/5	Birth of small active region.
172	N18	7/31	Filament disappeared in apparent response to growth of nearby active region.
156	S30	7/30	Birth of small active region near east limb.
		8/5	Filament disappeared within this region.
149	N11	8/8	Birth of small active region within large filament channel.
120	N11	8/3	Birth of small active region with slow initial growth.
		8/7	Rapid region growth began.
		8/10	Maximum development as class C spot group with large leader spot.
109	S38	8/9	Filament disappeared.
93	S11	8/9	Maximum development of class F spot group that had evolved through growth of class E spot group in trailing portion of old class C group near east limb.
		8/12	Growth of plage and spots north of leader spot.
90	S64	8/9	Filament disappeared.
82	N19	8/15	Birth of small active region near west limb.
75	S12	8/7	Birth of small active region near trailing edge of large active region.
72	N18	8/12	Birth of tiny active region.
42	N21	8/10	Birth of small active region.
41	S13	8/17	Filament disappeared near west limb.
36	N14	8/12	Birth of small active region.
16	S14	8/13	Birth of small active region.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1971 – ROTATION 1577



Hα SYNOPTIC CHART

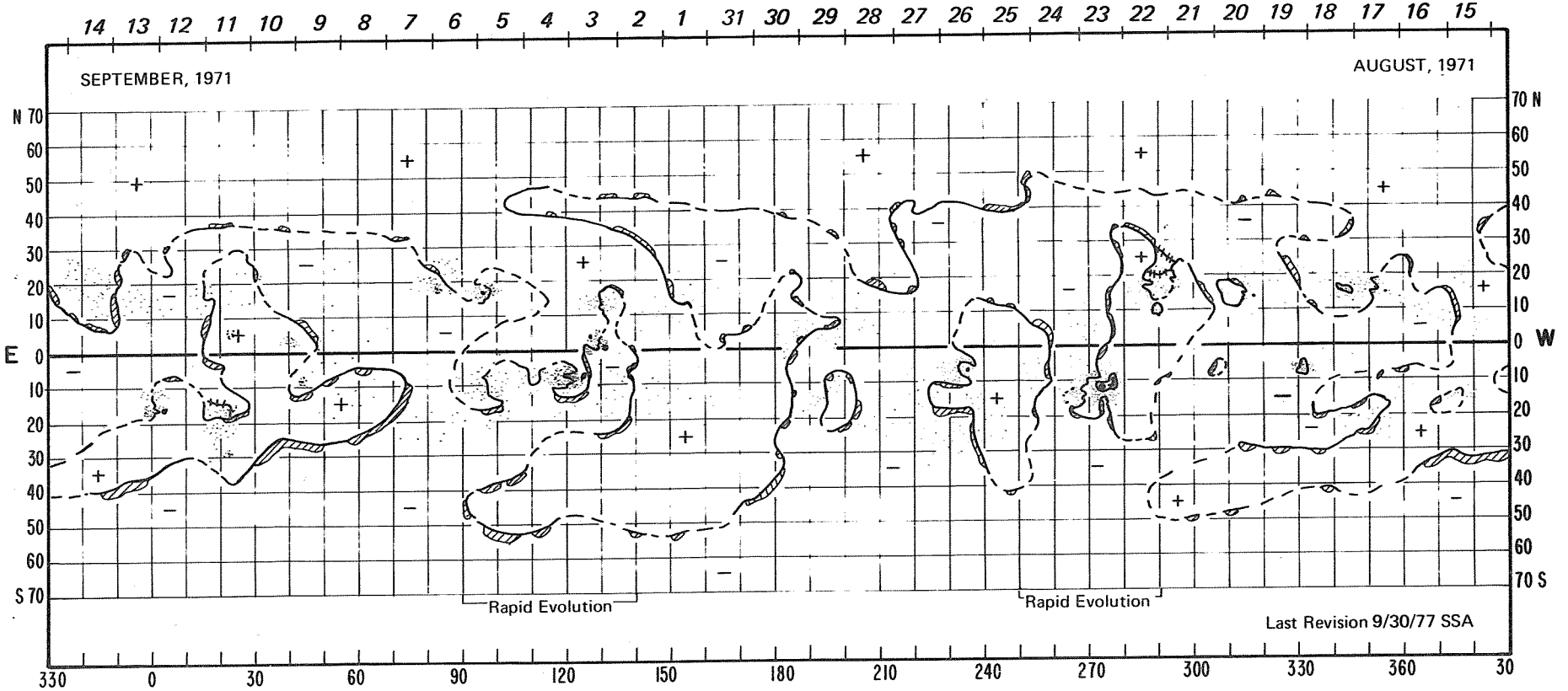
1971 - Rotation 1578

°Long.	°Lat.	Date	Descriptive Notes
345	N16	8/14	Birth of small active region in trailing portion of old plage.
294	N19	8/19	Birth of small region in leading portion of old plage.
289	N11	8/23	Birth of active region on southern border of old plage.
		8/25	Maximum development as class B spot group in bright plage.
270	S12	8/22	Maximum development near central meridian of one of the largest class F spot groups of the solar cycle. Region notable for source of great dark surges on same day that one leader sunspot penetrated another. Conspicuous clockwise pattern to relative motions among the leader spots. Region surrounded by large, active filaments. Source of large proton flare after west limb passage.
252	N45	8/24	Filament disappeared.
233	S06	8/19	Probable date of birth of active region at east limb.
		8/23	Maximum development as class D spot group.
		8/27	Growth of plage surrounding large leader spots. Follower spots had disappeared by this date.
179	S39	8/27	Filament disappeared near east limb.
140	N31	9/3	Filament disappeared.
135	N45	8/28	Filament disappeared near east limb.
129	N02	9/5	Birth of active region that grew to maximum on 8 September as large class D spot group. West limb passage next day.
126	S10	9/4	Large, curved filament disappeared in response to growth of active region nearby.
120	S08	9/1	Birth of active region that grew to maximum on 6 September as class E spot group with large leader spot.
97	N18	9/4	Birth of small active region.
		9/9	Additional minor growth.
82	N19	9/5	Birth of small active region.
	N23	9/7	Filament disappeared in apparent response to minor growth in nearby active region.
70	S18	9/9	Large filament disappeared.
43	S09	9/10	Birth of small active region.
30	N21	9/9	Filament disappeared; re-formed next day.
		9/13	Filament disappeared again.
25	N01	9/10	Filament disappeared.
24	N05	9/9	Birth of small active region.
23	S18	9/14	Filament disappeared.
22	S29	9/6	Birth of tiny active region near east limb.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1971 – ROTATION 1578



Hα SYNOPTIC CHART

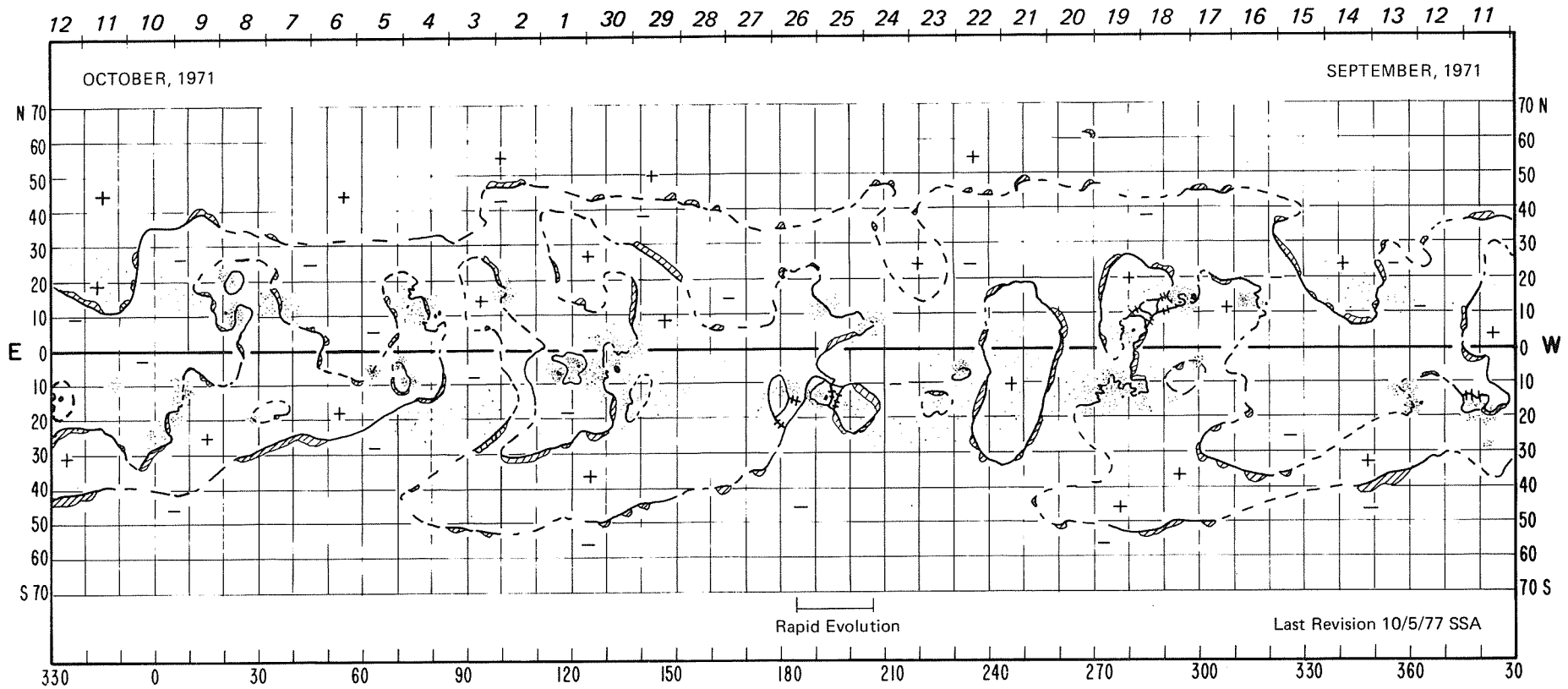
1971 - Rotation 1579

°Long.	°Lat.	Date	Descriptive Notes
352	S37	9/12	Filament disappeared; re-formed 13 September and remained for rest of disk passage.
326	N25	9/14	Large filament disappeared.
319	N12	9/16	CMP of isolated, leader sunspot that had returned for its third disk passage with virtually no attendant plage.
313	N13	9/21	Birth of small active region near west limb and near site of isolated, old leader spot that had disappeared by previous day.
306	N19	9/17	Filament disappeared.
300	S03	9/23	Birth of small active region at west limb.
295	N13	9/16	Birth of small active region within small, faint plage.
		9/20	Emergence of third region at this location. Grew rapidly to class D spot group on 21 September with negative inclination to group axis, i.e., with leader at higher latitude than follower spot.
282	N03	9/16	Plage and small spots developed near large leader spot for next 4 days.
275	S13	9/13	East limb passage of great region returned for second disk passage. Consisted of two overlapped regions--a second region had formed south of the old leader spot since west limb passage 2 weeks earlier. Clockwise proper motions occurred among leader spots. Extensive plage developed north of the leader since previous disk passage. Small spots throughout the large plage decayed steadily during this disk transit.
248	S05	9/17	Large filament disappeared near east limb.
232	S07	9/18	Birth of small active region near east limb.
205	S12	9/21	Filament disappeared.
196	S16	9/22	Filament disappeared in response to growth of nearby active region and rearrangement of underlying neutral line.
190	S14	9/21	Birth of active region that caused extensive rearrangement of neighboring neutral lines as the region expanded. Reached maximum development on 27 September as a class D spot group.
145	N25	9/25	Filament disappeared near east limb.
138	N14	9/26	Filament disappeared in apparent response to growth of nearby active region.
137	Equator	9/24	Birth of small active region.
119	S05	9/25	Probable date of birth of active region at east limb and on trailing border of large returning region. Grew to maximum on 29 September as small class D spot group.
106	S31	10/3	Large filament disappeared.
102	N46	10/1	Filament disappeared.
97	N24	10/4	Filament disappeared within faint active region.
79	N11	10/3	Large proton flare in simple class C spot group with large leader spot. Group had been class E near east limb. Group axis inclined to equator at unusually large angle.
73	S09	9/30	Birth of small active region at east limb.
		10/5	Second region emerged in leading portion of first, growing somewhat larger than earlier region.
71	S03	10/4	Birth of small active region.
63	S06	10/11	Birth of small active region at west limb.
37	S26	10/9	Large filament disappeared.
29	S20	10/10	Birth of tiny active region.
0	S28	10/7	Filament disappeared from southern portion of faint region. Re-formed next day.
		10/12-13	Disappeared again at time when large filament disappeared on same neutral line east of this location.

Note: Day without H-alpha photographs was 12 October 1971.

Hα SYNOPTIC CHART

1971 – ROTATION 1579



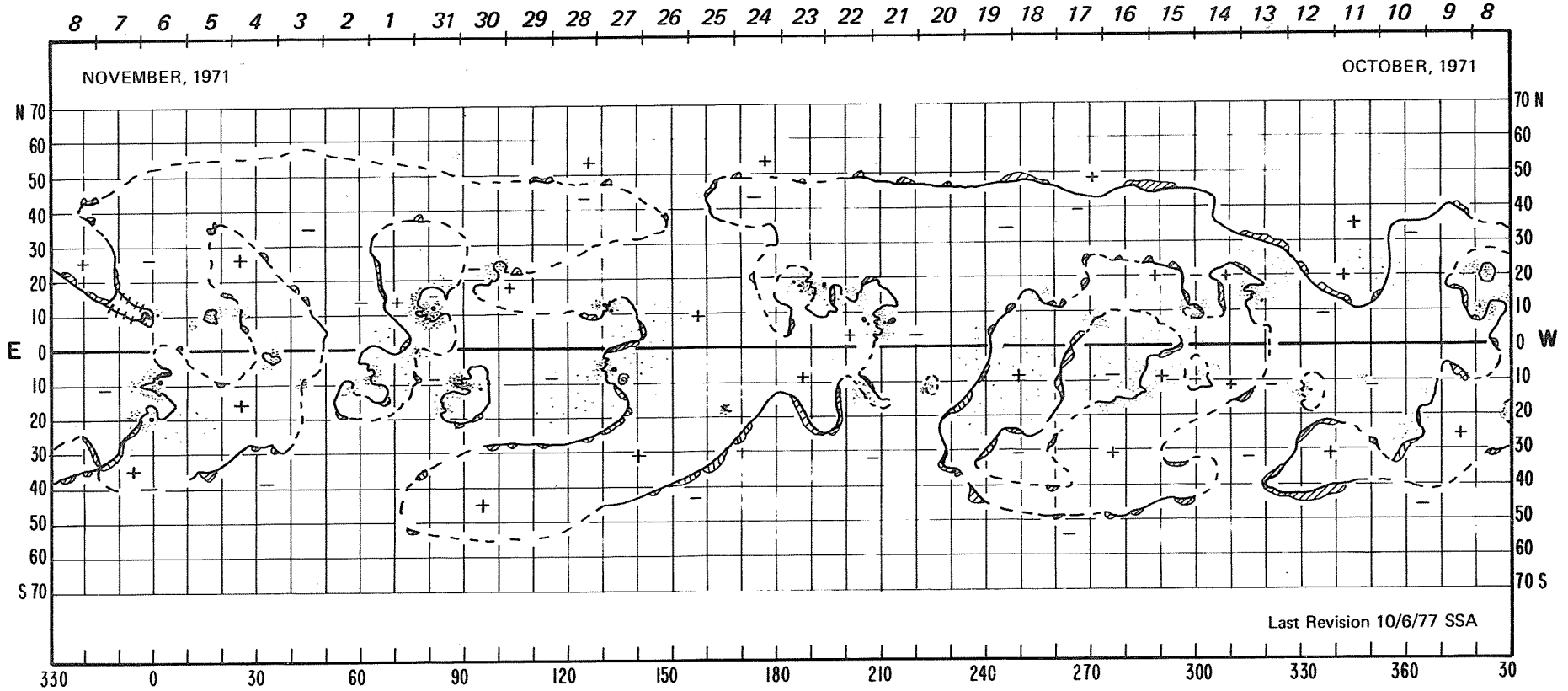
Hα SYNOPTIC CHART
1971 - Rotation 1580

°Long.	°Lat.	Date	Descriptive Notes
330	S13	10/10	Birth of active region that reached maximum on 15 October as class B spot group.
328	S32	10/12-13	Large, semicircular filament disappeared, in apparent response to growth of nearby active region.
313	S13	10/12-13	Filament disappeared.
300	N10	10/11	Birth of small active region.
297	N13	10/11	Filament disappeared in response to birth of small active region under filament.
287	N45	10/12-13	Filament disappeared; re-formed by 17 October.
280	S17	10/17	Faint plage on south side of neutral line brightened for 3 days, taking form of a ribbon. This area was remnant of great active region of rotation 1578.
204	S12	10/19	Birth of small active region.
272	N07	10/17	Birth of small active region.
262	S05	10/16-17	Filament disappeared.
213	S12	10/20	Birth of small active region.
208	N08	10/15	Probable date of birth at east limb of active region that grew to maximum 23 October as a great class E spot group with both leader and follower attaining a large and symmetric form.
197	S15	10/19	Large filament disappeared in apparent response to birth of nearby active region.
190	N18	10/19	Birth of active region with slow initial development.
		10/23	Beginning of rapid growth, with maximum by 25 October as large class D spot group.
133	S06	10/25	Complex pattern of fibrils, absorption features and plage formed around large returning sunspot and remained active for next 5 days.
		10/31	Important plage growth with small new spots occurred around the spot, especially next to its western edge.
130	N12	10/23	Birth of small active region near east limb. Grew to maximum by 26 October as large class B spot group.
93	S19	10/27	Filament disappeared; re-formed next day.
		10/29	Filament disappeared again in apparent response to growth of nearby active regions; filament did not re-form.
90	S10	10/28	Birth of active region with slow initial development
		10/31	Beginning of more rapid growth.
		11/2	First maximum development as small class D spot group; spots declined rapidly next day.
		11/4	Additional growth just before west limb passage formed follower-dominant class C group.
84	S18	10/29	Birth of small active region that merged with larger region northwest of this position. This small complex of activity was the precursor to the series of great active regions that formed in this location during the next 7 rotations.
81	N11	10/31	CMP of large single spot with strong vortical pattern to fibrils surrounding the spot and counterclockwise sense of twist. Marked return of proton-flare region of previous disk passage.
75	S08	10/28	Filament disappeared.
66	N20	11/1	Large filament disappeared; began re-forming next day.
43	S10	11/1	Birth of small active region.
25	S30	11/8	Filament disappeared near west limb.
18	N10	10/31	Birth of small active region near east limb.
11	N08	11/10	Birth of small active region near west limb.

Note: Days without H-alpha photographs were 12 and 16 October 1971.

Hα SYNOPTIC CHART

1971 – ROTATION 1580



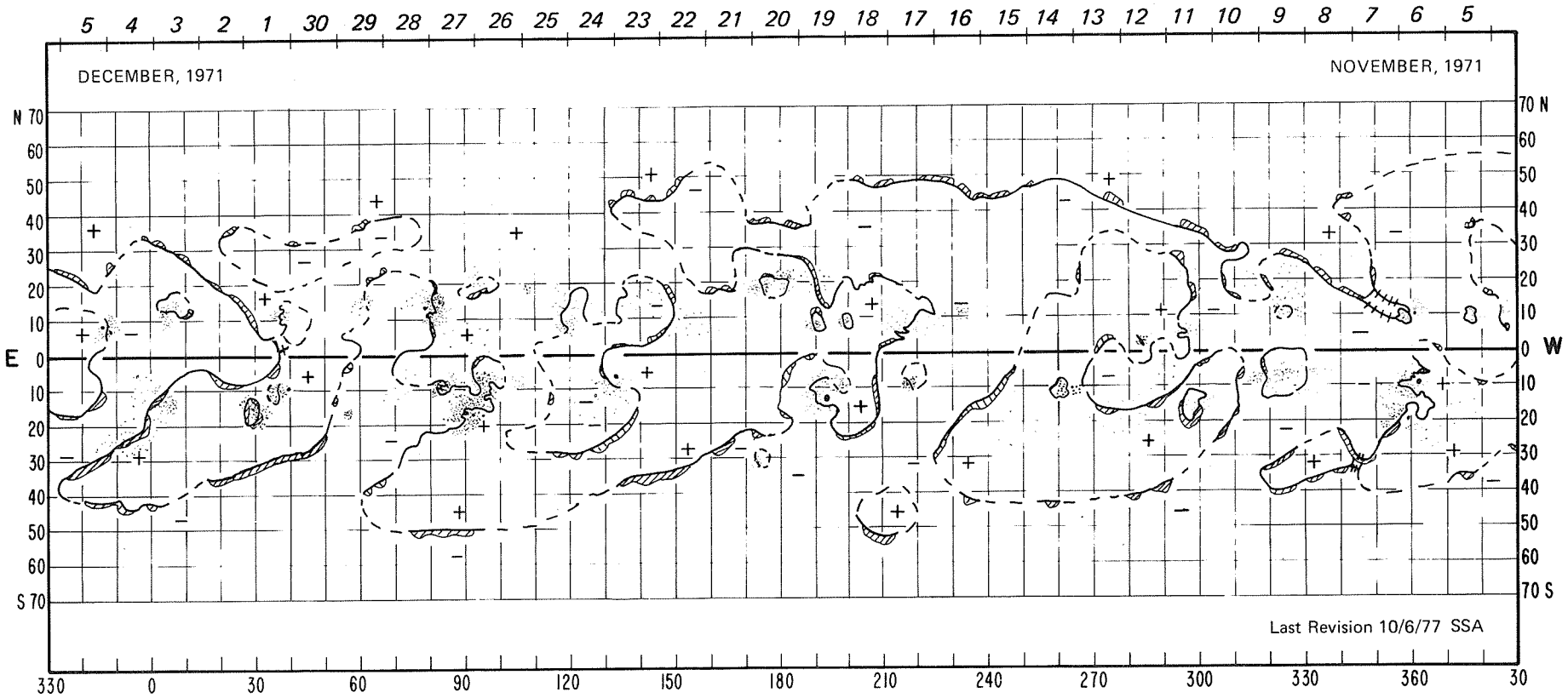
Hα SYNOPTIC CHART
1971 - Rotation 1581

°Long.	°Lat.	Date	Descriptive Notes
360	S15	11/6	CMP of pair of active regions on a common neutral line and situated north-south of one another. Each contained large leader spots that decayed slowly during the disk passage. These regions had formed on the backside of the sun, precisely on an existing, large-scale neutral line that had been present since rotation 1574. East limb transit occurred on 31 October. This particular +/- magnetic boundary remained identifiable near these coordinates through at least the fraction of rotation 1617 (July 1974) that this atlas contains. This large-scale feature therefore persisted for at least 44 solar rotations.
359	N09	11/4	Maximum development of class C spot group born at, or just before, east limb passage on 31 October.
		11/6	Neutral line east of region rearranged, isolating the region from the neighboring large-scale pattern.
326	N10	11/7	Birth of small active region.
323	S30	11/6	Filament disappeared.
297	N16	11/11	Filament partially disappeared from within faint plage.
296	S19	11/12	Semicircular filament, associated with faint plage, disappeared.
294	S03	11/8	Birth of small active region.
	N26	11/13	Remaining portion of filament disappeared.
283	N03	11/13	Birth of small active region.
266	N21	11/17	Filament disappeared.
262	S11	11/17	Birth of active region that grew to maximum next day as class C spot group.
238	S14	11/20	Great filament disappeared near west limb.
233	N10	11/21	Birth of active region near west limb on leading edge of large, faint plage. Growth continued during west limb passage next day.
209	S18	11/17	Large, curved filament present 1 day only with center of curvature located at large sunspot at (193,S13).
196	S10	11/19	Birth of active region near western edge of great sunspot. Grew slowly to maximum on 24 November near west limb as class D spot group.
190	S01	11/15	Filament disappeared near east limb.
	N16	11/16	Narrow filament disappeared from within faint plage; southern portion re-formed and became active next day.
		11/19	Re-formed southern portion of filament disappeared.
	S13	11/19	CMP of active region notable for its extremely large, symmetric leader spot; for its neutral line concentric to, and nearly encircling, the spot; and for its plage almost entirely confined to the trailing half of the region. Vortical pattern to fibrils around the spot with clockwise sense of twist. This great spot returned on next rotation very much diminished.
181	S05	11/20	CMP of extremely active filament.
145	S35	11/23	Great filament disappeared.
119	N14	11/21	Birth of small active region.
	N08	11/23	Birth of small active region.
107	N19	11/30	Birth of small active region near west limb.
93	N18	11/22	Filament partially disappeared near east limb; re-formed during next 2 days.
		11/26	Disappeared again.
	S09	11/23	Birth of active region between two faint regions near east limb. Grew to first maximum on 24 November as small class C spot group.
		11/28	New growth to small class D spot group. Formed intense complex with two other spotted regions.
	S01	11/27	Filament present 1 day only.
90	S17	11/28	Peak development of complex class E spot group that formed the most important member of large activity complex.
83	S09	11/23	Birth of small active region.
		11/26	New region merged with regions west and south to form important activity complex.
81	N14	11/26	Peak development of large, compact class D spot group with polarity arrangement reversed from normal for Northern Hemisphere in this even-numbered solar cycle. Follower spots of new group had been leader spots of strong region during previous two disk passages. The large class D spot group reestablished a major +/- boundary -- one that had first formed on rotation 1541 near a strong proton flare region. This boundary persisted throughout the remainder of the period described by this atlas (rotation 1616) and was involved with reversed polarity regions of exceptional activity on rotations 1600-1602. Total lifetime of the boundary may have exceeded 76 solar rotations.
62	N15	11/26	Birth of small active region.
55	S08	11/28	Filament fragments disappeared from neutral line segment between the solar equator and S20.
	S18	12/5	Birth of small active region near west limb.
37	S10	12/2	Birth of active region that grew to class C spot group by next day and merged with small, older region east of this location.
31	S16	11/27	Birth of small active region near east limb.
28	N10	12/4	Almost all of filament disappeared.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1971 – ROTATION 1581



Hα SYNOPTIC CHART

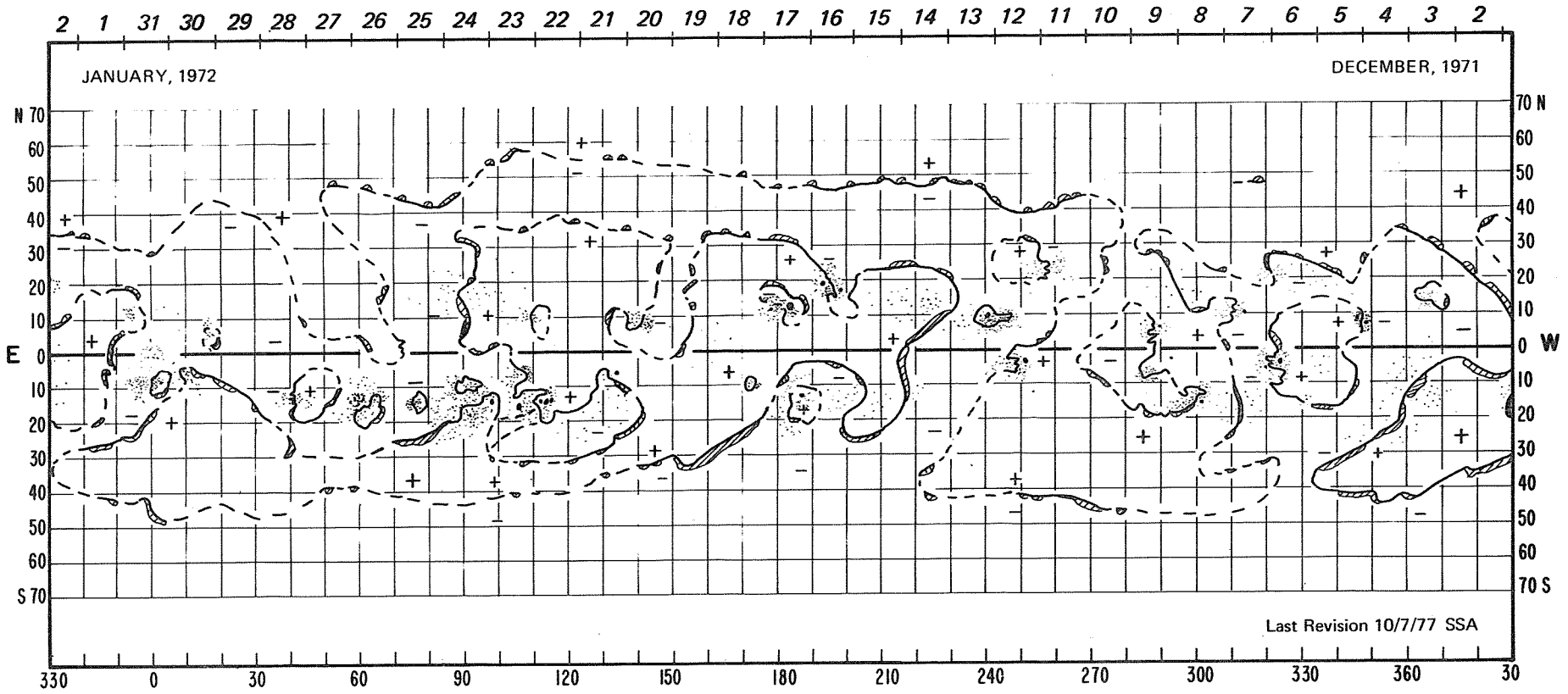
1971 - Rotation 1582

°Long.	°Lat.	Date	Descriptive Notes
347	N08	12/4	Birth of active region that grew to maximum by next day as class D spot group.
		12/9	Additional growth near west limb.
331	S16	12/4	Birth of small active region.
		12/8	Second small region emerged at this location with brighter plage.
322	S04	12/6	Maximum development of large class D spot group with group axis inclined to equator at angle larger than normal. The inclination was consistent with the orientation of the large-scale neutral line extending southwest from the region. Large-scale neutral lines normally extend southeast from active regions in the Southern Hemisphere.
321	N15	12/5	Filament disappeared near east limb.
	N20	12/8	Birth of small active region.
310	N10	12/5	Birth of small active region.
		12/9	Additional growth.
		12/12	Additional growth in trailing portion.
300	S15	12/5	Birth of small active region.
297	S15	12/12	Birth of small active region near west limb in trailing portion of older region.
290	N28	12/5	Filament disappeared near east limb.
285	S09	12/9	Birth of small active region on trailing boundary of small faint plage.
278	N07	12/8	Birth of active region that grew to maximum next day as large class B spot group.
272	S09	12/12	Filament disappeared.
245	N09	12/11	Maximum development of follower-dominant class D spot group with brilliant, compact plage. Neutral line encircled the follower spot and lay east-west within the compact plage--a configuration often associated with high flare activity.
		12/16	Filament formed around follower spot.
		12/18	Embedded filament disappeared at west limb.
218	N01	12/15	Great equator-crossing filament disappeared, perhaps as part of process of major rearrangement of neighboring magnetic patterns. This rearrangement ended one long-lived pattern and established a new one which endured for many rotations.
216	N24	12/16	Filament disappeared; re-formed during next 2 days.
		12/19	Disappeared again near west limb.
204	S25	12/14	Curved filament disappeared; re-formed next day.
195	N18	12/12	Peak development of large class D spot group.
182	N32	12/15	Large filament disappeared.
180	N12	12/12	Birth of active region at east limb with slow initial growth.
180	N12	12/16	Rapid growth began; maximum occurred 18 December as large class D spot group.
173	S10	12/18	Birth of small active region.
141	N09	12/15	Probable date of birth at east limb of small active region.
137	S10	12/17	Filament disappeared.
133	S06	12/21	CMP of large, single sunspot that had returned from previous disk transit with virtually no attendant plage.
111	S14	12/20	Maximum development of simple, large class E spot group --one that formed western portion of a great activity complex.
105	S11	12/26	Minor plage growth near west limb.
95	S14	12/19	Birth of major active region near northern edge of a small leader spot. The new group emerged along the neutral line and within the remains of a large region that had returned from the previous rotation. The old spot slowly diminished, as this new region developed in a rapid and unusual fashion. Instead of a bipolar pair of small spots, the initial spots lay within a single, symmetric penumbra. This penumbra enlarged and became more irregular, and new follower spots formed to its east on 21 December. The group attained maximum development on 24 December as a compact class D group of normal orientation. By this time the original sunspot had disappeared. Forming a semicircle around the leader spot, the neutral line appeared as a conspicuous corridor within brilliant plage. Its distinctive pattern continued for the next 3 solar rotations.
94	S10	12/27	Birth of small active region on northern edge of great activity complex.
90	N12	12/27	Great filament disappeared within faint remnants of reversed-polarity region.
79	S25	12/26	Filament disappeared from southern edge of great activity complex.
75	S14	12/23	Birth of small active region.
64	S12	12/21	Birth of small active region near east limb.
60	S14	12/29	Birth of active region that grew to maximum 31 December as class C spot group.
40	Equator	12/23	Filament disappeared near east limb.
	S25	12/28	Filament disappeared.
20	S08	12/30	Filament disappeared in apparent response to growth of active region east of this location; re-formed next day.
		1/3	Filament disappeared near west limb.
19	N02	12/27	Small filament disappeared.
0	S09	12/28	Birth of active region that grew to maximum by 31 December as small class D spot group.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1971 – ROTATION 1582



Hα SYNOPTIC CHART

1971-1972 - Rotation 1583

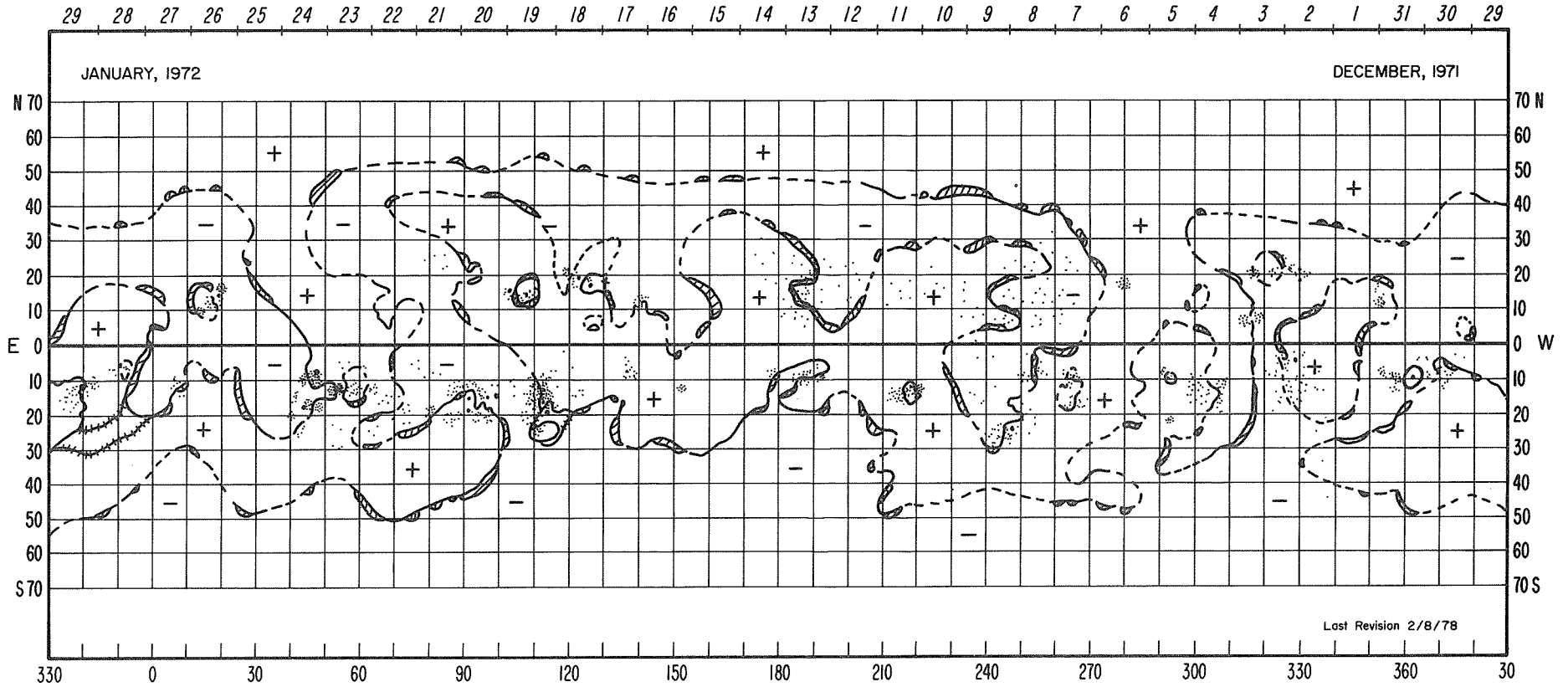
°Long.	°Lat.	Date	Descriptive Notes
353	N13	1/5	Birth of small active region near west limb.
325	N07	1/5	Filament disappeared in apparent response to growth of active region northeast of this location.
316	N09	1/4	Birth of active region that grew to small class D by 6 January and formed important complex with region 3° north.
	N12	1/5	Birth of small active region that merged with region to its south to form important complex.
	N20	1/6	Birth of small active region.
315	S22	1/7	Portion of large filament disappeared.
292	S22	1/1	Birth of small active region.
	S09	1/5	Birth of small active region.
280	N18	1/9	Birth of small active region.
265	S16	1/1	Probable date of birth of small active region at east limb.
262	S01	1/6	Large filament disappeared; re-formed after 9 January.
252	S12	1/4	Filament disappeared near east limb.
225	N43	1/7	Large filament disappeared.
220	S12	1/9	Birth of small active region that maximized by 12 January as a follower-dominant class C spot group.
205	S21	1/11	Filament disappeared; as it erupted, the filament was observed at high latitudes in projection against the solar disk.
193	N06	1/11	Filament disappeared from southern border of faint plage.
188	S10	1/12	Maximum development of class C spot group.
185	N12	1/16	Filament disappeared within faint plage.
179	S08	1/18	Birth of small active region near west limb.
152	S12	1/21	Birth of tiny plage near west limb.
134	S25	1/15	Filament disappeared.
126	N04	1/15	Small filament disappeared; re-formed at higher latitude on 23 January near west limb.
124	N18	1/21	Birth of active region. Grew rapidly to class D spot group by next day; little dimunition by west limb passage on 24 January. Leader spot returned for next disk passage.
119	N20	1/14	Birth of very small active region near east limb; disappeared by 18 January.
112	S17	1/20	Birth of active region near neutral line that lay within remnants of large active region. Developed into reversed-polarity class D spot group by 22 January. Group axis was inclined strongly to equator at a negative angle, i.e., leader spot lay at higher latitude than follower. This unusual inclination was consistent with the associated large-scale neutral line orientation that was itself opposite to the normal orientation for the Southern Hemisphere. Growth of this region resulted in rearrangement of neutral line south of the region, creating an isolated cell of positive polarity. Group rapidly diminished to single tiny spot by west limb on 24 January.
111	S11	1/13	Birth of small active region at east limb within remnant plage of large active region. Indistinguishable from old plage by 18 January.
105	N16	1/14	Probably date of birth of small active region at east limb; slow initial development.
		1/19	Rapid growth began.
		1/22	Maximum development of class D spot group.
100	S32	1/19	Large filament disappeared south of great, reversed-polarity active region. Gradually re-formed during remainder of disk passage.
93	S15	1/20-21	CMP of large, brilliant, reversed-polarity region -- the midpoint of the fourth and most active transit of an exceptional activity complex. During this disk passage, the spot group was highly variable: an unusual region with significant spot growth occurring in the southern portion. The plage became particularly complex after 22 January. It is a region noted for the large white-light coronal transients detected by the OSO-7 spacecraft during earlier solar rotations. The principal follower sunspot -- of "leader" polarity for the Southern Hemisphere -- returned for the next 2 solar rotations. The surrounding large-scale neutral-line pattern retained its distinctive shape during these two 27-day periods. Furthermore, the large-scale magnetic pattern south of the region, at latitude 40°, rotated at the same rate as the spot group, as if "connected" to it. This area slowed to the normal rate for latitude 40° after the spot group disappeared.
54	S13	1/23	Birth of small active region on trailing edge of small plage present since east limb; declined after 24 January.

Note: There were no days without H-alpha photographs.

(Continued)

Hα SYNOPTIC CHART

1971-72 - ROTATION 1583



Hα SYNOPTIC CHART

1971-1972 - Rotation 1583 (Continued)

°Long.	°Lat.	Date	Descriptive Notes
54	S13	1/27	New growth began, continuing through west limb passage on 29 January. Attained small class D spot group by that time.
45	S07	1/21	Birth of small active region with slow initial development.
		1/24	Rapid growth began late in this day. Maximum area occurred on 27 January as class D spot group.
		1/29	Plage blended with growing region to southwest.
	S17	1/24	Birth of active region that grew to maximum on 27 January as follower-dominant class C spot group.
31	N15	1/27	Filament disappeared.
25	S15	1/22	Filament formed.
		1/29	Filament disappeared.
20	N18	1/29	Birth of small new region on northern edge of plage that had nearly disappeared by this date.
18	N13	1/25	Growth within small plage.
13	N11	1/30	Birth of active region that continued to grow through west limb passage on 1 February, but had not exceeded class B spot group by that date. Returned next rotation as part of a great spot group.
11	N14	1/28	Filament disappeared; re-formed on 29 January.
		1/31	Filament disappeared again near west limb.
6	S15	1/31	Filament disappeared.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART
1972 - Rotation 1584

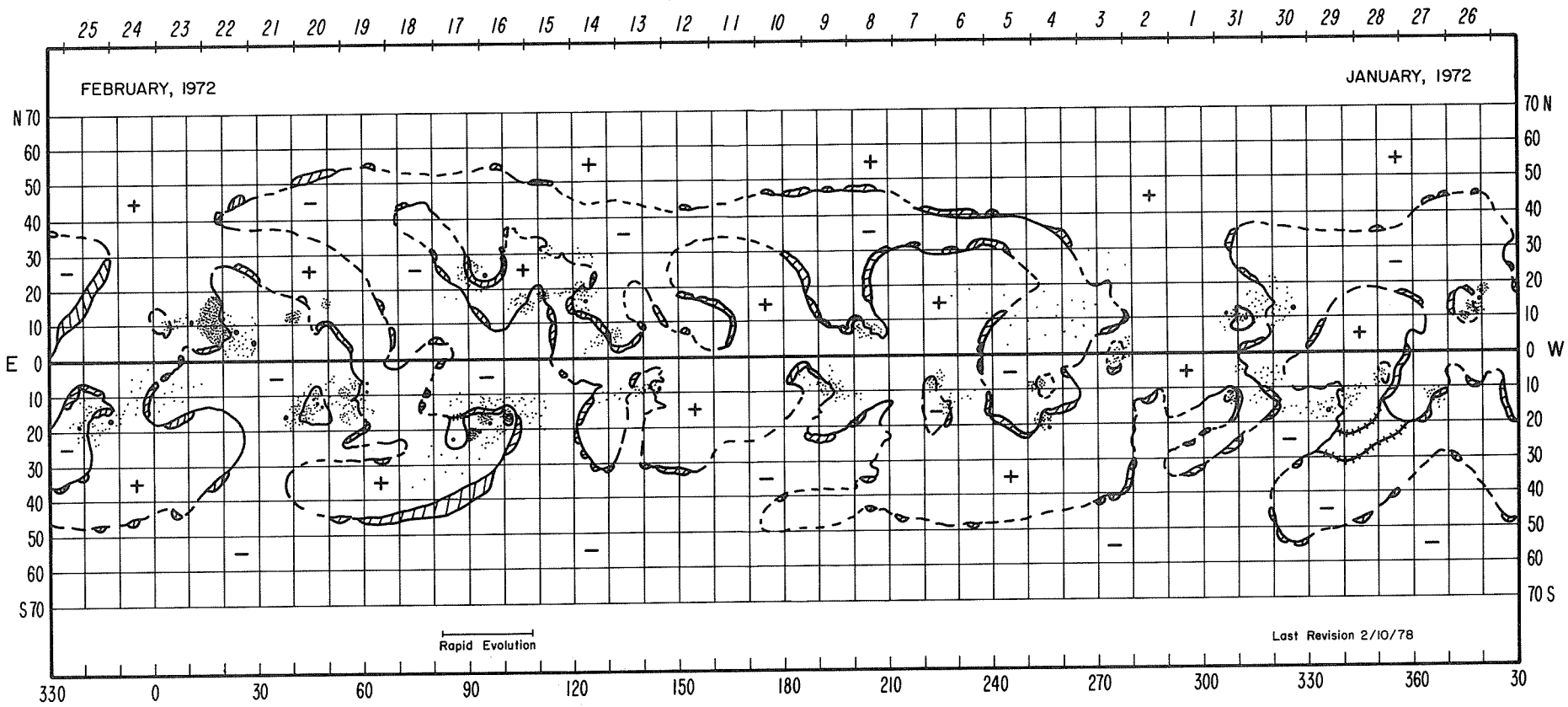
°Long.	°Lat.	Date	Descriptive Notes
354	S05	1/27-29	Filament gradually disappeared.
351	S06	1/28	Birth of small active region near filament.
345	S48	2/1	Filament disappeared.
339	S14	1/25	Maximum development of class C spot group with follower spot dominant.
		1/30	New growth, with second maximum next day as class D group.
310	N10	1/28	Birth of small plage within small, old plage.
		1/31	Third period of growth for this small region.
		2/2	Beginning of rapid growth, with maximum 4 February as class D spot group.
	N23	1/31	Filament formed.
309	S11	2/1	Birth of active region that grew to small follower-dominant class C spot group by 3 February.
	S15	2/2	Filament disappeared in response to growth of nearby active region.
308	S27	1/29	Filament disappeared.
278	S35	1/31	Filament disappeared.
275	N07	1/30	Filament disappeared; re-formed next day.
		2/1	Filament disappeared in apparent response to birth of nearby active region; re-formed by 3 February.
		2/4	Filament disappeared as nearby active region grew.
260	S16	2/6	Filament disappeared in response to growth of nearby active region.
253	S19	2/5	Birth of active region near filament. Maximum next day as class C spot group with group axis at negative inclination to solar equator, i.e., with leader spot at higher latitude than followers.
252	S09	1/31	Birth of small active region near east limb; disappeared by 8 February.
		2/10	Birth of active region at west limb near this position.
245	S20	2/9	Filament formed and enlarged during remaining 2 days of disk passage.
242	N10	2/5	Filament disappeared.
237	Equator	2/6	Filament disappeared.
230	N40	2/6	Filament disappeared.
226	S19	2/7	Small filament disappeared near faint plage.
223	S08	2/6	Birth of small active region.
205	N15	2/8	Large filament disappeared; gradually re-formed during next 3 days.
190	S23	2/12	Filament disappeared; re-formed next day.
184	N25	2/7	Almost all of large filament disappeared; remainder gone by 9 February. Re-formed by 14 February at west limb.
165	N12	2/9	Almost all of filament disappeared; partially re-formed next day.
		2/11	All of filament disappeared.
149	S32	2/11	Filament disappeared.
144	N12	2/11	Almost all of filament disappeared; remainder gone next day.
142	S08	2/7	Probable date of birth at east limb of active region that reached maximum 11 February as class C spot group.
135	N04	2/11	Curved filament formed.
		2/15	Filament disappeared; re-formed as large structure at west limb.
122	N20	2/12	Birth of new spots and plage near north edge of large sunspot.
	S16	2/17	Large filament disappeared.
120	N15	2/15	CMP of neutral line outlined by filament that was notably curved concentric to large, single sunspot.
112	N18	2/19	Birth of small active region near west limb.
103	S22	2/15	Large filament disappeared on western boundary of great activity complex but re-formed next day. It disappeared in apparent response to plage and spot growth nearby.
100	S17	2/14	Formation of small new active region within important, reversed-polarity activity complex. The new group emerged west of the principal sunspot simultaneously with birth of major new active region at (90,S20) on opposite side of the same spot. Maximized next day as class C spot group.
95	S18	2/10	East limb passage of great, reversed-polarity region that had returned for its fifth disk transit. Rapid and complex evolution occurred during first half of disk passage.
	N21	2/16	Filament encircling small single sunspot disappeared.
90	S20	2/14	Birth of major active region in trailing portion of great activity complex. This region and new spots at (100,S17) on opposite side of nearby large sunspot, emerged simultaneously. Region grew rapidly to maximum by 16 February as large class D spot group.

Note: There were no days without H-alpha photographs.

(Continued)

Hα SYNOPTIC CHART

1972–ROTATION 1584



Hα SYNOPTIC CHART

1972 - Rotation 1584 (Continued)

°Long.	°Lat.	Date	Descriptive Notes
60	S06	2/14	Birth of active region on northern border of bright plage near east limb. New spots grew to class C by 17 February. Spots in older plage apparently formed from merger of two small regions, so that complex grew to have appearance of three regions on a common north-south neutral line.
40	N12	2/23	Birth of small active region.
32	S14	2/17	Rapid growth within plage near east limb, reaching maximum by 29 February as class E spot group. Formed a large complex with plage to west that contained 3 spot groups.
20	N10	2/19	Maximum development of a great class F spot group. Large leader spot divided on this date and the components diverged.
5	N11	2/22	Birth of small active region near eastern border of the extensive fibril field that emanated from the great class F spot group plage. New region grew slowly until 27 February and contained only small spots.

