International Council of Scientific Unions

SCIENTIFIC COMMITTEE
ON
SOLAR-TERRESTRIAL PHYSICS

79-10

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IMS NEWSLETTER

CHUCK SHANKS, JEROME SMITH, FRANCES ROBERTS, CHARLIE SAMORA, PEG RUMAINE, CANDICE SAMORA, BONNIE HAUSMAN, MARK HENNING, JEROME KISSLINGER, PETER WILCOXEN, JOY IKELMAN, RON BUHMANN, HERB KROEHL, PAUL GRIM, RON SMITH, BRIAN FRASER, LEO MCNAMARA, CLIF ELLYETT, YOHSUKE KAMIDE, TOHRU ARAKI, ART RICHMOND, TOM GAUTIER, NEWBERN SMITH, JIM LANDER, and ALAN SHAPLEY; RAY LAWSON, HUNTLEY INGALLS, TOM THEOTOKATOS, and MARY; JIM COLT, HAL, and TOD; and, finally, ANDRE KONRADI, TOYOHISA KAMEI, MAURIZIO CANDIDI, PETER and MEREDITH DAVIES; the XDS-940 COMPUTER and OPERATORS. These are the names of the people (mostly) who really made possible each month's IMS Newsletter in the hands of the readers. They are not listed here because of having served as national or

(Continued inside, pg. 2)

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

(Continued from Front Page)

regional contacts, project scientists, institutional representatives, etc. The latter certainly made considerable input to these newsletters and they have often been named and given credit here. However, the above are listed simply because of their contributions to the sometimes imaginative but mostly routine "dog-work" of producing these newsletters. They are the ones who used scotch tape and drawing pens to convert a miscellanea of odd-sized figures and articles into a not-so-bad composition. They are the NOAA Boulder photolab staff who so often made prints while we waited to rush them to the printers. They are the private printers who learned with us how to do a job that hadn't been done before in that way and how to do it quickly (24-hr turnaround) and economically (about $200-300/newsletter). They are the NGSDC/WDC-A visiting scientists who took time from their research to help-out when it came time to stuff the newsletters into envelopes and rush them to the nearest postal sorting facility so that they would get off without delay. They are the Director and Deputy Director, NGSDC, who sometimes stopped by to help with mail stuffing when we were short-handed or particularly rushed and who were careful to keep personal contact with those working on the IMS Newsletter. They are the NGSDC/Data Studies Division staff, professional and otherwise, who over 4 years regularly put aside other tasks to cope with updating directories, making labels (not so easy when we first started), getting them on envelopes, and with getting the newsletters into the envelopes. Finally, they are the IMSCIE Associates who were such a fine group with whom to work over these years and who never once objected about doing the most menial tasks, running errands to photolab or printer or, again, stuffing envelopes. The last-named XDS-940 is the remote, old computer which has been used since March 1976 for the creation and then composition of these articles. Without the use of this device (which still stores our directories and retained program plans and actualities) and the careful, attentive work of those who kept it running and modified many schedules just to accomodate newsletter preparation at night, on weekends and holidays, we could not have accomplished the task represented by the body of these newsletters. Most of those named above have never had their names in these IMS Newsletters and it seemed highly appropriate that their unique and vital contributions be acknowledged in this nearly last issue of the International Magnetospheric Study Newsletter. In addition, the job could not have been done but for the patient understanding of my wife and daughters who, over these 4 years, tolerated my prolonged absences and sometimes came to the IMSCIE Office to help stuff newsletters.

JHA 79/11/23

PROGRAM PLANS FOR NOVEMBER-DECEMBER 1979 & ALL 1980

SPECIAL IMS HIGH-ALTITUDE SATELLITE PERIODS - 1979

Special IMS High-Altitude Satellite Intervals for NOV - DEC 1979 are given below. In IMS NL 79-9, pg. 4, is given a detailed listing of all the SSC-selected Special Satellite intervals for July - December 1979 and the satellite configurations that were the basis for selection of these periods. As is always done for these intervals, start and end times were extended from the model calculations to allow for boundary fluctuations during disturbances. Details for the first half of 1979 were published in NL 79-3, pg 7.

#13	13 Nov	317/2300 UT	to	15 Nov	319/0500 UT
#14	13 Dec	347/0100 UT	to	14 Dec	348/0100 UT
#15	24 Dec	358/0800 UT	to	25 Dec	359/1700 UT

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. NOTE ADDED IN-PRESS: The IMS Satellite Situation Center is scheduled to terminate operations with the end of December 1979, at the end of the observational period of IMS. We have not received official notice of plans to terminate the distribution of these telexes; however, it is assumed this will happen. Due to reduction of IMSCIE Office staff back to 1 person (with much scheduled travel, administrative duties, etc.) the distribution of these telexes had already become sporadic. There may not be any option for these messages other than termination.

Recall that these messages were instituted in answer to a need to coordinate data acquisition between the mis-launched GEOS-1 and other satellite and ground-based programs. The service seems to have become even more useful since then for it acquired additional importance with the launch of the EXOS and ISEE satellites. However, we remind IMS participants that although the SSC is not scheduled to continue, this does not represent a reduction in NASA support for the IMS. Rather, emphasis has now shifted to analysis of IMS data as realized in the several Coordinated Data Analysis Workshops (CDAWs) which have already been held or which are scheduled (see pg. * under MEETINGS & WORKSHOPS).

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----------

Nov 1 to Jan 31; D. L. Matthews; " 18.203/205UE "; Antarctica; ROCKETS (3) - Details in NL 79-10
Nov 10 to Nov 28; J. R. Winckler; " ECHO V "; Poker Flat ; ROCKET - see NL 79-9, page pg 2
Nov 11 to Nov 17; C.A. Barth; 33.008 UE; White Sands; ROCKET - see NL 79-10
Dec 11; W.E. Sharp, U. Mich.; 4.338 UE; White Sands; ROCKET - see note in NL 79-10

1980 PROGRAMS

Jan xx to ------; W.R. Sheldon; 15.189-15.192 UE; Siple, Antarctica; ROCKETS (4) - See NL 79-10
Jan xx to ------; L.G. Smith; 31.014-31.015 UE; Wallops; ROCKETS (2) - Plasma Physics
Jan 20 to Feb 04; J. A. Holtet; " Ferdinand 49 Pulsaur "; Andoya; ROCKET - see NL 79-10
Jan 20 to Feb 04; Several Scientists; Ferdinand 50 "Corobier"; Andoya, Norway; ROCKET - See NL 79-10
Jan 21 to Feb 08; L.J. Cahill & R.L. Arnoldy; 29.014 UEX; Poker Flat; ROCKET - Plasma Physics
Feb 06 to Feb 22; J.C. Ulwick; A51.9D2; Poker Flat; ROCKET - "ELIAS"
Feb 08 to Feb 22; Second window for Ferdinand 49 "Pulsaur"
Feb 16 to ------; L.C. Hale; 15.200-15.202 UE and 23.017-23.018 UE; San Marco, Kenya, Africa; ROCKETS (5)
Feb 19 to Mar 03; Second window for Ferdinand 50 "Corobier"
Mar xx to ------; E.C. Zipf; 33.006 UA; Churchill, Canada; ROCKET - Aeronomy
Mar xx to ------; R.A. Goldberg; 18.XXX GE; Poker Flat; ROCKETS (2) - Plasma Physics
Mar xx to ------; E.M. Wescott; 34.001-34.003; Poker Flat; ROCKETS (3) - Shaped Charge Barium
Mar xx to Apr xx; J.P. Heppner; 29.XXX GE & 18.XXX GE; Poker Flat; ROCKETS (2) & (4) - Plasma Physics **
Mar 10 to Mar 31; W.E. Sharp; 25.059 UE; Churchill, Canada; ROCKET
Apr 15 to May xx; J.C. Ulwick; A30.9D3; Poker Flat; ROCKET - Field-Widened Interferometer (FWIF)
May xx to Jun xx; NASA-not specified who; Andoya; ROCKETS (15) - See NL 79-10
Jul xx to Jul xx; J.P. Heppner; 18.XXX GE; Wallops; ROCKETS (2) - Plasma Physics
Jul xx to Jul xx; M. Kelly; 30.XXX & 31.XXX UE; Wallops; ROCKETS (3) & (1) - Plasma Physics
Jul xx to Aug xx; R.S. Narcisi; Paiute-Tomahawks; Poker Flat; ROCKETS (2) - Solar Proton Event
Oct 01 to Oct 26; N.C. Maynard; 31.XXX GE & 18.XXX GE/IE; Andoya, Norway; ROCKETS (4) & (1) -See NL 79-10
Oct xx to ------; R.A. Goldberg; 15.XXX GE; Andoya, Norway; ROCKETS (9) - Plasma Physics
Oct 15 to Oct 26; Several Scientists; Ferdinand 51 "Polar 6"; Andoya, Norway; ROCKET - See NL 79-10
Nov xx to ------; L.G. Smith; 33.009-33.011 UE; ESRANGE; ROCKETS (3) - Plasma Physics
Nov 05 to Jan 21; Several scientists; E1-E11; ESRANGE; ROCKETS (15) - See NL 79-10 "EBC"
Nov 05 to Jan 21; Several scientists; Ferdinands 52-57; Andoya, Norway; ROCKETS (6) - See also "EBC"
Nov 05 to Jan 21; NASA and MPAe; E10 & E7; Andoya, Norway; ROCKETS (1) & (7) - More EBC
Nov 05 to Jan 21; Several Scientists; Andoya, Norway; BALLOONS (2) - Also part of EBC
Dec xx to ------; A.B. Christensen; 18.1025 UE; Poker Flat; ROCKET - Plasma Physics
Dec xx to ------; D. Winningham; 29.009-29.010 UE; Cape Parry, Canada; ROCKETS (2) - "MAP 80"

------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, SEPTEMBER - NOVEMBER 1979

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

In this IMS NL (79-10) we have listed rocket and balloon programs now scheduled with differing degrees of firmness for launch through sometime in 1980. Please bear in mind that some of these programs may not yet be completely approved and their listing here is only conditional. Some launchings listed here are in question because they are given different windows by different groups contributing to the preparation of the rockets and still different launch windows by the several ranges involved. We will pass along clarification about each of the above programs and new details as these are received from individuals involved in the programs; especially, we will try to find names for each campaign or program and names of participants.

