International Council of Scientific Unions

SPECIAL COMMITTEE
ON
SOLAR-TERRESTRIAL PHYSICS

78-3

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IMS NEWSLETTER

This IMS Newsletter could easily have been 2 to 6 pages longer, mostly additional text. Easily, that is, except that it requires an average per page of about six hours. This value rises as the percentage of solid text increases. We include only time spent on actual composition and not the drafting, daily record keeping, etc. We depend upon your continued input for material and your reactions to issues for guidance. Please note the "URGENT" message included here for lack of room inside: W. Stoffregen is preparing a CCOG Handbook supplement for GEOS-2. His questionnaire to collect this information is now in circulation. Please help. JHA 78/03/06

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PROGRAM PLANS FOR MARCH 1978 - MAY 1978

SPECIAL IMS HIGH-ALTITUDE SATELLITE PERIODS - 1978

Special IMS High-Altitude Satellite Intervals for March-May 1978 are given here. On page 4 of IMS NL 78-2 details are given listing all the SSC-selected Special Satellite intervals for January-June 1978 and the configurations that were the basis for this designation by the IMS Satellite Situation Center. Times of the intervals given below were extended by six hours at start and end of each period from those given in the detailed table because the boundaries used in the exact model calculations may fluctuate during disturbances. These extended periods have been announced for 1976 and 1977 in IMS/SSC Reports and IMS NLs.

20 Mar	79/0200 UT to 21 Mar	80/2200 UT	1 Apr	91/0200 UT to 3 Apr	93/0100 UT
9 May	129/0100 UT to 10 May	130/1700 UT	22 May	142/1200 UT to 23 May	143/1600 UT
31 May	151/1400 UT to 3 Jun	154/0500 UT			

SPECIAL LOW-ALTITUDE SATELLITE CONJUNCTIONS

Magnetic flux tube conjunction times have been forecast by the IMS SSC for GEOS, ISEE, and selected low - altitude satellites and ground-based arrays on a weekly basis. These forecasts have been distributed via telex from the IMSCIE Office to provide two or three week advance notice of opportunities for coordinated data acquisition. In general, the numbers of intervals are too numerous for reproduction in these NLs.

GROUND-BASED, BALLOON AND ROCKET CAMPAIGNS:

----------Phenomena-related Campaigns----------

Feb 1 to Mar 31; V.D. Sokolov; Tixie Zhigansk & Yakutsk; BALLOONS (75) - details in NL 78-2, pg 3
Feb 1 to Mar 31; E. Llewellyn; "ATOMIC OXYGEN AND OZONE"; Ft. Churchill; ROCKET - note NL 77-12, pg 4
xxxxxxxxxxxxxxxx L.J.C. Woolliscroft; "2nd High Latitude Campaign"; Andoya rocket campaign delayed
Feb 16 to Mar 13; T.N. Davis & E. Wescott; "18.1017UE & 18.1018UE"; Poker Flat; ROCKETS (2)- Ba release
Feb 21 to Mar ??; D. Venkatesan; "AURORAL X-RAYS"; Ft Churchill; ROCKETS (3) - note in 77-11, pg 10
Feb 22 to Mar ??; B.A. Whalen; "ENERGETIC PARTICLE DETECTOR"; Ft. Churchill; ROCKET- note in 77-11, pg 10
Feb 24 to Mar 20; Jorgensen & Kelley; "18.1015UE & 18.1016UE"; Poker Flat; ROCKETS (2) - in NL 78-2, pg 3
Feb 26 to Mar 10; P. Cloutier & H. Anderson; "29.007UE"; Poker Flat; ROCKET - aurora
Feb 27 to Apr 9; W. Sharp; "25.031UE"; Ft. Churchill; ROCKET - auroral studies, update in NL 78-2, pg 3
Feb 27 to Mar 17; E. Thrane, U. von Zahn; "Ferdinand 47-BUGATTI"; Andoya; ROCKET-note NL 77-12, pg 3
Feb 27 to Mar 17; E. Thrane, D. Krankowsky; "Ferdinand 48-TRINOM"; Andoya; ROCKET - with BUGATTI
Feb 27 to Mar 20; M. Baron; "WIDEBAND"; Poker Flat; ROCKET - details in NL 78-2, pg 3
Feb 27 to Mar 20; J. Ulwick; "TMA"; Poker Flat; ROCKET - Nike-Javelin IC606.35-1, release
Feb 27 to Mar 20; J. Ulwick; "LWIR"; Poker Flat; ROCKETS (2) - Nike-Hydac IC607.15-1 & -2, infrared meas
Feb 27 to Mar 20; J. Ulwick; "AURORAL STRUCTURE"; Poker Flat; ROCKET - Coordinated launches, NL 78-2, pg3
Mar 1 to Mar 31; L.C. Hale; "15.170UE & 15.171UE"; Poker Flat; ROCKETS (2) - Super Arcas, plasma physics
Mar 20 to Apr 7; R.A. Goldberg; "18.214 & 18.215GM"; Poker Flat; ROCKETS (2) - broadened window
Mar 21 to Apr 7; R.A. Goldberg; "AURORozone"; Poker Flat; ROCKETS (6) - note in NL 78-1, pg 3
Apr 1 to Apr 13; W. Bernstein; "E PARALLEL B"; Ft. Churchill; ROCKET - 27.010AE, details in NL 78-2
Apr 1 to Apr 15; R.H. Holzworth; "E-Field-Spring 78"; E. Canada; BALLOONS (3-5) - updated details below
Apr 1 to Apr 30; G. Witt; "S27-TWILIGHT"; Kiruna; ROCKET - Nike-Orion 31.006UE, details in NL 78-2, pg 3
Apr 1 to Apr 30; A. Christensen; "18.1023UE"; White Sands; ROCKET - Nike-Tomahawk for plasma physics
Apr 1 to Sep 30; See below; "Austral Winter Campaign"; Syowa; ROCKETS (4) - details of program below
May 24 to Jul 5/Jun 30 to Aug 8; S. Ullaland; "SBARMO"; Scandinavia; BALLOONS (36) - update below

------Quasi-synoptic Observations involving Balloons, Rockets, Aircraft, Selected Surface Campaigns------

Mar 7-9, Apr 12; Bauer, Evans; IISN; Global Network; SURFACE - see NL 78-2, pg 2 for details
Monthly; Wright & Hilsenrath; "OZONESONDE"; Various Sites; ROCKETS - see Actualities, NL 77-10, pg 3

----------Observing Plans for Temporary Surface Stations----------

------ to Apr 30; Eather; "MERIDIAN SCANNING PHOTOMETERS"; Churchill Chain; SURFACE - note in NL 77-11
Feb 27 to Mar 13; W. Heikkila, R. Pellinen; "AURORAL BREAKUP"; N. Europe; SURFACE - update below
Feb 27 to Mar 13, Apr 20 to Oct 15; M. Siebert; "GEOMAGNETIC PULSATIONS"; N. Scandinavia; SURFACE - note
Feb 27 to Mar 13; R. Heacock; Alaska; SURFACE - extensive GB network, see NL 78-2, pg 3 for details

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REGIONAL IMS SAT/GBR PROGRAM DETAILS, NOV 77-JAN 78

Program details for some of the brief listings given above have appeared in earlier IMS NLs.

SATELLITES

GEOS-1 --- The spacecraft has survived the eclipse period between 14 December and 16 February, during which it encountered conditions for which it was not designed. In spite of significant degradation, the solar array is still able to support payload operation for the whole European pass. Daily summary plots for a number of U.S. passes between June and October are now available. Copies have been sent to the US IMS Coordinator, Dr. R.H. Manka. Summaries for U.S. passes until 16 December will be available by mid-March.

GEOS-B --- Official launch date for this spacecraft is 22 June 1978. Launch slot which was reserved for a back-up Japanese launch, if needed, has been officially reallocated by NASA for GEOS-B (to become GEOS-2 upon successful launch). Spacecraft integration and test program is completed. Satellite is stored in its transport container. A final integration period for some experiments which have been taken out for final calibration is scheduled for mid-April. Early in May the transport to Eastern Test Range (Canaveral) will take place.

During the experimenter meeting on 13/14 February 1978, it was noted that at present no requirements exist to place GEOS-2 on any longitude other than 37 +/- 1 deg east. For the time being there are no plans to drift away from this position. With launch on 22 June it will be possible to overlap with the major part of the 1978 SBARMO Campaign (see Scandinavian region note following).

