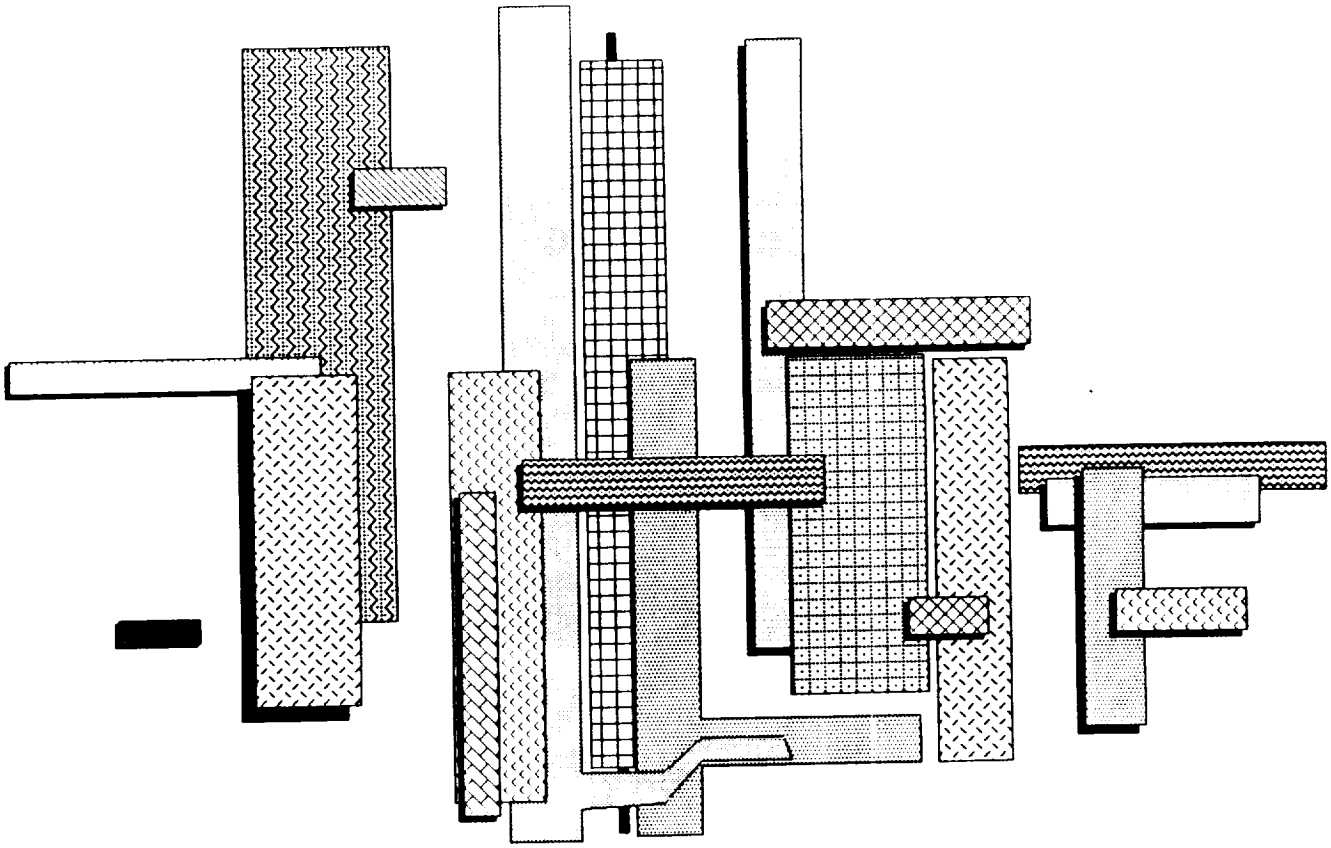
NSSDC/WDC-A-R&S 89-03

The Worldwide Ionospheric Data Base

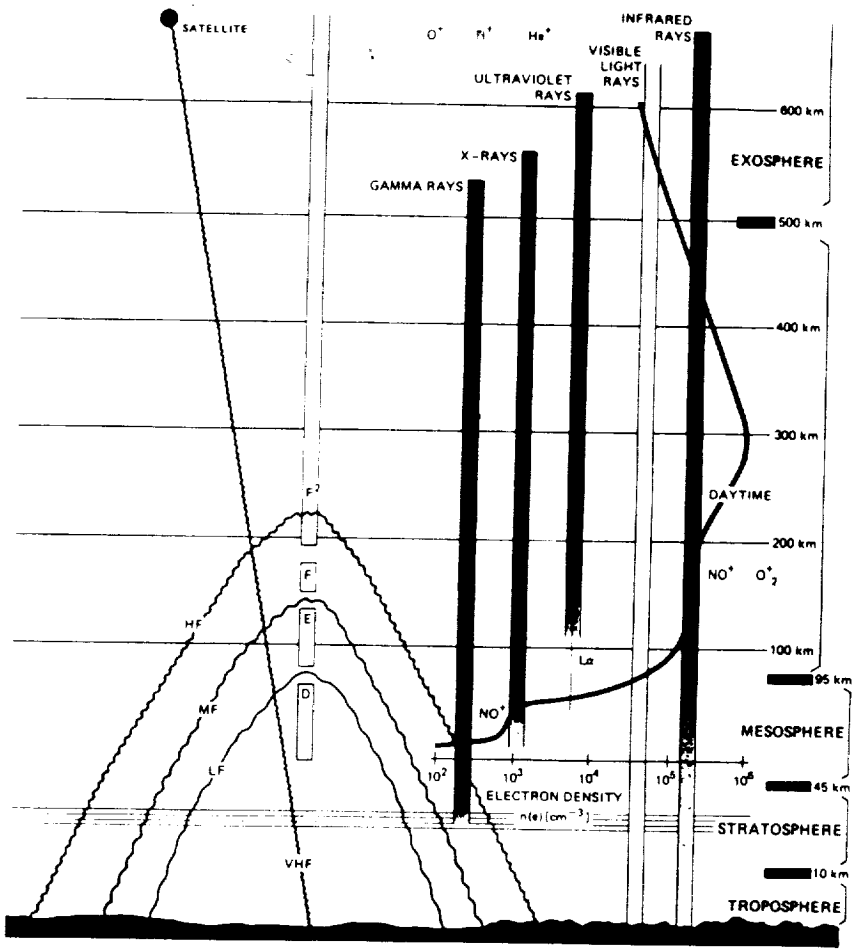


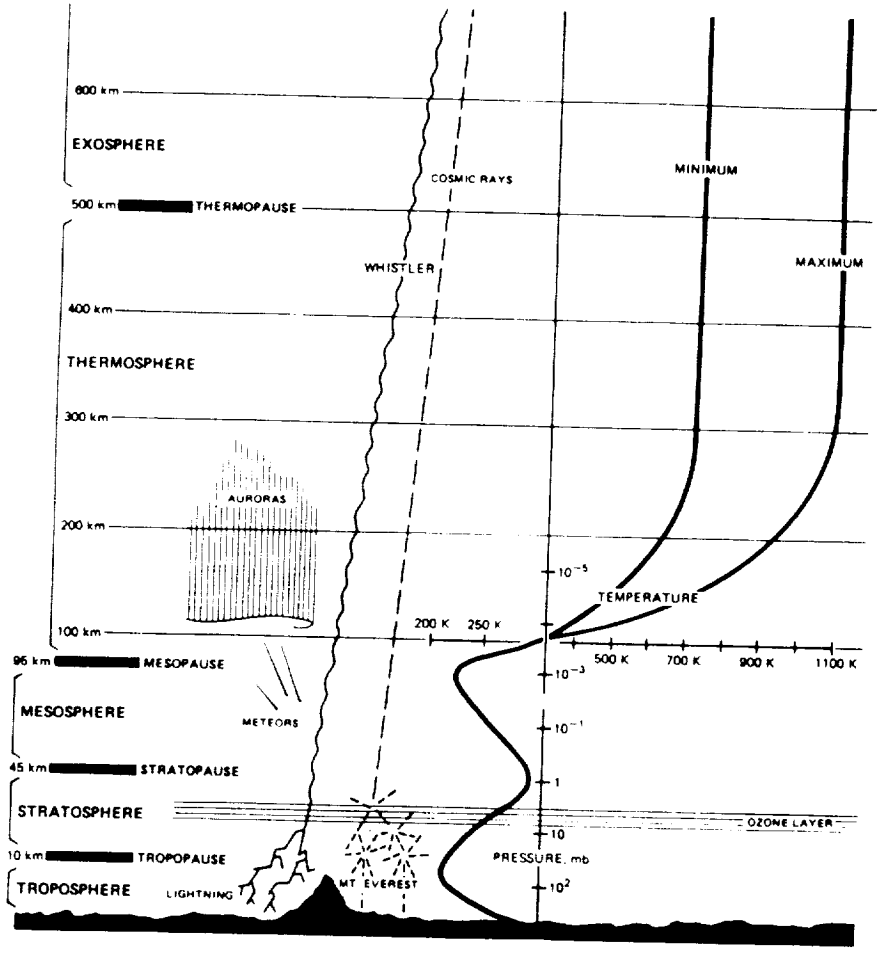
Dieter Bilitza

April 1989

NATIONAL SPACE SCIENCE DATA CENTER/
WORLD DATA CENTER A FOR ROCKETS AND SATELLITES

Ionosphere





Atmosphere

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The Worldwide Ionospheric Data Base

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April 1989

NATIONAL SPACE SCIENCE DATA CENTER/
WORLD DATA CENTER A FOR ROCKETS AND SATELLITES

Progress, far from consisting in change, depends on retentiveness . . . .

Those who cannot remember the past are condemned to repeat it.

George Santayana

The Life of Reason (1905)

Contents

Figures

Tables

Chapter 1

Introduction

Over the last decades, ground-based, rocket and satellite experiments have supplied us with a wealth of information about the ionospheric plasma.

From early on, exploration of the ionosphere was driven not only by the human quest to understand the world that surrounds us but also by basic day-to-day needs in radio communications. Soon the ionosphere was also recognized as a natural laboratory for testing our ideas and theories in plasma physics and thermodynamics. In our age, in which earth observation from space plays an ever increasing role in the global well-being of our planet, predictability of the ionospheric environment is more important than ever.

The electromagnetic waves used for remote sensing are affected by the ionospheric plasma. Moreover, the accuracy of satellite positioning and navigation depends heavily on proper corrections for ionospheric influence (see Table 1.1). Accurate knowledge of the satellite's orbit position is especially important for geodesy, altimetry, and gravimetry, as well as for Search and Rescue from space.

In solar-terrestrial physics we are getting closer and closer to understanding the flow of matter, energy, and momentum from the sun to the Earth. The ionosphere plays a crucial role in the large-scale coupled system of heliosphere, magnetosphere, and atmosphere [15, 17].

The worldwide ionospheric data base is scattered over the entire globe. Different data sets are held at different institutions in the United States, the Soviet Union, Australia, Europe, and Asia. The World Data Centers in the different continents archive and distribute part of the huge data base; the scope and cross-section of the individual data holdings depend on the regional and special interest of the center.

This report should be viewed as a central document pulling together all the strings that point toward different ionospheric data holdings. It will provide requesters with the information about what is available and where to get it. An attempt is made to evaluate the reliability and compatibility of the different data sets based on the consensus in the ionospheric research community. The status and accuracy of standard ionospheric models are also discussed because they may considerably facilitate first order assessment of ionospheric effects.

