International Council of Scientific Unions

SPECIAL COMMITTEE
ON
SOLAR-TERRESTRIAL PHYSICS

77-3

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INTERNATIONAL MAGNETOSPHERIC STUDY
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IMS NEWSLETTER

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The IMS Workshop being organized in Finland in May (see pg 5) epitomizes two of the key attributes of the IMS that distinguishes it from earlier programs in international cooperation. One is the introduction of science at an early stage of the observational period while there is still time to influence detailed plans for the rest of the IMS observational period. The other is the coordinated study of selected intervals when unusual phenomena occurred. By chance (or design?) one of these intervals (one of four in 1976) coincides with one of the IMS preselected satellite intervals based on favorable configuration with respect to magnetospheric boundaries of several high altitude satellites. IMS Participants now have a positive stimulus to work up their data specially for these event-intervals and the other (preselected satellite configuration) intervals announced in these NL's. Such work can be important contributions to this and the other workshops which we hear are in the planning stages. JHA 77/03/02

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PROGRAM PLANS FOR March 1977 - May 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).

Mar 4, 0600 UT to Mar 8, 1000 UT — Apr 2, 0700 UT to Apr 4, 0000 UT

May 25, 2200 UT to May 26, 1800 UT — May 30, 0100 UT to Jun 3, 1800 UT

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 21; #0308; Theile ("Polar High Atmosphere"); Andoya; ROCKETS (2) - See actualities
------ to Apr 30; A-32; L.G. Smith (Univ Illinois); Wallops Isl; ROCKETS (2)- 80-200 Km study, see 76-11
------ to Mar 12; #0400; Fitz ("Stress"); Eglin; ROCKETS (10) - 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
Mar 1 to Apr 30; #0327; Beghin/Avdushin ("IPOCAMP 2"); Heiss Island; ROCKETS - MR12, E-layer studies
Mar 1 to Apr 30; #0159; Chanin/Tulinov ("IPOCAMP 2"); Heiss Island; ROCKETS - joint with #0327
Mar 6 to Mar 12; #0315; Venkatesan; Cold Lake (Canada); BALLOONS (3) - bremstrahlung X-rays
Mar 7 to Apr 3; #0183; Haerendel ("Porcupine"); Kiruna; ROCKET - Aries, detailed note & map below
Mar 16 to Apr 8; B-12; Hays/Sharp ("MAP-1"); Ft Churchill; ROCKET - 25.025 UE, aurora/nitric oxide study
Apr 1 to Apr 22; #0400; Fitz; Poker Flat; ROCKET - Sergeant, field-widened interferometer
May 1 to May 14; #0400; Fitz ("Equatorial Wideband"); Kwajalein; ROCKETS (3) - scint meas with Wideband
May 1 to May 31; #0139; Berthellier; Pretoria; BALLOONS (2) - long flights, E-field experiments
May 26 to Jun 15; B-7; Matthews; Andoya; ROCKET-18.211UE/IE

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

Mar 15-17; Apr 19-22; May 17-19; Bauer (0004), Evans (#0171); IISN; SURFACE incoherent scatter radar net

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

Mar 6 to Mar 12; B-13; Parsons & Berkey; Cold Lake (Canada); SURFACE - auroral TV, note below
------ to Mar 31; #0169; Eather & Mende: Canada; SURFACE - merid scan photom, note below
------ to Apr 30; B-17; -----; Atlantic & Pacific; SURFACE - ship "Akademik Kurchatov", see note below
------ to May 31; #0304; Stuart; Multiple Sites; SURFACE- "Pulsations" program of magnetometers, NL 76-12

Regional GBR IMS Program Details, Mar - May 1977

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.

OCEANS

B-17; ----; Migulin reports Soviet scientific ship "Akademik Kurchatov" put to sea at the end of December 1976, for its regular cruise. The ship carries cosmic ray and ionospheric measuring instruments according to the USSR IMS program. Purpose of the cosmic ray observations is to obtain the distribution of neutron and rigid component intensities over the region of the Atlantic and Pacific Oceans for the given period of the solar cycle. This will give the latitudinal variation of intensity, coupling constants and rigidity cutoff values. The ionospheric measurements are to study the ionosphere along the route by means of vertical sounding for investigation of geomagnetic anomalies in the ionosphere and latitudinal and longitudinal distribution of ionospheric parameters. The work continues until the end of April 1977.

HEISS ISLAND

#0327; Beghin,/Avdushin, see Migulin's note in 77-2
#0159; Chanin/Tulinov, also in 77-2, pg 3 as above

KIRUNA

#0183;Haerendel,"Porcupine II" detailed description with map given on page 3

ANDOYA

#0308; Theile, two launches completed in "Polar High Atmosphere" program. See note in 77-1, pg 2-3.

B-7; Matthews postponed launch now set for 26 May - 15 June 1977 (see NL 76-12, pg 3).