SATELLITES

MAGSAT --- On Tuesday morning, 30 October 1979, this satellite was launched at 1515 UT into a sun-synchronous, near polar orbit with apogee 587 km and perigee 352 km altitude. It has a 92.7 minute period and the orbit inclination is 96.8 degrees (in the dawn-dusk meridian plane). The magnetometers were turned-on Thursday evening and the boom successfully extended on Friday, 2 November, when data collection began. The orbit is slightly higher than nominal altitude which may extend the expected lifetime of about 6 months. There was a 1-day launch delay because of high winds. Details about the MAGSAT Program (e.g. satellite, payload, data processing, program objectives, etc.) are contained in a NASA Booklet MAGSAT: "Magnetic Field Satellite, Resource Observation Program" available from Project Scientist Dr. Robert A. Langel, NASA GSFC, Code 612, Greenbelt, Maryland 20771, USA.

ISEE-1&2 (Mother-Daughter) --- ISEE investigators have been active in recent months (see report on CDAW-3.0 on pg 10) and many ISEE-papers will be given in Melbourne as noted in the tentative program published in IMS NL 79-9.

R. McPherron, UCLA, reported to this office a joint endeavor with several ISEE experimenters who have selected event intervals in 1978 for detailed study. These include: 2 March; 25 March (2200 UT) - 26 March (1800 UT); 4 April; 19 April; and 23 April (0000 UT) - 24 April (1200 UT). As of this time, Bob has completed a detailed analysis of the 26 March and 23/24 April events (14 pages of time tables, etc. sent to IMSCIE Office). Among the preliminary conclusions are:

(from the April 23/24, 1978 events)

1. The strength of the tail field at 20 Re, 6 Re above the Neutral Sheet, increases prior to expansion onsets.
2. The GSM Z-component becomes negative prior to expansion onsets.
3. At the time of a substorm onset or at a later intensification, Bt begins to decrease and Bz begins to increase (dipolarization).
4. Usually the dipolarization takes 30-60 min.
5. Usually (about an hour after expansion onset) during the substorm recovery, the plasma sheet expands to 6 Re above the Neutral Sheet. Field aligned currents and earthward streaming plasma are embedded in the boundary. Often there are E-W flows as well.
6. If the satellite is in a thick plasma sheet at expansion onset, it usually leaves, reentering during the recovery phase.
7. The boundary of the plasma sheet 6 Re above the Neutral Sheet apparently has wave-like structures since there are multiple encounters both on entering and leaving the sheet.

(from the March 26, 1978 events)

(1-5) For moderate substorm (=800γ) observed in tail lobe at about 20 Re.

(6-9) For weak substorm (=200γ) observed in plasma sheet at about 20 Re.

1. The expansion phase causes a decrease in strength of the lobe field, i.e. a decrease in Bx.
2. The expansion phase causes "Dipolarization" of the lobe field, i.e. an increase in Bz.
3. These effects may be significantly delayed relative to onset and/or an intensification.
4. The recovery phase causes expansion of plasma sheet at 20 Re.
5. The boundary of the expanding plasma sheet contains plasma streaming roughly earthward along field lines and also multiple layers of field aligned currents.

(Continued on pg 4)

(Continued from pg 3)

6. A weak substorm can occur when the plasma sheet at 20 Re is very thick (T = 14 Re).
7. The expansion phase was almost undetctable in plasma and field except for slight dipolarization.
8. The recovery phase causes expansion of the plasma sheet.
9. The boundary of the expanding plasma sheet contains earthward streaming field-aligned plasma.

The following individuals have copies of the materials mentioned here (and we assume are participating in the joint study): G. Paschmann, L. Frank, G. Rostoker, C. Russell, G. Parks, D. Williams, S. Mende, G. Romick, J. Allen, and J. Walker. Other ISEE investigators may be studying these events since they were included in ISEE workshops. Anyone interested in cooperating in this study should contact one of the persons named above. We understand that G. Parks, Univ. Washington, Seattle, is organizing a CDAW (Coordinated Data Analysis Workshop) dealing with these events. It is to be in Seattle during the summer 1980 (write to George for details, this is not a formal announcement).

ISEE-3 ("Heliocentric") --- Prior to the launch of ISEE-C, requests were shared via these newsletters from IMS participants interested in obtaining real-time data from this spacecraft. Although this was not the intended mode of operation for ISEE-3, efforts were channeled through the US IMS Coordinator, Dr. R.H. Manka, to arrange for special access to the data at the satellite operations control center at Goddard Space Flight Center.

Interest grew quickly in different possibilities for obtaining the ISEE-3 data promptly for use in a variety of forecasting operations. Dr's S.J. Bame and E.J. Smith, PIs respectively for the plasma analyzer and the vector helium magnetometer, agreed to make their data available and furnished subroutines to reduce the data to useful parameters. Project Scientist T. Von Rosenvinge arranged for an ISEE data system to employ a microprocessor prepared by H. Heetderks and F.S. Mozer. E.R. Schmerling and M.J. Wiskerchen coped with the details of making the system possible, including getting necessary funds from NASA. D.J. Williams organized use of the NOAA/NESS facilities and the SELDADS to process the data and make it directly available to a variety of users along with the other IMS data accessible through that system. G. Heckman-SESC, will be responsible for derivation and dissemination of realtime indices from SELDADS. B. Tsurutani and D. Baker presented the skeletal outline of the proposal for this system at the April 1979 Solar-Terrestrial Predictions Workshop organized in Boulder by R.F. Donnelly and it was discussed in several of the working groups there. For more details, please see the article by Bruce Tsurutani, JPL, in EOS, vol. 60, no. 41, 9 October 1979, pps. 702-703.

TRIAD --- R. Vondrak, Stanford Research Institute, attended the recent Review of US NSF-sponsored IMS research where he passed to us the following information about this satellite. "Installation of TRIAD Ground Station at Chatanika --- A tracking station for reception of magnetometer data from the TRIAD satellite has been installed at the Chatanika, Alaska incoherent scatter radar site by Tom Potemra, JHU/APL. The station is automated and will monitor all passes over Alaska. This installation insures the availability of satellite measurements of field-aligned currents for correlation with Chatanika radar measurements of the auroral zone ionsophere. The TRIAD data are available from Tom Potemra and will also be archived in the SRI Chatanika Radar Data Library in Menlo Park. For information about the TRIAD satellite data, contact Dr. Thomas Potemra, Applied Physics Laboratory, Johns Hopkins University, Laurel, Maryland 20810, USA."

GEOS-1&2 --- Experimenters on GEOS-1 participated in CDAW-2, a workshop for study of the events of 29 July 1977. Many GEOS-1 & 2 papers will be presented at the IMS Symposium in Melbourne, Australia. The IMSCIE Office continues to receive the Summary Data Plots from GEOS-2.

EXOS-A ("KYOKKO") - K. Hirao continues to apprise the IMSCIE Office and IMS SSC of the elements of Kyokko and we receive daily Data Summary Plots for each quarter-year about 3 months after they are collected. Papers from this satellite will also be given in Melbourne.

ISIS --- T.R. Hartz, CRC, has written a letter about the status of this long-lived satellite program. It was circulated in the Canadian IMS Newsletter and is briefly summarized here. ISIS operations have been extended beyond the recently announced cutoff data of 31 Oct 1979, but a number of changes are involved: ISIS operations at Resolute Bay are terminated as of the end of August 1979; the Ottawa station is on a 2-shift/day, 5-day/week basis as of 1 November 1979. This is the "minimum viable program" if adequate satellite control is to be assured and users supported. Operation on this revised basis is scheduled through 31 March 1980 and prospects for continued operation beyond that date will be reviewed. This is an attempt to respond positively to requests from the international (non-Canadian) community of users of the ISIS sounder data. Hartz would appreciate communications from those interested in using ISIS data and in continuation of the program. These comments are primarily about the sounder data although other operable experiments could be activated on special request (e.g. VLF experiment or auroral scanner), particularly when these involve instruments for which means other than at GSFC exist for data acquisition.

ROCKETS

ANTARCTICA

SIPLE Campaign --- Project Scientist, Dr. David L. Matthews, IPST, Univ. of Maryland, College Park, Maryland 20742, USA, Telephone (301) 454-3966, has written to summarize the cooperative rocket, balloon and ground-based campaign scheduled for Siple, Antarctica and at its conjugate point, Roberval, Canada. These details relate to the campaigns of Matthews, Sheldon and Carpenter from pages 2 & 3 of this NL.

To search for electron precipitation triggered artificially and to further elucidate precipitation triggered by natural VLF emissions, the University of Maryland, with NSF and NASA support, will launch three NIKE-TOMAHAWK sounding rockets equipped with wide-range electron spectrometers and a full vector electric and magnetic wave package at Siple in December 1979 and January 1980. The wave experiment is provided by Cornell University (M. Kelly) and the Universities of Southampton, UK, (M. Rycroft) and Oslo, Norway (J. Holtet). Ten balloons will also be launched, each equipped with an X-ray spectrometer (T. Rosenberg, U. Md.) and an electric field (E. Bering, U. Houston) or VLF (U. of Oslo) package. A key participant will be Stanford University, which will operate its 150-kW VLF transmitter at Siple and make VLF measurements there and at the magnetic conjugate point at Roberval, Canada. Other key participants will be:

U. of Houston (Super Arcas rockets: X-rays, electrons, VLF to 80 km - W.R. Sheldon)

Bell Laboratories (riometers (with U. Md.), 3-axis magnetometers; L. Lanzerotti & T. Rosenberg)

U. of Washington and U. California @ Berkeley (Balloons at Roberval: X-rays and E-fields)

U. New Hampshire and U. Minnesota (Micropulsation magnetometer; R. Arnoldy)

Other scientific objectives include measurement of:

Siple transmitter efficiency below the ionosphere and signal intensity available in the ionosphere for ducting into the magnetosphere;

Intense substorm-associated E-fields at the plasmapause;

The degree of conjugacy of E-fields and precipitation;

Absolute calibration of bremsstrahlung X-ray intensities against electrons producing them;

Correlation of wave events with particle bursts at conjugate points; and
ULF magnetic field correlation with precipitation and VLF.

D. Carpenter, Stanford, adds that the Stanford VLF direction finder near Siple will be used to support launch decisions as to time and direction of rocket launches. ATS communication platform capability will be used to connect Siple and Roberval to enhance opportunities for joint observation of wave and other geophysical features of the environment.

The campaign is to take place during Dec-Jan, as specified above by Matthews. In the chronological listing of campaigns, the Sheldon rockets were listed by the Wallops Flight Center (1 Oct 1979) as having a Jan 1980 window; however, we suppose they may be launched whenever appropriate conditions are encountered during the 2-month campaign.

