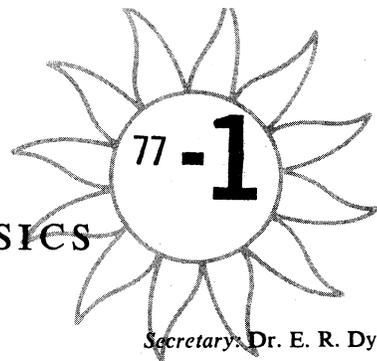


International Council of Scientific Unions

SPECIAL COMMITTEE
ON
SOLAR-TERRESTRIAL PHYSICS



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INTERNATIONAL MAGNETOSPHERIC STUDY
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WORLD DATA CENTER A FOR STP, D64 NOAA, BOULDER, COLORADO 80302, USA

IMS NEWSLETTER

Program Plans for Jan, Feb & Mar 1977	Page 2,3
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The general research objectives of the IMS have been spelled-out in the many planning documents of the past few years. Now the international IMS Steering Committee is seeking to identify specific research efforts being done by individuals, organizations or cooperatives. This news of IMS science may result in voluntary collaboration, in speeding up of sharing of correlative data, in stimulating related research or, in some cases, in avoidance of duplication of effort. Please send to Secretary, SCOSTEP, directly or via IMSCIE Office any such news or suggestions for enhancing the scientific output and direction of IMS. Please be quite specific -- date(s) of event or disturbed conditions, location(s) in the magnetosphere or on the surface or near-surface of sensors or stations being used, physical parameters being studied, etc. We will try to summarize such contributions in these NLs (see pg 3). --- JHA 77/01/06

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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).
 Jan 3, 1100 UT to Jan 5, 0200 UT 4 satel crossing magnetopause in 5hrs, 3 satel in tail 8hr
 Jan 11, 1400 UT to Jan 14, 1000 UT 6 satel in magnetosheath for 10 hrs (only Moon not in)
 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

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 Jan 7; #0522; Truttse; Moscow Region; AIRCRAFT - Oxygen emissions, H-, Nitrogen, other spectra
 ----- to Mar 31; A-32; L.G. Smith (Univ Illinois); Wallops Isl; ROCKETS (2)- 80-200 Km study, see 76-11
 Jan 1 to Jan 31; B-14; Whalen; Ft Churchill; ROCKETS(2) - Complex experiments, see note in NL 76-11
 Jan 10 to Jan 31; #0064; Scherb, Lynch; Poker Flat; ROCKET - energetic 10 Kev Oxygen, Helium ions, note
 Jan 11 to Mar 4; B-3; Bjorn (S-18 "D-Layer"); Kiruna/ESRANGE; ROCKET - Complex experiments see 76-11
 Jan 13 to Mar 21; #0308; Theile ("Polar High Atmosphere"); Andoya; ROCKETS (4) - Complex exper, 76-11
 Jan 12 to Mar 5; #0170; D. Evans; Poker Flat; ROCKET-29.003AE, resched Terrier-Malemute (A-7 in 76-1)
 Jan 22 to Feb 14; #0131; Arnoldy, Cahill; Andoya; ROCKETS (2) - 18.1004UE, 18.1005UE Nike-Tomahawks
 Jan 24 to Jan 27; #0400; Fitz ("SPIRE"); Poker Flat; ROCKET - optical earth-limb meas in quiet conditions
 Feb 1 to Feb 28; B-9; Zipf; Ft Churchill; ROCKETS (3) - 31.001UA, 31.002UA and 14.500UA, aeronomy
 Feb 1 to Mar 31; A-19; Williams; S Uist; ROCKET - P112H, Winter Anomaly & Strat-Warms
 Feb 1 to Mar 31; #0085; Dickinson; S Uist; ROCKETS (2) - P189H & P192H, Neutral O2 & e- concentrations
 XXXXXXXXXXXXXXXX; A-18; Woolliscroft; S Uist; Postponed to June/July 1977
 Feb 1 to Mar 31; P73H; Woolliscroft (?); S. Uist; ROCKET - mass spectrometer
 Feb 1 to Mar 31; P191H, P193H; Williams (?); S. Uist; Roclets (2) - U.C. Wales D-region study
 Feb 1 to Mar 31; P194H, P195H; ? ; S. Uist; ROCKETS (2) - Max Planck Inst prog, mass spectrometer
 Feb 1 to Mar 31; "M.O.P.I."; ? ; S. Uist; ROCKET - Ozone concentration measurements
 Feb 7 to Feb 25; #0164; Davis; Poker Flat; ROCKETS (2)- Nike-Tomahawk 18.1011UE & 18.1012UE
 Feb 7 to Mar 27; B-1; Witt (S-22 "Aurora"); Kiruna/ESRANGE; ROCKET - Complex experiments see note 76-11
 Feb 7 to Mar 31; B-2; Holmgren (S-21 "Trigger"); Kiruna/ESRANGE; ROCKETS(4)-Complex experiments, 76-11
 XXXXXXXXXXXXXXXX; #0400; Fitz ("ICECAP"); Poker Flat; -----CANCELLED-----
 Feb 11 to Mar 16; B-8; Maehlum & Maynard ("Composition"); Andoya; ROCKET-over quiescent arc, note NL76-12
 Feb 14 to Mar 31; B-7; Matthews; Andoya; ROCKET - 18.211UE/IE during dark of Moon, see note below
 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; Mentali; 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 7 to Mar 27; #0183; Haerendel ("Porcupine"); Kiruna; ROCKET - repeat of Aries launch, details 76-3
 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-----

--- to continue through IMS; #0178; Gadsden; Aberdeen; SURFACE - all-sky camera, see note below

-----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

Program Planning Notes by Region, Jan - Mar 1977

GROUND-BASED, BALLOON & ROCKET PROGRAM DETAILS

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

USSR

#0522; Truttse, NL 76-11, pg 2.

