International Council of Scientific Unions

SCIENTIFIC COMMITTEE
ON
SOLAR-TERRESTRIAL PHYSICS

79-7

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INTERNATIONAL MAGNETOSPHERIC STUDY
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IMS NEWSLETTER

As we write this sermon, we are waiting for SKYLAB to reenter the earth's atmosphere. The 77.5 ton ship is expected to come back anytime between July 10 and 15, missing by just a few days the July 4 celebrations in the US. The largest piece to reach the ground is expected to weigh 1500 lbs; if this piece hits the South-Western corner of RB-3, on the first floor, that is our offices, you may receive the next newsletter with some delay.

JHA 7/3/79

IMSCIE Office: Telex 45897 SOLTERWARN BDR
Telephone: 303-499-1000 x6501 (FTS 323-6501)
Satellite Situation Center (J. Vette): Telex 89675 NASCOM GBLT
Telephone: 301-982-2354
European Information (P. Simon): Telex 200590 CNET OBS B MEUDO
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USSR Coordination/Information Office (I. Zhulin): Telex 7523 SOLTER SU

SPECIAL IMS HIGH-ALTITUDE SATELLITE PERIODS - 1979

Special IMS High-Altitude Satellite Intervals for Jul - Sep 1979 are given below. Page 5 of NL 79-3 has a detailed listing of all the SSC - selected Special Satellite intervals for January - June 1979 and the satellite configurations that were the basis for selection of these periods. As was done for such earlier intervals, start and end times were extended from the model calculations to allow for boundary fluctuations during disturbances. Details for the latter half of 1978 were published in NL 78-8, pg 4.

#8 2 Jul 183/0200 UT to 2 Jul 183/1500 UT

At press time #8 is the only Special IMS High-Altitude Satellite Interval available. Those for August and September, if there are any, will be announced in next issue.

SPECIAL LOW-ALTITUDE SATELLITE CONJUNCTIONS

The IMS Satellite Situation Center prepares a weekly forecast of times of satellite magnetic field line conjunctions for the principal high-altitude IMS satellites (ISEE-1&2, GEOS-2 and SCATHA), selected low-altitude satellites and selected ground arrays. This information is telexed by the IMSCIE Office, upon request, to some 20 locations for use by project scientists, satellite tracking controllers and administrators. Those interested in addition of other satellites or ground based experiments to these forecasts should contact J. Vette, IMS SSC (see NL letterhead for address) and anyone wishing to receive the weekly telexes should contact the SSC or the IMSCIE Office.

Because of the introduction of SCATHA, the number of conjunctions has become so vast to suggest a change of format. Time intervals of special significance are now selected. These, numbered sequentially, include all conjunctions between target satellites (ISEE, GEOS-2, SCATHA) and those conjunctions between target satellites and low altitude satellite or ground based station which fall in the selected interval. These periods are called " special periods of magnetic conjunction ". In addition to these times two tables are given; the first shows additional information about conjunctions between target satellites, including altitudes, geomagnetic separation and separation along the magnetic flux tube; the second shows the total number of conjunctions between each target satellite and the other satellites and ground stations. Additional information about these conjunctions is available directly from the SSC.

GROUND-BASED, BALLOON AND ROCKET CAMPAIGNS:

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

May 1 to Jul 31; K. Tsuruda; Roberval, Canada; GROUND BASED - see NL 79-6, page 2.
May 28 to Jul 13; S. Ullaland; "SBARMO 79"; N. Scandinavia; BALLOONS (36) - see NL 79-4 pg 2
Jun 1 to Jul 13; J. Wygand; Manitoba, Canada; BALLOONS (5) - See NL 79-4 pg 3
Jul 16 to Aug 11; P.H.G.Dickinson;"P197H,P209H,P210H,P211H";South Uist;ROCKETS(4)-Petrel-see NL 79-5 pg 3
Jul 16 to Aug 11; Krankowsky; "P212H,P213H,P214H"; South Uist; ROCKETS (3) - Petrel - see NL 79-5 pg 2
Jul 16 to Aug 11; E.R. Williams;"P169H,P170H,P171H,P172H";South Uist;ROCKETS(4)-Petrel - see NL 79-5 pg 2
Aug 12 to Sep 15; G. Witt ; "S27 Twilight" ; Kiruna ; ROCKET - see NL 79-7, page 3
Aug 15 to Aug 31; L. C. Hale ;"23.016UE,15.188UE,15.193UE";White Sands; ROCKETS (3) - see NL 79-7, page 2
Sep 1 to Sep 30; E. Zipf ; "33.005UA" ; White Sands ; ROCKET -
Sep 13 to Oct 10; G. Holmgren ; "S29 Ba-GEOS" ; Kiruna ; ROCKET - see NL 79-7, page 3

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

Monthly; Wright & Hilsenrath; "OZONESONDE"; Various Sites; ROCKETS - See Actualities, NL 77-10, pg 3

REGIONAL IMS SAT/GBR PROGRAM DETAILS, JULY - SEPTEMBER 1979

Program details for many brief listings given above appeared, as indicated, in earlier IMS NLs.