A Flight Worthiness Review (FWR) report on GEOS-2 has been prepared. It reviews experiment performances on GEOS-1, modifications of GEOS-2 experiments based on this experience, the test history of GEOS-2 units, principal actions to be completed after FWR, and availability of spare units for GEOS-2. Attention was called to problems associated with experiments S.310, S.329, and S.331: S.310 --- 10 Channeltron electrostatic

analysers to measure pitch-angle distribution of electrons and protons in the 0.2-20 KeV energy range; B.K.G. Hultqvist, Kiruna Geophysical Observatory, Sweden. Detector # 1 failed soon after launch. Electronic modifications and part replacements have been performed for GEOS-2 unit.

S.329 --- 4 electron guns on booms and an electron receiver to measure DC E-field and B-field gradient by e- beam deflection; F. Melzner/G. Haerendel, MPI fur Extraterrestrische Physik, Garching, FRG. First e- gun tested operated well for 5 days but filament became poisoned. The other 3 guns did not uncover successfully. Continued operation of the detector revealed a need for greater Sun shielding. A new type of e- gun is to be used on GEOS-2 and additional desensitization to sunlight built into the experiment. The experiment must work in conjunction with S.331.

S.331 --- Triaxial fluxgate magnetometer to measure tne B-field from DC to 5 Hz; F. Mariani, Lab Inst de Fisica, Frascati, Italy. In early December 1977, a large offset developed. Cause of the problem is still under study. Possibility of C-MOS radiation damage is being examined. Some modifications may yet be made on this experiment.

Detailed descriptions of all GEOS-1 experiments can be found in K. Knott's "Payload of the 'GEOS' Scientific Geostationary Satellite", in ESA Scientific & Technical Review, Vol 1, No 3, (173-196) 1975.

SUPPLEMENTARY IMS SSC SPECIAL SATELLITE PERIODS

P. Reiff, Rice Univ, has requested that the following intervals be considered special opportunities for satellite and other data acquisition because of the satellite configurations then that are especially suitable for collection of data useful for checking magnetospheric models. The intervals are (beginning date, start day number/UT hour - end day number/UT hour): 4 March 63/1700 UT - 64/0500 UT; 16 March 75/1700 UT - 76/0500 UT; and 21 March 80/1500 UT - 81/0300 UT. During these intervals the SSC has confirmed that: 1. ISEE will be in the tail and near apogee; 2. GEOS-1 will be in the tail and near apogee (over the Odenwald meridian); 3. S3-3 will be in the dawn-dusk meridian; and 4. ISEE in the plasma sheet/neutral sheet.

Dr. Reiff's request was telexed to GEOS Project Scientist, K. Knott (ESTEC), and by return telex he replied "Confirm that GEOS will be operational with all experiments (except S-329) on the days you specify. Acquisition windows are as follows: 4/5 March 1753 - 0437 UT; 16/17 March 1708 - 0351 UT; and 21/22 March 1649 - 0332 UT. Apogee occurrances are as follow: 4/5 March 2329 UT 0208 LT; 16/17 March 2244 UT 0128 LT; and 21/22 March 2227 UT 0113 LT."

Low-altitude satellite experimenters receiving the SSC weekly telexes from the IMSCIE Office are requested to note that the third of the special periods requested above corresponds to conjunction interval number 285, when ISEE and GEOS-1 are to be in magnetic conjunction from 80/2354 UT to 81/0100 UT. During this time their geometric separation will vary from 4.9 to 3.7 Re and their separation along the magnetic flux tube will vary from 6.4 to 5.3 Re.

PROGNOZ-6 --- Satellite was launched on 22 September 1977. Orbit elements are: Apogee = 197,900 Km; Perigee = 498 Km; Inclination = 65 deg; Period = 94 Hr 48 Min. The main scientific tasks of Prognoz-6 experiments are:

1. Acceleration processes in the solar corona, in particular, of flare-associated acceleration of charged particles.

2. Propagation of accelerated particles in the solar corona and interplanetary space.

3. Acceleration processes in the interplanetary space, in particular, particle acceleration in shock fronts.

4. Chemical and charge composition of the solar wind and energetic particles of solar origin.

5. Instability processes in the interplanetary plasmas and interplanetary wave processes.

6. Penetration and propagation of solar plasmas and energetic particles in the earth's magnetosphere.

7. Magnetotail plasma dynamics during magnetic substorms.

8. Discrete gamma-lines of solar and galactic origin.

9. UV-emission in the upper atmosphere and interplanetary medium.

The experiments are headed by Dr. A.A. Galeev (Institute of Space Research, Moscow)

On-board equipment:

1. X-ray Spectrometer, energy range 2-511 KeV. G.E. Kocharov, Ioffe Physical and Technical Inst, Leningrad.

2. Electron and Proton Spectrometer, energy range 30 KeV - 10 MeV. Yu.I. Logachev, Inst of Nuclear Physics, Moscow State Univ.

3. Plasma detector for the concentrations (Np=0.1-50/cm3), temperature (Ti=20=20-1000x103 deg K) and velocity (Vp=240-870 Km/s). K.I. Gringauz, Inst of Space Research, Moscow.

4. Gamma Spectrometer, energy range 0.1-3 MeV. I.V. Estulin, Inst of Space Research, Moscow, and G. Vedrenne, CESR, Toulouse, France.

5. Solar X-ray Spectrometer, energy range 1-100 KeV. O.B. Likin, Inst of Space Research, Moscow, and B. Valnicek, Astronomical Inst of Czsan, Ondrejov, Czechoslovakia.

7. Electron and Proton Spectrometer, energy range 3-100 MeV. N.F. Pisarenko, Inst of Space Research, Moscow, and L. Treger, Centre of Nuclear Research, Saclay, France.

8. UV-emission Photometer with filters H-I (Lambda = 1216 Angstroms), He-I (Lambda = 584 Angstroms) and He-II (Lambda = 304 Angstroms). V.G. Kurt, Inst of Space Research, Moscow, and J. Bertaux, Aeronomical Service, Verrieres, France.

9. UV-emission Spectrometer. A.B. Severny, Crimean Astrophysical Observatory, G. Courtez, Space Astronomy Lab, Centre of Scientific Research, Marseille, France.

10. Proton and Heavy Nucleus Spectrometer, energy range 0.8-15 MeV/Nucleon. G.P. Skrebtsov, Ioffe Physical and Technical Inst, Leningrad.

11. Three-component Magnetometer for field intensity range 1-60 gammas. E.R. Eroshenko, Inst of Terrestrial Magnetism, Ionosphere and Radio Wave Propagation.

EXOS-A ("KYOKKO") --- K. Hirao telexes the following mean elements as of epoch 1978/02/20 (Y/MO/DA) at 0000.00 UT for revolution 169: Semi-major axis 8684.373 Km, dot axis 0.0 Km/da; Eccentricity 0.192242; Inclination 65.354 deg; Right Ascencion of the Ascending Mode 183.249 deg, dot node -1.521954 deg/da; Argument of Perigee 331.550 deg, dot perigee -0.237879 deg/da; Mean Anomaly 26.430 deg; Mean Motion 10.727421 rev/da; Height of Perigee 636.730 Km; Height of Apogee 3975.732 Km; Period 134.235 min, dot period 0.0 deg/da.

(Continued on pg 4)

(Continued from pg 3)

ISS-B ("UME-2") --- N. Wakai sends the following information: Satellite 1978-018A has been successfully launched from Tanegashima Space Center, NASDA, Japan at 0400 UT on 16 Feb 1978. Orbital parameters are: Apogee 1221 Km, Perigee 977 Km, Inclination 69.4 deg, and Period 107.2 min. The initial stage of operation of ISS-B will continue for about two months. At this time acquisition of house-keeping data is in progress. So far data has been acquired in both real time mode and stored-data mode; deployment of two booms and extension of sounding antennas have taken place. Final tip-to-tip lengths of 11.4 m and 36.8 m, respectively, were attained for two pairs of dipole antennas. The test operation and data acquisition of the four main missions are to be commenced by turns during the next four weeks. These are: 1. RAN - Radio Noise measurement; 2. RPT - Plasma measurement; 3. TOP - Topside Sounding; and 4. PIC - Positive Ion Composition measurement. Routine operation of ISS-B by Radio Research Laboratories will begin in April 1978 when the initial stage of operation is finished.

ISEE-1&2 --- No new information to report concerning these satellites. Some experimenters commented that as of 2 March 1978, experimenter data tapes had been distributed covering the period through 11 Nov 1977, and that satellite orbit/attitude data for the first three days of operation were available. No data pool tapes had been received. See "ACTUALITIES" for a sample of magnetometer data from ISEE-1 (pg 5). Details on ISEE orbits and data acquisition rates remains unchanged from that given in IMS NL 78-1, pg 8.