WHITE SANDS, USA

4.338 UE --- Dr. W.E. Sharp, Univ. of Michigan, will launch an Aerobee 200 rocket from White Sands on 11 Dec 1979 to an altitude of 150 km. Objectives are: to measure atomic hydrogen in the mesosphere; determine kinetics of O2 nightglow emissions; and serve as test flight of a prototype plasma instrument. The payload will carry several photometers, a UV spectrometer, resonance fluoresence module, and a retarding ion mass spectrometer. The launch will be 1 hour after local sunset. Cooperating scientists for the payload are C.R. Chappel (NASA, MSFC) and T. Hoffman (UT Dallas).

33.008 UE -- Dr. F.C. Wilshusen, Univ. of Colorado, provided the information about this launch of Barth's. It is a NIKE-ORION scheduled to be launched during the week of 11-17 November 1979 to an altitude of 200 km. Objectives are to measure the altitude distribution of NO δ -bands in the night airglow and the γ-bands in the twilight glow while making simultaneous measurements of O2 Hertzberg bands to obtain the altitude distribution of O, N, and NO.

The payload carries a UV scanning spectrometer (as on Pioneer-Venus Orbiter), a prototype spectrometer using microchannel plate (planned for Galileo mission), and a VU photometer to measure the nightglow. Launch will be at a time when the Sun is 13 degrees under the horizon (evening). Half of the planned 400-sec flight will be used for looking at the E. horizon and half looking at the W. horizon, always in the plane of the Sun.

ANDOYA, NORWAY

Ferdinand 49 "PULSAUR" --- Launch rescheduled to early 1980 with windows of 80/01/20-02/04 and 80/02/19-03/03. This NIKE-TOMAHAWK is to be launched to an altitude of 240 km. Objective to study pulsating auroral. The payload is designed for investigating physical processes involved in generating pulsating aurora and will include: measurements of particle intensity, optical emissions, X-rays, DC and AC electric and magnetic fields, HF emissions and electron density and temperature. Observations will be coordinated with optical equipment at the launch sites which includes narrow field and wide angle TV cameras, several photometers, standard and pulsation magnetometers at Andenes, Tromso, Kiruna and Fauske, the STARE auroral radar and, if possible, any components of EISCAT which could be operated during the launch. Project Scientist is either F. Soraas or J. Holtet. The program is described in CCOG Handbook supplement, Circular Letter No. 8. Participating organizations/scientists for this rocket are: U. Oslo/K. Maseide - auroral photometers, vertical profiles of optical emissions in pulsating aurora patches; NOAA/D. Evans - auroral particles, energy and pitch angle distribution of e- and p+ in the 0.5 to 15 keV range; NDRE/Maehlum - high time resolution of precipitating e- at two fixed energies; U. Bergen/Aarsnes, Lundblad, Soraas - energy & pitch angle distribution of e- and p+ above 15 keV; RIT/Falthammar, Marklund - DC electric field, E-field magnitude and polarization for pulsating aurora with full vectorial resolution (3-axis sensor); U. Oslo/Holtet - VLF electric field, electromagnetic and electrostatic wave fields related to pulsating aurora and particle precipitation including distribution of auroral hiss relative to precipitation regions; U. Bergen/Bjordal, Aksnes - DC magnetic field, current regions and variations in ambient magnetic field by full vectorial measurement; UIO/Holback - plasma density, Ni and Delta-Ni/Ni, DC and AC measurements of thermal plasma density to establish electrostatic nature of wavefields; NDRE/Jacobsen - Electron temperature (Te), spatial structure of e- temperature associated with pulsating aurora; and U. Bergen/Stadsnes, Aarsnes - Auroral X-rays, spatial and temporal distribution of e- precipitation (Ee>= 3 keV) by bremsstrahlung X-rays to compare X-ray measurements with photometric auroral measurements.

Ferdinand 50 "Corobier" --- F. Soraas is Project Scientist for this launch of a NIKE-TOMAHAWK to study plasma instabilities and irregularities in the auroral E-Region and their relation to radio aurora. Payload experiments and PIs/institutes are: DC electric field, C.G. Falthammar & U. Fahleson, KTH; VLF electric field, J.A. Holtet, U. Oslo; HF electric field, J. Troim, NDRE; DC magnetic field, F. Primdahl, DSRI; Ne, Delta-Ne, Te, R. Bostrom, Uppsala Ionospheric Observatory; Ti, R. Arnoldy, U. New Hampshire; Energetic Particles, F. Soraas, U. Bergen and D. Evans, NOAA; and X-ray detector, J. Stadsnes, U. Bergen. Launch will be coordinated with STARE radar and into well developed eastward electrojet (determined by the radar). Program described in CCOG Handbook Supplement, Circular Letter No. 8.

POKER FLAT, ALASKA

** --- The Heppner campaign of 6 rockets (2 Terrier-Malemutes and 4 Nike-Tomahawks) shown on pg 3 for March/April 1980 is taken from the Poker Flat Research Range Launch Schedule of 25 October 1979. However, both the NASA Goddard and NASA Wallops Flight Center listings of sounding rocket programs show Heppner as scheduled for a 6-rocket campaign at PFRR during March/April 1981. We hope to have clarification about this for the next IMS NL.

SCANDINAVIA --- ESRANGE & ANDOYA

Energy Budget Campaign (EBC) --- The EBC is an extensive program of coordinated rocket and balloon launches from the two sites. It is scheduled for winter 1980-81. The 15 rockets from ESRANGE will include Skylark 6, Nike-Apache, Nike-Orion, Skua, and Petrel II. Participating institutions are: Technische Universitat Wuppertal, MPI Heidelberg, Universitat Bonn, DFVLR, Appleton Lab, UC London, TU Graz, and IZMIRAN. From Andoya are to be launched 3 Nike-Apache and 3 Nike-Orion rockets (Rugatti II and Trinom II payloads, respectively) with participation by U. Bonn, MPI Heidelberg, TU Graz, NDRE, and U. Bergen. Another set of launches will include 1 Nike-Orion or 1 Seargeant and 4 Skua rockets with payloads by NASA and MPAe. More information about this major campaign will be forthcoming.

GROUND-BASED

CANADA

Possible Reduction in Canadian Ionosonde Operation- Early in IMS we shared a request from B.W. Currie, Canadian IMS Coordinator, and published a notice of the need for confirmation by IMS participants of their requirements for continued data acquisition at the sites of the Canadian network of standard observatories (NL 76-5, pg 3). Dr. Currie has again circulated material on this topic via the Canadian IMS Newsletter. In summary, Canada operates ionospheric sounders at Resolute Bay, Ashton, Fort Churchill and St. Johns. Records are taken automatically every 15 min on 35 mm film. The

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(Continued from pg 5)
films are analyzed in Ottawa and data sent to Canadian users and, via the World Data Centers, to global users. Costs for collecting this data are high, particularly at remote locations such as Resolute Bay and there is a continuing need for assurance that the use of the data and benefits derived therefrom are sufficient to justify the continuing operation of the system. Some or all of the above ionospheric observatories may be closed in 1980. Although time for making an effective response already may be past, anyone feeling strongly about the possible closure and having pertinent information might write to Dr. J.H. Chapman, Assistant Deputy Minister, Space Program, Department of Communications, Ottawa K1A 0R6, Canada.

SCANDINAVIA

IMS Magnetometer Array (Univ. of Munster and Tech. Univ. Braunschweig) --- Wolfgang Baumjohann sent a final note giving the plans for switching off this magnetometer array and some additional information. The final stage of the array is as shown in the map in IMS NL 78-10 (pg 6) including the four stations added in July 1978 to the original array which was described in the CCOG Handbook (1976). A detailed description of the U. of Munster array is in:

F. Kuppers, J. Untiedt, W. Baumjohann, K. Lange and A.G. Jones, "A two-dimensional magnetometer array for ground-based observations of auroral zone electric currents during the International Magnetospheric Study (IMS), J. Geophysics, submitted (probably to be in Vol. 46, No. 4, 1980). Details of the Tech. Univ. Braunschweig magnetometer chain is in:

H. Maurer, B. Theile, "Parameters of the auroral electrojet from magnetic variations along a meridian," J. Geophys. 44, (415-426), 1978.

The six Braunschweig IMS magnetometers (chain # 5 in the map in NL 78-10) were removed in June 1979. In Sept/Oct 1979, nine Munster stations were switched off (MAL, HEL, KLI, HAS, JOK, RKS, BER, VAD, SKO) and the remaining 27 magnetometers were changed to a 20-sec recording interval between points (formerly 10-sec). By this means, the remaining network can be kept in operation until early summer 1980, at which time all remaining stations will be removed.

IMS Pulsations Chain (Universitat Gottingen) --- Operation of this chain was from September 1974 through June 1979. Data were recorded at 10 sites in Scandinavia, frequently in conjunction with the Braunschweig chain observations. An excellent summary report (7 pages) was sent to the IMSCIE Office by Udo Wedeken, Institut fur Geophysik der Universitat, Herzberger Landstr. 180, For details see IMS Bulletin No. 2, #0066, or CCOG Handbook, pg. 179.

NORTH AMERICA

IMS (MAGNETOMETER) CHAINS --- The status of these chains of magnetometers (with some sites having riometers and others photometers coupled into the systems) was reviewed during October by the scientists responsible for their operation. This review was at a meeting called by the US NSF to review progress on IMS programs, plans for analysis of the mass of accumulated IMS data, and possibilities/needs for some continued observations using the systems developed for IMS. Bits of information from this meeting will be encountered throughout this IMS Newsletter and possibly in future issues as these topics are still current and several decisions are not yet made.

M. Sugiura, NASA/GSFC, compiled a Status Report (with Bob Manka) of the US-Canadian IMS Magnetometer Network Operation. In 23 pages of text and graphs it covers the status of the Alaska Chain (U. Alaska, Geophysical Institute), the Auroral Zone East-West Chain (State Univ. of New York), the Fort Churchill Chain (Energy, Mines and Resources, Canada), the Mid-Latitude Chain (Univ. of California @ Los Angeles), plans of the US Geological Survey to continue supporting operation of the network instruments and possible upgrading of the systems, plans of the NOAA/ERL - Space Environment Laboratory to continue supporting the satellite telemetry data collection via SMS/GOES and processing through SELDADS and into the NOAA/EDIS - National Geophysical and Solar-Terrestrial Data Center/WDC-A archives, the AFGL Magnetometer Network, and a brief summary of uses made of the data. Individuals from the organizations mentioned above and who contributed to the compilation were C.R. Clauer, P.F. Fougere, A. Grey, C. Hornback, J.A. Joselyn, J.S. Kim, R.W. Kuberry, R.L. McPherron, G.J. Romick, G. Rostoker, P.H. Serson and J. Walker.