GROUND BASED

NORTHERN EUROPE

Magnetic Pulsations I --- W. F. Stuart, Institute of Geological Sciences, Edinburgh, has sent to the IMSCIE Office a note informing that, during the SBARMO 79 ballon campaign (see NL 79-4, page 2-3) in Northern Europe, there will be a coordinated ground based pulsation project involving cooperation between USSR, the United Kingdom, Norway, West Germany and Finland. The map reproduced on page 4 shows the approximate positions of the stations involved. Respondants are Dr. J. Holtet (Norway), Dr. J. Kangas (Finland), Dr. L. Baransky (USSR), Dr. U. Wedeken (Germany) and Dr. W. F. Stuart (UK). The induction magnetometers operated by Germany and the USSR record on magnetic tape and/or analogue chart. The IGS magnetometers record digitally. It is hoped that data compatibility will be improved by having duplicate records (i. e. IGS magnetometers and induction magnetometers) at several sites, notably Oulu and Nurmijarvi.

Magnetic Pulsations II --- At the same time we received, through the European IMS Information Office of P. Simon, a copy of a telex from E. Krenzien, which gives the start and stop times for the 1979 magnetic pulsations campaign of the German chain in Northern Scandinavia.

Station	Geog. Lat.	Lon.	Start	Stop Time UT
Kunes	70° 21'	26° 31'	79.03.16	***
Kevo	69° 45'	27° 02'	79.03.17	***
Ivalo	68° 36'	27° 28'	79.03.18	***
Martti	67° 28'	28° 17'	79.03.12	***
Kuusamo	65° 55'	29° 03'	79.03.09	***
Kuhmo	64° 06'	29° 39'	79.04.18	***
Esrange	67° 53'	21° 06'	79.03.14	79.04.06

*** The precise stop times for each station are not available now but they fall between June 23 and June 25, 1979. This was the last campaign.

ROCKETS

WHITE SANDS

23.016UE, 15.188UE, 15.193UE --- Prof. L. C. Hale, Pennsylvania State University, was so kind to give us the following details for this series of three rocket launches to be fired late in August 1979. The scientific objective will be to measure the variations of the atmospheric conductivity between 20 and 80 Km at sunrise. A first launch, an Astrobee "D" rocket, instrumented with conductivity probe, UV lamps and electric field antenna, will go before sunrise. Two Super Arcas rockets, instrumented with Gerdien condensers to measure conductivity, mobility and number density, will follow. The Astrobee "D" payload will be recovered

in flight by an airplane. Prof. L. C. Hale and Dr. C. L. Croskey, both from Pennsylvania State University, are responsible for the Astrobee "D", while Dr. J. D. Mitchell, University of Texas at El Paso, and Prof. L. C. Hale, are responsible for the Super Arcas.

KIRUNA

S29 Ba-GEOS --- This rocket program was announced in January 1979 for launch in the Spring and later delayed to the time window September 13 to October 10, 1979. See NL 79-1, pages 2-3, for details.

S27 Twilight --- This program is a repetition of one already successfully carried out in April 1978. It is a coperative effort between the University of Stockholm, the Uppsala Ionosphere Observatory, Johns Hopkins University and the University of Saskatchewan. Details about payload and scientific objectives can be found in NL 78-2, page 3 and NL 78-6, page 4.

ACTUALITIES

SATELLITES

GEOS-2 --- The GEOS-2 daily summaries are currently being received at the IMSCIE Office. They now cover a period from August 15, 1978 to April 29, 1979. The two last shipments came in together with notes by the GEOS project scientist, K. Knott, on the general performance of the payload and the attitude maneuvers which have been performed lately. We quote from those notes in what follows:

"Since March 22, 1979, the magnetometer on GEOS-2 has developed an anomaly in its bias adjustment circuitry. Following some days of experimenting, a procedure has been developed to overcome this problem. The initial difficulties and the subsequent attempts to overcome them are reflected in the data between March 22 and April 7, 1979. Please treat the magnetometer data for this period with caution. GEOS-2 was maneuvered into the half inverted position on April 25, 1979 at 16.48 GMT. The spacecraft attitude before/after the maneuver was as follows: Right ascension 269.34 / 127.82 deg; Declination 88.42 / 24.4 deg; Spin rate 9.69 / 9.60 rpm. The attitude was corrected on April 26, 1979, at 00.20 GMT to the following values: Right ascension 126.1 deg; Declination 11.8 deg. The spacecraft spin axis was erected on April 29, 1979, at 16.58 GMT to the following values: Right ascension 100.0 deg; Declination 89.3 deg; Spin rate 9.54 rpm. On April 30, 1979, GEOS-2 operations were temporarily suspended until May 14, 1979, at 13.00 GMT. The next issue of summaries will continue from this date."

K. Knott mentioned in a letter to the experimenters of GEOS that the possibility of joint experiments between SCATHA and GEOS-2 has been discussed with E. C. Whipple. Three special topics have been identified for possible cooperation: Xe ion tracing using the ion gun on SCATHA and the mass spectrometer on GEOS-2; a general cross calibration of particle instruments on both SCATHA and GEOS-2; a wave propagation experiment using the GEOS-2 VLF transmitter as a generator and the wave experiment on SCATHA as a receiver.