WALLOPS ISLAND

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

FORT CHURCHILL

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

B-11; Bernstein (NL 77-1, pg 3) launch rescheduled to January 1978

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

Distributed Sites in CANADA

#0315; Venkatesan and B-13; Parsons & Berkey, 77-2

#0169; Eather & Mende will set-up 3-station meridian scanning photometer chain through central Canada in late Feb. - early March 1977. Station locations are Rankin Inlet, Fort Churchill and Island Lake (see N. American magnetometer network map in NL 77-1, pg 7), providing complete auroral zone coverage (~18° latitude). Will record Hβ (proton precipitation), 4278 N2+ and 6300 OI (electron precipitation and average energy) and 5577 OI. Will operate through March to test systems prior to full-time operation in winter of 1977-78. Data will be available in form of merged keograms to simultaneously show auroral data over 18° of latitude throughout dark hours.

POKER FLAT

#0400; Fitz; "SPIRE" rescheduled to September 1977

#0400; Fitz; "Auroral Studies" background measurements of I.R. in the aurora . Field widened Michelson interferometer cooled by liquid He, 2-10u scheduled 1-22 April 1977.

EGLIN AFB

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

WOOMERA

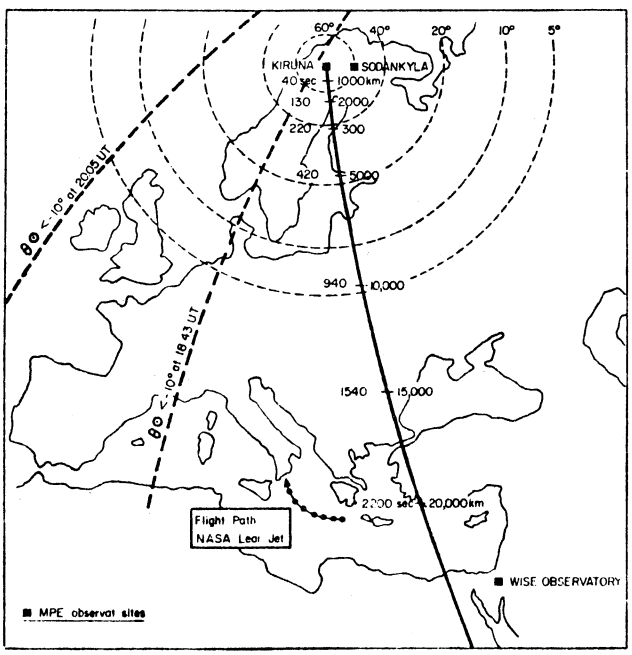
B-15; J.E. Carver, note in NL 77-2, pg 3

PORCUPINE II --- G. Haerendel (#0183) is Project Scientist for the launch of Porcupine II, scheduled during Mar 7 - Apr 3, 1977. Details on possible problems leading to the malfunction of Porcupine I were given in NL 77-2, pg 3. Experiment details for this rocket were given in NL 76-3, pg 2 and are briefly summarized again here. 1A. DC E-field, Grabowski & Wolf; 1B. AC E-field, Pedersen; 2. Plasma density changes, Kelley; 3. Thermal Plasma Probe, Spenner & Ott; 4. High frequency e- density probe, Storey, Illiano and Thiel: Middle frequency e- current probe, same as (4); 6. DC magnetic field, Theile; 7. AC magnetic field, Hausler & Kelley; 8A. Low energy e-, Wilhelm, Saeger, Becker, Schmidt and Engelhardt; 8B. Low energy protons, Riedler & Urban; 10. Ejectable probes containing particle detectors and E- and B-field sensors, Mozer, Anderson, Carlson and Kelley; 11. Barium ion jet, Haerendel, Valenzuela, Rieger and Foppl; 12. Xenon plasma source, Sagdeev, Zhulin, Dokukine, Ruzhin and Haerendel. Experiment details are contained in information brochure "Project PORCUPINE", Sep 1974, and MPI-PAE/Extraterr. 121a 'Project PORCUPINE' - Summary of Scientific Objectives and Instrumentation, Feb 1976.

Launch: preparations are scheduled for Mar 4 and 6. After these are completed, the launch window opens at 17:58 UT and closes at 19:08 UT, 7 March 1977. Thereafter, the window opening slips about 4 min later in the day with each day that passes. The window closing slips about 5 min later each day. Last launch date listed is April 3, 20:10 to 23:23 UT. After March 21 the moon is above the horizon during the launch window and optical observations will be impeded.

Conditions for launch are that at least two observations stations (including the Learjet) must be clear and auroral activity over ESRANGE.

Experiment 11, the Barium Ion Jet, will be directed upward along B-lines with initial speed of about 13 km/sec. The adjacent map displays the ground projection of the path (with time and altitude marks shown). Unpredictable transverse drifts are anticipated. As the Barium trace stretches, it becomes so faint that after 15 min (about 3000 km) it can only be observed with very sensitive optical instruments with narrow interference filters. After 30 min the typical brightness is about 50 Rayleighs. The explosion and the lower part of the ion jet are well visible. Some elevation angles for observers in N. Europe are marked with concentric dotted circles. Dashed lines indicate the shadow limits (solar elevation below -10) at beginning and end of the launch window on March 18.



ACTUALITIES

ANDOYA

#0308; Theile, "Polar High Atmosphere" launches denoted "EUV-1" and "EUV-2" on 22 Jan and 8 Feb 1977, respectively.