Hα SYNOPTIC CHART
1972 - Rotation 1585

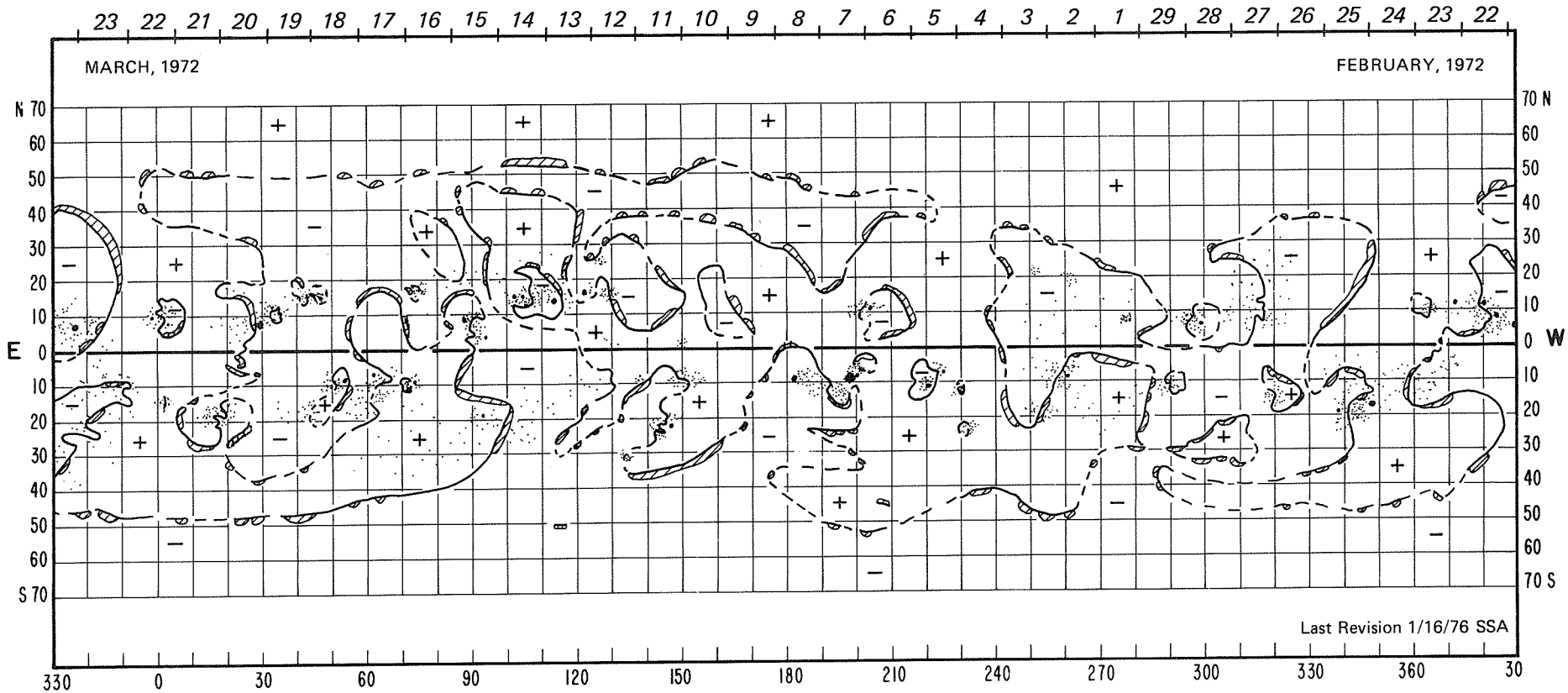
°Long.	°Lat.	Date	Descriptive Notes
343	N15	2/25	CMP of large filament with inclination to equator of sign opposite to normal for large filaments in the Northern Hemisphere. Had formed northern portion of large-scale equatorial cell on previous 3 solar rotations. Cell merged with north polar region during this rotation; differential rotation then changed the neutral line's orientation. Six rotations later the great flaring region of August 1972 connected to this neutral line.
342	S18	2/23	Peak development of large class E spot group with open interior. Leader spot divided after 24 February.
320	S14	2/21	Birth of small active region at west limb.
307	N25	3/3	Filament disappeared.
296	N08	2/26	Birth of active region that grew to maximum by 1 March as class D spot group.
290	S11	2/27	Birth of small active region.
283	S15	2/28	Filament disappeared in apparent response to growth of nearby active region.
280	N10	2/25	Large filament disappeared near east limb.
277	N08	3/4	Birth of small active region.
275	S04	3/1	CMP of filament which was active throughout disk transit.
261	N19	2/27	Birth of small active region.
252	N21	2/28	Birth of small active region.
244	S18	3/3	Large filament disappeared; re-formed 7 March near west limb.
232	S23	3/2	Birth of small active region.
229	S12	3/3	Birth of small active region.
222	S09	2/28	Birth of active region at east limb that grew to maximum by 2 March as class C spot group with group axis inclined to solar equator at angle larger than normal.
215	N10	3/7	Filament partially disappeared; re-formed next day.
202	N11	3/2	Peak development of small class C spot group in bright plage that was larger than plages normally associated with so small a spot group.
192	S10	3/3	Peak development of large, class F spot group with simple structure and exceptional length (exceeded 20 heliographic degrees).
192	S10	3/7	Dark surges projected from follower spot; "islands" of follower-polarity plage north and south of the large leader spot reached maximumum size.
	N17	3/7	Filament disappeared.
166	N09	3/7	Filament disappeared.
150	S33	3/9	Large filament disappeared.
	N01	3/11	Plage present this day only.
145	N08	3/10	Filament present this day only.
	S20	3/10	Birth of small region with small spots adjacent to north side of large single sunspot.
138	S10	3/16	Birth of small active region.
137	S11	3/12	Filament disappeared; re-formed next day.
		3/17	Filament disappeared in apparent response to growth of nearby active region.
131	N10	3/9	Filament disappeared; re-formed 11 March.
		3/12	Filament disappeared again.
125	N25	3/15	Birth of small active region.
122	N17	3/13	CMP of large, single sunspot that was surrounded by a counterclockwise vortical pattern of fibrils.
120	N35	3/9	Filament disappeared; re-formed after 12 March and was very active.
117	N13	3/10	Filament disappeared from between closely-spaced active regions; re-formed after 12 March.
		3/16	Filament disappeared again.
107	N14	3/9	Maximum development of class E spot group with simple structure; interacted with older declining region west of this position.
100	S18	3/15	CMP of S-shape filament within extensive plage of reversed polarity (the return of the highly active region of the previous several solar rotations). Spot of leader polarity, but in following portion of the plage, disappeared by 19 March.
90	N08	3/11	Birth of active region that grew to follower-dominant class D spot group by 15 March; attained class E, as the leader became dominant by 17 March and rapidly diverged from the follower spots. Inclination of the group axis to solar equator was exceptionally large.
75	N18	3/11	Probable date of birth at east limb of small active region.

Note: There were no days without H-alpha photographs.

(Continued)

Hα SYNOPTIC CHART

1972 – ROTATION 1585



Hα SYNOPTIC CHART

1972 - Rotation 1585 (Continued)

°Long.	°Lat.	Date	Descriptive Notes
73	S10	3/19	Birth of small active region on western edge of complex of three active regions.
70	N11	3/15	Small filaments disappeared.
65	N16	3/18	Filament disappeared.
62	S10	3/15	Birth of small active region near neutral line separating remnants of two extensive active regions. New region grew to maximum by 19 March and contained only a small spot group.
55	N06	3/16	Filament disappeared.
46	N15	3/23	Birth of small active region near west limb. Fourth in a series of small regions to form northwest of large, single sunspot.
42	Equator	3/22	Birth of tiny plage.
40	N15	3/23	Birth of small active region near west limb. Emerged between two small regions that lay northwest of a large, single sunspot.
32	N10	3/15	Birth of small active region with small spots close to northern edge of large, single sunspot. First of series of four small regions to form close to the sunspot.
		3/20	Important additional plage and larger spots formed on eastern edge of this region and even closer to the large spot. Second in a series of small regions that formed close to this spot.
23	S05	3/18	Filament disappeared.
	S23	3/18	Filament disappeared in apparent response to growth of nearby active region.
19	S18	3/17	Birth of active region with slow, complex growth until 23 March. Many highly variable spots formed, as if small amount of magnetic flux emerged on nearly every day of the disk passage.
15	S38	3/25	Filament disappeared.
12	S28	3/23	Filament disappeared.
2	S15	3/24	Birth of small active region.
1	N09	3/22	Birth of active region that grew to maximum by 24 March as class D spot group.

Hα SYNOPTIC CHART

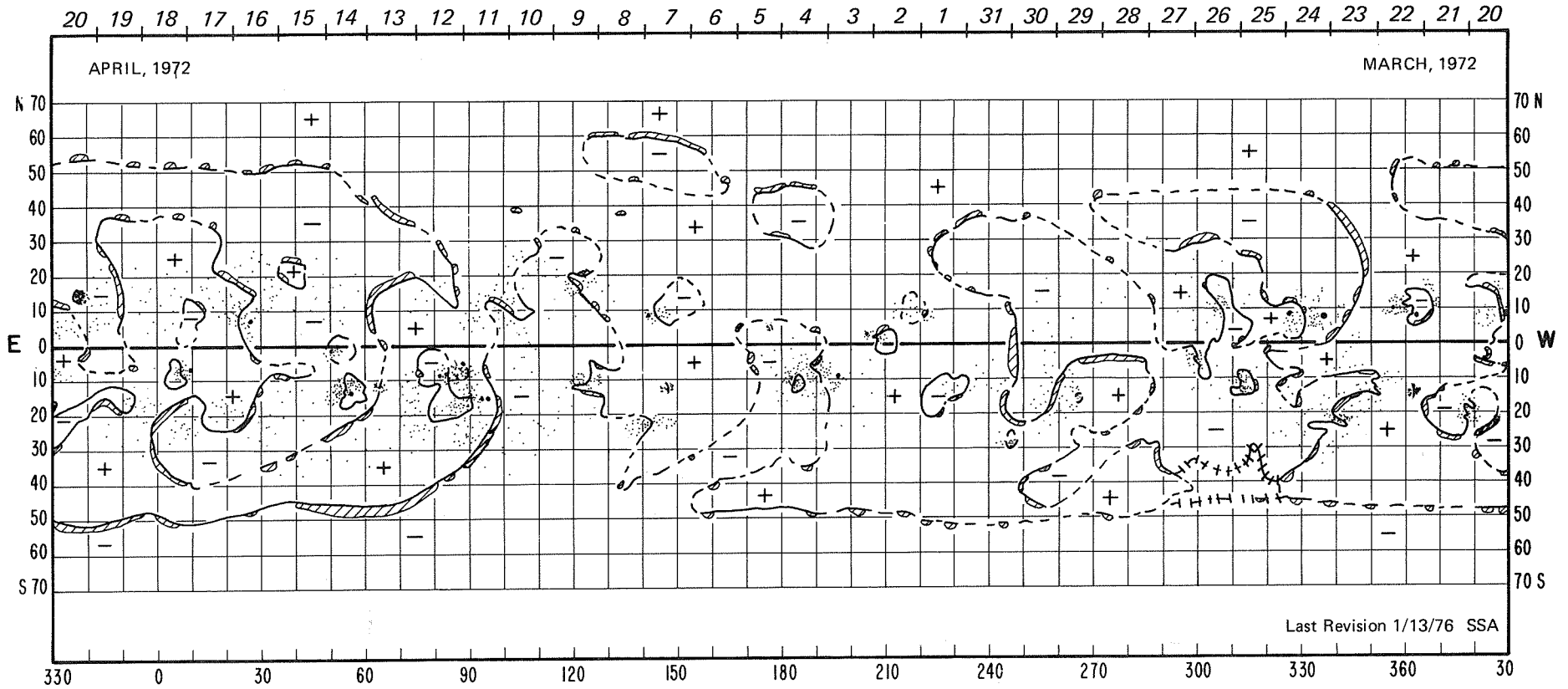
1972 - Rotation 1586

°Long.	°Lat.	Date	Descriptive Notes
345	N30	3/23	Great filament disappeared in apparent response to growth of nearby active regions. Note change in orientation of neutral line north of N20 since previous rotation.
331	S22	3/25	Birth of new small region near neutral line within extensive faint plage.
330	N19	3/22	Maximum development of moderate-size class E spot group.
		3/23	Complex plage, absorption features and dark surges formed on western and southern border of large leader spot. Gone by end of next day.
312	S12	3/22	Birth of small active region.
300	S04	3/23	Birth of small active region.
	N29	3/26	Filament disappeared.
275	S03	4/1	Large filament disappeared.
250	S40	3/28	Filament disappeared.
245	S29	3/29	Birth of small active region.
207	N02	4/1	Birth of small active region.
192	S03	4/2	Curved filament within large active region disappeared. This region had formed on the sun's invisible hemisphere and in the northern portion of a large region from the previous disk passage.
185	N35	4/4	Small filaments, bordering this large-scale cell of negative polarity, disappeared.
184	S11	4/6	Birth of small active region within the scattered follower plage of large, old region. Slow growth still apparent at west limb passage.
177	N03	4/10	Birth of small active region near west limb.
167	N04	4/2	Filament disappeared.
147	S11	4/6	Birth of small active region.
145	N09	4/5	Birth of active region that grew to maximum next day with small follower-dominant spot group.
121	N18	4/10	Filament disappeared within faint plage.
95	S25	4/7	Great filament disappeared near east limb; re-formed next day.
		4/13	Filament disappeared again.
90	S15	4/7	Birth of active region in center of existing class D spot region that was near its peak development. New spots reached maximum on 9 April. Leader spots of the two overlapped groups approached one another, both disappearing soon after reaching minimum separation of less than 1 heliographic degree.
85	S06	4/9	Maximum development of follower-dominant class D spot group that formed northern member of important activity complex.
		4/15	Additional plage and small spots formed in leading portion of region after original spots had disappeared.
68	N36	4/15	Filament disappeared.
60	S46	4/14	CMP of great polar-crown filament that became exceptionally large just before west limb passage.
55	S22	4/19	Large filament disappeared at west limb.
54	S12	4/11	Maximum development of region with class C spot group. Plage remained bright and complex for most of disk passage.
6	S07	4/15	Birth of small active region.
	N37	4/20	Filament disappeared.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1972 – ROTATION 1586



Hα SYNOPTIC CHART

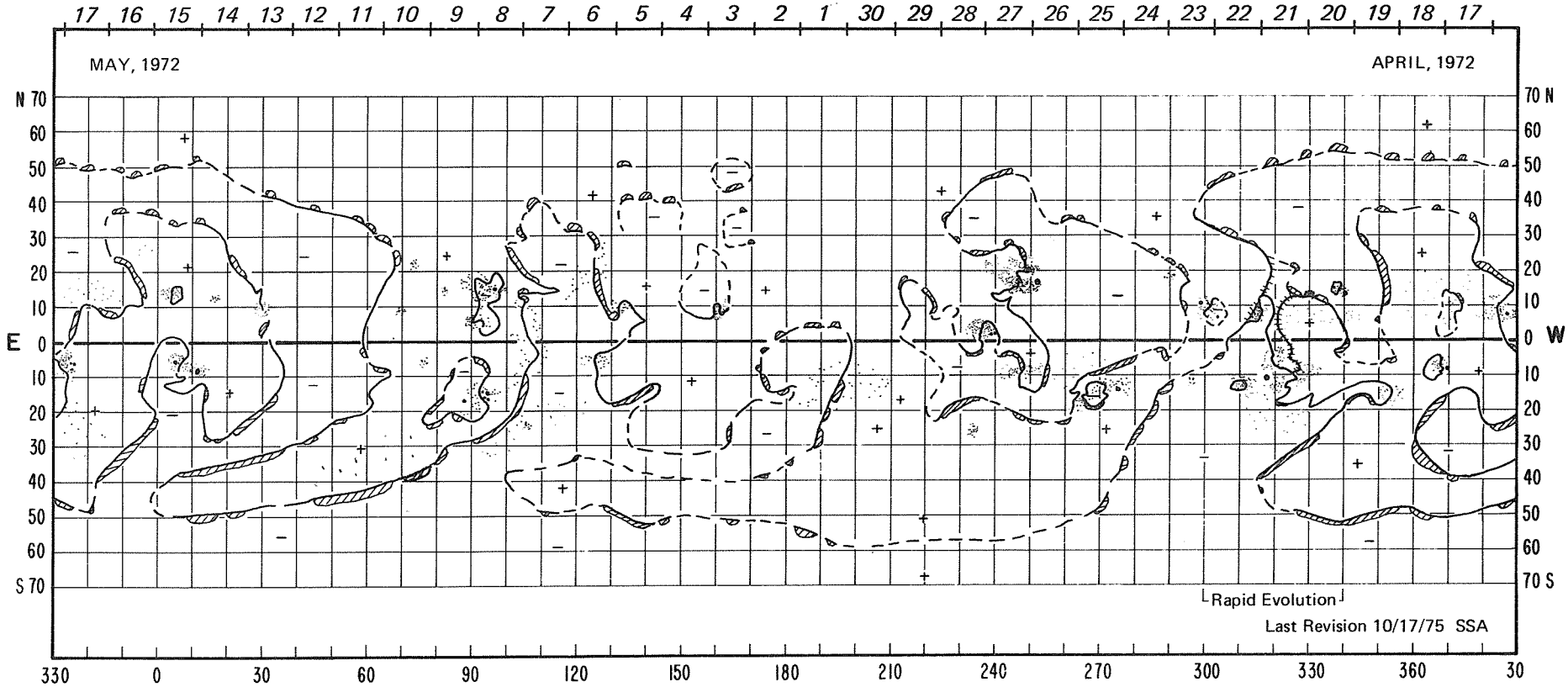
1972 - Rotation 1587

°Long.	°Lat.	Date	Descriptive Notes
338	N14	4/21	Birth of small active region.
325	S11	4/18	Maximum development of complex class E spot group that had formed in following portion of decaying, older region. Spot group was follower-dominant.
	S31	4/20	Filament disappeared.
320	S05	4/21	Birth of small active region.
316	N07	4/25	Birth of small active region.
312	S13	4/23	Birth of small active region in trailing portion of large follower-dominant region. New region expanded until its leader plage contacted the large follower spot of the old region.
308	N30	4/22	Filament disappeared, possibly as part of major rearrangement of neutral lines that in turn resulted from merger of large-scale areas of negative polarity.
301	N09	4/24	Birth of active region that grew to maximum by 27 April as large class D spot group near west limb. Group axis was inclined to solar equator at exceptionally large angle. Large-scale neutral line 10° west of the region was oriented orthogonally to the spot group axis, as if this major magnetic boundary influenced the development of this important region.
297	S12	4/29	Birth of small plage at west limb.
290	N18	4/19	Birth of small active region near east limb.
280	S25	4/23-26	Filaments along this large-scale neutral line disappeared gradually during these 4 days.
275	S06	4/22-23	Filament disappeared.
272	S14	4/19	Birth of small region at east limb.
		4/21	Birth of active region slightly east of small plage, which had nearly disappeared by this day. New region grew rapidly to maximum by 24 April as class C spot group.
255	S23	4/23	Filament disappeared; re-formed after 26 April.
247	N24	4/28	Filament disappeared.
235	N02	4/23	Birth of small active region.
222	N11	4/28-29	Filament disappeared.
185	S55	4/28	Filament disappeared.
161	N09	5/4	Birth of small active region.
131	N10	5/1	Birth of small active region near large filament that lay close to the east limb.
126	S05	5/1	Birth of small active region near east limb.
	N13	5/2	Large filament disappeared in apparent response to growth of nearby active region.
	S05	5/6	Minor brightening of this region.
122	N30	5/5-10	Filament exceptionally active.
105	N10	5/2	Birth of small active region at east limb.
	S23	5/7	Birth of small active region.
103	N20	5/5	Filament formed.
		5/10	Filament disappeared in apparent response to growth of nearby active region.
93	N05	5/4	Birth of small active region.
	S14	5/7	Maximum development of large and complex class D spot group that had formed shortly before east limb passage on 2 May.
92	N17	5/4	Birth of active region with slow initial growth. Reached maximum on 10 May as class D spot group with relatively large inclination of group axis to solar equator.
83	N15	5/9	Birth of small active region.
80	S35	5/5	Large filament partially disappeared; re-formed after 6 May.
76	S05	5/12	Birth of small active region.
70	N09	5/6	Birth of very small plage.
65	N29	5/11	Filament disappeared.
29	S20	5/11	Filament disappeared; re-formed 13 May.
		5/14	Filament disappeared again; re-formed by 17 May.
22	N20	5/16	Filament disappeared.
20	S35	5/14	Large filament disappeared.
16	N12	5/10	Birth of small plage.
14	S49	5/13	Filament disappeared.
8	S07	5/16	Maximum development of complex class D spot group that had been active and highly variable since its east limb passage on 9 May. Exceptionally high spot count on some days. Group axis had negative inclination to solar equator, i.e., leader spot lay at higher latitude than followers.
5	N13	5/11	Birth of small active region.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1972 – ROTATION 1587

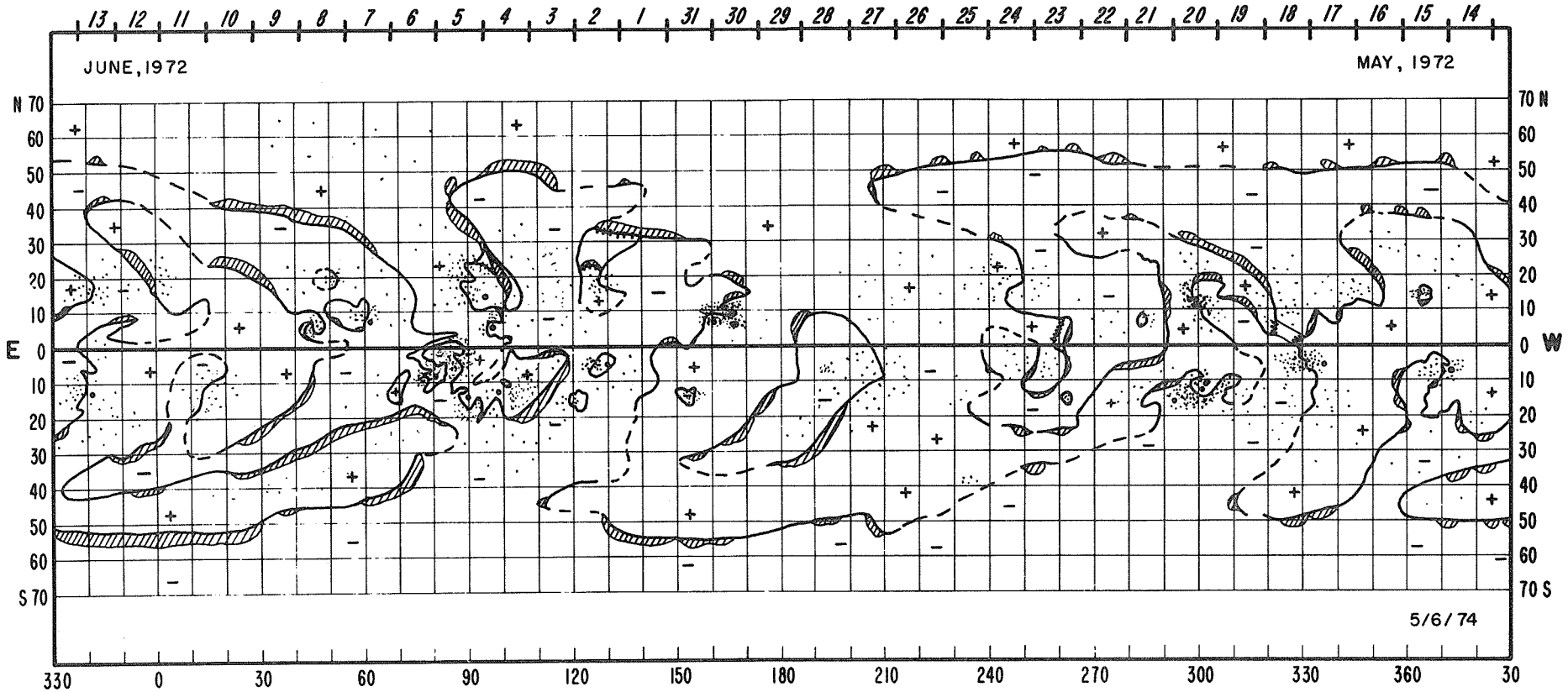


Hα SYNOPTIC CHART
1972 - Rotation 1588

°Long.	°Lat.	Date	Descriptive Notes
353	S29	5/13	Large filament disappeared near east limb.
330	S04	5/15	Maximum development of class E spot group.
310	N24	5/17	Large filament disappeared.
299	N13	5/14	Large single spot of follower polarity (positive) returned to east limb attended by bright leader-polarity plage without spots.
		5/17	New region with brilliant plage formed adjacent to northern edge of the large spot, growing to maximum by 19 May and creating a class D spot group of peculiar configuration.
298	S13	5/18	Maximum development of class E spot group with large, symmetric leader and follower spots and simple configuration.
283	S21	5/23	Birth of small active region.
261	S15	5/21	Birth of small plage with single spot.
255	S24	5/25-26	Filament disappeared.
236	N19	5/29	Birth of small region near west limb.
234	N11	5/31	Birth of small active region at west limb. Returned next solar rotation as remnant of an important region.
192	S06	5/29	Birth of small active region.
171	N23	5/27	Small plage formed; gone by 29 May.
	S20	5/31	Filament disappeared.
163	N09	5/31	CMP of very active reversed-polarity region with complex class D spot group containing strong "delta" magnetic configuration in the leader spots. Maximum development approximately 29 May. Source of proton emission. Spot group axis at slight negative angle, i.e., leader spot at higher latitude than followers.
155	S14	5/30	Birth of small active region.
140	N31	6/1	Almost all of very active large filament disappeared.
126	S04	5/31	Birth of active region that nearly disappeared next day; began strong growth on 2 June and attained maximum on 4 June as large class C spot group. Group axis strongly inclined at negative angle, i.e., leader spot at higher latitude than followers.
120	S16	6/1	Birth of small active region.
105	N50	6/4	Almost all of large, active filament disappeared.
96	N06	6/2	Minor growth in small plage began and continued for next 4 days.
95	N28	6/3	Large and very active filament disappeared, in apparent response to rearrangement of underlying neutral line. Re-formed after 8 June near west limb.
90	S16	6/4	Growth of plage and small spots near southern edge of large leader spot of simple class D spot group. This area became most complex on 8 June.
77	S08	6/3	Birth of strong active region in the center of small plage. Grew rapidly to first maximum on 6 June as large class D spot group.
		6/8	Rapid additional spot growth in the center of region created complex configuration and second maximum by 10 June near west limb. Region expanded westward into old plage of moderate intensity. Circular area of fibrils ahead of leader spot appeared to push plage into more compact form.
60	N09	6/5	Maximum development of small region with large class B spot group.
52	N20	6/7	Birth of small active region.
45	N07	6/5	Birth of small active region.
38	S18	6/9	Filament disappeared; re-formed 11 June.
35	S31	6/7	Part of large filament disappeared.
27	N20	6/11	Large filament disappeared.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART
1972 - ROTATION 1588

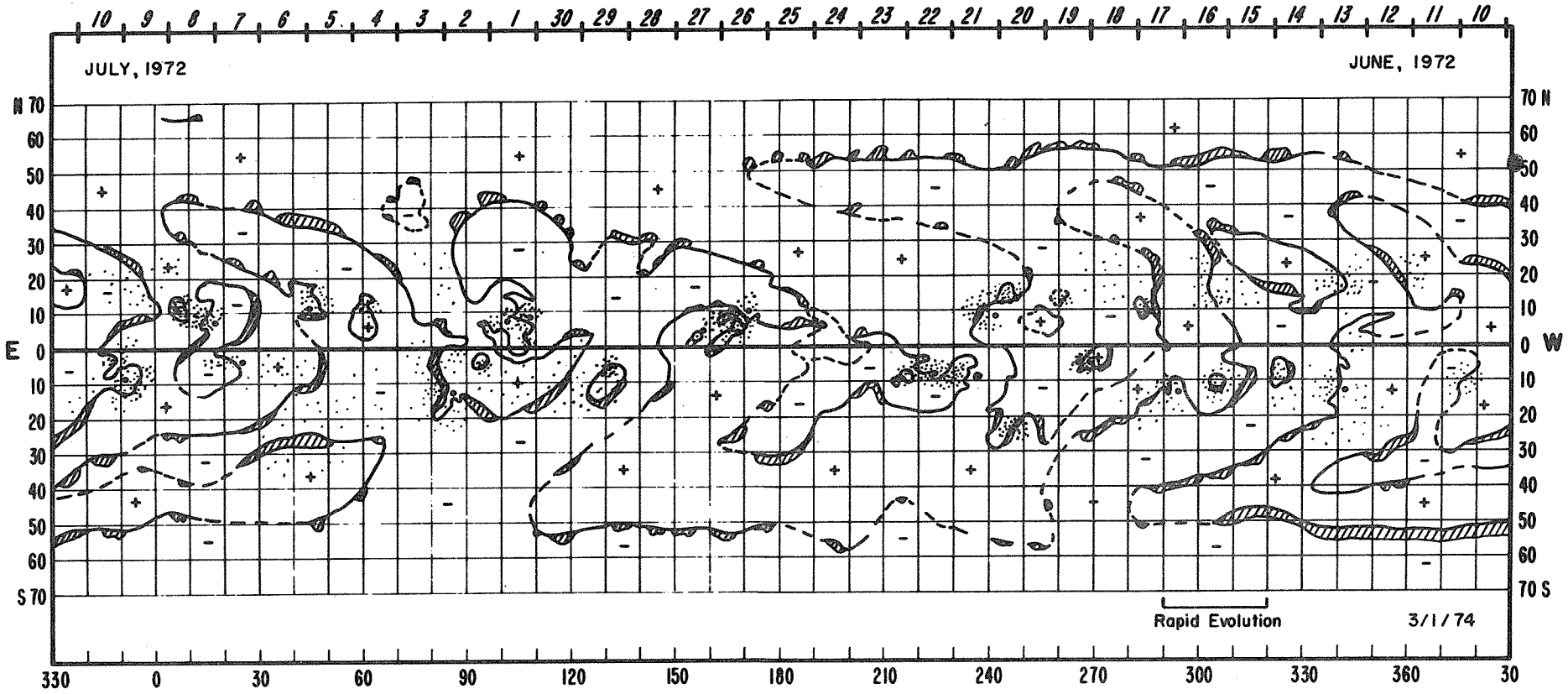


Hα SYNOPTIC CHART
1972 - Rotation 1589

°Long.	°Lat.	Date	Descriptive Notes
355	N21	6/16	Large filament disappeared.
	S27	6/18	Large filament disappeared at west limb.
339	S13	6/14	Birth of small active region on large-scale filament channel. Grew to maximum by 17 June with small class D spot group.
320	N17	6/12	Filament disappeared; re-formed next day.
	S30	6/13	Large, long filament disappeared; re-formed 15 June.
		6/17	Filament disappeared again.
	S49	6/18	Filament disappeared at west limb.
310	S05	6/12	Great active filament north of major center of activity disappeared; partially re-formed next day and remained exceptionally active.
304	S11	6/14	Maximum development of extremely complex class D spot group with many spots. Formed just west of returning follower spot of large region from previous solar rotation. Associated with a great active filament.
287	N10	6/14	Almost all of large filament disappeared near east limb. Remaining portion enlarged after 19 June.
285	N10	6/20	Birth of small active region.
275	S01	6/15	Small filament disappeared in apparent response to growth of nearby active region.
266	S05	6/14	Probable date of birth of small active region near east limb.
		6/19	Additional region growth.
261	N12	6/23	Birth of small active region.
245	S24	6/16	Birth of small active region.
	N15	6/22	Birth of small active region on neutral line north of large stable spot.
242	N09	6/21	CMP of large single spot remarkable for associated neutral line oriented northwest-southeast, i.e., opposite to normal for Northern Hemisphere. Inclination angle of group axis significant when region lay near east limb as a class C spot group. Group axis orientation was consistent with northwest-southwest alignment of associated neutral line.
235	N30	6/17	Filament disappeared at east limb.
228	S08	6/18	Maximum development of class F spot group with large leader spot and large number of small follower spots. Neutral line doubled back through the region, indicating that the region was composed of two merged bipolar groups.
215	S11	6/20	Birth of active region at western end of filament and near eastern edge of large class F spot group region. Grew to maximum next day as class C spot group. Second maximum in area reached 24-25 June as small class D spot group.
	Equator	6/20	Filament disappeared near east limb; re-formed 25 June.
190	N16	6/29	Filament disappeared near west limb.
180	S30	6/25	Large filament disappeared.
169	N08	6/20	Embedded filament disappeared again.
		6/23	New spot growth in large, complex reversed-polarity region that had returned from previous disk passage.
		6/27	Filament, embedded in northern portion of the plage, disappeared; re-formed 29 June.
154	N12	7/3	Birth of small active region at east limb and near trailing portion of large, reversed-polarity region.
112	S13	6/30	CMP of active filament that was especially large during latter portion of its disk passage.
108	N08	7/3	Birth of small active region on southern border of large, active region.
105	N16	6/28	Significant growth began in small active region. Maximum 1 July as class D spot group.
99	N03	7/7	Birth of active region at west limb.
96	N05	6/28	Birth of small active region near eastern border of large active region.
95	S03	7/4	Birth of small active region.
86	S12	7/4-5	Clockwise vortical pattern to fibrils surrounding large, single spot.
62	N05	7/4	Filament disappeared.
40	S26	7/11	Large filament disappeared at west limb.
28	N10	7/8	Large, very active filament formed semicircle along western boundary of vortical field of fibrils emanating from great active region.
20	S03	7/4	Birth of active region that grew to maximum by 6 July with class C spot group.
		7/11	Additional growth near west limb.
16	N10	7/3	Birth of active region within northern portion of active region near east limb. Older feature had crossed east limb with a large, single leader spot. Growth of new plage and spots produced complex region with extensive vortical fibril field and clockwise sense of twist. Although such vortical patterns are usually confined to the vicinity of a large leader spot, here they encompassed the entire active region. This was the most active region for this solar rotation. Maximum development occurred by 6 July. New spots remained small but numerous.
11	N01	7/9	Active filament formed along neutral line that extended south of the large active region.
9	N13	7/11	Birth of active region near west limb that grew to peculiar class C group by 13 July. Group axis 90° from normal orientation with leader spot directly south of followers. Main spot returned next rotation as a member of the most active spot group of Solar Cycle 20.
	N30	7/12	Filament disappeared.

Note: Day without H-alpha photographs was 2 July 1972.

Hα SYNOPTIC CHART
1972 - ROTATION 1589



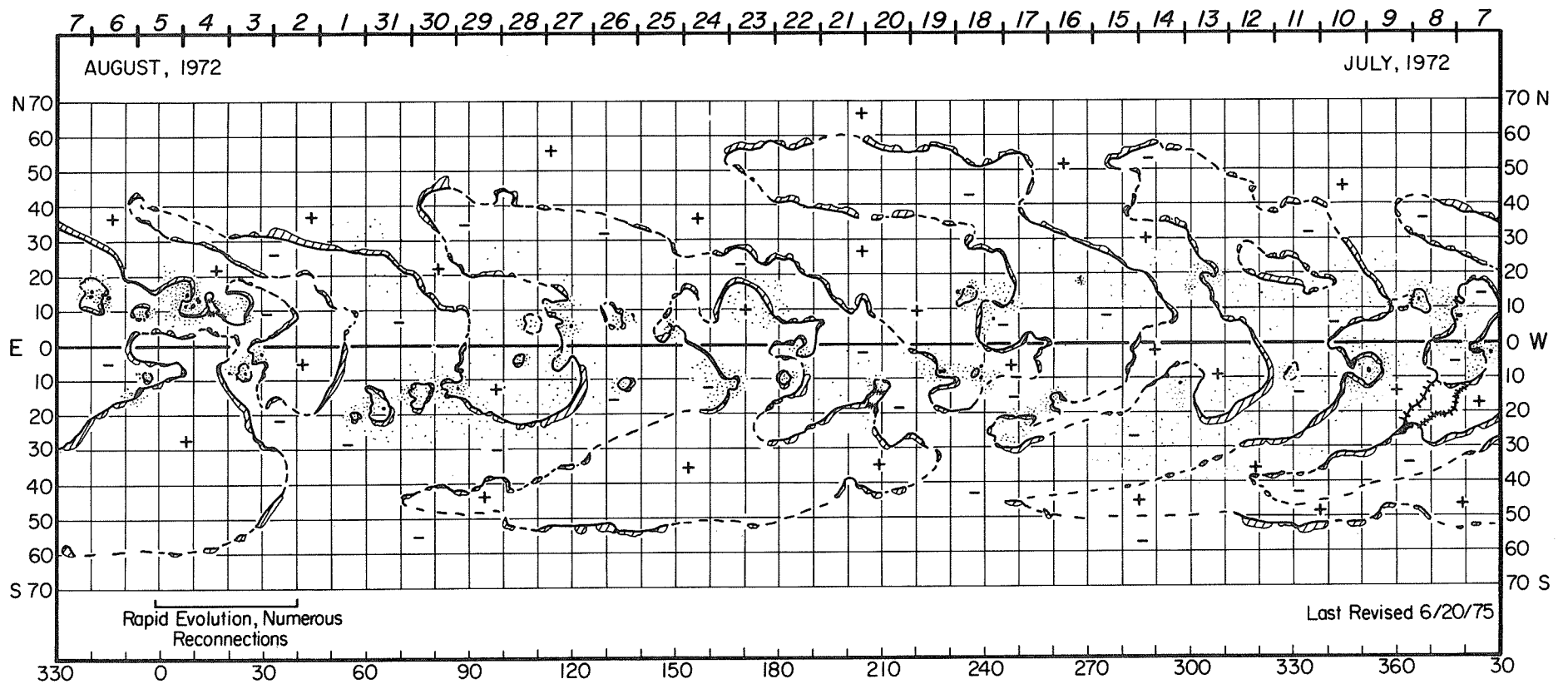
Hα SYNOPTIC CHART
1972 - Rotation 1590

°Long.	°Lat.	Date	Descriptive Notes
352	S08	7/6-10	Neutral line encircling follower sunspots remained connected to adjacent neutral line east of region through 6 July. Closed neutral line loop formed isolated negative cell 7-10 July, then rejoined adjacent neutral line in original configuration.
330	S08	7/13	Birth of small active region that remained visible 2 days only.
325	N18	7/14	Filament disappeared.
300	N17	7/19	Region born near west limb.
290	N15	7/10	Large filament disappeared near east limb.
268	N19	7/16	Tiny bipolar region visible 1 day only.
258	S25	7/14 7/17	Small plage formed without spots. Region with spots stronger than those on 14 July emerged. Group nearly disappeared by 21 July when small additional plage formed in western portion.
243	S10	7/14-22	Plage and absorption-feature activity south of sunspot maximized 14 July and vanished by 18 July. Vigorous new region emerged at this location 22 July, enveloping the old sunspot.
238	N03	7/22	North-south filament disappeared.
235	N12	7/18	Strong region with D-type spot group formed late in the day; expansion of region affected filament and major neutral line west of region.
227	S08	7/21	Large sunspot invisible in H-alpha.
212	S10	7/16 7/21	Small region born. Expansion of leader polarity effected disruption of filament/neutral line to south, with rearrangement of neutral line by 21 July.
195	N15	7/25	Most of filament disappeared.
183	S08	7/25	Small region formed.
170-240	N55	7/22	Much of polar crown filament disappeared.
135	N07	7/25	Birth of active region that grew to large D-type spot group by 29 July.
120	S08	CMP 7/28	Filament exceptionally large after central meridian passage.
107	N06	7/30	Small region born 30 July; gone by 2 August.
105	S04	7/25	Birth of small region that disappeared by 30 July.
64	S17	7/27	Region born near east limb became small D-type group.
30	S05	7/28 7/30	Small plage at east limb; gone by next day. Stronger region formed in plage area; reached maximum as a D-type spot group by 3 August.
	S50	7/31	Filament near east limb disappeared.
40	N30	7/31	Filament disappeared; gradually re-formed by 6 August.
25	N23	7/31	Almost all of filament disappeared.
	S08	8/3	Birth of active region that formed adjacent to above filament.
18-32	S05-S30	7/31	Filaments along this continuous neutral line disappeared.
		8/3	Development of large single filament.
10	N12	8/4	This large circular sunspot group marked the site of the most energetic flares of Solar Cycle 20: those of 4, 6 and 7 August. Spots exhibited large relative proper motions in a vortical pattern.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1972 - ROTATION 1590



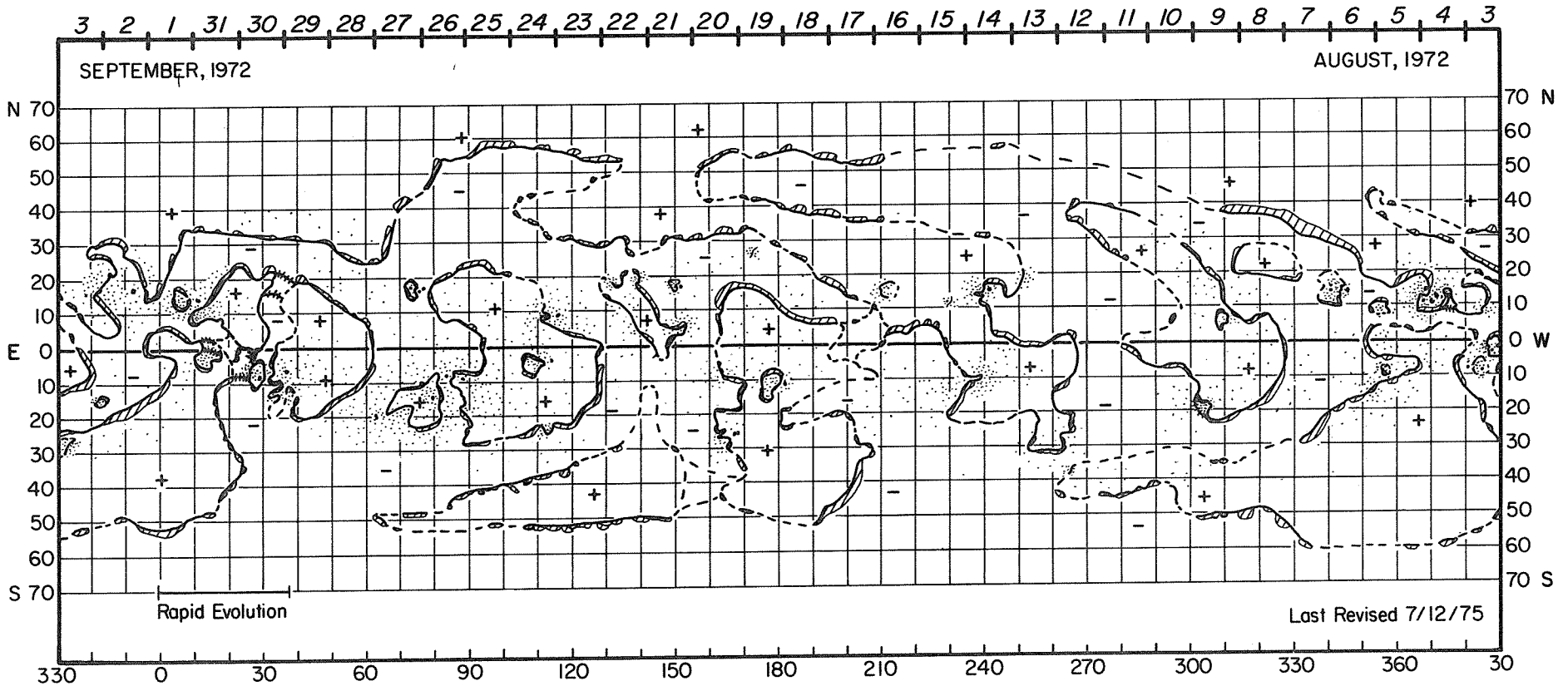
Hα SYNOPTIC CHART
1972 - Rotation 1591

°Long.	°Lat.	Date	Descriptive Notes
355	N07	8/8	Small region born.
352	Equator	8/5	Filament disappeared.
344	N14	8/9	Birth of region.
338	S22	8/4	Filament disappeared. Partially re-formed by 9 August.
330	N35	8/7 8/11	Filament enlarged. Filament disappeared.
310	N08	8/13	Tiny region visible 1 day only.
308	N18	8/6	Filament disappeared.
303	S18	8/12	Birth of small active region that declined by 13 August.
250	N20	8/18	Minor growth in small region.
240	N17	8/11 8/17	Birth of active region with slow initial development and transient filaments. Rapid growth occurred.
230	N11	8/12	Birth of small active region.
210	N16	8/12	Probable date of birth of region at east limb.
178	N26	8/14	Birth of active region near east limb, which reached maximum as a class C spot group.
173	N26	8/21	Small plage visible 1 day only.
165	S26	8/16	Maximum development of class C spot group near east limb.
160	S40	CMP 8/20	Fission of large-scale, positive-polarity area occurred during disk passage.
155	N16	8/25	Small region formed near west limb.
150	N17	8/20	Birth of tiny active region.
130	N20	8/29	Small bright plage formed at west limb.
113	N09	8/19	Region formed as a brightening of scattered plage near east limb on an existing large-scale neutral line. Peak development occurred 22 August.
112	S25	8/26	Birth of small region under large quiescent filament. Nearly dissipated by 29 August at west limb.
110	S05	8/19	Birth of region near east limb; growth until 22 August.
85	S08	8/28	Birth of active region; rapid growth to moderate type D spot group by early on 30 August.
78	S25	8/22	Filament disappeared with resultant parallel-ribbon flare at 1340 UT on 22 August. New filament formed 23 August and moved systematically poleward and westward through the remainder of the disk passage, becoming increasingly separated from its neutral line at the surface. The filament encountered west limb 2 days before west limb passage of its associated surface neutral line.
75	N17	8/26	Birth of active region with peak development 28 August; rapid decline on 29 August.
40	S15	8/29	Two small regions formed simultaneously in contact with each other. They dissipated by 2 September.
35	S06	8/28	Additional plage formed, surrounding existing leader sunspot.
34	S02	8/27	Filament disappeared.
30	N05	8/28	Filament disappeared.
27	S07	9/1	Birth of active region with rapid growth 2-3 September. Forced complex rearrangement of surrounding neutral lines.
7	N15	8/29	Region emerged through old "follower" plage (of "leader" polarity) that represented remnants of powerful active region of previous rotation. Growth peaked by 31 August.

Note: Day without H-alpha photographs was 8 August 1972.

Hα SYNOPTIC CHART

1972 - ROTATION 1591



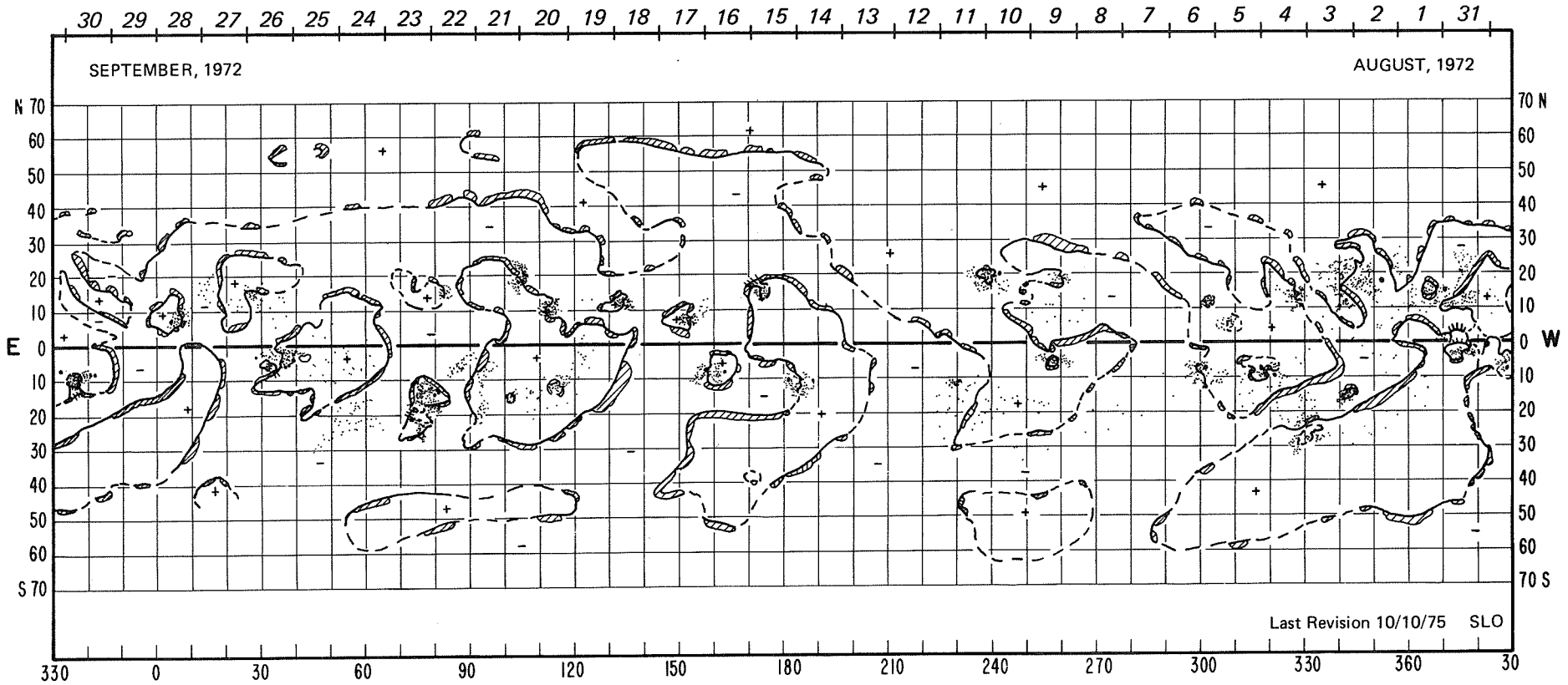
Hα SYNOPTIC CHART
1972 - Rotation 1592

°Long.	°Lat	Date	Descriptive Notes
328	N14	9/9	Significant brightening of small active region just before west limb passage. Region had been evolving in rapid and complex manner during previous 6 days.
315	S08	9/1	Birth of small region with peak development 3 September as class C spot group.
		9/5	Stronger region than that of 1 September emerged in same location and reached peak development 7 September as class E spot group. Expansion of region resulted in filament disappearance south of region 8 September.
308	N05	9/5	Birth of small active region that dissipated rapidly after 8 September as another region formed to the northeast.
305	N08	9/7	Birth of active region. Growth coincided with filament disappearance south of region 8 September.
299	S08	9/5	Birth of small active region that showed additional growth on 7 September.
290	N15	9/8	Filament disappeared as region grew southwest of this location.
258	N18	9/5	Birth of small region.
257	S06	9/6	Birth of small active region.
244	N15	9/8	Filament within old plage region disappeared as new region developed to the northeast.
238	N20	9/7	Birth of strong active region that formed large leader sunspot by 9 September. Vortical structure north of leader formed 12 September. Polarity arrangement reversed from normal for Northern Hemisphere in even numbered solar cycle.
226	S10	9/12	Birth of small active region.
180	N18	9/16	Large curved filament disappeared.
170	N18	9/18	Birth of active region near site of large disappearing filament 16-17 September. Nearly dissipated by 20 September.
165	S20	9/18	Filament, which had been large and active throughout disk transit, disappeared.
162	S08	9/18	Merging of leader-polarity fields with large positive-polarity region to west occurred after this date.
153	N06	9/14	Birth of small region, with maximum development by 15 September. Unusual active filament formed southeast of region 20 September as secondary growth of plage occurred.
134	N13	9/14	Birth of small region, with maximum development by 15 September. Exceptionally rapid dissipation 18 September. Complex and active filament channel and terminus of active transequatorial filament lay 10° south of this region.
132	S10	CMP 9/19	Filament exceptionally large and active during entire disk transit.
124	N07	9/20	Small filament disappeared.
115	S12	9/15	Birth of small region with maximum development 16-17 September.
		9/20	Major new growth with filament development. Dissipation began 24 September.
103	S15	9/23	Tiny new region present 1 day only.
92	N25	9/24-26	Large curved filament formed as new region developed at (83,N17).
83	N17	9/25	Birth of small region with maximum development just before west limb passage 27-28 September.
75	S15	9/19	Filament embedded in plage near leader sunspot disappeared while accompanied by chromospheric brightenings. Filament re-formed 20 September, disappeared 22 September, and re-formed 23 September, disappeared 24 September, and re-formed 25 September. Associated leader sunspot divided 23 September as new plage grew north of spot. Positive-polarity cell, bounded intermittently by filaments, divided 26 September. This cell merged with large positive cell to the west by west limb passage 28 September.
37	S05	9/21-22	Large active region composed of two regions that merged 21-22 September. Eastern component younger than western component. Groups formed just before east limb passage on 20 September. Gradual decay of region after 25 September and rapid decay 28 September.
8	N08	CMP 9/28	Compact plage with strong follower sunspot near east limb; continual and gradual dissipation throughout disk transit.
0	S15	10/2	Large filament disappeared near west limb.