This study is a first step towards an ionospheric data directory within the framework of NSSDC's Master Directory.

1.1 The Ionospheric Plasma

The gaseous envelope that surrounds our planet can be divided into two regions at about 80 km altitude. The turbulent and neutral gas mixture of the lower region is the stage for all

meteorological processes. This part fills only 1/50,000 of the total gas volume, but it contains 10^5 times more gas than the rest. In the upper region, solar irradiation produces a partially ionized plasma composed of neutrals (O, N_2, O_2, He, H), ions (O^+, H^+, He^+, NO^+, O_2^+, N_2^+) and electrons. The ionosphere is electrically neutral. The most abundant neutral is N_2 and the most abundant ion is O^+. Above 1000 km altitude light ions (H^+, He^+) become dominant; below 250 km heavy ions (NO^+, O_2^+) play an important role.

Plasma-related nomenclature distinguishes the "ionosphere" as below about 1000 km altitude and the "protonosphere" or "plasmasphere" as above that altitude. Both regions are part of the much larger magnetosphere, which is the region controlled by the Earth's magnetic field.

Electron and total ion number densities are in the range 10^8 to 10^{13} m^{-3}. Neutral densities decrease from 10^{17} m^{-3} at low altitudes to 10^{12} at about 500 km.

Unlike the almost hydrostatic altitude profiles of the neutral densities, the electron density profile exhibits several layers (E, F1, F2), as a result of the competing processes of particle production, loss, and transport. The highest densities (10^{12} to 10^{13} m^{-3}) are observed at the F2 peak; the peak altitude ranges from 250 to 350 km at mid-latitudes and from 350 to 500 km at equatorial latitudes. The E peak density is about one order of magnitude smaller than the F2 peak and typically located at 100 to 120 km altitude. Between these two layers under certain conditions a valley and/or an F1 ledge can be observed. Below the E peak, in the D region, the electron density decreases rapidly with altitude. At 80 to 90 km the profile may exhibit an inflection point.

The ionization in the D region is primarily caused by solar X-rays and depends strongly on the solar zenith angle. The highest values

TABLE 1.1 Estimated Maximum Ionospheric Effects on Electromagnetic Waves [11]

Effect	100 MHz	300 MHz	1 GHz	3 GHz	10 GHz
Faraday rotation (rotations)	30	3.3	0.3	0.033	0.003
Excess time delay (μs)	25	2.8	0.25	0.028	0.0025
Refraction	≤ 1°	0°7'	0°0.6'	0°0'4.2"	0°0'0.36"
Variation in direction of arrival (s)	1200	132	12	1.32	0.12
Absorption, auroral and polar cap (dB)	5	1.1	0.05	6×10^{-3}	5×10^{-4}
Absorption midlatitude (dB)	< 1	0.1	< 0.01	$< 1 \times 10^{-3}$	$< 10^{-4}$
Dispersion (ps/Hz)	0.4	0.015	0.0004	1.5×10^{-5}	4×10^{-7}

Note: Data were collected in the United States for one-way paths at an elevation angle of about 30°.

(10^8 to 10^9 m^{-3}) are reached near noon during summer. Below about 70 km ionization by cosmic rays becomes the major electron source. As a consequence of the different production sources, the electron density is negatively correlated with the solar cycle below 70 km and positively above.

