International Council of Scientific Unions

SPECIAL COMMITTEE
ON
SOLAR-TERRESTRIAL PHYSICS

78 - 7

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IMS NEWSLETTER

XXIst COSPAR, 13th ESLAB Symposium, IMS Working Conference, Middle Atmosphere Program Steering Committee, Solar Maximum Year discussions, SCOSTEP, IMS Steering Committee, ... Innsbruck was a busy place for some three weeks. There'll be much more about each of these in later Newsletters. I'm proud of the fine job done by the IMSCIE Associates in producing NL 78-6 while I was away from Boulder. The Candidi's have a new son, Matthew. Best wishes from everyone to GEOS-2.

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PROGRAM PLANS FOR JULY 1978 - SEPTEMBER 1978

SPECIAL IMS HIGH-ALTITUDE SATELLITE PERIODS - 1978

Special IMS High-Altitude Satellite Intervals for July-Sept 1978 are given here. On page 4 of IMS NL78-2 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. Similar extended periods were announced for 1976 and 1977 in IMS/SSC Reports and IMS NLs.

29 Jul 210/1700 UT to 30 Jul 211/0600 UT

SPECIAL LOW-ALTITUDE SATELLITE CONJUNCTIONS

See Program Details NL78-4 for special requests for coordinated satellite data acquisition intervals and copy of a typical recent satellite conjunction forecast telex sent to spacecraft experimenters and staff. The IMSCIE Office will continue to send weekly telexes to those requesting this prompt IMS SSC forecast even though GEOS-1 is no longer included (see program notes below). We assume that conjunctions of low altitude satellites and ground arrays with the ISEE-1&2 satellites will be of interest for possible joint data acquisition. Once GEOS-2 is in geostationary orbit (fixed or drifting), we expect that such times will also be of interest for conjunctions with low-altitude satellites and/or the ISEE pair.

SATELLITE LAUNCHES:

Jul 14; K. Knott; "GEOS-2"; ETR; SATELLITE - update below
Aug 12; T.T. von Rosenvinge; "ISEE-C"; ETR; SATELLITE - details below
Aug 1 to Sep 30; T. Obayashi; "EXOS-B"; Uchinoura; SATELLITE - details below

GROUND-BASED, BALLOON AND ROCKET CAMPAIGNS:

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

------ to Sep 30; Ejiri, Kimura, Oya, & Nakamura; "AUSTRAL WINTER CAMPAIGN"; Syowa; ROCKETS(4)- NL 78-3
Jul 1 to Jul 31; G. Thomas; "31.xxxUE"; White Sands; ROCKET - Nike-Orion for plasma physics
Jul 7 to Aug 8; I.B. Iversen, M.M. Madson; "POLAR 78"; Ny-Alesund; BALLOONS (3) - see NL 78-6, pg 4
Jul 27 to Aug 15; L. Bjorn; "D-Layer Campaign"; Kiruna/ESRANGE; ROCKETS (7) - see NL 78-6, pg 4
Aug 1 to Aug 31; W.R. Sheldon; "23.009UE & 23.010UE"; White Sands; ROCKET (2) - Plasma Physics
Aug 3 to Aug 17; R.H. Holzworth; "E-Field Summer 78"; Canada; BALLOONS (10) - see NL 78-6, pg 3
Sep 1 to Sep 30; E.C. Zipf; 33.005UA; White Sands; ROCKET - Taurus/Orion for EUV dayglow, ion chem
Sep 1 to Sep 30; E. Nier; 18.1024UA; White Sands; ROCKET - Nike/Tomahawk for neutral comp & temp
Sep 9 to Oct 9; G. Haerendel; "PORCUPINE-III&IV"; Kiruna/ESRANGE; ROCKETS (2) - see below
Sep 15 ---------; J.P. Heppner, "CAMEO"; ETR; ROCKET - see details below
Sep 18 to Oct 3; W. Sharp; 13.135UE; White Sands; ROCKET -

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

Aug 1-2, Sep 6; 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 Oct 15; Siebert; "GEOMAGNETIC PULSATIONS"; N. Scandinavia; SURFACE - See actualities
------ to Nov 30; K. Wilhelm; "GEOMAGNETIC PULSATION CAMPAIGN"; 20 W to 40 E; SURFACE - NL 78-5 pg 3&11
Jun 19 to Jul 16; D.L. Carpenter; "Plasmapause Campaign"; Antarctic; SURFACE - See "IPPDYP" below

REGIONAL IMS SAT/GBR PROGRAM DETAILS, JULY - SEPTEMBER

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

SATELLITES

K. Knott, GEOS project scientist, relays following information from Cape Canaveral:

GEOS-1 --- On June 23 GEOS-1 was switched off in order to allow the ESA Odenwald station to make the necessary preparations for the tracking of GEOS-2. The satellite is now in a state in which it could be reactivated at any time. Tracking of both GEOS-1 and GEOS-2 is impossible from Odenwald, but GEOS-1 could be tracked by other non-ESA stations.

GEOS-2 --- The satellite has successfully undergone all testing phases prior to integration to the Delta launcher. It will be mated to the 3rd stage, transported to the gantry, and integrated to 1st and 2nd stages. A final operational test will take place on July 5. Launch is scheduled for July 14, at 0643 LT. Launch window is 1-hour. 37 hours after take-off the apogee boost motor will be fired, with injection into geosynchronous orbit nominally between 20 and 30 degrees W. Depending on the amount of maneuvers necessary to stabilize the satellite, erect spin axis and deploy booms, from 10 to 20 days after injection the payload will be switched on and tested. Duration of switch-on and testing sequence is foreseen to be 1 week. Two weeks after this, distribution of the daily summaries is scheduled to start. The longitudinal shift plan was rediscussed at a meeting between GEOS and ground based experimenters present at Innsbruck. It will consist of a fast drift (10 degrees/day) from injection position to 6 degrees E, over Iceland, where the drift will be slowed down to 1 degree/day. Satellite will then slowly drift past the geomagnetic equator (15 degrees E) to 37 degrees E, where it will be stationed, in time for coordination with the Porcupine campaign, scheduled for early Sept 1978.