HEISS ISLAND

#0327; Beghin, CRPE/CNRS and Pokhunkov, Gidromet, will launch MR12 rocket during Mar/Apr 77 to study E-layer instabilities. Peak altitude will be 190km and experiments/participants are: C. Beghin, e-density fluctuations probes; J.J. Berthellier (#0139), C. Renard, DC E-fields; and A.A. Pokhunkov energetic e- <10 kev.

KIRUNA

#0183; Haerendel, "Porcupine" is a complex set of experiments carried by an Aries rocket, 24.002IE. Details on participants for the launch Porcupine

I and the many supporting ground, aircraft and satellite experiments were given in NL 76-3, pg 2. IMSCIE Office has not received any new information about the present launch except for the launch window. The shift of ATS-6 may curtail cooperation between rocket and satellite experiments. As more information on this program is available it will be given in later NL's.

ANDOYA

#0474; Rees, 1st UK High Latitude Campaign, NL 76-11 launch window now ends Dec 16. Observations to be coordinated with interferometer measurements from Skibotn by Smith, #0115 (exper # 3).

#0152; Bryant, NL 76-11, window now ends Dec 16.

B-5; Egeland, Johnstone (#0450) "Harang Pair I" is rescheduled to two periods in 1976: Nov 14 to 30 & Dec 12 to 21. Detailed program in NL 76-11, pg 3.

#0131; Arnoldy & Cahill, revised launch window is Jan 22 through Feb 14 for 18.1004UE & 18.1005UE.

#0308; Theile, revised launch window for the 4 Skylark 7 rockets of "Polar High Atmosphere": Jan 13 to 31; Feb 9 to 24; and Mar 9 to 21. Rockets EUV1

and EUV2 are also part of PHA-program and their new launch window is Jan 13 - Mar 20, inclusive.

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

B-7; Matthews, co-participants: M. Kelly, Cornell; J. Holtet, Norway; and M. Rycroft, U.K.

ABERDEEN

#0178; Gadsen has added an all-sky camera to other photometric instruments at Aberdeen to record SAR-arcs, aurora, airglow and noctilucent clouds. It will operate from 4 Dec 76 through the IMS and has a 1/2-hr sequence of 1,2,4,8,8 min exposures.

SOUTH UIST

A-19; Williams, P112H, NL 76-8, pg 7; NL 76-12, pg 3

A-18; Woolliscroft, P139H & P140H now Jun/Jul 77

P73H; Sheffield launch (may be by Woolliscroft) of mass spectrometer.

SAO PAULO

#0332; De Mendonca, NL 76-11, pg 3.

WALLOPS ISLAND

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

FORT CHURCHILL

B-14; Whalen (NRC, Canada), NL 76-11, pg 3.

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

B-10; Mentall & Gentieu Nike-Tomahawks launch re-

ACTUALITIES

#0531; Lazutin, et al in the multinational SAMBO-76 balloon program (NL 76-12, pg 2) successfully completed launches of 13 balloons on 8 days. The following are the day and time of launch and, in parentheses, the duration of the flight: 10 Nov 1430 UT (16 hr); 11 Nov 1650, 1811 and 1921 UT (18 hr); 12 Nov 1521, 1700 UT (20 hr); 4 Dec 1647, 1832 UT (19 hr); 7 Dec 1621 UT (11 hr); 8 Dec 1606, 1709 UT (10 hr); 9 Dec 1719 UT (10 hr); and 13 Dec 1534 UT (11 hr).

#0400; Fitz launched 4 successful rockets: 13 Nov 76, V3-8608 to measure e- density during satellite overpasses; 15 Nov 76, V3-8607, vehicle performance test; 19 Nov 76 V2-8612 "EXCEED", large

SL 1422; Bryant reports successful launch of Skylark at Andoya on 21 Nov 76, 2114 UT. Rocket carried experiments #0152, 0450, 0114 and Martelli's (Sussex); details in NL 76-11, pg 3. Excellent data collected on particles and waves in auroral arc. "Highly successful flight of first European 3-stage sounding rocket, namely Skylark 12." In conjunction, there was a successful launch of a Fulmar F2 at 2115 UT. The two simultaneous flights gave measurements of particles and waves at two altitudes.

B-5; "Harang Pair I" ("Ferdinand 38 & 39"), Egeland and Johnstone successfully launched rockets 29.005IE & 18.206IE from Andoya on 27 Nov 76 at 2052 UT (simultaneous launches). The launches were successful but there was some questions about operation of Maynard's E-field antenna.

#0474; Rees, et al "1st High Latitude Campaign". Information just received suggests that Fulmar rocket F5 was launched 11 Dec 76 (no time given). No word about Skylark 12, SL 1425. e- accelerator (payload not located); and 26 Nov 76, V3-8609 e-density measurements during satellite overpasses.