B-8; Maehlum, Maynard (#0025), et. al. launched "Composition" (also called "Ferdinand 46") on 16 Feb 1977 at 2047 UT. Experimental program described in NL 76-12, pg 3.

#0131; Arnoldy, Cahill successfully launched two rockets (18.1004UE and 18.1005UE) into a stable quiet arc and during auroral break-up on 23 Jan 1977 and 6 Feb 1977, respectively. The rockets carried magnetometers, E-field probes and various particle detectors.

EGLIN AFB

#0400; Fitz, "STRESS" (NL 77-1, pg 3). One 48 kg Ba release at 185 km on 26 Feb 1977. Limited data, poor visibility. Neutral cloud motion at 200 km/hr.

FORT CHURCHILL

B-9; Zipf, successfully launched Nike-Apache and Nike-Orion on 15 and 26 Feb 1977.

#0100; McEwen, Anger, Lewellyn, McNamara successful launch of Black Brant VA on 13 Jan 1977. Spectra of aurora above 1100A. Photometers, UV, vis, IR, plasma probes and electron spectrometer.

#0087; Forsyth, syccessful launch of Black Brant VI on 27 Feb 1977. Coherent pulsed radar system to identify, locate and follow behavior of ion-acoustic waves and thereby locate the E-field.

KIRUNA

B-1; Witt, "S-22" also called "Aurora". Payload launched with a Skylark 3 rocket on 8 Feb 1977 at 17:58 UT. Peak altitude 212 km. Preliminary evaluation is that all experiments worked well. Good scientific output was expected from most experiments. The particle experiments were not so successful as the rocket was passing just beside an aurora.

B-2; Holmgren, et. al. (see NL 76-11, pg 2) "S-21/3" ("Big Trigger") launched at 20:49 UT on 11 Feb 1977. Peak altitude 200 km. Good scientific output expected; all experiments worked well.

"S-21/2" ("Little Trigger"), launched payload with a Nike-Apache rocket at 18:48:10 UT on 15 Feb 1977. Peak altitude: 165.5 km. Good scientific output expected; all experiments worked well.

#0356; Sheldon, X-ray bremsstrahlung experiments were launched on 2 Super Arcas, 15.154UE and 15.155UE. The launches were coordinated with the two Trigger launches (B-2).

B-3; Bjorn, S-18, "D-Layer" campaign successfully completed with the launch of two Nike-Apaches. Preliminary analysis indicates very good results from payloads flown on 21 Feb 1976 at 1942 UT and 15 Jan 1977 at 0050 UT. The altitudes reached were 104.6 and 104.2 km, respectively.

POKER FLAT

A-24; R.A. Goldberg was project scientist for "Operation Aurorozone" which was a major and highly coordinated rocket, balloon and ground instrument supported study conducted at Poker Flat Rocket Range from Sept 20 to Oct 3, 1976. This program was designed to study energetics of X-ray auroral events and determine the degree of change in key stratospheric and mesospheric parameters (e.g. O3, conductivity, temperature) induced by the incoming X-rays. A total of 35 successful rockets were launched during the 2 week period, including 2

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Nike-Tomahawks to measure auroral particle and X-ray energetic structure, 8 chemiluminescent and optical ozonesondes, 6 conductivity and Gerdien probes to measure stratospheric ionization and 19 datasondes to measure temperatures, pressures and winds. These flights were supported by 5 large balloon (0.25 to 1.0 million cubic foot) payloads to measure X-rays, cosmic rays and conductivity near 40 km. In addition, 4 ozonesondes were employed to measure ozone up to 30 km. The nearby Chatanika radar backscatter facility was also coordinated to predict, verify and map electron particle energetics during the Nike-Tomahawk flight periods.

Scientists from several universities and government laboratories participated in the cooperative effort. Included were: Williamson, Doupnik, Wickwar, Barcus, Parks, Olsen, Randhawa, Mitchell, Szuszczewicz, Hilsenrath, Krueger, Jones and Goldberg (see NL 76-8, pg 2).

Comparison of the high altitude energy sources with stratospheric behavior will provide fundamental answers concerning the role of X-ray bremsstrahlung radiation as a trigger energy source for sun/weather processes.

#0164; Davis, 2 successful launches of Ba shaped charges on 7 & 11 Feb 1977.

SOUTH UIST

B-16; Krankowsky (MPI) mass spectrometers launched on P195H and P194H on 7 Feb and 11 Feb 1977, respectively.

#0085; Dickinson, spectroscopic measurement of D-region. P192H and P189H launched at B-16 times.

A-19; Williams, constitution of D-region. P193H and P191H launch times as B-16, above. Williams and DeJonckheere, Ozone concentration. Launched MOP 1 on 7 Feb 1977.

South Uist Feb/Mar 1977 rocket program is complete.