On page 6 we reproduce the GEOS-2 longitudinal shift plan as it is derived now from the following boundary conditions: the SBARMO 79 balloon campaign requires the presence of GEOS-2 over or very near the Scandinavian longitude until 13 July; the GEOS-2 experimenters are interested in a position near to the intersection between geomagnetic and geographic equator (15 degrees eastern longitude); two rockets with Barium payloads are scheduled for launch from Kiruna between 10 and 30 September 1979; there will be a French ground based campaign (GBC) carried out from Scandinavia between January and March 1980; interest exists in moving GEOS-2 closer to METEOSAT to correlate with METEOSAT electrostatic charging events; EISCAT will become operational early 1980 requiring GEOS-2 over Scandinavia.

ISEE 1/2 --- Keith Ogilvie, project scientist for ISEE 1, reported to us about a Science Working Team meeting held on June 2 at the Goddard Space Flight Center. At this meeting it was decided that, for the next six months, the separation between the two spacecraft will be kept small. The European Space Operations Center (ESOC) in Darmstadt, which is in charge of the control of the maneuvers of the ISEE pair on the basis of the tracking information supplied by the NASA network, has therefore been requested to conduct a study to determine the amount of gas needed to correct for a small difference between the orbits of the two spacecraft which makes it impossible now to get them closer than 75 Km. A resolution was also passed that an attempt be made to increase the priority with which NASA tracks the two spacecraft so that the percentage of time during which ISEE 1, 2 and 3 are simultaneously tracked increases correspondingly from the present 70%.

ISEE 3 --- Tycho Van Rosenvinge, project scientist for ISEE 3, gave us updated information about this spacecraft. A couple of experiments have shown malfunctions leading to partial degradation of their scientific return. The low energy cosmic ray experiment is now able to cover a reduced energy range and its ability to discriminate between isotopes is impaired. One of the two gamma ray burst experiments shows loss of pulse height memory. On the positive side, Dr. Van Rosenvinge mentioned the detection by ISEE 3 of an extremely unusual gamma ray burst, whose intensity saturated both the Los Alamos and the GSFC detectors, and whose duration was less than a tenth of a second. This burst was correlated with a Supernova explosion in the Magellanic Cloud. This is the first and only gamma ray burst positively correlated to an identified object. Its unusual characteristics would suggest that the source of this burst is different from the source of the usual bursts.

BALLOONS

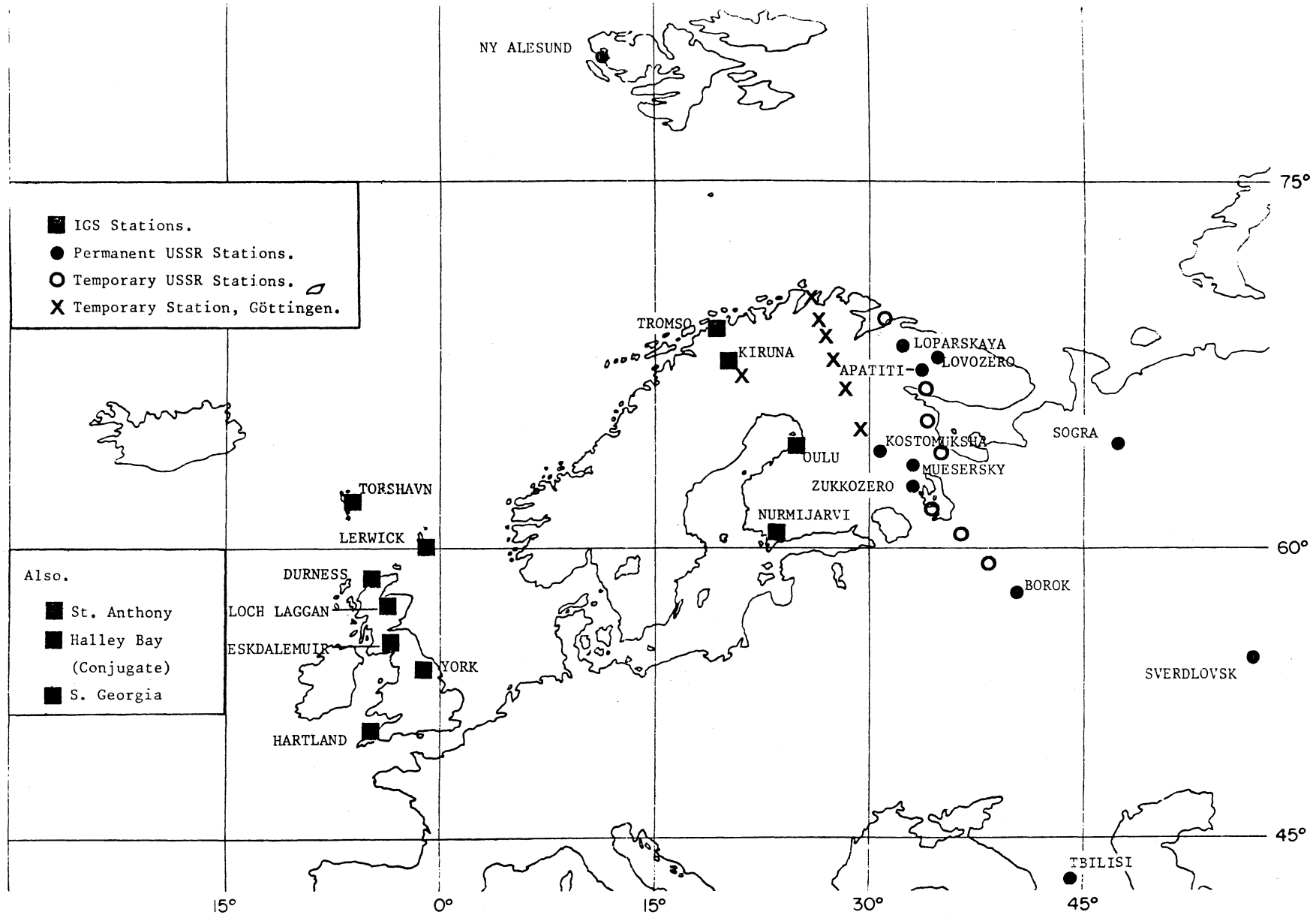
SBARMO 79 --- Paul Simon relays a telex that he received from the SBARMO 79 project scientist, Stein Ullaland. During the period of strong solar activity that started on June 6, 1979, altogether eight balloons were launched from Northern Scandinavia between June 6 and 8. The duration of flight ranged from 70 to 100 hours. There were up to seven balloons simultaneously at ceiling altitude in the region between Northern Scandinavia and Greenland. The payloads included instrumentation to measure auroral X-ray and E fields. It is expected that the X-ray detectors also measured gamma rays from solar protons.