Note: Days without H-alpha photographs were 16 and 29 September 1972.

Hα SYNOPTIC CHART

1972 – ROTATION 1592



Hα SYNOPTIC CHART

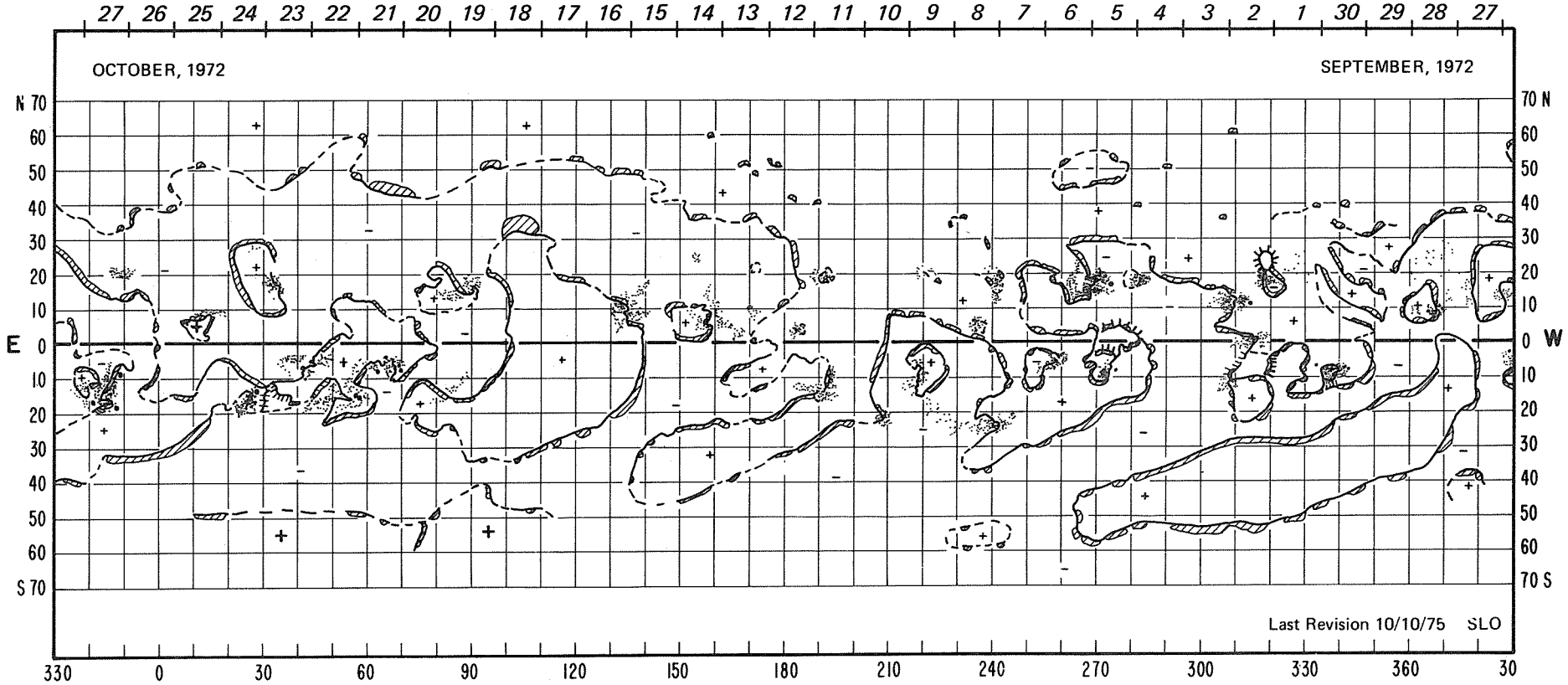
1972 - Rotation 1593

°Long.	°Lat.	Date	Descriptive Notes
348	S05	10/3	Filament vanished 1 day after large filament disappearance at (0,S15).
338	S08	9/25	Region formed at east limb and slowly developed to maximum size by 1 October. Minor additional growth on 3 October.
320	N20	10/2	Filament activity on northern border of cell was followed by decrease in size of the cell.
310	N11	9/29	Birth of strong active region. Developed large leader and follower spots and reached maximum area by 1 October. Gradual decay from 2 October to west limb passage.
		10/5	Filament formed within region and disappeared next day.
308	S12	10/3	Birth of small region with decay occurring 4-6 October.
		10/7	New growth commenced and continued through west limb passage 9 October.
280	N17	10/4	Birth of small region; declined after 6 October.
270	S05	10/5	Birth of small region; dissipated by 8 October.
	S20	10/7-11	Exceptionally large filament.
255	S10	10/9	Plage growth in old active region with rapid decline after 10 October.
250	S12	10/11	Birth of region in following portion of old plage. Growth in progress at west limb 13 October.
240	N01	10/7	Birth of tiny region that vanished by 10 October.
215	S10	10/11	Filament disappeared.
207	S05	CMP 10/10	Filament steadily enlarged throughout disk transit.
192	N20	10/15	Birth of new region, which grew rapidly until west limb passage 17 October.
183	N03	10/11	Birth of small region which dissipated by 14 October.
173	N22	10/14	Birth of small region in which growth ceased on 16 October.
170	S05	10/16	Filament disappeared near same latitude of disappearance on previous day of very large eruptive filment east of this location.
136	S15	10/15	Large active filament disappeared.
105	N32	10/16	Filament became exceptionally active.
		10/23	Filament disappeared.
68	N42	10/17	Filament disappeared.
		10/21	Filament re-formed.
65	S05	10/19	Significant growth of small active region. Spots and plage reached maximum development 21 October.
44	S05	10/21	Minor plage growth.
25	S15	10/19	Birth of small active region that reached maximum as class C spot group 21 October.

Days without H-alpha photographs were 29 September and 18 October 1972.

Hα SYNOPTIC CHART

1972 – ROTATION 1593



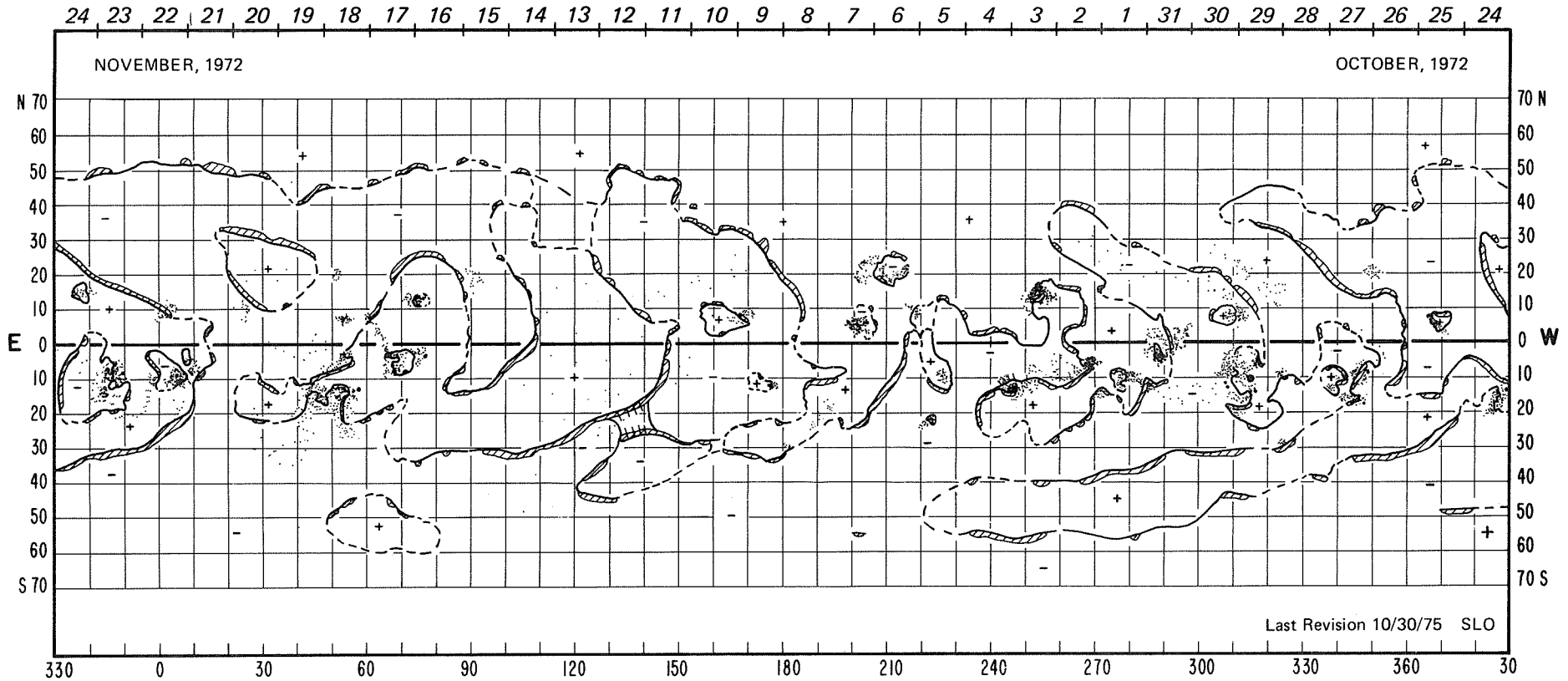
Hα SYNOPTIC CHART
1972 - Rotation 1594

°Long.	°Lat.	Date	Descriptive Notes
360	S31	CMP 10/26	Filament was exceptionally large and stable for the entire disk transit.
335	N20	11/1	Large filament disappeared.
312	S10	10/30	Peak development of a great active center with sunspot group exceeding 1500 millionths of the solar hemisphere in area. Complex active absorption features formed frequently west and north of the giant leader spot.
308	N07	10/28	Birth of small region which declined after 28 October.
		11/4	New region born near position of previous region.
305	S32	10/30	Filament disappeared.
288	S04	11/4	Birth of large active region that grew rapidly to at least a class D spot group by west limb passage 6 November.
285	S12	11/3	Small plage formed at terminus of filament.
282	S37	11/2	Filament disappeared on same neutral line as filament disappearance of 30 October. Re-formed 4 November.
279	S11	10/29	Birth of small region.
254	N14	10/30	Birth of small region.
247	S13	11/3	Birth of tiny region, which was associated with filament disappearance of 5 November.
		11/8	Second and more important growth near west limb.
225	S10	10/31	Birth of small plage.
210	N20	11/11	Birth of region within faint extended plage. Still growing at west limb next day.
205	S18	11/5	Filament disappeared; re-formed gradually during remainder of disk passage.
202	N05	11/9	Birth of region which grew to class D spot group by 12 November.
140	S22	11/15	Merger of two large positive cells.
125	S25	11/12	Large filament disappeared.
105	S05	11/15	Partial disappearance of large filament.
75	N14	11/13	Birth of small active region.
53	N07	11/16	Birth of small active region.
51	N20	11/19	Tiny plage clearly visible 1 day only.
33	N30	11/17	Filament disappeared.
25	N15	11/16	Filament disappeared and gradually re-formed by 19 November.
7	S08	11/20	New region developed rapidly but quickly dissipated next day.
		11/22	New and even stronger development that attained a class D sunspot group by 25 November. Filaments north and west of the region were active and disappeared 23 November.
	S18	11/23	Small region formed; disappeared by 26 November.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1972 – ROTATION 1594



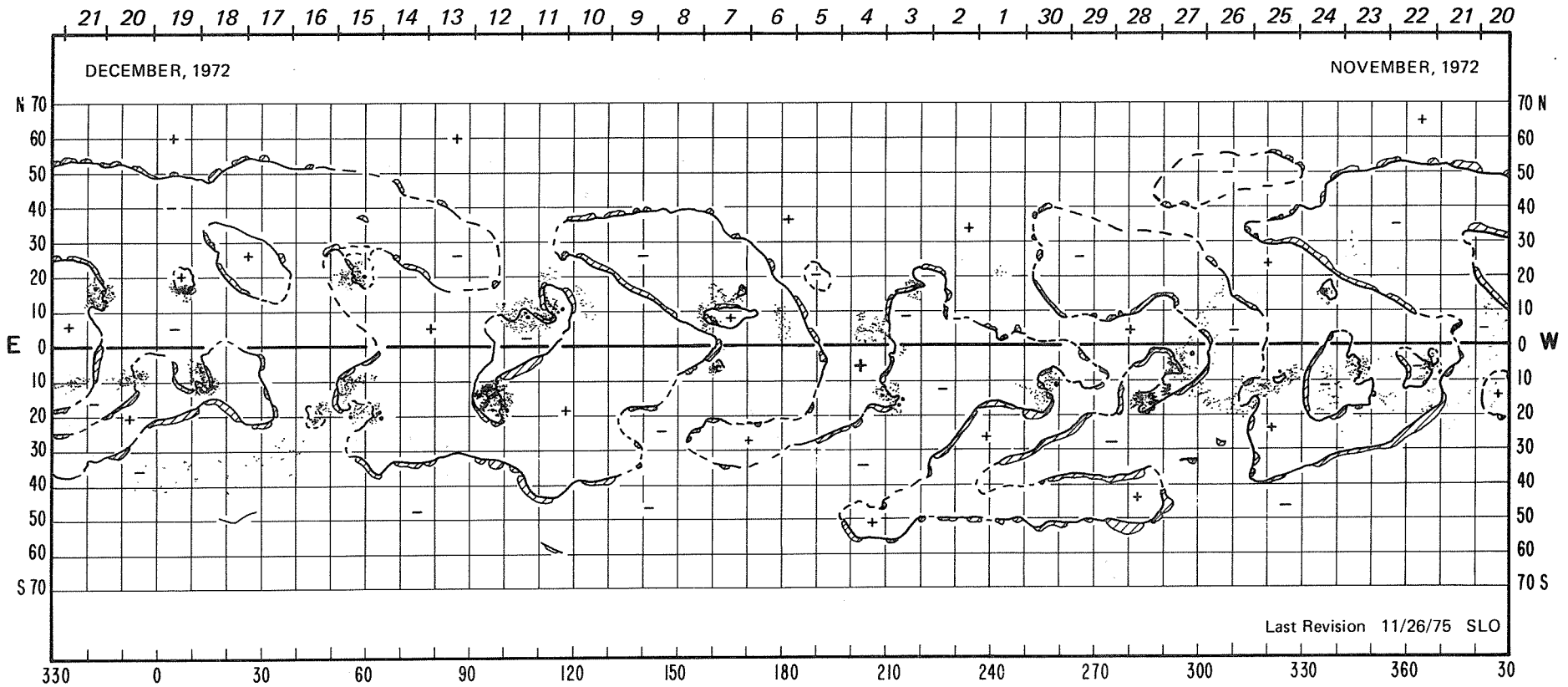
Hα SYNOPTIC CHART
1972 - Rotation 1595

°Long.	°Lat.	Date	Descriptive Notes
337	N15	11/24	Birth of small region.
323	S11	11/23	Plage with small circular neutral line emerged south of large sunspot, becoming very weak by 29 November.
284	S17	11/27	Birth of small region.
		11/30	Second and more important growth to class D spot group.
240	S16	12/3	Filament disappeared.
211	N12	12/4	Filament disappeared.
210	S14	12/2	Birth of small region that reached maximum 5 December as class C spot group with polarities reversed from normal arrangement for Southern Hemisphere.
162	S05	12/9	Birth of small region.
110	N10	12/6	Birth of strong region on following boundary of old plage at east limb. Large, complex region formed from collision and merger of these two regions.
		12/9	Region maximized as class D spot group.
105	S06	12/11	Large filament disappeared concurrent with new regions forming near its southern terminus.
95	S17	12/9	Birth of small region that merged with the negative cell to the north by 15 December.
60	N20	12/11	Birth of small region.
	S20	12/11	Birth of large active region that grew to class E spot group by 13 December.
8	N20	12/17	Birth of small region that disappeared by 22 December.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1972 – ROTATION 1595



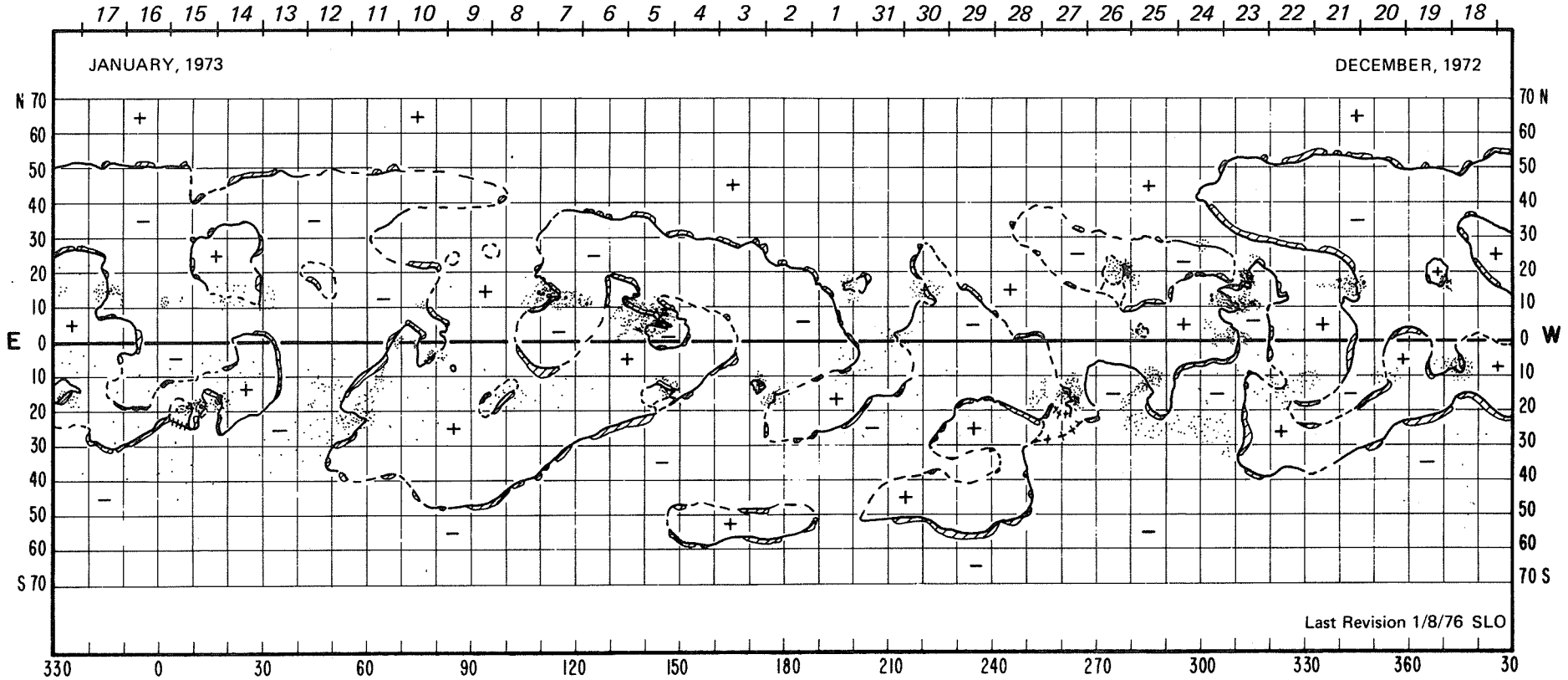
Hα SYNOPTIC CHART
1972-1973 - Rotation 1596

°Long.	°Lat.	Date	Descriptive Notes
360	N03	12/20	Filament active throughout disk passage.
353	S10	12/15	Birth of small active region.
350	N52	12/20	Filament active throughout disk passage.
345	N18	12/16 12/17 12/20	Region formed as small brightening beneath filament. Filament disappeared. Maximum development of D type spot group.
329	S16	12/26	Small plage formed on west limb.
318	N29	12/23-24	Filament disappeared.
314	N18	12/20 12/25	Birth of small region. Significant brightening; region merged with larger region to the south.
313	S10	12/15	Birth of small active region.
310	N12	12/20 12/25	Birth of active region. Region at peak activity as class E spot group.
264	S18	12/29	Small region appeared in position of old faint plage.
217	N22	12/27 12/31	Filament disappeared; gradually re-formed during next 3 days. Filament disappeared.
200	N15	1/2	Birth of small region.
175	S18	1/1	Birth of small region.
173	S13	1/6	Birth of small region in old plage area.
148	N10	12/31	Filament west of large active region near east limb disappeared.
146	S23	1/5	Filament formed; disappeared 6 January.
140	N09	12/30	Probable birth of region on east limb. Region at maximum activity as class C spot group on 6 January.
135	S34	1/1	Filament spread and dissipated; re-formed 8 January and grew large again.
115	N14	1/6	Maximum activity as type E spot group.
110	S09	1/8	Filament disappeared.
18	S18	1/9	Birth of small region near east limb.

Note: Days without H-alpha photographs were 19 December 1972 and 3 January 1973.

Hα SYNOPTIC CHART

1972-73 – ROTATION 1596



Hα SYNOPTIC CHART

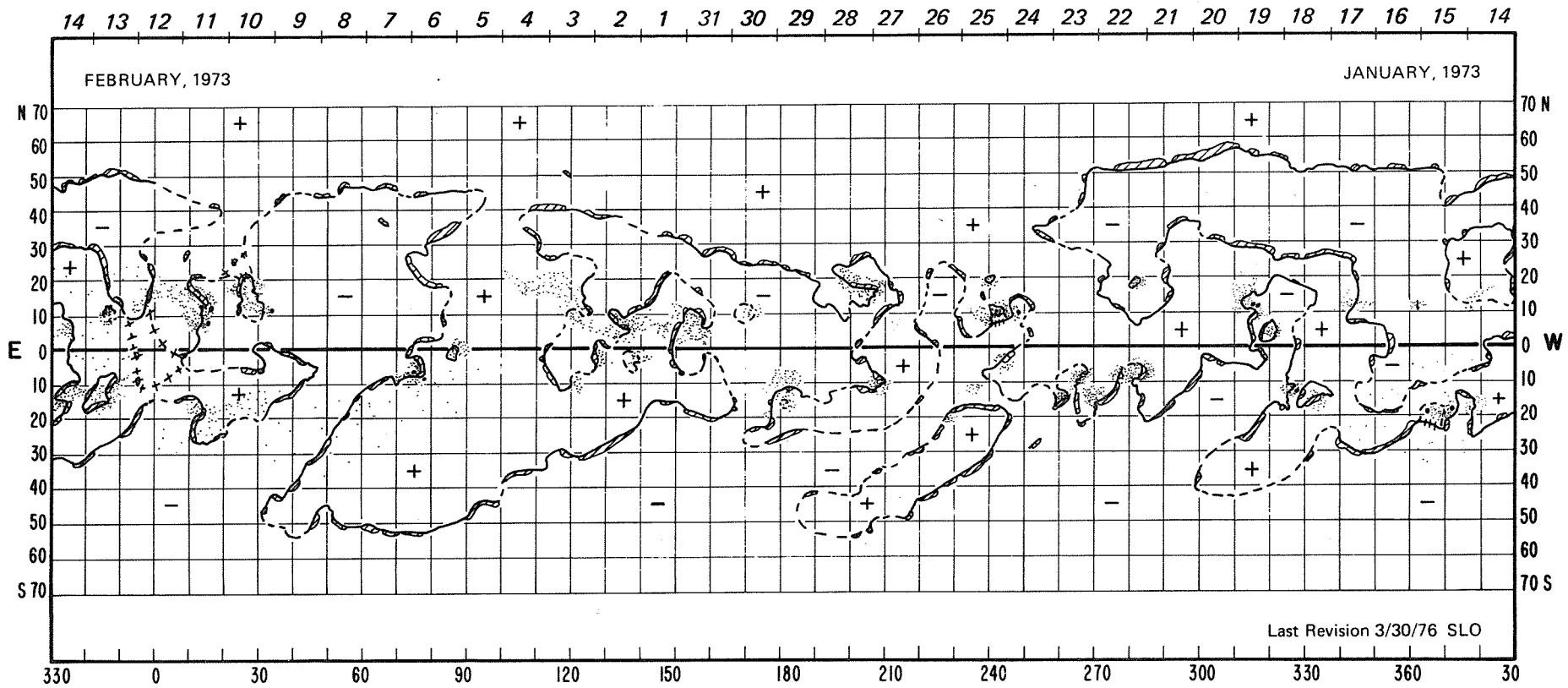
1973 - Rotation 1597

°Long.	°Lat.	Date	Descriptive Notes
355	Equator	1/20	Filament disappeared.
327	S12	1/17	Birth of active region that attained moderate-sized type D spot group by 21 January. Cell of negative polarity immediately west of region was bounded by active filaments 3 days before region formation.
321	N03	1/18	Birth of small region, which grew only 1 day, then decayed through remainder of disk passage.
316	N12	CMP 1/20	Large sunspot returned from previous rotation with almost all of plage in follower polarity along a curve concentric to the sunspot. Little changed until central meridian passage, when weak new plage formed east and southwest of spot on 20 January. Southwest portion brightest on 23 January.
315	S25	1/17	Large filament disappeared in apparent response to new region (327,S12) emerging at low latitude end of filament.
295	S15	CMP 1/21	Exceptionally large and active filament.
290	N25	1/24	Filament disappeared.
283	N18	1/20	Birth of small active region.
260	S15	1/22	Faint region formed in old plage.
248	N14	1/26	Small curved filament disappeared.
246	N10	1/20-22	Small region born near east limb; began decay 21 January. Second region formed at east end of first region and the two merged into a common neutral line by 25 January. The older western member was gone by 24 January.
240	N19	1/24	Birth of small region.
210	S10	1/23	Birth of small region near east limb.
		1/29	Minor new growth.
	N10	2/1	Filament grew larger 28-31 January and disappeared 1 February.
183	S16	2/3	Small region born near west limb.
165	N28	2/1	Large filament gradually fragmented after 1 February as reconfiguration process may have begun. Note change in this pattern on rotation 1598.
146	N20	2/6	Large filament disappeared near west limb. This occurrence may be part of process of large-scale reconfiguration along the neighboring neutral line that is evident on rotation 1598 and later.
138	S02	2/5	Birth of small region.
87	Equator	2/1	Appearance near east limb of short-lived plage; gone by 4 February.
77	S05	2/1	Birth of active region near east limb. Maximum spot development 3 February as class C spot group. Filaments developed within and east of region 8 February.
40	S12	2/10	Filament disappeared simultaneously with formation of filament at S02 on same neutral line.
31	N12	2/7	Birth of small region that reached maximum development 10 February.
		2/11-12	Additional region growth occurred.
		2/13	Additional flux region appeared directly north, presenting a complex bright region on 14 February as the area approached west limb.
18	S08	2/17	Small bright plage born near west limb (not on chart).
14	N10	CMP 2/12	Large region consisted of a pair of regions aligned north-south on a common neutral line with large leader spots in both regions. Growth occurred in smaller, southern (N08) member 12-13 February. Northern member declined slowly throughout disk passage.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1973 – ROTATION 1597



Hα SYNOPTIC CHART

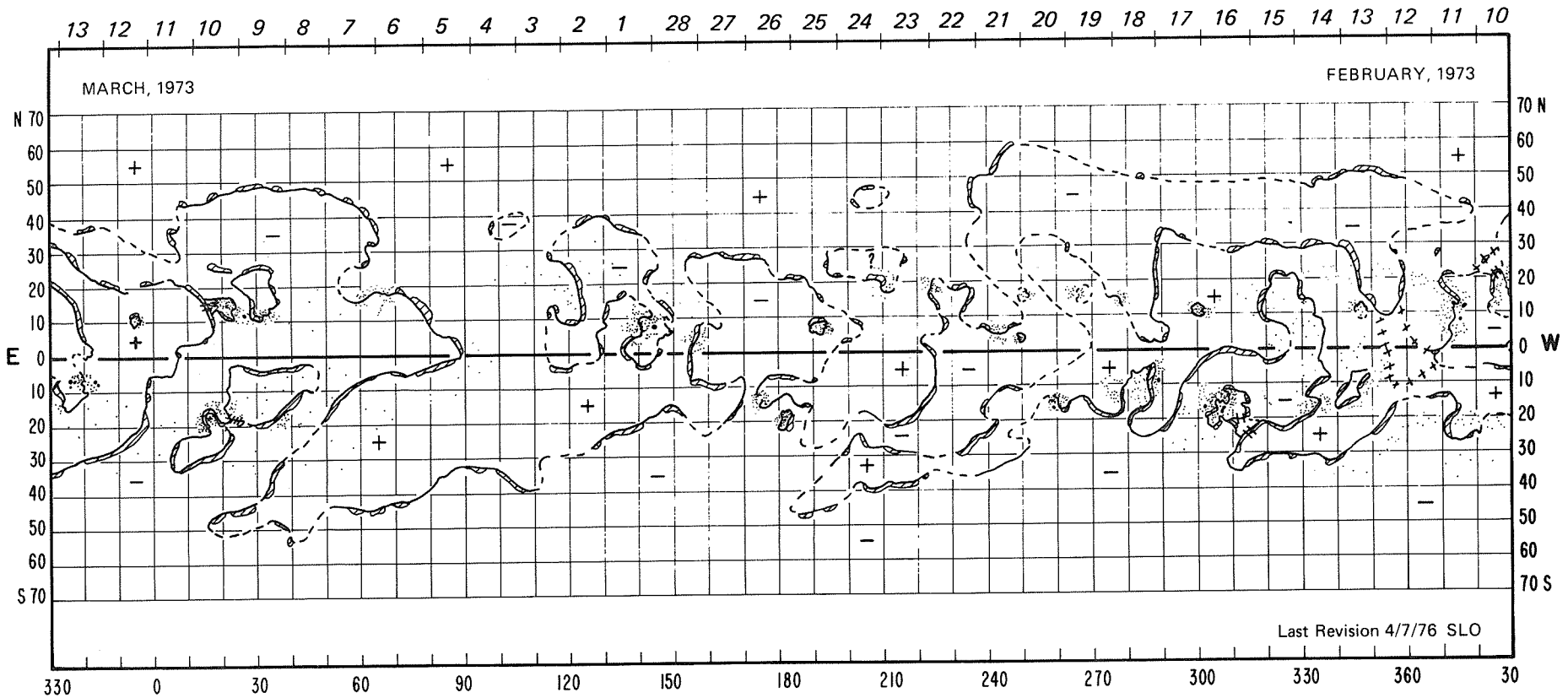
1973 - Rotation 1598

°Long.	°Lat.	Date	Descriptive Notes
355	S18	2/8	Filament near east limb partially disappeared.
	S05	2/8	Two filament fragments disappeared. Crossed out neutral line here and to northwest probably disappeared at this time as magnetic patterns re-formed.
347	S13	2/10	Filament embedded in faint plage became elevated from neutral line.
345	N10	2/12	Birth of small region, which remained at constant intensity and small size for nearly all its disk passage.
	N25	2/19	Filament disappeared near west limb. First became conspicuous 12 February.
320	S22	2/14-16	Large filament disappeared except for small fragment that moved slowly southward until 18 February. Western portion of filament, which was part of neutral line within an aged active region, enlarged and darkened after 15 February.
	N17	2/19	Filament disappeared. Enlarged significantly 12 February. Evolution appeared to parallel filament at (345,N25).
317	S32	2/19	Small filament disappeared.
310	S01	CMP 2/12	Large east-west filament was exceptionally active and elevated throughout disk passage.
305	S16	CMP 2/16	Moderate-sized active region was growing at east limb transit 10 February. Second bipolar area emerged a few degrees east of neutral line 16 February. A third region emerged north of this complex 18 February. Entire region was fading at time of west limb passage 22 February.
303	N11	2/16	Birth of tiny region. Rapidly dissipated 18 February.
287	S09	2/22	Filament formed in decaying active center 16 February and became elevated 21 February before erupting with consequent flare 22 February. Filament activity appeared related to other active filaments along the same highly convoluted neutral line.
278	S15	2/15-23	Filament formed 15 February and developed progressively along curved neutral line south and east. Disappeared 21 February in apparent response to developing active region to the east. Re-formed 23 February, just before west limb passage.
	N15	2/17	Birth of very small region.
274	S10	2/23	Birth of small active region that reached peak development 24 February and was fading at west limb 25 February.
260	S15	2/18	Birth of small active region that reached peak development 20 February. Minor growth 24 February.
251	N16	2/20	Birth of small active region. Faint and fading throughout disk passage.
249	N03	2/22	Birth of tiny active region.
235	N45	2/20	Filament disappeared.
234	N14	2/20	Filament disappeared.
223	N18	2/16	Birth of small region near east limb. Slow growth through 19 February. Filament formed within the decaying plage 22 February.
222	S15	CMP 2/23	Large filament elevated and active throughout disk passage.
193	N06	2/24	Birth of small active region that developed slowly through 1 March.
182	S20	2/19	Probable date of birth of small active region at east limb. Developed circular embedded filament 22 February. Nearly invisible by west limb passage 4 March.
177	N23	2/22	Part of filament near east limb disappeared.
174	S14	2/20	Probable date of birth of small active region at east limb.
		2/28	Rapid growth to class D spot group. Decayed at west limb 4 March.
165	N27	2/28	Filament disappeared.
160	S09	2/27	Filament disappeared.
156	S05	3/3	Large filament formed.
140	N07	2/25	Peak development of large active region that formed at location of great region of rotation 1596.
		2/28	New plage with flares formed on west boundary of the large leader sunspot. This activity had faded by 4 March.
138	S22	2/27	Filament disappeared and re-formed next day.
		3/1	Filament disappeared and re-formed again.
122	N22	2/27	Filament disappeared. Re-formed 28 February and enlarged steadily until west limb passage 8 March.
118	S05	2/26	Filament visible this day only.
100	S35	3/7	Filament disappeared but re-formed next day.
76	N15	3/4	Most of filament disappeared.
75	S05	3/8	Filament became oriented more east-west and became active from this day until limb passage 13 March. These developments occurred as distance to a neutral line to the east decreased noticeably. The two neutral lines combined by the next rotation.
60	N17	3/5	Small region, which was bright on 1 March at east limb, faded as it evolved into a cellular form.
24	N14	3/6	Birth of region within extensive area of faint plage. Became large type C sunspot group by 8 March.
20	S18	3/9	Merger of two large-scale areas of positive polarity as a result of expanding active region fields.
15	S18	3/5	New plage with spots formed north of older region.
	N16	3/9	Filament disappeared as active region to west expanded to cause rearrangement of neighboring neutral lines. Large section of filament remained visible 10-13 March, 10° north of this location and apparently suspended far above the neutral line.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1973 – ROTATION 1598



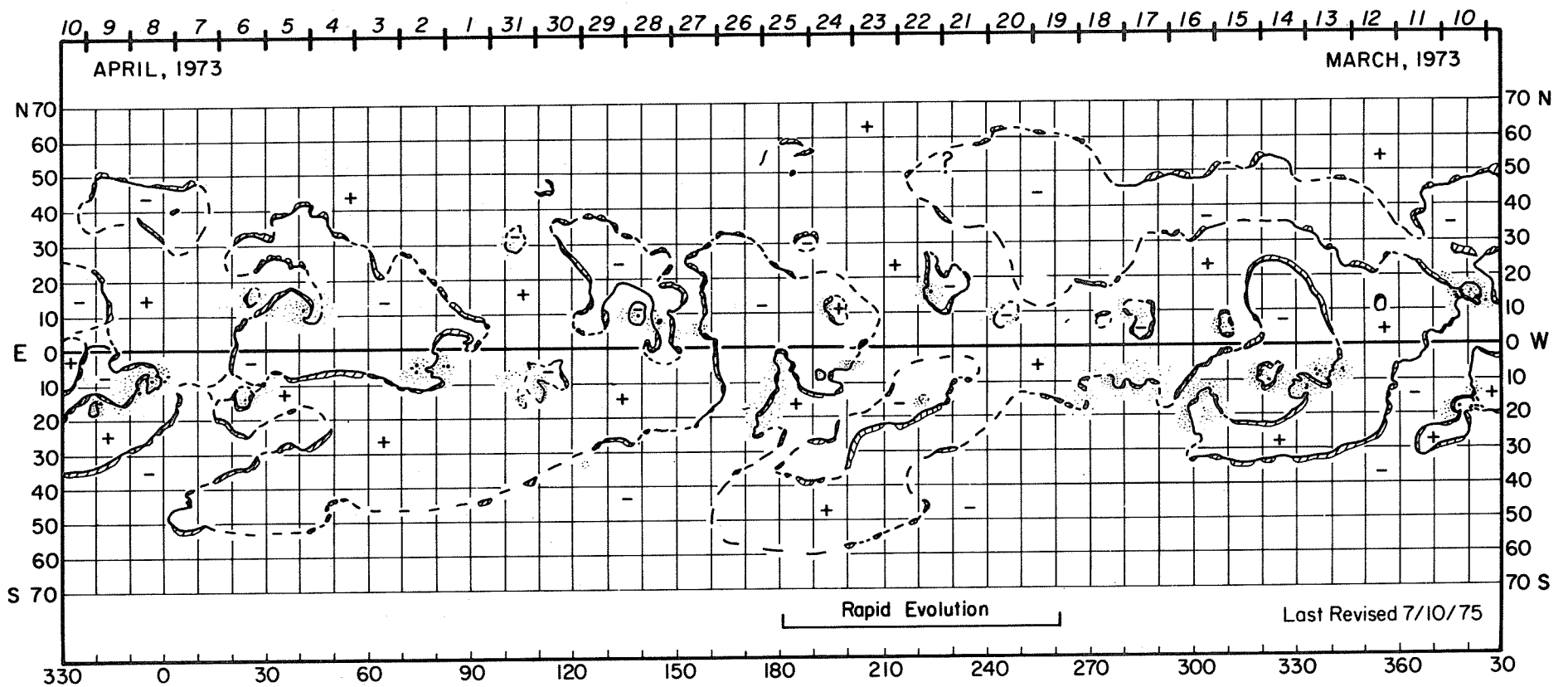
Hα SYNOPTIC CHART
1973 - Rotation 1599

°Long.	°Lat.	Date	Descriptive Notes
340	S05	3/8	Probable date of birth of active region at east limb. Grew rapidly to maximum on 11 March as class E spot group.
328	S12	3/10	Birth of important active region on western border of old plage that contained a large, single leader sunspot. Grew to maximum by 14 March as class D spot group with old leader spot appearing as the "follower" of the group.
308	N06	3/11	Birth of small active region.
230	S20	3/22	Filament partially disappeared; re-formed 23 March.
		2/24	Filament disappeared.
223	N15	3/15	Probable birth of active region on east limb.
		3/23	Region showed slow development to class C maximum. Bright compact plage featured throughout disk passage.
220	S15	3/22	Birth of tiny plage, possibly associated with disappearing filament. Plage disappeared following day.
206	S22	3/25	Filament disappeared.
194	N10	3/22	Birth of small region which disappeared 25 March.
144	N08	3/28	Central meridian passage of large complex region on second disk passage.
140	N10	3/30	Rapidly developing region appeared at approximately 2200 UT. Region became quite large and bright within hours of birth and began to merge with large region to the west before completing disk passage.
		4/1	Reached maximum as D-type spot group.
120	N25	3/27	Large filament disappeared.
110	S10	3/28	Birth of small region.
78	S06	3/29	First maximum of class E spot group.
		4/2	Important new growth of spots and plage on northern border of large class E spot group. Maximum development by 4 April of blend of these two bipolar areas. This region developed in the same heliographic location as important region of rotation 1597.
60	N10	CMP 4/3	Large-scale cell of negative polarity extended 40° in latitude and over 60° in longitude. This feature separated from patterns to its east on this solar rotation and remained a distinctive, large, isolated cell near the solar equator for the remainder of 1973. By rotation 1603 it had evolved into the form of a "fish". This evolution is seen clearly in the series of shaded charts at the end of this atlas.
43	N12	3/31	Growth began within old, small plage and spot group near east limb.
		4/1	Maximum development as a class D spot group with high magnetic gradient and spots in abnormal north-south configuration.
		4/8	Filament disappeared within this region.
25	S13	4/1	Birth of small region.

Note: Days without H-alpha photographs were 2 and 6-7 April 1973.

Hα SYNOPTIC CHART

1973 - ROTATION 1599



Hα SYNOPTIC CHART

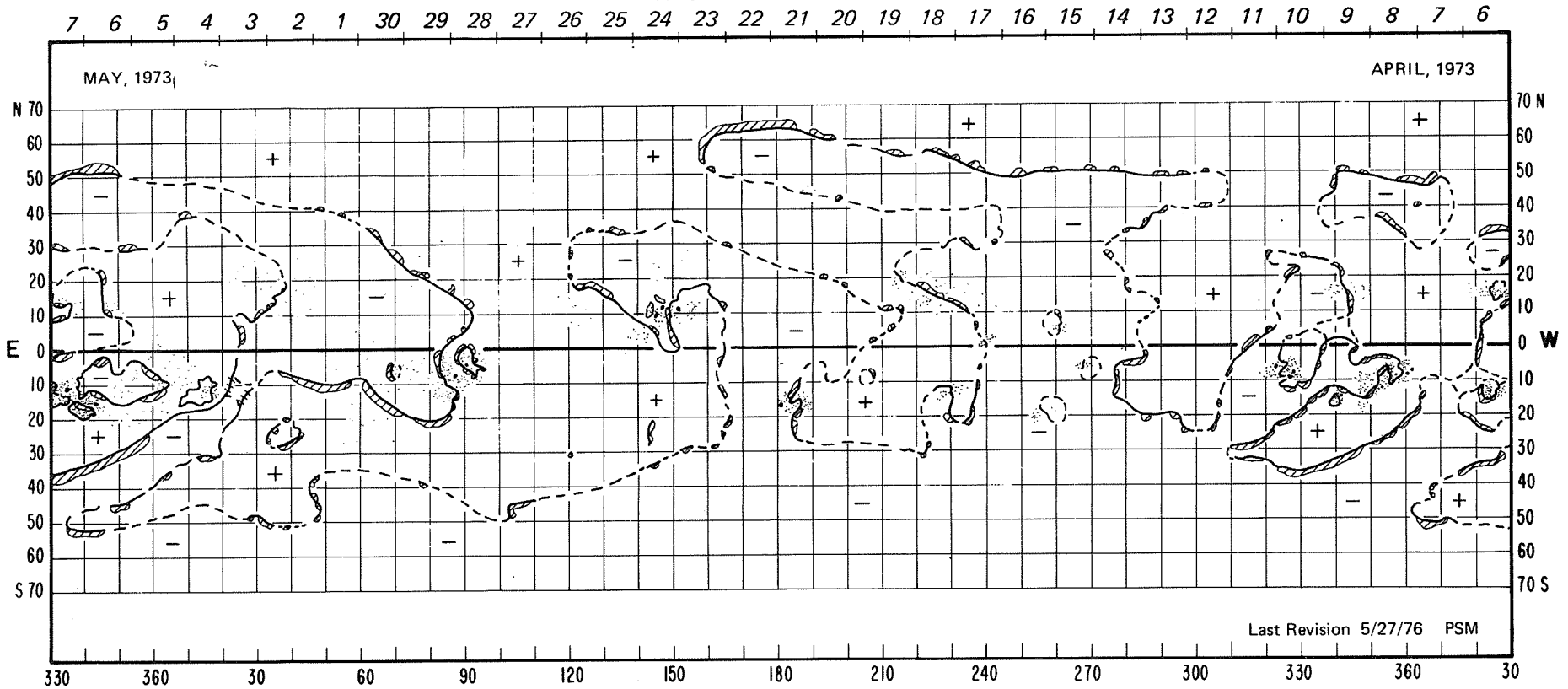
1973 - Rotation 1600

°Long.	°Lat.	Date	Descriptive Notes
357	S09	4/9	Minor growth within extensive remnants of significant region that had returned from previous disk passage.
340	S38	4/11	Filament became very large and dark and remained so until completion of disk passage.
335	S05	4/9	Large filament, which delineated neutral line between two large active regions, disappeared.
325	S05	4/6	Birth of large active region that grew rapidly to an E-type spot group by 9 April.
		4/9-12	Region's plage combined with that from region to the west, forming a large bright plage complex.
		4/12	Plage brightened and region separated from western region.
315	Equator	4/9	Filament disappeared.
283	S03	4/16	Filament disappeared.
278	S05	4/16	Filament disappeared.
270	S05	4/12	Birth of small region.
260	S19	4/13	Birth of small region.
259	N05	4/14	Birth of small region.
185	S15	4/17	Birth of active region, that reached maximum as a small D-type spot group on 22 April.
150	N05	4/21	Large filament disappeared that was associated with complex active region. Reappeared following day as long, thin, dark filament.
	N10	4/23	Maximum development of class E spot group with polarities reversed from normal arrangement for Northern Hemisphere. Region appeared to evolve as two overlapped bipolar spot groups. It contained a "delta" configuration and produced a large proton flare.
		4/26	Second major growth phase began and reached maximum 29 April as compact, round penumbra of 1000 millionths area with strong "delta" configuration.
88	N03	4/27	Filament disappeared.
	S05	CMP 4/29	Second disk transit of region in area that had been active since rotation 1597; it continued to be active until rotation 1603. This region formed the leading boundary of the large-scale, negative-polarity cell called "the fish".
	S03	4/30	Top of horseshoe formation of filament disappeared.
83	S03	4/27	Filament disappeared.
65	S15	4/25	Filament rotated onto disk as very large and dark feature.
15	S12	5/4	Birth of small region.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1973 – ROTATION 1600



Hα SYNOPTIC CHART

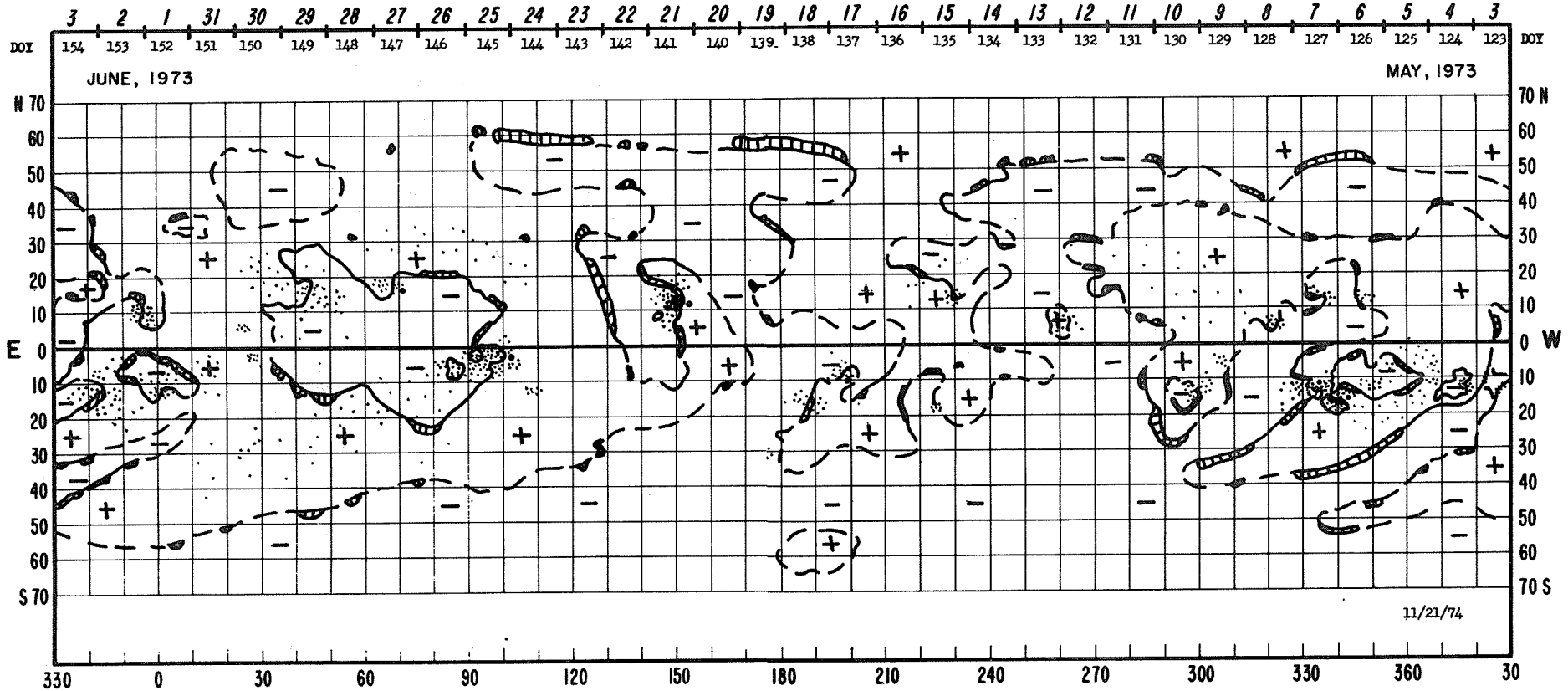
1973 - Rotation 1601

°Long.	°Lat.	Date	Descriptive Notes
332	S12	5/3	Birth of strong active region in following portion of larger region with declining class E spot group. New spots reached maximum by 6 May as class D group and blended with older group to give appearance of a class F spot region. All spots had nearly disappeared before west limb passage.
305	S33	5/8	Filament disappeared.
300	S15	5/3	Probable date of birth of small active region on east limb.
290	S29	5/10	Filament disappeared.
263	N05	5/11	Birth of small region.
198	S08	5/14	Birth of small region that reached maximum as a C-type spot group 16 May.
180	N58	5/21	Filament disappeared.
151	N11	5/19	Major region, with polarities reversed from normal arrangement for Northern Hemisphere, was at maximum spot area as complex class D group.
109	S12	5/23	Birth of small region.
100	S03	5/24	Birth of active region on boundary of faint extensive plage. Reached maximum activity as D-type spot group next day. This was fourth consecutive disk passage for activity at this location.
69	N18	5/27	Birth of small region that reached peak activity as C-type spot group on 29 May.
43	N15	5/27	Small bright region appeared in old plage 1 day only.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1973 - ROTATION 1601