SCANDINAVIA

ANDOYA

2nd UK High-Latitude Campaign --- Due to inclement weather the final two rockets of Woolliscroft (F6 & SL1424) were not launched. No decision has been made about rescheduling these launches. Possibly they may be included in an Autumn 1978 campaign.

SBARMO --- We assume that since the GEOS-B launch window is relatively firm to open 22 June 1978, the later of the two SBARMO launch windows will be selected, namely 30 June to 8 August. However, program details are given here to supplement preliminary information in IMS NL 78-2, pg 11. Project scientist is S. Ullaland, Univ Bergen, Norway. Launching sites are: Honningsvag and Karasjok (Norway), Sodankyla and Oulu (Finland). Four sizes of balloons (36000, 10000, 7000, and 4000 cu m) will be launched to peak altitudes ranging between 30000 and 40000 m. The SBARMO-78 campaign aims at a further understanding of dynamical processes in the magnetosphere. The coupling of phenomena in the outer magnetosphere with those in the auroral-zone ionosphere is of special interest. Examples of phenomena to be investigated are the processes preceding the break-up phase of magnetospheric substorms, the break-up phase itself, and the redistribution of particles and fields following the substorm. It is not yet known how substorms are triggered and how the trigger is loaded. Furthermore, substorms abruptly change the conditions for particle propagation in the outer magnetosphere. Radial and pitch-angle diffusion can drastically change the particle distribution. Other phenomena of interest are related to the occurrence of SSC's. It will be possible to investigate in detail their implications on the particle flux variations and their relationship to substorms. Furthermore, in the case of solar particle events the influence can be studied that magnetospheric processes have on the propagation of solar particles.

Experiments and PI's: Directional X-ray detectors, Kremser and Stadsnes; Omnidirectional X-ray detectros (energy spectrometer), Kremser, Riedler, Bronstad, and Tanskanen; DC E-field probe, Bronstad, Fahleson, and Riedler; DC B-field probe, Bjordal; VLF goniometer, Egeland and Moe; and Infrasonic wave probe, Thrane.

This program will be coordinated with the many GBR-campaigns listed in the CCOG Handbook and cooperation with balloon programmes of UC Berkeley, Univ Calgary, Univ Maryland, and the Danish Space Research Inst is foreseen. Balloon observations will be coordinated with ISEE and GEOS-2 programs. The balloons will be launched if periods of substorm activity lasting for several days can be expected or if geomagnetic storms are forecast. Simultaneous flights from as many stations as possible shall be performed. Restrictions may be due either to weather conditions at the different launching sites or to limited telemetry capacity.

CANADA

E-Field Spring 78 --- Two balloon campaigns are planned by F. Mozer's balloon group at UC Berkeley: "Spring 1978" (1-15 April) and "Summer 1978" (1 July - 15 August). The latter will be coordinated with the SBARMO campaign . The coordinator for both is R. Holzworth. Launch site for the Spring campaign is Thompson, Manitoba (Canada). Up to 5 balloons with double probe electric field detectors will be launched. Flights are to be in collaboration with E-field measurements by: (a) ISEE and S3-3 satellites; and (b) Chatanika and Millstone Hill incoherent scatter radar facilities. Further coordination with European installations is also possible.

Purpose of the campaign will be to study electrical coupling between the ionosphere and deep magnetosphere by simultaneously measuring convection patterns near midnight on auroral zone field lines with balloons, radars, and satellites. Further, it is desired to obtain direct field line conjunctions between the satellites and the balloon/radar sites.

E-Field Summer 78 --- Two balloon launch sites in Canada at Sheffield, Quebec and Thompson, Manitoba with a down wind telemetry site in McMurray, Saskatchewan will be used. It is expected that up to 5 balloons with E-field detectors (and possibly X-ray detectors) will be launched from each site. During two of the balloon flights from Thompson, R. Markson (MIT) will make simultaneous airborne E-field measurements in the lower atmosphere. In addition to these double probe measurements by the UC Berkeley group, SBARMO will launch simultaneously from four sites along a meridian in northern Europe. The SBARMO balloons will be tracked across the North Atlantic making it possible, after a few days of continuous launchings, to have altogether as many as 12 to 15 balloons simultaneously aloft and spaced several hours in longitude and somewhat in latitude. These balloons will measure E-fields and X-rays in conjunction with the radars at Chatanika, STARE, Millstone Hill and possibly also Jicamarca and Arecibo.

Purpose of this coordinated program is to obtain simultaneous auroral zone ionospheric electric field measurements from many longitudes in order to resolve temporal and spatial effects in the convection pattern. These data will be used in ionospheric E-field spatial and power spectral analyses in conjunction with satellite E-field measurements. This spatial and temporal scale size information will be used to study electrical coupling between ionosphere and magnetosphere.

ANTARCTICA

SYOWA

Austral Winter Program --- 4 rockets are planned to be launched from Syowa Base during the Austral winter by Japanese scientists. The window for this program opens in April and lasts through September 1978. Each rocket program is described below.

S-310JA-4 --- M. Ejiri, ISAS (U. of Tokyo) is project scientist for this launch to perform general observations of the E-field and waves. Experiments and scientists participating are: EMF - Electric & Magnetic Field, VLF Pointing Flux spectrum, K. Tsuruda & M. Ejiri; PWH - Plasma Wave

in HF band, H. Oya & S. Miyatake; TEL - Electron Temperature, K. Oyama; and NEI - Electron Density & NEL - Electron Density Fluctuation, M. Ejiri. Coordination with conjugate experiments between Syowa and Iceland is planned and with satellites EXOS-A and/or B.

S-310JA-5 --- I. Kimura, Faculty of Engineering (Kyoto U.), project scientist for launch to study wave-particle interactions. Experiments are: PWL - VLF Spectrum & PFX - VLF Pointing Flux Spectrum, I. Kimura & K. Tsuruda; PWL-ELF - ELF Polarization, I. Kimura & O. Yamagishi; DPL - Electron Density by Doppler method, K. Hashimoto; ESM - Auroral Particles (KeV), H. Matsumoto; NEI - Electron Density, H. Oya; and TEL - Electron Temperature, K. Oyama. Also planned as part of conjugate experiments between Syowa and Iceland.

S-310JA-6 --- H. Oya (Tohoku U.) is project scientist. Experimenters will study wave-particle interactions. Experiments are: PWL-PFX - VLF Pointing Flux Spectrum, T. Kamada & H. Nishino; PWH - Plasma Waves in HF band, H. Oya & S. Miyatake; ESM - Auroral Particles (=KeV), H. Matsumoto; ESH - Auroral Particles (>30KeV), M. Kodama & H. Takeucni; NEI - Electron Density, H. Oya; and TEL - Electron Temperature, K. Oyama.

S-310JA-7 --- Nakamura, ISAS (U. of Tokyo), is project scientist. Purpose to observe waves, particles, and electric fields. Experiments: PWN - Density, Fluctuation & Plasma Wave, S. Miyazaki & Nakamura; EF - Electric Field, T. Ogawa; ESL - Auroral Particles (=KeV), H. Kubo; TEL - Electron Temperature, K. Oyama; and TED - Distribution Function of Thermal Electrons, K. Oyama.

ACTUALITIES & SPECIAL INTERVALS/EVENTS

SATELLITE

ISEE-1 --- The flare-associated interplanetary shock wave of 26 October 1977 was mentioned in IMS NL 78-2 (pg 9) under ISEE Actualities. The following text and figure were furnished by C.T. Russell.