IMS SCIENCE

An IMS objective is the development and application of direction finding on whistler-mode signals. The

scheduled to Mar 1 - Mar 31.

B-11; Bernstein, NOAA, with Wilhelm, MPI, and Evans NOAA. Nike-Black Brant rocket carrying e- accelerator on main payload with 4 ejectable probes. To measure E-field parallel to B by fast e- echos. e- energy ranges: 1.9, 4 and 10 Kev.

B-12; Hays and Sharp will launch Astrobee F after Bernstein rocket 25.025UE (B-11).

CANADA

#0205; Vallance Jones, photometer array program and map in NL 76-12, pg 7.

POKER FLAT

#0064; Scherb, Lynch - NL 76-11, pg 3.

#0170; Evans, NL 76-11, pg 3.

#0400; Fitz, "SPIRE" in NL 76-11. "ICECAP" cancelled.

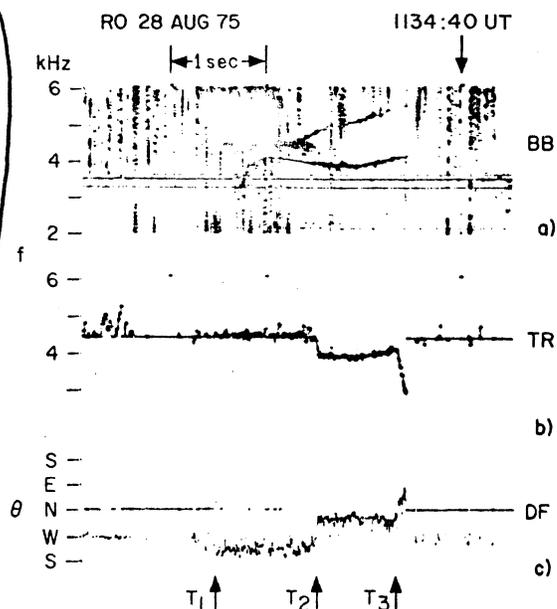
EGLIN AFB

#0400; Fitz program "STRESS" is not scheduled for Poker Flat as reported in 76-12. The 11 rockets will be launched from Eglin Air Force Base in Florida to study scintillation phenomena.

MULTIPLE SITES

In NL 76-12, we provided details on #0304, Stuart's 3-component Rb magnetometers under "SCANDINAVIA" because that was the region in which several sites had recently been occupied. With that listing, we included other U.K. "Pulsation" program sites in N. America and the Antarctic (see 76-11, pg 3).

work is proceeding as part of several national programs and is a major part of IPPDYP (see NL 76-3, pg 4). D. L. Carpenter (#0192) provided the following information about testing of new df-equipment that is being used during IMS. Results from a summer-75 testing campaign of df equipments are the following: (1) A Tracker/df analyzer (Tr/df) developed at Stanford agreed within $\approx 10^\circ$ (several-min averages of bearings) with standard goniometer results from the same location. (2) Comparison of Tr/df and Univ of Tokyo df-system results show good agreement on signal bearings. One system is a high incidence angle sensor and the other is best for low elevation angles; agreement came with each system recording arrival bearings for signals having intermediate (45°) elevation angles. Cooperative IMS direction finding (continued on pg 4)



(continued from pg 3)

campaigns in the Antarctic at Siple (Helliwell, Carpenter), Belgrano (Cazeneuve, Corcuff), Sanae (Walker, Scourfield), Halley Bay and a near-by remote site (Bullough) are in progress. In 1977 goniometers will operate at Siple, Belgrano, Halley Bay and HB-remote. Tracker/df systems will be at Sanae in 77 and Siple and Palmer in 78. The Siple transmitter will continue to serve as a signal source for special df campaigns and tests of df equipment in the conjugate region, Roberval, Canada. Special recording periods and ad hoc arrangements of opportunity will be cooperatively developed in both hemispheres. A figure showing typical output from the Tr/df system is included here. The top panel shows a spectrogram of signal frequency vs. time with a strong Siple transmitter signal above a natural whistler signal. The middle panel displays the tracking filter frequency. The lower panel shows the analyzer output of bearings for the different signals including spherics before T1, Siple at T1T2 and whistler from T2T3. From triangulation by such recordings it is proposed to locate ionospheric exit points of natural and manmade signals propagating in the magnetosphere.