SKIBOTN

#0011, #0109; Gendrin, Perraut, French Mobile Station/Skibotn Campaign. In preparation for the conjugate point experiment between Syowa/GEOS/Iceland (June-Sept 1977) the following experiments were operated from 13 Nov to 22 Dec 1976. Location Skibotn, Norway (69.4 N, 20.3 E). Aurora Photometer, Weill & Fehrenbach; Riometer, Lavergnat; Magnetic field (3-component fluxgate), Schlich; ULF Waves Flux meter for Pc2-Pc4 (2 components) and Pc1 (3 components), Glangeaud & Gendrin, respectively; and VLF waves, Corcuff. VLF waves recorded on analog chart, all others were digital and began recording 15 Nov 1976. Operation was practically continuous. In coordination, T. Hirasawa, PRI, Tokyo, Japan operated VLF goniometer, scanning photometer and aurora TV.

CORRIGENDA --- In NL 77-2, pg 8, HEISS ISLAND, we incorrectly identified Beghin, et. al. "IPOCAMP". Beghin's IMS Directory number (Bulletin No. 2) is #0327. This is the joint program for which details were provided by V.V. Migulin for NL 77-2, pg 3.

In NL 77-2, pgs 3&8, SOUTH UIST, Krankowski's IMSCIE Office identification number should have been B-16.

B-13, Berkey and Parsons planned surface campaign in Norway (image intensifier auroral TV) did not take place. However, they are concentrating on processing the same type of data gathered in that region the year before. Similar observations during IMS may still be performed.

GENERAL IMS NEWS

STIP News --- M. Dryer delivered the 2nd Announcement of the L.D. de Feiter Memorial Symposium on "Study of Travelling Interplanetary Phenomena" to be held in Tel-Aviv, Israel, 7-10 June 1977. It gives details on submission of abstracts (deadline is passed), meeting location and invited speakers (many confirmed). Also, he reminds us that STIP Interval III is scheduled for the period 15 March - 15 May 1977.

Canadian IMS Coordinator Request --- B.W. Currie reminds us that the Kenora ionosonde station ceased operation on Dec 31, 1976. However, operation of Resolute, Churchill, Ottawa and St. John's is assured through the end of 1977. Dr. Currie again asks that IMS researchers please write to him if they are using Canadian ionosonde data or believe they will need this data available during the rest of IMS. His mailing address is: Canadian IMS Coordinator, Inst. of Space and Atmospheric Studies, Univ. of Saskatchewan, Saskatoon, Canada S7N OWO.

IMS Magnetometer Systems Training Session --- Staff of NOAA's Space Environment Lab and the US Geological Survey are planning to conduct a one-week training course in the operation and maintenance of the new magnetometer systems which will form the main part of the N. American IMS ground-based arrays. Representatives from each of the groups scheduled to operate these systems will gather in Boulder from March 14-18 to review the total system concept and obtain hands-on experience setting up the magnetometers, system power supplies, radio set and interface controller to form a complete, working system communicating to SEL from the field site via the GOES satellite. Except for site environmental differences, each participant will perform the same tasks required to place each of the 23 to 25 satellite telemetry relay magnetometer systems in routine operation. At sites out of range of the SMS/GOES satellites, on-site digital magnetic tape recorders will take the place of the radio transmitters. See NL 77-1, pgs 5-7 for site locations.

News from the US National Science Foundation --- D. Peacock sends word to the IMSCIE Office that the NSF is interested in receiving proposals for research in Aeronomy and Solar Terrestrial Research (Division of Atmospheric Sciences). The IMS has been in progress since 1 Jan 1976 and is scheduled to continue in an operational phase through the end of 1979. Observational programs of the IMS will utilize ground-based techniques, rockets, balloons and satellites to conduct cooperative, coordinated investigations into the dynamics of the ionosphere and magnetosphere. However, proposals for research support need not be limited to instrumental/observational programs. Theoretical and laboratory studies should play an important role in the IMS.

For further information, contact Dr. D.S. Peacock, Program Director for Solar Terrestrial Research, or Dr. G. Adams, Program Director for Aeronomy, Division of Atmospheric Sciences, National Science Foundation, 1800 G Street, N.W., Washington, D.C. 20550.

Note from the IMSCIE Editors --- The IMS Newsletter is to be a convenient and useful information exchange medium. IMSCIE Office is always striving to fulfill this goal and we appreciate the many contributions sent to us from all over the world. However, to maintain and improve its usefulness we need feedback from our readers in the form of evaluations and suggestions for changes or additions in coverage. Through discussions with some friends and among ourselves, we had these ideas (please comment):

1. While many campaigns, rocket and balloon launches, etc. are well documented and thus informative for readers, on others we have very scanty information. In particular, we would like more details on scientific objectives, instrumentation and, after project completion, a few words about the results obtained.

2. IMS is generating large numbers of studies and

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we expect the amount to increase in the next few years. The journal publication cycle is frequently long. To help disseminate information quickly, we are thinking of publishing titles, authors' names and perhaps a one or two sentence summary of preprints related to work of interest to other IMS participants. We would welcome reports of both theoretical and experimental work.

3. In the past, laboratory studies in areas of aeronomy, magnetospheric plasma physics, terrella experiments, etc. have been done in several countries. Such work is, no doubt, of interest to IMS participants. We would like to hear about it.

If you have other ideas, let's hear them!

