International Council of Scientific Unions

SPECIAL COMMITTEE
ON
SOLAR-TERRESTRIAL PHYSICS

77-2

President: Dr. Francis S. Johnson *Vice-President:* Dr. J. W. King *Secretary:* Dr. E. R. Dyer

INTERNATIONAL MAGNETOSPHERIC STUDY

J. G. Roederer, Chairman IMS Steering Committee
JOE H. ALLEN, HEAD, TEMPORARY IMS CENTRAL INFORMATION EXCHANGE OFFICE
WORLD DATA CENTER A FOR STP, D64 NOAA, BOULDER, COLORADO 80302, USA

IMS NEWSLETTER

Notice our new letterhead, next time, please. IMSCIE Office is very pleased to have Dr. A. Konradi, NASA Houston, in residence as our new Associate. This contribution of NASA and personal contribution of Andrei is appropriately noted in our new letterhead; however, our printer had already run-off some 2000 cover pages in order to be ready for a speedy execution of NL 77-2 (24 hours from manuscript to sealed envelopes). We'll share this front page space to convey the thanks of the IMS Steering Committee to their ESA/ESTEC hosts, Dr's. Trendlenburg and Page, for the hospitality and other assistance tendered during the 8th IMS Steering Committee Meeting (see page 7). IMSCIE Office also acknowledges the unrecognized workers so necessary of these NL's each month: Candy Mobley, Charlie Samora, Mark Henning, Peg Yotka, Jerry Kisslinger and the more Senior scientific staff who occasionally help out with such tasks as stuffing envelopes, etc.

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PROGRAM PLANS FOR FEBRUARY 1977 - APRIL 1977

SPECIAL IMS SATELLITE PERIODS

Times of Satellite Conjunctions from SSC Report No 7, Oct 76, pg 15 (also in IMS NL 76-11, pg 3).

Feb 2, 0700 UT to Feb 6, 0400 UT	5 boundary crossings in 5 hrs, mult satel in tail
Feb 7, 0800 UT to Feb 8, 0100 UT	7 satel in sheath 9 hrs, 4 boundary crossings in 2.5hr
Mar 4, 0600 UT to Mar 8, 1000 UT	satel in sheath, cusp & tail, 14 boundary crossings
Apr 2, 0700 UT to Apr 4, 0000 UT	4 bndry crossings in 3 hrs; 3 satel in tail for 13 hrs

At SSC suggestion, start and end times of "idealized" periods of interest have been extended by 6 hrs to allow for possible motion of the boundaries and cusp region or later adjustment of orbit parameters.

GBR Campaigns: (numbers refer to program details in IMS Bulletin No 2 or in references in these NLs)

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

------ to Mar 4; B-3; Bjorn (S-18 "D-Layer"); Kiruna/ESRANGE; ROCKET - Complex experiments see 76-11
------ to Mar 5; #0170; D. Evans; Poker Flat; ROCKET-29.003AE, resched Terrier-Malemute (A-7 in 76-1)
------ to Mar 21; #0308; Theile ("Polar High Atmosphere"); Andoya; ROCKETS (4) - Complex exper, 76-11
------ to Mar 31; A-32; L.G. Smith (Univ Illinois); Wallops Isl; ROCKETS (2)- 80-200 Km study, see 76-11
------ to Feb 14; #0131; Arnoldy, Cahill; Andoya; ROCKETS (2) - 18.1004UE, 18.1005UE Nike-Tomahawks
Feb 1 to Feb 28; B-9; Zipf; Ft Churchill; ROCKETS (3) - 31.001UA, 31.002UA and 14.500UA, aeronomy
Feb 1 to Feb 28; A-19; Williams; S Uist; ROCKETS (3) - P112H, P191H & P193H, note below
Feb 1 to Feb 28; #0085; Dickinson; S Uist; ROCKETS (2) - P189H & P192H, Neutral O2 & e- concentrations
Feb 1 to Feb 28; A-18; Woolliscroft; S. Uist; ROCKET - mass spectrometer
Feb 1 to Feb 28; B-14; Krankowsky; S. Uist; ROCKETS (2) - P194H, P195H, mass spectrometers
Feb 6 to Feb 25; #0164; Davis; Poker Flat; ROCKETS (2)- Nike-Tomahawk 18.1011UE & 18.1012UE, note below
Feb 7 to Mar 27; B-1; Witt (S-22 "Aurora"); Kiruna/ESRANGE; ROCKET - Complex experiments see note 76-11
Feb 7 to Mar 27; B-2; Holmgren (S-21 "Trigger"); Kiruna/ESRANGE; ROCKETS(4)-Complex experiments, 76-11
Feb 11 to Mar 16; B-8; Maehlum & Maynard ("Composition"); Andoya; ROCKET-over quiescent arc, note NL76-12
XXXXXXXXXXXXXXX; B-7; Matthews; Andoya; ROCKET - 18.211UE/IE --- launch postponed to May 1977
Feb 22 ; B-15; J.H. Carver; Woomera; ROCKET - 13.123IS, early morning E & lower F regions, note
Feb 22 - Mar 12; #0400; Fitz ("Stress"); Eglin; ROCKETS (11) - Ne/Ne distribution, note in NL 76-12
Mar 1 to Mar 31; B-10; Mentall; Ft Churchill; ROCKETS (2) - Nike-Tomahawk 18.1013GA & 18.1014GA, note
Mar 1 to Apr 30; #0327; Beghin ("IPOCAMP 2"); Heiss Island; ROCKET - MR12, E-layer studies, note below
Mar 6 to Mar 12; #0315; Venkatesan; Cold Lake (Canada); BALLOONS (3) - bremstrahlung X-rays, note below
Mar 7 to Mar 27; #0183; Haerendel ("Porcupine"); Kiruna; ROCKET - repeat of Aries launch, details 76-3
Mar 13 to Mar 27; #0400; Fitz; Poker Flat; ROCKET - Sergeant, field-widened interferometer
Mar 16 to Apr 8; B-11; Bernstein; Ft Churchill; ROCKET - 27.010 AE, complex exper, note below
Mar 16 to Apr 8; B-12; Hays/Sharp ("MAP-1"); Ft Churchill; ROCKET - 25.025 UE, aurora/nitric oxide study