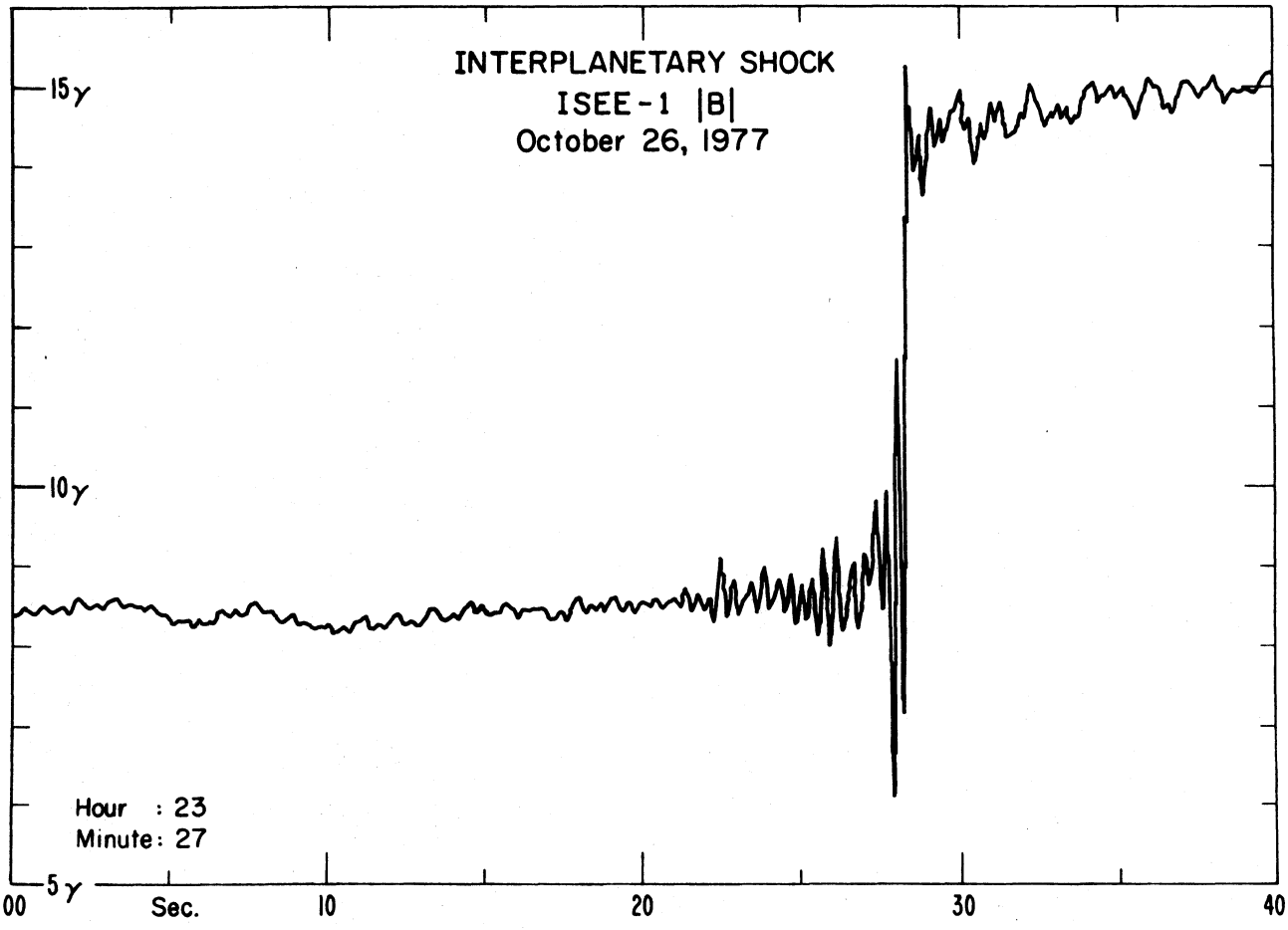
"Inbound on orbit 2 a rather strong interplanetary shock crossed over ISEE 1 and 2. ISEE-1 was spinning at 60 RPM and was transmitting at high bit rate at the time. ISEE-2 was spinning at about 8 RPM and was transmitting at low bit rate. The main gradient of the shock was crossed in less than 1/10th second as the attached plot shows (see below). Since ISEE-2 was transmitting only 4 vector samples per second at this time, I have not plotted the corresponding ISEE-2 data. For all practical purposes the shocks are simultaneous at the two spacecraft as one would expect for a phenomenon travelling about 500 km/sec."

"We initially found this event after an examination of data from a magnetometer we were testing at a site near Los Angeles for eventual installation at Eusebio, Brazil as part of the low latitude IMS chain of stations. A strong sudden commencement was observed at about 2330 UT on 10/26/77 (Day 299) so then we examined our ISEE records. As noted in Solar Geophysical Data, this sudden commencement was also reported by 21 observatories throughout the world and hence was quite a large one. The shock was also observed later on Voyager (Scarf, personal communication)."

"Unfortunately, several key instruments were not yet turned on at this time. However, those that were might like to consider this as a candidate for correlative study. The opportunity for ISEE-Voyager correlations seems especially attractive."

"The data on the attached plot were produced using nominal instrument calibrations and preliminary software. Future analysis may result in slight revisions, so please treat these data accordingly."

(Continued on pg 6)



(Continued from pg 5)

"At this writing we have received data up to day 315 (November 11) on ISEE-A and 305 for ISEE-B. We have also received one orbit tape for the first three days of ISEE-A. Since ISEE-A and -B were not operated in their nominal modes until after day 305, we have put off selecting shock and magnetopause crossings for possible workshop activities. However, shortly Gene and I will start going through the run 3 and 4 data for candidate events."

GMS ("HIMAWARI") --- T. Kohno, Meteorological Satellite Center, Japan, reports that after some delays, continuous routine operation of the GMS satellite began 1 February 1978. Details on this satellite were given in IMS NL 77-8, pg 3. Kohno has discovered that there are back-up data tapes covering the test operational period and he is trying to retrieve the flare data from last September. Hopefully, the back-up tapes cover data of all channels of the particle detector during the events of 18-22 September 1977.

ISIS-1&2 --- Lists of data acquisition intervals for the months of December 1977 and January 1978 have been received at the IMSCIE Office from D. Boulding, CRC SATCON, Ottawa, Canada. Many of the intervals are for conjunction times with GEOS-1. These lists give the date of data acquisition, station recording it, hour and minute start and stop times, storage tape number, hr/min/sec of coincidence time, field line separation and remarks. During conjunctions, separations between the ISIS and GEOS-1 satellites ranged from 160 to 1728 km along their common flux tubes. We remind IMS participants that the ISIS data is only processed upon request or as part of a planned experimental program. Lists of ISIS experimenters are given in IMS Satellite Situation Center (SSC) Report No. 9, "IMS Directory of Spacecraft and Experiment Scientific Contacts", January 1977.

AE-C --- T. Potemra (Johns Hopkins U.) has written to M. Candidi (IMSCIE Office) and others about AE-C particle data during a special interval (see IMS NL 78-2, pgs 4&5 "DMSP Data"). Excerpts from his letter are given here. Intensity-time spectrograms from the Photoelectron Spectrometer (PES) on AE-C show that on 21 Sep 1977 (orbit 20627) the spacecraft passed through the cusp over the southern hemisphere at 0924:30 UT (Λ 69 deg, 1100 MLT, dipole lat$\sim$-52 deg). An intense net flux of soft electrons was measured precipitating in this region up to Λ =72 deg at 1152 MLT (dipole lat$\sim$ -55 deg). At this time Kp=7- and displacement of the cusp to this invariant latitude is not unreasonable. At higher latitudes, in the polar cap region, low fluxes of electrons were observed. Intense fluxes of "harder" electrons were later observed in the evening auroral zone (0932:30 UT, Λ = 68.8 deg, 1713 MLT). It will be interesting to compare the electron fluxes observed by DMSP with those from AE-C at nearly the same times and locations. The position of GEOS computed for this time and the variations shown in the magnetic field and ULF magnetic detectors in the "GEOS Wave/Field Data Summary" sheets make it particularly interesting for a joint study. It is important that the orbits of GEOS, DMSP, and AE-C be confirmed and more details provided on the data from each for this time.

POTPOURRI --- In a January letter, US IMS Coordinator R.H. Manka summarized the priority selection of special events/intervals in June - October 1977. These dates had been identified in several IMS NL's and summarized in NL 78-1, pg 5. NOTE --- the times given in 78-1 for the six events G9, G10, G14, G6, G1, and G17 were in error (they represented GEOS data acquisition intervals over the European Apogee). Manka gives the following summary of interesting results which come from a variety of satellites or ground sites. June - VLF signals from Jim Creek transmitter detected by GEOS on two orbits. June 19, July 29-30 - S3-3 sees upstreaming ions during GEOS conjunction G9 (June 19) and during the 29-30 July substorm. July 29, 0027 UT - R. Heacock noted an outstanding magnetic storm sudden commencement. Good ELF and induction magnetometer recordings were obtained. July 29, 0100 UT; Sept 21, 0500 UT - R. Arnoldy (ATS-6) reports seeing plasma injection events with 20 keV electrons and, for Sept 21, also 20 keV protons near local midnight. He would like to know what other high and low altitude satellites observed at these times. Sept 21 - GEOS sees strong ULF ion cyclotron waves from 1030-1130 UT and 1200-1300 UT. July 29, Sept 21 - S3-3 (Johnson) reports large oxygen fluxes in the ring current. Chatanika radar has data on density and electric field for early GEOS conjunctions during intervals G1, G6, and G7 (see NL 77-12, pgs 6&7). July 29-30 - Lazarus reports IMS-7&8 observed high solar wind pressure. Oct 26, 2330 UT - Russell reports sudden commencement seen by ISEE and on the ground. Scarf reports Voyager-1 observed same shock wave passage later at about 2.8AU. This event occurred during the satellite radial alignment that was the basis for declaration of STIP-IV Special Observation Interval by the COSPAR in June 1977 at Tel-Aviv. Nov 15, 1400 UT - Prolonged ISEE/GEOS conjunction with multiple conjunctions with low altitude satellites AE-C, TRIAD, and DMSP (NL 77-11, pg 8). A current summary statement about these intervals has just been dictated to IMSCIE staff and appears on page 10 of this NL.