PROGRAM UPDATE

Dr. O. Hillebrand (see #0066, Siebert) recently visited the IMSCIE Office and left with us an update of the Gottingen IMS program for magnetometer observations in Northern Scandinavia. Based upon their experience with two campaigns in 1974 and 75, the instrumentation, site selection and mode of operation is fixed for the IMS campaigns. The six sites are shown in the IMS NL 77-1, pg 4 map of Scandinavian observatories and magnetometer chains. They form profile #5. From N. to S. these locations are: Skarsvaag, Kunes, Kev, Ivalo, Martti and Kuusamo (an alternate site was occupied during 1975). The three most northern sites have digital magnetometers and the other three have FM magnetometers. Components H, D and Z are recorded at all sites. The instruments may operate independently of mains and each site can record 10-days of data. Previously announced plans for IMS programs covered only 3 weeks in 1976 because of the changed GEOS launch schedule. Data was collected between March 15 and April 15, 1976. Cooperation with the PORCUPINE launch was planned. For 1977, some 5 months of operations were planned but coordinated with GEOS.

Hillebrand has recently drafted an update to this program and in preliminary form he specifies:

Past Campaigns:

A. Sept 4 - Oct 27, 1974 at KEV, IVA, MAR & KUU

B. June 11 - Sept 28, 1975 at SKA, KUN, KEV, IVA, MAR, KUU (KUH)

C. Mar 9 - Apr 5, 1976 at KEI, ESR & HAK

Planned Campaign during IMS:

D. Sept 10, 1977 - Mar 20, 1978 at SKA, KUN, KEV IVA, MAR& KUU

Coordination and Cooperation during Campaign D with: Muench/Wilhelm, 6 pulsation magnetometer stations in auroral latitudes; Kertz/Maurer, 6 fluxgate magnetometers at the same sites as D; Untiedt, Kuppers, 30 magnetometer array; Troitskaya/Baranskiy, GMP chains; Observatories of Sodankyla, Tromso and Kirun; GEOS satellite; and "PORCUPINE" Campaign in Fall 1977.

Data Availability:

Data from the digital recording sites of campaigns B and C are available on request as 9-track, 1600 bpi digital tape data. FM-data is only available on special request. All digital data of planned campaign D will be available in summer 1978 approximately.

REGIONAL IMS WORKSHOP --- on ground based observations in northern Europe. To be in Hankasalmi, Finland May 23-27, 1977. The second circular was distributed at the end of January. It litsts names and addresses of the program committee, W. Heikkila (Chairman), Dept. of Plasma Physics, Royal Inst of Technology, S-10044, Stockholm 70, Sweden, Telephone 08-236 520. Some 60 persons responded to the 1st announcement. Invited speakers have been chosen and a Workshop format adopted. Of special interest will be the STARE, Scandinavian Twin Auroral Radar Experiment, of R. Greenwald. It is now operating from nearby Sauvamaki and also at Trondheim, Norway.

Emphasis of the program will be on magnetospheric, ionospheric and auroral physics using many poster displays. A few invited review papers will be given to introduce problems around which discussions may focus. Brief reports on: (1) interesting observations and (2) new theoretical ideas with firm suggestions for testing are encouraged. Titles and short abstracts of such reports are requested by the Chairman by 4 April 1977.

Special emphasis is placed on identifying events of common interest. Ten events have already been selected (only 4 actually in IMS, i.e. since Jan 1976).

1.	Pulsation (pc5)event,	75/03/11,	0430-1030 UT
2.	Substorm event,	75/04/06,	2000-2300 UT
3.	Magnetic storm,	07/07/7-8,	1700-0700 UT
4.	Eastward PEJ event,	75/10/26,	1500-1900 UT
5.	Substorm event,	75/10/30,	1900-2330 UT
6.	Substorm event,	75/12/3-4,	2100-0100 UT
7.	Magnetic storm,	76/03/6-7,	1300-0500 UT
8.	Eastward PEJ,	76/04/07,	1200-1500 UT
9.	East-& westward PEJ	76/10/07,	1600-2200 UT
10.	East PEJ ending with substorm expansion phase,	76/10/27	1700-2100 UT

Some of these intervals will be studied closely at the Workshop together with other data. Other groups are invited to suggest special events and intervals to Heikkila in time for them to be included in the last circular in mid-April.

PULSATIONS NEWSLETTER

Fraser and Glangeaud have distributed their second newsletter to members of IAGA Div. III, WG III-I on Magnetic Pulsations and to others interested. Since there are certainly overlaps between IMS and the pulsations studies (IPPDYP, etc.) we feel it useful to mention some of the items in this NL. Of main concern was a possible concensus on topics of interest for the Seattle IAGA Meeting. The most-favored topic suggested is: "Joint ground-satellite studies on all types of magnetic pulsations. The second was "Results from spaced station studies. These include meridian, intrahemisphere and conjugate networks."

Also given are ranking of pulsations related research topics which, in the opinion of the respondees, will still be topical in 2 years. The seven most favored are: Generation of pulsations including wave-particle interactions instabilities and non-linear theory; Satellite-ground observations; Ionospheric effects, including propagation and absorption; Role of the plasmapause; Ground induction effects on source fields; Pulsations and auroral zone phenomena including substorms; and Magnetic pulsations and interplanetary phenomena including other planets.