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

No new starts of quasi-synoptic IMS observational programs announced to IMSCIE Office in January 1977

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

--- to May 31; #0304; Stuart; Multiple Sites; SURFACE- "Pulsations" program of magnetometers, NL 76-12
Feb 9 to Feb 22; #0205; A.V. Jones; Canada; SURFACE- meridian scanning photometers, note/map in NL 76-12
Feb 9 to Feb 22; #0454; Paulson; Canada; SURFACE - meridian scanning photometer, coord with #0205
Feb 9 to Feb 22; #0169; Eather & Mende; Canada; SURFACE - merid scan photom, coord with #0205
Feb 9 to Feb 22; #0414; Oguti; Ft. Churchill; SURFACE - high-rate auroral photography, note below
Mar 6 to Mar 12; B-13; Parsons & Berkey; Cold Lake (Canada); SURFACE - auroral TV, note below

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Program Planning Notes by Region, Feb - Apr 1977

GROUND-BASED, BALLOON & ROCKET PROGRAM DETAILS

Past NL's have given detailed programs descriptions for some of the 1-line references above. These will not be repeated below unless the IMSCIE Office has received new information.

HEISS ISLAND

#0327; Beghin, CRPE/CNRS and Pokhunkov, Gidromet, detailed note in NL 77-1, pg 2.

KIRUNA

#0183; Haerendel, "Porcupine" note in NL 77-1

ANDOYA

#0131; Arnoldy & Cahill, NL 77-1, pg 2

#0308; Theile, note in NL 77-1, pgs. 2,3

B-8; Maehlum & Maynard, "Composition", NL 76-12

B-7; Matthews, launch rescheduled to May 1977

SOUTH UIST

A-19; Williams; P112H Winter Anomalies & Stratwarms P191H,P193H Constitution of D-region, Lyman e- den

A-18; Woolliscroft, P73H, mass spectrometer

All S. Uist rocket launches shown in NL 77-1 for windows Feb 1 to Mar 31 have now been announced to have scheduled launch from Feb 1 to Feb 28, 1977. Included are: P112H, P191H, P193H,P189H,P192H, P73H,P194H and P195H. Rocket program labeled "MOPI" in NL 77-1 is not shown on latest S. Uist schedule.

WALLOPS ISLAND

A-32; L.G. Smith, Univ Illinois, NL 76-11

FORT CHURCHILL

B-9; Zipf, Univ Pittsburg, NL 76-12

B-10; Mentall & Gentieu note in NL 77-1, pg 3

B-11; Bernstein, note in NL 77-1, pg 3

B-12; Hays and Sharp, note in NL 77-1, pg 3

Distributed Sites in CANADA

#0205; Vallance Jones, note in NL 76-12, pg 7

#0414; Oguti, will record auroral activity with high speed, high-sensitivity photographic system at

Churchill in cooperation with Jones, et. al.

#0315; Venkatesan will launch 2 or 3 balloons from Cold Lake, Alberta, to study bremsstrahlung X-rays. B-13, Parsons & Berkey will record auroral activity using Image Intensifier Closed-Circuit TV system.

POKER FLAT

#0164; Davis, two Nike-Tomahawks to 450 km alt with Ba shaped charges for field line tracing. To be supported by low light level auroral TV at Ft Yukon and Chatanika incoherent scatter radar. Launches to be at evening or morning twilight.

EGLIN AFB

#0400; Fitz ("STRESS") in NL 77-1, pg 3

WOOMERA

B-15; J.H. Carver (Univ Adelaide) will launch 13.123IS (Aerobee 170) to study early morning development of E and Lower F Regions. Detectors to be carried are: Pair of mass spectrometers for ion and neutral constitutents; Multi-channel visible, near ultraviolet and near infrared airglow photometer; Grazing-incidence spectrometer for solar EUV flux and atmospheric dentsity; Ultraviolet spectrometer for solar UV flux and molecular oxygen density; Ion chamber ultraviolet detectors for molecular oxygen density; Proportional counters for X-ray intensity and total atmospheric density; Differential electrostatic analyser for low-energy e- spectrum; and Retarding potential analysers for e- and ion density and energy spectrum.

ACTUALITIES

IISN - Multinational program of coordinated incoherent scatter radar observations with a common plan for recording the same type data at each of these sites (see NL 76-3, pg 4). Monitoring observations are usually on the Regular World Days of each month as listed in the IUWDS International Geophysical Calendar. The dates and types of observations given here for part of 1976 are from the French system with transmitter at St Santin and receivers at Nancay, Monpazier and Mende. The Project Scientist is P. Bauer (#0004), CNET.

Sept 20 0800 UT to 21 1200 UT - E-fields with high resolution; day: 200-225-250-300 km; night 275-325-350-400 km. Good results at the three stations.