Hα SYNOPTIC CHART

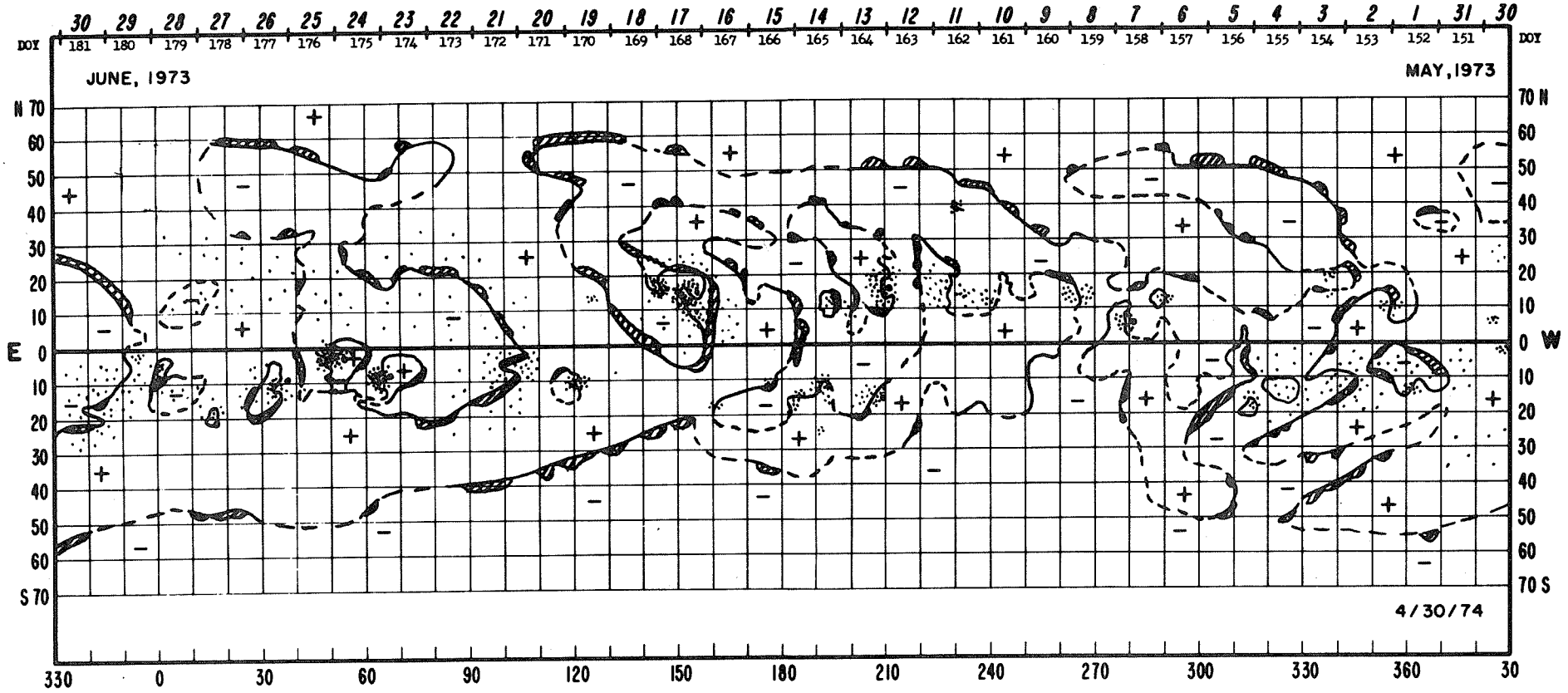
1973 - Rotation 1602

°Long.	°Lat.	Date	Descriptive Notes
355	N12	6/2	Filament disappeared.
352	S03	6/2	Filament disappeared.
340	N07	6/2	Filament disappeared.
300	N12	6/7	Birth of small region. Reached maximum as B-type spot group on date of birth, then dissipated rapidly.
280	N05	6/6	Birth of small region.
265	N15	6/5	Birth of small region.
		6/11	Beginning of rapid growth.
		6/14	Probable maximum development at west limb as a D-type spot group.
210	N15	6/9	Significant plage brightening was followed by rapid decay and spreading of this region. Had D-type spot group from 7-11 June. Region rotated onto disk 6 June.
		6/15	Large flare occurred on day spot group diminished to single spot without penumbra. Flare was extensively recorded by Skylab ATM telescopes.
196	N12	6/10	Birth of small short-lived region.
160	N10	6/13	Disappearance of very large filament in apparent response to developing active region east of this location.
154	N15	6/13	Peak development of reversed polarity, class D spot group at identical site of the great reversed-polarity region of the previous two solar rotations. Source of numerous strong flares observed with Skylab ATM telescopes.
145	N17	6/14	Birth of active region near following border of active, reversed-polarity region. Blended with older region by 17 June.
132	N08	6/16	Large filaments disappeared. Re-formed next day and became especially large by west limb on 24 June.
63	S09	6/18	Birth of region near east limb. Reached maximum as a D-type spot group 19 June. Very similar to region that followed closely near same latitude. These two regions lay within the large-scale area known as "the fish"--an area on its fifth disk transit as a recognizable feature.
50	S04	6/25	Central meridian date of region that rotated onto disk 18 June and reached maximum as a D-type spot group 20 June.
30	S20	6/28	Birth of small region on leading edge of old plage.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1973 – ROTATION 1602



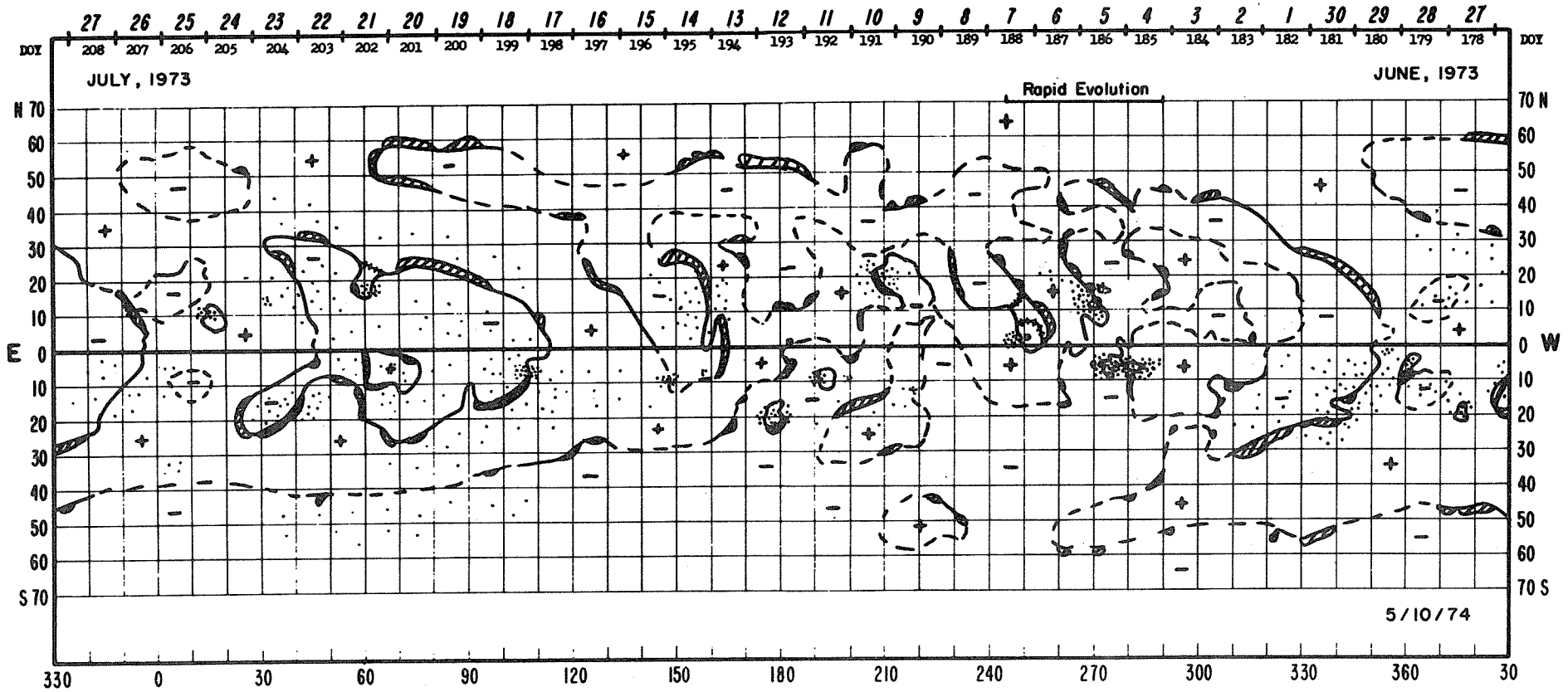
Hα SYNOPTIC CHART
1973 - Rotation 1603

°Long.	°Lat.	Date	Descriptive Notes
340	N22	7/3	Large filament disappeared.
277	S04	6/30	Birth of small region that merged with larger region to the west. Peak activity on 6 July as D-type spot group.
269	N12	CMP 7/5	Large region featuring a large, symmetric leader spot and a plage almost totally confined to the follower portion. Extensive fibril field surrounding the region reached to the borders of small active regions southwest and southeast of this region. Source of great flare on 29 July during next solar rotation.
		7/8	Birth of new plage and spots southeast of the large leader spot. New spots formed small class D spot group by 10 July, just before west limb passage.
248	N03	7/6	Birth of region with peak development next day as C-type spot group.
203	N09	7/6	Filament disappeared.
180	N51	7/12	Filament disappeared.
178	S20	7/6	Birth of small region.
163	Equator	CMP 7/13	Exceptionally active equator-crossing filament.
155	N25	7/13	Large filament disappeared in area of extensive faint plage.
107	S07	7/15	Birth of small region on leading boundary of "fish" and amid faint remnant plage.
22-114	N33-S28	CMP 7/20	Sixth disk passage of "fish" as a distinctive large-scale feature. During this rotation its form most suggested its designated name.
62	N18	7/18	Birth of small region.
30	S25	7/25	Filaments disappeared.
15	N10	7/24	Birth of small region.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1973 - ROTATION 1603

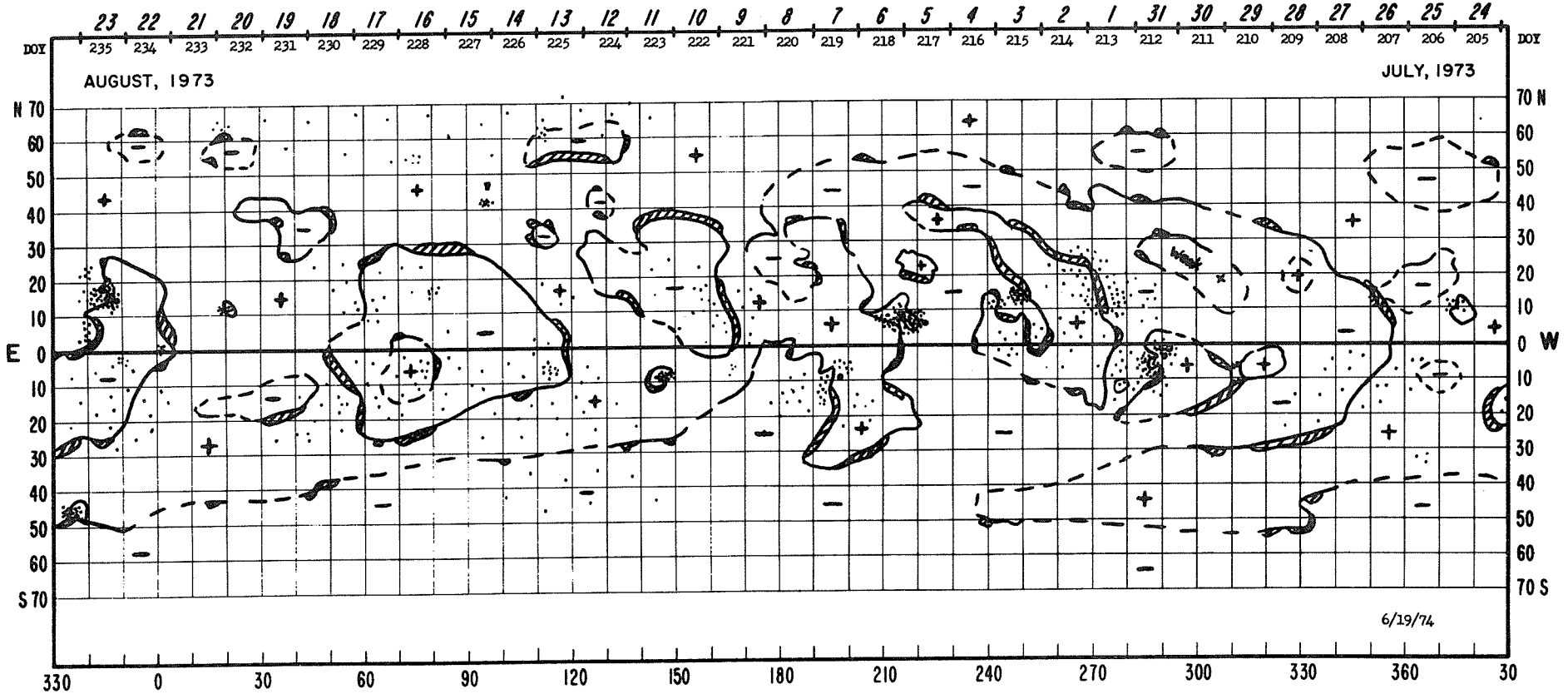


Hα SYNOPTIC CHART
1973 - Rotation 1604

°Long.	°Lat.	Date	Descriptive Notes
271	N13	7/29	Large flare occured with disappearance of elevated dark filament inside old plage area. Filament re-appeared after flare and remained a strong feature until end of disk passage. Although the region contained strong spots during the previous rotation, it contained no spots during this disk passage.
265	N23	8/7	Disappearance of filament at west limb associated with above region.
249	N14	8/8	Birth of region at west limb. Very bright next day during limb passage. Returned as large region next rotation.
245	N20	8/6 8/8 8/9	Filament, which appeared 3 August, disappeared. Filament re-formed as exceptionally large feature. Filament disappeared at west limb in apparent response to emerging region.
216	N08	8/3	Birth of active region that reached maximum 7 August as D-type spot group.
145	S10	8/6	Birth of small region.
136	N12	8/9	Filament disappeared.
20	N10	8/24	Birth of very small bright region.
5	N05	8/20	Filament disappeared.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART
1973 - ROTATION 1604



Hα SYNOPTIC CHART

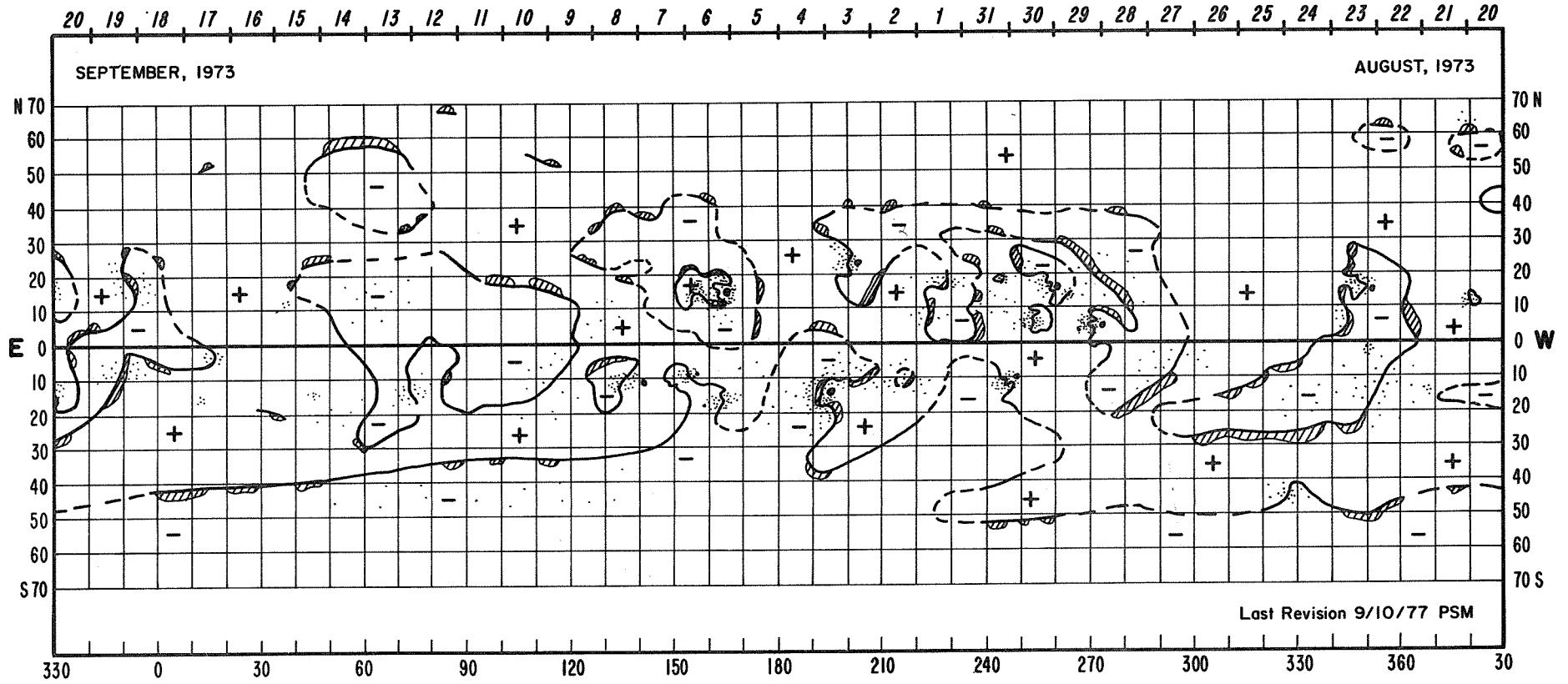
1973 - Rotation 1605

°Long.	°Lat.	Date	Descriptive Notes
350	N15	8/16	Probable date of birth of small region on east limb.
270	N05	8/25	Birth of active region that grew to small class D spot group by 27 August.
255	N05	8/31	Birth of small region that grew to maximum on 3 September as class B spot group.
249	N23	8/31	Filament disappeared.
248	S12	8/29	Birth of active region that reached maximum as class D spot group on 2 September.
239	N02	9/2	Filament disappeared.
218	S10	9/2	Birth of small region.
200	N22	9/2	Birth of active region that reached maximum as class D spot group on 3 September.
196	S20	9/6	Large filament, which accompanied region across disk, disappeared.
		9/7	Largest flare (class X) of Skylab period occurred in this region.
172	N25	9/2	Large filament disappeared near east limb.
163	S18	9/1	Birth of large region that reached maximum as class E spot group on 4 September.
153	S10	9/9	Birth of region that grew rapidly to maximum as class D spot group on 10 September. Decay began as it crossed the west limb.
130	S10	9/9	Filament formed a ring around this region and remained until region completed disk passage.
125	S10	9/1	Birth of fast-growing region near east limb. It reached maximum 5 September as class E spot group.
114	N18	9/9	Filament disappeared; re-formed 11 September.
72	S24	9/13	Filament disappeared.
63	S10	9/14	Filament disappeared.
18	S03	9/16	Birth of very small region.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1973 - ROTATION 1605

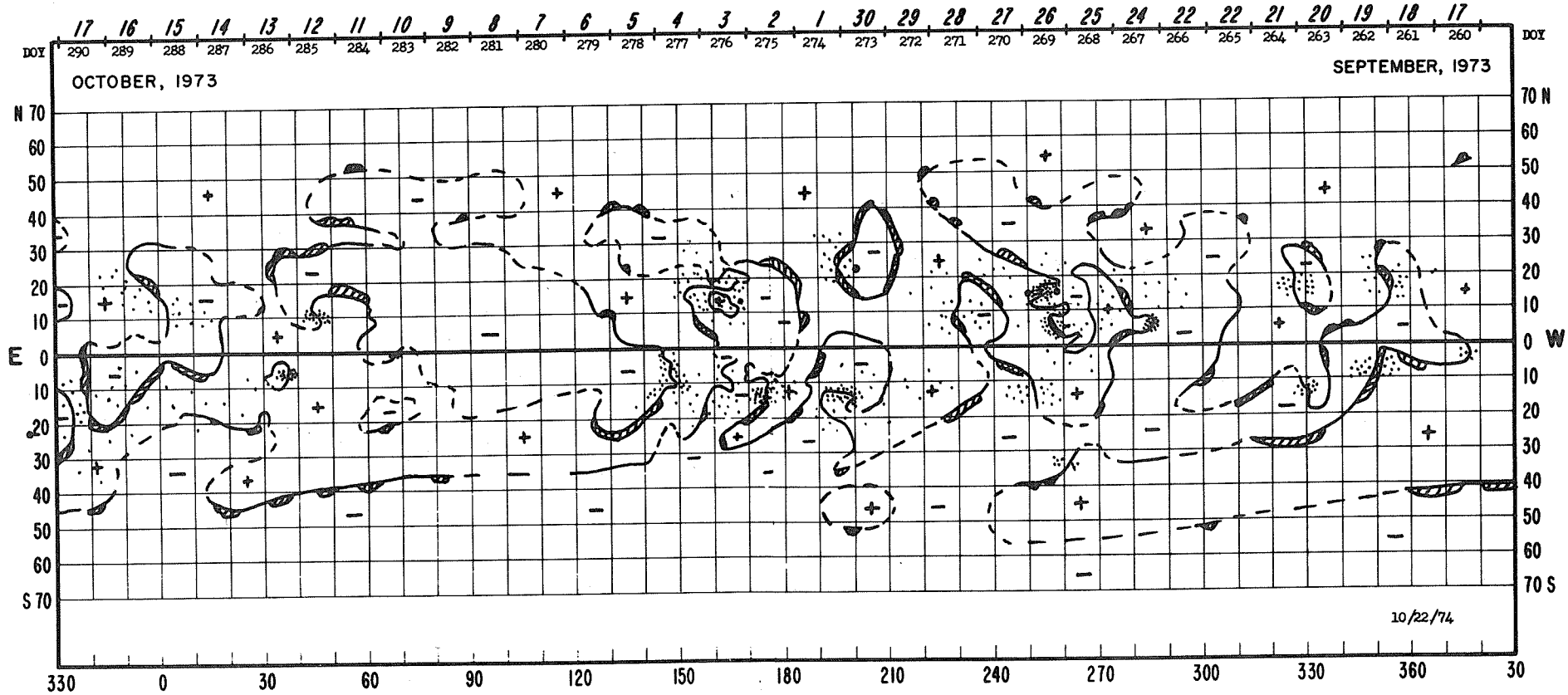


Hα SYNOPTIC CHART
1973 - Rotation 1606

°Long.	°Lat.	Date	Descriptive Notes
350	S05	9/16	Filament disappeared north of faint plage; re-formed 19 September.
		9/20	Filament disappeared again.
275	N05	9/18	Probable date of birth of small region near east limb.
274	N37	9/22	Filament disappeared.
244	N16	9/19	Probable date of birth of active region at east limb. Group emerged within faint plage on northern border of a small active region that rotated onto the disk 20 September.
		9/30	Maximum activity as class E spot group.
201	N22	9/30	Central meridian date of spot making its second disk passage. Spot encircled by filament ring that moved eastward during next two solar rotations.
195	S12	9/25	Probable date of birth on east limb of region in which maximum activity occurred on 1 October with a class C spot group.
180	N20	9/29	Filament disappeared; re-formed 2 October.
162	N13	10/7	Birth of small region.
70	S01	10/8	Birth of small region.
45	N10	10/10	Birth of small region. Began more rapid growth on 13 October and reached maximum as class C spot group on 17 October near west limb.
34	S07	10/14	Birth of small region that developed class C spot group.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART
1973 - ROTATION 1606



Hα SYNOPTIC CHART

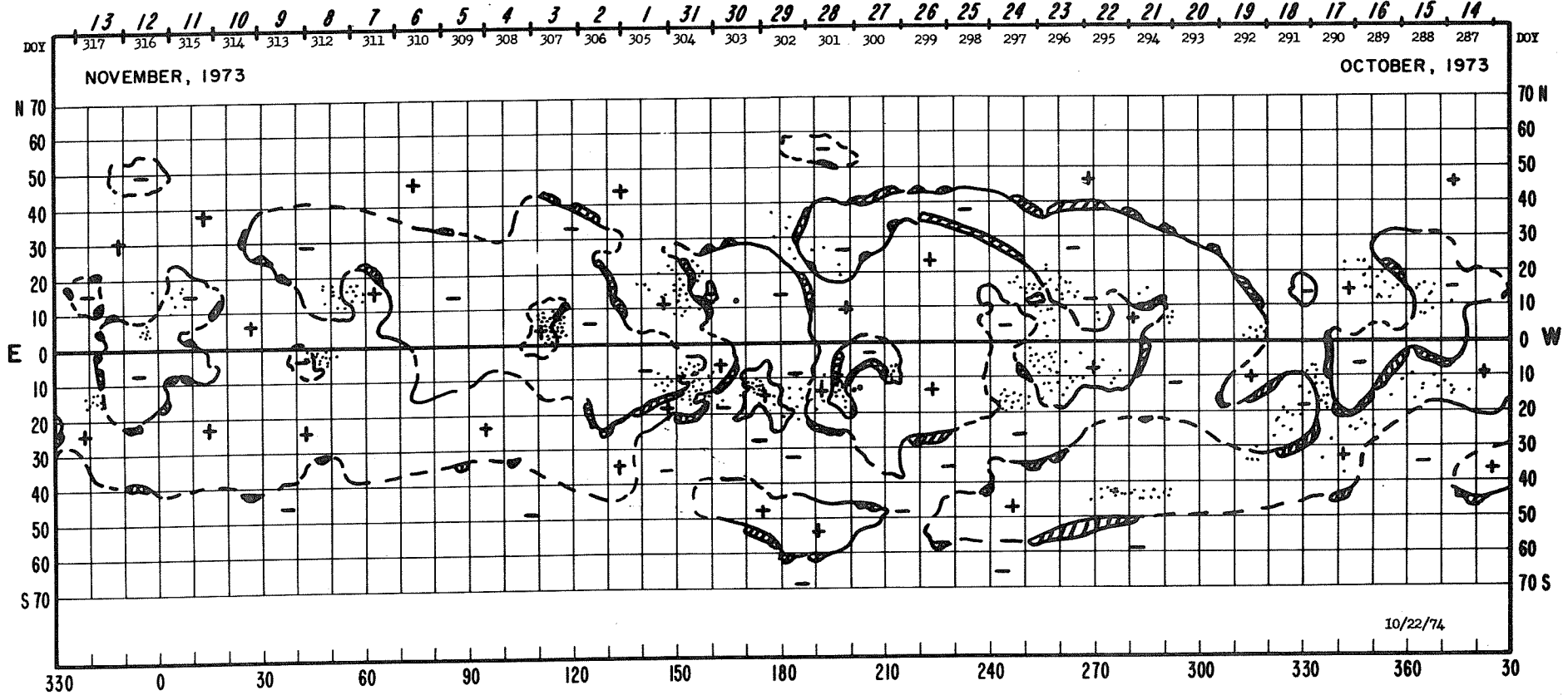
1973 - Rotation 1607

°Long.	°Lat.	Date	Descriptive Notes
330	S28	10/19	Filament disappeared.
288	N10	10/21	Filament disappeared.
255	N15	10/25	Spots became visible in H-alpha in old plage area that rotated onto the disk on 18 October. The C-type spot group was diminished by 26 October.
224	S27	10/27	Filament disappeared.
200	N30	10/24	Filaments in this area formed a large, closed cell, then opened and attached to western filaments on 28 October. Cell moved eastward to combine with large-scale area of negative polarity by next rotation.
199	S13	10/21	East limb passage of large region that formed where significant region was present since rotation 1604. Reached peak activity 22 October as a D-type spot group. Region decayed slowly throughout disk passage. Associated filaments were active.
196	S09	10/31	Filament within faint plage east of large class D spot group disappeared.
190	S25	10/30	Filament disappeared.
167	N12	10/30	CMP of single class H sunspot with little accompanying plage. This was third disk passage of leader spot that was associated with important flare-surge activity during September. Note its nearly stationary position while surrounding large-scale neutral lines were in motion relative to Carrington coordinates.
165	N29	10/31	Filament disappeared after slow fade from 29 October.
160	N28	10/29	Filament disappeared.
155	N15	11/2	Filament disappeared.
115	N05	10/28 11/2	Probable date of birth of small region at east limb. Filament disappeared from within faint plage.
49	S32	11/4	Filament disappeared.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1973 – ROTATION 1607

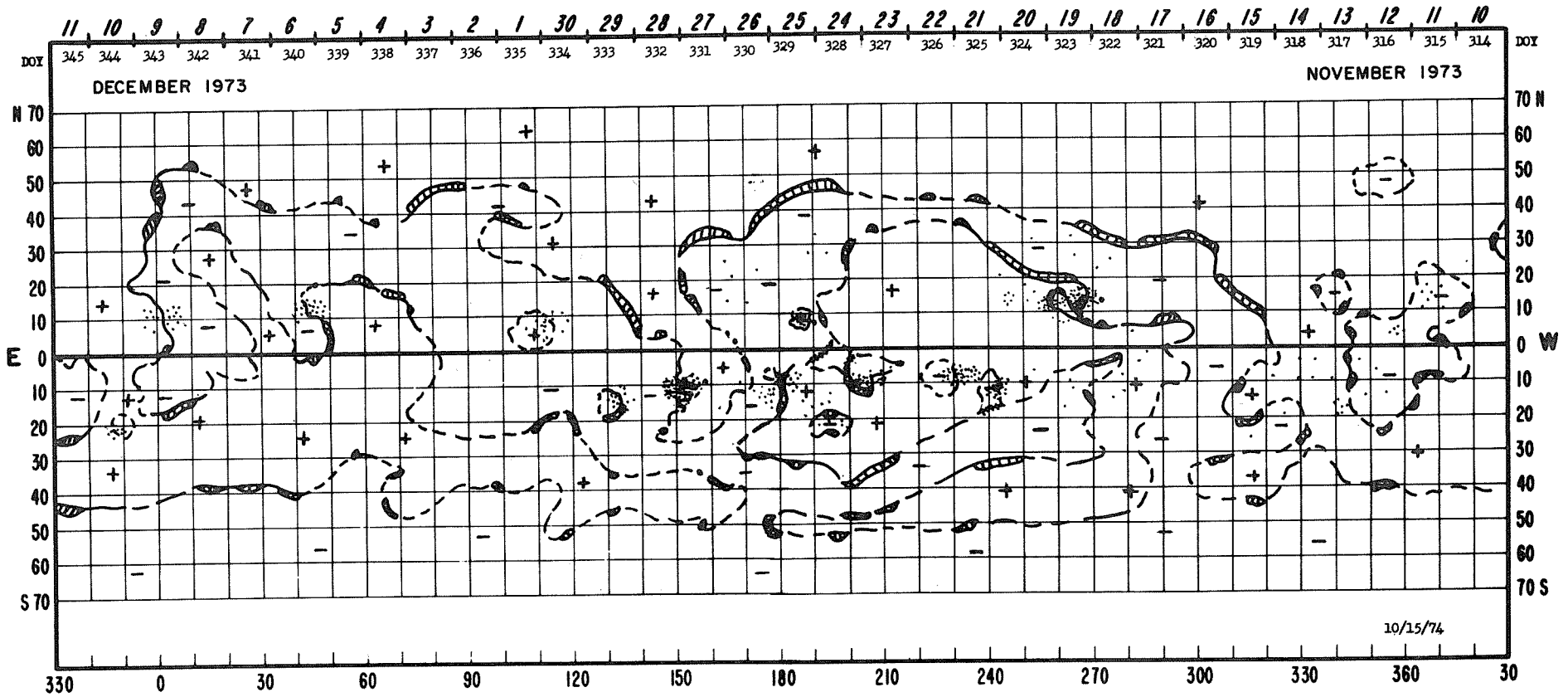


Hα SYNOPTIC CHART
1973 - Rotation 1608

°Long.	°Lat.	Date	Descriptive Notes
358	N05	11/12	Birth of small region, which decayed before completing disk passage.
320	N15	11/14	Large filament disappeared. Underlying neutral line had become convoluted since previous rotation, indicating change in neighboring large-scale velocity pattern.
265	N13	11/12	Probable date of birth of region on east limb that developed into a large class C spot group by 14 November.
258	N13	11/19	Birth of small region near follower portion of older plage.
243	S11	11/24	Birth of small active region.
233	S08	11/21	Birth of active region that reached maximum as class D spot group on 23 November.
208	S08	11/22	Filament disappeared near time of birth of region west of this location.
205	S10	11/25	Birth of small region in old plage area. Region decayed rapidly.
195	S18	11/21	Filament disappeared.
187	N09	11/24	Birth of small region that remained bright and stable throughout disk passage.
180	S13	11/18	Birth of small region that decayed rapidly.
		11/22	Large filament in this region disappeared.
	N09	11/29	Birth of active region within area of faint plage.
170	N32	11/26	CMP of exceptionally large filament in configuration of "seagull" and known as Jonathan Livingston Seagull by Skylab crew and ground support teams. Formed northern boundary of a large-scale feature that arose from the merger of two cellular areas of previous solar rotations.
152	S11	11/21	East limb passage of large and complex region that reached maximum as class E spot group on 25 November.
150	S15	11/28	Birth of small region that merged with large region north of this location.
133	S17	11/29	Filament disappeared.
115	S19	12/3	Filament disappeared.
71	N47	12/6	Filament disappeared.
65	N18	12/6	Filament disappeared.
50	N05	12/4	Filament disappeared.
45	N12	11/30	Birth of small region.
5	N10	12/4	Birth of small region.
0	N40	12/9	Filament disappeared.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART
1973 - ROTATION 1608



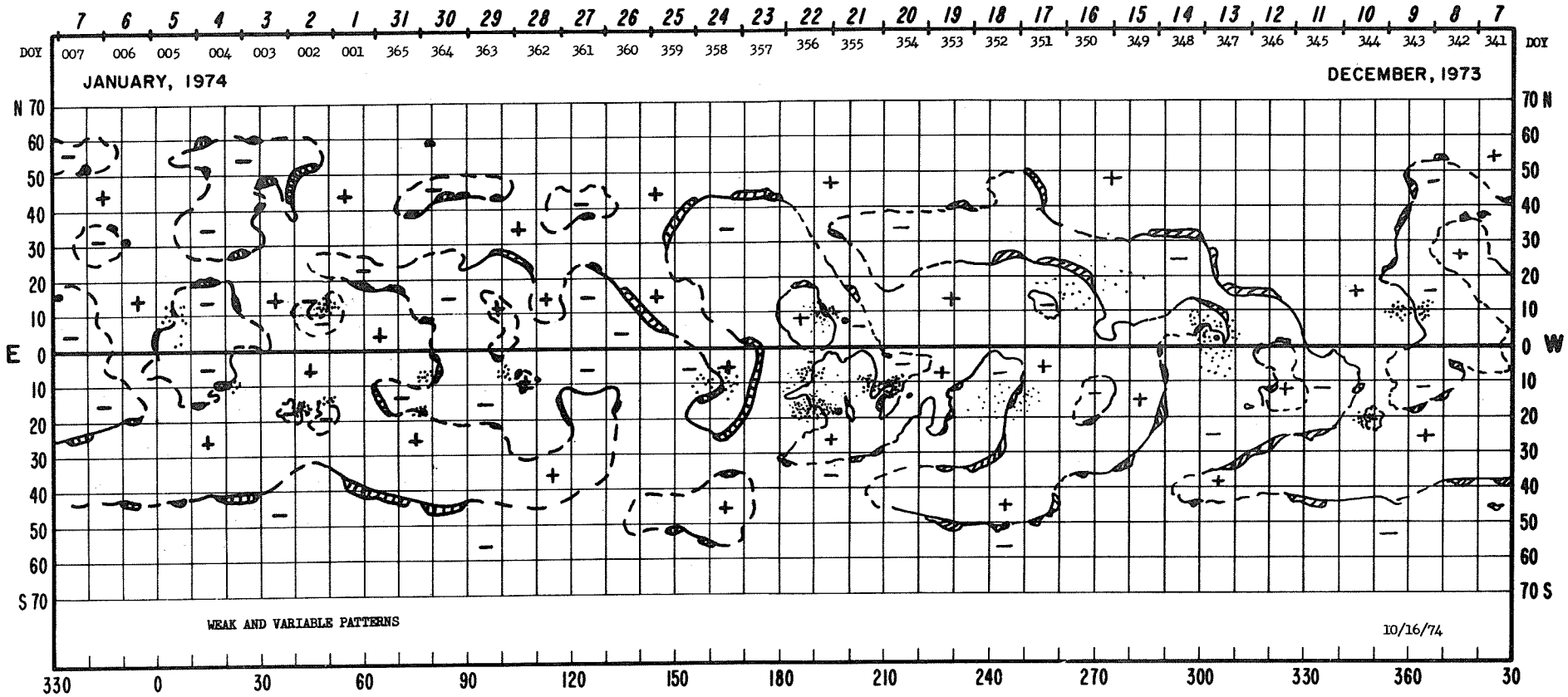
Hα SYNOPTIC CHART

1973-1974 - Rotation 1609

°Long.	°Lat.	Date	Descriptive Notes
346	S20	12/12	Birth of small active region.
315	N15	12/13-15	Gradual and partial disappearance of filament above neutral line that had become progressively more convoluted over the previous two solar rotations.
		12/21	The deformation of this large-scale and long-lived structure assumed special significance with the occurrence of a great coronal transient at west limb, above this location.
305	N03	12/13-14	CMP of small region that was decaying slowly throughout disk transit. Notable for its highly convoluted neutral line and its location near a large-scale neutral line that had become progressively convoluted during the previous two solar rotations. This region may have been involved in the great west limb transient of 21 December.
290	S10	12/11-14	Gradual disappearance of filament.
240	S32	12/19	Filament disappeared; associated with faint plage north of this location.
211	S13	12/19	Birth of active region with slow initial development.
		12/23	Rapid growth with maximum development 25 December as class D spot group.
208	S10	12/19	Birth of small active region. It later merged with larger region that formed southwest of this location.
190	S18	12/16	Probable date of birth of large active region that grew to class E spot group by 20 December. Leader spot continued to enlarge after maximum plage development.
189	S08	12/25	Birth of small region within extensive faint plage.
187	N18	12/23	Filament disappeared.
145	N06	12/24	Partial disappearance of filament; re-formed and became especially large before west limb transit.
105	N26	12/31	Filament disappeared.
50	N13	1/1	Birth of tiny active region that was gone by 4 January.
42	S17	1/1	Birth of small region that reached small class D spot group by next day.
40	N45	12/30	Filaments disappeared near east limb.
25	S41	12/31	Filament disappeared.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART
1973, 1974 – ROTATION 1609



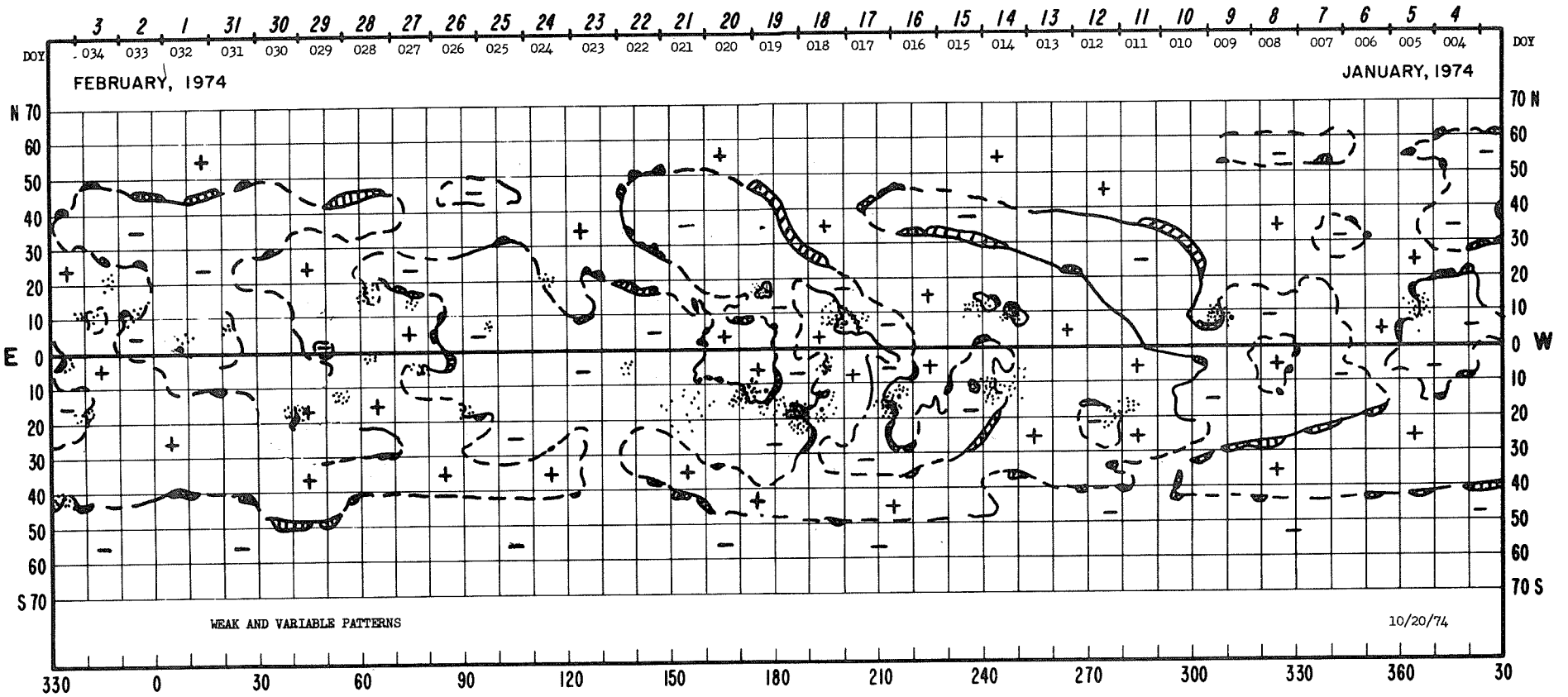
Hα SYNOPTIC CHART

1974 - Rotation 1610

°Long.	°Lat.	Date	Descriptive Notes
340	S22	1/5-6	Filament disappeared.
308	N09	1/7	Birth of region that grew to maximum by 10 January with type D group. An associated dark filament developed on the southern boundary of plage on 9 January.
261*	N08	1/9	Birth of small region that disappeared by 13 January but again brightened on 15 January.
252*	N10	1/9	Birth of small region that disappeared 18 January.
243	S10	1/15-18	Filament developed within and south of this moderate active region.
240	N29	1/14-15	Filament disappeared.
226	N19	1/16	Birth of small region.
188	N07	1/18	Birth of region that commenced rapid growth 20 January and continued bright until west limb passage on 23 January.
185	S18	1/22	Minor growth within extensive area of weak plage.
183	N30	1/21	Disappearance of large filament.
180	Equator -S10	1/18	Filament crossing the equator disappeared with chromospheric brightening.
177	N15	1/19	Birth of small region.
173	S14	1/13	Birth of region at, or just before, east limb passage. Developed to maturity by 17 January and interacted with extensive surrounding remnant plage and filaments. Decay nearly completed by west limb passage on 25 January.
140	N16	1/27	Filament disappeared.
137	N17	1/28	Birth of small region near site of filament that disappeared during previous 24 hours.
90	S17	1/26	Birth of very small region.
62	N17	1/30	Birth of small region with additional growth on 1 February.
52	N01	1/30	Birth of small region.

Note: There were no days without H-alpha photographs. Chart in error by 10° for these regions.