GROUND BASED, BALLOON AND ROCKET CAMPAIGNS

ANTARCTICA

IPPDYP --- Under this acronym the International Plasmapause Plasmasphere Dynamics Program, cooperative VLF observing programs have been undertaken during each of the IMS years, with special emphasis on recordings during the June-July austral winter period (see IMS newsletter 77-1). Stations at which coordinated observations are being made include Halley Bay, General Sanae, Palmer, Siple (all in the Antarctic), and Kerguelen Island. At a number of the stations there are special VLF direction finding systems, which are intended to locate the ionospheric exit points of magnetospherically propagating VLF signals. The measurements will be used in coordinated studies of

plasmapause position and of plasma structure and motions, in studies of magnetospheric propagation, and in correlation studies involving wave activity and particle precipitation. Participating workers are looking forward to discussion of recent developments at the URSI Helsinki assembly in August, 1978.

As part of the IPPDYP, Stanford University (Helliwell, Katsufrakis, Carpenter) reports having established its tracker/direction finder system at Palmer Station, Antarctica, (L 2.3), near the meridian of Siple Station. The equipment has been tested on fixed frequency signals from known sources and is now operating on an ad hoc basis during periods of well-defined whistler activity. The first results, acquired in March, 1978, show that the tracker is capable of identifying the relatively closely-spaced fine structure elements of whistlers propagating near L=2.5. From previous application of the tracker/DF system at Roberval and from the Palmer data, it is planned to investigate 'scintillation effects' associated with magnetospheric signals. In a number of cases, magnetospheric signal activity has been confined to a limited region, but within this region, rapid changes in the fine structure of the signals have been noted. A combination of direction-finding and signal strength studies should lead to new understanding of this feature of magnetospheric wave propagation.

Observational plans call for four types of cooperative recording: (1) Special 4-week plasmapause campaign, 19 June - 16 July 1978. Within this period synoptic recording for 1-min every 5-min, beginning at multiples of 5-min past the hour. (2) Special continuous recordings 19-25 June and 3-9 July from 00 to 12 UT each day. Intended for detailed studies of substorm plasma drift effects (these supersede the synoptic 1-every-5-min recordings). (3) Ad hoc continuous or 1-in-5-min operations April through September when activity is well-defined and of interest, as determined by the station operator or appropriate other party. (4) Special 1-in-5-min synoptic recordings for 24 hours beginning at 1400 UT on the eleven Wednesdays May 3, 10, 17, 24, 31, June 7, 14, July 19,26, August 2 and 9.

EASTERN TEST RANGE, ALASKA & SCANDINAVIA

CAMEO --- Chemically Active Material Ejected in Orbit. Dr J.P. Heppner, NASA/GSFC, gave IMSCIE these preliminary details of the CAMEO experiment by telephone. The chemical release experiment is to be carried on the Delta second stage vehicle which will launch the Nimbus G satellite on 15 Sept 1978.

Two experiments will be carried out. The first involves a sequence of four barium releases as the Delta vehicle approaches the north coast of Alaska. The first release will be at approximately latitude 73N and the last release will be at approximately latitude 67N over Central Alaska. The four releases will be at 40-second time intervals starting at about 0130 LT at an altitude of 965 Km.

This sequence of four releases is expected to produce a thin sheet of barium ions of about 1000Km length along the orbit path.

The second experiment involves the release of lithium over Northern Scandinavia. This release will be initiated north of the foot of the GEOS-2 field line, and the release duration of approximately 50 seconds is to occur such that the end of release is near the foot of the GEOS-2 field line.

One purpose of this experiment is to see whether or not the IMS spectrometer on board GEOS-2 will detect the lithium ions produced by the release.

KIRUNA/ESRANGE

PORCUPINE-III&IV --- G. Haerendel sends word about the coming launch of the two remaining PORCUPINEs. The experiments and scientists for the payloads are the same as those detailed in IMS NL 77-3, pg 3, except for the following additions: electric wave HF-receiver for range from 1 to 8 MHz, A. Pedersen; e- spectrometer looking "down the field lines", K. Wilhelm; retarding potential analyzer also facing "downwards", K. Spenner. The payloads will go through different ACS-maneuvers resulting this time in a magnetic field-aligned position of the symmetric axis. Launch windows are 9-13 September 1978, from 2029 to 2400 UT and 24 Sept to 9 October from 1750 to 1850 UT. Conditions for launch are as for previous flights, at least two observation stations (including the NASA Learjet from Crete) must be clear and auroral activity has to take place over ESRANGE. In addition to the NASA aircraft, a diagram for the coming launches shows a YAK-40 aircraft to observe in the Arkhangel'sk region.

ACTUALITIES

SATELLITE

13th ESLAB Symposium --- Many interesting results from the IMS satellites GEOS-1 and ISEE-1&2 were presented at the ESLAB Symposium in Innsbruck, Austria. We will not attempt to summarize all 44 papers listed in the program, nor even give their titles here. We look forward to the publication of the special issue of Space Science Reviews which will contain the reviewed and edited papers. However, we will remind IMS NL readers of D.E. Page's introductory comments in which he reviewed the history of GEOS-1 and raised the question whether or not any of the papers to follow would confirm the hope that some successful science had been recovered from a satellite launch that had to be classed a failure. He also wondered whether or not the ISEE scientists would succeed in presenting a convincing case from their early results that the Mother/Daughter, spacecraft pair concept was really justified. Surely, by the close of the Symposium there was a firm consensus that his questions could be answered "YES" and that contagious enthusiasm for cooperative work with data from these satellites assures that more results will follow. One ISEE paper is briefly mentioned here and a figure is shown on page 5 of this NL.

ISEE-1&2 --- Forrest Mozer presented a group paper "Electric Field Measurements in the Solar Wind, Bow Shock, Magnetosheath, magnetopause and magnetosphere" (Mozer, Torbert, Fahleson, Falthammar, Gonfalone, Pedersen and Russell). He shared with us a preprint titled "Direct Observation of a Continuous Tangential Electric Field Component during Magnetopause Crossings" which included the data shown in the figure on page 5. With his permission, we reproduce here the abstract and brief description of the data shown.

"The first direct, in situ, quasi-static, electric field measurements in and near the magnetopause, magnetosheath, bow shock and solar wind have been made on the ISEE-1 satellite. They show the existence of a tangential electric field component at the magnetopause and, hence, that magnetic field reconnection occurs near the nose. In combination with the ISEE-1 magnetic field data, these measurements also suggest that a magnetopause expansion over the spacecraft occurred locally as a breathing mode (an expansion or contraction of the magnetosphere not distorting the magnetopause), that the magnetopause velocity and thickness were about 10 km/sec and 100 km, respectively, and that the local I*E power dissipation was about 65 watts/sq km. When integrated over the front of the magnetopause, this local level of power dissipation produces 10 exp 12 watts of particle heating."