The E region is under solar control, being formed mostly by ionization of atomic oxygen by EUV radiation. Again the daily maximum density occurs near noon, the seasonal maximum is found in summer, and the density increases with solar activity. During the night, the density decreases by more than an order of magnitude due to recombination. A very thin and patchy sporadic E (Es) layer occurs irregularly and can exceed the normal E and F peak densities (see special issue of *Radio Science*, Vol. 10, No. 3, 1975 for in depth discussion).

The F region consists of two overlapping layers (F1, F2), with the F2 layer being the most important, exceeding the F1 layer in magnitude and altitude. A clear separation, i.e. a distinct F1 ledge, is most obvious during daytime in summer. The F1 region at 150 to 200 km altitudes is still under strong solar control. With increasing altitude, however, the neutral densities decrease rapidly and transport processes become more important than the ionization process. Ambipolar diffusion, electrodynamic drift, and neutral wind drag determine the density distribution. As a result the F2 peak and the topside above it are highly variable (10 to 30 percent from day to day). The topside densities decrease exponentially to between 10^9 and 10^{10} m^{-3} at 1000 km altitude. Unlike the lower layers, the F2 peak density tends to reach maximum values in the afternoon and during winter.

The latitudinal profile of F region electron density exhibits two crests at ±15° magnetic latitude with a minimum at the magnetic equator. Towards night (and also towards higher altitudes) the two crests merge into one latitudinal peak at the magnetic equator. This "equatorial anomaly" is caused by the so-called "fountain effect": the charged particles are pushed upward by the equatorial electric field and drift downward along magnetic field lines (see *Journal of Atmospheric and Terrestrial Physics*, Vol. 39, No. 9/10, 1977).

At high latitudes the ionosphere is strongly coupled to the magnetosphere and to the solar wind. The transition from closed to open magnetic field lines and the influx of energetic particles profoundly affect the ionospheric plasma [16, 17, 24, 26]. The boundary region, the auroral oval, is marked by the beautiful display of auroras (northern lights)[23]. In recent years satellite imaging instruments allowed us to monitor the oval from space. Surrounding the magnetic poles, the oval extends to near 75° geomagnetic latitude at noon and 65° at local midnight. On the nightside the oval is well marked by a depletion in electron density, the so-called trough. On the dayside one finds a region of enhanced densities just inside the oval, the so-called magnetospheric cleft; the electron density at the tip of the crest is almost an order of magnitude greater than it is at the bottom of the trough. During magnetic storms the trough moves equatorward by about 2° latitude per unit increase in K_p. The region inside the oval is called the polar cap. The auroral oval and its role in ionospheric physics was reviewed by Feldstein and Galperin [1985], and by Feldstein [1986].

A wide variety of ionospheric irregularities have been observed, predominantly at high latitudes and during the equatorial nighttime [Fejer and Kelley, 1980; Szuszczewicz, 1986]. The plasma fluctuations range in scale from hundreds of kilometers down to centimeters. Plasma instabilities play an important role in the generation of medium-scale (kilometers) and small-scale (meters) irregularities. Examples of irregularities are patches of enhanced ionization in the E region (sporadic E) and of depleted ionization in the F region (spread F). Spread F is most frequently observed in the equatorial nighttime ionosphere. The term "spread F" originates from the range and frequency spread on ionosonde recordings, with which it was first discovered. Reviews of spread F theories were given by Ossakow [1981], and by Ossakow et al. [1984]. The irregularities cause signal fluctuations in traversing radio waves, known as scintillations.

Influx of solar plasma into the tail of the magnetosphere, sometimes preceded by solar flares, can cause complex ionospheric disturbances (storms); the most consistent pattern is an enhancement in D region ioniza-

tion. These effects are felt most strongly in the polar cap. A particular severe event is due to protons arriving from the sun and causes a radio communication blackout over considerable time periods, the so-called polar cap absorption (PCA) events.

The main source of energy for the terrestrial ionosphere is extreme ultraviolet radiation from the sun. The electrons are heated most efficiently and their temperature exceeds the temperatures of ions and neutrals. Electron temperatures increase from about 300 K at 100 km to about 3500 K at 800 km. Ion temperatures are close to the neutral temperature below about 400 km and increase towards the electron temperature above that altitude. Below 150 km the high neutral densities and the high collision frequencies result in the same temperature for electrons, ions, and neutrals. During nighttime (no solar heating) the temperatures of all species are close together.

In general, plasma temperatures are lowest at the geomagnetic equator and increase towards higher latitudes, due to the increased influence of heating by precipitating particles at auroral latitudes. At low altitudes, however, the electron temperature peaks at the magnetic equator, reaches minimal values at about $\pm 20^{\circ}$, and then increases towards higher latitudes. This behavior is the mirror image of the equatorial anomaly of the electron density and illustrates the strong anticorrelation between electron density and temperature.

Roughly speaking, the temperatures increase from an almost constant nighttime value to an almost constant daytime value. The most significant departure from this behavior is the early morning peak in electron temperature. It is most pronounced at the magnetic equator at about 300 km altitude (the peak temperature exceeds the daytime value by a factor of 2 to 3); its magnitude decreases rapidly towards higher and lower altitudes and towards higher latitudes. The temperature peak is a result of the sharp increase in solar heating with at the same time still low electron densities.

The electron temperature stays almost constant through a solar cycle, in contrast to the increase of almost all other neutral and ionized parameters. This again is a result of the close coupling with the electron density which determines both energy gain and loss of the electron gas; the simultaneous increase of both terms leaves the electron temperature nearly unchanged.

An excellent review of ionospheric electron temperatures was published by Schunk and Nagy [1978]. The theoretical and experimental evidence for temperature anisotropies was reviewed by Demars and Schunk [1987] and by Oyama and Schlegel [1988].

The sun-induced thermospheric winds provide the energy source needed to drive the so-called ionospheric dynamo which maintains the system of ionospheric electric currents and fields. See Blanc [1979] and Richmond [1979] for review and references. On the sunlit side of the Earth two large vortices of electric current exist in the quiet equinoctial ionosphere; the current flows counterclockwise in the northern hemisphere and clockwise in the southern hemisphere (Sq currents). The concentrated current at the magnetic equator represents the equatorial electrojet [Forbes, 1981]. Magnetic storms severely affect thermospheric winds and ionospheric currents. The thermospheric winds and ionospheric drifts are of the order of 100 m/s and can reach 1000 m/s and more during magnetic storms. Ionospheric current densities are of the order of 10^{-6} A/m^2 and electric fields are of the order of 10^{-2} V/m. The Earth's magnetic field reaches values of 3×10^{-8} T at ionospheric altitudes.

The solar wind blowing past the Earth's magnetic field creates a magnetospheric dynamo which drives ionization across the polar cap. The empirically found dependence of the auroral plasma convection on solar wind parameters [Reiff and Burch, 1985; Clauer and Banks, 1986] illustrates the strong coupling between solar wind and high-latitude ionosphere [19].

While the dynamics of the terrestrial ionosphere is largely controlled by the magnetic field, some other planetary ionospheres interact directly with the solar wind. The ionospheres of the other planets and their relation to the Earth's ionosphere were described by Strobel [1979] and by Schunk and Nagy [1980]. Korösmezey et al. [1987] investigated cometary ionospheres.