Our abbreviated summary by chain of the future program plans and other comments follows:

Alaska Chain --- Hope to operate into 1980 although perhaps with fewer stations (eliminating those most expensive to reach when service is needed). Chain operation funded through Dec 1979.

At the meeting S.-I. Akasofu presented a brief overview of the MIRROR array (Magnetometer, Ionosounder, Riometer, Radar, Optical and Rocket complex). This comprehensive network of instruments for studying the physics of the auroral zone would form around the nucleus of instruments in the current Alaskan Chain and otherwise operated around College, Alaska by the Geophysical Institute and other organizations.

Auroral Zone E-W Chain --- Funded by NSF for operation through 31 Oct 1979. Kim (SUNY) plans to request support for continued operation of the 3 stations (Fort Simpson, Lynn Lake, and Norman Wells, all in Canada) which are maintained in cooperation with representatives of different Canadian institutions.

Alberta Chain --- Program officially ended on 30 June 1979. The array is being deactivated although parts will continue to operate until the end of 1979 if there are no problems with the equipment. Only one site, Fort Smith, is a satellite telemetry relay part of the network supplying real-time variations data to the SELDADS. Gordon Rostoker hopes to keep the system at Fort Smith operating and will try to maintain his base station at Leduc for the foreseeable future.

Fort Churchill Chain --- 15 magnetic recording stations are part of this cruciform array with the long axis roughly along the Churchill meridian. Data from six are transmitted via satellite to Boulder, Colorado (SELDADS). Current plans are for EMR-operated IMS stations to continue in operation during the lifetime of MAGSAT (see Satellite program news in this NL). In the summer of 1980 nine of the stations will be closed and the satellite telemetry relay stations will be returned to the USGS unless other instructions are received. The other 6 stations will continue in operation unless financial constraints force a reduction in the Canadian magnetic observatory program.

Mid-Latitude Chain --- "The five magnetometer experiments operated by UCLA are all providing useful data. The IMS North American magnetometer network has demonstrated the feasibility of remote, semi-automatic digital data acquisition. Within the constraint of a limited budget, the program has been successful. Several problems, however, exist in the design and operation of the platforms. These problems are specifically addressed in the attached report. In addition there has been some deterioration in the performance of many of the systems. Many of the housekeeping circuits have failed and the frequency of failures that cause data outages appears to be increasing." For the future, McPherron and Clauer report "At a time when more and better quality data are necessary the once extensive network of ground geomagnetic observatories is decaying as a result of the increased cost of operating and maintaining observatories and the lack of trained personnel. The technology developed for the IMS could play an

important role in modernizing and upgrading existing observatories. The French government is considering such a modernization program, and the IMS experiment in Tahiti has been useful in this regard. We cannot overemphasize the importance of digital data acquisition."

AFGL Chain --- The US Air Force Geophysics Laboratory operates a chain of 5 stations along the 55 degree N. geomagnetic latitude and 2 stations on latitude 40 degrees N. in the continental USA. These are unattended data collection systems combining 3 search coils for rapid variations and 3-axis fluxgates connected to a central processing facility by voice-grade telephone lines. The details of this network are given in "An Introduction to the AFGL Magnetometer Network" by D.J. Knecht, R.O. Hutchinson, and C.W. Tsecoyeanes, AFGL. The staff responsible for the collection, processing and analysis of this extensive data set have offered to share it upon request within the limitations of available staff and computer time. Plans are now developing for the transfer of 1-min average data and, possibly, the full high-resolution data set to NGSDC/WDC-A in Boulder. Present requests for data should be directed to: Dr. D.J. Knecht, AFGL (PHG), Hanscom AFB, Massachusetts 01731, USA, or by telephone to (617) 861-3828, 3827, or 3713.

Geological Survey --- In support of IMS, besides designing and serving as prime contractor for the IMS magnetometer and data relay systems, the USGS has operated real-time satellite relay systems at Guam, College, Tucson and San Juan observatories in support of the mid-latitude data collection effort. Observations at these sites will continue since they are part of the standard US magnetic observatory network. Acquisition is in progress to obtain a dedicated mini-computer to process both real-time (satellite relay) and delayed (tape) data from all observatories which are to be equipped with tri-axial fluxgate and proton precession magnetometers. Automatic telephone telemetry, satellite relay and on-site tape recording will be used. Changes will be gradual and no authorization for increased personnel is available.

NOAA/SEL --- System status reports (detailed) have been issued every few months from mid-1977 through late 1978. SEL will continue providing data taking and processing through 1980; however, no additional programming can be supported (only operational level support is possible for the present system). An updated memorandum of agreement between SEL and NOAA/NESS for use of the SMS/GOES platform is still necessary for 1980. If the system were to continue into 1981, transmitter frequency changes would be mandatory on the 19 platforms using the west satellite. Most system failures have been associated with radio set problems or power supplies. Future developments are urged to correct these so that cost of visiting the field sites will be reduced and data acquisition enhanced.

ALASKA

Chatanika Radar --- Rich Vondrak drafted the following note at the US NSF-sponsored review of IMS research meeting described elsewhere. "Recently a new computer has been installed at the SRI incoherent scatter radar facility at Chatanika, Alaska. The new computer, a Harris S123/6, is used for both on-line operation of the radar system and for analysis of the data. It has greater flexibility and capacity than the XDS-930 computer it replaced. Hardware and software modifications were made during August and most of September 1979. During this time no incoherent scatter measurements were made. The normal program of experiments and observations resumed on 1 October. Anyone wishing information regarding the scheduling of radar experiments or use of the Chatanika data library at Stanford should contact Richard Vondrak, Radio Physics Laboratory, Menlo Park, CA 94025, USA."

Also at this meeting some discussion took place about the plan to move the Chatanika radar, probably to Sondre Stromfjord, Greenland, to a location where cusp studies would be possible. When any "official" statement about this matter is available, we will try to share it promptly through these newsletters. In the meantime, discussion continues about the desireability of overlapping Chatanika radar operation with the EISCAT incoherent scatter radar when it comes on line, about timing of moving the equipment, and the need for overlap with the new MST radar being brought into operation near Chatanika (see item below on the MST radar).

POKER FLAT, ALASKA

MST Radar --- Ben Balsley described briefly the plans for the Mesosphere Stratosphere Troposphere (MST) radar currently under construction at Poker Flat by the Aeronomy Laboratory of NOAA's Environmental Research Laboratories. The 50 MHz coherent radar will have a 40000 sq m phased dipole array, a 6.4 MW peak power transmitter system (64 separate 100 kW peak pulse power transmitter modules distributed through the array), and an on-line Doppler analysis and data recording system. Within its limitations, the system will measure winds, waves and turbulence through a 1-100 km altitude range. Part of the system is already in operation.

The IMSCIE Office has received from Balsley a copy of preprints/reports (total 46 pages) "The MST Radar at Poker Flat, Alaska" by Balsley, Ecklund, Carter and Johnston, and "The Poker Flat MST Radar: First Results" by the same authors. The latter describes initial results obtained during the first 60 days of continuous operation of that part of the system already working. Mesospheric echoes between 57-72 km were observed during daytime periods of ionospheric absorption. The system was operating during a stratospheric warming and mesospheric winds then showed a more easterly component than winds measured later. The presently operating system, some three orders of magnetude less sensitive than the final system, is capable of measuring 10-day average winds between 83-95 km via meteor trail echoes.

ANTARCTICA & CANADA

VLF STUDIES --- D. Carpenter was also at the NSF Review and shared this report on Stanford University VLF studies, many taking place at Siple, Antarctica and Roberval, Canada, two conjugate locations. "Stanford University VLF Group Projects During IMS ---

(i) Studies of magnetospheric thermal plasma dynamics in VLF wave propagation. Observational programs have been conducted at Siple and Palmer Stations, Antarctica, at Roverval, Canada, and on the ISEE satellite. The experiments involve VLF wave injection, broadband and narrowband VLF recording, and VLF tracking/direction finding. A number of joint international VLF observing campaigns have been completed in the IMS years. The programs are continuing at roughly IMS levels of activity. Recent scientific results include: successful comparisons of equatorial plasma density determined from ground whistlers and by ISEE insitu radio techniques (Univ. of Iowa); detection of the presence of unexpectedly large radial gradients in plasma density in the plasmasphere from ground-to-satellite VLF transmissions; completion of numerical models based on whistler data of the E-W component of electric field in the magnetosphere near L = 4 for both quiet and disturbed conditions; successful 'mapping' of nightside electric fields from the magnetic equator (whistler data) to the ionosphere (Millstone Hill radar, Cornell Univ.); first multi-hour detection of magnetospheric convection using DF on drifting whistler ducts from Palmer Station. Future needs in observations include further application of all techniques in conjunction with radar and ionosonde probing techniques and further development and application of direction finding, including digital DF readout and multi-point interferometric techniques. Theoretical needs include interpretive modeling of multi-longitude plasmapause tracking

(Continued on pg 8)

(Continued from pg 7)
data, development of a theory of the perturbation of sub-ionospherically propagating VLF waves by wave-induced particle precipitation, and a new theoretical model of cool plasma dynamics in the outer plasmasphere.

(ii) Studies of magnetospheric wave-particle interactions. Observational programs and their status are essentially as listed in Item (i). Additional recent and/or ongoing features involve Siple transmissions to ISEE-1, ISIS, EXOS-B, MAGIK and SCATHA satellites. Recent scientific results include: new findings about the 'coherent wave instabilty' in which exponential wave growth by about 20-30 dB in the magnetosphere is observed to take place within extremely narrow (about 1% BW) VLF frequency bands; a threshold effect, apparently governed by resonant particle flux levels along the field lines, such that waves below a given field strength are not subject to large temporal growth; new phenomena indicating the manner in which the amplifying magnetospheric system shifts from driven to natural modes of oscillation; new findings on radiation from power distribution systems (PLR), icluding 'Sunday' effects in certain broad classes of wave activity and successful simulation of magnetospheric PLR effects by the Siple transmitter; the first one-to-one correlations between VLF wave bursts and 4278A optical emissions (Lockheed photometer); theoretical prediction of a large (up to 80 dB) difference between the power flux of an injected VLF wave and the local energy flux of particles precipitated through the cumulative effects on particle pitch angles of the quasi-coherent wave; fluctuations within minutes in the arrival vearings of ducted waves that depend on wave growth, possibly due to spatial structure in a gradient drifting resonant electron source population; the first directional information on VLF sub-ionospheric propagation anomalies. Future experimental needs include measures to increase radiation efficiency of the Siple antenna system, wave injection experiments in support of DF and the Shuttle, increased stress on correlation with other probing instruments, establishment of unmanned sites for purposes of separating active and passive experiments, achieving spaced station observations and conducting VLF imaging (DF and interferometry) experiments, development and application of a VLF radiometer. Theoretical needs include: support for further modeling of wave-particle interactions and for development of improved ray tracing analyses of magnetospheric wave propagation."