Oct 19 0600 UT to 21 2100 UT - On 19th: fixed point, 110 km for all three stations. On 20th: F Region (165-450 km). On 21st: Complete profiles (120-500 km), plasma lines. Good results at all three stations. On 23 0200 UT to 0600 UT: additional experiment at Mende and Monpazier during solar eclipse.

Nov 16 0500 UT to 18 1900 UT - On 16th: F Region, (90-200 km). On 17th: Complete profiles (100-500 km). On 18th: Complete profiles at Mende and Monpazier; Plasma line at Nancay. Night: 275-500 km. Good results at all three stations.

ANDOYA

#0474; Rees "1st High Latitude Campaign" (U.K.) detailed in NL 76-11, pg 2, launched SL1425 (Skylark 12) from Andoya at 001438 UT, 11 Dec 1976. It reached an apogee of 694 km and all experiments worked successfully. Rocket F5 (Fulmar) was launched at 024024 UT, 11 Dec 1976. It reached 213 km alt instead of the planned 269 km. Neutral wind, LIDAR tracking from Skibotn, 3-axis magnetometer all successful. Both launches coordinated successfully with airglow observations from Skibotn by Smith (#0115).

CANADA

#0454; Paulson (see NL 76-12, pg 7) reports Univ of Saskatchewan staff were to make geophysical observations from La Ronge between Jan 13 and Jan 25, 1977. Instruments in operation during the dark part of the day: All-sky camera, meridian scanning photometer, induction coil magnetometer and fluxgate magnetometer. The latter 3 record on 9-track digital tape and these data will be made available. ASCA film will be sent to A.V. Jones. A similar expedition is scheduled for February 1977.

#0031; Shepherd installed a 4-channel interference filter photometer and a scanning Michelson interferometer in a portable shelter at Cambridge Bay in late Nov 1976. The photometer was operated during Dec 1-18 and detected low levels of auroral intensity. The photometer and Michelson interferometer were to be operated together from 28 Dec 1976 to 15 Jan 1977.

#0087; Forsyth reported on satellite radio beacon experiment results from observations at Cape Parry, NWT, and Cambridge Bay during July 1976. An abstract is in this NL under IMS Science.

POKER FLAT

#0170; Evans launched 29.003AE at 101910 UT, 14 Jan 1977 (see NL 76-11, pg 3 for program details).

#0064; Scherb & Lynch launched 29.004UE on 18 Jan 1977 but the vehicle (Terrier-Malemute) failed.

(more Actualities on page 4)

Last Minute Program Announcements -- A telex received just as the NL 77-2 was nearing completion brought information from Prof. V.V. Migulin on the rocket program and radar sounding of the polar upper atmosphere which are being carried out as part of Soviet-French cooperation in the field of space meteorology and aeronomy at Heiss Island.

1. Study of the thermal balance of the polar thermosphere at 80-180 km

Dynamic parameters at 120-160 km are measured with the help of artificial clouds. The electric field is determined using a double electrostatic probe. Particle fluxes are measured using channeltrons and solid state detectors. The temperature and concentration of natural sodium at 80-100 km is found by means of laser sounding. Four MR-12 rockets are to be launched. The program leaders are Dr. G.F. Tulinov of the Hydrometeorological Service of the USSR and Dr. M.L. Chanen (#0159) of the Aeronomy Service, CNRS, France.

2. Study of polar ionospheric phenomena

The measurements include electron concentrations and electron temperature. Neutral and ion compositions are measured with a mass spectrometer. Particle fluxes are measured using channeltrons and solid state detectors. Four MR-12 rockets are to be launched. The program leaders are Dr. S.I. Avdyushin of the Hydrometeorological Service of the USSR and Dr. C. Beghin (#0327), CPE/CRPE, France.

Rocket launches are planned for February - March 1977. Laser sounding of the upper atmosphere will be carried out during the period from December 1976 to March 1977.

PORCUPINE 2 -- Haerendel (#0183) sends word that launch will be from Kiruna/ESRANGE between March 7 and April 3, 1977. Failure of Porcupine 1 is thought to be due to excessive heating during high-g flight (13 g's). With a new heat sink, a test flight of an Aries was successful on Dec 16. Payload of Porcupine 2 will be nearly identical to the first rocket (NL76-3, pg 2). The Barium ion jet (exp 11) will ignite at 374 sec after launch, about 455 km alt.

Coordinated optical or other geophysical observations are strongly encouraged. Real-time launch status information and launch time notification can be arranged. Please contact G. Haerendel, MPI fur Extraterrestrische Physik, Garching, telephone (089) 3299-516, telex 05215845, before March 1. Afterwards, contact via ESRANGE, Sweden, telephone (980) 21150, telex 8744.

ACTUALITIES

Certain Preliminary Results of the Expedition "SIBERIA-IMS-76" --- A.I. Yeruschenko, Ye.A. Ponomarev, R.A. Rakhmatulin and V.D. Urbanovich. In accordance with the announced IMS program, a number of the Institutes of Siberia and the Far East have conducted the complex high-latitude expedition "Siberia-IMS-76" during February - March 1976. The major region of operations was within 62 -80 N and 88 -160 E. The SibIZMIR took part carrying out all planned types of observations along the Norilsk chain of stations (see map) and also helping with staff and equipment in separate types of observations at some locations in the Yakutsk region. Table 1 shows the distribution of the basic types of observations carried out by the SibIZMIR. Table 2 shows the calendar of observations (days marked X) for Magneto-Variation Stations, photometers, auroral visual observations, ionospheric and infrasonic observations. Results from these studies gave an evaluation of the geophysical situation and provided the basis for a compilation of a catalog of characteristic geomagnetic, auroral and infrasonic events.