TABLE 1.2 Measurement Techniques and Parameters

Measurement Technique	Primary Parameters	Secondary Parameters	(1) First Year (2) Time Resolution (3) Spatial Resolution (4) Number of Stations (5) Volume of Data
Ground-Based			
Ionosonde	Plasma frequencies for E, F1, F2, Es Propagation factor M(3000) F2	Bottomside electron density profile Peak altitude of E, F1, F2	(1) 1940 (2) 1h, 15 min (4) ~ 400 (5) 45000 station-months
Incoherent scatter	Electron density Electron temperature Ion composition Ion temperature Ion drift velocity (line-of-sight)	Vector ion velocity Neutral drift velocity Electric field Neutral temperature	(1) 1964 (2) 1 - 30 min, 3 d/m (3) 5 - 100 km, (4) 8 stations
Absorption	Field strength (echo-amplitude)	Some information about the electron density in the D-region	(1) 1957 (4) 30 - 60
Others	Ionospheric modulation transfer (Laxemburg effect) VLF receiver (whistler) Ionospheric drifts (from travelling irregularities, meteor trail echoes, etc.) Atmospheric radio noise Optical measurements Artificial heating of the ionosphere		
Satellite, Rocket			
Beacon	Ionospheric and plasmaspheric electron content	Scintillations Irregularities	(1) 1958 (4) ~30
In situ	Most plasma parameters (depending on instrumentation)	Energy budget Particle budgets	(1) 1964 (2) 1 - 60 s
Topside sounder	Topside ionograms Plasma resonance frequencies	Topside electron density profile	(1) 1962 (2) 10 - 30 s (5) 4 million ionograms ~100,000 reduced
Others	VLF receiver (whistler) Chemical release (ion drift) and artificial disturbance of chemistry Optical measurements		

1.2 Ionospheric Measurement Techniques

The existence of the ionosphere was first demonstrated by Marconi's transatlantic radio experiments in 1901. Observation of the ionosphere started in the mid-twenties, when several groups around the globe began to apply radio echo sounding. Since then their instrument, the ionosonde, has undergone a remarkable evolution into an almost wholly automated monitor of ionospheric parameters.

The knowledge acquired with the growing network of ionosondes has helped to facilitate and improve worldwide radio communication and broadcasting. Ionosonde measurements, however, are limited to the ionospheric plasma below the F peak. In 1957, Sputnik 1 heralded a new era of ionospheric exploration. Satellites carried the ionosonde beyond the F peak boundary and allowed in situ measurements and wave-propagation experiments between satellites and ground stations.

In the mid-sixties the newly developed incoherent scatter radar technique evolved into a powerful, ground-based observation tool. For the first time, the ionospheric parameters could be measured from top to bottom with the same experiment. The incoherent scatter spectrum that is received back by the radar contains information about the electron and ion densities, temperatures, and drifts, thereby allowing a much more detailed investigation of ionospheric processes than the ionosonde, which is only sensitive to electron density. In parallel, satellite missions evolved from single-experiment/parameter investigations into highly equipped ionospheric and atmospheric observatories.

The region below the E peak (the D region), being inaccessible to either of the above measurement techniques, is the domain of rocket experiments. Rocket campaigns have provided important contributions to our understanding of specific ionospheric phenomena such as the winter anomaly or spread F. However, unlike ground-based and satellite observations, the short and localized rocket flights do not allow exploration of global or temporal behavior. Here the indirect evidence from ground-based radio absorption measurements has to be consulted.

Table 1.2 (see page 5) lists the measurement techniques addressed below. Far from being complete, our survey includes only those techniques of ionospheric exploration that have produced large data records that are of general interest to the science and engineering community.

Chapter 2 Ground-Based Measurements

All ground-based measurement techniques yield information about the ionosphere from the difference in phase, amplitude, or polarization between transmitted and received radio waves. Evidently the ionosphere's refractive and absorptive effect on radio waves allows us, on the one hand, to use radio signals as a diagnostic tool but, on the other hand, causes unwanted side effects in measurements that utilize radio waves. One man's signal is another man's noise. This explains the importance ionospheric information has for radio communication, radio astronomy, satellite orbit determination, and remote sensing from space.

We distinguish three basic methods of ground-based observation: ionosonde, incoherent scatter radar, and absorption measurements. See Rawer and Suchy [1967] and Booker and Smith [1970] for general overview.

Information about the operating stations in all three categories worldwide is included in the *Directory of Solar-Terrestrial Physics Monitoring Stations*, by Shea et al. [1984], published for the Scientific Committee on Solar-Terrestrial Physics (SCOSTEP). It lists more than 1000 stations. For each station the directory provides information on station location, dates of operation, observing schedule, instrument description, and availability of raw and reduced data. Figure 2.1 shows a typical page.

The number of ionospheric monitoring stations has dropped from 368 before 1977 to 293 in 1984, a decrease of 20%.

2.1 Ionosonde

Ionosonde measurements utilize the fact that each plasma has a characteristic plasma frequency f_p, which depends only on the electron density N_e of the plasma:

$$N_e/\mathrm{m}^{-3} = 1.24 \times 10^{10} (f_p/\mathrm{MHz})^2$$

Radio waves with this frequency are totally reflected by the plasma, due to the interaction between the electric field of the waves and the plasma electrons. The time delay between signal transmission and echo reception is a measure of the height at which reflection occurs.

Ionosondes record the time delay for different frequencies, sweeping from about 1 MHz to 20 MHz. The recording, usually on film, is called an ionogram. The time delay Δt is translated into a virtual height h' by assuming propagation at the speed of light c:

$$h' = c \frac{\Delta t}{2}$$

Actual reflection heights are smaller than virtual heights due to the ionospheric refraction effect.

The Earth's magnetic field splits the echo trace into an ordinary and an extraordinary trace. The usual ionogram reduction techniques use only the ordinary trace. Parameters routinely deduced from ionograms include

B01 Ionosphere Vertical Soundings (Cont.)

****
POITIERS, FRANCE
****

ITEM: 464
DATE: 01/08/83

DISCIPLINE	B01 Ionosphere Vertical Soundings
STATION LATITUDE	N 46.57
STATION LONGITUDE	E 0.35
ALTERNATE NAMES	
DATES OF OPERATION	07/1948 to present
OBSERVING SCHEDULE	REGULAR
INSTRUMENT DESCRIPTION	LRM Ionosonde. Ionograms every 15 minutes, 1.6 - 17 MHz.
RAW DATA	35 mm film
DATA REDUCTION PRACTICE	REGULAR SPECIAL
REGULAR REDUCED DATA AVAILABLE AFTER	3 MONTHS
FORM OF REDUCED DATA	Monthly tables of hourly values (microfiche) magnetic tape since 01/1971
DATA ROUTINELY PUBLISHED	BULLETIN DE MESURES IONOSPHERIQUES
DATA SENT TO WDC-A	YES
DATA SENT TO WDC-B	YES
DATA SENT TO WDC-C	YES
DATA AVAILABLE ON REQUEST	YES
ADDRESS FOR INFORMATION ABOUT STATION	Professeur Corcuff Laboratoire de Physique de la Haute Atmospherique Le Deffend - Mignaloux-Beauvoir 86800 St. Julien L'Ars France
ADDRESS FOR INFORMATION ABOUT DATA	Monsieur l'Ingenieur Charge du Service des Previsons Ionospheriques CNET - B.P 40 22301 Lannion Cedex France
ADDITIONAL COMMENTS	Special purpose data usually available after 3 months.