Hα SYNOPTIC CHART
1974 - ROTATION 1610



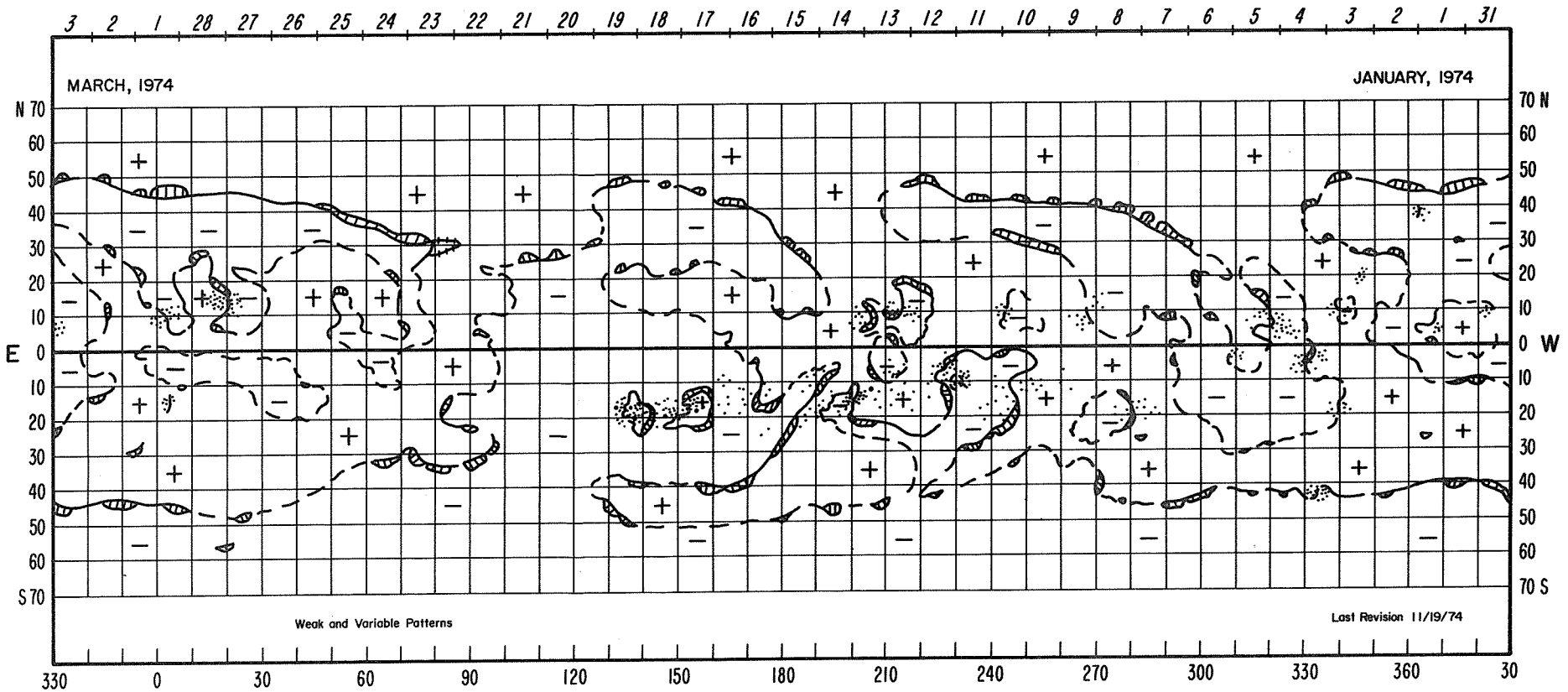
Hα SYNOPTIC CHART
1974 - Rotation 1611

°Long.	°Lat.	Date	Descriptive Notes
250	N29	2/7-10	Filament gradually disappeared.
230	S30	2/15	Birth and rapid growth of bright, spotted, active region in midst of extensive faint plage. Plage had faded by next day and continued to fade at west limb on 17 February.
214	N10	2/7	Birth of region near east limb. Faded significantly by 12 February.
200	S15	2/7	Probable date of birth of moderate active region at east limb.
		2/10-13	Filaments south of active region varied in position and intensity.
		2/17	Significant new growth of region.
190	S18	2/21	Birth of moderate active region on boundary of existing region. Growth maximized on 23 February with type D group.
150	S20	2/15	Birth of moderate active center 10° west of older, small, spotted region. Growth to large type D spots by 18 February.
		2/21-22	Active dark filaments encircled leader sunspot.
135	S40	2/20	Filament disappeared.
3	N10	2/26	Birth of small region.
	S17	3/2	Birth of very small region that disappeared next day.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1974 - ROTATION 1611



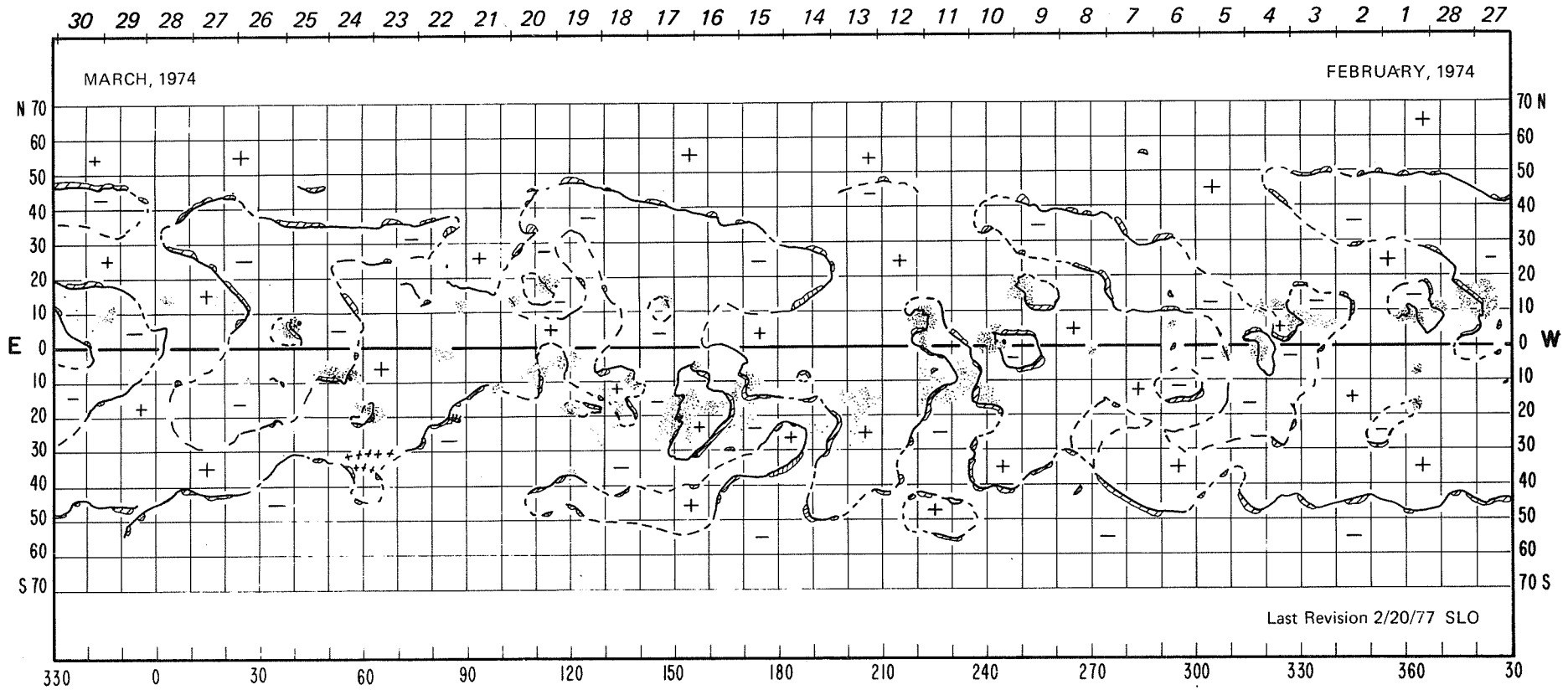
Hα SYNOPTIC CHART
1974 - Rotation 1612

°Long.	°Lat.	Date	Descriptive Notes
344	N12	2/27	Small filament disappeared.
318	S02	3/3-4	Rapid disappearance of plage.
315	S45	3/2	Filament disappeared.
297	S16	3/2	Filament disappeared.
255	N10	3/8	Active filament formed southeast of leading portion of small plage, outlining a portion of neutral line encircling the leader plage. Filament formed progressively along neutral line to the west by 10 March. All filament material disappeared by 11 March and associated plage faded rapidly thereafter. This filament and plage evolution occurred simultaneously with the birth and rapid growth of a moderate active region southeast of this location.
243	N01	3/9	Birth of moderate active region that developed stronger leader spot by 12 March. Growth of region was accompanied by filament developments to the southeast, west and northwest. Filaments encircled leader portion of region on 13 March.
235	S20-40	3/7-11	Filament very active.
233	N02	3/7	Filament disappeared.
225	S14	3/12	Filament disappeared.
223	S02	3/12	Filament disappeared.
188	N13	3/18	Filament disappeared.
160	S25	3/14	Filament section ejected vertically and westward from neutral line. The filament showed in projection against the disk southwest of the neutral line.
	N37	3/16-17	Polar-crown filament became complete over a 60° length of neutral line.
113	N17	3/22	Birth of moderate active region that reached maximum intensity same day.
		3/25	Minor new growth just before west limb passage.
40	N07	3/27	Birth of moderate active region that reached maximum size by 29 March, two days before west limb passage.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1974 – ROTATION 1612



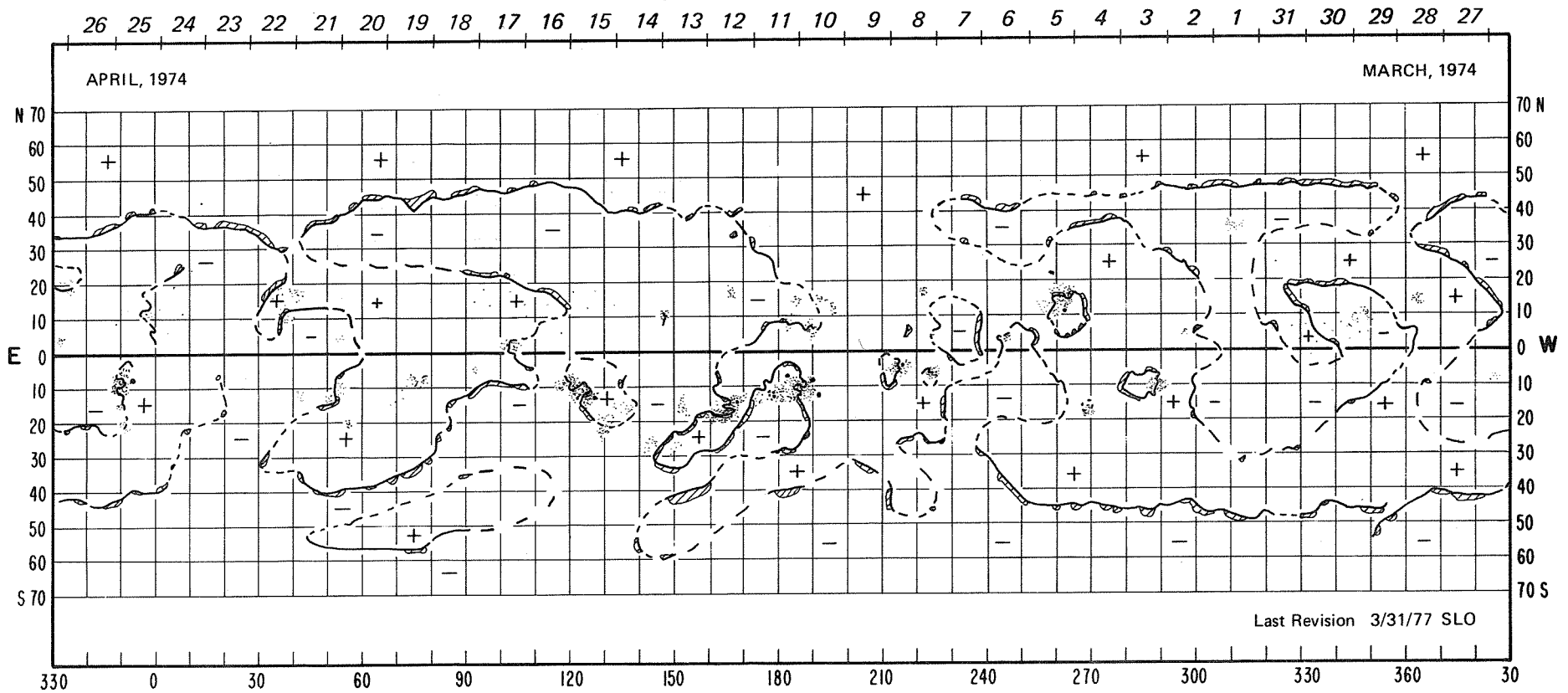
Hα SYNOPTIC CHART
1974 - Rotation 1613

°Long.	°Lat.	Date	Descriptive Notes
327	N15	3/28	Small filament disappeared.
288	S10	3/30	Birth of small active region that reached maximum development by 1 April. Follower-polarity portion of region partially encircled with a filament.
280	S10	4/5	Circular filament around follower portion of active region disappeared.
260	N13	3/31	Birth of active region near east limb. Growth very slow until 4 April; reached maximum on 6 April with small type D spot group.
237	N05	4/7	Filament disappeared.
227	S17	4/4	Filament disappeared.
214	S04	4/7	Birth of small active region that grew slowly until 11 April, when more rapid development began that peaked by 13 April. Spot group attained only class B size.
196	N12	4/15	Birth of small active region.
185	S12	4/7	Birth of major active center on filament-outlined neutral line. Growth continued during the entire disk passage. Important increase in growth occurred on 13 April: an additional strong spot group energed, centered on the same neutral lime at S08. The first spot group attained a class F size; the second a class E.
	N15	4/15	Birth of small active region.
183	N08	4/15	Birth of small active region.
165	S15	4/8	Birth of small active region that grew slowly until 14 April; thereafter growth accelerated. Attained maximum size as class D spot group by 16 April, 2 days before west limb passage.
150	S20-40	4/15	C-shape filament and filament to the south simultaneously disappeared during maximum growth of the two active regions sharing their underlying neutral lines.
124	S13	4/15	Birth of active region that began rapid growth 18 April. Attained class E spot group with slow growth continuing by west limb passage on 21 April. Simultaneous growth of two smaller active regions and filament activity, both to the northeast, may be related to the (124,S13) region development.
119	S09	4/16	Birth of small active region that attained class D spot group by 19 April.
105	N18	4/16-17	Gradual disappearance of filament.
103	N02	4/18	Birth of small active region with slow growth through 21 April.
100	S10	4/19	Disappearance of filament during time of rapid growth of three active regions near its western terminus.
52	S14	4/18	Small filament disappeared.
40	S35	4/26	Filament disappeared.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1974 – ROTATION 1613



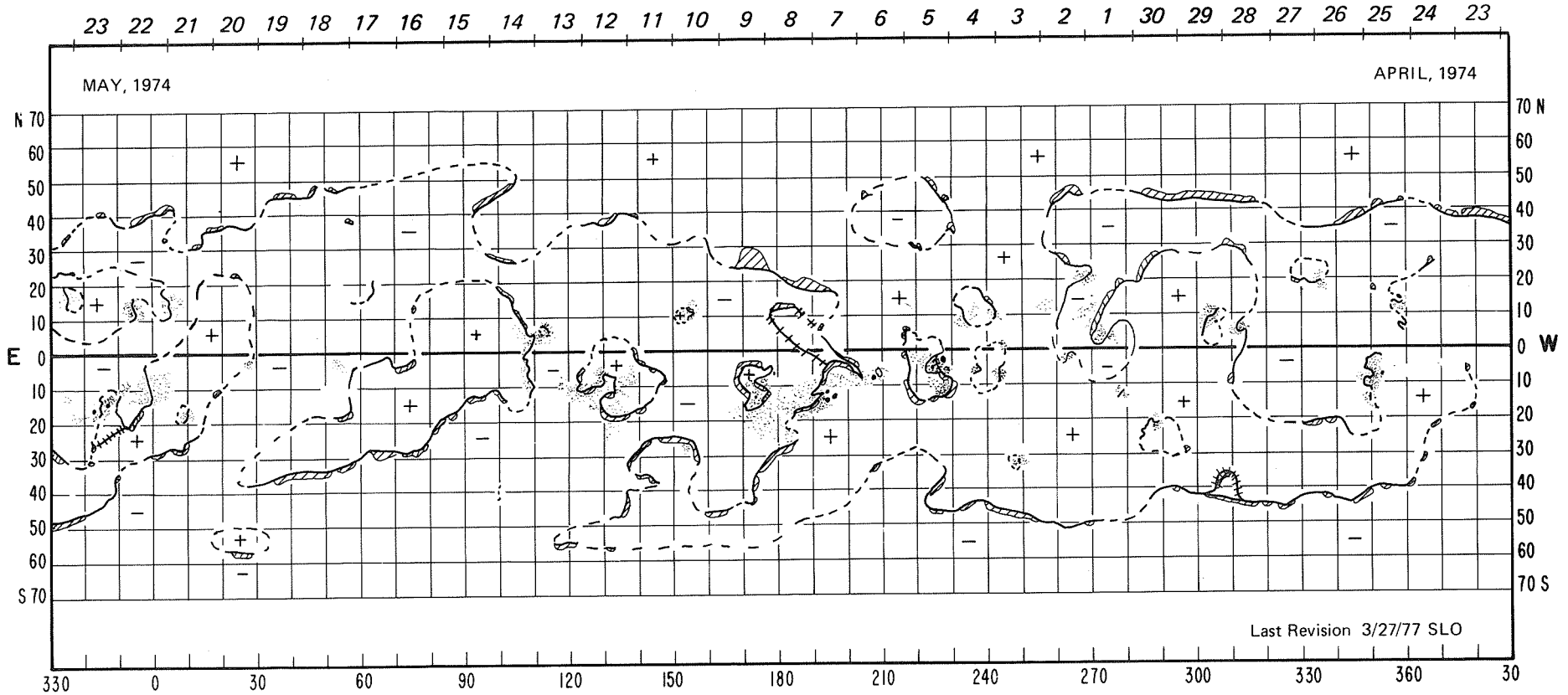
Hα SYNOPTIC CHART
1974 - Rotation 1614

°Long.	°Lat.	Date	Descriptive Notes
350	S08	4/21	Birth of small active region that grew slowly to class C spot group by 25 April.
322	N19	4/29	Birth of small active region.
303	N08	5/1	Birth of active region that grew to maximum next day as small class C spot group.
273	N05	5/2	Birth of active region that reached maximum intensity by 4 May.
		5/6	Additional growth at west limb simultaneous with emergence of new region at (269,N21).
	N12	5/6	Formation of filament between two growing active regions.
269	N21	5/5	Birth of small active region that reached peak next day, just before west limb passage.
262	N45	5/3	Disappearance of filament.
260	N10	4/26	East limb passage of faint spotless plage with simple neutral line.
243	S08	5/7	Birth of small active region.
222	S03	5/4	Birth of new small region within follower magnetic fields of old region and near the neutral line adjacent to large old leader spot. New region reached maximum development with small leader spot visible on 7 May. Neutral line in old region rearranged to run continuously through both new and old regions.
209	S06	5/6	Formation of bright plage with many small spots on the northern border of leader spot. This activity began to decay by 8 May.
202	S05	5/1-4	Rapid disappearance of follower plage and associated peninsular neutral line, as the large-scale neutral line through the giant active region to the east took on the simple form observed on rotation 1615. This major simplification may be associated with the great limb events of 30 April (Wu et al. 1975, *Solar Physics, 44,* 117).
183	N13	5/4	Small filament disappeared as a large portion of neutral line from here south moved rapidly west. Early position is marked as a crossed line.
180	N21	5/2-14	Large filament active throughout disk transit. Partially disappeared 12 May.
175	S15	5/7	Plage near old isolated sunspot began to intensify slowly over the next few days, as if the follower magnetic fields of the large region to the west began to interact with this region. Intensification continued until west limb passage on 14 May.
173	S04	5/10	Part of circular filament disappeared.
170	S08	5/11	Remainder of circular filament disappeared.
155	N12	5/8	Birth of tiny bioplar plage.
		5/11	Additional tiny plage with sunspot formed west of older tiny plage.
140	S27	5/9	Half of semicircular filament disappeared.
135	N12	5/16	Large semicircular filament disappeared.
130	N37	5/9	Formation of small filament.
112	N05	5/12	Minor new growth of plage and small spots within old plage.
105	N11	5/16	Disappearance of filament and beginning of rapid decay of associated active region.
98	N44	5/12	Formation of filament.
45	S35	5/20	Disappearance of filament while neutral line to the west developed more filament material.
25	S57	5/17	Filament clearly visible this day only. Indicated continunance of weak positive-polarity area mapped on previous solar rotation. Evidence for positive-polarity area from Mt. Wilson magnetogram only. Existence suggested by continuity with earlier solar rotations.
10	S18	5/22	Birth of small active region with tiny spots.
5	N16	5/26	Birth of small active region with single tiny sunspot.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1974 – ROTATION 1614



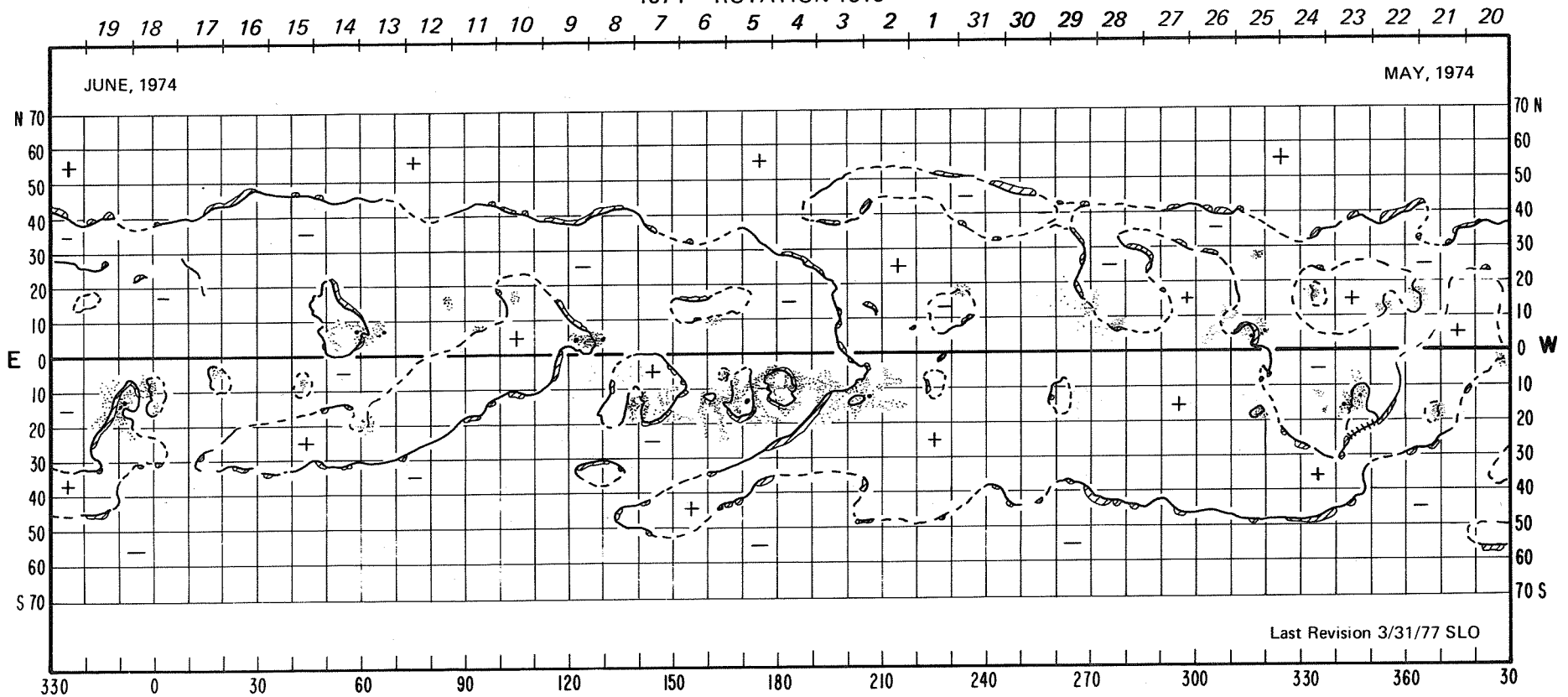
Hα SYNOPTIC CHART
1974 - Rotation 1615

°Long.	°Lat.	Date	Descriptive Notes
355	S18	5/18-22	Filament gradually disappeared. Active regions formed east and west of this location during the next 4 days.
354	N12	5/22	Birth of tiny bipolar region that virtually disappeared by 25 May. A larger new region formed immediately west of this location on 26 May. Very faint even by next day at west limb.
345	S15	5/22	Appearance of area of scattered faint plage in trailing portion of still fainter plage. Faded by next day.
		5/26	Birth of moderate active region that grew rapidly to maximum as a type D spot group by 28 May. Slight decay at west limb passage on 29 May.
317	N05	5/24	Filament formed within faint plage.
		5/27	Filament disappeared.
	N27	5/25	Tiny region visible this day only.
285	N18	5/30	Filament disappeared.
230-320	N30-50	5/28	All filaments within this zone simultaneously disappeared.
195	N18	5/29-6/8	Large filament active during this period.
	N38	6/2	Filament disappeared.
		6/9	Filament disappeared.
188	S19	6/4	Large dark filament within old active region disappeared. Filament re-formed 6 June at an abnormal distance above the neutral line, forming closely-spaced parallel filaments. The upper filament became dark and wide on 7 June and disappeared the next day.
183	S07	6/8	Filament well-developed this day only.
172	S16	6/3	Filament disappeared on western boundary of small cell encircling leader sunspot.
165	S06	6/9	Birth of bright active region with numerous small sunspots.
		6/11	Additional growth near west limb.
156	N16	6/6	Filament disappeared.
148	S12	6/5	Birth of small region that became faint and scattered by next day.
		6/8	Additional plage growth.
145	S19	6/6	Semicircular filament disappeared.
126	N06	6/4	Birth of moderate active region near east limb. Attained maximum by 6 June as class D spot group and dissipated thereafter.
120	N10	6/11	Filament formed north of active region and enlarged 13 June.
116	S04	6/8	Filament formed along same neutral line and north of disappearing filament at (100,S12).
		6/10	Filament disappeared.
100	S12	6/7	Filament became fully developed.
		6/8	Filament disappeared.
62	S18	6/18	Birth of small active region.
60	N06	6/8	Appearance at east limb of moderate active region that was growing. Attained maximum as a type E spot group with a high spot count by 12 June.
55	N14	6/14	Filament on northern boundary of large active region disappeared. It had been active for previous 7 days (from east limb to central meridian). Reappeared next day, but disappeared again 16 June and only partially re-formed during remainder of disk passage.

Note: Day without H-alpha photographs was 31 May 1974.

Hα SYNOPTIC CHART

1974 – ROTATION 1615



Hα SYNOPTIC CHART

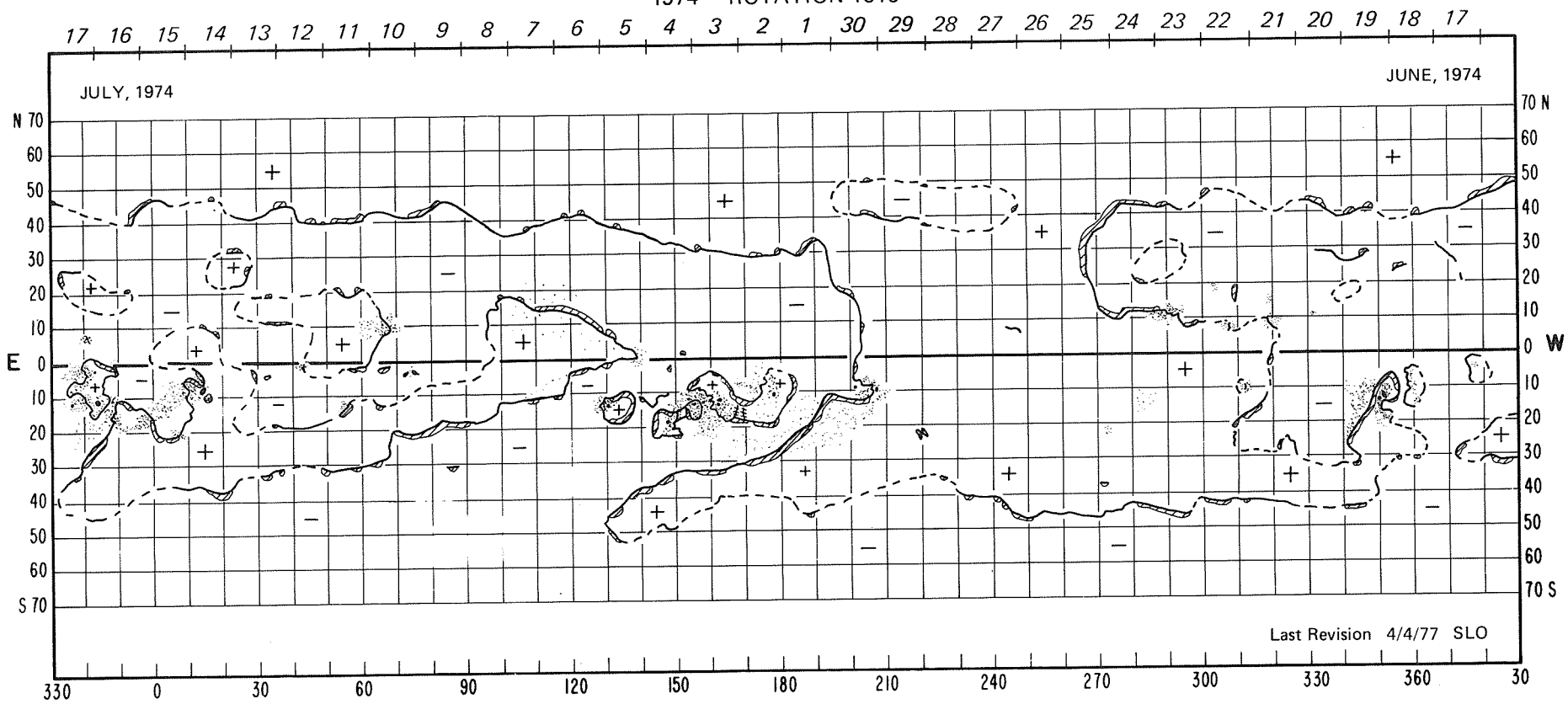
1974 - Rotation 1616

°Long.	°Lat.	Date	Descriptive Notes
350	S12	6/13-24	Returning active region with large type H sunspot and two umbrae within symmetric penumbra. Spot elongated, umbrae separated and area steadily diminished throughout the disk passage. Spots disappeared entirely by 24 June, just before west limb passage.
		6/17	Active filament partially encircling sunspot disappeared.
		6/18	Filament re-formed north of sunspot in elevated and active form.
		6/20	Filament north of sunspot and filament south of plage both disappeared, leaving only the filament within the plage.
		6/21	Filament south of plage re-formed in elevated and active form.
		6/22	Filament south of plage disappeared again.
		6/23	Filament re-formed both north and south of region and remained until west limb passage on 25 June.
290	N11	6/18-29	Small decaying active region moved westward by 5 heliographic degrees during the disk passage at an abnormally fast rate. Neutral line became more nearly parallel to solar equator during this time, as if the follower polarity plage rotated faster than the leader polarity. Region axis inclination also unusual because follower polarity portion lay at lower latitude than leader.
270	N35	6/24-28	Filament large and active.
205	S10	6/30	Birth of moderate active center on neutral line that had been a major feature in the large-scale magnetic patterns for several previous solar rotations. Attained maximum as type D sunspot group on 3 July.
195	S11	6/27	Filament disappeared over sharp inflection of neutral line.
185	S20	6/29	Section of filament lifted, projecting the filament to a position north of the surface neutral line. This location produced identical unusual filament behavior on previous disk passage.
175	S10	6/29-7/3	Decay accelerated in faint active region with single leader spot as rapid growth occurred in great active center <10° east of it.
		7/4	Minor new growth of plage and small spots.
		7/6	Peak plage and spot development.
170	S17	7/1	Neutral line rearranged as positive-polarity areas merged with expansion of growing active center to the east.
157	S13	6/28	Birth of one of the most powerful active centers of Solar Cycle 20.
		6/29	Rapid growth to type E sunspot group as two bipolar plage and spot areas merged. Point of merger developed powerful "delta" magnetic configuration with some of the strongest field strengths and steepest field gradients ever recorded. Space between the opposite polarity spots was marked by a brilliant narrow corridor in which all the powerful flares commenced, including white-light emission during at least two of the greatest flares. X-ray flux saturated satellite sensors on 4 and 5 July. Proton event and magnetic storm followed.
152	S16	7/3	Rearrangement of neutral lines as developing region to the west led to fission of positive-polarity area.
128	S13	7/4	Birth of moderate active center that attained maximum as small class C spot group on 6 July.
		7/9	Filament encircled leader polarity on this day.
110-140	N14-S05	7/5	Filaments bordering large-scale positive-polarity cell on equator disappeared on same day.
60	S30	7/8	Filament disappeared.
43	S02	7/9	Birth of very small active region.
10	S08	7/8-20	Large active region with large symmetric leader sunspot. Isolated pole on southwest border of spot source of frequent dark surges. Neutral line approached spot on border opposite to the surging. Spot umbra divided and rotated slightly during disk passage.
4	S20	7/13	Curved filament formed.
		7/15	Filament disappeared.

Note: There were no days without H-alpha photographs.