Besides the types of observations given in Table 1, the standard or more extensive observations of parameters of the ionosphere and cosmic rays were conducted in Norilsk, the conditions of radiowaves propagation were also studied there. Observations of geomagnetic variations were carried out additionally at points: Zhokov Island, Kotelny Island, Batagay, Batagay-Alyta and Zhigansk.

The SibIZMIR helped to carry out auroral and geomagnetic pulsations observations at Tixie, radar measurements at Zhigansk and ionospheric observations at Yakutsk. Recordings of infrasonic observations were made at Tixie and Badarakh.

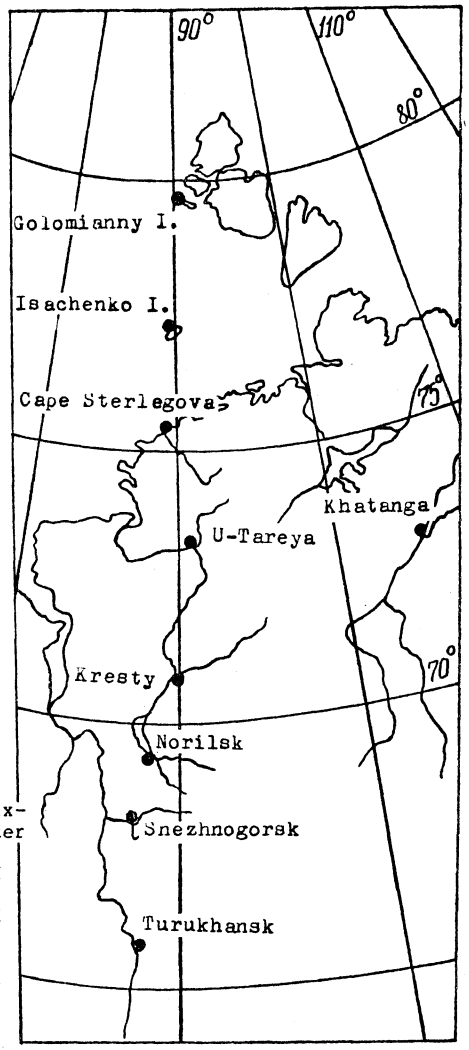


Table 1 — Types of Observations

Station	Magneto-variation station (MVS)	Zenith Photom	Scanning Photom.	C-180 Camera	Flux-meter
Golomyanniy Island	X	X		X	X
Isachenko Island	X	X			
Cape Sterlighova	X	X			X
Ust-Tareya	X	X			
Kresty	X	X			
Norilsk	X	X	X	X	X
Snezhnogorsk	X	X	X		
Turukhansk	X	X			
Khatanga	X				

Table 2 — Dates of Observations

Station	Instruments	February 10 - 29, 1976	March 1 - 31, 1976
Golomyanniy Island	MVS	XXXXXXXXXXXXXXXXXXXX	XXXXX--XXXXXXXXX-X-X--XXXXX-XX-
	Photometer	---XX--X-XXXX-X-X-XX	XXXX-XXX-XX--XXXXXX--X-----X---
	Fluxmeter	XXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX-
Isachenko Island	MVS	XXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX-
	Photometer	---------XXXX-XXXXXX	--XX-XXXXXX-----XXXXXX---XXX---
Cape Sterlighova	MVS	---------------XXXXX	-X--XXXXXXXXX-XXXXXXXXXXXXXXX-
	Photometer	---------XXX-XX-XXXX	XXXXXXXXXXXXXXXXXXX-XXXXXXXXX-
	Fluxmeter	XXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX-
Ust-Tareya	MVS	XXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX-
	Photometer	XXXX------XXXX-X----	XXXXXXXXXXXX-XXXXXXX-XXXXXXX---
Kresty	MVS	---------XX---X-----X	XXX-XXX-X-XX-XXXXXXXXXXXXXXXX-
	Photometer	---------XXX--------	XXX--X-XXX-----XXXXX-----XXXXX-
Norilsk	MVS	XXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
	Photometer	XXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
	Fluxmeter	---XXXXXXXXXXXXX-XX	XXXXX-XXXXXXXXXXXXXXXXXXXXXX-
	Visual aurora	----X-----XXX-------	XXXXX---XXXX---X-XX---X--XXX--X
	Ionosphere	XXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
Snezhnogorsk	MVS	--XXXXXXXXXXXXXXX-X	XXXXXXXXXXXXX-XXXXXXXXXXXXXX-
	Photometer	XXX-XXX---XXXX-X--X-	XXXXX-XXXXXXXXXXXXXXXXXXXXX-
Turukhansk	MVS	----X--XXXXX-XXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXX-
	Photometer	---------XXXXX-X----	-X-XX--XXXXXXXX-XX-XX-XXXXXXXX-
Khatanga	MVS	--X-XX-XXXXXXX-XXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXX-
Tixie	Infrasound	----------------X--	-----XXX-------XXXXXXXXXXX-XXX

IMS Data Services - 1976 was a startup period for the IMS Data Services to be carried out by NOAA/EDS/NGSDC which operates World Data Center A for STP. There follows a brief survey of accomplishments and other items in this NL present examples of IMS data products.