****
PROVIDENIYA BAY, USSR
****

ITEM: 2336
DATE: 01/05/84

DISCIPLINE	B01 Ionosphere Vertical Soundings
STATION LATITUDE	N 64.4
STATION LONGITUDE	E 186.6
ALTERNATE NAMES	
DATES OF OPERATION	1958 to present
OBSERVING SCHEDULE	REGULAR
INSTRUMENT DESCRIPTION	Set of ionosondes AIS No. 21 (made in 1957) and AIS No. 7515 (made in 1964)
RAW DATA	Ionograms on 35 mm film
DATA REDUCTION PRACTICE	REGULAR
REGULAR REDUCED DATA AVAILABLE AFTER	1/2 MONTHS
FORM OF REDUCED DATA	F-plots, monthly tables of ionospheric parameters, ionograms on film
DATA ROUTINELY PUBLISHED	
DATA SENT TO WDC-A	
DATA SENT TO WDC-B	YES
DATA SENT TO WDC-C	
DATA AVAILABLE ON REQUEST	YES
ADDRESS FOR INFORMATION ABOUT STATION	Research Institute of Applied Geophysics Glebovskaya ul. 20-b 107258 Moscow B-258 USSR
ADDRESS FOR INFORMATION ABOUT DATA	Same as above
ADDITIONAL COMMENTS	

****
PORT AUX FRANCAIS, KERGUELEN ISLANDS
****

ITEM: 302
DATE: 05/31/82

DISCIPLINE	B01 Ionosphere Vertical Soundings
STATION LATITUDE	S 49.35
STATION LONGITUDE	E 70.24
ALTERNATE NAMES	Port aux Francais
DATES OF OPERATION	02/1953 to present - 1964 station moved
OBSERVING SCHEDULE	REGULAR
INSTRUMENT DESCRIPTION	Ionosonde Magnetic AB, ionograms every 15 min and every 5 min on RWD, 0.25-20 MHz.
RAW DATA	35 mm film, 16 mm film
DATA REDUCTION PRACTICE	REGULAR
REGULAR REDUCED DATA AVAILABLE AFTER	15 MONTHS
FORM OF REDUCED DATA	Monthly tables of hourly values, magnetic tape since 04/1965
DATA ROUTINELY PUBLISHED	BULLETIN DE MESURES IONOSPHERIQUES
DATA SENT TO WDC-A	YES
DATA SENT TO WDC-B	YES
DATA SENT TO WDC-C	YES
DATA AVAILABLE ON REQUEST	YES
ADDRESS FOR INFORMATION ABOUT STATION	Monsieur le Dir. des Lab. Scientifiques T.A.A.F. 27 rue Oudinot Paris 75700 France
ADDRESS FOR INFORMATION ABOUT DATA	Monsieur le Chef du Dept. M.I.R. C.N.E.T. Lannion 22301 France
ADDITIONAL COMMENTS	Station moved in 1964 (former station location 549.30 E70.50).

****
PRUHONICE, CZECHOSLOVAKIA
****

ITEM: 821
DATE: 00/00/75

DISCIPLINE	B01 Ionosphere Vertical Soundings
STATION LATITUDE	N 50.00
STATION LONGITUDE	E 14.60
ALTERNATE NAMES	
DATES OF OPERATION	04/1958 to present
OBSERVING SCHEDULE	REGULAR
INSTRUMENT DESCRIPTION	Ionosonde at 1-10 MHz
RAW DATA	Film
DATA REDUCTION PRACTICE	
REGULAR REDUCED DATA AVAILABLE AFTER	MONTHS
FORM OF REDUCED DATA	Bulletins, microfilm
DATA ROUTINELY PUBLISHED	
DATA SENT TO WDC-A	
DATA SENT TO WDC-B	
DATA SENT TO WDC-C	
DATA AVAILABLE ON REQUEST	
ADDRESS FOR INFORMATION ABOUT STATION	Dr. Pavel Triska Geophysical Inst, Czechoslovak Acad Sci Bocni II Praha 4, Spořilov 141 31 Czechoslovakia
ADDRESS FOR INFORMATION ABOUT DATA	Same as above
ADDITIONAL COMMENTS	No response to inquiry for updating material in 1980 or 1983. Data have been received by the World Data Centers through 1978.

Figure 2.1 Sample page from the *Directory of Solar Terrestrial Physics Monitoring Stations*

the plasma frequencies and virtual heights of the F and E peaks: f_o F2 (the *o* stands for ordinary trace), f_o F1, f_o E, *h*F2, *h*E. In addition the maximum usable frequency (MUF) is scaled from ionograms. MUF (3000) is the highest frequency that, refracted in the ionosphere, can be received at a distance of 3000 km. The propagation factor

$$M(3000)F2 = \frac{MUF(3000)}{foF2}$$

has a strong correlation with the real height of the F2 peak and has been used to predict the variation of the F2 peak altitude. See Bilitza et al. [1979] for review. A comprehensive guide to ionogram interpretation and reduction was compiled by Piggott and Rawer [1972] for the International Union of Radio Science (URSI).

A more involved analysis of ionograms is necessary to obtain real peak altitudes and real height profiles. An inversion procedure is used which has to take account of the retardation of the radio wave by ionization below the reflection height. Its accuracy is limited by insufficient knowledge about (i) the ionization below the ionogram starting point, (ii) the valley between the E and F layers and (iii) the radio echo in the immediate neighborhood of the F2 peak [Jackson, 1971]. Reviews covering the various inversion techniques and the problems encountered were presented by McNamara [1978b] and Titheridge [1985, 1987].

The standard ionosonde of the past 40 years produces analog ionogram records on film. These raw data are used to generate the scaled, plotted, and digitized data archived at the World Data Centers. The data are available to users without restriction, but some WDCs must recover their cost of data preparation, reproduction, and postage. The material distributed by the WDCs includes:

- Ionograms (raw data) on 35mm and 16mm film, mostly for Regular World Days (3 or 4 days per month).

- Daily plots, generally with a resolution of 15 minutes, of F and E peak plasma frequencies on paper or microfiche (*f*-plots).

- Tables of daily/hourly values and monthly summary data on paper or magnetic tape. This is the standard information for interchange. Table 2.1 lists the data available on magnetic tape from the WDC-A-STP in Boulder. (For a complete listing, see Conkright et al. [1984]). The WDC-B2 in Moscow has started to put the data from Soviet ionosondes on tape (see Table 2.2 on page 15).

- Software for inversion of ionograms into electron density profiles. (See Appendix A.3.)

- WDC-A-STP, Boulder, also offers the service of generating electron density profiles from ionograms.

The data holdings of ionosonde measurements at the WDCs are listed in the combined *Catalog of Ionosphere Vertical Soundings Data*. The latest one is by Conkright et al. [1984]. Figure 2.2 is adapted from this catalog, and it shows all ionosondes known to have operated worldwide. Altogether the ionosonde data base includes about 45,000 station-months of hourly measurements.

The development of the international ionosonde network over the last 50 years is shown in Figure 2.3, indicating the positive impact of the International Geophysical Year (IGY, 1957/58) and the International Quiet Sun Year (IQSY, 1964). It should be noted that (i) more than half of the stations are located in northern middle and low latitudes, and (ii) the number of stations has been decreasing in recent years. The operation of ionosondes is coordinated by the Ionospheric Network Advisory Group (INAG).

Recently the data centers have started to receive data generated by modern ionosondes with the ionograms recorded directly on magnetic tape. In addition to the data recorded by the "old" ionosondes, the digital instruments record phase, amplitude, polarization, direction of arrival, Doppler phase shift, etc. [Reinisch, 1986]. The operating and planned digisondes are shown in Figure 2.4 and listed in Table 2.3 (see pages 14 and 16, respectively).