Hα SYNOPTIC CHART

1974 – ROTATION 1616

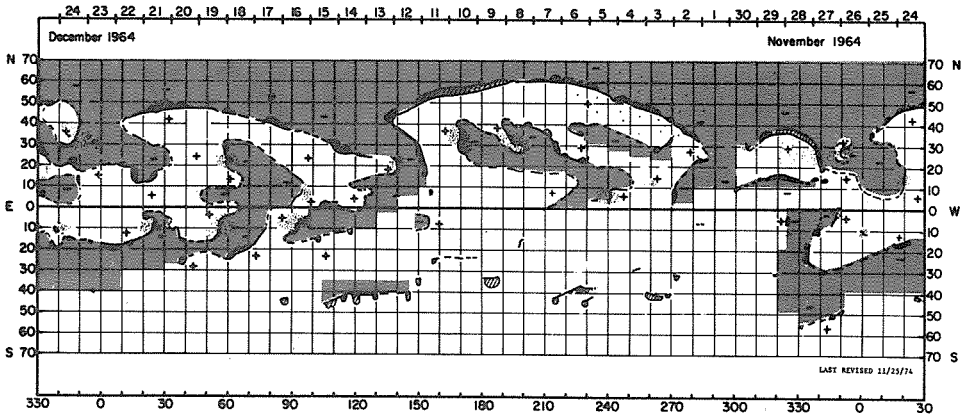


APPENDIX B

Shaded Synoptic Charts at Reduced Scale

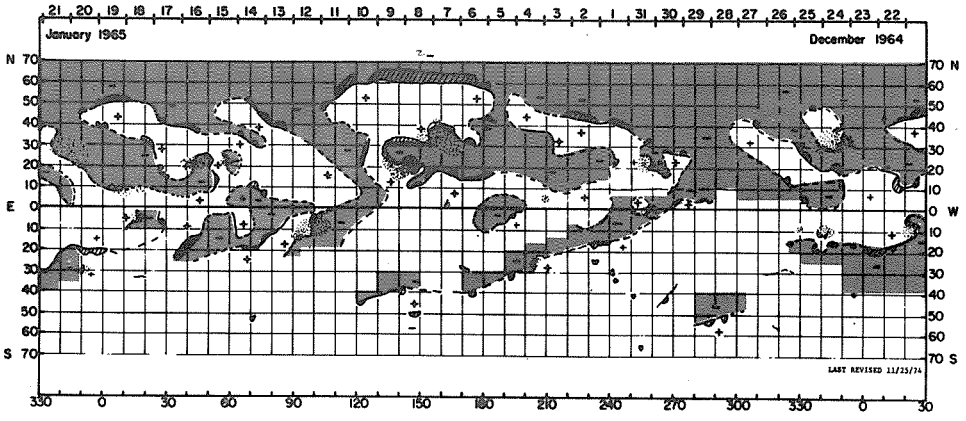
ROTATION 1488

NOV – DEC 1964



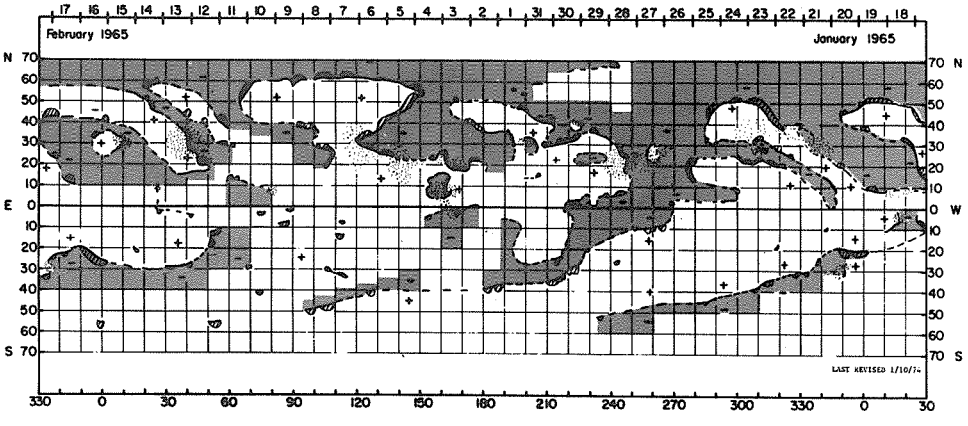
ROTATION 1489

DEC 1964 – JAN 1965



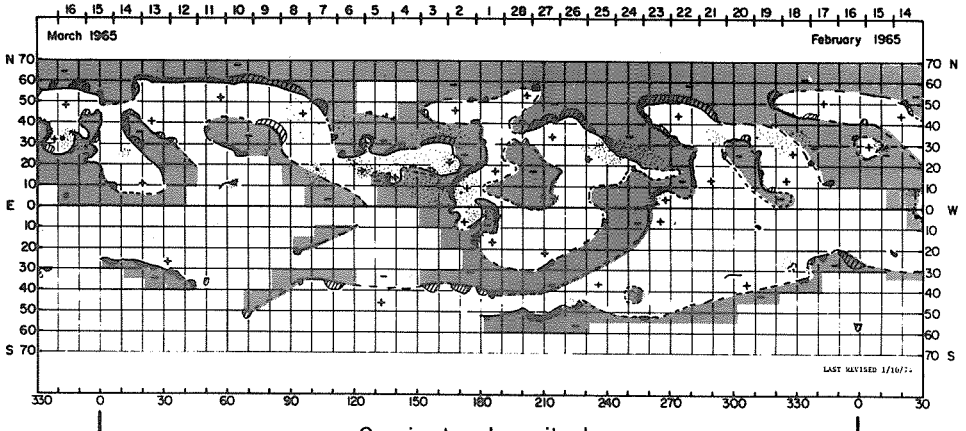
ROTATION 1490

JAN – FEB 1965



ROTATION 1491

FEB – MAR 1965

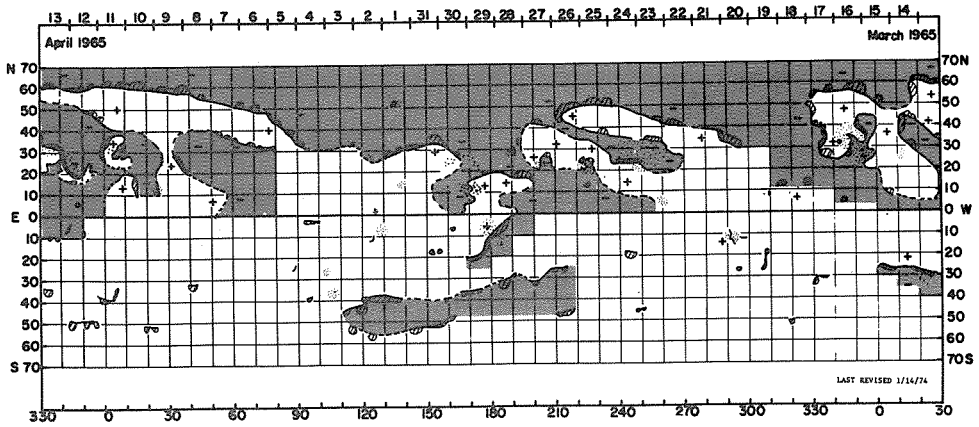


Carrington Longitude

0° 360°

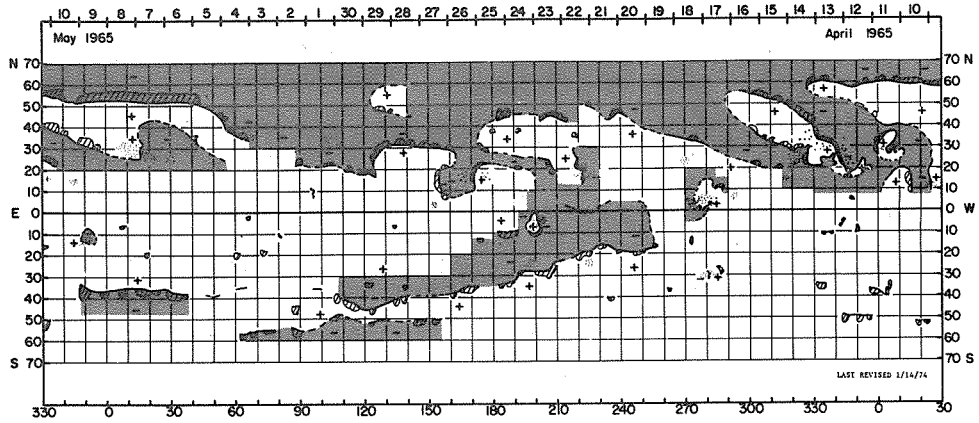
ROTATION 1492

MAR – APR 1965



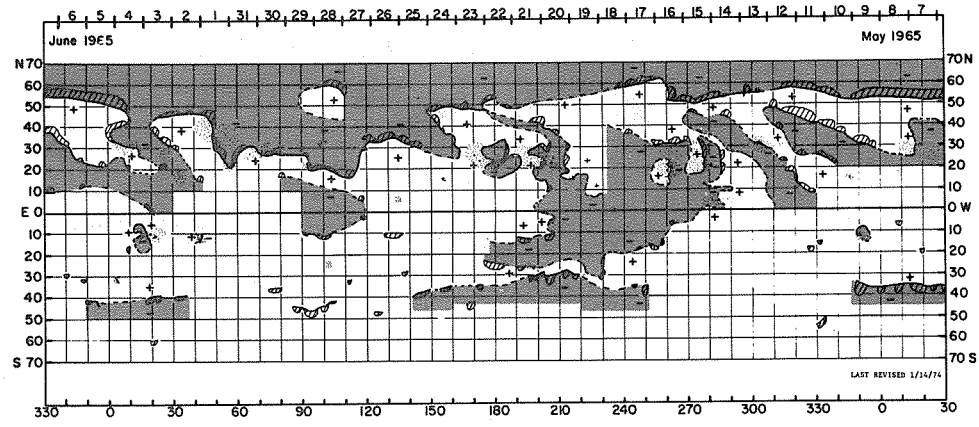
ROTATION 1493

APR – MAY 1965



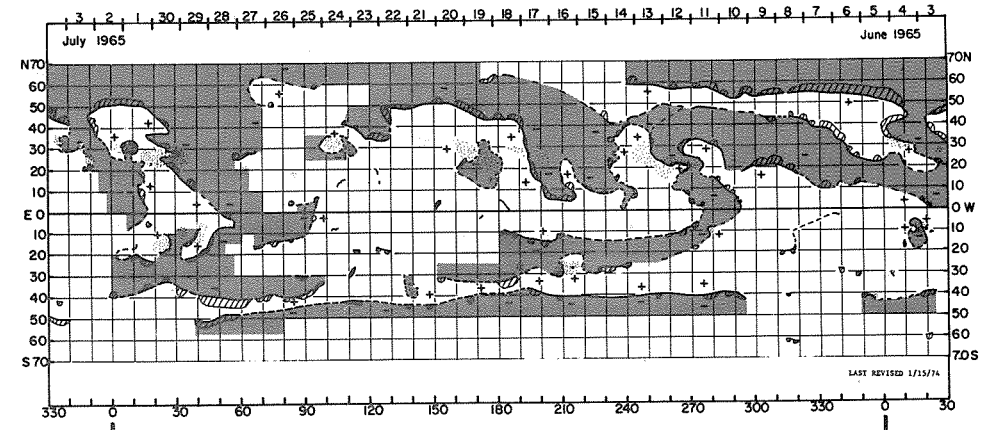
ROTATION 1494

MAY – JUN 1965



ROTATION 1495

JUNE 1965

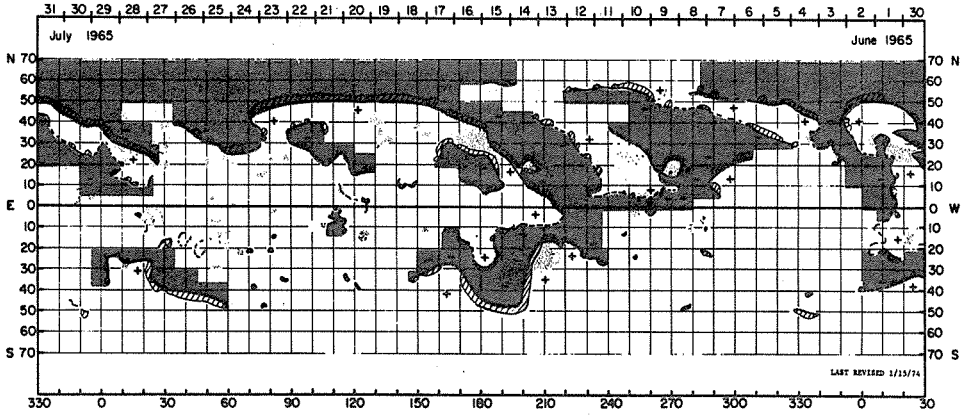


Carrington Longitude

0° 360°

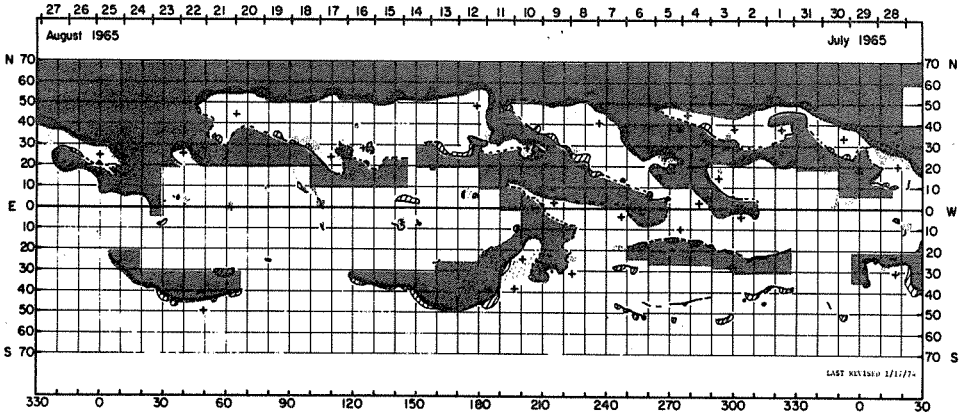
ROTATION 1496

JULY 1965



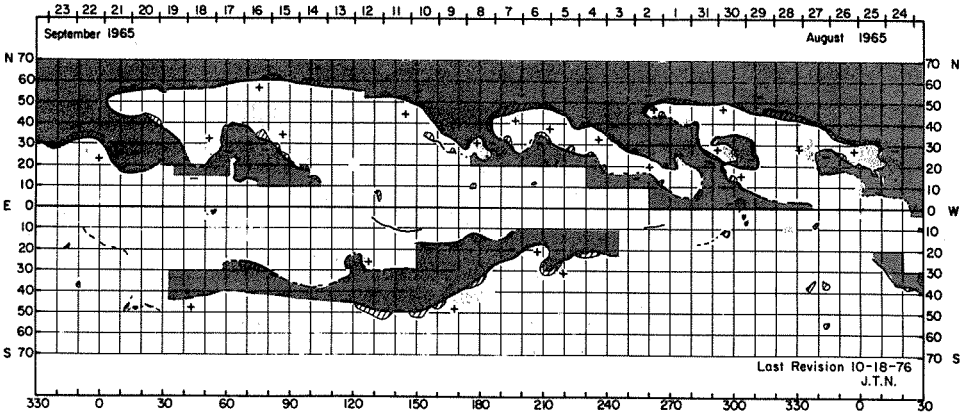
ROTATION 1497

AUG 1965



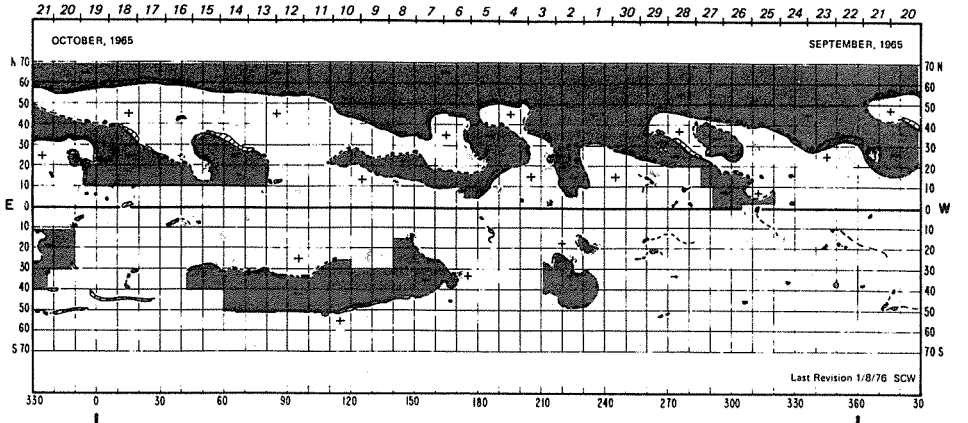
ROTATION 1498

AUG – SEP 1965



ROTATION 1499

SEP – OCT 1965

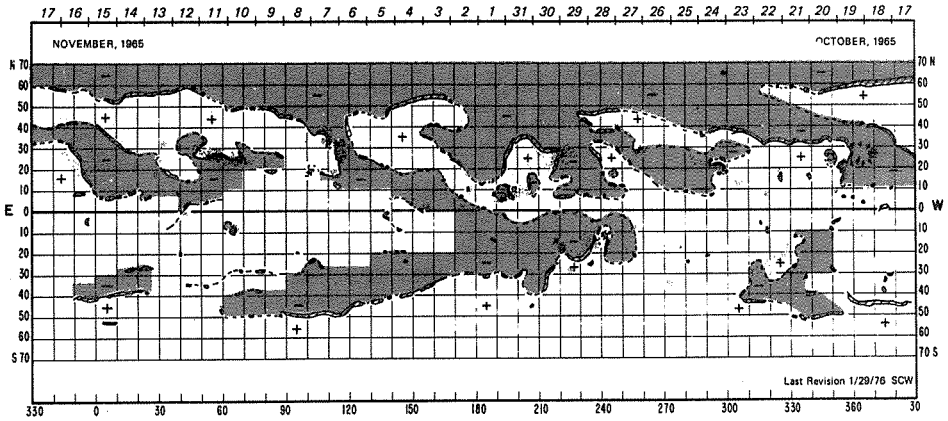


Carrington Longitude

0° 360°

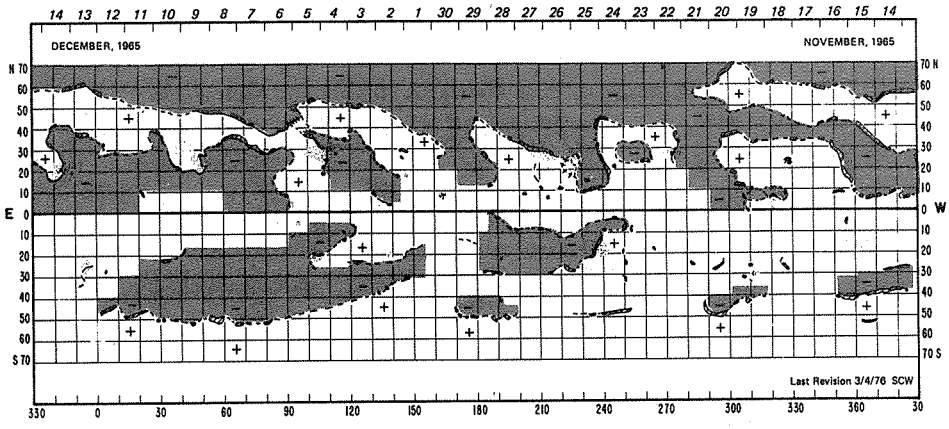
ROTATION 1500

OCT – NOV 1965



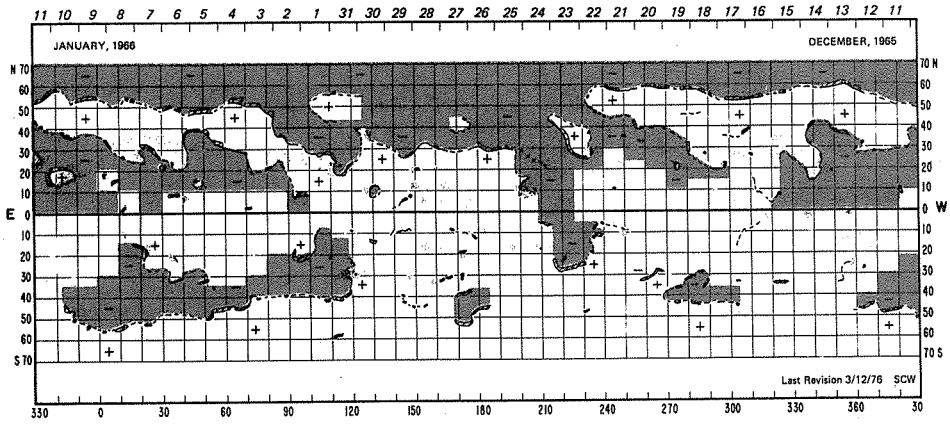
ROTATION 1501

NOV – DEC 1965



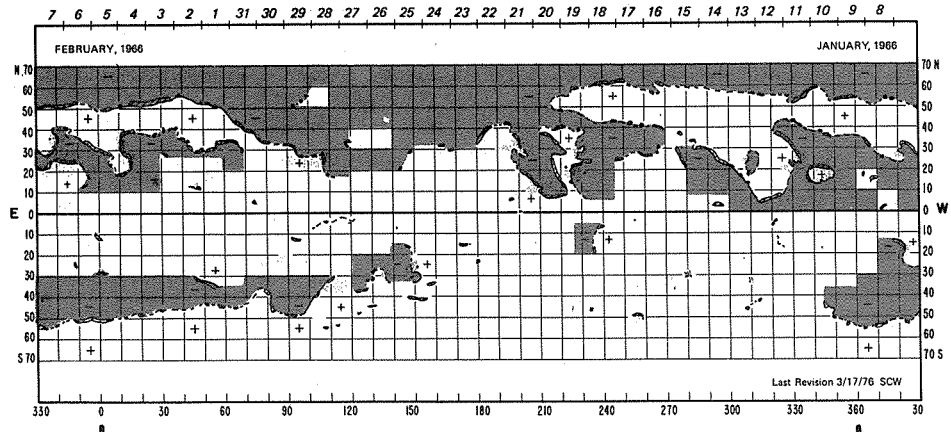
ROTATION 1502

DEC 1965 – JAN 1966



ROTATION 1503

JAN 1966

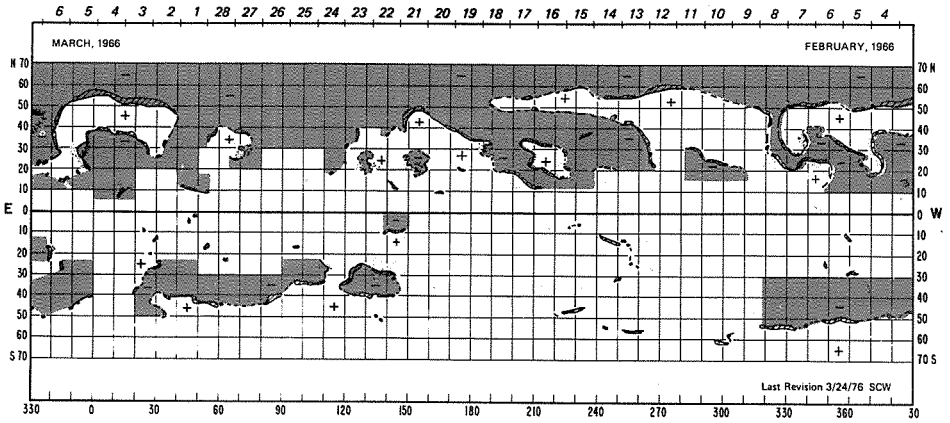


Carrington Longitude

0° 360°

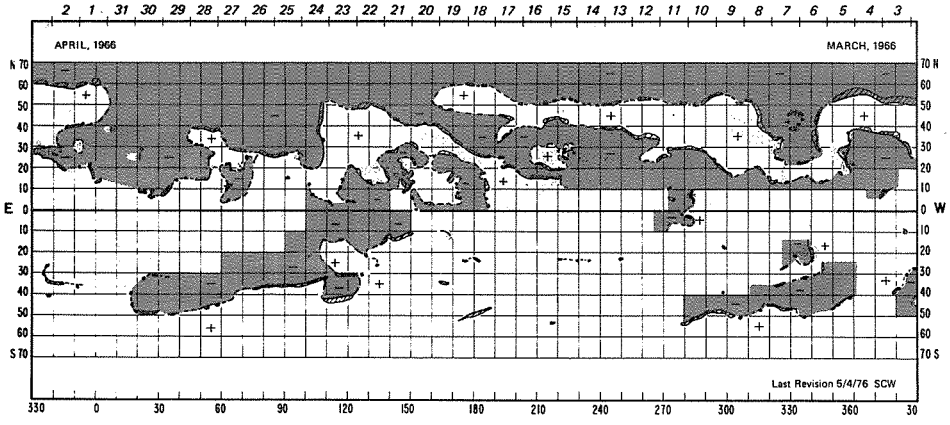
ROTATION 1504

FEB 1966



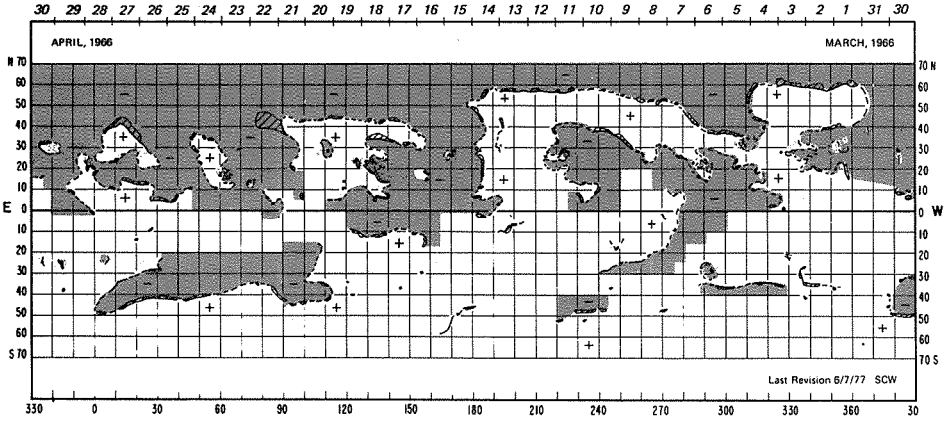
ROTATION 1505

MAR 1966



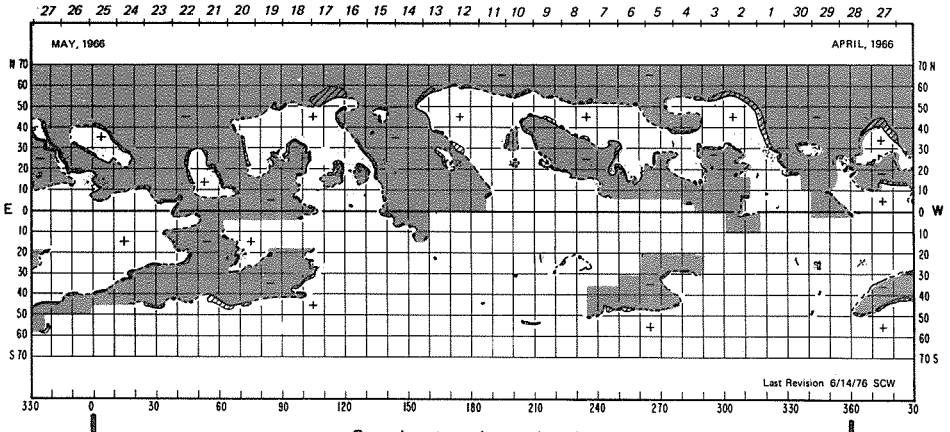
ROTATION 1506

APR 1966



ROTATION 1507

MAY 1966

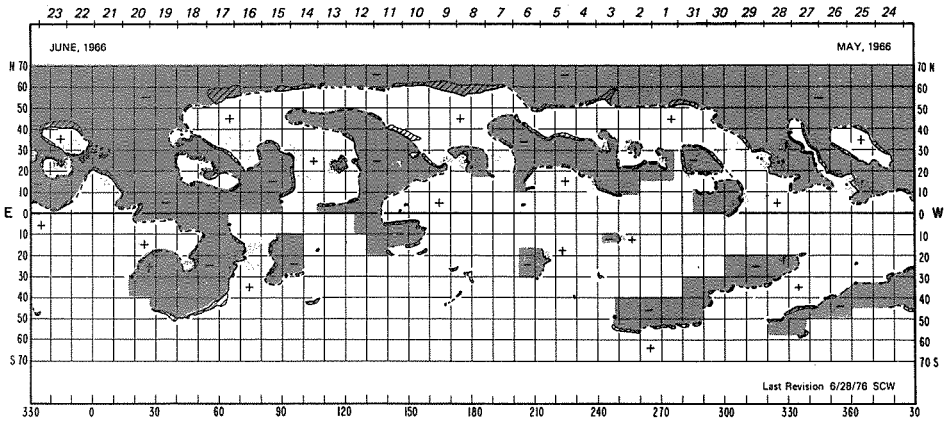


Carrington Longitude

0° 360°

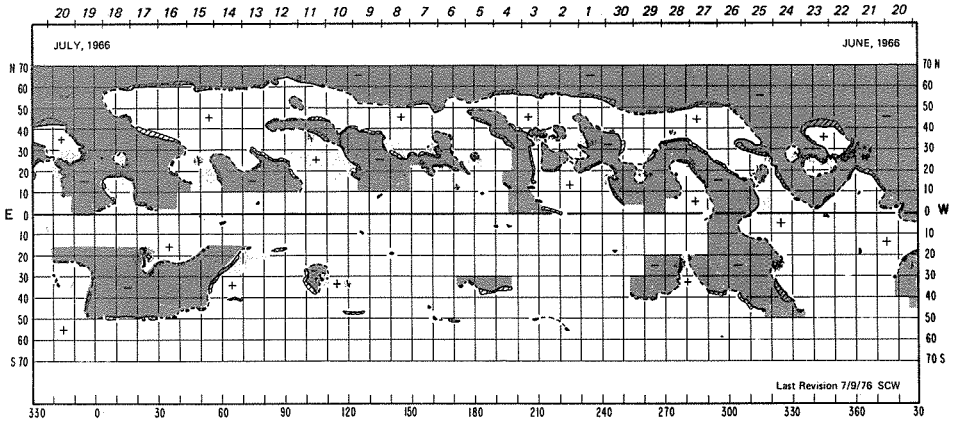
ROTATION 1508

MAY – JUNE 1966



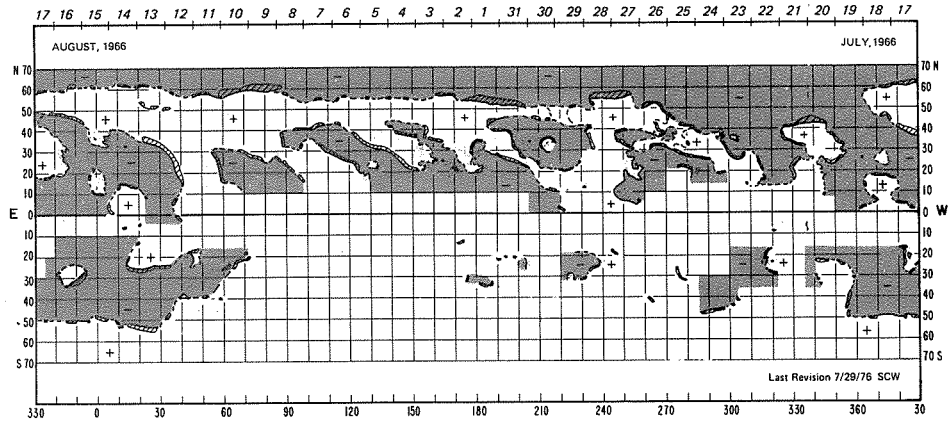
ROTATION 1509

JUN – JUL 1966



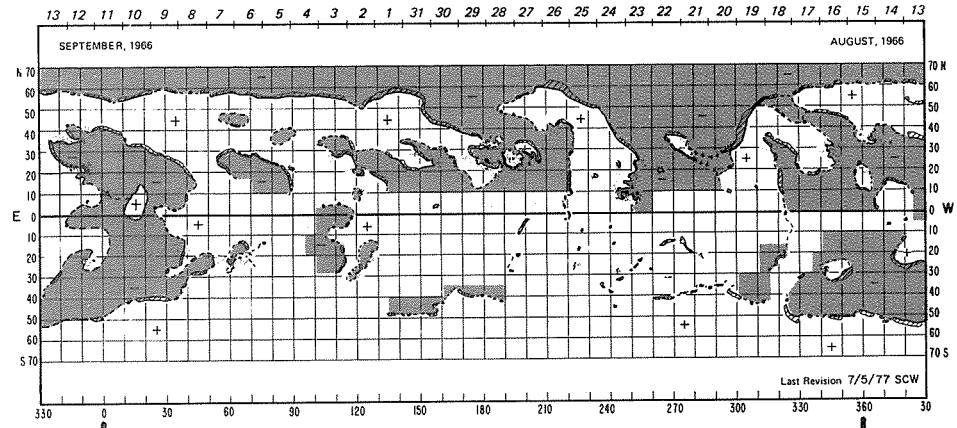
ROTATION 1510

JUL – AUG 1966



ROTATION 1511

AUG – SEP 1966

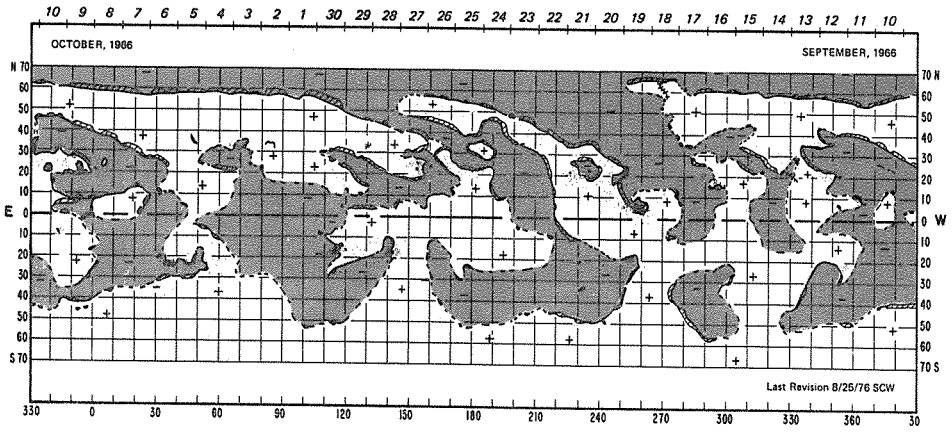


Carrington Longitude

0° 360°

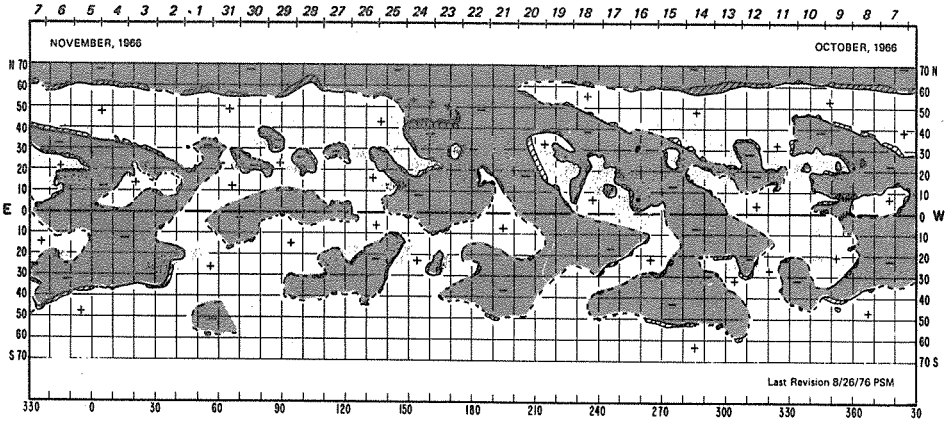
ROTATION 1512

SEP – OCT 1966



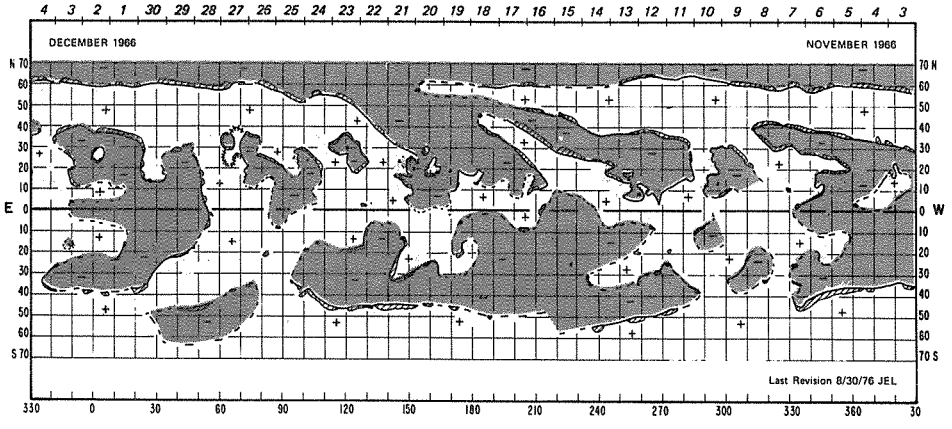
ROTATION 1513

OCT 1966



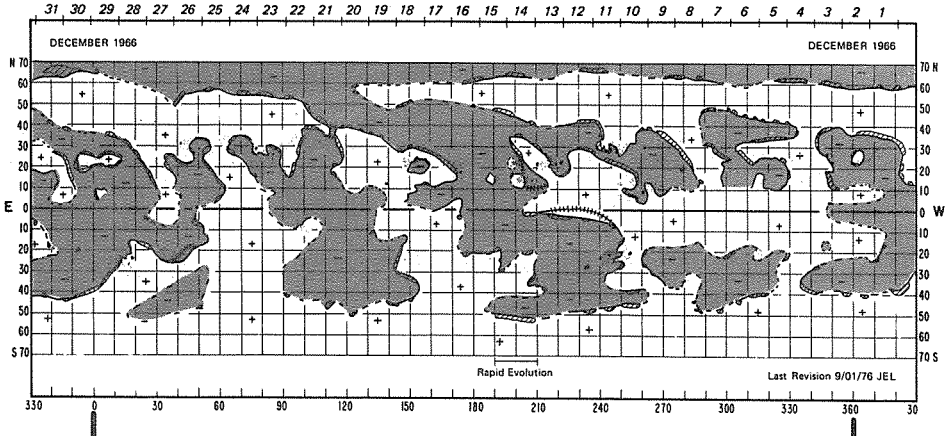
ROTATION 1514

NOV 1966



ROTATION 1515

DEC 1966

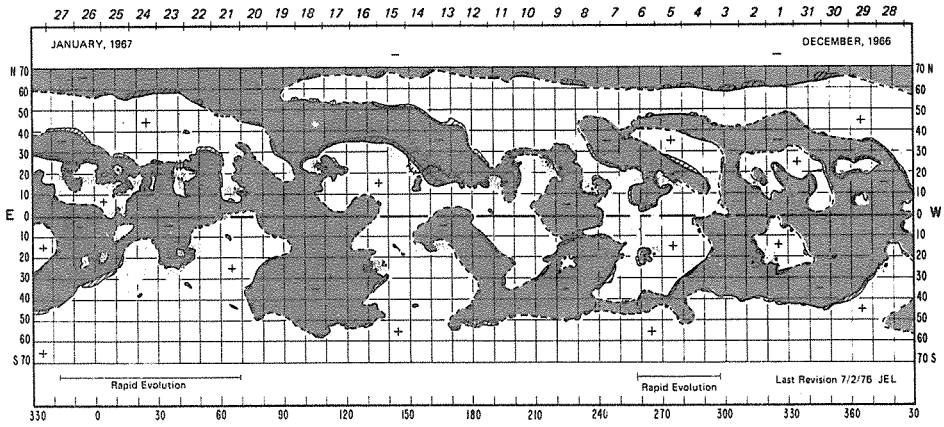


Carrington Longitude

0° 360°

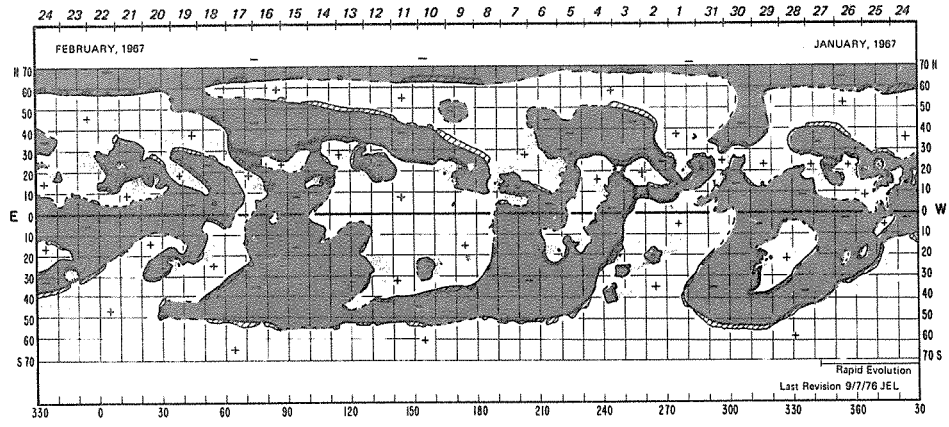
ROTATION 1516

JAN 1967



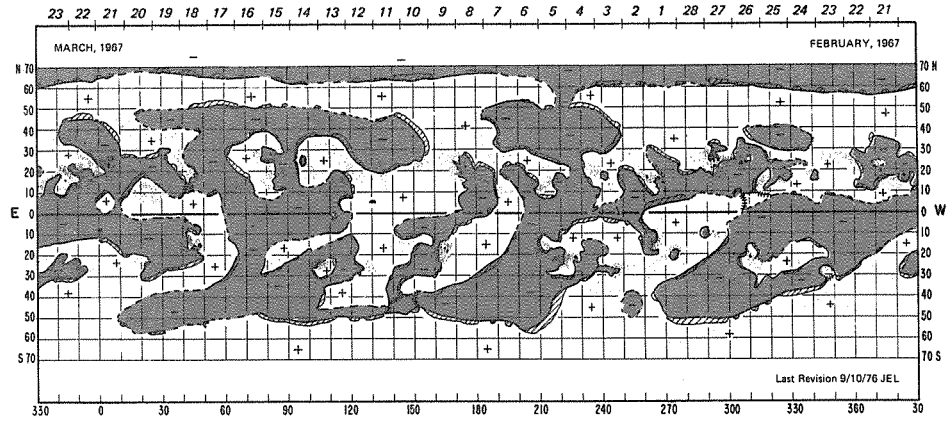
ROTATION 1517

JAN – FEB 1967



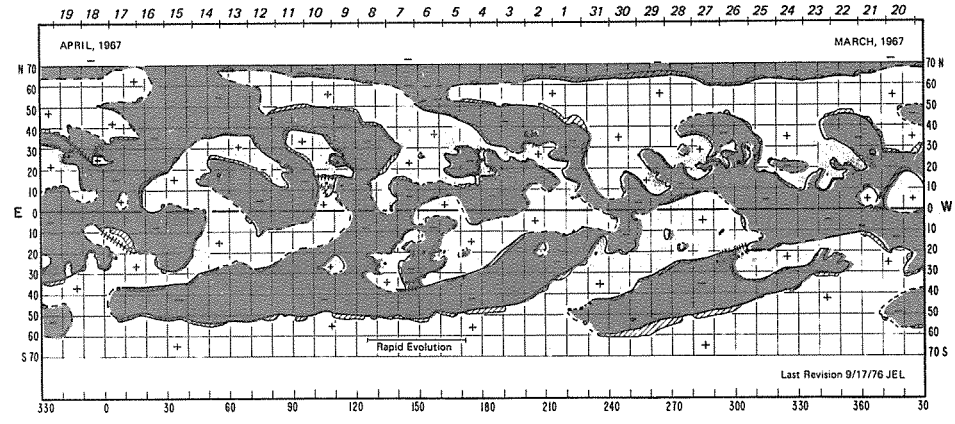
ROTATION 1518

FEB – MAR 1967



ROTATION 1519

MAR – APR 1967

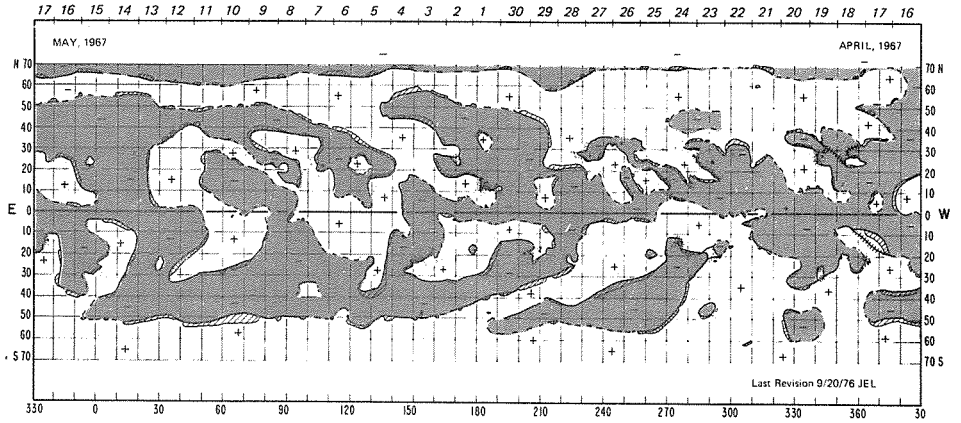


Carrington Longitude

0° 360°

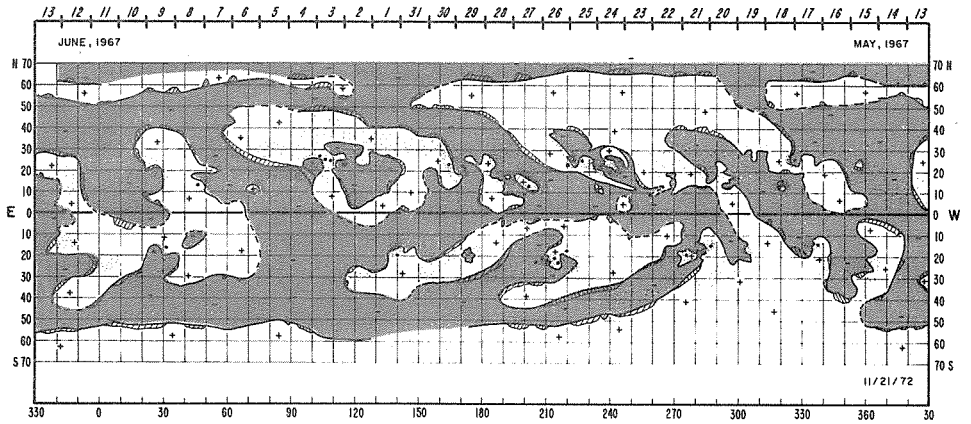
ROTATION 1520

APR – MAY 1967



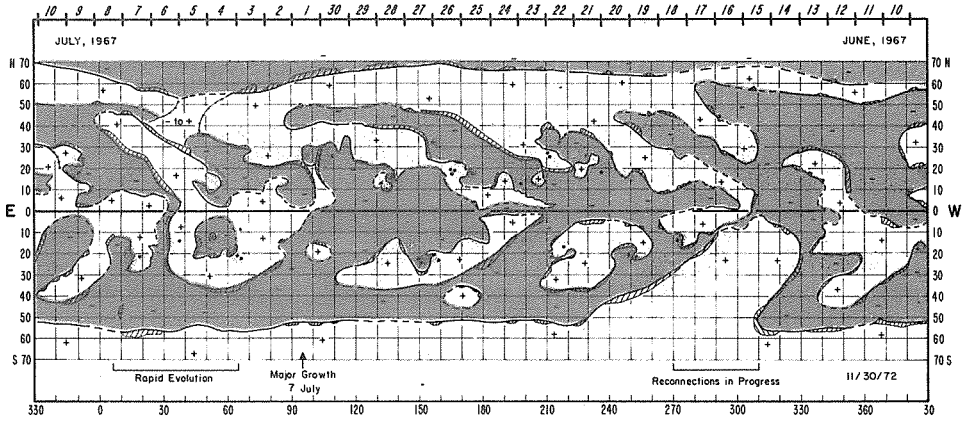
ROTATION 1521

MAY – JUN 1967



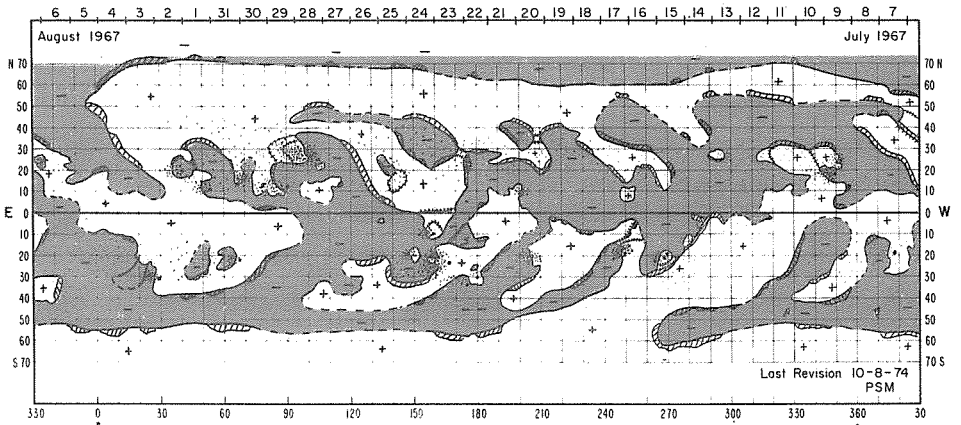
ROTATION 1522

JUN – JUL 1967



ROTATION 1523

JUL 1967

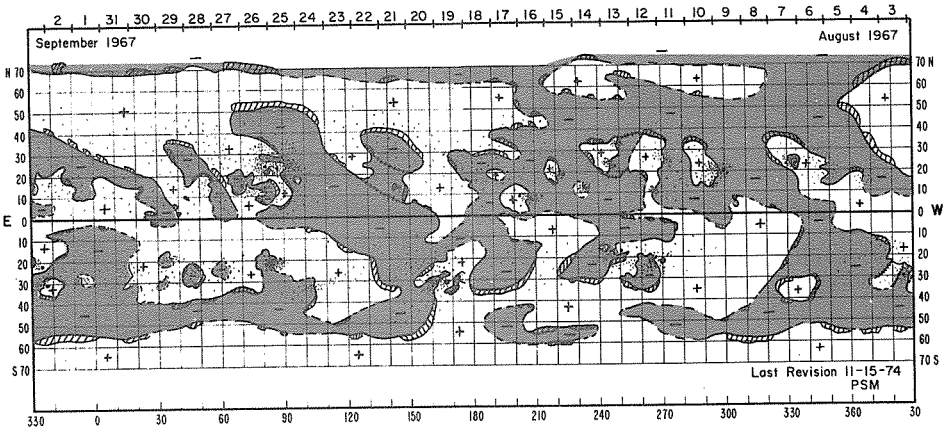


Carrington Longitude

0° 360°

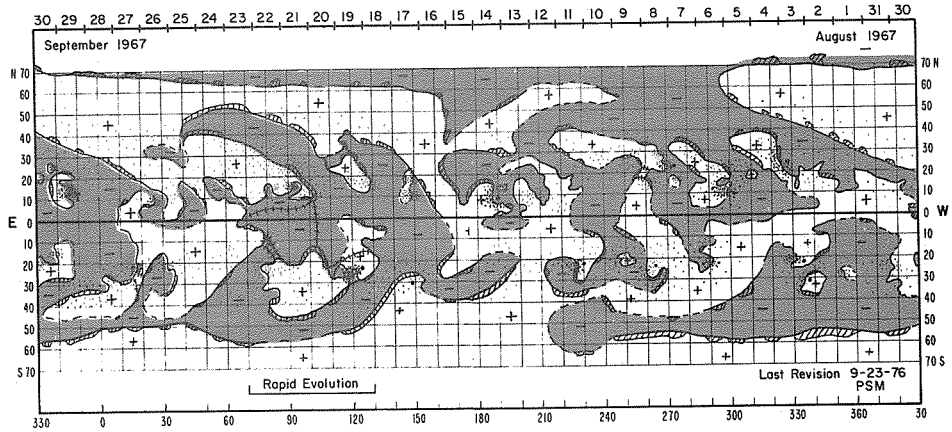
ROTATION 1524

AUG 1967



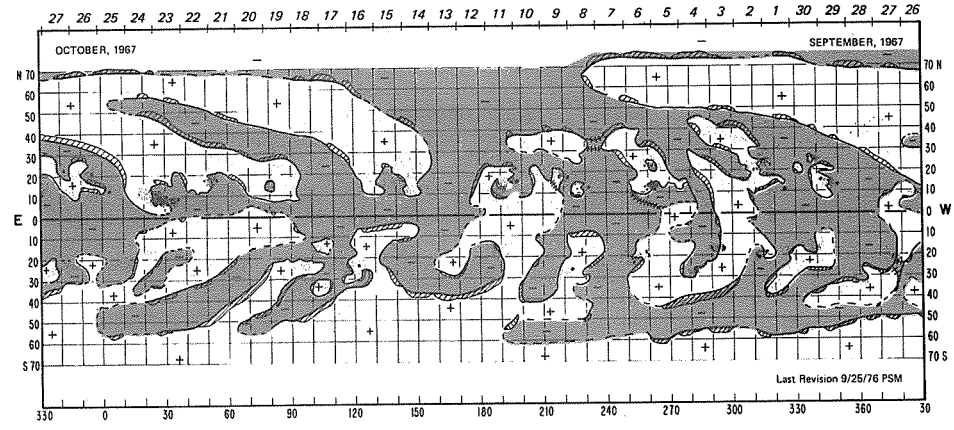
ROTATION 1525

SEP 1967



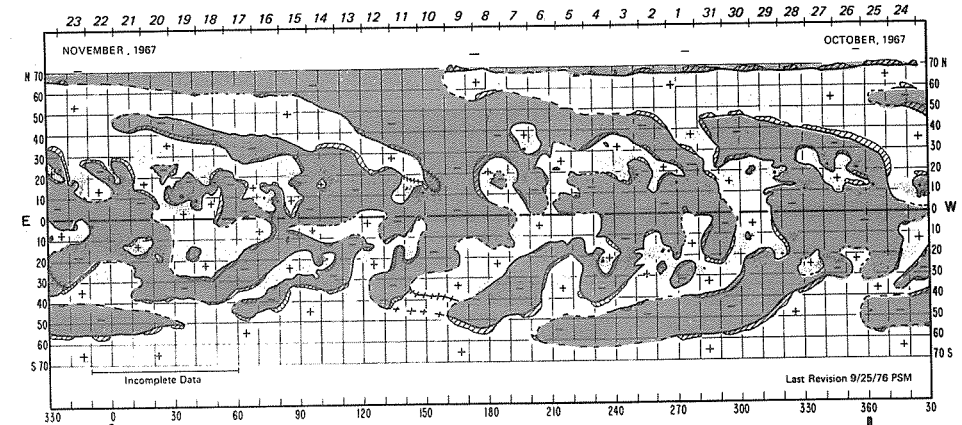
ROTATION 1526

OCT 1967



ROTATION 1527

OCT — NOV 1967



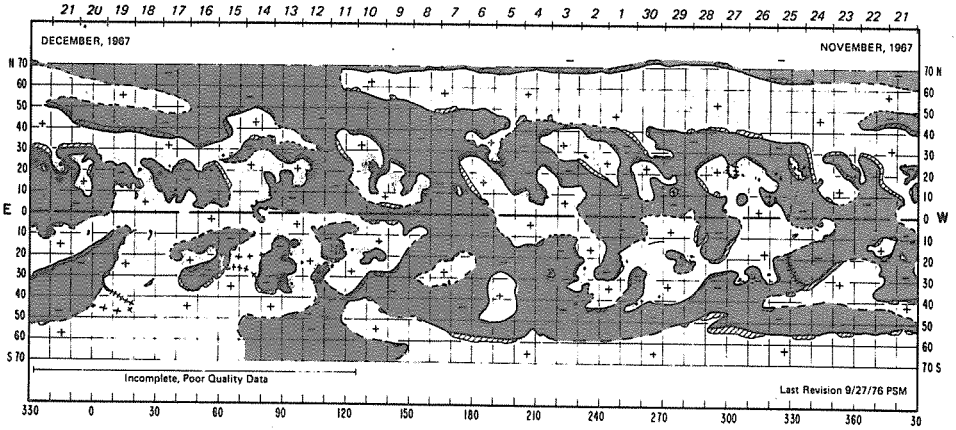
Carrington Longitude

0°

360°

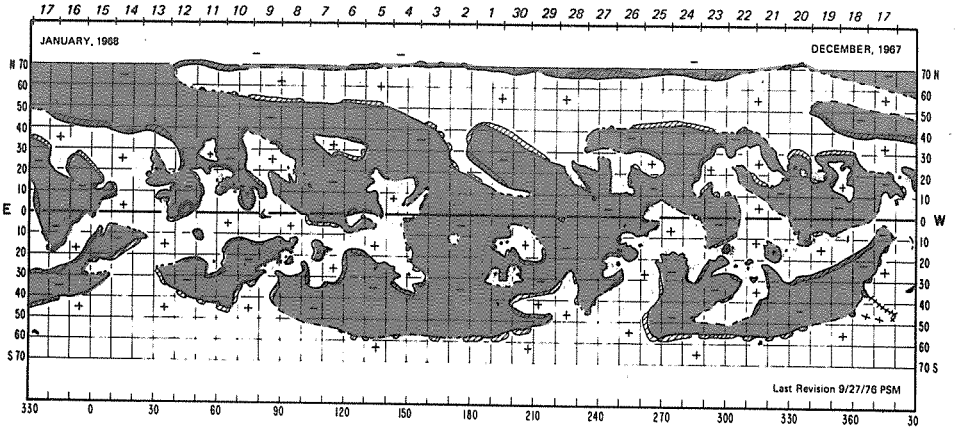
ROTATION 1528

NOV – DEC 1967



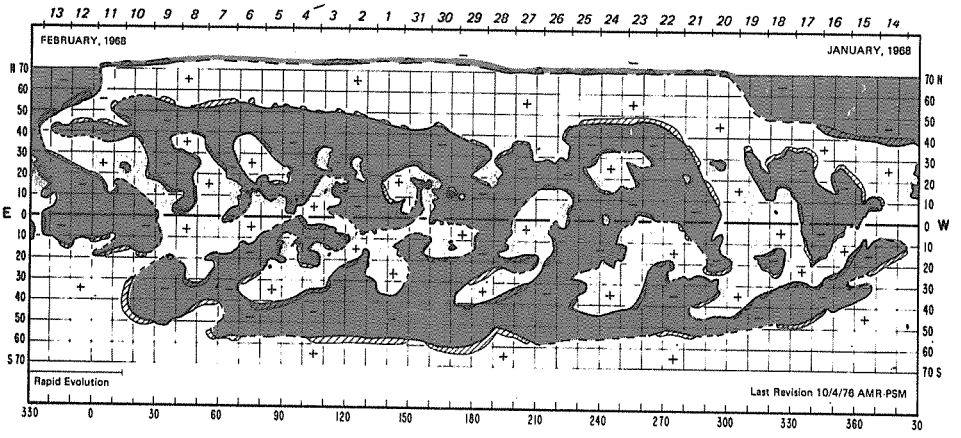
ROTATION 1529

DEC 1967 – JAN 1968



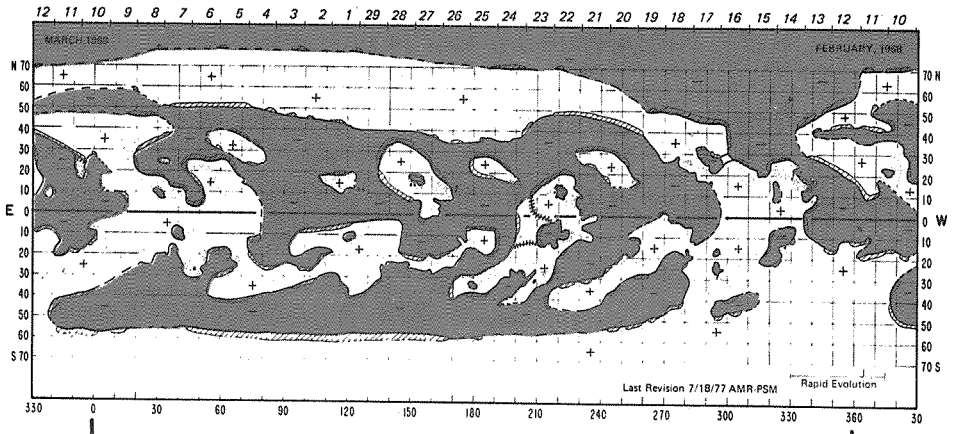
ROTATION 1530

JAN – FEB 1968



ROTATION 1531

FEB – MAR 1968

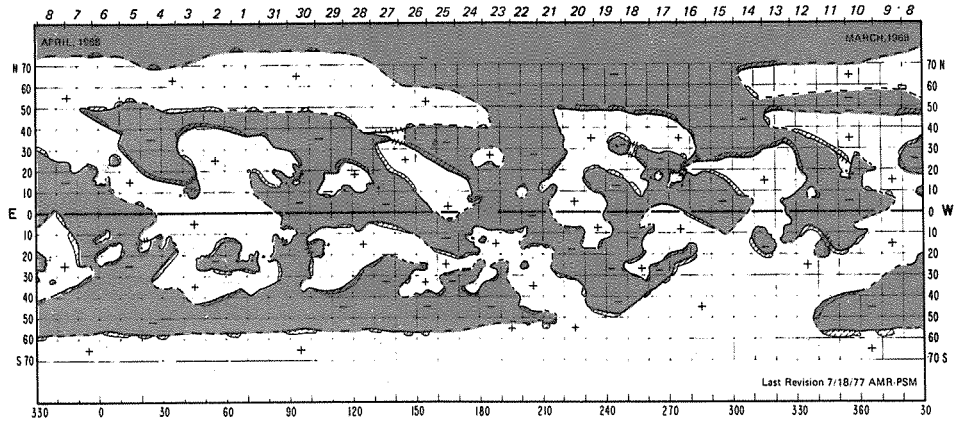


Carrington Longitude

0° 360°

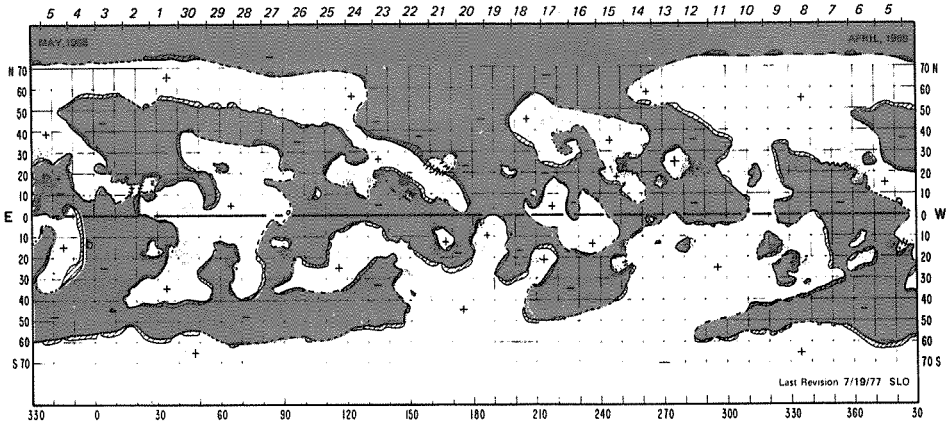
ROTATION 1532