Magnetometer Data

Analog: conversion of most computer programs for processing digitized magnetogram values to the new 1-min standard sample interval (rather than the 2.5-min interval which was a world standard for many years). 1-minute processing is now being used for digitizing 1975 data in regular NGSDC programs such as the derivation of AE(12) indices. Also, we have begun to use the new sample interval in preparing common-scale magnetograms for publication in Solar Geophysical Data and in IAGA Bulletin 32. For 1976 geomagnetic data, we are using the 1-min interval data for deriving preliminary AE indices using the earliest auroral zone magnetograms that come to WDC-A for STP during months of the IMS.

Digital: we have gained experience in archiving and providing user services with original digital magnetometer data from three of the networks that will be active in N. America during the IMS: U.S. Geological Survey, Univ. of Alberta and Dept. of Energy, Mines & Resources, Canada. Programs are now operational to plot 1-min magnetometer data in the format of standard magnetograms (almost) and as component stack-plots to the IMS time scale of 1 cm/hr. These plots are presently on paper (CALCOMP) but programs exist to use microfilm output when and if a new system with high resolution becomes available to us.

Data Formats

We have participated in several planning meetings on the standard formats for data from the U.S. magnetometer networks. While we do not yet have a sample of the 10-sec data to be produced by the new systems, we are working with staff of NOAA/ERL/SEL to anticipate ways of smoothing the entry of this new data format into archives.

Data Exchange

Almost all of the expected western hemisphere experimenters have been contacted and general (in some cases specific) plans for sending data to the WDC have been developed. J.H. Allen visited the USSR in May 1976 for many specific talks on data exchange with USSR networks. Sample magnetic and paper tapes were delivered to WDC-B at their request and further exchanges of such digital data have followed from this initiative. At the Geomagnetic Meridian Project Symposium in Leningrad, contact was made with Scandinavian and German scientists whose networks will be collecting data during IMS.

Data Products

In addition to the magnetogram stack-plots, an important new data product has been developed from groundbased geomagnetic network data. Contour plots of equipotentials (equivalent ionospheric currents) on a hemispheric scale have been derived from data from 82 stations at 1-minute intervals for a 36-hour period during which several large substorms occurred. Two alternative methods are now available to us for these computations and we are evaluating program accuracy, efficiency, etc. Results from the first study are available in the form of a cine-film and also as a publication (10-min plots) in the WDC-A UAG Report series. Another new product is a plot of hemispheric mid-latitude H-component magnetic variations during disturbed times. These are available in both cine-film and summary UAG Report format.

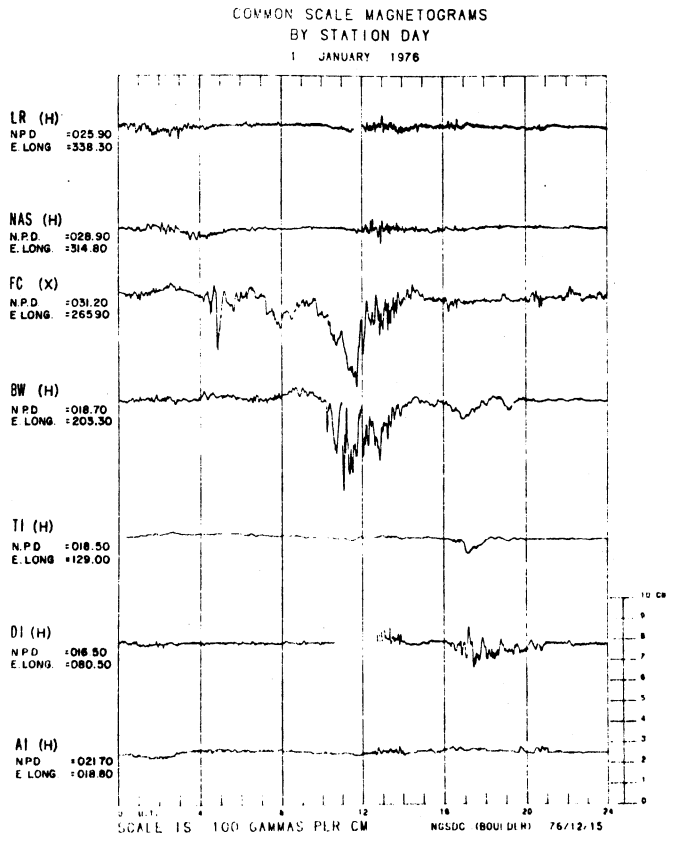
IMS Central Information Exchange Office

In December 1975, we were asked by the international IMS Steering Committee, as an emergency item, to provide a central information exchange mechanism for the IMS. This entailed obtaining IMS program information from about 40 participating countries with programs scheduled to begin in 1976. We particularly concentrated on learning about rocket, balloon and ground campaigns because these offer the greatest possibilities for cooperative rescheduling to take advantage of overlapping launch windows and interest in mutual coordination. The IMSCIE Office (we were TIMSCIE that first year) ascertains program actualities as well as plans -- what observations were actually carried out successfully. This and other information relevant to IMS is being distributed to more that 1600 IMS participants and interested persons through a monthly IMS Newsletter. This effort has been well received in the scientific community even though the demand of about 2 man-years/year has somewhat slowed the running start we had planned for IMS Data Services.