ROCKETS

WHITE SANDS

27.023US --- We receive a note from G. Rottman, LASP, University of Colorado, project scientist for this rocket program, with the update on its status. The launch was carried out successfully on June 5, 1979. The principal experiment obtained high resolution EUV spectra across the solar disc including measurements in an active region and in a coronal hole. In addition, two small spectrometers made full disc irradiance measurements between 115 nm and 260 nm.

MULTINATIONAL INDUCTION MAGNETOMETER NETWORK



STATUS OF IMS MAGNETOMETER NETWORK DATA

A memorandum came to the IMSCIE Office from R. Manka, US IMS coordinator, detailing the present status of the North American IMS Magnetometer Network data collection, processing and distribution as well as the future prospects for continuation of these services. This information is the result of meetings and personal contacts with the many individuals involved with the operation of the various stations and of the different data transmission and reduction phases.

IMS platforms --- The stations which make up the IMS Network are listed in the following table; AK=Alaska chain, CH=Fort Churchill chain, EW=East West chain, AL=Alberta chain, ML=Midlatitude chain.

ORG	STATION	lat.	lon.	installed	
AK UA	Eureka Can	80.0	85.7	Aug 77	*
AK UA	Isachsen Can	78.8	104.0	Aug 77	*
AK UA	Sachs Harbor Can	72.0	125.3	Nov 24, 77	
AK UA	Cape Parry Can	70.2	124.7	Nov 24, 77	
AK UA	Inuvik Can	68.2	133.3	Nov 17, 77	
AK UA	Arctic Village US	68.1	145.6	Feb 10, 78	
AK UA	Fort Yukon US	66.6	145.3	Nov 5, 78	
AK USGS	College US	64.9	148.0	Sep 21, 77	
AK UA	Talkeetna US	63.3	150.1	May 20, 78	
CH EM	Pelly Bay Can	68.5	89.5	Apr 27, 78	
CH EM	Rankin Inlet Can	62.8	92.3	Dec 6, 77	
CH EM	Eskimo Point Can	61.1	94.1	Dec 7, 77	
CH EM	Back Can	57.7	94.2	May 8, 78	
CH EM	Gillam Can	56.3	94.4	Dec 5, 77	
CH EM	Island Lake Can	53.9	94.4	Dec 15. 77	
EW NY	Norman Wells Can	64.9	125.5	Feb 10, 78	
EW NY	Fort Simpson Can	61.7	121.2	Oct 2, 78	
EW NY	Lynn Lake Can	56.8	101.1	Oct 4, 78	
AL AL	Fort Smith Can	60.0	112.0	Jun 26, 78	
ML UCIP	Eusebio Brazil	-3.8	38.4	Dec 9, 77	
ML USGS	San Juan US	10.1	66.1	Jan 17, 79	
ML USGS	Tucson US	32.2	110.8	Apr 78	
ML UCTM	Tahiti Fr	-17.5	149.6	Mar 23, 78	
ML UC	Honolulu US	21.3	158.0	Mar 17, 78	
ML UC	Midway Island US	28.2	177.3	May 12, 78	
ML UC	Wake Island US	19.2	193.3	Jun 1, 78	
ML USGS	Guam	13.6	215.1	Jul 3, 78	*

(* tape only)

It should be noted that the operation of Isachsen was terminated on June 7, 1978.

Data flow --- Full resolution (10 seconds) digital magnetometer data arrives at SEL (the Space Environment Laboratory, NOAA, Boulder, Colorado), either in "real time" via satellite or by magnetic tapes mailed from Eureka, Isachsen or Guam, sites which are not favorably located for relay via the GOES satellites. The satellite relayed data is transmitted from the remote station to either the East or the West GOES satellite. It is then relayed to ground at Wallops Island and transmitted by dedicated NOAA phone line to Boulder, Colorado, where it is processed in the NOAA/SEL SELDADS system and then sent over to NOAA/EDIS (Environmental Data and Information Service) for archiving and monthly distribution to the Principal Investigators and scientific community. The data is made available in three formats: full resolution (10 seconds) digital magnetic tapes, one minute averaged digital data, and microfilm plots of the one minute data. In addition, 5 minute averaged data plots are generated to monitor system performance and are used by the Space Environment Services Center.