A data base of more than 200,000 ionograms from oblique soundings is maintained at the

TABLE 2.1 Ionosonde Data on Tape Available From WDC-A-STP

Station	Station-Months of Data Available														
	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71
Adak	0	0	0	0	0	0	12	12	0	0	0	0	0	0	0
Akita	0	0	0	0	0	0	0	0	0	0	0	7	12	12	12
Anchorage	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0
Argentine Is.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12
Bangkok	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Barrow	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0
Bogota	0	0	0	0	0	0	12	12	0	0	0	0	0	0	0
Boulder	0	0	0	1	0	7	12	12	0	12	12	12	12	12	12
Brisbane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Byrd Station	0	0	0	0	0	0	12	12	0	0	0	0	0	0	0
Camden	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Canberra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cape Kennedy	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0
Churchill	0	0	0	0	0	0	0	0	0	0	0	0	0	6	12
College	0	0	0	0	0	0	0	12	0	12	12	0	0	0	3
Concepcion	0	0	0	0	0	0	12	12	0	4	8	11	5	12	12
Darwin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Djibouti	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fort Monmouth	0	0	0	0	0	0	12	12	0	0	0	0	0	0	0
Godhavn	0	0	0	0	0	0	0	12	0	0	0	12	12	12	12
Grand Bahama	0	0	0	0	0	0	12	12	12	12	12	12	12	12	6
Halley Bay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12
Hobart	12	10	0	0	0	0	0	0	0	0	0	0	0	0	0
Huancayo	0	12	0	0	0	0	12	12	0	0	0	12	12	12	12
Kerguelen	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kiruna	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0
Lannion	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
La Paz	0	0	0	0	0	0	8	11	0	0	0	0	0	0	0
Lycksele	0	0	0	0	0	0	0	0	12	8	0	0	0	0	0
Maui	0	0	0	0	0	0	12	12	0	0	0	0	12	12	12
Mawson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mundaring	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0
Narssarssuaq	0	12	0	0	0	12	11	12	0	0	0	12	8	11	12
Norfolk Is.	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0
Okinawa	0	0	0	0	0	0	12	12	0	0	0	0	0	4	12
Ottawa	0	0	0	0	0	0	0	0	0	12	12	12	12	12	12
Point Arguello	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Port Moresby	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0
Port Stanley	0	0	0	0	0	0	0	0	0	0	10	12	12	12	12
Resolute Bay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12
Reykjavik	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0
Slough	0	0	0	0	0	0	0	0	0	0	12	12	12	12	12
South Georgia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12
South Pole	0	0	0	0	0	0	7	12	0	0	0	0	0	0	0
St. Johns	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12
Syowa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Talara	0	0	0	0	0	0	12	12	0	0	0	0	0	0	0
Thule	0	0	0	0	0	0	0	12	0	0	0	0	0	0	12
Tokyo	0	0	0	0	0	0	0	0	0	0	0	7	12	12	12
Townsville	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Uppsala	0	0	0	0	0	0	0	0	2	7	0	0	0	0	0
Vanimo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wakkanai	0	0	0	0	0	0	0	0	0	0	0	7	12	12	12
Wallops	0	0	0	0	0	0	0	0	0	0	0	12	12	12	12
Washington	0	0	0	0	0	0	12	12	12	12	12	0	0	0	0
White Sands	0	12	0	0	0	0	12	12	0	0	0	12	0	5	1
Winnipeg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12
Yamagawa	0	0	0	0	0	0	0	0	0	0	0	7	12	12	12
Station-Months	12	46	0	1	0	19	182	272	46	79	112	159	169	194	289

TABLE 2.1 (continued) Ionosonde Data on Tape Available From WDC-A-STP

Station	Station-Months of Data Available													
	72	73	74	75	76	77	78	79	80	81	82	83	84	85
Adak	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Akita	0	12	0	0	0	0	0	0	0	0	0	0	0	0
Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argentine Is.	12	12	12	12	0	0	0	0	0	0	0	0	0	0
Bangkok	0	12	0	0	12	0	2	3	0	0	0	0	0	0
Barrow	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bogota	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Boulder	12	12	12	12	12	12	12	12	12	12	12	12	9	0
Brisbane	0	0	0	0	0	0	0	0	0	12	12	12	0	0
Byrd Station	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Camden	0	0	0	0	0	0	0	0	0	12	12	12	0	0
Canberra	0	0	0	0	0	0	0	0	0	12	12	12	0	0
Cape Kennedy	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Churchill	0	12	12	0	12	1	0	0	12	12	12	9	0	0
College	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Concepcion	12	12	3	4	12	12	12	12	0	0	0	0	0	0
Darwin	0	0	0	0	0	0	0	0	0	0	1	12	0	0
Djibouti	0	0	12	0	0	0	0	0	0	0	0	0	0	0
Fort Monmouth	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Godhavn	12	12	6	9	0	0	2	0	0	0	0	0	0	0
Grand Bahama	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Halley Bay	12	12	12	12	0	0	0	0	0	0	0	0	0	0
Hobart	0	0	0	0	0	0	0	0	0	12	12	12	0	0
Huancayo	12	12	12	12	12	12	12	12	12	12	11	4	0	0
Kerguelen	0	12	0	0	0	0	0	0	0	0	0	0	0	0
Kiruna	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lannion	0	0	0	12	0	0	0	0	0	0	0	0	0	0
La Paz	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lycksele	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Maui	12	12	12	12	12	8	12	12	12	12	12	12	12	5
Mawson	0	12	1	0	0	0	0	0	0	12	12	12	0	0
Mundaring	0	0	0	0	0	0	0	0	0	12	12	12	0	0
Narssarssuaq	12	12	12	8	1	0	2	0	0	0	10	0	0	0
Norfolk Is.	0	0	0	0	0	0	0	0	0	12	12	12	0	0
Okinawa	12	12	0	0	0	0	0	0	0	0	0	0	0	0
Ottawa	12	12	12	12	12	12	0	0	12	12	12	9	0	0
Point Arguello	12	11	5	0	0	12	12	12	8	12	12	12	12	1
Port Moresby	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Port Stanley	12	12	12	12	12	0	0	0	0	0	0	0	0	0
Resolute Bay	0	12	12	0	12	1	0	0	12	12	12	8	0	0
Reykjavik	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Slough	12	12	12	12	12	0	0	0	0	0	0	0	0	0
South Georgia	12	12	8	12	0	0	0	0	0	0	0	0	0	0
South Pole	0	0	0	0	0	0	0	0	0	0	0	0	0	0
St. Johns	0	12	12	0	12	6	0	0	8	0	0	0	0	0
Syowa	8	12	12	0	0	0	0	0	0	0	0	0	0	0
Talara	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thule	12	12	12	2	0	0	2	0	0	0	0	0	0	0
Tokyo	12	12	0	0	0	0	0	0	0	0	0	0	0	0
Townsville	0	0	0	0	0	0	0	0	0	12	12	12	0	0
Uppsala	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vanimo	0	0	0	0	0	0	0	0	0	12	12	12	0	0
Wakkanai	12	12	0	0	0	0	0	0	0	0	0	0	0	0
Wallops	12	12	12	12	12	12	12	12	12	12	12	12	12	5
Washington	0	0	0	0	0	0	0	0	0	0	0	0	0	0
White Sands	7	0	0	0	5	6	12	5	0	0	0	0	0	0
Winnipeg	0	12	12	0	12	0	0	0	0	0	0	0	0	0
Yamagawa	12	12	0	0	0	0	0	0	0	0	0	0	0	0
Station-Months	255	335	227	155	162	94	92	80	100	204	214	198	45	11