MAR – APR 1968



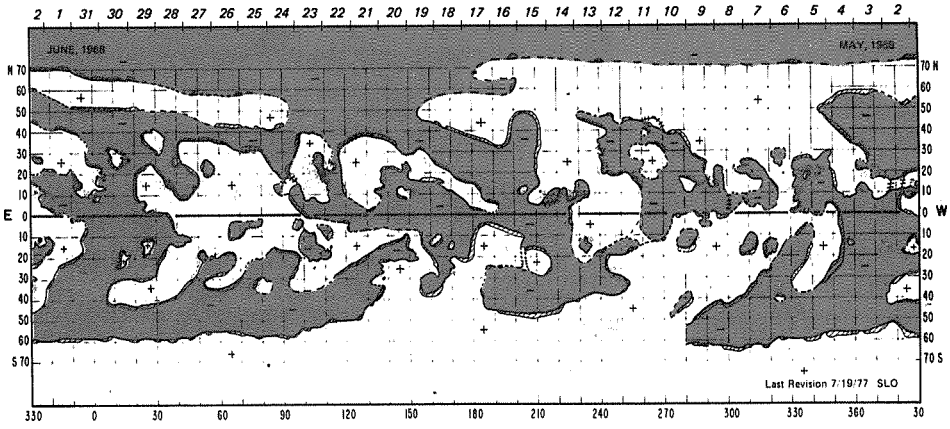
ROTATION 1533

APR 1968



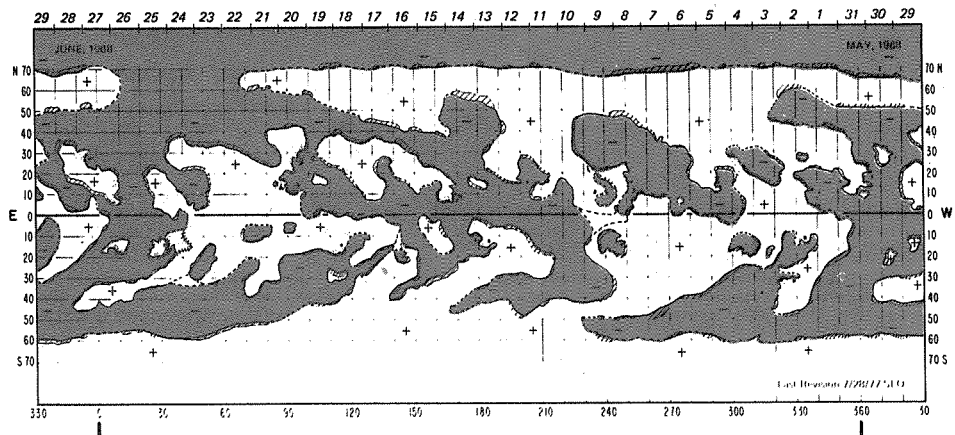
ROTATION 1534

MAY 1968



ROTATION 1535

JUN 1968



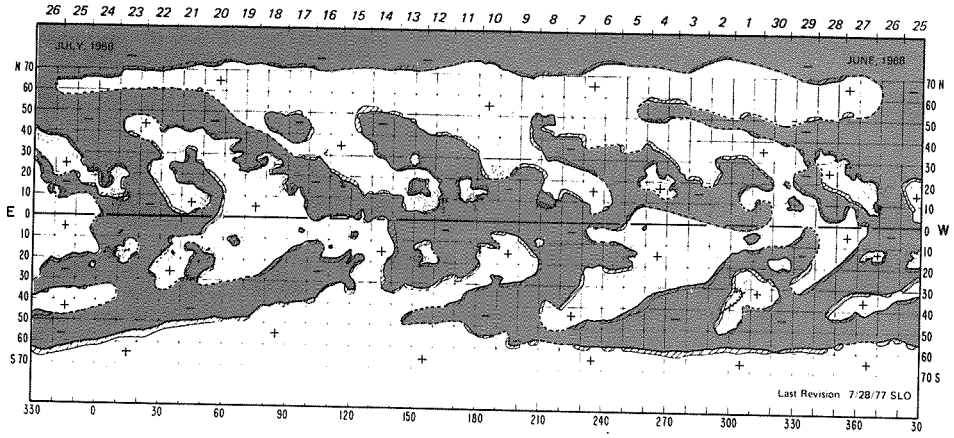
Carrington Longitude

0°

360°

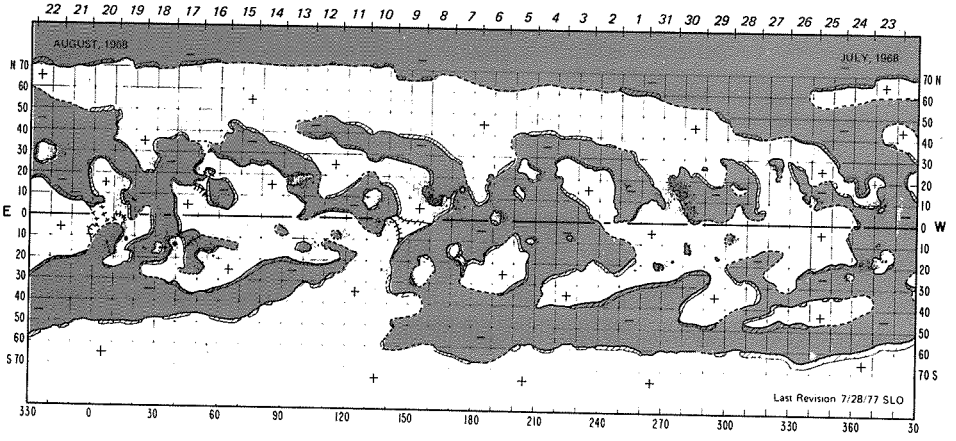
ROTATION 1536

JUL 1968



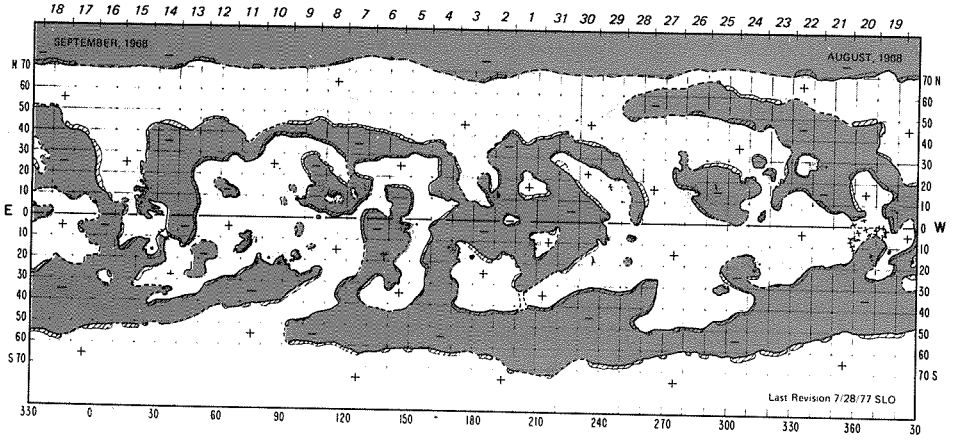
ROTATION 1537

JUL – AUG 1968



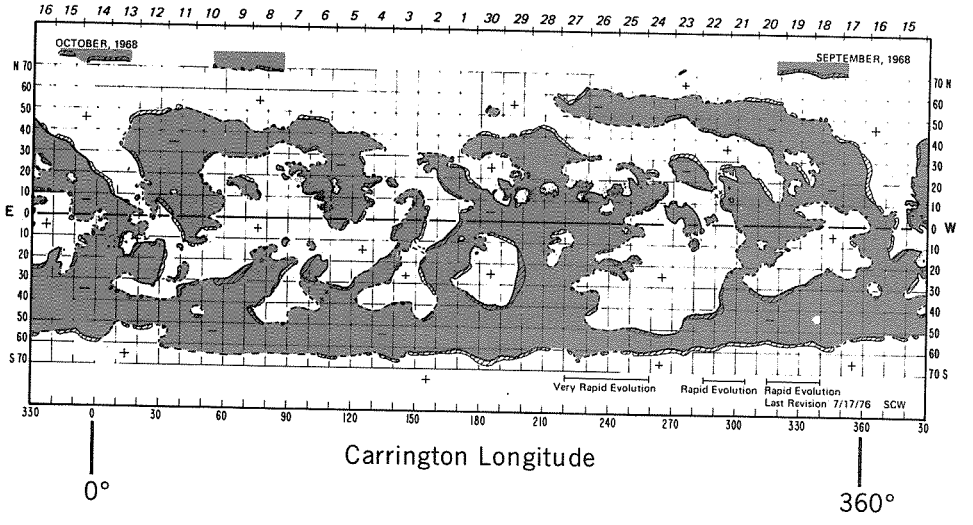
ROTATION 1538

AUG – SEP 1968



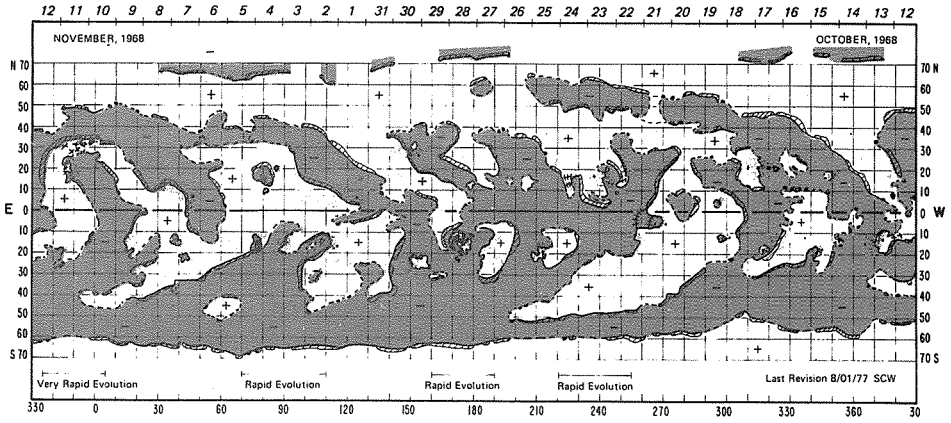
ROTATION 1539

SEP – OCT 1968



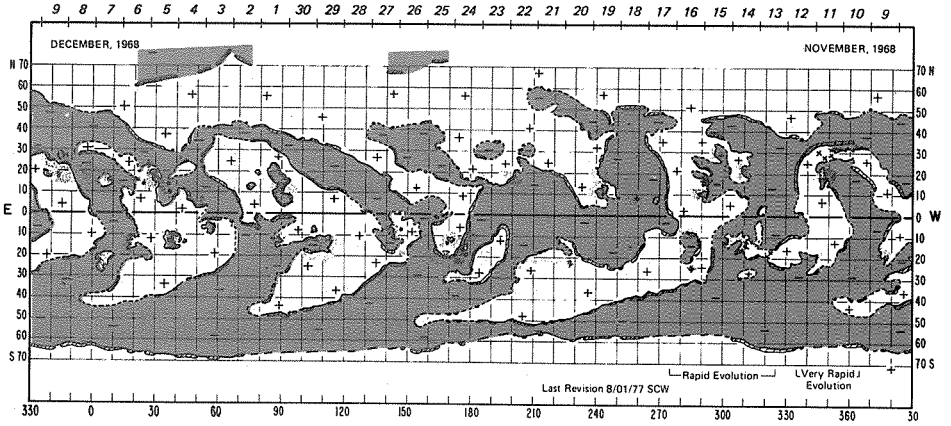
ROTATION 1540

OCT – NOV 1968



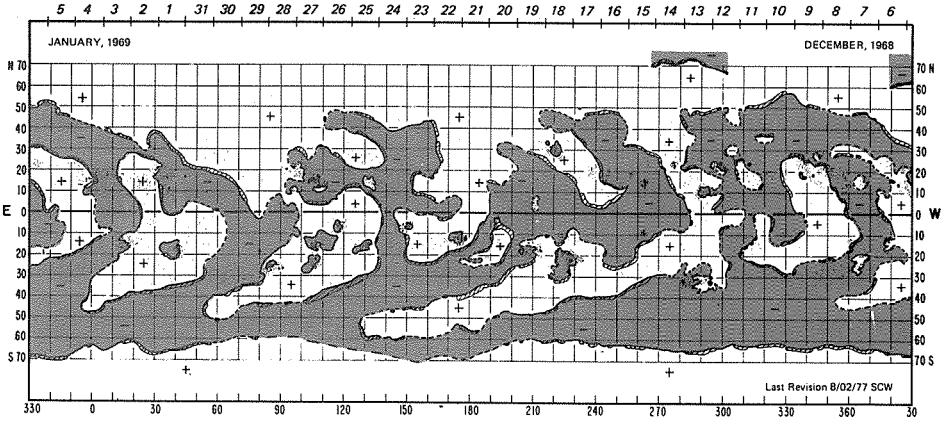
ROTATION 1541

NOV – DEC 1968



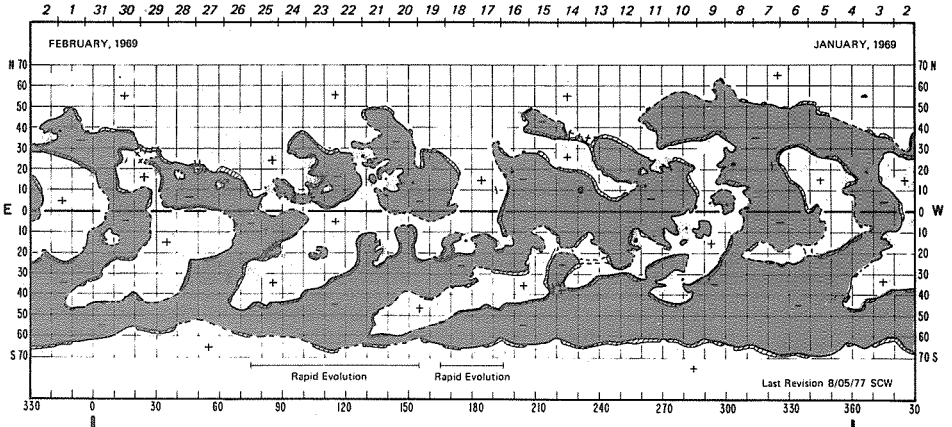
ROTATION 1542

DEC 1968



ROTATION 1543

JAN 1969



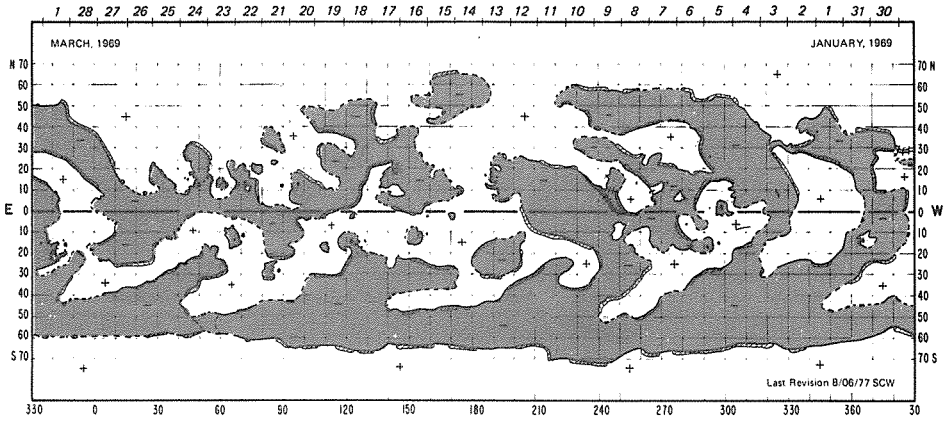
Carrington Longitude

0°

360°

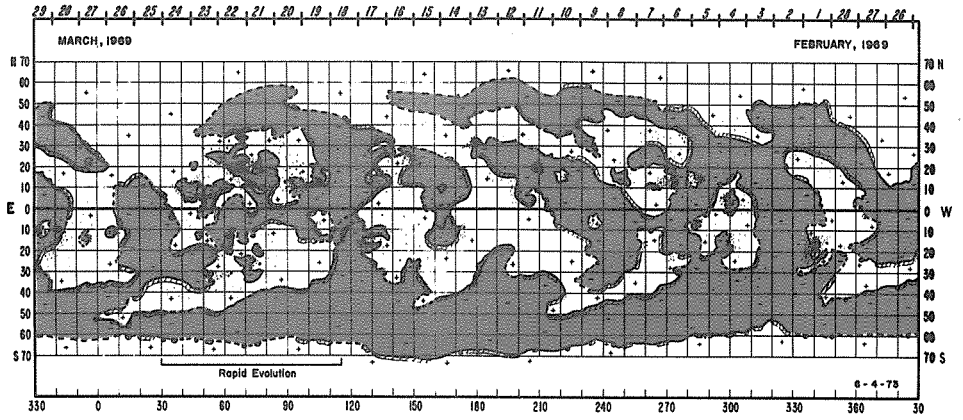
ROTATION 1544

FEB 1969



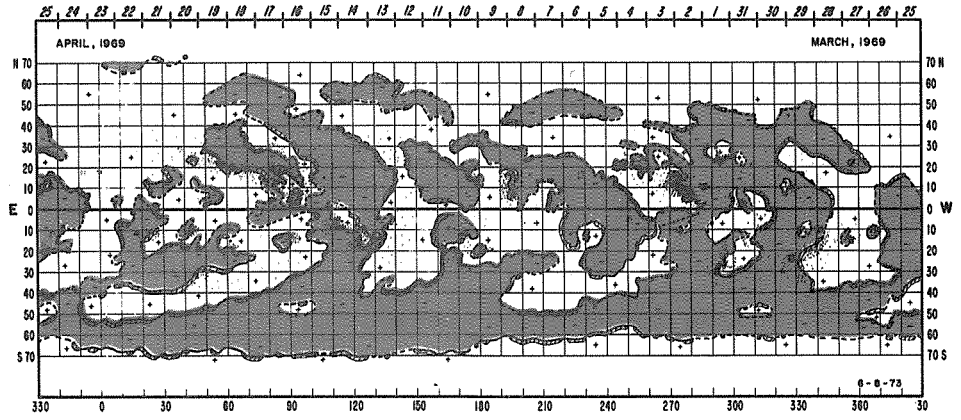
ROTATION 1545

MAR 1969



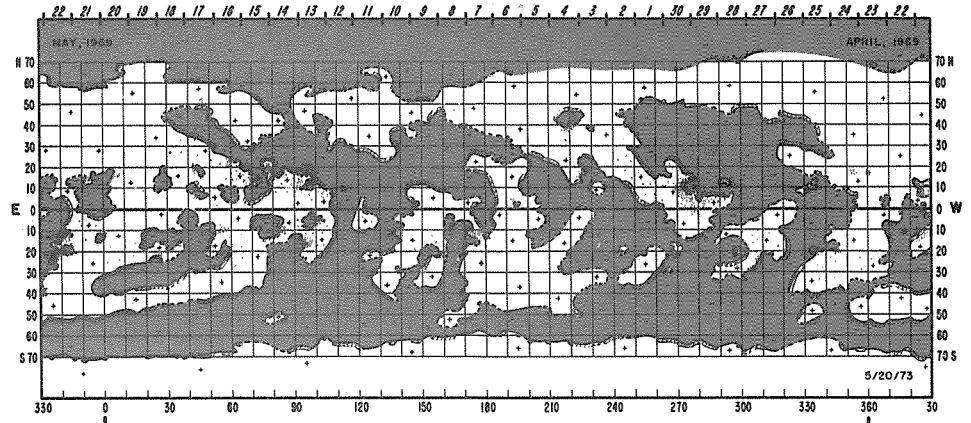
ROTATION 1546

MAR – APR 1969



ROTATION 1547

APR – MAY 1969

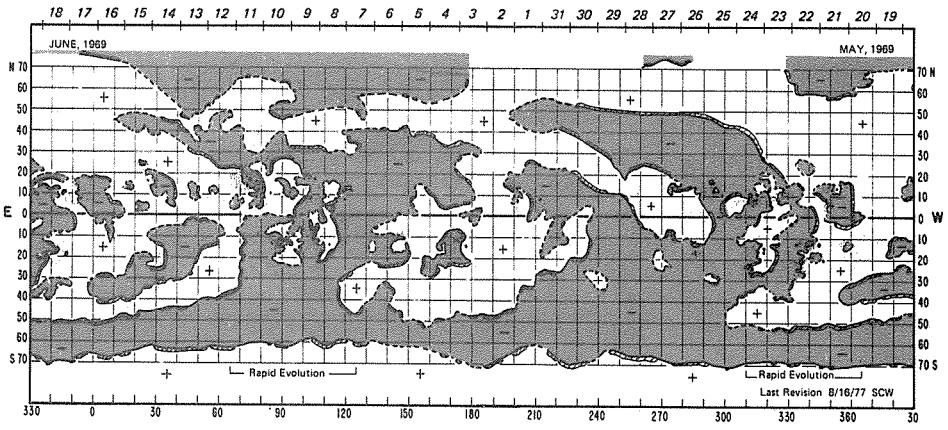


Carrington Longitude

0° 360°

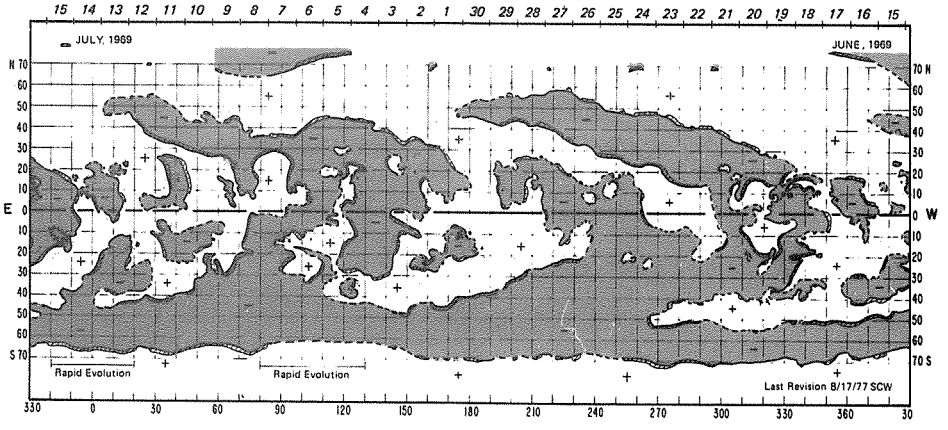
ROTATION 1548

MAY – JUN 1969



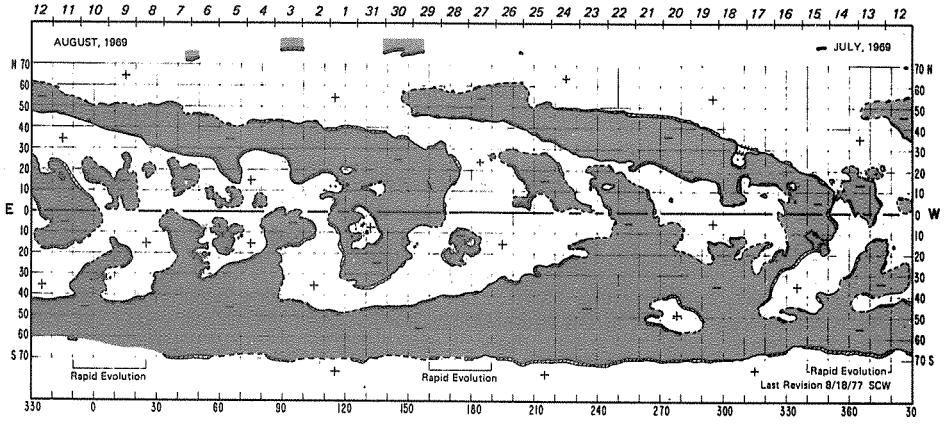
ROTATION 1549

JUN – JUL 1969



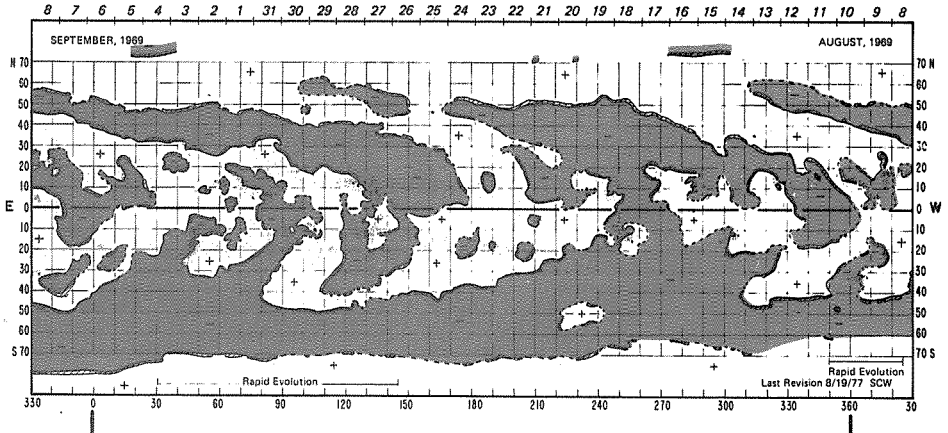
ROTATION 1550

JUL – AUG 1969



ROTATION 1551

AUG – SEP 1969

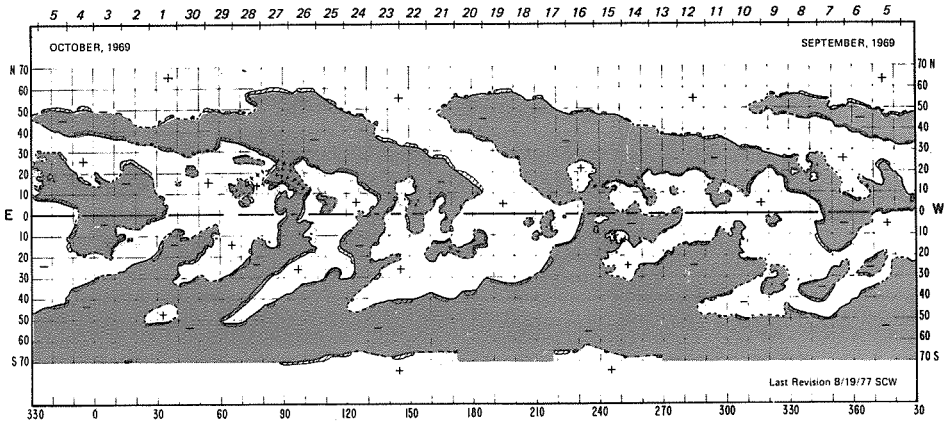


Carrington Longitude

0° 360°

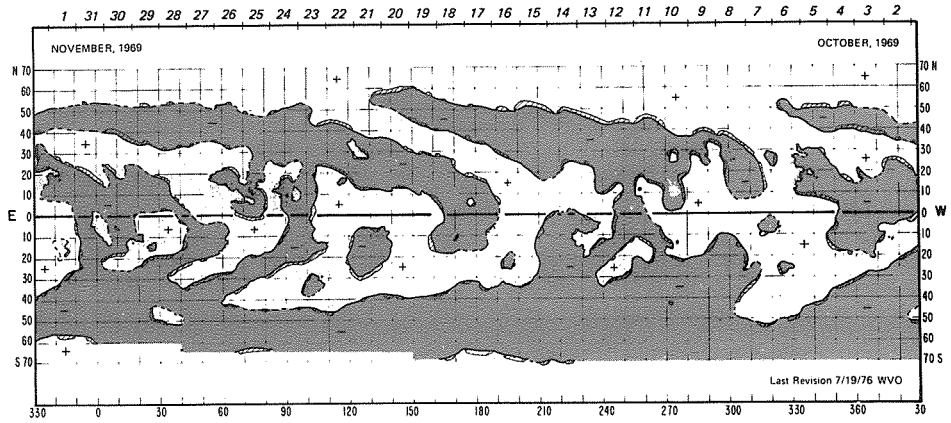
ROTATION 1552

SEP 1969



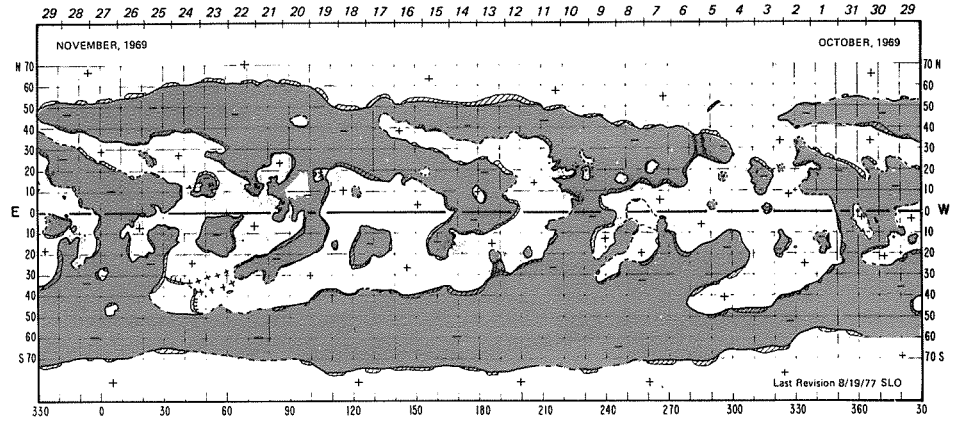
ROTATION 1553

OCT 1969



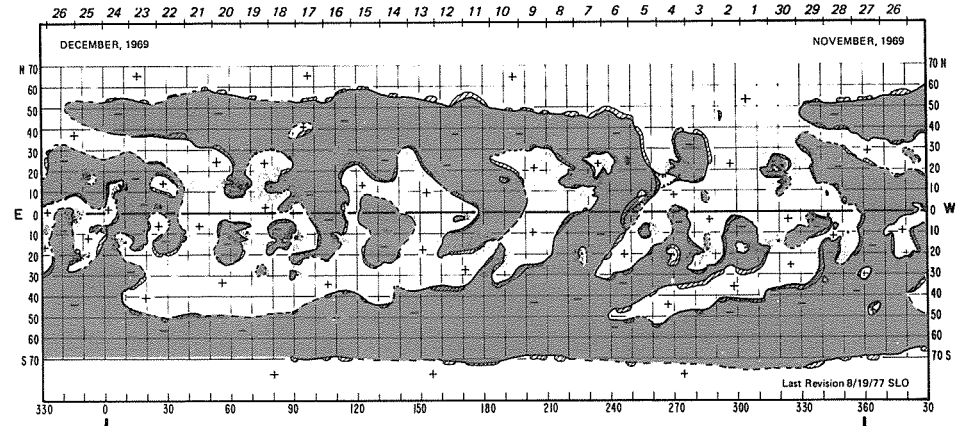
ROTATION 1554

NOV 1969



ROTATION 1555

DEC 1969

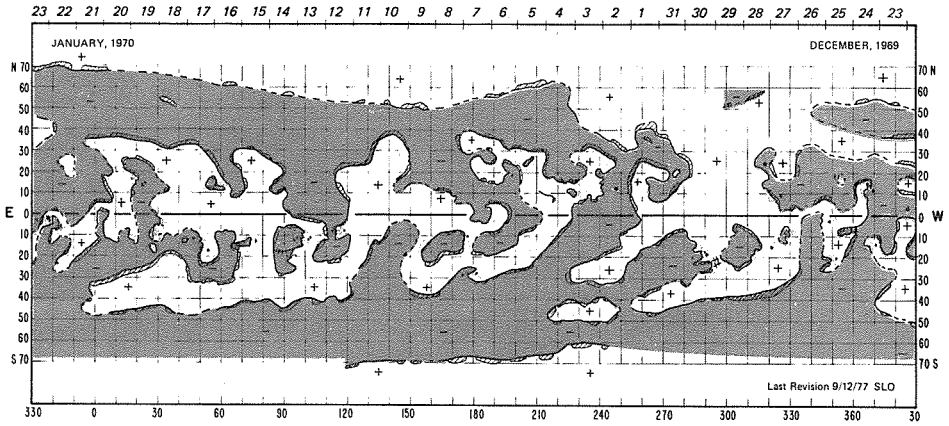


Carrington Longitude

0° 360°

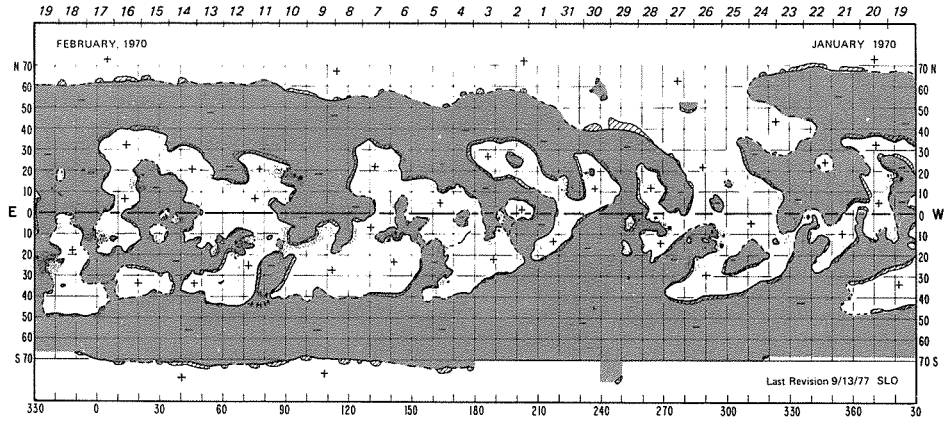
ROTATION 1556

DEC 1969 – JAN 1970



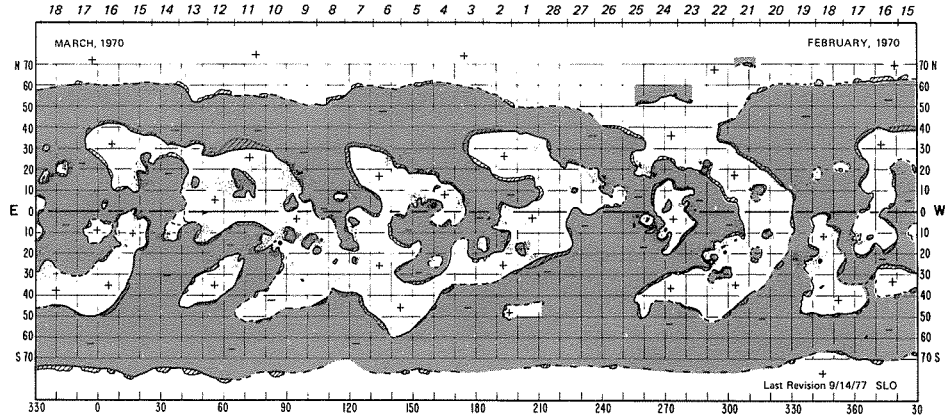
ROTATION 1557

JAN–FEB 1970



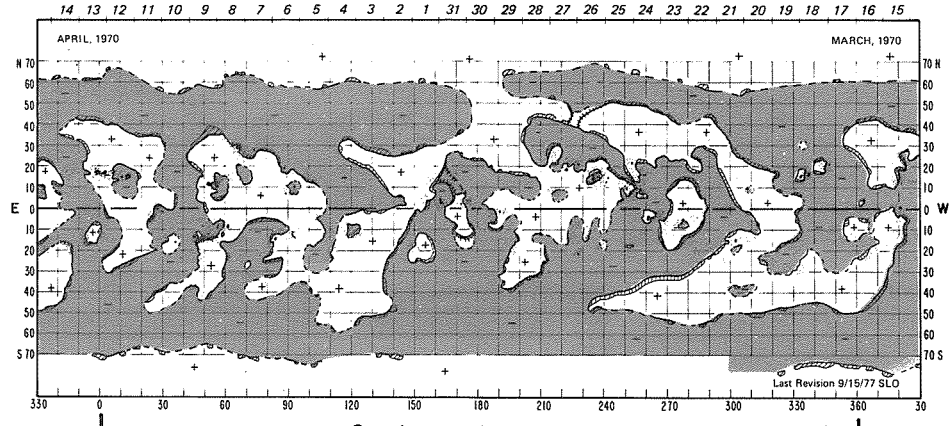
ROTATION 1558

FEB–MAR 1970



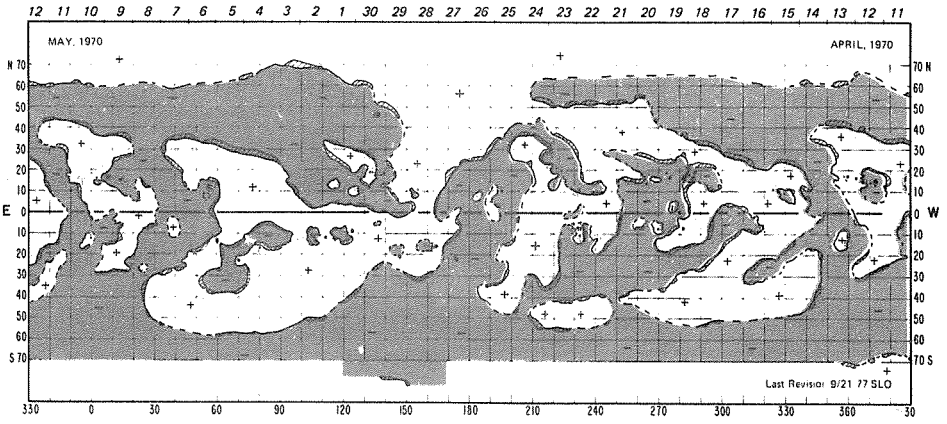
ROTATION 1559

MAR–APR 1970



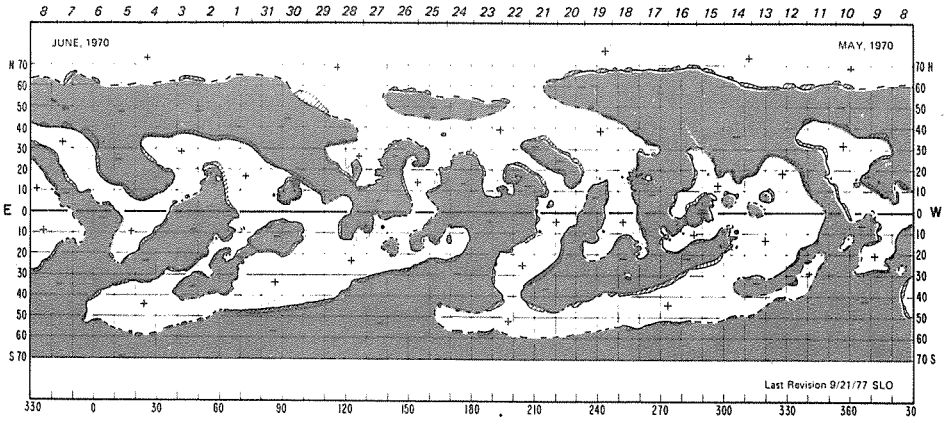
ROTATION 1560

APR–MAY 1970



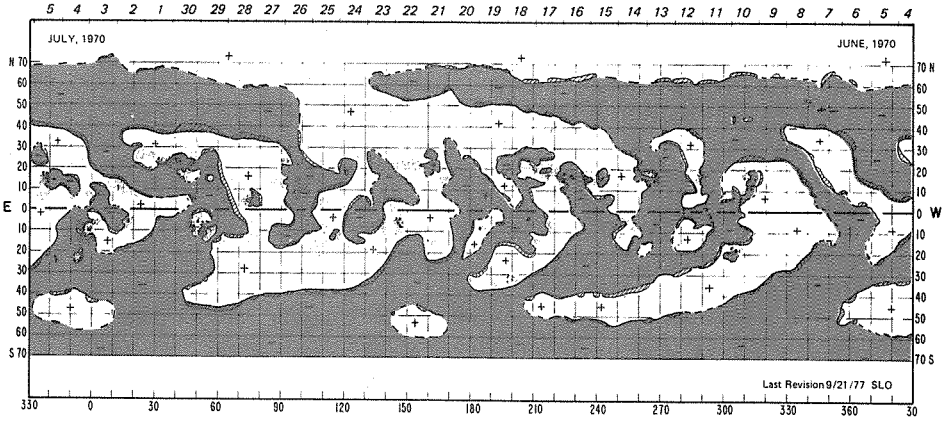
ROTATION 1561

MAY–JUN 1970



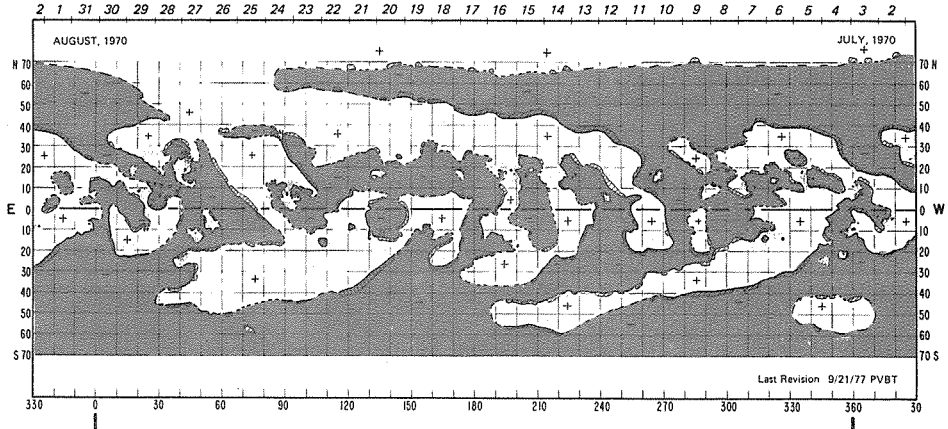
ROTATION 1562

JUN 1970



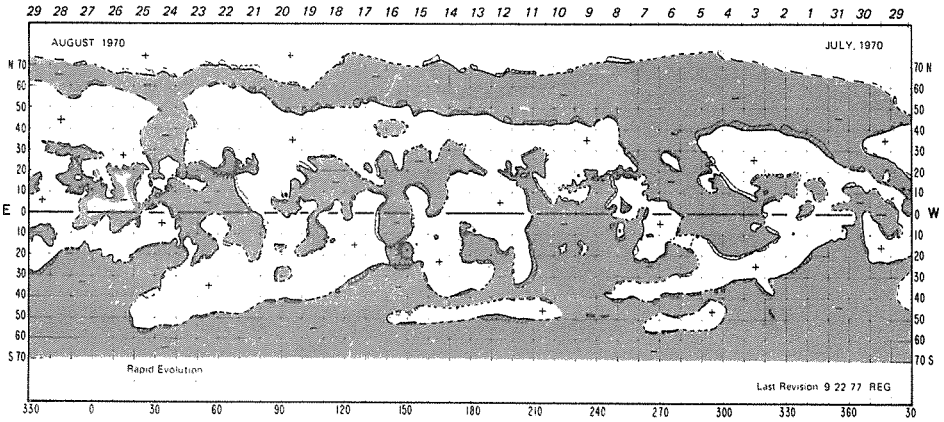
ROTATION 1563

JUL 1970



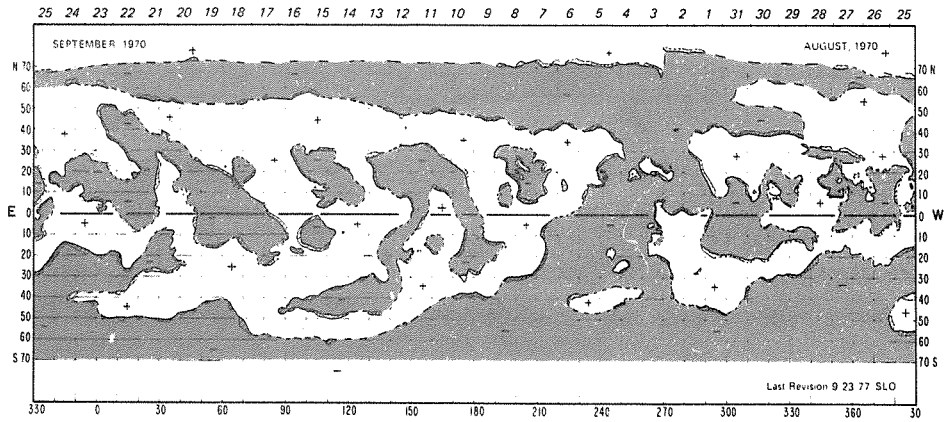
ROTATION 1564

AUG 1970



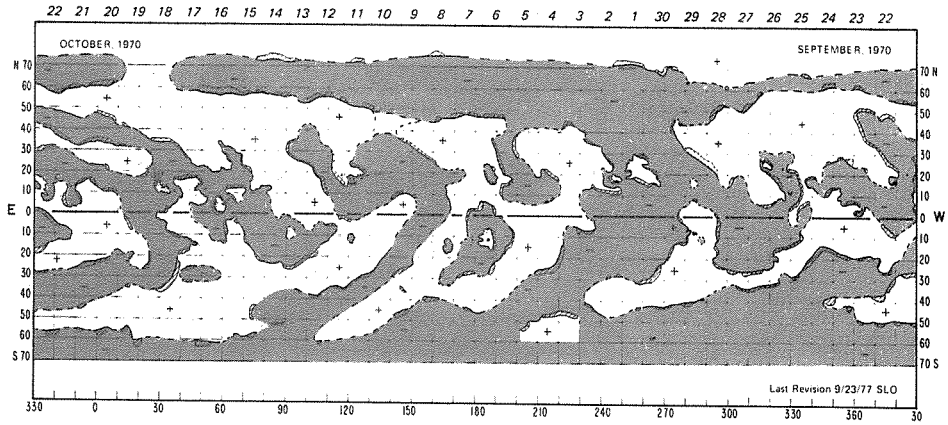
ROTATION 1565

AUG–SEP 1970



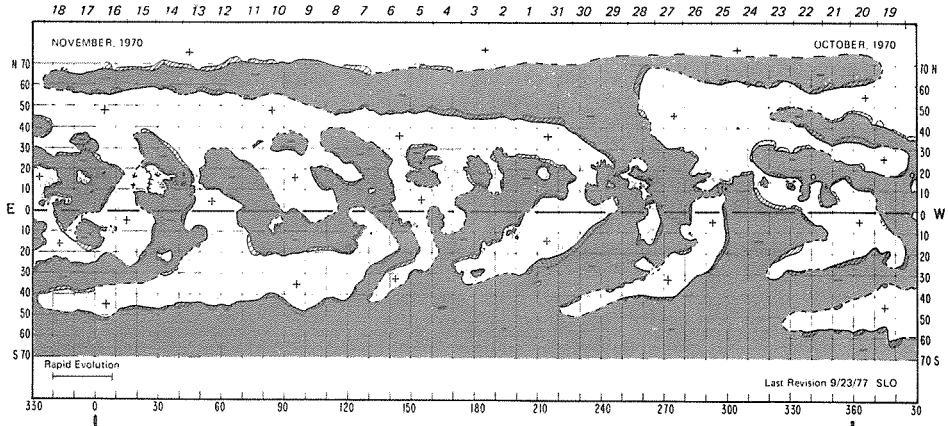
ROTATION 1566

SEP–OCT 1970



ROTATION 1567

OCT–NOV 1970

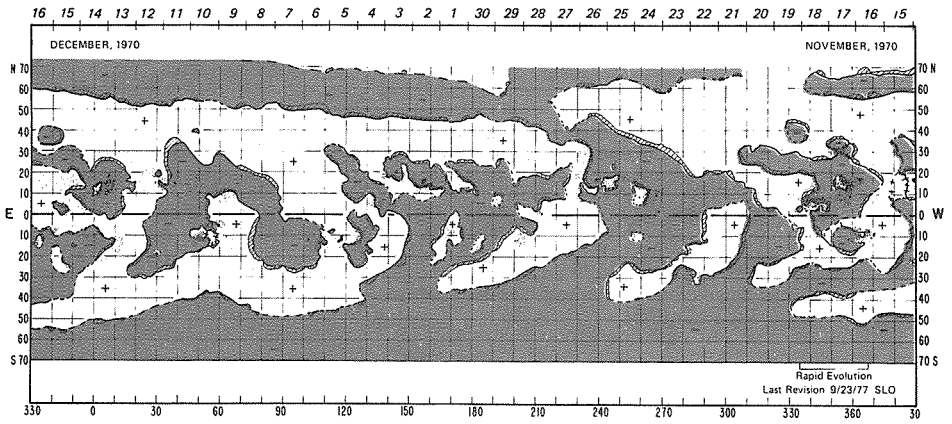


Carrington Longitude

0° 360°

ROTATION 1568

NOV–DEC 1970



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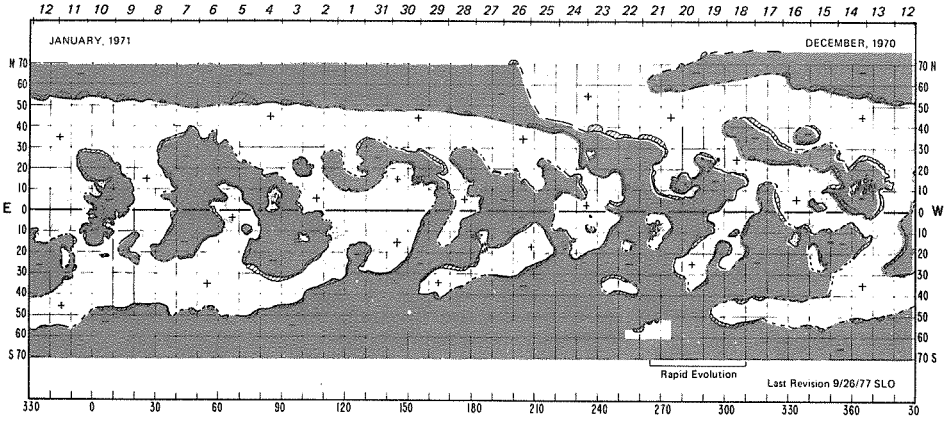
DEC 1970 – JAN 1971



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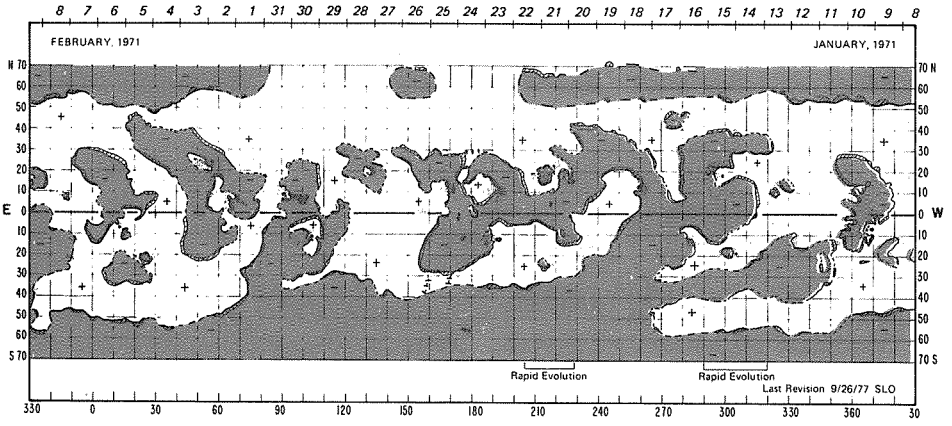

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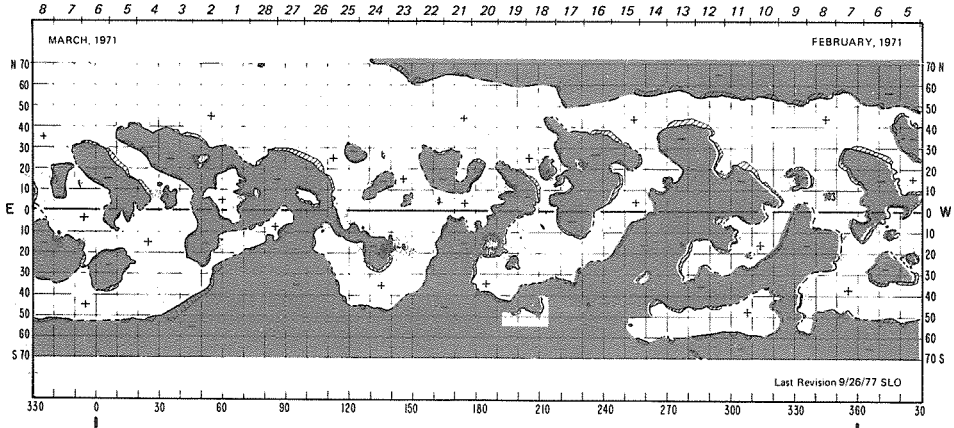
FEB–MAR 1971



Carrington Longitude

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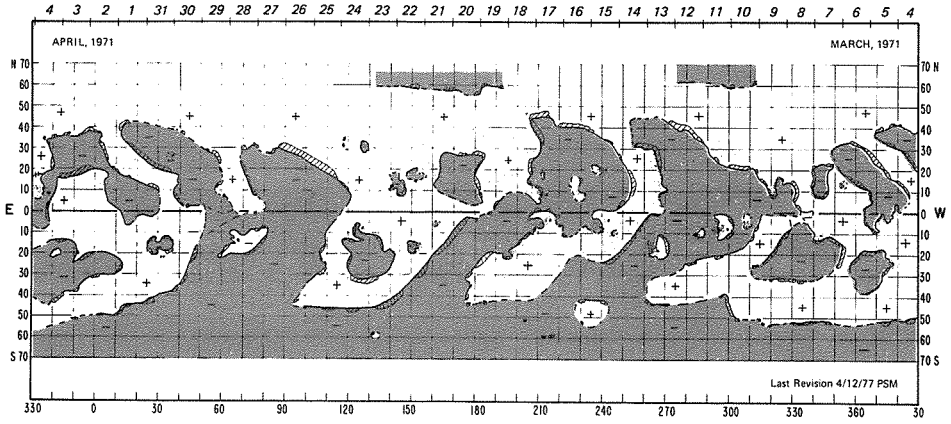
ROTATION 1572

MAR 1971



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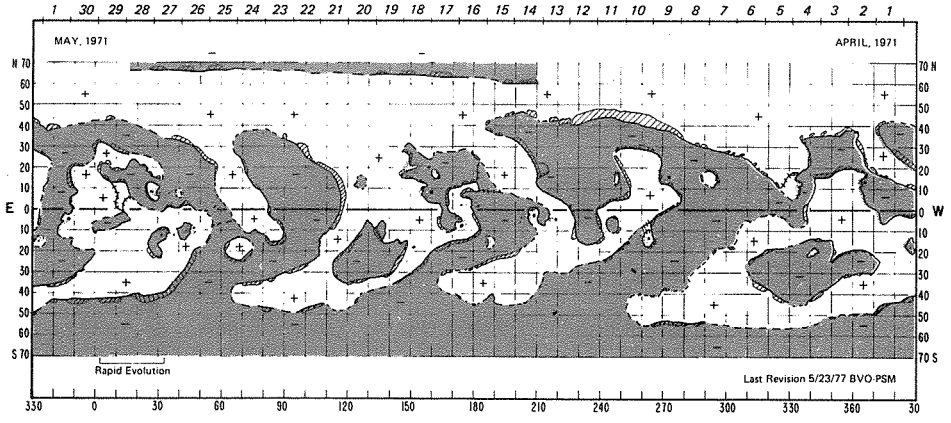

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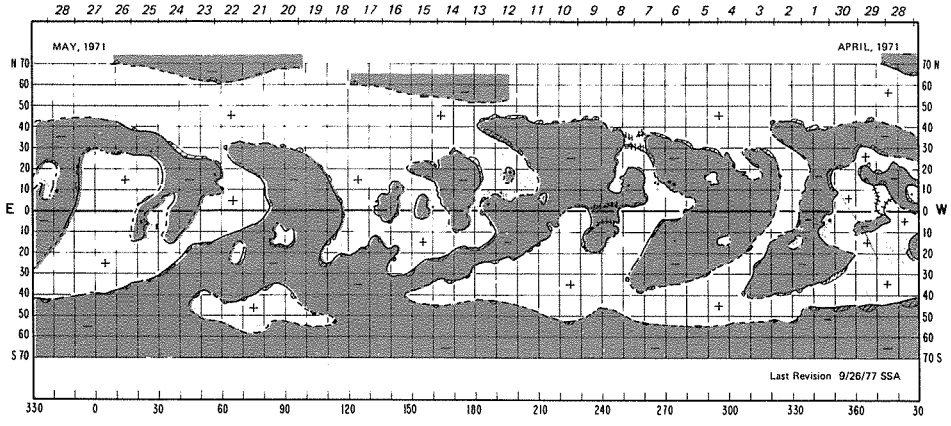
MAY 1971



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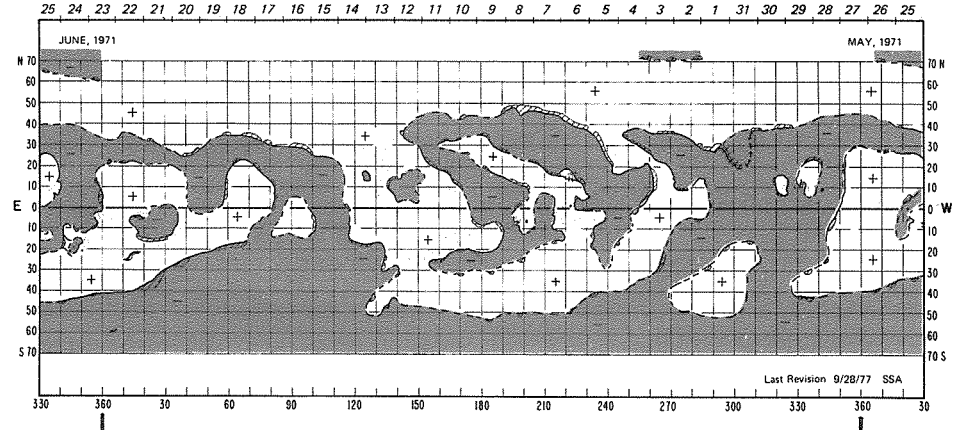

Carrington Longitude

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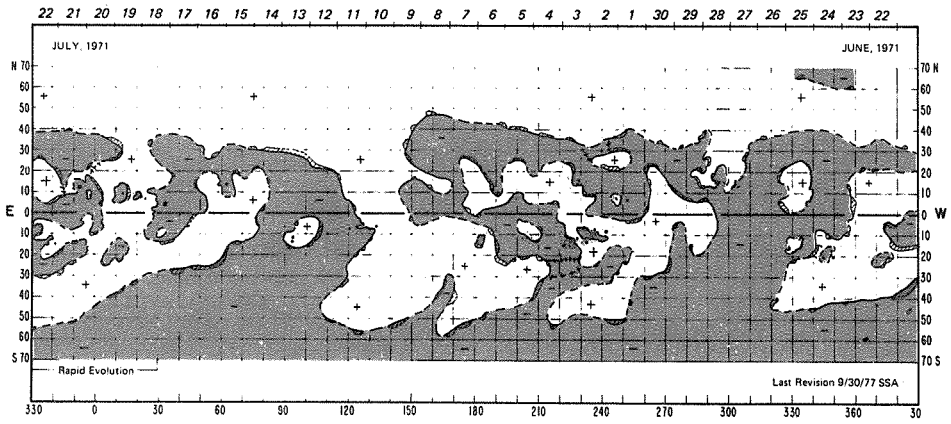
JUN–JUL 1971



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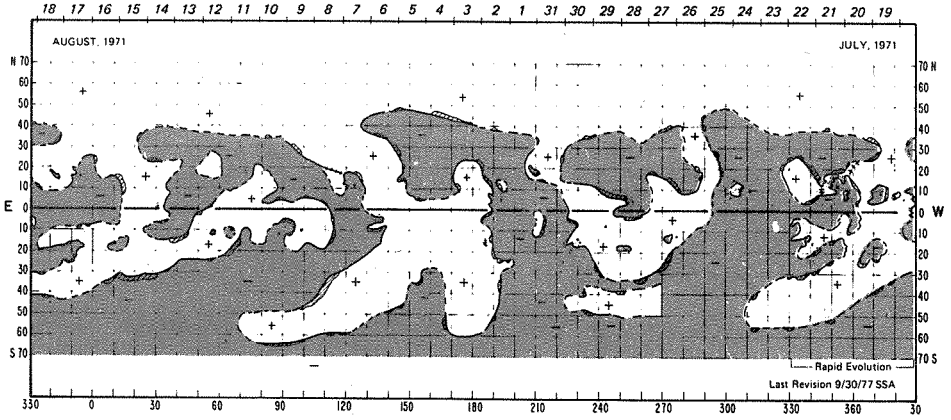