IMS AT SIPLE

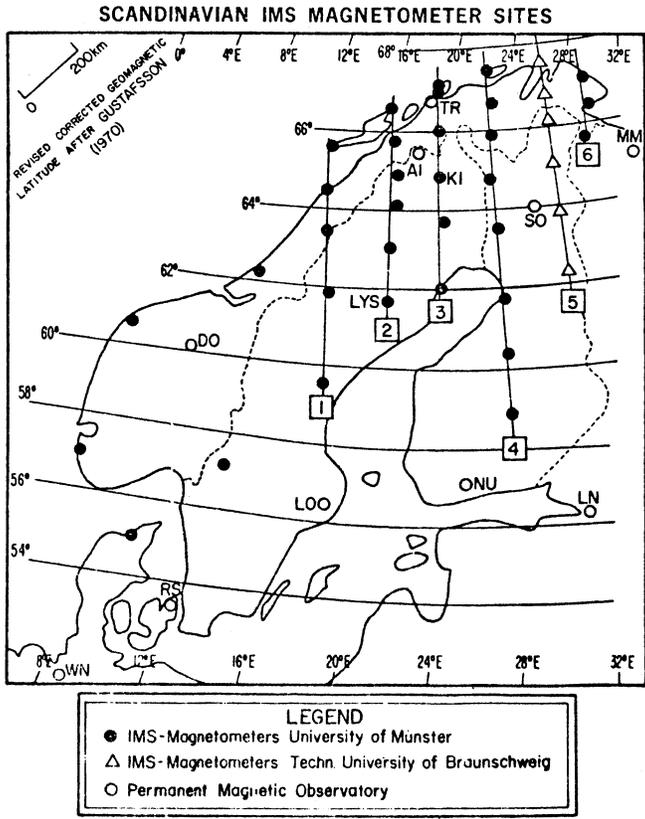
Siple Station, Antarctica, temporarily closed in January 1976, was reopened in November 1976. The station was found to be in good order and preparations are being made for a variety of magnetospheric probing experiments in 1977. Prominent among these will be VLF transmitting experiments using the ZEUS VLF transmitter and 21-km dipole antenna. Transmitting activities in 1977 will include tests of variations in magnetospheric response to changes in transmitted power level and further investigation of a variety of wave-wave interaction phenomena. New modulations have been designed to take into account recently discovered effects of multipath propagation and of suppression of the growth of a new signal by the returning echo of a previous transmission. Special attention will be given to studies of the precipitation of magnetospheric particles by natural or manmade waves. New results on the natural occurrence of such effects are available; these will be used to guide efforts to produce them on a controlled basis. Matthews pending Andoya rocket launch will test experiments to be launched next twelvemonth from Siple.

SCANDINAVIAN IMS MAGNETOMETER ARRAY

Untiedt, et. al. (#0312) have updated their IMS program description giving details on their Scandinavian magnetometer array which is now completely installed (earlier note in IMS NL 76-8, pg 7). This University of Munster program is in cooperation with scientists at the following: Geophysics Laboratory, Aarhus Univ; Finnish Meteorological Inst, Helsinki; Kiruna Geophysical Inst; Geophysical Observatory Sodankyla, Finnish Acad of Science and Letters; Dept of Plasma Physics, Royal Inst of Tech, Stockholm; Auroral Observatory Tromso; and Uppsala Ionospheric Observatory. The 32 sites were selected in cooperation with Dr. Bostrom, Uppsala Ionos Obser. The magnetometers are 3-component, improved Gough-Reitzel "posthole" units recording photographically on 35mm film (1 sample each 10-sec). Resolution is + 2 nT with a film scale of about 45 nT/mm. Station sites are coordinated with the several regular magnetic observatories in Scandinavia and the Kertz and Maurer (#0243) chain of digital magnetometers (profile # 5 on map below). They consist of some scattered locations and five N-S profiles as shown below. The records will be used to perform detailed analysis of spatial and temporal behaviour of high-latitude ionospheric current systems - including field-aligned currents - in cooperation with other groups in the area operating all-sky cameras, riometers, auroral radar, etc. N-S and E-W structures of geomagnetic variations will be studied with periods down to 1-min. Analog traces will be digitized for selected events. Such data or derived equivalent ionospheric currents will be made available for cooperative studies related to these events. For other times, film copies of the original magnetogram recordings will be available upon request and in reasonable quantities. For more detailed information please contact Prof J. Untiedt, Inst fur Geophysik, Universitat Munster, Gievenbecker Weg 61, D-4400 Munster, F.R.G., Telephone: (0251)4903591; Telex: 892 529 unimsd.

Kvikkjokk		66.90	17.92
Storavann		65.78	18.18
Lycksele		64.57	18.68
Mikkelvik	3 (Kiruna)	70.07	19.03
Rostadalen		68.97	19.67
Kiruna		67.83	20.42
Nattavara		66.75	21.00
Pitea		65.25	21.58
Soroya	4 (Finnmark)	70.60	19.03
Mattisdalen		69.85	22.92
Mieron		69.12	23.27
Muonio		68.03	23.57
Pello		66.85	24.73
Oulu		65.10	25.48
Jokikyla/Pyhasalmi		63.77	26.13
Sauvamaki/Hankasalmi		62.30	26.65
Berlevag	6 (East)	70.85	29.13
Vadsø		70.10	29.39
Skogfoss		69.37	29.42

Site	Profile (name)	Geographic Lat N	Long E
Namsos	-	64.45	11.13
Maløy	-	62.18	5.10
Arvika	-	59.60	12.60
Hellvik/Egersund	-	58.52	5.77
Klim	-	57.12	9.17
Fredvang	1 (West)	68.08	13.17
Glomfjord		66.90	13.58
Okstindan		65.90	14.27
Risede		64.50	15.13
Hassela		62.07	16.50
Andenes	2 (Andenes)	69.30	16.02
Evenes		68.53	16.77
Ritsemjokk		67.70	17.50



The IMS North American Magnetometer Network is neither exclusively N. American nor entirely composed of magnetometer installations. The lists below contain locations in S. America, the Caribbean and the Pacific Ocean. As recently pointed out by H.J.A. Chivers, many of the sites are already equipped with operational riometers and the magnetometer systems are to be added later. At some sites there are all-sky cameras, ionosondes, photometers and auroral backscatter or incoherent scatter radar units. By reference to a network of one sort of instruments, we do not mean to imply that only those are operational at the given sites. The IMS Newsletters will follow the convenient course of referring to a network according to the source from which we quote or reflecting the principal thrust of the news item related. Also, such lists of site locations as we publish are often subject to change. We will use the most recent available source and will announce changes or corrections as they become known to us (see note on Scandinavian magnetometer network below).