DISTRIBUTED SITES

HF Radar Systems --- Gene Adams, NOAA/ERL/SEL, also attended the NSF meeting and passed along the following information on the new HF Radars constructed by SEL (sometimes called "digital ionosondes", see IMS NL 79-9, pps. 2-3).

"The HF Radar Program --- Six HF Radars have been constructed by the Space Environment Laboratory of NOAA/ERL in Boulder, Colorado. The owners, current situation and planned deployment are:

1. NSF prototype - currently operating at the Boot Lake, Colorado field site. It will be moved to Poker Flat in 2 - 4 months (the site is now ready).

2. Utah State Univ./Stanford Univ. - currently operating at Logan, Utah. To be moved to Roberval, Canada in Spring, 1980, then to Siple in the Summer of 1980.

3. White Sands Missile Range - waiting for antennas to be built (due in Nov. 1979).

4. Max Planck Institute - HF Radar on-site but deployment uncertain.

5. British Antarctic Survey - operating near Cambridge, England. Destined for Halley Bay, Antarctica in 1980.

6. NOAA/SEL - in final stages of construction. It will replace the NSF machine at Boot Lake, Colorado when the NSF machine goes to Poker Flat, then be available for system development and travel.

Two high-power (100 kW) fixed-frequency transmitters and the associated hardware and software are being built now so that the HF Radar can operate as a partial reflection sounder. An 80-dipole array is in place at Boot Lake and a second array has been started at Poker Flat.

Current planning is to build several permanent antenna facilities around the world then visit them with the HF Radars as needed. Sites under consideration for particular scientific campaigns include Cape Parry, NWT, Canada (working with Hans Stenbaek-Nielsen, U. Alaska), Jicamarca, Peru, and Arecibo, Puerto Rico."

ACTUALITIES

SOUTH UIST, U.K.

UK Campaign --- Whitlock, Appleton Laboratory, telexed this actuality several months ago and we are only now able to fit it in. On 20 and 21 July the following rocktes were launched:

20th - P197H, Dickinson, AL, @ 0134 UT
P170H, Williams, UCW, @ 0158 UT
P210H, Dickinson, AL, @ 0316 UT
P209H, Dickinson, AL, @ 0355 UT
P169H, Williams, UCW, @ 0621 UT
P211H, Dickinson, AL, @ 0701 UT.
21st - P212H, Krankowsky, MPI, @ 0132 UT
P172H, Williams, UCW, @ 0304 UT
P171H, Williams, UCW, @ 0350 UT.

Rocket P214H (MPI) was not launched in this campaign and a new date has not been set.

KIRUNA/ESRANGE, SWEDEN

S-27 "TWILIGHT REPETITION" --- The last received listing of ESRANGE launches and planned launches shows this rocket, a NIKE-ORION, was launched on 79/08/21 into sunlit aurora. Participating institutions listed in the range summary were: Johns Hopkins Univ. and NASA, USA.

S-29 "Ba-GEOS" --- PI was Holmgren for this NIKE-BLACK BRANT VC launched at 20:20 UT on 79/09/24 to an altitude of 397 km. The rocket, equipped with a Saab/Scania guidance module S19, was launched into structured aurora with negligible moonlight and a clear sky for viewing the chemical injection. The rocket impacted on bearing 355 deg. at a range of 64.5 km. All experiments worked well and desired conditions were fulfilled. Participating institutions/countries were: Cornell Univ., NASA - USA; MPE - Germany; Univ. of Bergen - Norway; KGI, KTH, UJO, SSC - Sweden. U. of Bergen; KGI; KTH; UJO; and SSC

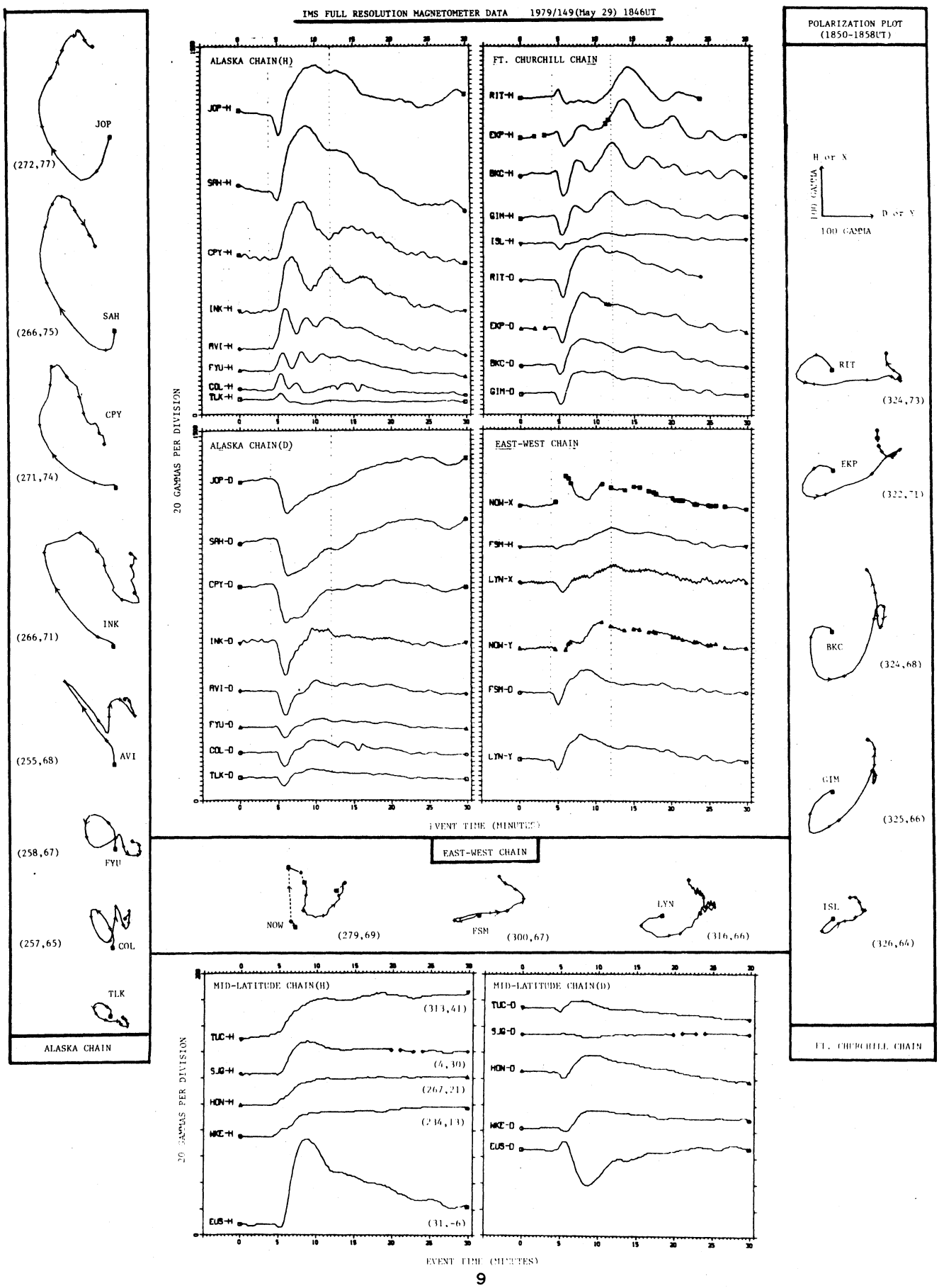
EL ARENOSILLO, SPAIN

Petrels (2) - Martelli, Sussex Univ., launched two chemical release rockets. One on 24 Sept at 0532 UT with premature detonation and the other on 3 Oct at 1842, completely successfully. The latter attained an altitude of 145 km.

GLOBAL ARRAYS, W. HEMISPHERE

N. American IMS Magnetometer Chains --- Dr. Tohru Araki, Kyoto Univ., is currently a Research Associate of the Univ. of Colorado's Cooperative Institute for Research in Environmental Sciences (CIRES) and, at the same time, a Guest Worker in the Data Studies Division of NGSDC. While spending 9 months with us (we're the IMSCIE Office too), he has continued earlier studies of Sudden Commencements begun in Kyoto. In this work he has used the ground-based magnetic data from NGSDC/WDC-A archives in Boulder, and satellite data from a variety of sources. An example of some of the data with which he is working is shown on the following page (pg 9) and described briefly here.

With the aid of a student programmer, Peter Wilcoxen, Tohru has now a family of computer
(Continued on pg 10)


IMS FULL RESOLUTION MAGNETOMETER DATA 1979/149(May 29) 1846UT
ALASKA CHAIN(H)
FT. CHURCHILL CHAIN
ALASKA CHAIN(D)
EAST-WEST CHAIN
MID-LATITUDE CHAIN(H)
MID-LATITUDE CHAIN(D)
20 GAMMAS PER DIVISION
EVENT TIME (MINUTES)
JOP-H
SAH-H
CPY-H
INK-H
AVI-H
FYU-H
COL-H
TLK-H
RIT-H
EKP-H
BKC-H
GIM-H
ISL-H
RIT-D
EKP-D
BKC-D
GIM-D
JOP-D
SAH-D
CPY-D
INK-D
AVI-D
FYU-D
COL-D
TLK-D
NOW-X
FSM-H
LYN-X
NOW-Y
FSM-D
LYN-Y
TUC-H
SJG-H
HON-H
BKE-H
CUS-H
TUC-D
SJG-D
HON-D
BKE-D
CUS-D
(313,41)
(4,30)
(267,21)
(234,13)
(31,-6)
JOP
(272,77)
SAH
(266,75)
CPY
(271,74)
INK
(266,71)
AVI
(255,68)
FYU
(258,67)
COL
(257,65)
TLK
ALASKA CHAIN
POLARIZATION PLOT
(1850-1858UT)
H or X
100 GAMMA
D or Y
100 GAMMA
RIT
(324,73)
EKP
(322,71)
BKC
(324,68)
GIM
(325,66)
ISL
(326,64)
FT. CHURCHILL CHAIN
NOW
(279,69)
FSM
(300,67)
LYN
(316,66)

(Continued from pg 8)
programs which allow him to select for a station 10-sec high-resolution magnetometer data from the satellite telemetry relay stations of the N. American IMS chains. He can list or prepare the data for 30-min intervals in stacked plots of one or more components and also prepare from the H & D (or X & Y) variations plots of the polarization of the wave producing the variations at each site. The figure reproduced here is for one of some 20 sudden commencement events he is studying in Boulder. At left-center of the figure are the H (Upper traces) and D (Lower traces) variations at the satellite relay stations of the Alaska Chain; right-center traces are H&D stack plots for the Ft. Churchill chain and X&Y traces for the E-W chain. At the bottom-center are the H&D variations traces for the Mid-latitude chain. In the outer left and right boxes are the polarization plots corresponding to the adjacent chain variations and the E-W chain polarization plots are just above the magnetic variations traces. Arrows indicate the sense of progress of the polarization curves. The Alaskan chain sites farthest north (JOP = Johnson Point) show clearly the initial reverse (-H) change at the onset of the sudden commencement and the polarization is clockwise for the four highest stations. Arctic Village (AVI) observed a more linear change and the lower three stations recorded counter-clockwise polarizations. The sudden commencement was at 1846 UT, i.e. morning local time in Alaska and mid-day in eastern Canada. The E-W chain sites recorded polarizations counter clockwise on the eastern end of the chain and clockwise on the western. All the stations of the Ft. Churchill chain recorded counter clockwise polarizations (the sense to be expected from the Wilson-Sugiura model). It appears from this one event that there is a latitude change as well as longitude in the sense of polarization of the wave whose arrival produces the sudden commencement and the high-resolution IMS data give a very clear view of the high latitude magnetic response associated with a sudden commencement and even of the reverse polarization impulse. Dr. Araki has indicated his good impression of the data quality and well-located recording sites of the IMS arrays.