The figure on page 5 shows data derived from ISEE-1 experiments for the 5-min from 0109 to 0114 UT on 20 Nov (day 324) 1977. The satellite was progressing inward across the bow shock (earlier) and the magnetopause when, for about 45 min, it apparently experienced several magnetopause passages before finally entering the magnetosphere to stay (for this orbit). From the Z' magnetic

(Continued on pg 4)

(Continued from pg 3)

component, ISEE was inside the magnetosphere for the middle 3-min shown here in this passage. The tangential E-field (Y' trace) was essentially non-zero and continuous across the boundary. According to Mozer, et. al., this requires that magnetic field reconnection be in-progress at the magnetopause boundary.

CLOSE ENCOUNTERS OF THE SOLAR KIND

T.A. Croft, SRI, has given out many copies of a brief report "High-Latitude Solar Wind Observations During Superior Conjunction of a Group of Spacecraft", here reproduced in part. As shown in the figures below, from 10 August to 20 September 1979, some 4 spacecraft will pass above the solar north pole and on the far side of the Sun from Earth. The 4 are: Voyager-1&2, Pioneer Venus orbiter, and Pioneer 11. Also, the spacecraft Helios-1&2 may be in position to make a useful contribution. Although there are now obstacles that might prevent tracking these satellites during this period, such an opportunity to study high-latitude solar wind distributions and interactions between fast and slow streams will be unmatched until the mid-1980's when the "Solar Polar" mission is operating. Further opportunities for international cooperation during this time are suggested by the fact that the USSR Venera spacecraft have dual-frequency transmitters that overlap the US frequencies to create a uniformly spaced logarithmic set of signals. Because of the critical importance of Pioneer Venus, which will then be past the end of its official mission, a coordinated response from the solar scientific community in the immediate future is vital. Since this interval falls inside the period designated STIP-VII (formerly special period STIP-VI) which covers all of August and September 1979, there is additional incentive to take advantage of this satellite processional. All those interested in participating in a concentrated solar and solar wind study during STIP-VII are invited to correspond with Thomas A. Croft, SRI International, Bldg 44, Menlo Park, California 94025, USA. Those having possible interest and observational capabilities are especially encouraged to write for news about this opportunity and the progress of STIP-VII.

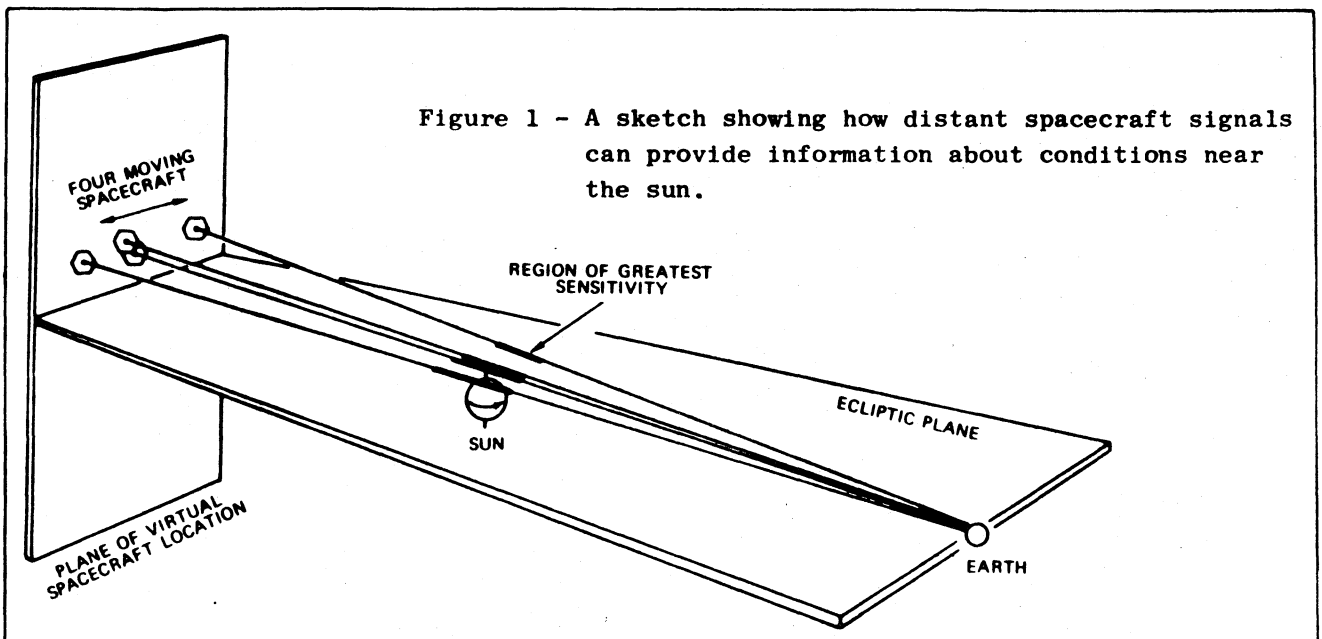


Figure 1 - A sketch showing how distant spacecraft signals can provide information about conditions near the sun.