First WDC-A IMS Data Publication

As a prototype of possible future IMS data publications, WDC-A for STP has in preparation a UAG Report covering auroral zone geomagnetic variations data for January 1976. 1-min digital data (either from analog magnetograms or original digital recordings) from 7 observatories evenly spaced around the northern auroral zone have been combined to produce stack-plots for the whole month and for each day of the month, plots and tables of "preliminary" AE(7) indices, and new plots showing the frequency with which each observatory contributed AU (or AL) for each minute of the UT-day. Also shown is the cumulative amplitude and average amplitude by UT time-of-day for each minute when the station was a source of AU (or AL).
Shown below is the stack-plot for 1 January 1976, for the H (or X) component. Only Barrow and Fort Churchill (BW and FC) are from original digital fluxgate recordings.

We plan to distribute this first IMS data publication to everyone receiving UAG Reports, SGD, or these Newsletters. If prompt availability of such preliminary geomagnetic data in published form seems useful, we will continue with monthly issues but work toward having them available within 4 months from the time covered.



Satellite Information

A. Durney, ESA/ESTEC, has shared with the IMSCIE Office a report on the International Magnetospheric Explorer Project. This booklet contains a most complete description of the whole ISEE mission including objectives, information about the data pool tapes which are intended for cooperating scientists such as those participating in the IMS, with GEOS or other "outside" groups. The data pool tapes will provide low time-resolution data for quick intercomparison or indexing of other data (not for data reduction). Type and quantity of data to be on the pool tapes are listed (pgs. 8 & 9) and detailed descriptions of the spacecraft and the experiments on them are given.

Durney mentions that he has a supply of these books and will glady share them with any who ask. Please write to: Dr. A.C. Durney, ESA, ESTEC, Domeinweg, Noordwijk, The Netherlands.

New SSC Report -- The IMS/Satellite Situation Center has just published Report No. 8 (Dec 1976) "Orbit Plots and Bar Charts for Prognoz 4, Days 1-91 1976". Orbit elements for Prognoz 4 for the months Jan - Mar 1976 were used to derive a set of plots similar to those shown in IMS NL 76-10, pg 5. These display the day-by-day position of this satellite relative to the magnetospheric boundaries and regions. This information is most concisely presented in the "Bar Charts" that the progressive passege of Prognoz 4 from one region to the next with several information sets stacked in the bar. This is the same form of SSC chart that will later be used to display the satellite's location during intervals when data was being recorded. In addition to the plots, some discussion is given of orbit characteristics and there is a detailed list of experiments and principal scientists.

IMSCIE Newsletter Deadlines -- We will plan to send completed NL manuscripts to the printer on these dates: Mar 2, Mar 30, Apr 27, May 25, Jun 29, Jul 27, Aug 24, Sep 28, Oct 26, Nov 23, and Dec 21.

IMS SCIENCE

JAPAN

Japanese support for the International Magnetospheric Study has been very great (see lists of ground-based programs in NL's 8, pg 5, and 9, pg 4). As early as 1973, they began a yearly schedule of IMS Symposia/Work Shops. Here scientists participating in IMS met to discuss research plans, international collaboration and results "hot off the computer". The Institute of Space and Aeronautical Science of the University of Tokyo has recently published "Proceedings of the IMS Symposium, 1976" (in Japanese). This 256-page book covers details of Japan's IMS program and gives preliminary results on: (1) Structure and dynamics of the plasmapause, (2) Aurora flare - magnetospheric substorms, (3) Earth corona, (4) Solar plasmasphere, (5) Active areas of the Sun and (6) Synthetic analysis.

USSR

The following contribution was received from the USSR: There is a very good relation between the irregular variations in the length of the Earth's day and the sector structure of the interplanetary magnetic field (IMF), communicate Prof. Yu. D. Kalinin (#0210) and Dr. V.M. Kiselev from Institute of Physics (Krasnoyarsk, USSR). This statement is based on the calculation of the correlation coefficient ρ between the annual values of the irregular variations in the diurnal rotation velocity of the Earth ($\partial\omega/\Omega$) and annual values of the index L from 1926 till 1973. This index is L=N-to:N-away, where N-to and N-away are equal to the number of days in the year with IMF directed to or away from the Sun, respectively. The data about IMF was extracted from the well-known Svalgaard catalogue. The value of ρ was found to be equal to 0.83 (!). Moreover, the correlation coefficient was calculated for the 210 pairs of monthly values $\partial\omega/\Omega$ and L for the period from April 1957 till September 1974. In this case, the variations in ω with periods less than one year were excluded and the values of L were based on the direct measurement of the IMF in Space. The value of ρ was found to equal 0.77 when the changes of $\partial\omega$ are behind (lag) the changes of L by 5 months. Kalinin and Kiselev conclude, "It will be interesting to verify these results on the basis of the new data for the period IMS."

CANADA

B.W. Currie, Canadian IMS Coordinator, sent the IMSCIE Office a copy of the Canadian IMS Newsletter for January 1977. In it is an abstract from a recent report by P.A. Forsyth (#0087) about satellite measurements of polar ionospheric irregularities. With acknowledgements to Currie and Forsyth, a selection from that abstract is included here. -- In July 1976, expeditions were conducted simultaneously to Cape Parry, NWT, and Cambridge Bay. The equipment at Cape Parry consisted of the system used in 1975 at Cambridge Bay but with some modifications dictated by that year's experience. It consisted of a dual-frequency, differential angle-of-arrival system capable of resolving the refraction suffered in the ionosphere by radio waves at frequencies of 150 and 400 MHz. The sources of these signals are the coherent radio beacons carried aboard the NNSS ("Navy Navigational Satellite System") series of polar-orbiting satellites.