Status of data reduction

a. One minute averaged data tapes and microfilm: these are the basic data being delivered to all P. I. groups, as well as being compatible with the NGSDC usual data distribution. These tapes (and microfilm) have been sent to EDIS by SEL covering data since April 1, 1978.

b. 10 second (full resolution) data: reduced tapes were sent by SEL to EDIS covering data since August 1978. These tapes were in CDC format. A new computer program was written by SEL during January to March, 1979, in order to produce tapes in IBM compatible format, which is now available. The 10 second data prior to August 1, 1978, and the one minute data tapes for periods prior to April, 1978 should be available by Fall 1979. The task of monitoring and validating data for each station as it came on line, as well as the task of identifying and correcting the problems associated with the data transmission has fallen mainly on the SEL staff, and a major effort has been required for the past two years in order to produce the programs to read the data.

c. Individual non-satellite tapes: At the date of this memo, the SELDADS staff has completed the program to read the individual tapes from those few sites which are not well situated for transmission via satellite. At this time they have read all the tapes from Eureka, Isachsen and Guam and are working on Johnson Point. The data recovery from these few stations having on site tapes varies.

A general summary of the data status is given in what follows.

Data type	Data stream began	Processed data available from
Remote satellite relay		
1 min average	Oct 1977	April 1978
10 sec (CDC format)	" "	August 1978
10 sec (IBM format)	" "	March 1979 *

(* Upon request includes any data previously available in CDC format)

Remote magnetic tape	July 1977	June 1979 *

(* includes all tapes from Eureka, Isachsen, Guam and Johnson Point from present back to initial acquisition)

Future status of data acquisition and system mainteinance --- The considerations which impact on the future of the IMS Magnetometer Network data are mainly those of scientific need and operational use by the various customers, and the availability of support for the processing and dissemination of the data and for the mainteinance of the remote platforms. There appears to be a general consensus among a number of scientific and operational groups that this data is very useful and should be continued. According to present information, the satellite data channel allocations should be available until at least January 1981. SEL intends, within their constraints, to continue to support the transmission and reduction of the Network data. A major limitation exists in that, having the programs been completed and tested, any future changes would not be possible. It is expected that EDIS can continue their present data distribution activities. Finally, in order for the operation of this network to proceed, there must be a committement on the part of the Investigators and the Agencies supporting this research, to continue to acquire and use this data.

Summary

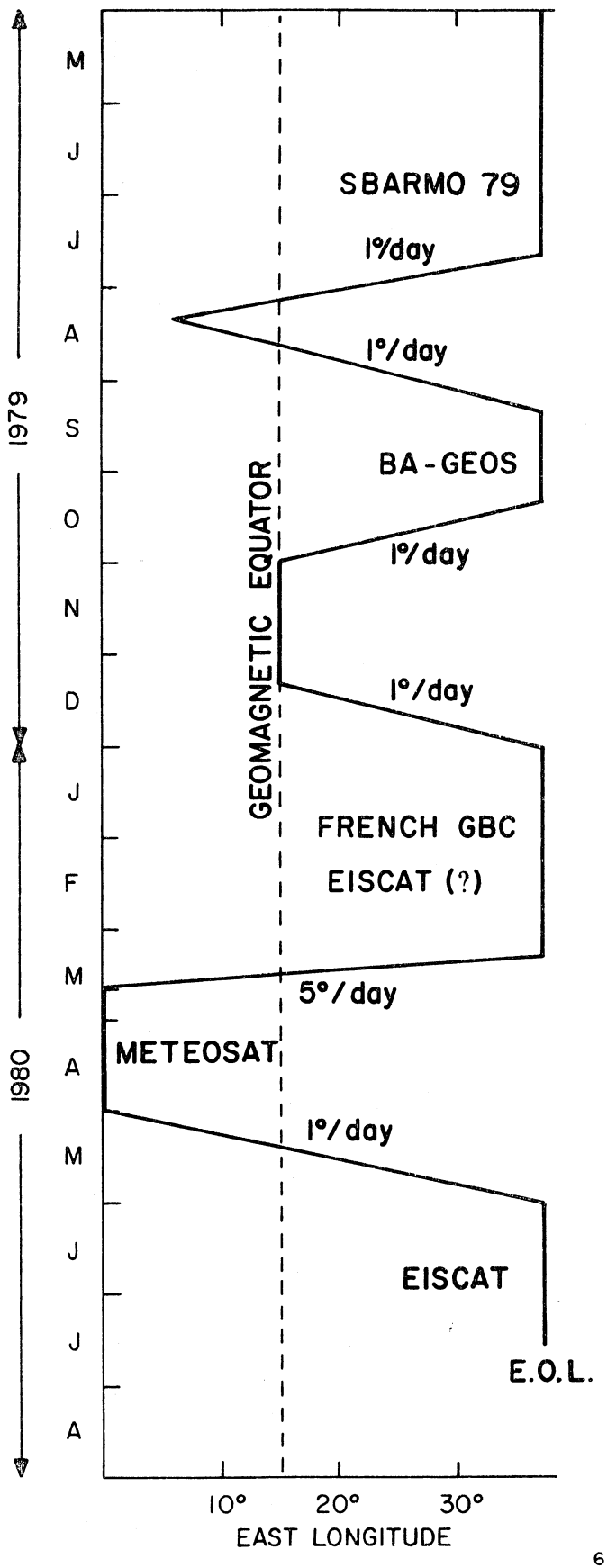
The data acquired during the earliest operations of the system is now being processed and will be available in the near future. The prospects for continued use of the satellite relay and mainteinance of the platforms are good. The network data is beginning to be utilized in new research projects. A great deal of cooperative effort on the part of the Principal Investigators, the various US and Canadian agencies, and the general scientific community have resulted in the successful operation of this unique facility.