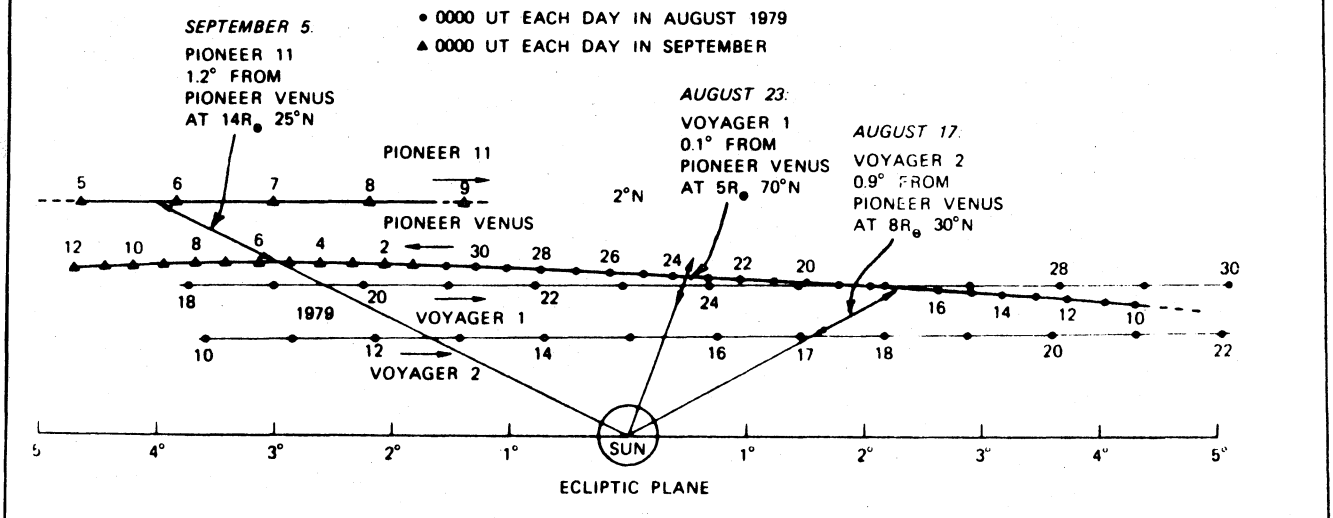
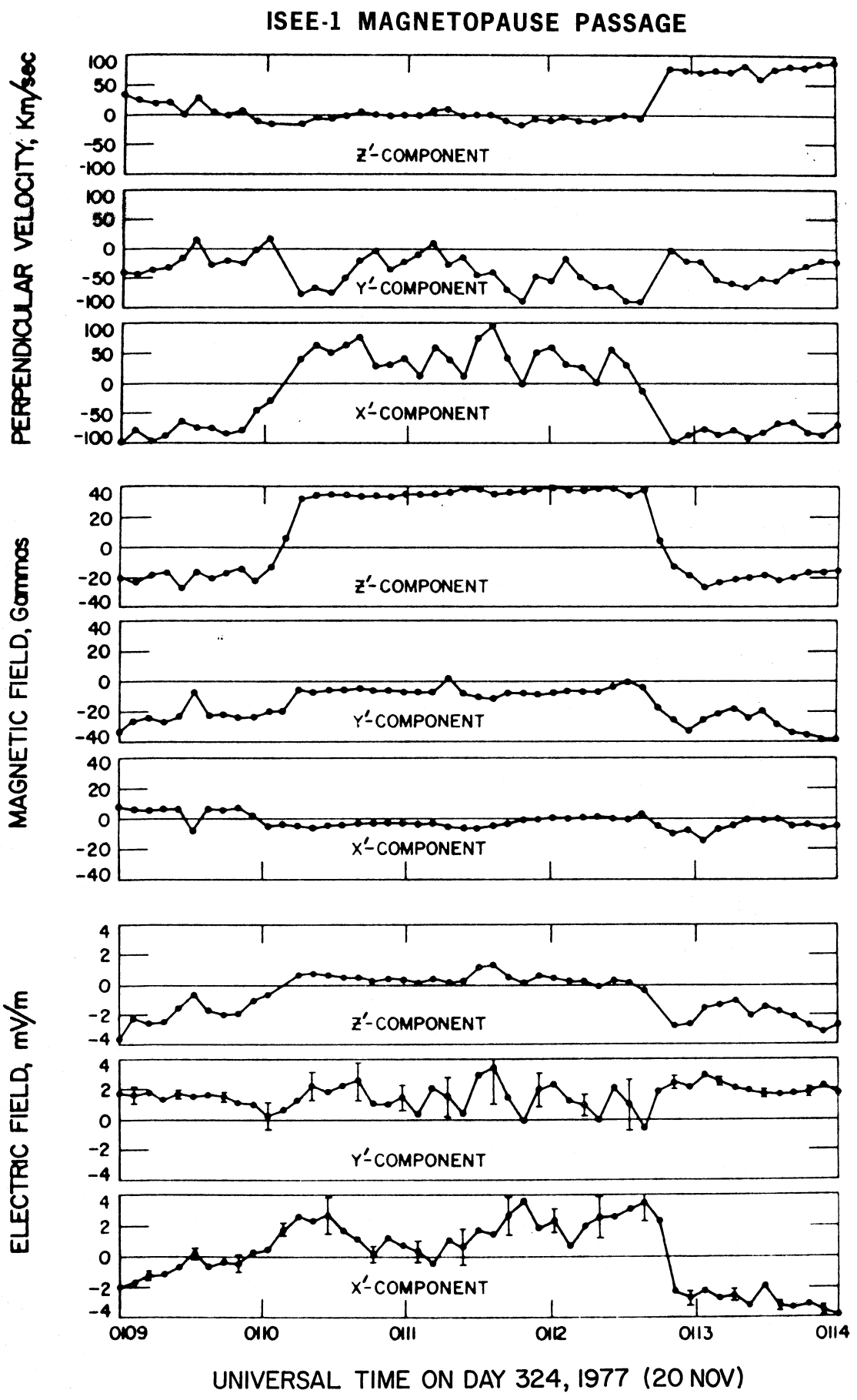
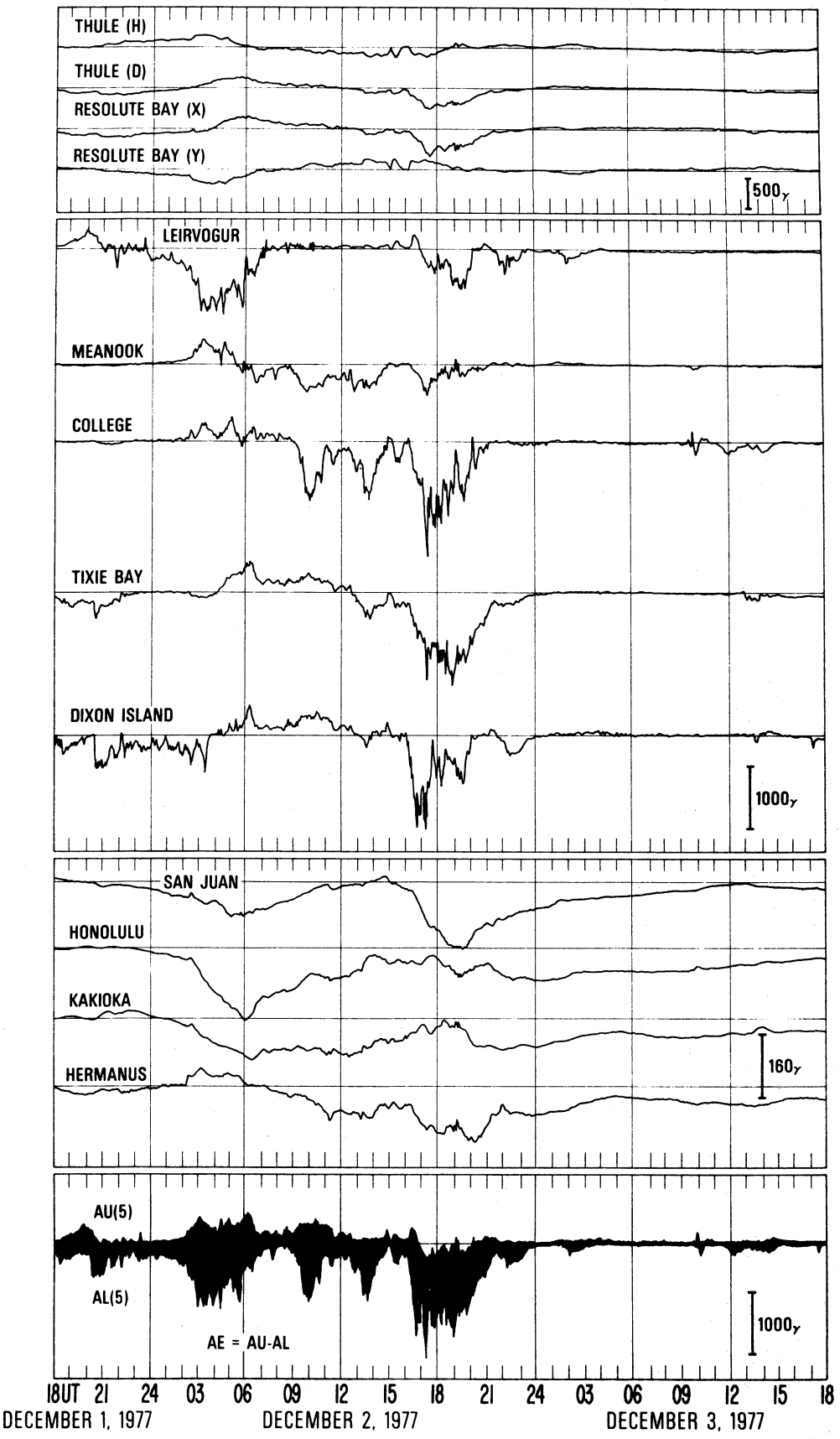