At Cambridge Bay, the 400 MHz receiver was connected to a short base line interferometer antenna to permit direct determination of the satellite location. Spaced receivers were used at 150 MHz to permit direct determination of irregularity height. During two weeks of operation, more than 70 hours of magnetic tape recordings were obtained at each station (digital at Cape Parry, analogue at Cambridge Bay). Most recording periods were simultaneous at the two stations.

Objectives of this program were: (a) To gain information about the height distribution of irregularities in the cleft - in order to assess the energy spectrum of the precipitating particles. (b) To gain information about the size, strength and height distribution of irregularities in the convection region - in order to assess the nature and strength of the E-fields in the cleft and in the adjacent region of the polar cap. (c) To compare the characteristics of the ionospheric irregularities in the cleft to those of irregularities in the night-time polar cap. (d) To observe simultaneously two geographically separated parts of the cleft - in order to separate geographical and temporal variations.

Analysis of all the recordings will require some months; however, all have been through preliminary processing and it seems likely that there are sufficient records to support each type of analysis for the objectives outlined above. For example, it is already clear that the height distributions of irregularities are markedly different in the cleft and in the night-time polar cap. These observations represent a new and relatively inexpensive technique for study of the morphology and dynamics of the magnetospheric cleft. As such, it is important that they be reported early and publications are planned on each aspect of the observations as the analysis proceeds. Also, it is important that this observational technique be further exploited.

For the summer of 1977 (N. hemisphere), at least one expedition will be conducted to the most favourable location (Cambridge Bay). This expedition would use a new configuration of the equipment to incorporate all the features used separately in 1976 at Cape Parry and Cambridge. Improvements will be made in several ways to increase the proportion of useful observations. It would be valuable to arrange for use of this technique in conjunction with optical or rocket observations of the cleft.

Dr. N.R. Parsons (B-13), Univ. of Calgary, has announced the objectives and preliminary results of cooperative IMS studies with Norwegian scientists based upon data collected during intervals near the end of 1975. Ground-based images of dayside aurora were obtained using high sensitivity television equipment. Some 23 hours of video tape were recorded from 23 Nov to 8 Dec 1975, at Ny-Aalesund, Spitsbergen. Simultaneous observations were obtained during 17 ISIS-2 satellite passes. Preliminary processing of the meridian scanning photometer data has been accomplished but quantitative analysis is delayed until data tape noise sources have been identified. Heikkila's soft particle spectrometer experiment was turned on during the transits, but that data has not yet been processed. The energetic particle experiment was not operational.

Objectives of this (and possibly future studies of similar content) are: (1) To carry out observations of the dayside auroral phenomena from a high-latitude site in the region of the dayside magnetospheric cleft using ground-based television techniques; (2) to coordinate such observations with overhead orbits of the ISIS-2 satellite near local magnetic noon; and (3) to investigate the response of the dayside cleft to changes in the IMF and to substorm activity on the nightside of the auroral oval.

Preliminary intervals of substorm activity on the nightside of the oval have been identified from Yellowknife and Churchill magnetograms. These will be supplemented with Alaskan meridian all-sky camera data to define periods for detailed study of the auroral TV imagery. Interplanetary magnetic field data from Explorer 50 satellite has recently become available to the scientific community. When this is obtained, we intend to study cleft response to changes in IMF. DMSP auroral imagery has been obtained for the interval and appropriate data isolated (Ed. note, DMSP data is available from the U.S. National Geophysical & Solar-Terrestrial Data Center, Boulder, Colorado 80302, USA).

Results from a study of brightness fluctuations in quiet auroral arcs are being prepared for publication using certain of the dayside TV data. This was processed using fast Fourier transform techniques. Other studies of a cooperative nature and currently in progress are: (1) HF radio noise bursts and their associateion with auroral configuration; (2) morphology of the dayside aurora; (3) comparison of the neutral wind motion using optical and radio techniques (with E. Leer, Univ. Tromso); (4) visual and photometric characteristics of an active auroral arc (with O. Harang, Univ. Tromso); and (5) comparison of the optical emissions of the dayside aurora using simultaneous satellite and ground-based measurements (with C. Anger and O. Harang, Univ. Tromso). Early results have been reported in talks or brief papers and, until possibilities improve for a second expedition, efforts are concentrated on concerted data analysis.

USA

Each month the IMSCIE Office receives from M. Baron (#0067) a list of the Chatanika radar scheduling for the following month. While we have not been able to reproduce this information in past NL's, we include it here to illustrate the range of program interests served by this facility and some of the scientific interests in this active IMS area.

Requests received for radar time:
Experiments 1 - 5 are by Foster and Stiles (Utah State University)

1. Altitude dependence of plasma convection velocity.

2. Temporal evolution of the convection electric fields associated with the formation of the main plasma trough in the evening sector.

3. Identify equatorward extent of the mid-latitude trough and investigate convection velocities in that region.

4. Investigate association of lower E-region density fluctuations with pulsating auroras.

5. Pattern and behavior of plasma convection in region of dayside polar cusp.

6. SRI (J. Kelly/V. Wickwar (#0067)) -- 24-hour synoptic experiment in association with world-wide electric fields program on 16 Feb.

7. University of Alaska/SRI (M. Rees (#0277)/V. Wickwar) -- Coordinated experiment with UA spectrometer to investigate photodissociation of O2 causing 6300 A emission of O.

8. UA/SRI (M. Rees/V. Wickwar) -- Input/output experiment to model effects of auroral precipitation using combined radar spectro-photometer observations. Three 1-hour experiments to sample variety of auroral conditions: (a) diffuse evening aurora, (b) hard morning aurora and (c) discrete arc.