MEETINGS AND WORKSHOPS

CDAW 2.0 on the July 29, 1977 substorms

Dr. T. Fritz, leader of subgroup 6, as defined in NL 79-5, page 9, has contributed the following short report:

On May 24-26 the energetic particles subgroup studying the July 29, 1977 IMS event met at NASA/GSFC using the Coordinated Data Analysis Workshop facilities of the Satellite Situation Center. Particle and magnetic field data from six satellites in the vicinity of the geostationary orbit were submitted and available during the workshop. The energetic particles subgroup had interacted a number of times prior to this workshop and a strong attempt was made to incorporate theoretical and modelling support into CDAW 2.0. Eight scientists representing seven institutions participated, two of which represented groups actively modelling and investigating theoretically



the equatorial substorm injection and dynamical processes in the vicinity of the geostationary orbit.

There were four major injection events which occurred between 00 and 12 UT on July 29. An initial investigation of the substorm associated with the interplanetary shock which hit the magnetosphere at 0027 UT and pushed the magnetopause in past GEOS-1 demonstrated that the substorm was actually in progress prior to the SC and therefore was a very complex event. The major effort was therefore expended on the event at 12 UT, which apparently was composed of at least four separate injections or particle intensifications at about 5 minute intervals. Ions with energies in excess of 1 MeV were produced ("energetized") during the event. It was not possible to model the particle intensity variations either quantitatively or in many cases even qualitatively in terms of present models. The major shortcomings appeared to be the depth of particle penetration into the inner magnetosphere during the injection, the gradients as a function of energy which were observed and the large energies produced (> 1 MeV).

The general consensus of the group was that this workshop was a step forward in understanding the complexity of large events but that the significant point to emerge was the failure of the present concepts to handle many of the observations. Each of the participants left the workshop with a number of "action items" to pursue, including modification to present modelling concepts, and to report back to the group at a later date. The group will continue to correspond internally, and develop a report on our present interpretation of the event. It is hoped that this report will be circulated to the other subgroups prior to the full CDAW workshop planned for this fall.

For those organizing future CDAW efforts --- some advice.

Two of us had participated in CDAW 1.0 in December, 1978 and the subgroup had exchanged data prior to the workshop, so we anticipated that many of the operational interface problems would be minimal. Even with this preparation, the necessary "housekeeping" worries about units, averaging intervals, coordinate transformations, etc. still required a full day of our effort before meaningful comparisons were possible and scientific questions were addressed.

Participants: D. Baker (LASL), T. Fritz (NOAA), P. Higbie (LASL), S. Kaye (UCLA), A. Masley (TRW), T. Moore (UNH), P. Smith (GSFC), B. Wilken (MPAE), R. Manka (US IMS coordinator).

R. N. Singh, Applied Physics Section, Institute of Technology, Banaras Hindu University, Varanasi, 221005 INDIA, sent us the following announcement:

"IMS activity in India --- A national symposium on Magnetospheric Phenomena was organized by Professor R. N. Singh, National Coordinator for IMS, in the Institute of Technology, on 23rd and 24th March, 1979. The symposium was inaugurated by Dr. Hari Naraian, Vice-Chancellor Banaras Hindu University and a reputed Indian Geophysicist. Six review talks and twentyfive research papers were presented in the four Technical Sessions. The review talks and the research contributions covered the broad aspects of Magnetospheric Phenomena such as Interplanetary magnetic field, Solar wind interaction with the magnetosphere, VLF and ULF wave generation and propagation and the Phenomena of magnetospheric-ionospheric coupling. The need for close collaboration between various Indian research groups and the leading international research groups was discussed. The need for data pool collected by IMS satellite was realized and it was thought that at a national level such data be procured and made available to Indian Scientists."

IMS DATA SETS

COSMOS 900 data --- Some more days of data plots of the same kind of those described in NL 79-6, page 3, have been received at the IMSCIE Office. The data for December 1-2, and 5-6, 1977 have been prepared by E. N. Sosnovets and provided by WDC-B in Moscow. They come to integrate the previous set covering at least a part of the primary interval selected at the IMS working conference in Innsbruck (NL 78-9, page 7), which was already the focus of CDAW-1.0 (NL 79-1, page 6) and will still be the subject of correlative studies in the framework of the Canberra IMS Symposium.