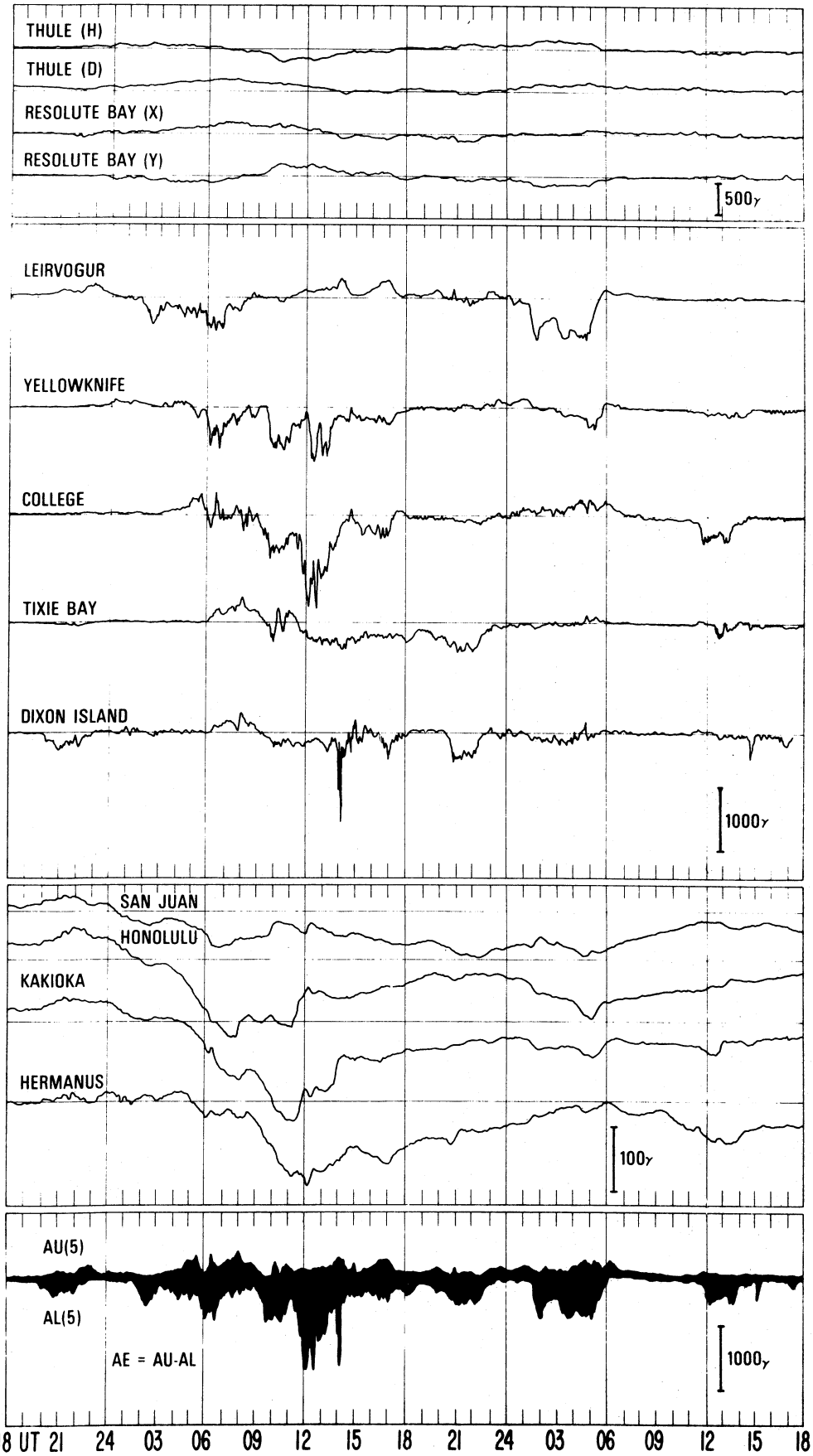
Figure 3 - The three close encounters among spacecraft along heliocentric radials