MEETINGS AND WORKSHOPS

PAST EVENTS

COORDINATED DATA ANALYSIS WORKSHOPS --- Since Dec 1979, there have been five CDAWs at NASA's Goddard Space Flight Center in the National Space Science Data Center (which also operated the IMS SSC). Jim Vette and his entire staff have expended themselves notably to achieve these first attempts at a new approach to the gathering of data for a preselected interval or type of phenomena and the group analysis of this data base in an intensive, computer interactive environment. Erwin Schmerling has supported Vette vigorously in creating the physical mechanism for staging CDAWs and various institutions besides NASA (most notably NSF) have contributed to these workshops. One measure of their success could be that several who were early sceptics about the utility of such efforts became the most vocal advocates of special CDAWs for topics/events with which they were closely associated. Perhaps better indicators are those first papers which are beginning to be given at meetings such as the IMS Symposium in Melbourne and which may soon begin to appear in print. The quality and timeliness of these works will help to establish whether the CDAW concept has realized its goal of bringing quicker appreciation of the meaning of the integrated mass of collected data so that the physics/science is understood and that works of significance appear with shorter time lags and are achieved with greater economy of all resources. The following is a brief account of CDAW-3.0, followed by personal notes from CDAW-2.

Coordinated Data Analysis Workshop (CDAW) 3.0 --- The third CDAW was held at the IMS/SSC on July 23-26. The data base included observations from 16 selected bow shock crossing periods experienced by ISEE-1 and 2 during the period 7 Nov 1977 - 1 Jan 1978. Although originally scheduled for three days, the ISEE science team decided to extend the successful activity for an additional day.

Dr. Keith Ogilvie, the ISEE 1 Project Scientist organized this workshop and commissioned Dr. Gene Greenstadt of TRW to select interesting bow shock crossings, particularly examples of quasi-perpendicular and parallel cases. The data base was constructed in a very compressed time period by the IMS/SSC led by Dr. Michael Teague and consisted of 11 data sets comprising 178 measured parameters from 9 ISEE-1 experiments and 7 data sets comprising 65 parameters from 6 ISEE-2 experiments. The total on-line data base consisted of more than 100 Megabytes.

Twenty four people including four theorists were in attendance and the participants were very satisfied with the progress that had been made and in the ability of the interactive graphics system to manipulate and display rapidly the multiparameter data base necessary to lead to the understanding of the very complex magnetohydrodynamic shock phenomena. During the 3-1/2 days that output could be requested, a total of 699 plots were generated representing a volume of output equal to approximately twice that generated at CDAW-1.0 in December 1978.

Besides making plans to continue analysis on the CDAW-3.0 data base, the ISEE Science team made plans to hold a CDAW-4.0 involving magnetopause crossing early in November. Since this activity is conducted as part of the ISEE Science Working Team, the attendees decided to limit the use of the CDAW-3.0 data base to these team members and their designated associates.

CDAW-2.0 --- Planning for this workshop on the substorm interval of 29 July 1977 when GEOS-1 experienced effects of one shock front arrival near the time of its western apogee over N. America and the other notable activity when near the eastern apogee over Europe, has been described in many of these IMS newsletters. These events were prior to the launch of ISEE-1&2 and before the deployment of many of the N. American IMS magnetometer chains; however, the events were recorded by an abundance of interplanetary, geostationary and low-altitude satellites and arrays of ground-based instruments. The US IMS Coordinator, R.H. Manka, organized this workshop with the assistance of the many individual Sub-group leaders and the IMS/SSC staff listed in our earlier articles.

When GEOS-1 was near apogee at local noon and near the longitude of ATS-6, a shock arrival compressed the magnetopause in past GEOS but not past ATS-6 so that these two nearby satellites "Trapped" the boundary for a time. At first it was thought that GEOS might have passed several times in and out of the magnetopause; however, Karl Knott announced that one result of the CDAW was confirmation that only one inward passage took place and that the other variations monitored during this time could be attributed to variations of the interplanetary field. A large substorm was already in progress (started about 0013 UT) when the shock arrived (0027 UT). IMP-H&J were in interplanetary space much of the time. Low altitude satellites TRIAD, S3-3 and AE-C had conjunctions and near simultaneous passes over the polar regions near the time of several important substorms. Common-scale magnetograms and preliminary AE indices were prepared cooperatively by NGSDC and the Univ. of Alaska Geophysical Institute. These and the other ground based records of magnetic variations from the Univ. of Munster's Scandinavian array and the Canadian observatories provided detailed information on the timing of effects of the disturbances and the field aligned and ionospheric currents. Use was made of the S3-3 field and particle data to calculate an estimate of the Joule energy input to the polar cap and auroral zone regions. These were compared with a calculated estimate from surface magnetometer data (AE*10exp15 ergs/sec) and the agreement was surprizingly good. Also, Syun Akasofu computed the epsilon measure of

energy coupling from the interplanetary field and solar wind into the magnetosphere ($\epsilon = VB^2 \sin^4 \frac{\theta}{2} \ell_o^2$) and compared it with the AE time series. The agreement was good except for one interval. Further checking revealed what had already been noted in another context, that the B field during the interval of disagreement came from an IMP satellite that had ceased to be interplanetary because of moving inside the magnetopause.

A unique feature of this CDAW was the close interaction with several groups of modelers from various universities and aerospace companies. The modelers had access to their home computers from terminals at the CDAW and could interact with the CDAW Sub-groups to input specific information into their respective models as it became available. At the closing summary session, Bill Olson, McDonnell-Douglas, commented that he and Karl Pfitzer had taken their magnetospheric model through 3 generations at the CDAW. They could show complex changes in the GEOS-1 and ATS-6 satellite magnetic foottracks during the disturbances as the dynamic magnetospheric model incorporated the many varying inputs. Usually, Bill said, it took six months of correspondence with several different experimenters to finally pull together the information needed to generate one new model. To create three in so short a time as the workshop occupied was a distinct tribute to the effectiveness of having assembled the data from the many pertinent experiments and also the people who had already gained experience with their data in their working groups. A notebook prepared for all participants at CDAW-2 lists the data sets, the experimenter/source responsible for each data set, the computed parameters and the algorithms by which each data set could be accessed (1 to 6 per frame). Figures displaying the data in various combinations were produced at the CDAW on hard-copy equipment, could be recorded on video discs, and will be reproduced on 35 mm microfilm and copies sent to all participants. At the end of the workshop, the participants decided to not only keep the data base actively available to participants who might request new plots from the staff but also that the data base should be available on request to anyone.

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One side result of the CDAW was a meeting among representatives of most of the ground-based magnetometer and related data sets. They decided that the IMSCIE Office should coordinate acquisition and distribution of a comprehensive day-by-day listing of data acquired during the IMS at the several sites of the ground-based arrays. An effort will be made among participants to identify an interval (days, weeks, month, ...) containing interesting events or, in analogy with the ISEE experimenters studying intervals containing plasmapause crossings, intervals when a particular type of phenomena occurred. For these selected times, all participants will be asked to derive the most complete possible digital data base from their raw records and to collect these data in standard format at a location to be selected, based upon accessibility to all and the large-computer capability needed to permit full analysis of the global collection of surface data from the time(s) selected. A workshop devoted just to these data is anticipated with perhaps a later workshop involving satellite, rocket, balloon, etc. experimenters. Letters and forms for the simple display of site information and whether or not data was acquired on each day (graphical display) have been sent to each representative at the sub-group meeting and to others who may be interested in cooperating and contributing their data. Copies of replies will be distributed to those asking to receive them. News of further plans, intervals selected for special study, etc. will be shared in later newsletters. We already know that early data from the Alaska Meridian magnetometer chain has been compiled for 9 March to 27 April 1978 and used by Syun Akasofu and NGSDC - Data Studies Division staff to create a computer cinema film displaying the vector variations as the chain sweeps around the auroral zone. A subset of this interval (16-23 March) was selected by Wolfgang Baumjohann and Yohsuke Kamide for a joint study (see McPherron special intervals for an ISEE study, pg 3 of this NL). Other times will surely be identified by those involved in this study effort and evolution of a workshop.

Round Table Discussion on Pulsations - Tokyo --- Dr. B. Fraser sent to the IMSCIE Office Dr. T. Saito's report of the RTD-Tokyo and the sub-reports of the five coordinators (10 pages) for each of the special intervals studied and they are reproduced here (more or less):

"Report on Round Table Discussion on March 15, 1979 - In order to study the mechanism of both generation and propagation of various types of ULF waves, really world-wide ULF data must be analyzed, since HM waves propagate through the vast magnetosphere. For example, we have no knowledge even on both latitudinal and longitudinal global distribution of any type of ULF waves based on simultaneous world-wide data.

So, the Executive Committee of the International Workshop on Selected Topics of Magnetospheric Physics (held in Tokyo on 13-16 March 1979) planned to have a round table discussion (RTD) on selected ULF events during the workshop. The committee members decided on five intervals for representative ULF waves as shown in the list following and, in advance of the workshop, requested the participants who planned to attend the RTD to bring their ULF data for these intervals: 13-14 July; 16-19 Aug; 20-23 Sept; 9-10 Dec 1977; and 14-15 Feb 1978.