Interestingly, most respondees believed that an important role for a newsletter is to spread the word about planned and future studies by research groups.

PUBLICATIONS --- Welcome additions to our IMSCIE supply of journals have been two ESA publications, ESA Scientific and Technical Review and ESA Bulletin. Items we have noted in recent issues are: G. Pfotzer,s review paper on "Important Problems in Physics of the Auroral Zone", ESA Sci & Tech Rev, Vol 2, 181-197, 1976; the ESA Bulletin No. 7, Nov 1976, devoted to the European Space Agency Space Operations Center (with its center pages reviewing the status of several satellites of particular interest for IMS and the brief article about the ESRANGE launch facility). We have also been delighted with the variety and beautifully presented articles in the CNRS Research magazine. Issue No. 3, 1976, told about EISCAT.

SATELLITE INFORMATION

Notes from the IMS Satellite Situation Center

Item 1. Achieved Orbit Data. The following achieved orbit data tapes are available from the SSC for the time period January to December 1976: Hawkeye 1, IMP-J,IMP-H, and for the time period January to June 1976: Vela 5A, Vela 5B, Vela 6A, Vela 6B and for the time period launch though July 1976: Solrad 11A , Solrad 11B.

Item 2. Satellite Data Availability. The SSC has the GSFC magnetometer data (Lepping/Ness) from IMP-J available for distribution. Currently the SSC has the 15 sec averaged data from the first nine Special IMS Periods only (SSC Report 6) but expects to receive additional 1976 data on a continuing basis. The data is available either on magnetic tape or on 35mm microfilm and may be obtained on request from NSSDC/WDC-A R&S.

Following the upcoming ESA GEOS launch, WDC-A R&S expects to receive the daily GEOS summary plots. It is expected that these plots will be available as 35mm microfilm within a few months of data acquisition.

Item 3. Field Line Tracing. The SSC's program to perform external field line tracing is presently operational. Two external field models are offered: the Mead-Fairfield model and the Olson-Pfitzer model. The program is able to determine the satellite magnetic 'footprint' and display it on a world map. It is anticipated that the program will be useful in the coordination of ground based and satellite activity and requests for such output may be sent to the SSC. The SSC plans to perform field line tracings for the ISEE A and B satellites for the altitude range 3-10 earth radii and to have this available for distribution as 35mm microfilm.

Item 4. Prognoz 5.

The following Prognoz 5 orbit elements have been received by the SSC from Dr A.I. Zhulin:

Element Epoch (UT): 29 Dec 1976, 4h 35m 11.216s
Period 5713.7783m Semi-major Axis 106557.65 km
Eccentricity 0.93546697 Inclination 64.965917 d
Arg of perigee 289.93728d RA asc node 159.78868d
Mean anom 1.088471487d Perigee height 497.2979 km

The following information is available on the experiments carried by Prognoz 5:

Scientific Contact: A.A. Galeev, Spa Res Inst AS.

Experiment: Kilometric/Hectometric Receiver. Electric and magnetic fields from 50kHz to 1MHz in 10 channels. V.P. Grigoryeva, Shternberg As Inst Moscow.

Experiment: Plasma Detector. Ion spectra from 0.1 to 4.4 keV. Electron probe for density and temperature below 330 eV. K.I. Gringauz, Spa Res Inst.

Experiment: Solar X-Rays. X-rays from 2 to 511 keV. G.Ye. Kacharov, A.F. Ioffe Leningrad Inst for Phys and Tech AS.

Experiment: Interplanetary Helium Photometer. 304-A He+ line with thin film filter, 584-A He solar line with thin film filter, 584-A He with thin film filter and 1216-A H Lyman alpha line with absorption cell. V.G. Kurt, Spa Res Inst and J.L. Bertaux, CNRS.

Experiment: Soft X Rays. Energy range 2 to 100 keV in 5 bands. O.B. Lickin, Spa Res Inst AS and B. Valnicek, Czech Astronomical Observatory.

Experiment: Energetic Particles and Charge Composition. Spectra, anistropy and charge composition above 500 MeV/nucleon for Z from 2 to 6, 6 to 15, 15 to 35 and 35 to 50. Yu.I. Logachev, Inst Nuclear Phys Moscow State Univ.

Experiment: Energetic Particles. Charge and Mass composition energy range 7 to 30 MeV/nucleon. V.N. Lutsenko, Spa Res Inst AS.

Experiment: Three axis Fluxgate Magnetometer. Vector magnetic fields from 1 to 60 gammas. Ye.G. Yeroshenko, IZMIRAN.

Experiment: Plasma Spectrometers. Electrons from 3 eV to 15 KeV, protons from 3eV to 15 KeV and positive ions from 3eV to 4keV with mass resolution. A.A. Zertsalov, Spa Res Inst AS and J.M. Bosqued, CESR.

Full addresses and telephone numbers of the experimenters are given in SSC report #9, IMS directory of spacecraft and experiment scientific contacts (now in press).