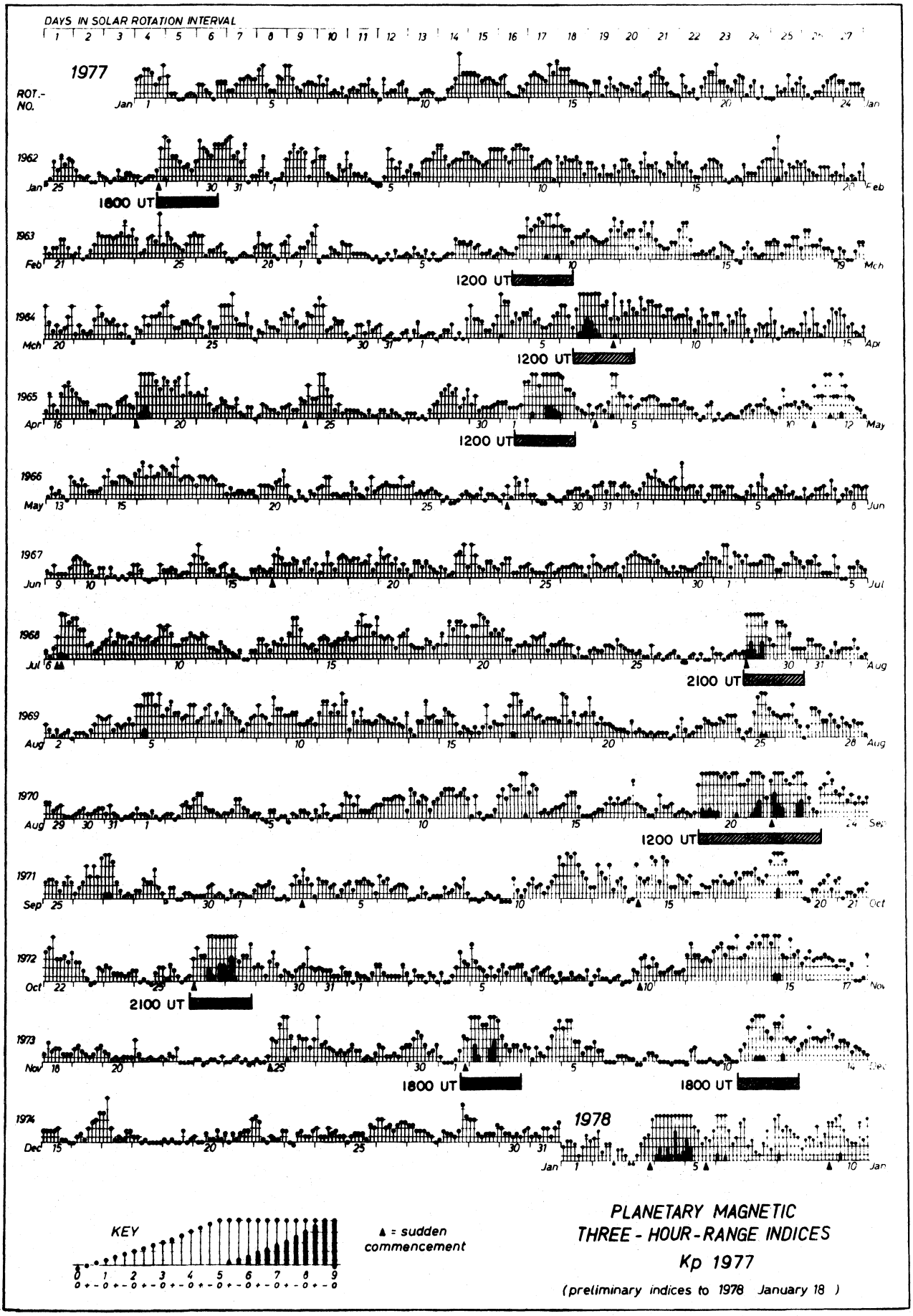
WORLDWIDE GROUND-BASED NETWORK

Kp Indices and Common-Scale Magnetograms --- Staff of WDC-A for STP regularly prepare common time and amplitude scale magnetograms and preliminary AE indices for special intervals for publication in Solar Geophysical Data and IAGA Bulletin 32. Usually the intervals selected number about 10 2-day periods during each year. On page 7 (facing this item) is shown the "musical-note chart" of Planetary Magnetic Three-Hour-Range Indices Kp 1977. Magnetograms available from the selected list of polar cap, auroral zone, and mid-latitude observatories have already been digitized for the first four intervals marked by the beginning time and hatched box beneath the Kp chart. The five remaining intervals, selected by WDC-Af staff for the rest of 1977 are also shown. It is not a coincidence that these include the July 28-30, Sept 19-23, Oct 26-28, Dec 1-3, and Dec 10-12 periods shown. We than Prof. Siebert and staff of the Geophysical Institute, U. Goettingen, for a prompt copy of the Kp chart for 1977.

ANTARCTICA

SIPLE --- W.R. Sheldon, U. Houston, writes that four SuperArcas rockets were launched from Siple Station in January. The payloads descended from an apogee of 80 km by parachute and measurements were made of the X-ray flux above 5 keV. On 4 January three payloads were launched: at 0610, 0716, and 1140 UT. The first was a failure due to vehicle failure 1 second after ignition. The second provided data from 0716-0734 UT during the intense phase of a VLF event and there are data from the third from 1140-1247 UT, a later period in the same event when VLF activity was structured and there were risers at frequencies of 2 to 4 kHz. The fourth and final rocket was launched at 0957:30 UT on 12 January and there are data until 1107 UT. There was mild VLF activity just before launch, but during the data collection period local geomagnetic conditions were quiet. Weather conditions were often better at Siple than in Houston since Sheldon's return.

SYOWA BASE --- Rockets S-210JA-30 & -31 were launched on 28 Jan and 6 Feb 1978, at 2020 UT and 1855 UT, respectively. The first to a height of 125.2 km and the second to 116.0 km. Both rockets carried the same payloads, as follows: Density of NO - Y. Kondo (Toyokawa Obs., Research Inst of Atmospherics, Nagoya U.); Density of O3 - T. Watanabe (Fac of Science, Tokyo Univ of Education); and Electron Density - H. Oya (Fac of Science, Tohoku U.). The project scientist for both these rockets was the late Dr. Tohmatsu whose untimely death was noted in IMS NL 78-1.


DAYS IN SOLAR ROTATION INTERVAL
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
ROT.-NO.
1977
Jan 1 5 10 15 20 24 Jan
1962
Jan 25 30 31 1 5 10 15 20 Feb
1800 UT
1963
Feb 21 25 28 1 5 10 15 19 Mch
1200 UT
1964
Mch 20 25 30 31 1 5 10 15 Apr
1200 UT
1965
Apr 16 20 25 30 1 5 10 12 May
1200 UT
1966
May 13 15 20 25 30 31 1 5 8 Jun
1967
Jun 9 10 15 20 25 30 1 5 Jul
1968
Jul 6 10 15 20 25 30 31 Aug
2100 UT
1969
Aug 2 5 10 15 20 25 28 Aug
1970
Aug 29 30 31 1 5 10 15 20 24 Sep
1200 UT
1971
Sep 25 30 1 5 10 15 20 21 Oct
1972
Oct 22 25 30 31 1 5 10 15 17 Nov
2100 UT
1973
Nov 18 20 25 30 1 5 10 14 Dec
1800 UT
1800 UT
1974
Dec 15 20 25 30 31
1978
Jan 1 5 10 Jan
KEY
0 1 2 3 4 5 6 7 8 9
0 + - 0 + - 0 + - 0 + - 0 + - 0 + - 0 + - 0 + - 0
▲ = sudden commencement
PLANETARY MAGNETIC
THREE - HOUR - RANGE INDICES
Kp 1977
(preliminary indices to 1978 January 18)

SYOWA BASE (Continued Actualities) --- Four balloons were launched here during Nov-Dec 1977. B5-19, 30 Nov, 1400 UT (no telemetry reception); B5-20, 4/5 Dec, 1046-0154 UT, E-fields and X-rays; B5-15, 12 Dec, 1138-2325 UT, E-fields and X-rays; B5-18, 12 Dec, 1225-1340 UT; E-fields and NO dens.