9. SRI (R. Tsunoda(#0384)/R. Vondrak (see #0067)) -- Magnetospheric-ionospheric coupling studies using Chatanika radar, Homer radar and various satellites in a series of coordinated experiments.

10. SRI (O. de la Beaujardiere/C. Rino) -- Coordinated measurements with the Wideband satellite (see NL 76-7, pg 4). One experiment per week coinciding with high-elevation satellite pass.

11. UA/SRI (H. Nielsen/M. Baron (#0067)) -- Coordinated measurements with shaped charge barium release, launch window 5 Feb to 25 Feb during twilight conditions.

Approved Chatanika schedule, Feb 1977 -- Exp's 1-5, 90 hours radar time from 24 Jan to 4 Feb. Exp 6, approved for Feb 16. Exp 7, to be combined with 11 if possible. Exp 8, approved if it is appended to beginning or end of any other. Exp 9, approved for 70 hours radar time from 23 Feb to 4 Mar. Exp 10, approved with optimum dates 3, 10, 16, 24 Feb. Exp 11, evening twilight window approved on weekdays. On weekends and during morning twilight, window subject to provision by coexperimenters of additional person to help operate radar.

Notes: Exp 10 takes priority over other exp on 3, 16 and 24 Feb. Exp's 7 & 8 are experiments of opportunity. They will be run only if they can be conveniently combined with, or appended to, other operations. Exp 6 is not to be interrupted for Exp 11 since the operating mode for 6 will cover 11.

IMS Steering Committee Meeting -- From Jan 24-27, 1977, the IMS Steering Committee held its 8th meeting at ESA/ESTEC, Noordwijk, The Netherlands. Hosts were E.A. Trendlenburg and D.E. Page. Among agenda items were: GEOS, ISEE and other spacecraft for IMS; operation of IMS Satellite Situation Center; IMSCIE Office; CCOG; magnetometer networks; information exchange; IMS participant file at SSC; Handbook guide to IMS services, individuals, programs, etc.; special observational periods and retrospective intervals; availability of program accomplishment information; IMS workshops; public information; and scientific accomplishments and goals. Perhaps the main accomplishment was drafting of the IMS Report No. 3. It will contain a resume of scientific accomplishments since IMS Rpt. #2 (1972), pinoint knowledge gaps and strategies for their elimination, milestones in conduct of IMS, national programs, use of SSC, updated bar charts for dedicated IMS spacecraft, using IMS file at SSC, data sources, IMSCIE Office, special services of IUWDS and SELDADS, post-IMS spacecraft, special intervals, recommendations about data analysis, workshops, programs, etc. The some 20 full- and part-time participants viewed the assembled GEOS now scheduled for mid-April launch (ISEE A/B now mid-Oct 1977 launch date).

IMS CALENDAR OF GBR CAMPAIGNS JANUARY - JUNE 1977
(As of 27 January 1977)

WORLD-WIDE- -
Special SSC-selected satellite periods
GEOS (K. Knott, et al)
ASHAY (Radicella, et al)
IISN (Bauer, et al) (preliminary)

MULTIPLE SITES- -
#0522 (Truttse) Moscow region, 50-79 deg N.
#0139 (Berthellier; "Vortex") Pretoria region

HEISS ISLAND- -
B-15 (Beghin, et al; "IPOCAMP")

KIRUNA (ESRANGE)- -
B-1 (Witt, et al; "Aurora")
B-2 (Holmgren, et al; "Trigger")
B-3 (Bjorn, et al; "D-Layer")
#0183 (Haerendel, "Porcupine")

ANDOYA (ANDENES)- -
#0131 (Arnoldy, Cahill; 18.1005UE, 18.1004UE)
"Polar High Atmosphere" (#0308; Theile; Skylarks)
"Polar High Atmosphere" (EUV-1; EUV-2)
B-7 (Matthews; 18.211 UE/IE)
B-8 (Maehlum, Maynard, et al; "Composition")

SOUTH UIST- -
A-19 (Williams; P112H, P191H, P193H)
#0085 (Dickinson; P189H, P192H)
A-18 (Woolliscroft; P73H)
B-14 (Krankowsky; P194H, P195H)
A-18 (Woolliscroft; P139, P140H)
A-19 (Williams; P170H, P197H)
#0085 (Dickinson; P196H)

WALLOPS ISLAND- -
A-32 (Smith; 14.533UE, 14.534UE)

FORT CHURCHILL B-14 (Whalen, et al) - - - - - - - - - - - - -
B-9 (Zipf; 31.001UA, 31.002UA)
B-10 (Mentall; 18.1013GA, 18.1014GA)
B-11 (Bernstein, et al; 21.035AE)
B-12 (Hays/Sharp; 13.132UE)

POKER FLAT- -
#0064 (Scherb; 29.004UE)
#0170 (Evans; 29.003AE)
#0400 (Fitz; "SPIRE")
#0164 (Davis; 18.1011UE, 18.1012UE)

WHITE SANDS -
B-10 (Mentall; 31.004GA)
#0356 (Sheldon; 23.009UE, 23.010UE)

EGLIN AFB -
#0400 (Fitz; "STRESS")

KWAJALEIN -
#0400 (Fitz; "Equatorial Wideband")

CANADA- -
#0205 (A. Vallance Jones, et al)

CONJUGATE POINTS- -
#0011, 0429 (Perrault, Hirosawa)

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