SOLRAD 11 A&B SATELLITES

IMSCIE Office received the following information from G. Righini, Dir. Osservatorio Astrofisico di Arcetri. The pair of satellites SOLRAD A&B were successfully launched by US NRL in March 1976 (see IMS NLs 76-9, pg 5; 76-7, pg 4; 76-6, pg 5; and 76-4, pg 2). They orbit 180 out of phase and carry identical experiments. The NRL data collection site is at Blossom Point, Maryland, USA. Arcetri Observatory has been invited to serve as a recording station for satellite passes over and near their meridian (about 4 hrs per day). Data recorded at Arcetri are available upon request for a nominal charge. A 1-month raw data tape (2400 ft) is $25, a 15-day digital tape of raw data is $18 and a tape containing reduced data for one hour of telemetry for one element is $15. Printouts of reduced data for short periods (less than 100 sheets) are available for $0.30/sheet. Requests for data or information should be addressed to: Prof. G. Tagliaferri, Osservatorio Astrofisico di Arcetri, 5, Largo E. Fermi, 50125 Firenze, Italy. For lists of experiments on SOLRAD 11 A&B, see SPACEWARN BULLETIN, SPX-271, 11 May 1976 (pg 7-10); IMS NL 76-9, pg 5; or MONSEE BULLETIN NO. 8.

SPECIAL SOLRAD NOTE: Information received at press time from Dr. R.W. Kreplin indicates that SOLRAD 11 A&B have experienced temperature problems (overheating) and that several experiments on each satellite are either partially or completely inoperative. A detailed list should be available for next IMS NL. Until a solution is found to satellite overheating, most experiments must be turned-off when the satellites are below the horizon at Blossom Point. Since the horizons of Blossom Point and Arcetri overlap, data acquisition at Arcetri will still be possible but on a reduced schedule. Generally, the Solar X-ray and EUV monitors are operational at this time on both satellites. Some recalibration for instruments at higher temperatures is necessary and now in progress at NRL. Latest information on SOLRAD tracking and experiment status is available from Dr. R.W. Kreplin, US Naval Research Laboratory, Washington, D.C. 20390, USA. Present trends suggest that the satellites are returning toward normal temperatures. If this continues, a longer operational schedule will be instituted.

GEOS INFORMATION

GEOS is a European Scientific Geostationary satellite which is to be launched in April 1977 and is expected to have a two-year lifetime (see IMS NL's 76-11, pg 7 & 76-12, pg 4). It consists of 7 different experiments among which one, named S-300, is devoted to wave measurements (for a description of all the experiments, see K. Knott "Payload of the GEOS Scientific Geostationary Satellite", in E S A Scientific and Technical Review, 1, 173-196, 1975). This wave experiment is managed by 5 different European institutes, which are organized within the "S-300 Scientific Board".

Because of the high telemetry bit rate which is required by the wave experiments, only 10% of the S-300 wave data (ELF + VLF) will be kept.

(continued on page 7)

(continued from page 6)

To remove any misunderstanding that may have been caused by a note in IMS Newsletter Nr. 11, page 7 "Selection of GEOS Archive Data", we stress that all the data from the other GEOS experiments are permanently saved, and this includes the DC electric field, the ULF wave experiment, and some VLF amplitude data. With respect to the high speed data, S-300 experimenters will have three months to decide which tapes they want to keep. After this period the other 90% of the recorded tapes will be recycled.

In the selection, S-300 experimenters have foreseen to include information on any known GBR (Ground, Balloon and Rocket) experiment which could be carried out at the same time, in view of saving data which would allow for intercomparison between phenomena observed at low altitude and at the geostationary orbit. S-300 experimenters are willing to make any effort, within reasonable limits, to satisfy the wishes of the GBR experimenters.

But, due to the rather short period allocated to the selection, such a process needs to be organized well in advance. We suggest the following procedure:

1. Cooperation ---

Each GBR experimenter who thinks that GEOS data could be of interest to his experiment should express his wishes to Dr. A. Bahnsen, Chairman of the S-300 Scientific Board (Danish Space Research Institute, Lundtoftevej 7, 2800-Lyngby, Denmark). In his request, he should briefly describe his own experiment, its expected date and the kind of S-300 measurement with which he would like to compare his own results. He should also evaluate the number of 6-minute periods (data are kept in files of 6-min length) over which he would make the comparison, and he should think of the way of defining these periods within the time of three months.

2. Operational phase ---

Once the agreement would have been reached between GBR and S-300 experimenters, a special procedure would be set up for the operational phase. This procedure will involve the European IMS Center in Meudon, led by Dr. P. Simon (DASOP, Observatoire de Meudon, 92190 Meudon, France). It will depend on the nature of the GBR experiment. A special data link between Darmstadt (West Germany), where the ESA Satellite Operation Center is situated, and the rocket launching site at Kiruna (Sweden) is also foreseen. Its description will be given in a forthcoming note.

3. Summaries ---

Note that, in almost real time, the ESA Center in Darmstadt will issue daily summaries (which contain concentrated information about all GEOS data) and experimenter summaries (which contain more detailed information about each experiment's data). These could be distributed to GBR experimenters upon request, in order to help them in selecting periods of interest.