ANDOYA, NORWAY

18.211UE/IE --- Matthews Nike-Tomahawk was launched at 2052 UT, 30 Jan 1978. The test of Antarctic instrumentation was successful but the Cornell experiment (3-axis E-field probe, Kelley) only returned partial data.

SOUTH UIST

U.K. Petrels --- These 1978 launches were reported in NL 78-2 ACTUALITIES, pg 10. Launch times are now available: Williams - P112H, 2 Feb 1356 UT & P202H, 6 Feb 0100 UT. Dickinson - P199H, 2 Feb 1304 UT ; P200H, 6 Feb 0020 UT; P198H, 0101 UT. Krankowsky - P203H, 2 Feb 1333 UT & P204H, 7 Feb 0030 UT.

POKER FLAT, ALASKA

29.008 UE --- On 2 Feb 1978, at 0854 UT, Scherb and Evans successfully launched a Terrier-Malamute to study particles and fields associated with aurora. The description of this program was unintentionally omitted from NL 78-2 so additional details are given here. Objective was to measure: charge, energy, and mass spectra of positive ions in a proton aurora and the energy and pitch angle distributions of the electrons in the event. The U. of Wisconsin proton experiment was a cylindrical mirror electrostatic analyzer to focus the beam of ions onto an array of four silicon surface barrier detectors. Pulse heights of the detectors are relayed to the ground via optical isolators. Electron detectors were provided by NOAA. They were two cylindrical capacitor electrostatic analyzers both swept in acceptance energy. T. Moore (NOAA-SEL) provided a new energetic ion mass spectrograph that uses the same "door" as the Evans experiment. Scientific ground support was provided by chart records of combined photometer Hβ signals from Ft Yukon and Ester Dome and by combined magnetometer and riometer data from all sites.

KAGOSHIMA (UCHINOURA), JAPAN

K-9M-62 --- K. Hirao launched on 22 Jan 1978. Details in IMS NL 78-1, pg 3.

K-9M-61 --- N. Kawashima launched on 27 Jan 1978. See NL 78-1, pg 3.

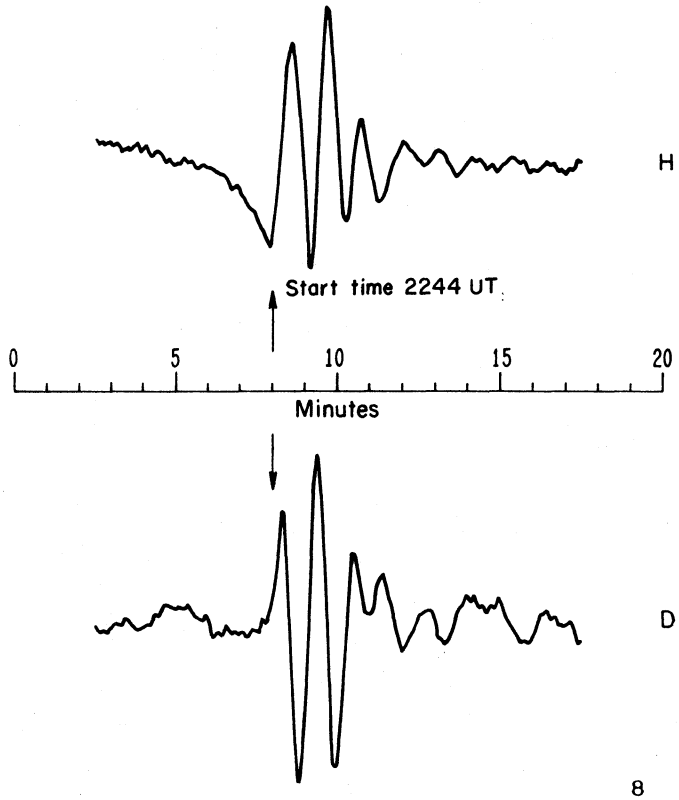
NETWORK NEWS

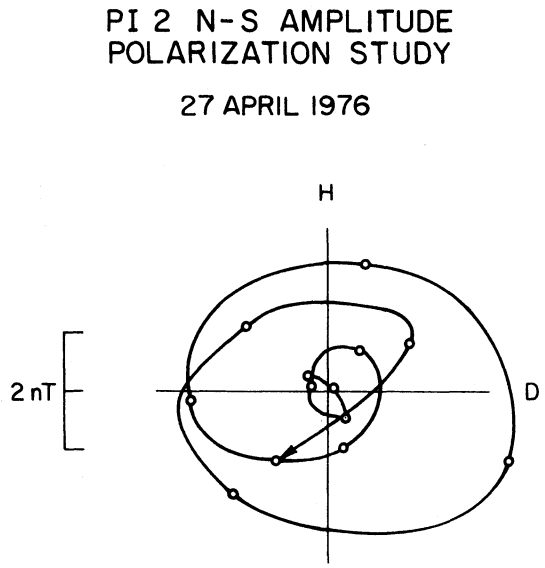
As a follow-up to our visit to Edinburgh, W.F. Stuart has compiled several lists of interesting pulsations events recorded by the UK Rubidium Magnetometer Network. Total length of the compilation is some 35 large pages of hand-written notes, typed tables, figures and comments. We reproduce his cover letter here, together with some sample figures and comments about each of the different categories of pulsations.

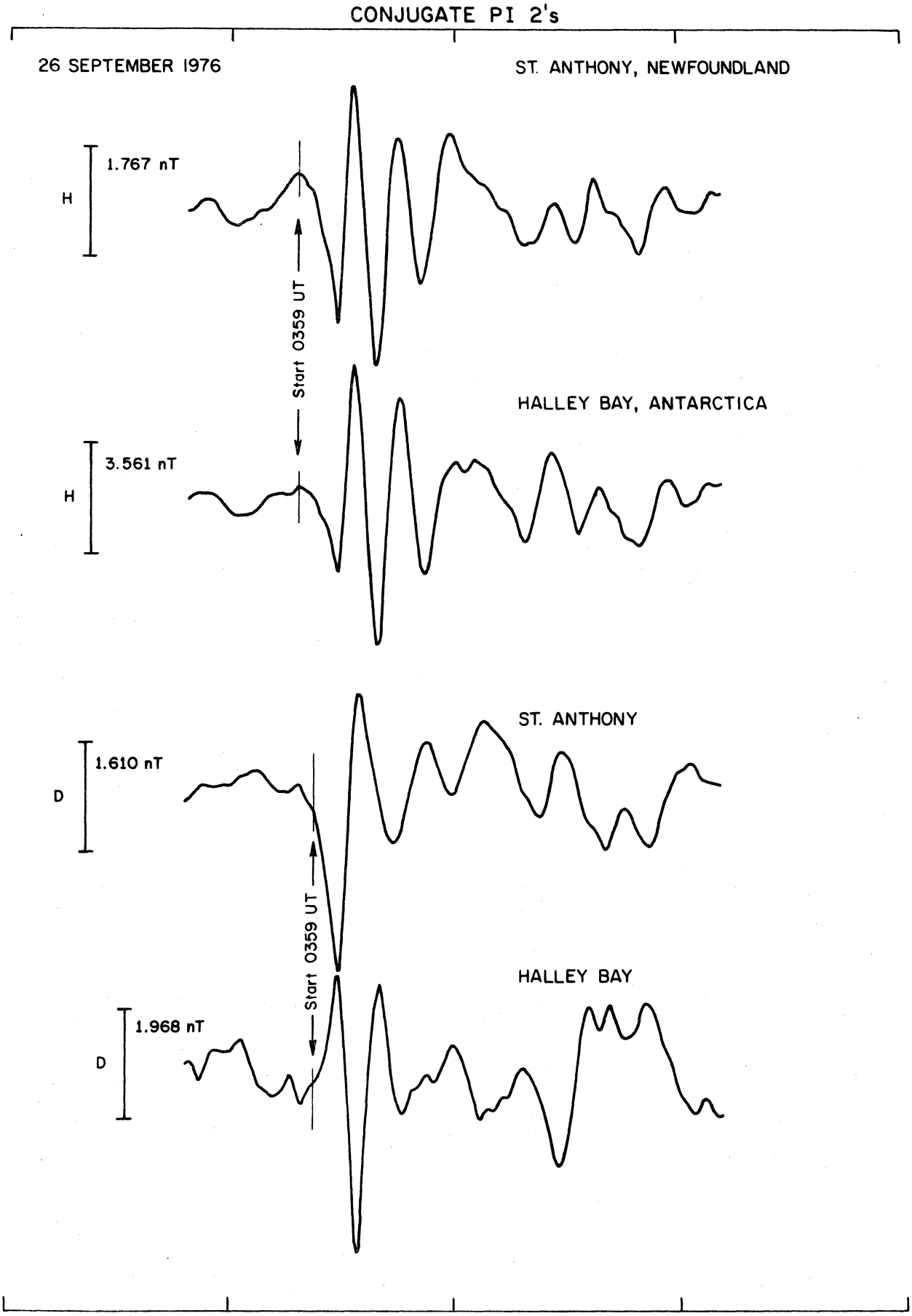
The figure below is from a collection of events during Feb-April 1976. These events were used in an analysis of N-S amplitude polarisation and spectral content of Pi2's. Raw data were first filtered to remove background field movements where possible. When background movement was too rapid events were rejected and are not listed here although are still on file in their library. Events analysed completely were further filtered, hodograms of horizontal variation were drawn and Maximum Entropy spectra were computed.