Magnetic Potential Plots over the Northern Hemisphere for 26-28 March, 1976 --- This is the title of the report UAG-71, published by WDC-A for STP, NOAA, Boulder Colorado. Magnetic variations data, excluding normal Sq variations, from 52 Northern Hemispheric observatories were used as input to a complicated potential equation, and this was solved using a spherical harmonic series. The expansion increases with increasing latitude to give the desired resolution in the polar regions without exceeding available computer memory. Contour maps of the potential values calculated over the Northern Hemisphere were generated every minute to show the spatial and temporal variations of the so called "equivalent ionospheric current" systems. Symmetric ring current contributions were removed and contour plots regenerated every ten minutes to facilitate magnetic substorm analyses. UAG-71 consists of magnetic potential contour plots with and without the symmetric ring current contribution, plotted every 10 minutes between 0000 UT March 26, 1976 and 0600 UT March 28, 1976. These 1,224 plots offer a unique data set for studying magnetic substorms associated with the 26-28 March 1976 magnetic storm, a time period which falls within STIP Interval II and has been declared a Retrospective World Interval. A movie film of the one minute plots has been presented at the Seattle IAGA meeting, the ISSTP in Innsbruck and the Chapman Conference in Los Alamos. The authors are A. D. Richmond, H. K. Kroehl, M. A. Henning and Y. Kamide.

Aurora Quick Look Tables --- We received from R. Pellinen and K. Kaila, Finnish Meteorological Institute, Division of Geomagnetism, P. O. Box 503, SF-00101 Helsinki, Finland, a copy of their aurora quick look tables. We reproduce in the following the description given in the cover letter.

"During the IMS period (and earlier) digitally controlled all-sky cameras have been operated at the following locations in Finland:

	coordinates		since	until
Hankasalmi	62.18.17N	26.38.58E	78-02-22	
Oulu	65.06.20	25.29.16		78-01-22
Sodankila	67.21.50	26.38.07	74	
Muonio	68.01.41	23.33.46	74	
Ivalo	68.35.50	27.27.56	73	
Kilpisjarvi	69.03.07	20.47.13	78-03-01	
Kevo	69.44.58	27.01.14	73	

All cameras take all-sky photographs on color film (sensitivity 640-1000 ASA) simultaneously. The time of exposure is two seconds. The average auroral situation for each 15 minutes interval starting at 0, 15, 30 and 45 minutes has been scaled from each film. The original scalings stored on computer tape include the following parameters: a) Type of aurora or the general recording condition; b) Highest intensity of the aurora IBC I, II, III or IV as scaled by eye by using the reference lights; c) Main location area of the aurora; d) Indices for scientific projects (quiet arcs, WTS or ETS, red aurora etc.). The usual recording speed of the camera is one frame per minute but during certain periods centered around new moon also speeds of three frames per minute have been used. It is also possible to operate the camera with a speed of six frames per minute. In the quick look tables we have listed only the first parameters given above. For those who want to get more detailed information we can do the following services: 1) Copies of the complete parameter lists; 2) Copies of the original films in color; 3) Black and white prints and negatives; 4) Substorm analysis (description of the data from diferent stations with interpretation)."

Northern Scandinavia magnetometer array --- W. Baumjohann, University of Munster, supplied the IMSCIE Office with a detailed set of bar charts covering the period April to October 1978. The stations Flotningen, Esmared, Hoopaka, Roksa have been installed in July 1978 and have therefore data for the period July to October 1978 only. The bar charts show, station by station and component by component, the availability and quality of the magnetometer data. Time resolution is either 10 or 20 seconds depending on the station. The data are on 35 mm film. For a detailed map of the whole array, see NL 78-10.

PUBLICATIONS

Proceedings of the Second Symposium on Rocket Experiments in Antarctica --- This volume, edited by T. Nagata and published by the Japanese National Institute of Polar Research in Tokyo, reports about the exploration of the southern polar ionosphere and austral auroras by use of sounding rockets. The Japanese IMS rocket program in Antarctica has been based on a series of rockets developed by the Institute of Space and Aeronautical Sciences (ISAS), University of Tokyo, along with the technology of sounding rockets in the special conditions offered by the Antarctic base at Syowa. The rockets used were the S160, S210, S310, where the number stands for the rocket diameter in mm, which can be launched to a maximum altitude of respectively 85, 130 and 220 Km. The launches S210JA-19, S210JA-22, S310JA-1 and S310JA-2 are described, with special emphasis on the last two. S310JA-1 on February 13, 1976, was launched in quiet magnetospheric conditions to study the standard day time polar ionosphere, collecting data on electron density and temperature, precipitating electrons and VLF emissions. S310JA-2, on February 10, 1977, took measurements of precipitating electrons during a magnetospheric substorm expansion phase. More launches have been carried out during 1977 and 1978 in coordination with polar orbiting satellites and ground based observations. These will be described in future publications.