The Department of Energy, Mines and Resources (EMR), Canada, and the U.S. Geological Survey operate the principal networks of magnetic observatories on the N. American continent and some W. Hemisphere island sites. From time-to-time these have been supplemented by observations made by university or industrial research groups. The 1974 report "International Magnetospheric Study --- Detailed Plan for a U.S. Ground-Based Research Program" (National Academy of Sciences) recommended that the U.S. National Science Foundation support the creation of a number of digital magnetic observatories in the auroral zone of N. America and at a few other sites. In cooperation with the Canadian government (EMR) and the University of Alberta, this effort is being integrated with their IMS programs. Three meridional chains and one longitudinal chain of magnetometers (and riometers) are to be operated at high latitudes (see note about W. Canadian chain in IMS NL 76-9. pgs 3 & 4) and a widely-spaced longitudinal network will be at midlatitude. Data from as many as 25 of the sites will be collected by relay from the instrument platforms to the SMS/GOES satellites then to the Space Environment Laboratory of NOAA's Environmental Research Laboratories in Boulder, Colorado U.S.A. These data will be available in quick-time through the SELDADS system and will be transferred to the World Data Center A for Solar-Terrestrial Physics/National Geophysical and Solar-Terrestrial Data Center of NOAA's Environmental Data Service. From the data center they will be distributed upon request in magnetic tape, printed or microfilm format. Details of data availability and sample plots will be given in these NLS when they become generally available. The first satellite telemetry relay of magnetometer and riometer data is now scheduled for March 1977, although it will represent only test transmissions until system reliability is established and experience gained processing the mass data flow.

Data from sites not using the satellite relay will be recorded on digital tapes and sent to the WDC-A on a prompt, timely basis. A trial tape and the

first large data transfer from the 8 University of Alberta sites in W. Canada has just been received by WDC-A. Data from the USGS and Canadian observatories are received as either analog magnetograms for each station day or in digital format. Questions about availability of any geomagnetic data may be addressed to W.P. Paulishak, WDC-A for STP, NOAA/NGSDC, Boulder, Colorado 80302, USA.

Details on the N. American IMS Magnetometer Network will appear in the intermittently-issued IMS Magnetometer Network Notes, edited by: Masahisa Sugiura, Vice-Chairman, ICAS Panel on IMS, Code 625, Goddard Space Flight Center, Greenbelt, Maryland 20771; and Robert H. Manka, Chairman, ICAS Panel on IMS, National Science Foundation, Washington, D.C. 20550, USA. These notes are sent only to those interested in great technical detail. They are the main source for the following tables.

List of N. American Magnetometer Network Stations for IMS. The following set of 7 tables provide a list of stations of the N. American Magnetometer Network for the IMS and include other stations that supplement the special IMS sites (e.g. the regular U.S. and Canadian observatories that do not lie in any of the chains and the US Air Force Geophysics Laboratory network). Abbreviations are given to indicate the organization responsible for the station, the main instruments operating there and the elements of the special IMS instrumentation funded by the US NSF and prepared by the US Geological Survey. This instrumentation is modular and not every site will have the same combination. At some locations there are already magnetometers in operation that can be attached to the new interface controllers. Those sites from which data will be relayed to the satellite(s) will require the data collection platform radio set.

The following abbreviations are used in the tables.
Organizations: UAL = University of Alaska; EMR = Department of Energy, Mines and Resources, Canada; GS = U.S. Geological Survey; UAB = University of Alberta; DC = Department of Communication, Canada; NRC = National Research Council, Canada; CRC = Communications Research Centre, Canada; SUNY = State University of New York; USAS = University of Saskatchewan; UCLA = University of California @ Los Angeles; INPE = Instituto de Pesquisas Espaciais, Brazil; TM = Tahiti Magnetic Observatory; AFGL = Air Force Geophysical Laboratory; NOAA = National Oceanic and Atmospheric Administration.
Instruments: M = magnetometer; A = all-sky camera; P = photometer; R = riometer; I = ionosonde. IMS magnetometer instrumentation: M = magnetometer; IC = interface controller; DCPRS = data collection platform radio set; PDC = precise digital clock; T = low-power digital magnetic tape recorder; WWV = standard time receiver. Stations marked with an * are those for which satellite telemetry relay (STR) of data is planned. This list is subject to revision if insurmountable problems arise with telemetry to the SMS/GOES satellites from some high latitude locations. At this time the only sites for which digital tape recorders are indicated are those for which STR data collection is not planned. At these sites, timing will be provided by internal system clocks tied to WWV signals.