"I have compiled some lists of pulsation events which we have either analysed or which look interesting enough to warrant analysis. As you know, our attitude is to work towards a global understanding of pulsations and their relationships to associated geomagnetic, ionospheric, atmospheric and STP events. I feel that there is some merit in making these events known and inviting scientists in other disciplines to look at their data at these times or, in the case of satellite or space vehicles, to look and see if they have data at these times. We would welcome any additional input from the scientific community and be happy to collaborate in joint interpretation if it is within our range."

(Continued on pg 10)






CONJUGATE PI 2's
26 SEPTEMBER 1976
ST. ANTHONY, NEWFOUNDLAND
1.767 nT
H
Start 0359 UT
HALLEY BAY, ANTARCTICA
3.561 nT
H
ST. ANTHONY
1.610 nT
D
Start 0359 UT
HALLEY BAY
1.968 nT
D

(Continued from pg 8)

"Regarding the special interval for IMS analysis the only really interesting pulsation activity occurred on 3 and 6 December. Contrasting Pc activity occurred on these two days and we could be persuaded to analyse it in detail. Apart from that we could join in an analysis of the two or three substorms which occurred later."

"In the lists most of the times are approximate to a minute or two. As and when necessary I can, as you know, locate a signature to better than a second over the whole network. Only UT is used."

The second set of events selected by Stuart is represented by the data shown on page 9 of this NL. These are analog traces from conjugately located Rubidium magnetometers, one at St. Anthony, Newfoundland and the other at Halley Bay, Antarctica. Shown are the H and D component variations during a Pi2 event. The nominal start time shown is 0359 UT on 26 September 1976; however, as Stuart has pointed out, he can locate an event to better than one-second resolution. The data shown come from two subsets of events listed for conjugate Pi2's. The first set (some 72 intervals) were chosen because they have a high superficial resemblance between the signals recorded at the two conjugate sites. The second set were selected on a "lower criterion", namely that a Pi was recorded clearly at either one station. There may be some duplicates in the second set (some 120 intervals). For all these events high quality traces are available and rough horizontal hodograms. The analogue records have background field movements removed by a high-pass filter curring off at 200 seconds. Background field movements for the timing of substorms, etc. are, of course, available in the original data.

The three remaining groups of events identified from 1976 and 1977 recordings are not represented by sample figures. However, each description is summarized here and typical entries are given. One set was made from records at Tromso, Kiruna, Nurmijarvi, Lerwick and Eskdalemuir. It was to assess the relationship of the various types of pulsations over the whole Northern European Array. Emphasis was placed on tie-ups between mid latitude and high latitude forms of coincident activity hence the preponderance of Pc5 and Pi2 (also dPi) over Pc3 & 4. The expression dPi was coined by Stuart and denotes a night time Pi2 characteristically at mid latitude, but clearly observable in the auroral zone. It has a distinctive impulsive signature and "sits up" (or down) on the long period background field. The expression "current rotation" denotes times when a rapid field movement has orientations over the observation area which suggest by simple equivalent current models that either a radial current flow or a circular current flow pattern is responsible. "Switch on" and "Switch off" times are precisely that since the pulsation activity begins and ends abruptly. The are more examples of this phenomena than in Stuart's list (about 140) and they appear to be global phenomena, at least over the 1/4 of the globe covered by this network. Stuart is especially interested in confirmation of switch-on times from recordings by other pulsation workers and also changes in the interplanetary medium (notably IMF) occurring at or just before the times listed. Sample entries from this set are: 77/02/03; day 34; times: 2240-50, 2300-10, 2310-15, & 2315-25 UT; Train of dPi's at mid latitudes, substorm onset at 2310 UT. 77/04/01; day 91; times: 0245-0445 UT; Good Pc4 "Switched off" by "ionospheric" wave.

The next selection of events was taken primarily from Kiruna and Tromso records. The object was to identify clear Pc5 events which occurred against an essentially quiet background field and to pick out impulsive events, not necessarily oscillatory, which might be associated with substorm onsets and/or mid latitude Pi2's. Here the expressions "current rotation" and "FAC" are meant to suggest that the simple equivalent current pattern observed suggests the presence of a "narrow beam" field aligned current. Significance of events noted as dominant in the Z component suggests that the station(s) is close to the edge of a strongly developing current sheet, usually to the North. Expression "Pseudo Substorm" is used to indicate conditions when a substorm "trigger" appeared to occur without further development. Often two or three of these occur in a train which coincides with a train of Pi2's at mid latitude. The background field returns to a quiet condition after each "Pseudo" event. Often the last of the train initiates a significant substorm. Representative entries from this list (from some 250 events) are: 77/07/29; day 210; time: 0300-0600 UT; Large amplitude Pc5. Lesser Pc5's in disturbed field before & after. 77/09/19; day 262; times: 1330-1500, 2100-2400 UT; Pc5, Large pulsation in Z (period about 25 min). 77/09/20; day 263; times: 0400-0600, 1700-1800 UT; Pc5's. 77/09/21; day 264; times: 0315-0400, 1245-1315 UT; Good Pc5's; furtner times and comments: 1940, Pseudo substorm, 2015, same; 2025, same; 2050, same; 2105 UT, Substorm onset - recovery period - 2345 UT, Large substorm onset. This list covers from June through Nov 1977.

The final set of Stuart events is reproduced here completely. It contains instances of Pg, mainly from Tromso and Kiruna magnetometers. These have been extensively analysed for N/S amplitude and phase characteristics and form the basis of a paper currently in preparation. The definition Pg used in compiling this list is stricter than that in some of the others mentioned here. This improvement is based on experience with the current data which leads us to believe that some of the other events superficially identified as Pg may be of a borderline nature. Dates are given as month/day for the year indicated and time spans are in UT. 1976: 09/23 2320-0100; 09/25 0620-0800; 10/12 2335-0135; 10/19 2240-0020; 10/20 2050-2250; 10/23 0100-0210;and 12/07 0250-0350.
1977: 02/26 0200-0250; 03/01 0135-0235; 04/23 2300-0430; 05/14 0930-1030; 05/20 0110-0210; 08/02 0350-0500 & 0710-0800; 08/04 0140-0430; 08/24 0220-0500; 08/31 0600-1200; 09/03 0440-0615 & 0940-1200; 09/07 2310-0010; 09/17 0245-0415; 10/25 2330-0045; 11/05 0620-0750; 11/22 0100-0335; 11/29 0240-0420.
Anyone interested in any of the data sets mentioned above may contact W.F. Stuart, Geomagnetism Unit, Inst of Geological Sciences, Murchison House, West Mains Road, Edinburgh EH9 3LA Telephone 031-667 1000. The IMSCIE Office will prepare a few copies of these tables for distribution upon request.