ISEE-1 MAGNETOPAUSE PASSAGE
PERPENDICULAR VELOCITY, Km/sec
100
50
0
-50
-100
Z'-COMPONENT
Y'-COMPONENT
X'-COMPONENT
MAGNETIC FIELD, Gammas
40
20
0
-20
-40
ELECTRIC FIELD, mV/m
4
2
0
-2
-4
0109
0110
0111
0112
0113
0114
UNIVERSAL TIME ON DAY 324, 1977 (20 NOV)

COMMON-SCALE MAGNETOGRAMS DECEMBER 1-3, 1977



COMMON-SCALE MAGNETOGRAMS DECEMBER 10-12, 1977



MEETINGS AND CONFERENCES

IMS Symposium/IUGG General Assembly. The first circular concerning the IUGG General Assembly in Australia in November/December 1979 has been circulated. This contains introductory information and a pre-registration card covering, in addition to other things, the IMS Symposium to be held at La Trobe University, Melbourne, from November 27 to December 1, 1979. This will be the first major Symposium on the results of the IMS.

Persons interested in attending the Symposium who have not received the first circular should write for it to- Dr.B.P.Lambert, Executive Director, Organising Commitee, IUGG 1979, Australian Academy of Science, P.O. Box 783, Canberra City, A.C.T. 2601, Australia.

Conference on Quantitative Modeling of Magnetospheric Processes September 19-22, 1978. Information on a conference on magnetospheric modeling has been prepared by the conference convener, W.P.Olson and conveyed to the IMSCIE office by the U.S. IMS Coordinator, R.H. Manka. As described below, this conference will concentrate on the quantitative modeling techniques that are available to study the magnetosphere. This conference should prove to be a very useful complement to the present IMS workshop's efforts to analyze magnetospheric data. The A.G.U. will be the primary sponsor of this Chapman Conference on the Quantitative Modeling of Magnetospheric Processes to be held at Sea Lodge at La Jolla Shores, California, from September 19 to 22, 1978. Primary objective of this conference will be to see which models are capable of providing the best quan titative description of magnetospheric features and processes.

Most present magnetospheric models include features representing magnetic and electric fields and the low- and high-energy charged particle populations. These quantitative modeling efforts have at least two important goals: the quantitative comparison between theory and observational data sets and quantitative description of cause and effect relationships between various magnetospheric processes.The latter is the necessary step in our understanding of the magnetosphere that must occur before the prediction of magnetospheric behaviour can be made.

The description of models that can be used quantitatively to understand and describe the magnetospheric processes will be the theme of the meeting. Sessions will be organized on low- and high-energy particles, electric and magnetic fields, and electric currents. In each of these modeling areas an attempt will be made to answer questions concerning:

-the availability and description of data sets for the testing and verification of models,

-the application of quantitative models to the development and testing of theories of magnetospheric processes, and

-the use of models of magnetospheric features and processes in the prediction of space environmental influences on hardware systems.

The conference will be divided into seven half-day sessions. Each session will contain contributed and invited papers and time for discussion. A meeting proceedings is planned for publication, including descriptions of available quantitative models,new data sets of interest, and assessments of present quantitative model useage and future needs.

The deadline for abstracts was 26 June 1978. It should be published by April 1979.

Those interested in attending the conference should send their name, title, address, and phone number to W.P.Olson, Chairman, Program Committee, McDonnell Douglas Astronautics Company 13/3, 5301 Bolsa Avenue, Huntington Beach, Calif. 92647 (phone: 714-896-4368).

International Workshop on Selected Topics of Magnetospheric Physics --- Tokyo, 13-16 March 1979. T. Obayashi, Chairman, Organising Committee, IWSTMP has sent the first announcement to the IMSCIE office.

The International Magnetospheric Study has entered the third year. This organized campaign to study the physics of the outer envelopes of the planet has already produced a wealth of new information and is proving to be a most successful international project. In order to clarify what we have learnt about the magnetosphere and to discuss what has to be done in future, the Japanese IMS Committee is organising an International Workshop on Selected Topics of Magnetospheric Physics, at the International House of Japan, Tokyo, from 13 through 16 March, 1979. This Workshop will be cosponsored by SCOSTEP, IAGA, and National Society of Terrestrial Magnetism and Electricity (Japan), and the Science Council of Japan (to be confirmed).

The major topics to be covered in the present Workshop are:

1) Integrated Approach to high-latitude Phenomena
2) Wave Particle Interactions in the Plasmasphere
3) Recent Developments in Magnetospheric Studies

The Workshop program, in the four day period, includes presentations by invited review speakers on IMS activities at various disciplines (experimental and theoretical), panel discussions on relevant IMS Projects and some topical papers.

There will be no formal publication of Workshop Proceedings, but it is hoped that a summary will be reported in Solar Terrestrial Environmental Research in Japan (STER) and individual papers published in relevant scientific journals.

The Japanese IMS Committee looks forward to the participation of the international clan of magnetospheric physicists in the Workshop. Additional information is obtainable from Dr. A Nishida, Institute of Space and Aeronautical Science, University of Tokyo, Komaba, Tokyo 153, Japan. (Earlier announcement in IMS NL 78-4, pg 8.)

2nd Workshop on IMS Observations in N. Europe --- 24-27 October 1978. Details on this meeting were given in IMS NL 78-4 (pg 6) from the second circular. At Innsbruck we learned that a third study interval has been added covering the dates 15-16 February 1977. Data sets for this time are available from the STARE auroral radars (Greenwald), the Finnish All-sky camera network (Pellinen), and the Univ of Munster magnetometer network (Untiedt, et. al.). The other two periods for special study are 1-15 December 1977 (Special IMS Working Conference interval) and 27 February to 13 March 1978 (Auroral Breakup Campaign). The meeting will be held at the REVITA HOTEL in Bad Lauterberg, about 40 km east of Goettingen, FDR.