On the first day of the workshop the Convenor of the RTD collected the data from them and made copies. He appointed five coordinators and asked them to choose a favorite interval from the five given above. Thus, the data copies were surveyed by them before the RTD.

On the day of the RTD, 30 scientists from 10 countries gathered to the round table, to whom the copies were distributed. In the chronological order of the five intervals, the coordinators took the chair and led very active discussions on their intervals. Although decisive analyzed results could not be derived within the limited very short time, various valuable comments were presented. Dr. C.T. Russell suggested the importance of using satellite data in addition to ground-based data. It was concluded that another RTD should be held during the coming IUGG Meeting and the result of the analysis of the data should be reported by the coordinators. It was agreed that anyone who wishes to use any of the data in publications should contact the supplier of the data. Dr. V.A. Troitskaya proposed to submit a report on RTD to the IMS Newsletter. It is the reason why this report is submitted together with the five coordinators' reports.

The convenor wishes the reader of this report to cooperate by sending his data to any of the five coordinators to make a success of the next RTD." The next RTD will be held in Canberra during the IUGG Meeting under the co-chairmanship of Prof. B.J. Fraser and T. Saito. Anyone having an interest in discussing the ULF events during these five intervals is welcome to attend the next RTD.

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1. 13-14 July 1977 Interval --- W.J. Hughes - The most interesting pulsation events observed during the 2 days were a series of Pi2 events. It appeared from the round table discussion that two particular trains of Pi2 were worthy of fuller investigation. The aim of the subsequent study should be to investigate the global structure of Pi2 pulsations, and to study in particular the propagation of Pi2's to the dayside and to mid-latitudes. The 2 time intervals for which I will request data from as many observations as possible are: 0200-0600 UT, 13 July 1977 and 0200-1000 UT, 14 July 1977. Both of these intervals include several Pi2 pulsation events seen in Japan, North America and South Africa. Data from these intervals should be sent to W.J. Hughes,

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(Continued from pg 11)
Dept. of Astronomy, Boston Univ., Boston, Massachusetts 02215, USA.

2. 16-19 August 1977 Interval --- J. Vero - It has been known for some time that geomagnetic impulses (SIs) have an effect on geomagnetic pulsations. Following certain such impulses, pre-existing pulsations stop; it is also possible that after some time (minutes) pulsations having other parameters, i.e. periods and amplitudes, appear. Simultaneously with these changes, characteristic variations are found in the data of the interplanetary medium. The sudden impulse corresponds to a change in the IMF; if the new situation does not allow the excitation of pulsations, their activity is disrupted. If in the new IMF pulsations can be excited, they will appear after some time. In August 1977, several such events could be found based mainly in the dynamic ULFspectra of the Japanese observatories (Memabetsu and Onagawa). They could be confirmed using pulsation records from European and South African mid-latitude observatories. Two such events occurred at the following times: 0415-0530 UT, 17 Aug and 0815-0915 UT, 20 Aug 1977. It is characteristic for both cases that at the end of the events, Pi2-like pulsations appeared at certain observatories which transformed later into Pc-type activity. In order to study these events, pulsation (rapid run) records are needed from many observatories, including all longitudinal sectors and polar cap and auroral stations. Further data on the interplanetary medium are also necessary. J. Vero, Geophysikalisches Forschungslavoratorium der Ungarischen Akademie der Wissenschaften, Sopron, Szt. Gyorgy u. 16, Hungary.

3. 10-23 September 1977 Interval --- D. Orr - 23 Sept 1977, 0600-0730 UT. Clear Pc3 pulsations detected over the IGS European network of observatories with centre period of approximately 30 seconds. 20 Sept 1977, 0600-0730 UT. Pc3 pulsations switch off during this interval. Request worldwide geomagnetic data in these intervals together with satellite data of magnetospheric and interplanetary parameters. Please sent to coordinator: Dr. David Orr, Dept. of Physics, Univ. of York, Heslington, York, York 5DD, England.

4. 9-10 December 1977 Interval --- B.J. Fraser - Within this time there were three interesting events in the Pc1 - Pi1 categories:

(1) 0200-2300 UT Dec 10. IPDP structures (0.2-0.7 Hz) were observed in Australia, Macquarie Island, Japan, Kerguelen, Sodankyla, the USSR and the Antarctic.

(2) 0600-0640 UT, Dec 10. Structured Pc1 observed in Australia and Japan.

(3) 1500-1700 UT, Dec 10. Structured Pc1 observed in Australia, Macquarie Island and Sodankyla. Communications on these events should be addressed to: Dr. B.J. Fraser, Physics Dept., Univ. of Newcastle, N.S.W. 2038, Australia.

5. 14-15 February 1978 Interval --- V.A. Troitskaya -

I. The main general features of the storm

(1) The storm started with ssc around 2147 UT and the activity finished rather abruptly around 1200 UT, 15 Feb. The duration of the storm was about 14 hours.

(2) Maximal Kp was +7, and was reached shortly before the end of the storm (0800-1200 UT).

(3) The initial phase of the storm was unusually long (Dst positive or slightly negative from 2200 UT of the 14th Feb to 0800 UT of the 15th Feb); that is more than 2/3 of storm time, there was no indication of the development of the ring current.

II. Microstructure of the storm (Pulsations)

(1) The most unusual and spectacular feature of the storm is superimposed Pc2, Pc3, Pc4, and Pc5 activity revealed both on day and night side simultaneously and the almost total absence of all kind of irregular pulsations which one could expect during evening and night hours. The intensity of Pc pulsations was several times greater than usually observed during disturbed periods. The character of superposed regimes of Pc pulsations allows to suggest (see Dan, V. 194 NS, 1970, 1069; Reports of Academy of Sciences of USSR), that the density and pressure of the solar wind was rather high. The absence of irregular pulsations indicates that most probably the big scale electric field was directed from dusk to dawn, and the plasma flow in the tail was directed away from the Earth. One could expect that maximal values of density of the solar wind were reached between 2230-0430 UT, and solar wind speed being high in general, could rise more beginning from about 0430 UT on the 15th Feb. Highest values of Vsw could be possibly achieved between 1000-1200 UT, 15 Feb.

Beginning from about 0800 UT begins the development of the ring current which can be traced by the character of Dst and appearance of different types of irregular pulsations, mainly in short period range in the longitude range of the USSR.

III. Recommendations for studies of microstructure of the storm

(1) ssc - To study the oscillations observed at the moment of ssc in different frequency ranges. Most typical seem oscillations in the Pc4 range (70-100 sec), and the absence of oscillations in the Pc1-2 range which often accompany the ssc. The amplitudes, period, spectra of ssc, as well as the time of the beginning of oscillations could be important for interpretation of the global distribution of the impact.

(2) Pi2 observed around 0200-1215 UT starting slow decreasing of Dst.

(3) Pc1 - observed in the initial phase of the storm (Australian stations) - their distribution in space.

(4) The character, amplitudes, periods of Pc2,3,4 and 5 events composing the main part of the storm, from its beginning to about 0800 UT.

(5) The transition to the main phase of the storm occurring around 0800 UT, revealing and describing the irregular pulsations characterising the development of the ring current.

(6) The situation in the interplanetary space and in the magnetosphere at the beginning of the storm, its initial and main phases as well as the moment of a rather abrupt end of the storm.

IV. Explanation of the presented scheme of the storm. The rest of Valeria's report describes figures which were not included with the material received from Saito and Fraser. Records apparently shown were pulsations recordings from Borok, Yakutsk and Petropavlovsk on Kamchatka. Also referred to but not included with the report sent to the IMSCIE Office was a table of oscillation amplitudes and frequency ranges and indications of earth current recordings available. Anyone interested in this interval should correspond with Dr. V.A. Troaitskaya, Institute of Physics of the Earth, B. Grousinskaya 10, Moscow D - 242, USSR.

The IMSCIE Office greatly regrets that this information was received after preparation of the last IMS NL (79-9) and that the delay in publication of the current NL will possibly preclude some interested persons taking data to Canberra for the RTD.

International Solar-Terrestrial Predictions Workshop --- Richard F. Donnelly, NOAA/ERL/SEL, provided a write-up describing this workshop (23-27 April 1979) for EOS, Vol. 60, no. 41, 9 Oct. 1979, pg 707. Several IMSCIE staff participated in this event and our impressions were contained in an earlier IMS Newsletter. We encourage those interested to read this overview provided by the organizer and we understand from Dick that the first of three projected volumes of proceedings is about ready for publication.

FUTURE EVENTS

National Space Sciences Symposium, INDIA --- Prof. R.N. Singh, Inst. of Technology, Nanaras Hindu Univ., Varanasi 221005, India, sends notice of this symposium to be held 21-25 January 1980, at Banaras

Hindu University. His text follows:

"The National Space Sciences Symposium sponsored by ISRO, INSA and UGC will be held in Banaras Hindu University during January 21-25th, 1980. The Symposium will cover various aspects of Space Research in India. The participation of various International Space Agencies is expected. Indian Space Scientists from various organizations will attend the Symposium.

The Symposium will broadly cover the following aspects:

1. Solar radiations and their effects on Earth's upper atmosphere.
2. Equatorial ionosphere.
3. Magnetospheric physics, solar wind and its interaction with the Earth's magnetic field.
4. Middle atmospheric studies, ozone.
5. Meteorological studies using the space as well as ground based techniques - MONEX results.
6. Cosmic radiations - IR, UV, X-rays, Gamma rays, optical astronomy, astrophysics and cosmology.
7. Planetary studies.
8. Space plasma, simulated laboratory experiments, collision physics, etc.
9. Remote sensing of Earth's resources.

The deadline for the receipt of detailed abstracts is 10th Dec 1979. Further information and detailed program of symposium can be obtained from Prof. R.N. Singh, Banaras Hindu University, Varanasi 221005, India.

Exploration of the polar upper atmosphere --- Alv Egeland, Univ. Oslo, sends the following information about this NATO Advanced Study Institute scheduled for 5-16 May 1980, at Lillehammer Turisthotell, Norway. For further information please contact: Prof. A. Egeland, Inst. of Physics, Univ. of Oslo, P.O. Box 1038 Blindern, Oslo 3, Norway. The deadline for applications is 1 Feb 1980.