GEOS/N. AMERICAN DATA ANALYSIS

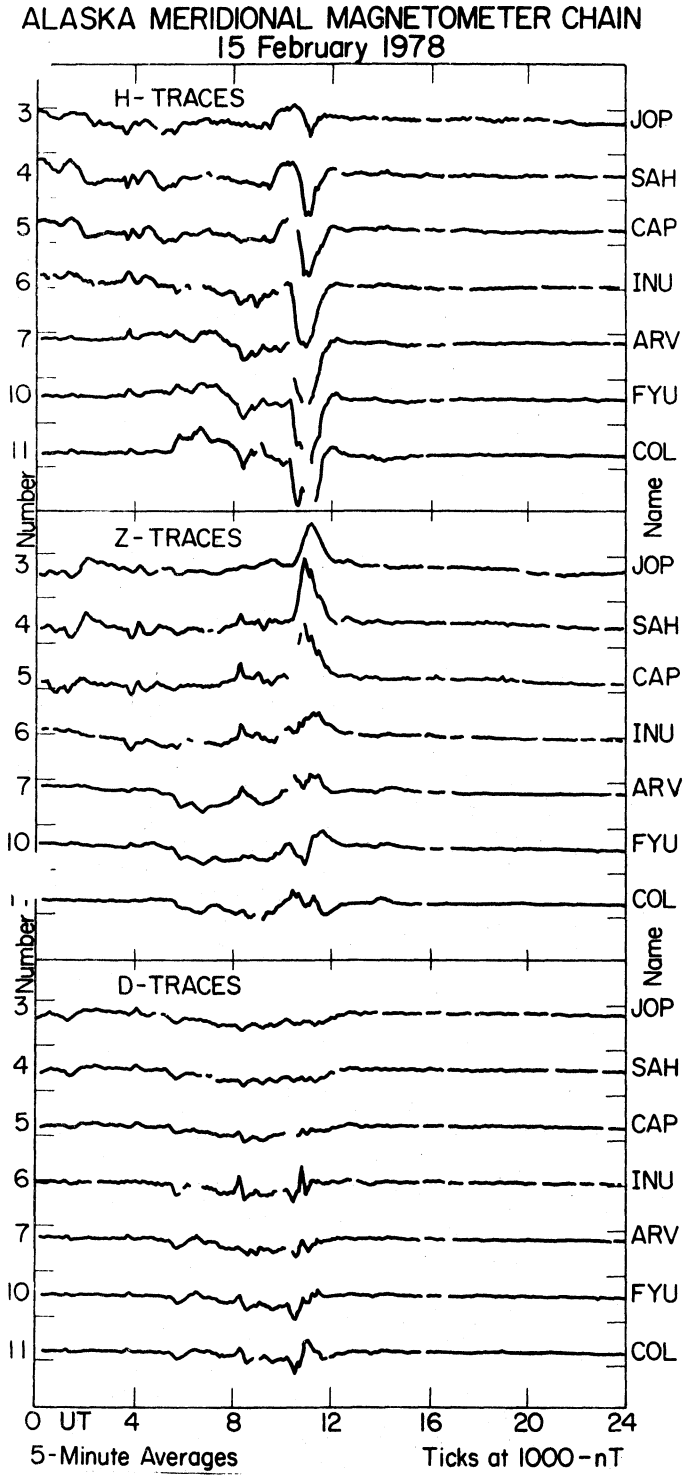
Dr R. Manka reports on progress in identifying data available from ~12 spacecraft and N. American ground-based arrays that made coordinated measurements. Priority days have been selected for analysis (NL 78-1, pg 5).

Two periods of significant magnetospheric activity occurred: one was the substorm of 29-30 July 1977; the other was the magnetic storm activity following the flares of 17 & 19 Sept (class 3B). Data from these two periods appear to be excellent for cooperative analysis. Other periods (e.g. 26 Oct) may be considered later.

29-30 July: Sudden commencement in Alaska (Heacock) at 0027 UT on 29th. Plasma injection seen at ATS-6 (~1800 LT) at 0100 UT on 29th. Relativistic e- and p+ in solar wind (IMP H&J) arrived at Earth on 27-28th. A. Lazarus (IMP) reports a shock in solar wind plasma at about the start of 29 July; detailed solar wind plasma and B-field data is in processing.

19-22 Sep: Magnetospheric activity followed after the flare of the 17th & major flare of 19 Sep. First sudden onset at 1200 UT on 19th. Plasma injection seen at ATS-6 (~2200 LT) at ~0500 UT on 21st. GEOS sees ULF ion-cyclotron waves on 21st from 1030-1130 UT and 1200-1300 UT. SSC at 2045 UT on 21st seen by N. American plasmapause magnetometer chain.

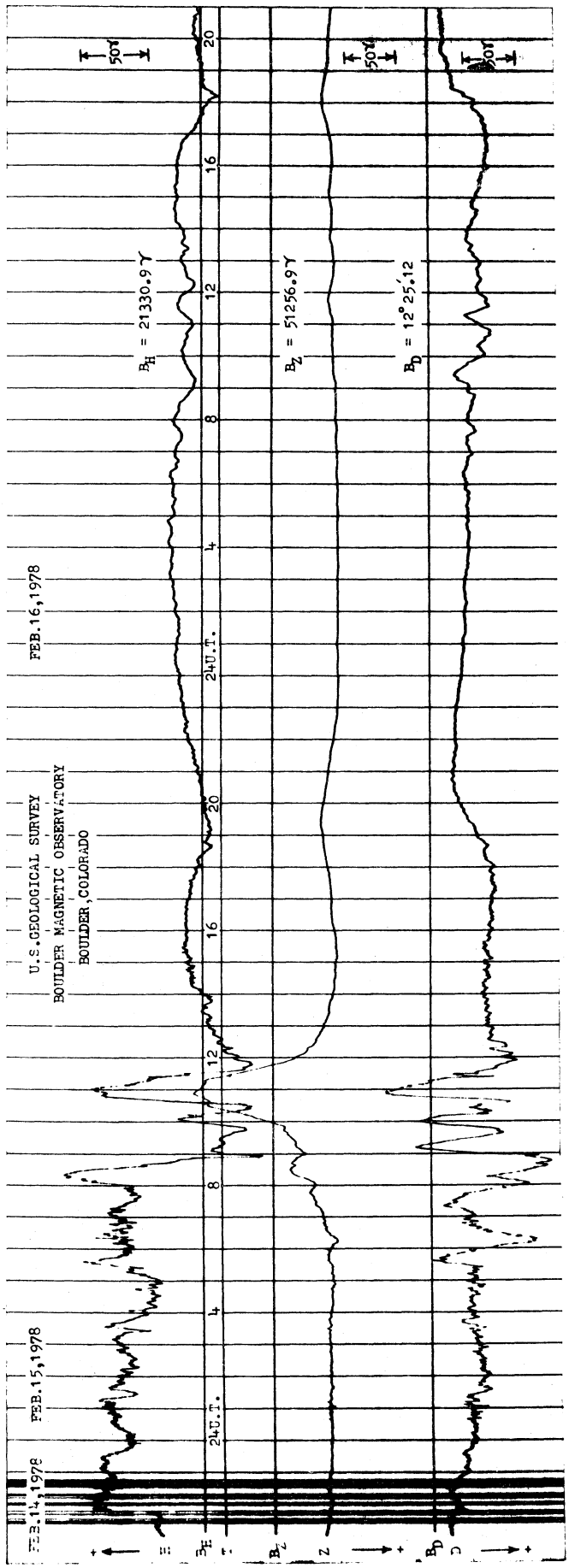
Short workshops on these events may be incorporated in the Innsbruck meeting in June and informal discussions at Miami during Spring AGU are possible. Dr's Manka, Knott, Pedersen, Johnson, Fritz and Vette would appreciate comments or information about data for these events.



GEOMAGNETIC DISTURBANCE --- 15 Feb 1978

Above are stacked-plots of 5-min average magnetic variations in H, Z, and D. They were recorded at the indicated ground sites composing the present Alaskan Meridian Chain (see IMS NL 77-1). These records were relayed via SMS/GOES satellites to the SELDADS in NOAA-ERL, Boulder, Colorado. Stations are numbered for ordering purposes in the high-time resolution data which is still in a soft-ware development stage during site/instrument checkout.

The record on the right is a copy of the mid-latitude magnetogram from Boulder Magnetic Observatory. The large (>30γ), rapid sudden commencement occurred during absolute observations, somewhat to the temporary confusion of the observer who stabilized the D-magnetometer, turned away to trigger the time mark, and turned back to find the D-magnet rotated out of alignment.



IMS CALENDAR OF GBR CAMPAIGNS JANUARY - JUNE 78
(As of 28 February 1978)