I. ALASKA CHAIN							
Location	Geographic		Geomagnetic		Operating Organization	Instrument	IMS Magnetometer Instrumentation
	Lat N	Long W	Lat N	Long E			
Eureka	80	85.70	--	--	UAL	MR(3)	M, IC, PDC, T, WWV
Isachsen	78.80	104	--	--	UAL	MAR(3)	M, IC, PDC, T, WWV
*Johnson Point	72.46	118.30	--	--	UAL	MAR(4)	M, IC, PDC, T, WWV (6)
Mould Bay (1)	76.2	240.6	79.1	255.4	EMR	MR	
*Sachs Harbor	72	125	75.27	266.40	UAL	MAR	M, IC, PDC, T, WWV (6)
*Cape Parry	70.20	124.70	--	--	UAL	MR	M, IC, DCPRS
*Inuvik	68.25	133.30	70.58	266.40	UAL	MAR	M, IC, DCPRS
*Arctic Village	68.13	145.57	67.88	254.52	UAL	MAR	M, IC, DCPRS
*Fort Yukon	66.57	145.28	66.62	256.80	UAL	MAR	IC, DCPRS
Poker Flat	65.13	147.48	65.12	257.55	UAL	MAPR(5)	
*College (2)	64.88	148.05	64.60	256.30	GS/UAL	M/AR	IC, DCPRS
*Talkeetna	63.30	150.10	61.88	256.95	UAL	MAR	IC, DCPRS

(1) Energy, Mines and Resources Canada Magnetic Observatory, magnetometer with analog output

- (2) US Geological Survey Magnetic Observatory, routine IMS 16mm all-sky camera nearby at Murphy Dome
- (3) Installation postponed until late spring or early summer 1977, uncertainties with power source
- (4) 16mm and 35mm all-sky cameras, IMS meridian scanning photometer, magnetometer and riometer
- (6) Pending test results of satellite telemetry relay, DCPRS will replace PDC,T,WWV if STR possible

II. ALBERTA CHAIN

Location	Geographic		Geomagnetic		Operating Organization	Instrument (Date oper)	IMS Magnetometer Instrumentation
	Lat N	Long W	Lat N	Long E			
Fort Reliance	62.7	109.0	70.3	300.1	UAB	MR, 12 Aug 76	
*Fort Smith	60.0	112.0	67.3	300.0	UAB	MR, 11 Jul 76	IC,DCPRS
Fort Providence	61.4	117.4	67.5	292.0	UAB	MR, 11 Aug 76	
Hay River	60.8	115.8	67.3	294.3	UAB	MR, 10 Aug 76	
Uranium City	59.6	108.5	67.4	304.3	UAB	MR, 16 Jul 76	
Fort Chipewyan	58.8	112.0	66.3	303.1	UAB	MR, 17 Jul 76	
Fort McMurray	56.7	111.2	64.2	303.5	UAB	MR, 12 Jul 76	
Meanook (1)	54.6	113.3	61.9	300.7	EMR	M	
Leduc (2)	53.3	113.5	60.6	302.9	UAB	MR, 10 Jul 76	

- (1) Energy, Mines and Resources Canada Magnetic Observatory
- (2) To be operated using spare equipment on intermittent, expeditionary basis

III. FORT CHURCHILL CHAIN

Location	Geographic		Geomagnetic		Operating Organization	Instrument	IMS Magnetometer Instrumentation
	Lat N	Long W	Lat N	Long E			
Alert (1)	82.50	62.50	85.9	168.2	EMR	M	
Resolute Bay (2)	74.70	94.90	83.1	287.7	EMR	MIR	
*Pelly Bay	68.53	89.51	78.6	320.45	EMR	M(3)	IC,DCPRS
Baker Lake (2)	64.33	96.03	73.9	314.8	EMR	M	
*Rankin Inlet	62.80	92.33	72.9	321.9	EMR	M(3)	IC,DCPRS
*Eskimo Point	61.10	94.07	71.1	321.8	EMR	M(3)	IC,DCPRS
Fort Churchill (2)	58.80	94.10	68.8	322.5	EMR/DC/NRC	M/I/A(4)	
*Back	57.69	94.23	67.8	323.0	EMR	MP(5)	IC,DCPRS
*Gillam	56.35	94.42	66.2	323.4	EMR	MP(3)	IC,DCPRS
*Island Lake	53.88	94.68	64.0	324.4	EMR	MP(6)	IC,DCPRS
White Shell (2)	49.75	95.25	59.9	325.3	EMR	M(7)	

- (1) Variometer with analog output
- (2) Energy, Mines and Resources Canada Magnetic Observatory; digital and analog output
- (3) Operational digital magnetometer with tape and analog output, will become STR when IC,DCPRS ready
- (4) Ionosonde, partial reflection ionospheric sounder operated by Dept of Communication (Mr Robinson); All-sky camera operated by National Research Council, Canada
- (5) Magnetometer with low-power digital data logger operated since 1 Oct 76; 2-channel zenith photometer (3914,5577 A); awaiting delivery IC,DCPRS
- (6) Digital magnetometer here formerly analog unit at Norway House; 2-channel zenith photometer; STR to begin when IC,DCPRS available
- (7) Magnetic observatory began Sept 75; digital and analog output