As an example of the type of cooperative paper that can emerge from such workshops, we call attention to "Joint Magnetometer Array and Radar Backscatter Observations of Auroral Currents in Northern Scandinavia" by Baumjohann, Greenwald and Kuppers. This study was published in J. Geophys, 44, 373-383, 1978. It is concerned with a weak, isolated substorm on 7 October 1976 (1600-2200 UT) and resulted from interest stimulated by the IMS-workshop at Hankasalmi. This is the first research paper using data from the Munster array and, perhaps, from the STARE.

Computer Data Analysis Workshop --- During the winter 78-79, a computer-intensive data analysis workshop will be held at the IMS SSC (NASA GSFC). A well-defined group of scientists will submit their data to the center months before the workshop and then convene there to use the common data base and extensive SSC interactive graphic and analysis tools to jointly study their data. This will be ther first trial of the workshop concept presented at Innsbruck by J. Vette.

CURRENT SOLAR ACTIVITY

The last two pages of these NLs continue to contain "quick look" preliminary summaries of recent solar and geomagnetic activity as well as the 6-month GBR Program calendar giving recent actualities and planned programs.

Solar Activity 28 April - 5 May --- K. Marubashi, Forecast Center of RWC/RRL Japan has summarized the solar terrestrial activities of 28 April-5 May in the diagram below. The data used in the chart are those which are routinely interchanged among the World Warning Agency and the Regional Warning Centers under the IUWDS program.

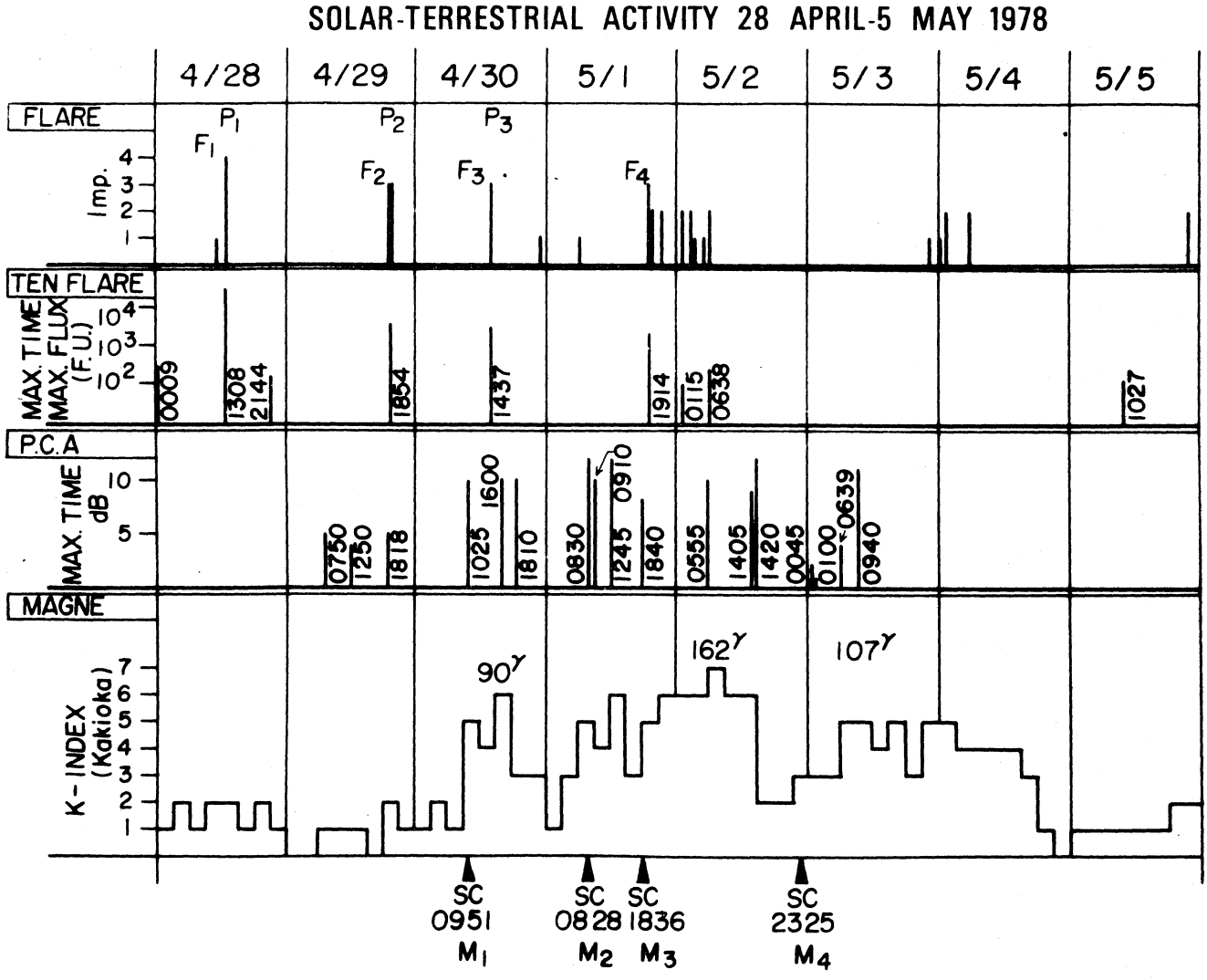
The first row shows the daily time of maximum and H alpha importance for all reported flares of importance greater than or equal to 1. Sunspot region #1092 produced all of these flares except three class-1 flares on 4/28, 4/30 and 5/4. It was reported that flares F1, F2, F3 were proton flares. The second row shows the time of maximum and peak flux value attained by radio bursts at 10 cm. The third row shows the time of maximum and peak absorption value measured by riometers at several ground stations in the polar region. At the bottom, the variation in K index from Kakioka (Japan) is shown together with SC marks and the maximum H ranges for M1, M3 and M4.

Flares F1-F4 were taken to be the causes of the four SC storms M1-M4.