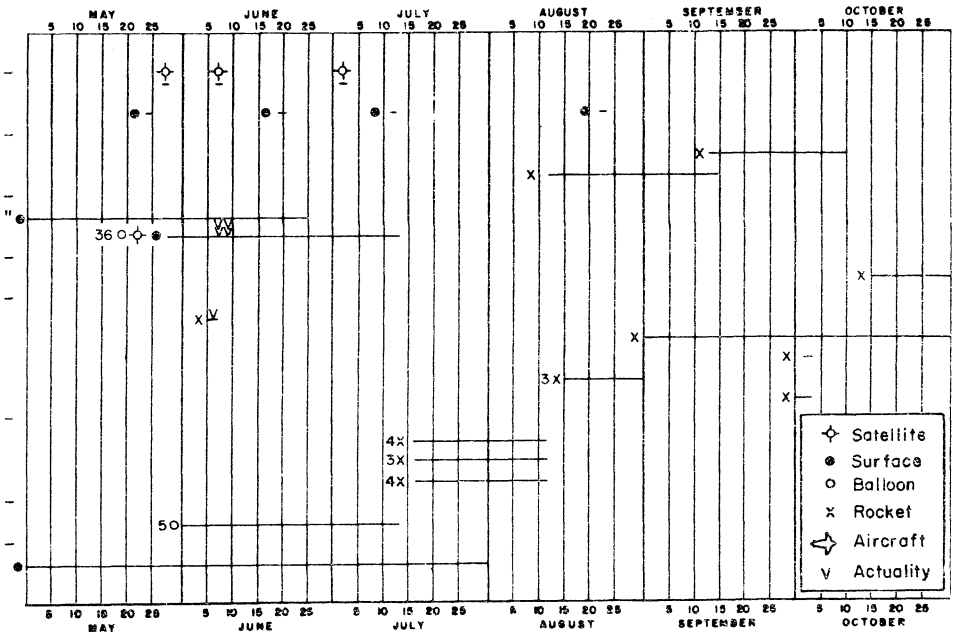
Preliminary Listing of Solar Flares

Solar Flare Data --- The table below contains a listing of X-ray flares, class M1 and higher, for the period 22 May 1979 - 24 June 1979 extracted from "Preliminary Report and Forecast of Solar Geophysical Data", published by SESC Boulder (see IMS NL 78-5).

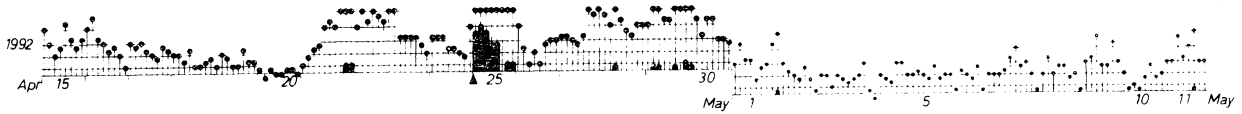
Date	Begin	Max	End	Location		Imp	Reg	Cl
May 21	0608	0638	0837	---	---	--	----	M1
Jun 2	1443	1449	1508	N21	E47	SB	1781	M1
Jun 3	0845	0944	1020	N18	E38	2N	1781	M2
Jun 3	1430	1438	1500	N21	E35	SB	1781	M4
Jun 4	0345	0409	0458	N20	E34	2B	1781	X1
Jun 5	0143	0153	0210	N20	E18	1N	1781	M1
Jun 5	0510	0553	0653	N20	E16	1N	1781	M1
Jun 6	2102	2113	2136	N15	E68	2N	1796	M3
Jun 9	0004	0108	0110	N18	W30	SN	1781	M5
Jun 10	0804	0902	0953	N25	W50	3N	1781	X2
Jun 11	1222	1227	1232	---	---	--	----	M1
Jun 18	0619	0625	0628	S17	W66	1N	1797	M1
Jun 18	2047	2102	2112	N23	W15	1F	1807	M1

IMS CALENDAR OF GBR CAMPAIGNS MAY 79 - OCTOBER 79
(As of 29 JUNE 1979)

WORLD-WIDE- -
Special SSC-selected satellite periods
IISN (Bauer et al)
KIRUNA (ESRANGE)- -
Holmgren; "Ba-Geos (S29)"
"S27 (twilight)"
N. SCANDINAVIA- -
Siebert, Wedeken, Krenzien; "Geomagnetic Pulsations"
Ullaland; "SBARMO 79"
POKER FLAT- -
Ulwick; "EXCEDE II"
WHITE SANDS -
Rottman; "27.028US"
Zipf; "33.005UA"
Christensen; "25.046UE"
Hale; "23.016UE,15.188UE,15.193UE"
Sharp; "13.XXXUE"
UK (SOUTH UIST) -
Dickinson; "P197H,P209-211H"
Krankowsky; "P212-214H"
Williams; "P169-172H"
CANADA (MANITOBA) -
Wygand; Balloons
CANADA (Roberval) -
Tsuruda; GBR

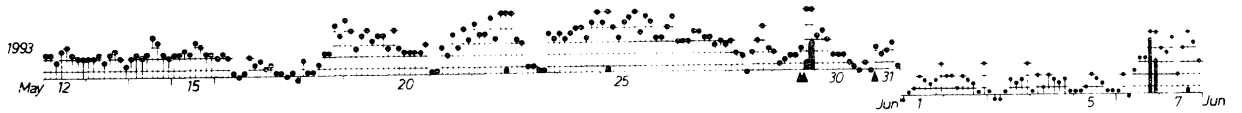


SOLAR AND GEOMAGNETIC ACTIVITY APRIL 15 - JUNE 7



ROTATION #1992

KP																											
2800 MHZ FLUX OTTAWA	167	172	169	155	158	154	160	161	161	161	161	160	174	182	190	194	178	178	163	173	166	171	175	184	178	171	175
SS NO. BOULDER	202	202	231	185	156	122	124	108	98	98	100	131	174	239	228	200	232	173	138	179	150	165	279	271	213	184	215



ROTATION #1993

KP																											
2800 MHZ FLUX OTTAWA	180	182	178	177	172	184	169	159	153	152	154	152	159	152	145	146	145	146	154	170	184	205	220	234	224	229	231
SS NO. BOULDER	228	260	287	297	238	216	185	195	145	191	173	161	169	144	168	155	150	141	129	150	196	185	188	261	266	309	300