IV. EAST-WEST CHAIN

Location	Geographic		Geomagnetic		Operating Organization	Instrument	IMS Magnetometer Instrumentation
	Lat N	Long W	Lat N	Long E			
→ Norman Wells	64.90	125.5					
*Tungsten	62.00	128.15	66.04	279.00	SUNY	M(1)	M,IC,DCPRS
*Fort Simpson	61.75	121.23	--	--	SUNY	M(1)	M,IC,DCPRS
*Lynn Lake	56.85	101.06	--	--	USAS/CRC/SUNY	M(2)	M,IC,DCPRS
Fort Severn	55.98	97.65	66.8	333.0	EMR	M(3)	
Thompson	55.72	97.88	65.4	319.3	EMR	M(3)	
Great Whale River (5)	55.27	77.78	66.8	347.2	EMR	M	

- (1) Site permission obtained, installation during fall 1977
- (2) Univ of Saskatchewan installed CRC magnetometer with analog output in mid-76; maybe riometer later
- (3) Digital magnetometer oper 5 Oct 76; IC,DCPRS could be used here if available
- (4) Analog data from 1969; digital data from 1 Nov 76; IC,DCPRS could be used here
- (5) Energy, Mines and Resources Canada Magnetic Observatory; digital and analog output

V. MIDLATITUDE CHAIN

Location	Geographic		Geomagnetic		Operating Organization	Instrument	IMS Magnetometer Instrumentation
	Lat N	Long W	Lat N	Long E			
*Eusebio, Brazil (1)	-3.87	38.42	--	--	UCLA/INPE	M	M,IC,DCPRS
*Tahiti (2)	17.55	149.62	-15.3	282.7	UCLA/TM	M	M,IC,DCPRS
*Midway Island (3)	28.20	177.30	--	--	UCLA	M	M,IC,DCPRS
*Wake Island (4)	19.20	193.30	12.6	233.6	UCLA	M	M,IC,DCPRS

- (1) Cooperatively with Instituto de Pesquisas Espaciais, near dip equator
- (2) Cooperatively with Tahiti Magnetic Observatory, Office de la Recherche Sci et Tech Outre-mer (ORSTOM)
- (3) Cooperatively with National Weather Service, NOAA, and permission from U.S. Air Force
- (4) With permission of U.S. Navy

VI. AFGL MAGNETOMETER NETWORK

Location	Geographic		Geomagnetic		Operating Organization	Instrument	IMS Magnetometer Instrumentation
	Lat N	Long W	Lat N	Long E			
Newport (1)	48.27	117.12	55.20	299.55	AFGL	M	
Rapid City	44.15	103.10	54.12	317.31	AFGL	M	
Camp Douglas	43.98	90.27	56.32	334.21	AFGL	M	

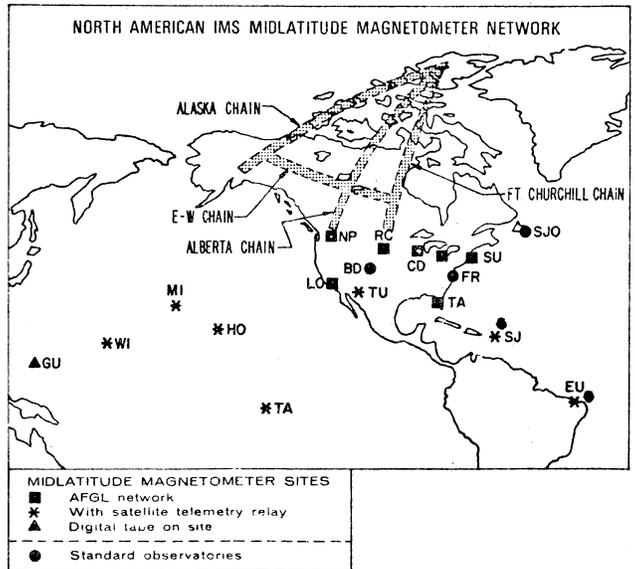
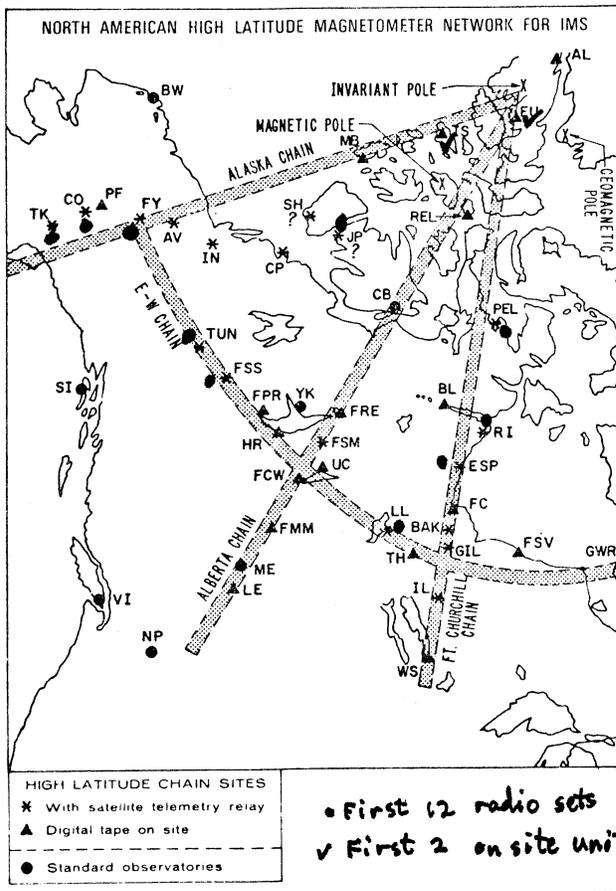
Mt. Clemens	42.60	82.85	55.78	344.84	AFGL	M
Sudbury	42.20	71.28	55.78	1.87	AFGL	N
Lompoc (3)	34.72	120.55	40.22	300.61	AFGL	M
Tampa (2)	27.82	82.50	40.71	344.90	AFGL	M