This study institute is divided into 9 subject areas which will provide the basic tutorial content for 1-day each. A limited number of informal research reports related to the scientific programme will be accepted. Admission is by application only and a letter to the Study Institute Secretariat (Egeland) should contain the following information: Name and citizenship, Address for correspondence, Present employer, Professional position and duties, Field of interest. Attendance will be limited to about 65 participants and applicants will be selected on the basis of the relation between their qualifications and the purposes of the study institute. There is no registration or tuition fee and limited funds are available for participants from the NATO countries. If financial support is needed, the minimum required should be stated in the application.

Scientific Programme:

1. Neutral polar atmosphere above the tropopause, Dr. Hans Volland
2. The polar ionosphere (F region), Dr. O. Stubbe
3. The polar ionosphere (D and E regions), Dr. Lance Thomas
4. Optical remote sensing of the polar atmosphere and ionosphere, Dr. G.G. Shepherd
5. Solar-Magnetosphere-Polar atmosphere interactions and auroral morphology, Dr. Juan Roederer
6. ELF, VLF and micropulsation in the polar regions, Dr. R. Gendrin
7. Electric fields and currents at high latitudes, Dr. T. Stockflet - Jorgensen
8. Applications of polar exploration, Dr. E.V. Thrane
9. Historical exploration: Long-term aspects of polar geophysics, Dr. G.L. Siscoe.

6th International Symposium on Equatorial Aeronomy (ISEA) --- the first announcement of this meeting, scheduled for 17-24 July 1980 in Puerto Rico, was just received from S. Matsushita, Ben Balsley and Henry Rishbeth. It is to be sponsored by URSI, IAGA, IUGG, COSPAR and several national organizations and will be held at the hotels Guajataca/Vistamar at Quebradillas near Arecibo Observatory. Among the broad range of topics anticipated for discussion are: problems in low-latitude aeronomy and geomagnetism, radio propagation problems such as trans-equatorial propagation, solar-interplanetary effects on equatorial aeronomy and climatology, and topics such as plasma bubbles, equatorial airglow, electromagnetic and dynamic interactions between high and low latitudes, and the dynamic coupling or interaction between the thermosphere and middle atmosphere as observed by the MST radar technique (see Ground Based program details in this NL).

Those interested in attending the 6th ISEA should return a form (send a note) to the organizers by 31 December 1979. These responses will be used in planning the meeting. Final deadline for abstracts will be April 1980. The registration fee will be about $35, rooms for 2 persons will be about $35/night and meals will cost about $15/day. A detailed brochure will be mailed around Feb 1980 to those responding. Efforts are in progress to raise money to provide financial support for key scientists (preferably from developing countries) for traveling expenses. The worldwide economic situation does not give cause for high expectations in this area but the organizers are hard at work on this important task. For details please write: Dr. S. Matsushita, NCAR-HAO, Boulder, CO 80303, USA.

REPORTS & PUBLICATIONS

Fourth Consolidated GUIDE TO INTERNATIONAL DATA EXCHANGE through the WORLD DATA CENTERS --- In June 1979 the International Council of Scientific Unions' Panel on World Data Centers (Geophysical and Solar) issued the 4th in the series of Consolidated Guides to International Data Exchange. WDC-A in Boulder sent copies to many scientists and groups who are sources of data sent to us or who are major "customers" for data from WDC-A. The ICSU Panel sent copies of the new Guide to the international unions, committees and commissions which were involved in its preparation.

In some 113 pages the bright yellow book (no longer "the green book" of past years) sets forth the international understandings regarding the basic principles of the World Data Center system and the regular and special data exchanges for the various disciplines. The basis for the system of WDC's is essentially unchanged since they were instituted for the IGY; however, the disciplines covered have, in many cases, experienced revolutionary change over the two decades since IGY. In addition to sections of general information and an explanation of the current status of the international bodies responsible for maintaining and updating the sections of the Guide, there are the detailed descriptions of the data exchange agreements for Solar-Terrestrial Physics, Rockets and Satellites, Meteorology, Oceanography, Glaciology, and Solid-Earth Geophysics. Each of the six technical data exchange sections is divided into detailed subsections according to the format prescribed by the drafting bodies. Finally, there are lists of instruction manuals and data handbooks, data catalogues, and addresses of the World Data Centers.

Launch Summary for 1978 --- The National Space Science Data Center/WDC-A for Rockets and Satellites published in August 1979 the listing of reported launches of sounding rockets and of artificial earth satellites and space probes. R.W. Vostreys compiled the publication. Covered are all launches reported in conformance with the COSPAR agreements in regard to exchange of such information (as set forth in the ICSU Guide described above). Besides the extensive launch information, the report (79-4) also gives launch sites, experiment and instrument codes, and lists of all experimenters associated with the sounding rocket launches. Copies of this report may be

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obtained from Dr. J. Vette, Director NSSDC (see address on the front page of this NL).

CDAW Report --- NSSDC/WDC-A-R&S/IMS SSC has published report 79-02 (May 1979) "An Evolutionary Approach to the Group Analysis of Global Geophysical Data." In some 50 pages it provides a very detailed description of what and how a CDAW is conducted, based upon CDAW-1.0 (Dec 1978). Besides the information relating directly to the science for which the CDAW's are conducted, there is much information on cost comparisons for conducting this type of intensive data analysis. We greatly commend this report to anyone interested in this emerging approach to the computer-intensive analysis of multi-disciplinary data.

UAG Reports --- WDC-A for STP is facing a requirement to consolidate our collection of printed material. We have a limited number of extra copies of UAG Reports: 18 - Study of Polar Cap and Auroral Zone Magnetic Variations; 22, 29, 31, 33, 37, and 59 - AE Indices for 1970, 68, 69, 67, 66, and 1974, respectively; 62, 63, and 64 - Preliminary AE Indices for Feb, Mar, and Apr 1976. Copies are available free of charge from WDC-A for STP, NOAA D63, Boulder, CO 80303, USA. Remaining extra copies will be disposed of in January 1980.

SMS-GOES Position Report --- Dr. Carlene Arthur, CIRES, is working in the Boulder scientific community at the University of Colorado's CIRES and at NOAA's Space Environment Lab and the NGSDC. In part of her research she has been using data from the SMS/GOES Space Environment Monitoring package (X-rays, Energetic Particles, and Magnetometers) and has often found it important to know when the data with which she worked came from different satellites in this series. Also, because the satellites have each been relocated several times, she was often needing to know where the data was acquired. To answer these recurring question, Carlene prepared a computer program that assembled the necessary information and displayed it graphically. She soon had several requests for copies of this information from others here in Boulder and decided to prepare this report. It is published at NOAA Technical Memorandum ERL SEL-54, "SMS-GOES Satellite Position and Data Availability". Anyone wishing a copy may write to her at Space Environment Laboratory, Boulder, Colorado 80303, USA.

Quantitative Modeling of Magnetospheric Processes --- The Proceedings of the conference of the same title (held 19-22 Sept 1978 in La Jolla, California) are published as Geophysical Monograph 21, W.P. Olson, Editor, American Geophysical Union, 1979. If the talks and discussion in the meeting were as informative as the published versions, this must have been a very worthwhile meeting for all participants. The book (655 pages) is divided into 8 topical areas which span the range of subjects naturally related to modeling the magnetosphere in a quantitative, analytical way. While a comprehensive review is not possible here (has this already been reviewed in EOS or elsewhere?), we can reproduce the section headings under which as many as 10 review and contributed papers may be found, including a useful Overview that leads-off each section.

1. Magnetic Fields
2. High Energy Particles
3. Electric Fields
4. Low Energy Particles
5. Modeling Techniques
6. Modeling Applications
7. Review of July 29, 1977 Substorm
8. An Annotated List of Existing Quantitative Models of Magnetospheric Particle and Field Features.

We quote briefly from Bill Olson's Introductory Remarks to give some of the intent and flavor of this meeting which seems to be regarded as very successful by those who participated (M. Candidi attended from the IMSCIE Office). "Quantitative models may be purely empirical, that is based on data sets, semi-empirical, that is relying on physics whenever appropriate and available, but the "holes" being filled in with data as necessary, and finally purely physcial models. It was apparent at the meeting that most current quantitative modeling efforts at this point in time are semi-empirical. This is partly because the physics of the magnetosphere is not yet entirely understood. At the same time, however, there is a large user community that needs models that can accurately describe magnetospheric features. The preponderance of semi-empirical models results because current data sets describing various magnetospheric features and processes are limited. The is some additional discussion of this topic in the section summaries. In particular, Cauffman in his introduction to the electric field section makes the useful distinction between "explanatory" and "representative" models. It is believed that all kinds of modeling will continue because of the various needs of the model user community."

The introduction continues to cover briefly each of the topical areas of the meeting/proceedings but also stresses two areas not covered there and which may be included in future meetings. They are:

1. "The subject of where to break into the 'interactive particle-field' loop was not considered in detail. The problem may be described as follows. The magnetospheric magnetic field is largely determined by several magnetospheric current systems, which are in turn the result of motions of low energy charged particles. These are in turn the result of motions of low energy charged particles. These motions are influenced by the magnetic field and sometimes, more importantly, by the electric field that resides in the magnetosphere. The currents produced by these particle motions contribute to the magnetic field and are in turn determined by the magnetic field. Thus, there is the need to solve the particle-field interaction problem in a self-consistent way. Other self-consistency problems were mentioned at the meeting. For example, it was suggested that it is not sufficient to simply calculate the magnetopause currents but instead it is necessary to accurately determine the entire bow-shock, magnetosheath magnetopause interactions with the solar wind in order to quantitatively represent the flow of energy between the magnetosphere and solar wind. However, again, the magnetopause shape and current and the solar wind must be considered simultaneously in some self-consistent way in order to accurately determine the problem. There are many such "loops" that must be considered before the quantitative descriptions of many magnetospheric processes can be obtained. PApers were presented which considered magnetic and electric fields and charged particles simultaneously; but there does not at present exist a self-consistent model that quantitatively determines the interaction of the magnetosphere with the solar wind and interplanetary magnetic fields to the extent that it can be used to describe such magnetospheric processes as the substorm and magnetic storm."

2. "The other subject that was omitted in the formal presentation, but arose in several contexts, concerned the use of indices and input parameters to the models. In the past decade or two, it has been popular to use magnetic indices as inputs to various magnetospheric models. The reason for this centers around the positive correlation between such indices as Kp and various observed magnetospheric parameters. It is not surprising that the correlations exist, but it is also clear (based on our current physical understanding of the magnetosphere) that there is not necessarily any direct causal relationship between the observed magnetospheric feature and variations in these magnetic indices. Rather, these indices describe roughly the variation in some magnetic parameter at the earth's surface with time. Obviously these observations are produced by many changes in magnetospheric current systems and other magnetospheric processes. What is required for the input to these quantitative magnetospheric models is the proper set of physical parameters."