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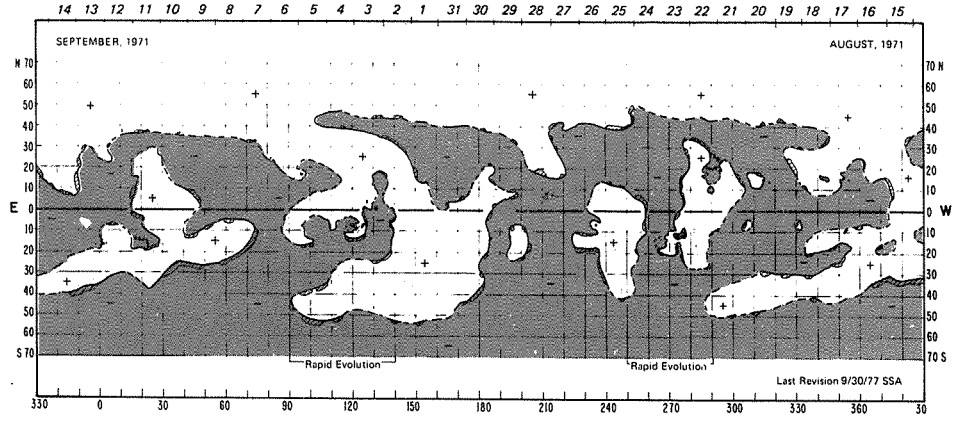

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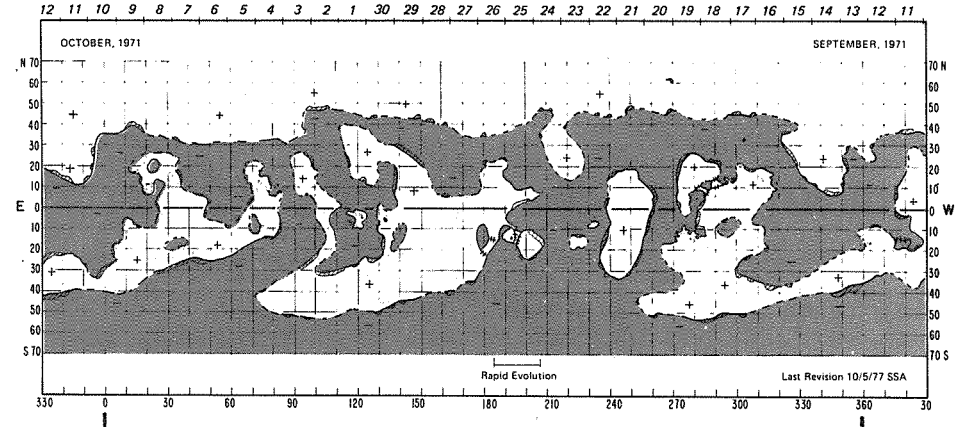
SEP–OCT 1971



Carrington Longitude

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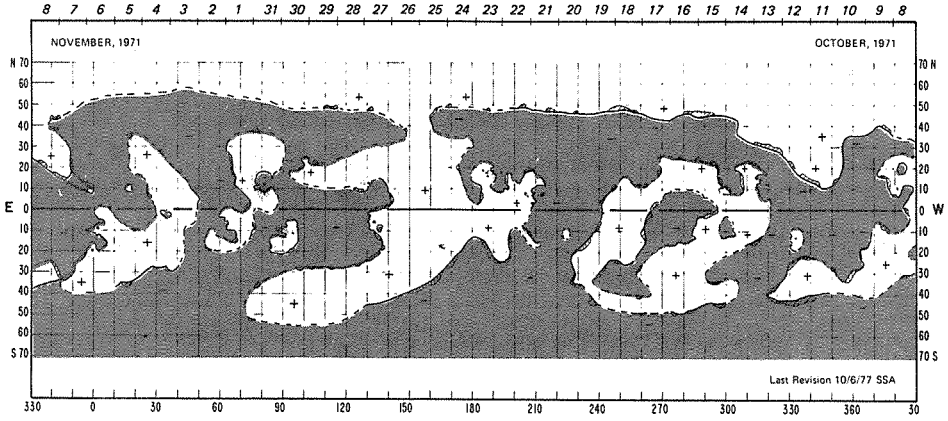
ROTATION 1580

OCT—NOV 1971



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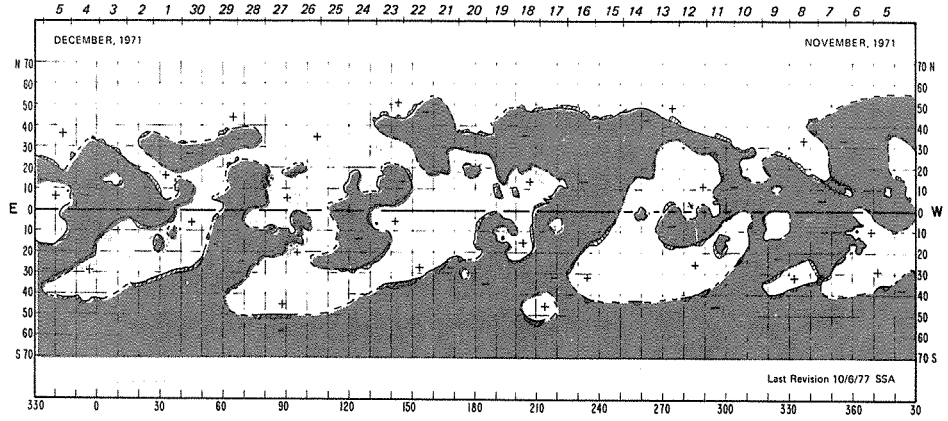

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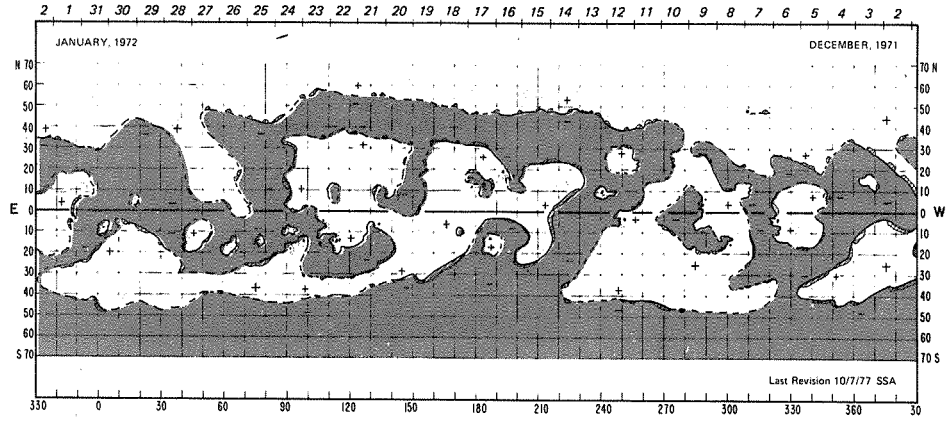

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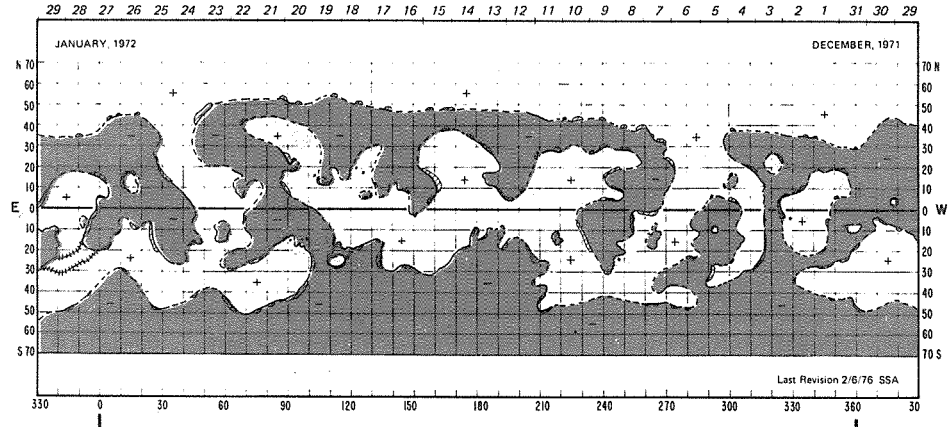
JAN 1972



Carrington Longitude

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ROTATION 1584

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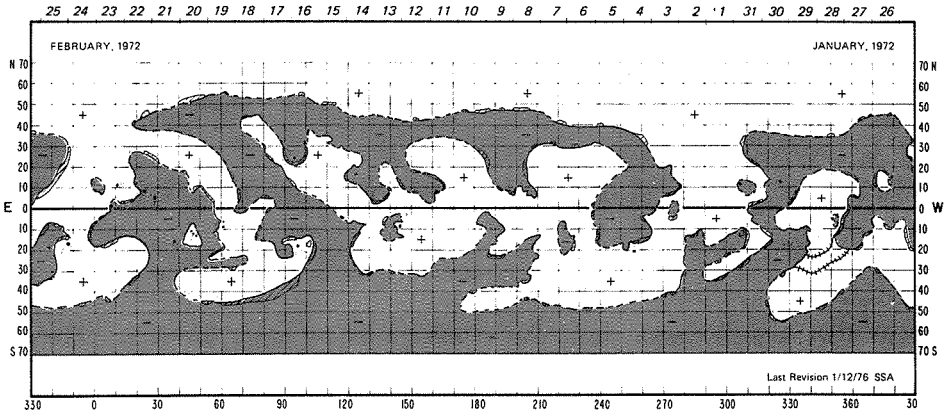

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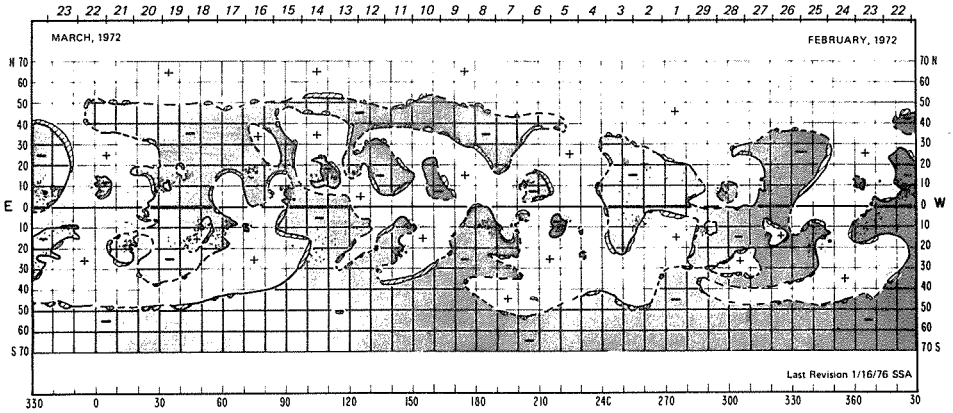

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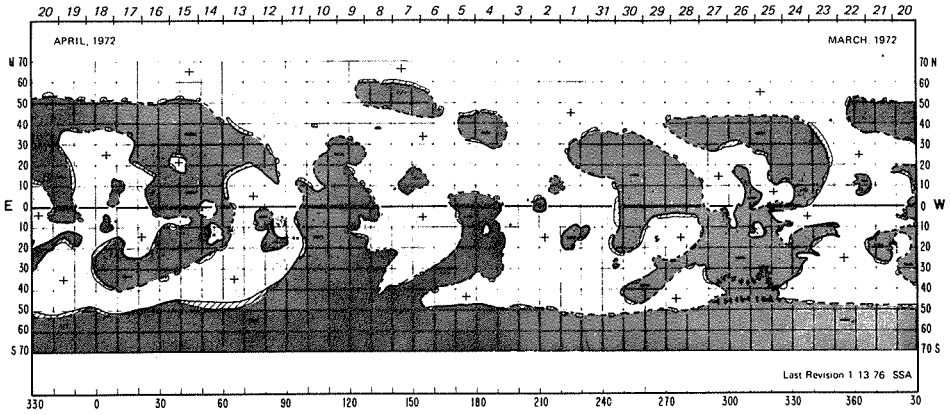
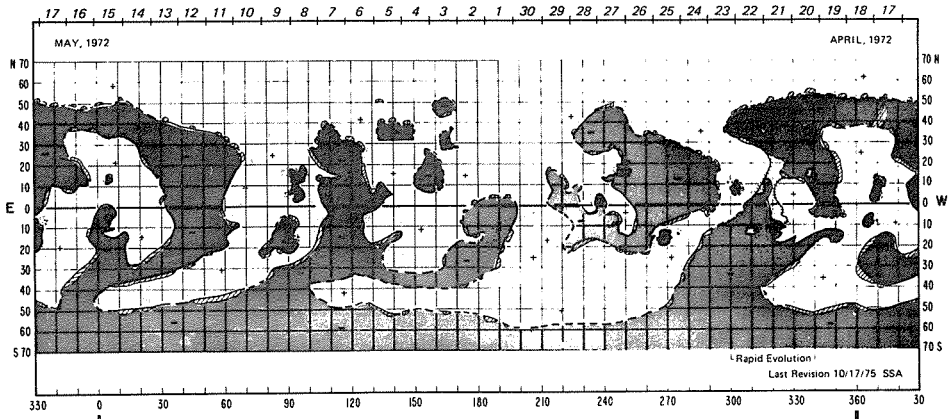
MAR – APR 1972



ROTATION 1587

APR – MAY 1972

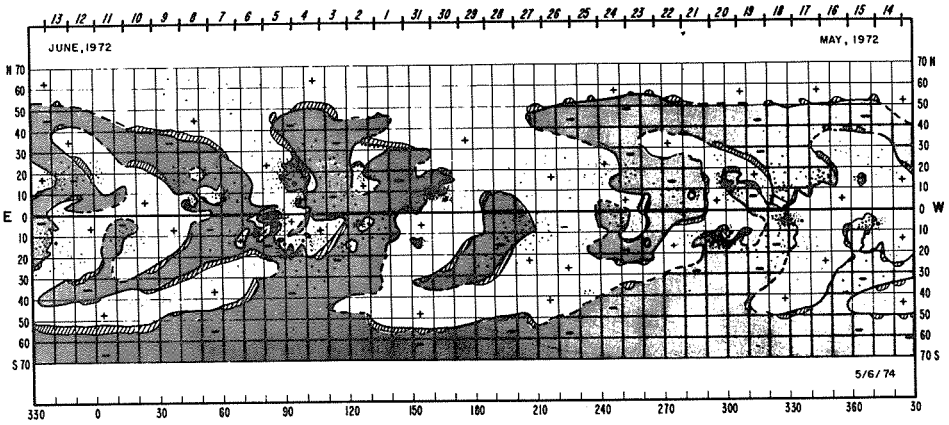


Carrington Longitude

0° 360°

ROTATION 1588

MAY – JUN 1972



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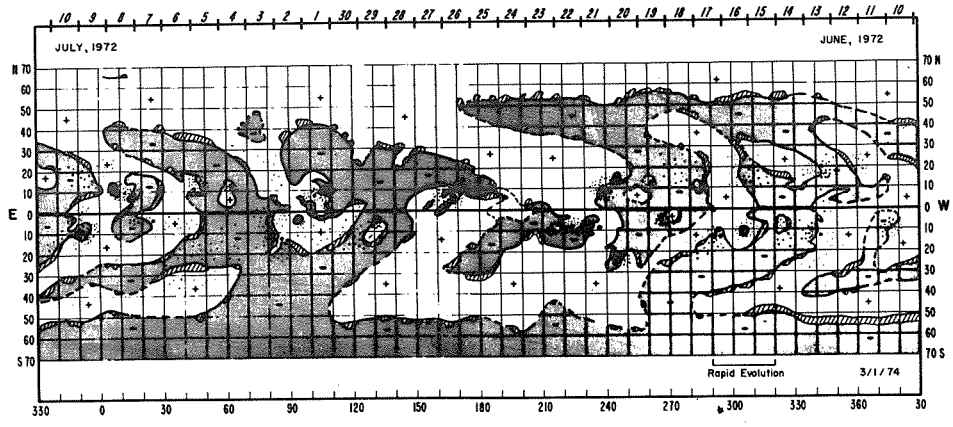

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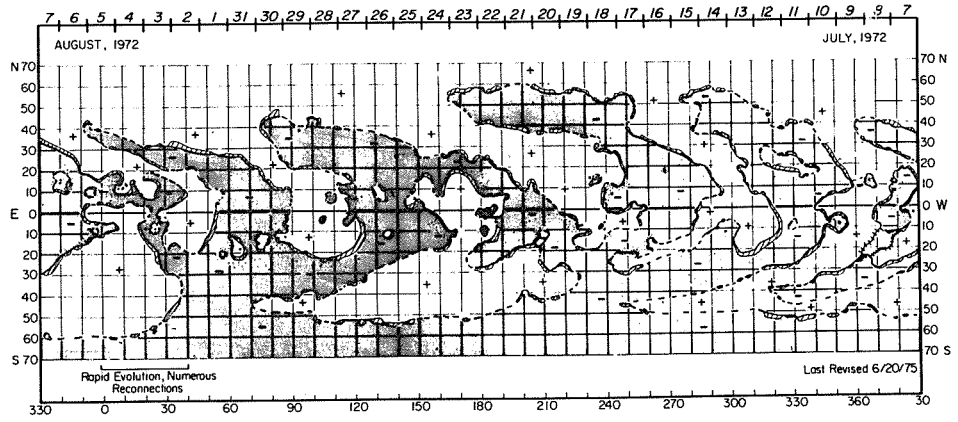

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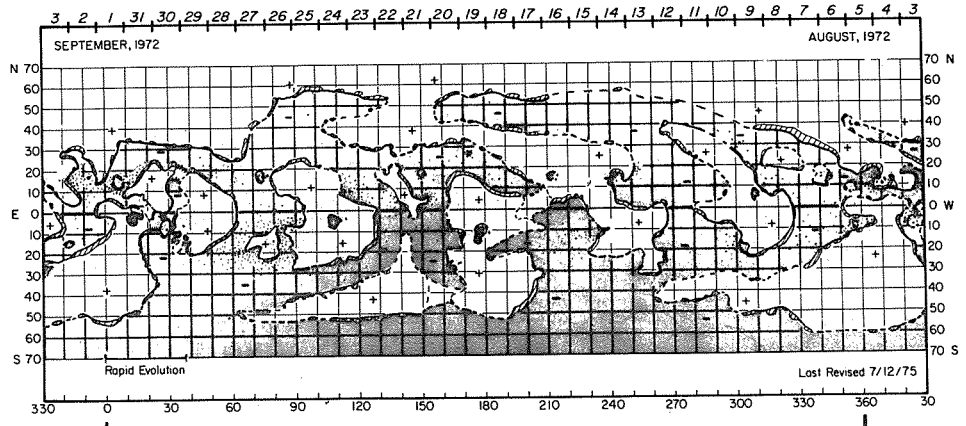
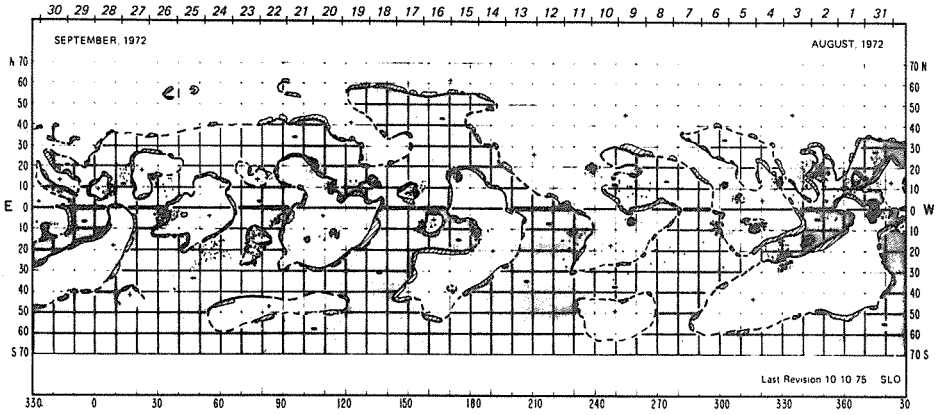


Carrington Longitude

0° 360°

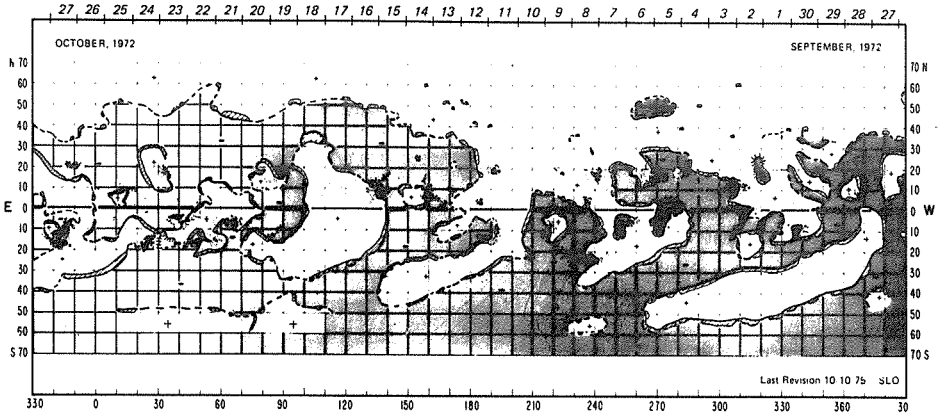
ROTATION 1592

SEP 1972



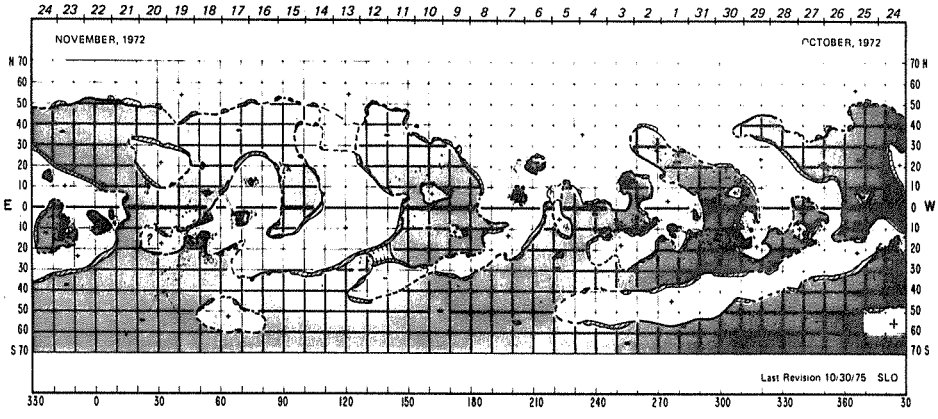
ROTATION 1593

OCT 1972



ROTATION 1594

OCT – NOV 1972



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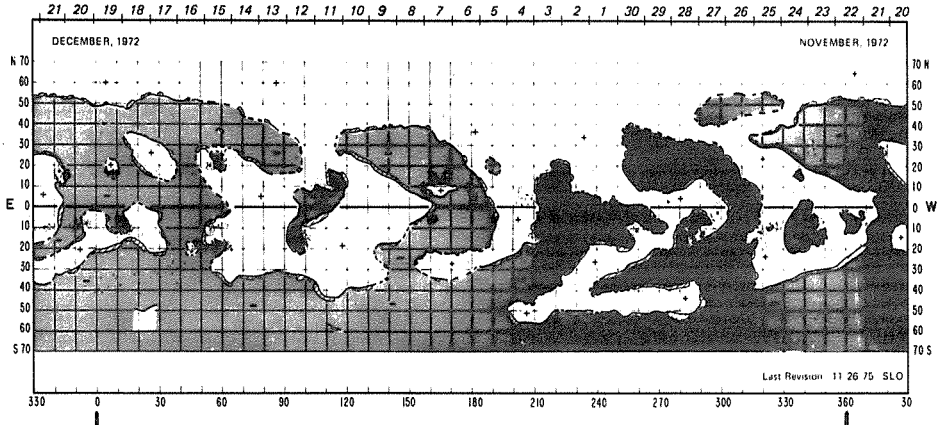
NOV – DEC 1972

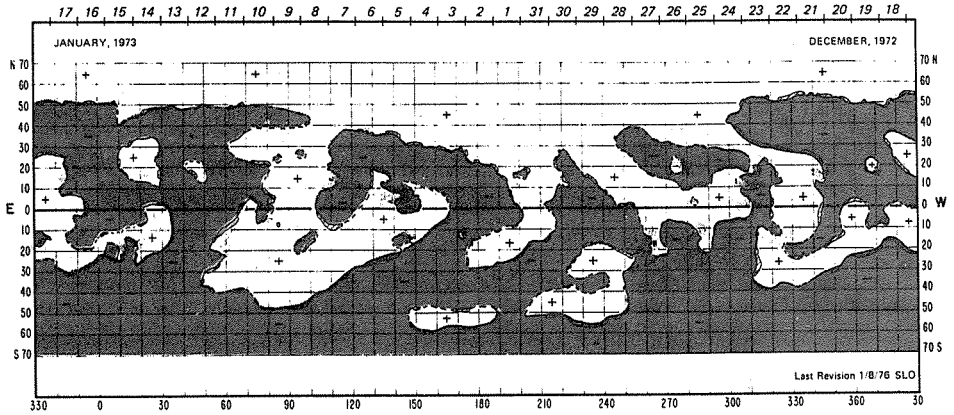


Carrington Longitude

0° 360°

ROTATION 1596

DEC 1972 – JAN 1973



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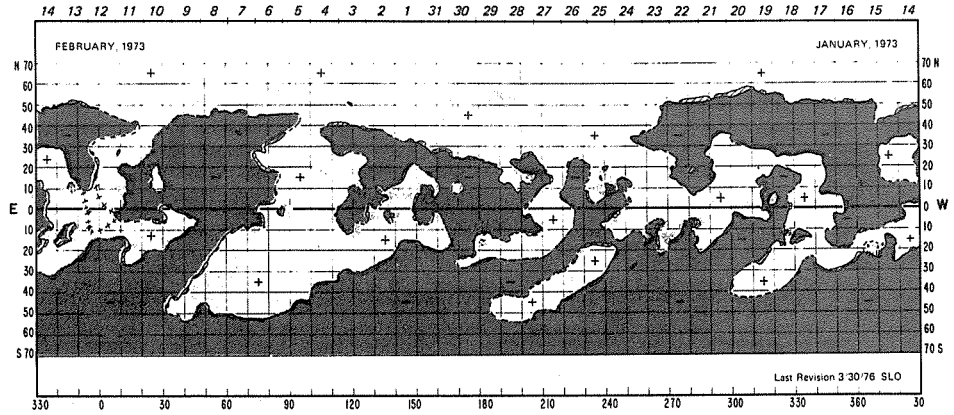
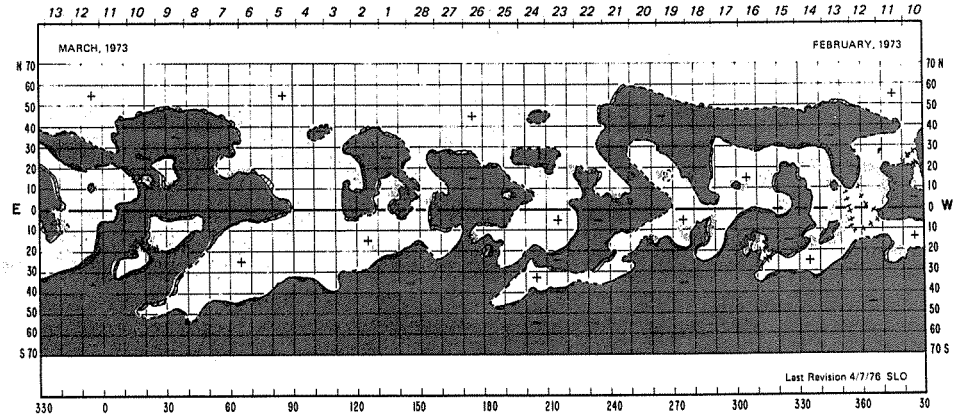


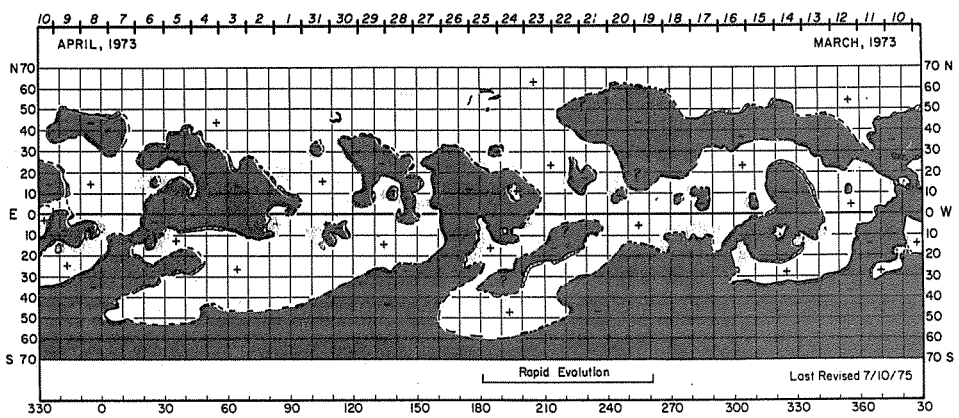
ROTATION 1598

FEB – MAR 1973



ROTATION 1599

MAR – APR 1973

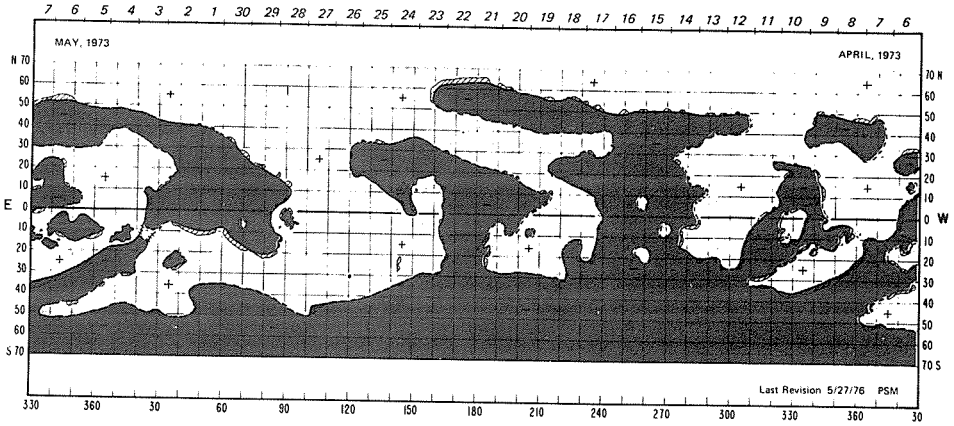


Carrington Longitude

0° 360°

ROTATION 1600

APR – MAY 1973



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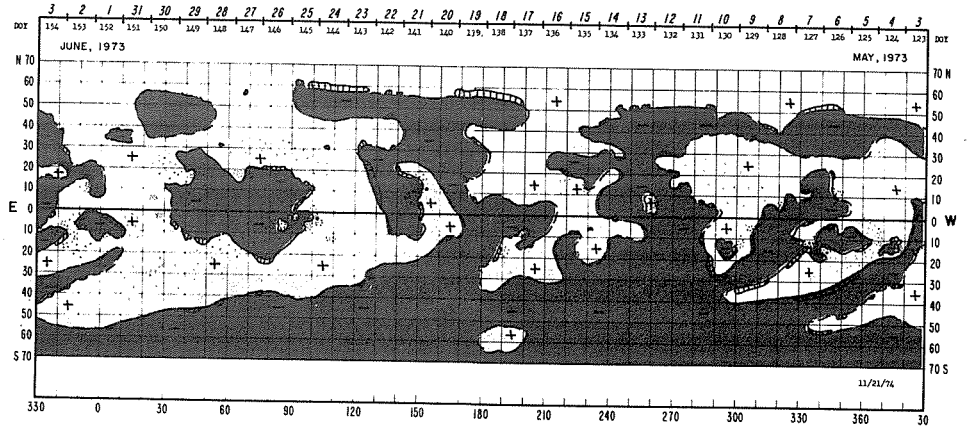
MAY 1973



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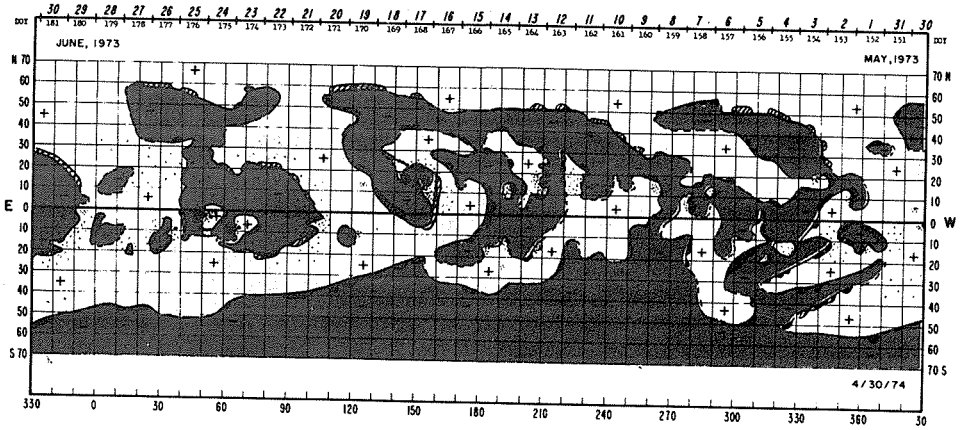

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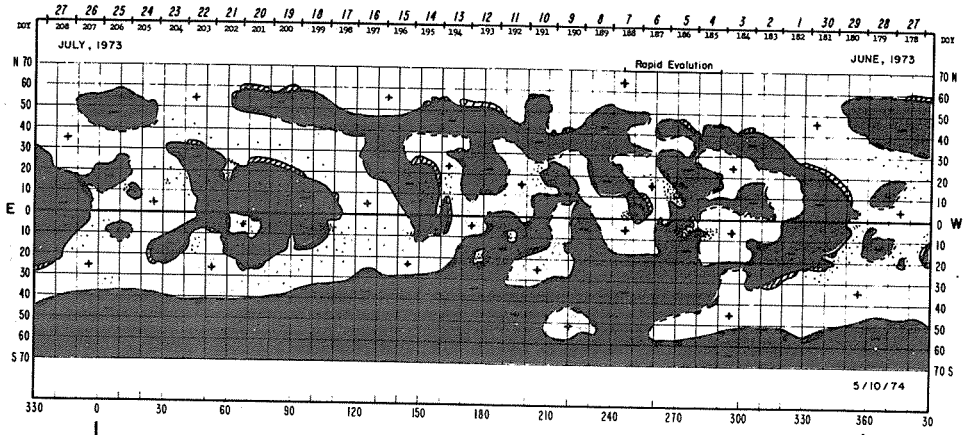

Carrington Longitude

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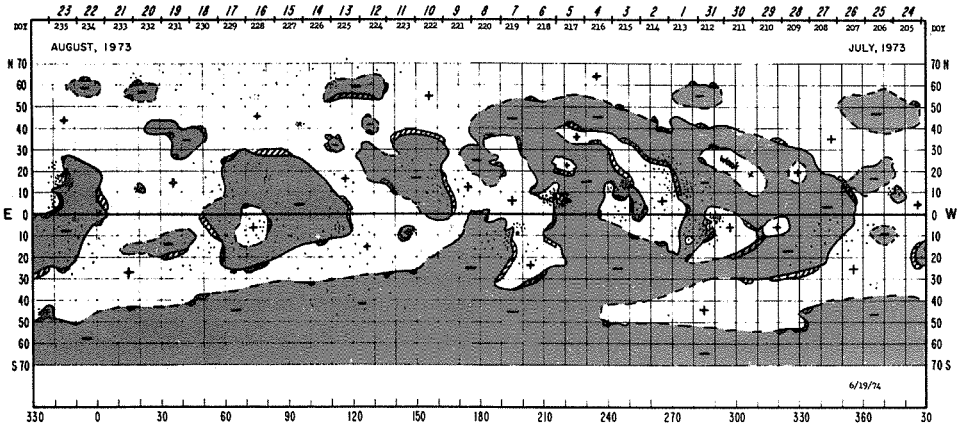

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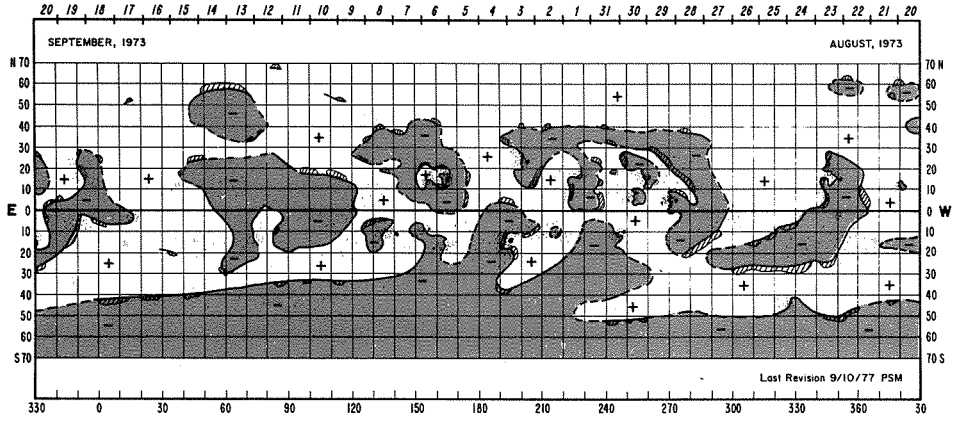

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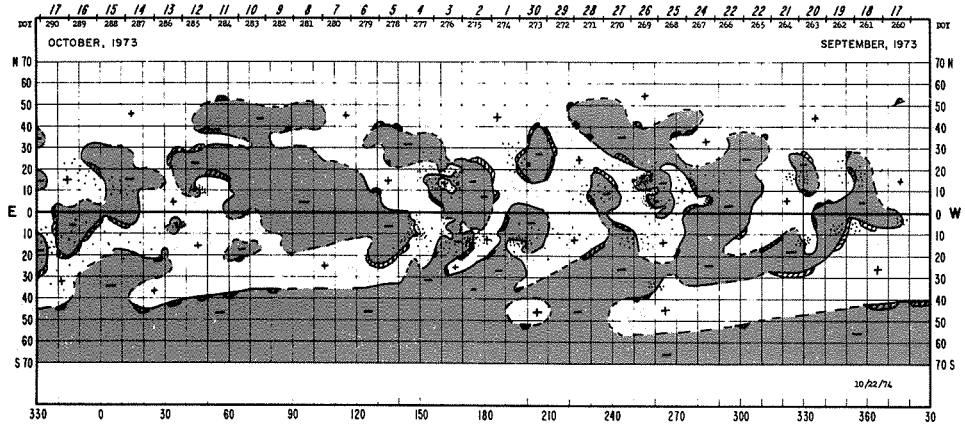

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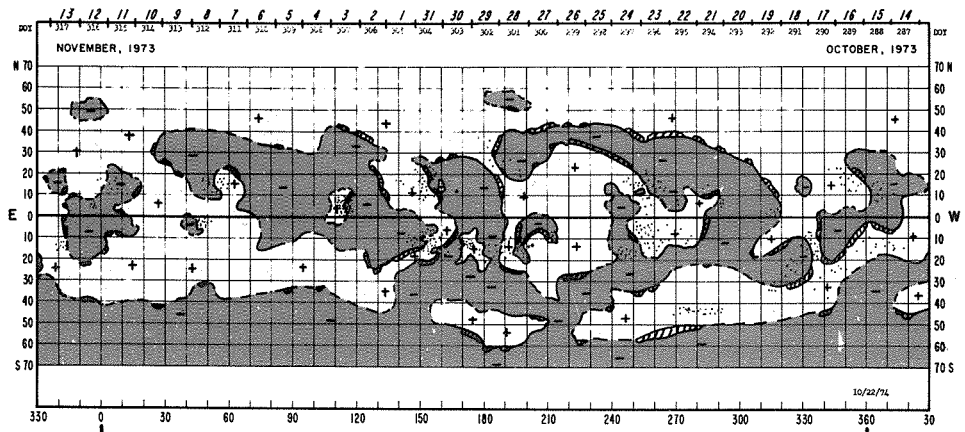
OCT – NOV 1973



Carrington Longitude

0° 360°

ROTATION 1608

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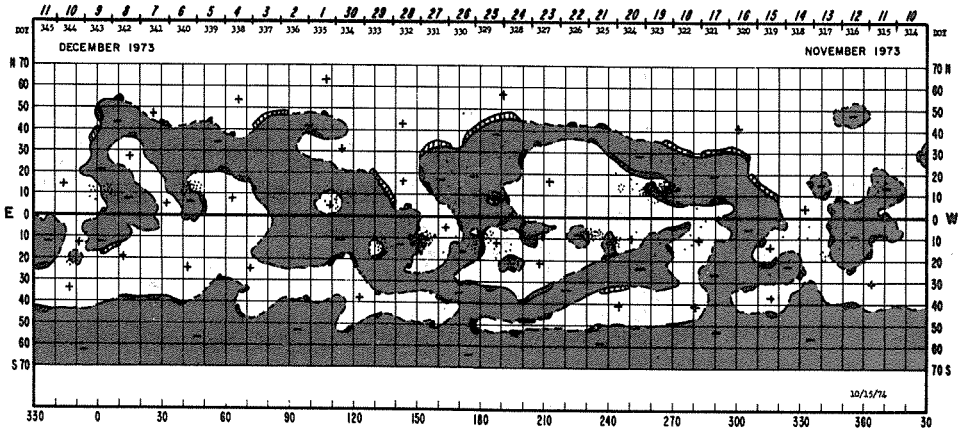

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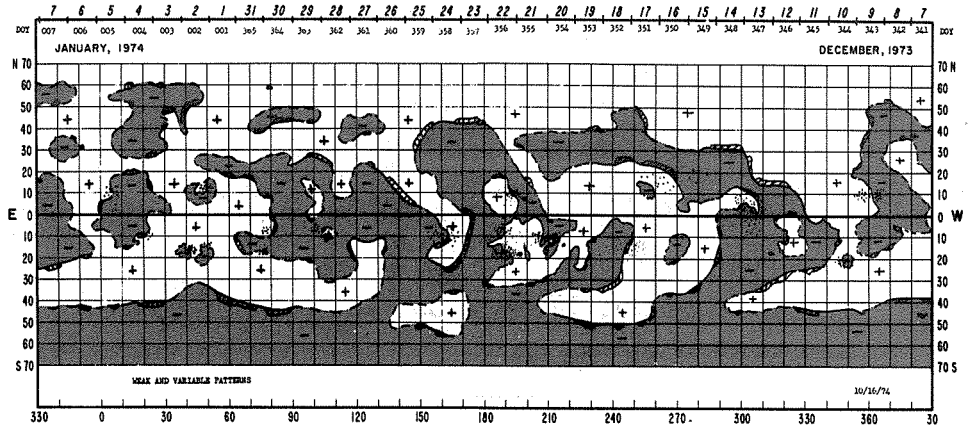

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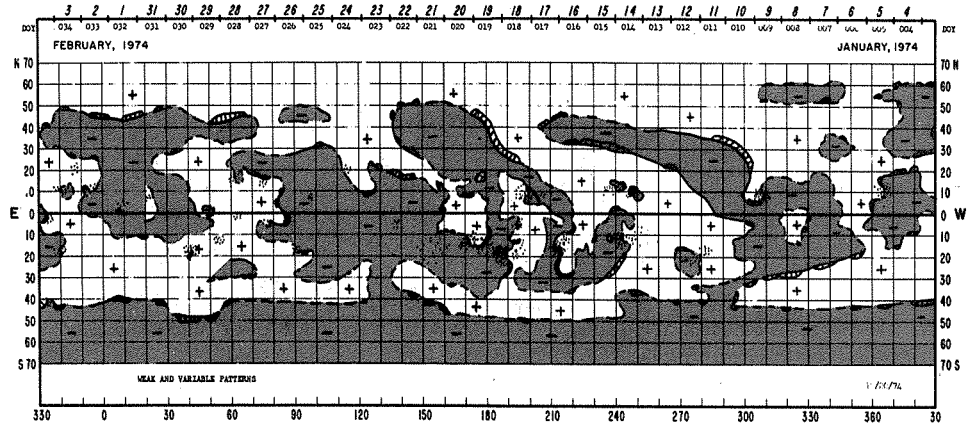
JAN 1974



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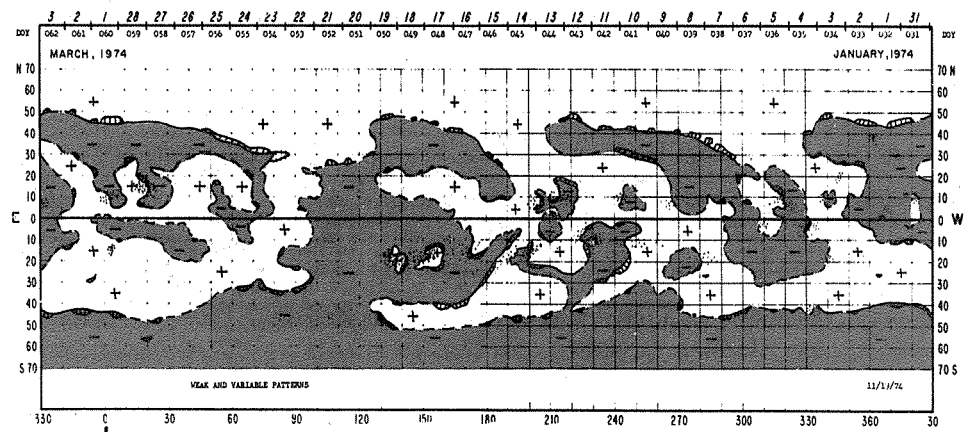
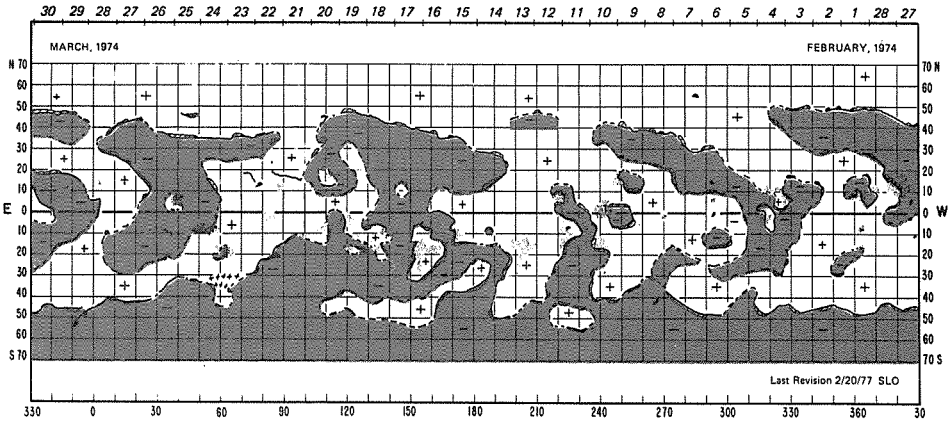


Carrington Longitude

0° 360°

ROTATION 1612

MAR 1974



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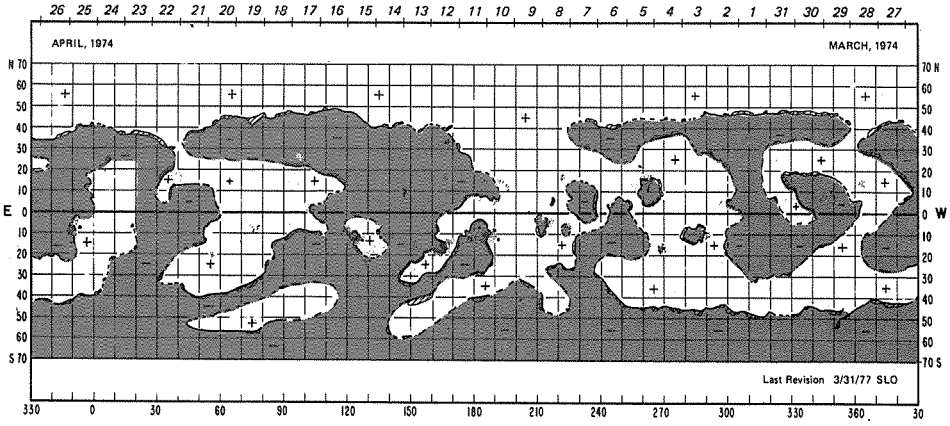

ROTATION 1614

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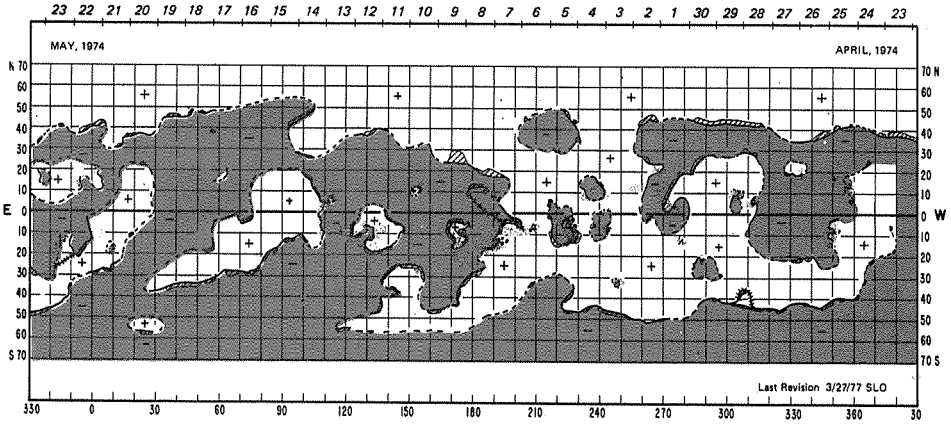

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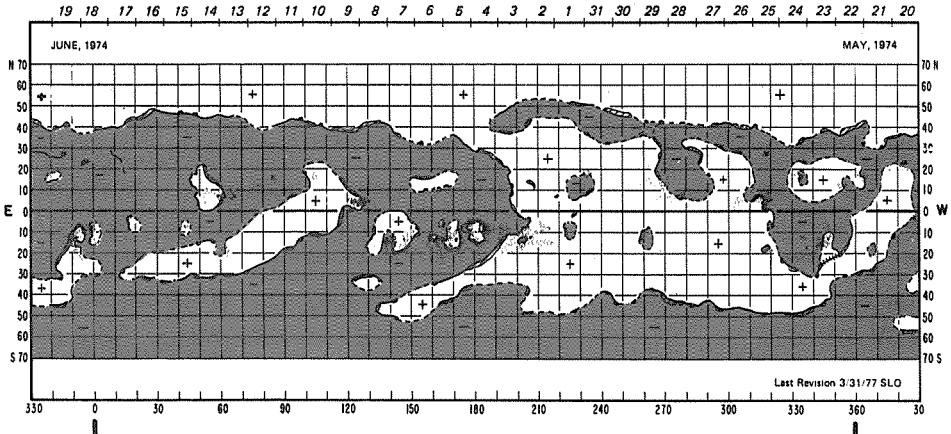

Carrington Longitude

0° 360°

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