- (1) AFGL magnetometer systems at regular US Geological Survey Magnetic Observatory site
- (2) To become operational about Jan 77
- (3) To become operational about summer 1977

VII. OTHER MAGNETIC OBSERVATORIES

Location	Geographic		Geomagnetic		Operating Organization	Instrument	IMS Magnetometer Instrumentation
	Lat N	Long W	Lat N	Long E			
Barrow (1)	71.30	156.75	68.64	241.55	GS	M	
Sitka (2)	57.07	135.33	60.09	275.86	GS	M	
Newport	48.26	116.99	55.15	300.76	GS	M	
Fredericksburg	38.20	77.37	49.54	350.42	GS	M	
Boulder (2)	40.13	105.23	49.03	317.04	GS	M	
*Tucson	32.25	110.83	40.48	312.72	GS	M	IC,DCPRS
*San Juan	18.12	66.15	29.57	3.63	GS	M	IC,DCPRS
Guam	13.58	215.13	4.04	213.35	GS	M	M,IC,PDC,T,WWV
*Honolulu	21.32	158.00	21.17	266.99	NOAA	M	M,IC,DCPRS
Cambridge Bay (1)	69.1	105.0	76.7	294.0	EMR	M	
Meanook (2)	54.6	113.3	61.9	300.7	EMR	M	
Ottawa (2)	45.5	75.55	57.0	351.5	EMR	M	
St. John's (1)	47.6	52.7	58.7	21.4	EMR	M	
Victoria (2)	48.5	123.4	54.3	292.7	EMR	M	
Yellowknife (1)	62.4	114.4	69.1	292.8	EMR	M	

- (1) Digitally recording magnetic observatory
- (2) Digital magnetic observatory and photorecording variometers



- | | |
|----------------------|----------------------|
| 1. AEROBEE 100 | 17. AEROBEE 350 |
| 2. ARCON | 18. NIKE TOMAHAWK |
| 3. NIKE ASP | 19. BLACK BRANT IV |
| 4. AEROBEE 150/150A | 20. BULPUP CAJUN |
| 5. IRIS | 21. BLACK BRANT VC |
| 6. AEROBEE 300 | 22. BLACK BRANT IIB |
| 7. ARGO E-5 | 23. ASTROBEE D |
| 8. JAVELIN | 24. ARIES |
| 9. SKYLARK | 25. ASTROBEE F |
| 10. NIKE CAJUN | 26. AEROBEE 200 |
| 11. ARGO D-8 | 27. NIKE BLACK BRANT |
| 12. SPECIAL PROJECTS | 28. NIKE/MALEMUTE |
| 13. AEROBEE 170 | 29. TERRIER/MALEMUTE |
| 14. NIKE APACHE | 30. HAWK |
| 15. ARCAS | 31. NIKE HAWK |
| 16. ASTROBEE 1500 | 32. NIKE/JAVELIN |

Rocket Codes

Perhaps many readers of the IMS NL's are aware that the NASA rocket designation 24.0021B means that it is an Aries rocket, the second of a series and prepared by NASA for an "International" instrumenting agency to be used as a vehicle for experiments in "Magnetospheric Physics". Until recently, the editor of these NL's didn't know what these designations meant. For others in IMS but previously not involved with rockets, we here reproduce the NASA numbering system as sent to IMSCIE by the NASA Sounding Rocket Division.

The 2 letters following the number designate the agency and the experiment type: 1. A= Other U.S. Government Agency; C= Industrial Corporation; D= DOD; G= Goddard; I= International; N= Other NASA; U= College or University; W= Wallops. 2. A= Aeronomy; B= Biology; E= Magnetospheric Physics; G= Galactic Astronomy; H= High Energy Astrophysics; I= Magnetospheric Physics; L= Lunar and Planetary Aeronomy; M= Meteorology; P= Special Projects; R= Radio Astronomy; S= Solar Physics; T= Test and Support; and C= Cometary Physics.

IMS CALENDAR OF GBR CAMPAIGNS JANUARY - JUNE 1977
(As of 5 January 1977)

WORLD-WIDE--
 Special SSC-selected satellite periods
 GSOS (K. Knott, et al)
 ASHAY (Radiceia, et al)
 IISN (Bæver, et al) (preliminary)
 MULTIPLE SITES--
 #0522 (Truttse) Moscow region, 50-79 deg N.
 #0139 (Bertheliet; "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; Skylark)
 "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)
 #0085 (Dickinson; P189H, P192H)
 P73H (Sheffield)
 P191H, P192H (Appleton Lab)
 P194H, P195H (MPI)
 M.O.P.. (Met Office, UC Wales)
 A-18 (Woollicroft; P139, P140H)
 P190H (UC Wales)
 P196H (Appleton Lab)
 P197H (UC Wales)
 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, 00429 (Perrault, Hiroswawa)