Preliminary Listing of Solar Flares

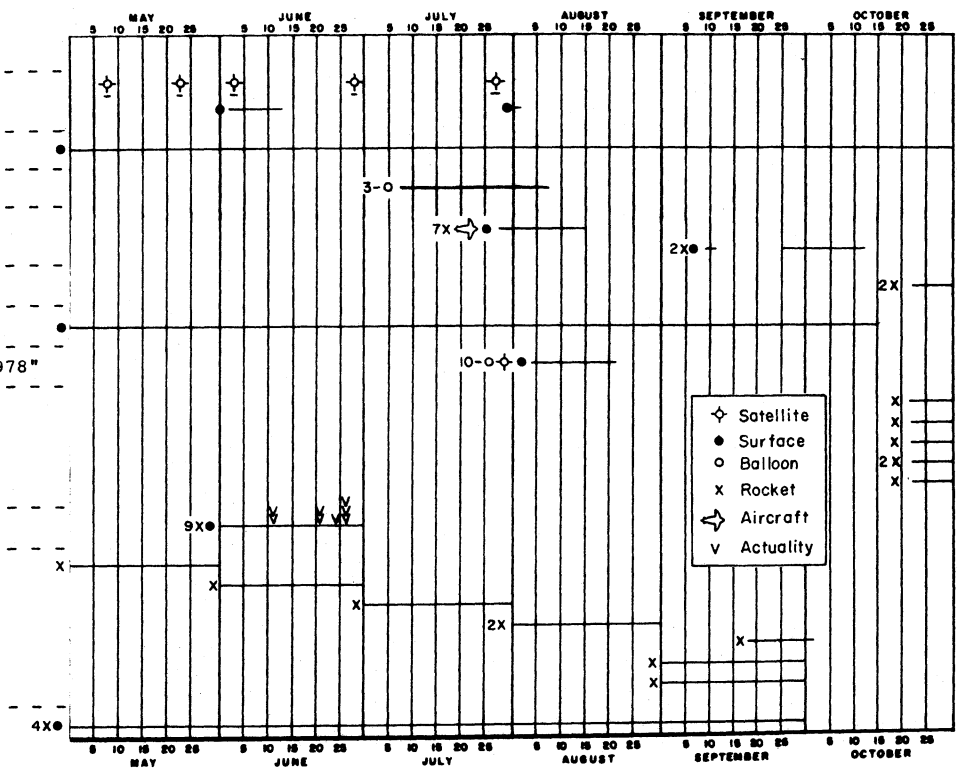
Solar Flare Data --- The table below contains a listing of X-ray flares, class M1 and higher, for the period 10 May - 23 June 1978 extracted from "Preliminary Report and Forecast of Solar Geophysical Data", published by the SESC in Boulder (see IMS NL 78-5).

Date	Begin	Max	End	Location		Imp	Reg	Cl
May17	1505	1507	1513	S26	W85	-N	1117	M1
19	B2315	2315	2345	S20	W67	2B	1110	M1
23	B0106	0107	A0114	N25	E85	1B	1131	M2
24	1907	1915	2055	N18	E44	1B	1129	M1
26	1734	1752	1827	N18	E60	1B	1134	M4
28	B1044	1047	1101	N18	W05	-N	1129	M1
	1314	1315	1353	N20	W18	-B	1133	M1
	1457	1502	1507	N17	W10	1B	1129	X1
29	1312	1458	1632	N16	W10	1B	1129	X1
	1314	1315	1353	N20	W18	-B	1129	M1
30	0716	0721	0813	N17	W26	2B	1129	M6
	1524	1528	1607	N17	W35	-B	1129	M1
	1926	1926	2000	N17	W30	1B	1129	M4
31	B1044	1125	A1338	N16	W48	3B	1129	M6
Jun 1	B2113	2113	A2115	N23	W45	1N	1131	M1
5	0723	0744	0801	N21	W63	1N	1134	M1
20	1919	1925	2000	S20	E80	1N	1172	M1
22	B0237	0237	A0250	S19	E63	-B	1172	M1
	1639	1709	2346	N19	E18	3B	1164	M2
	1937	1953	2108	S18	E53	1B	1172	M1
23	B0739	0758	A0820	N23	E33	1N	1171	M1



IMS CALENDAR OF GBR CAMPAIGNS MAY - OCTOBER 78
(As of 26 June 1978)

WORLD-WIDE- -
Special SSC-selected satellite periods
IISN (Bauer, et al)
20 W TO 40 E- -
Wilhelm; "Geomagnetic Pulsation Campaign"
NY-ALESUND- -
Iversen; "POLAR 78"
KIRUNA (ESRANGE)- -
Bjorn; "D-Layer"
Haerendel; "Porcupine"
ANDOYA (ANDENES)- -
Woolliscroft; "UK Andoya Campaign"
N. SCANDINAVIA- -
Siebert; "Geomagnetic Pulsations"
CANADA- -
Holzworth; "Electric Field Campaign - Summer 1978"
POKER FLAT- -
Ulwick; "EXCEDE II Spectral"
Ulwick; "FWIF"
Ulwick; "TMA"
Ulwick; "SWIR"
Ulwick; "IR"
WALLOPS ISLAND- -
Smith, Kelley, Morse, USSR; "JASPIC"
WHITE SANDS -
Zipf; "31.004UE"
Christensen; "18.1023UE"
Thomas; "31.XXXUE"
Sheldon; "23.009UE & 23.010UE"
Sharp; "13.135UE MAP-2"
Zipf; "Taurus-Orion 33.005UA"
Nier; "18.1024UA"
SYOWA -
"Syowa aus. Winter Rocket Program"

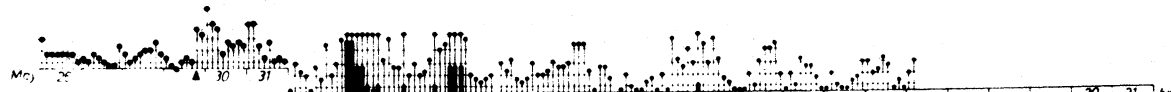


SOLAR AND GEOMAGNETIC ACTIVITY APRIL 29 - JUNE 21 (PRELIMINARY)

KP																												
2800 MHZ	183	210*	179	180	179	175	173	170	165	141	133	127	131	135	137	141	143	149	141	132	131	130	130	135	141	145	144	
FLUX OTTAWA	62	98	109	121	77	106	90	-	-	55	81	77	85	96	116	154	146	131	94	102	105	89	120	89	120	101	164	
SS NO. BOULDER																												

ROTATION #1979

*Flare enhancement



KP																												
2800 MHZ	149	148	145	145	146	148	145	145	127	115	114	107	107	106	103	103	110	116	117	125	120	137	144	151	160	169	184	
FLUX OTTAWA	163	236	173	183	155	166	108	46	77	42	110	45	64	71	37	48	67	77	113	120	85	126	156	167	148	139	215	
SS NO. BOULDER																												

ROTATION #1980