4. Analysis ---

Within reasonable limits, S-300 experimenters are prepared to give preprocessed data to GBR experimenters. Any further detailed analysis could require a financial contribution to the computing expenses, or should be made on the basis of bilateral agreement and exchange of data.

5. Satellite experimenters ---

This proposal is also valid for satellite experimenters who would like to study correlations existing when their spacecraft are in interesting positions with respect to GEOS.

ATS-6 INFORMATION

T. Fritz (#0176) has prepared a report on the scientific mission of the ATS-6 satellite. It contains details of all experiments and principal investigators, the status of instruments and analysis, data return and availability, the some 63 publications and 94 talks already resulting from analysis of ATS-6 data, a listing of the 11 principal scientific results to date and expected scientific returns to be realized from continued operation of the on-board scientific experiments during the coming year. A partial summary of some of these items is given below. Copies of the complete report are available from Dr. T.A. Fritz, NOAA/Space Environment Laboratory, Boulder, Colorado 80302, USA.

ATS-6 Scientific Objectives --- To study the space environment at synchronous altitude by monitoring spatial and temporal variations of the various plasma regimes, geomagnetic field and energetic particles present near the spacecraft.

Scientific Experiments and PI's --- For a complete listing with full addresses, see NSSDC/WDC-A R&S "1975 Report on Active and Planned Spacecraft and Experiments", pages 29-30. Auroral Particles, McIlwain; Low energy Protons, Fritz; Electron-proton spectrometer, Winckler; Solar cosmic rays and trapped particals, Masley; Omnidirectional spectrometer, Paulikas; Magnetometer, Coleman; and Radio beacon, Davies. There are no major operational problems at present and data from all instruments are being actively analyzed by the respective teams. All experiments are recording data 100% of the time except the radio beacon which is off about 10 hours per week.

Future ATS-6 Plans --- Study of spacecraft charging in synchronous environment; flare associated protons and heavy ions temporarily trapped at this altitude during rising phase of the solar cycle; and continued addition to the long-term data base of energetic particles observations at this altitude. Other studies will focus on rare events and correlative opportunities, including: equatorial magnetospheric measurements in association with IMS programs; multiple point measurements jointly with GEOS (drifting ATS-5 may be selectively reactivated to further this coordination); multiple magnetopause crossings around local noon during flare associated geomagnetic storms; energetic electron flux modulation with interplanetary magnetic field boundary structure changes for comparison with data such as auroral D-layer ionosphere variations; and possibilities for near-real-time monitoring and display at Boulder of the ATS-6 EME data stream.

NEWS FROM ANTARCTICA --- Two recent communications have come to the IMSCIE Office from the Antarctic via the last planes out. A.N. Zaitzev is the Soviet Exchange Scientist wintering over at the South Pole Station. He plans to send information by cable about the status of his various experiments and these will be shared in these NLs. Among his several projects at Pole, he will reestablish geomagnetic recording at that site using a portable magnetometer "IZMIRAN-4" (see Bobrov's paper in Geomagnetism & Aeronomy, vol 5, 695-697, 1965).

Chivers shared with us a copy of the Jan telex from Francher, the US scientist wintering over at VOSTOK. Facilities there are sound enough to support another year of work. With help from several others, Hessler's equipment has been cleaned, recalibrated and restored to original specifications. New Stanford programmer and mixer-monitor installed on the standard VLF; tape units restored; WWV receivers and new antenna operating. VLF lab now at Siple standard for coordination with Soviet traverse from Mirny to Vostok I. Dartmouth hiss recorder OK. Stanford field mill seems OK but high winds limited data. Chivers 30 MHz riometer installed and data legibility only slightly degraded by ionosonde interference. Data recorded on slow speed tape and chart. Staff impressed with this system. Campbell micropulsation system packed and stored.

IMS CALENDAR OF GBR CAMPAIGNS JANUARY - JUNE 1977
(As of 2 March 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- -
#0327 (Beghin, et al; "IPOCAMP")
KIRUNA (ESRANGE)- -
B-1 (Witt, et al; "Aurora")
B-2 (Holmgren, et al; "Trigger")
#0356 (Sheldon,X-ray)
B-3 (Bjorn, et al; "D-Layer")
#0133 (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-16 (Krankowsky; P194H, P195H)
A-19 (Williams and De Jonckheere, MOPI)
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, 14.500UA)
B-10 (Mentall; 18.1013GA, 18.1014GA)
B-12 (Hays/Sharp; 13.132UE)
#0100; (McEwen et al., Black Brant Va)
#0087; (Forsyth, Black Brant VI)
POKER FLAT- -
#0064 (Scherb; 29.004UE)
#0170 (Evans; 29.003AE)
#0400 (Fitz; Auroral Studies)
#0164 (Davis; 18.1011UE, 18.1012UE)
WHITE SANDS -
B-10 (Mentall; 31.004GA)
EGLIN AFB -
#0400 (Fitz; "STRESS")
KWAJALEIN -
#0400 (Fitz; "Equatorial Wideband")
CANADA- -
#0205 (A. Vallance Jones, et al)
CONJUCATE POINTS- -
#0011, 0429 (Perrault, Hirosawa)