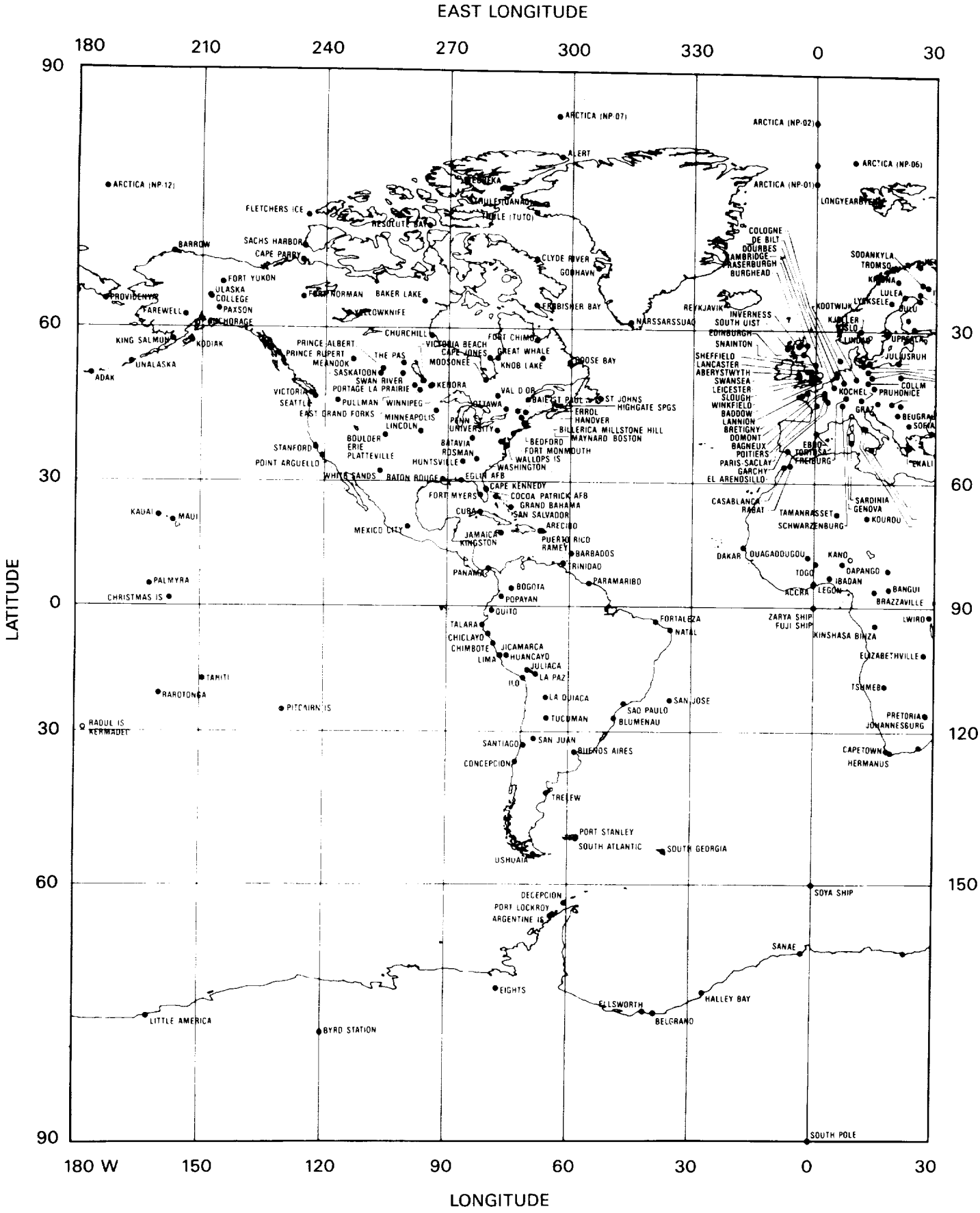


Figure 2.2 Location of all ionosondes known to have operated

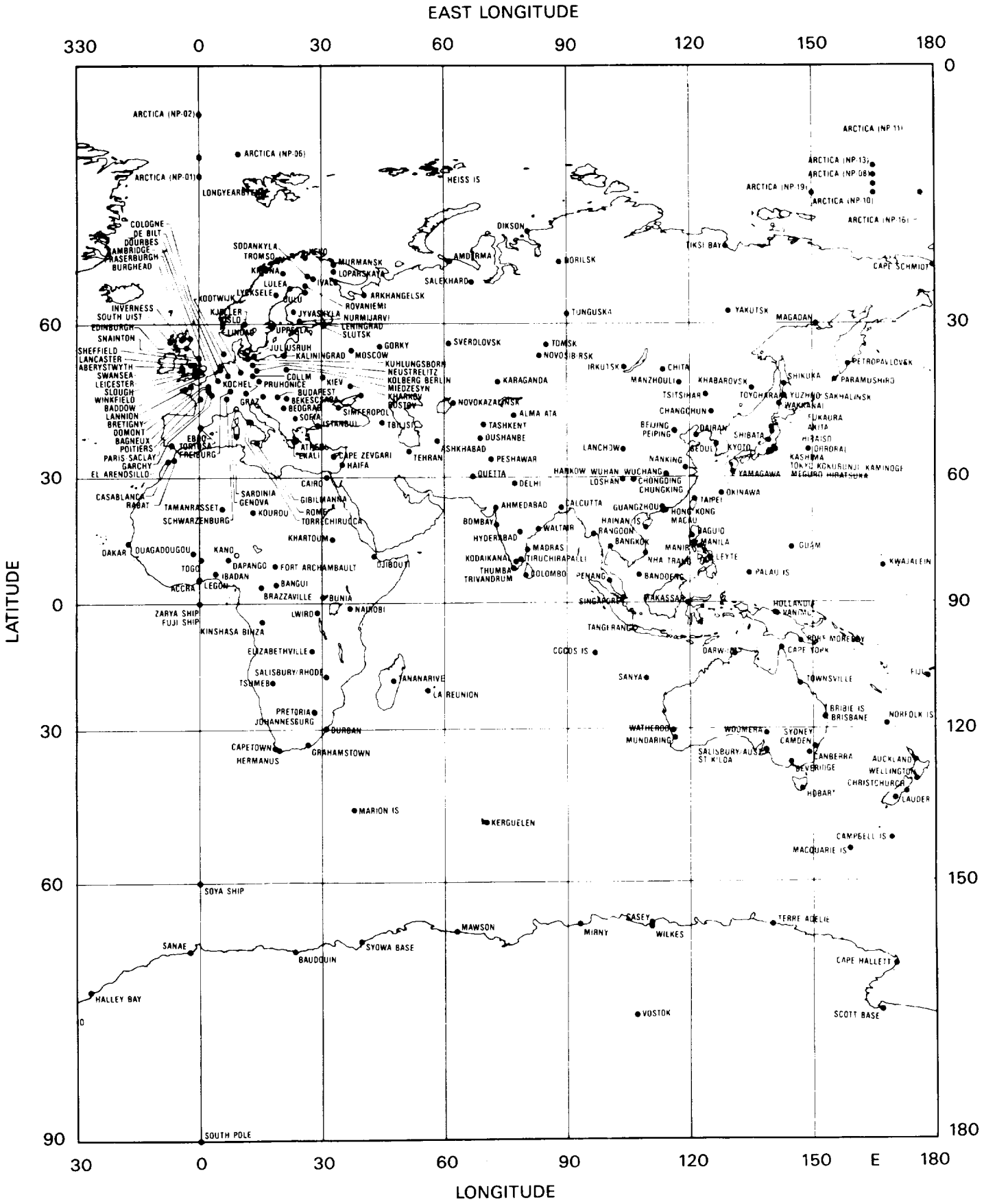


Figure 2.2 (continued) Location of all ionosondes known to have operated

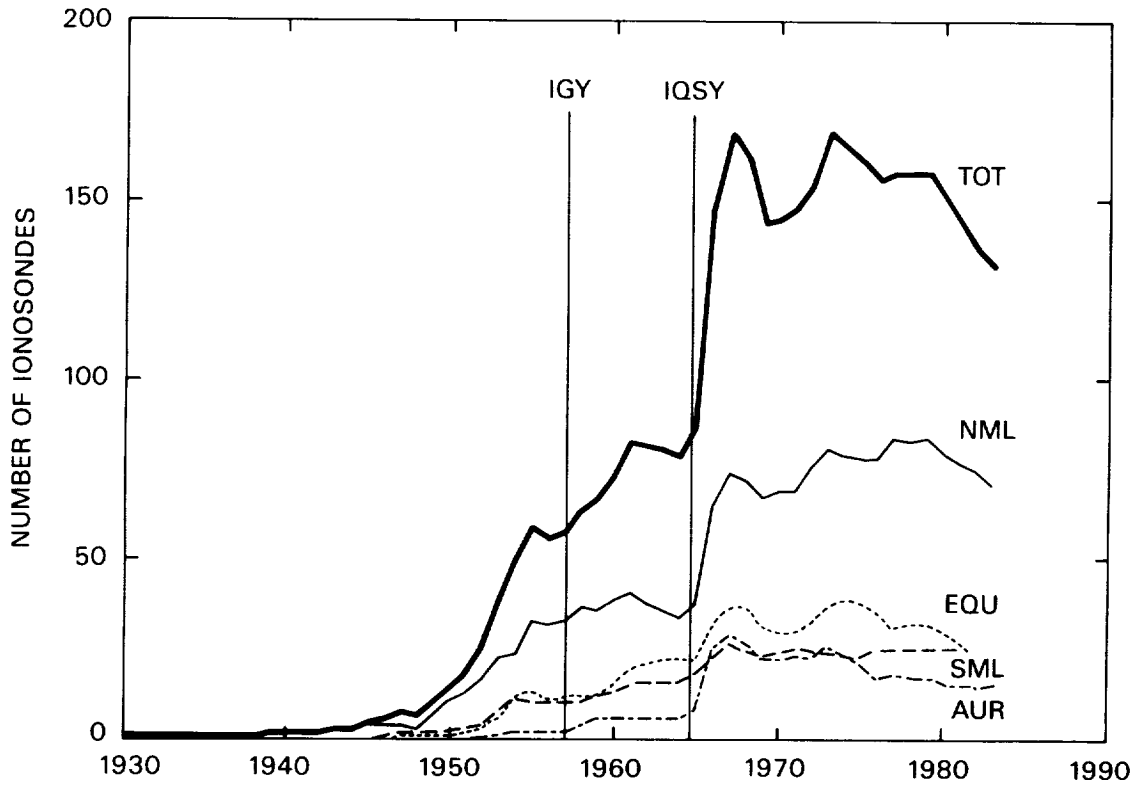


Figure 2.3 Number of ionosondes operational from 1930 to 1984: TOT = total number, NML = number of ionosondes at northern midlatitudes, EQU = at equatorial latitudes, SML = at southern midlatitudes, AUR = at auroral latitudes, IGY = International Geophysical Year, IQSY = International Quiet Sun Year

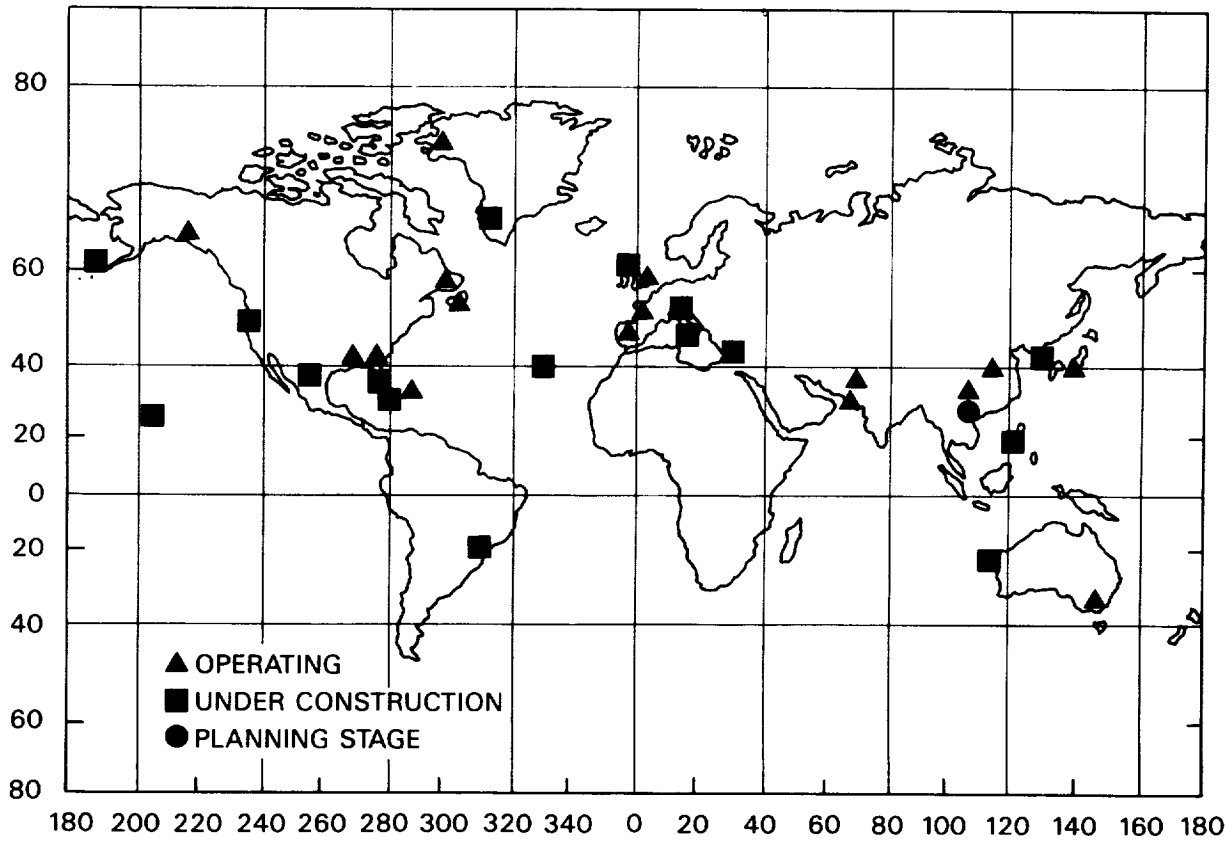


Figure 2.4 Global Digisonde 256 network as of July 1988

Naval Research Laboratory in Washington, DC [Goodman and Daehler, 1988]. About 42% of these have been scaled for "routine" propagation parameters (MOF, LOF, FOT bands) and have been recorded on magnetic tape cartridges. Since 1982 the ionograms have also been recorded on magnetic tape. Another data base of oblique soundings was established by CCIR (Data Bank D1, WP 6/1, Doc 265).

The information of the two catalogs [Shea et al., 1984; Conkright et al., 1984] is stored in computer files and may be remotely accessible in the near future. The WDC-C1 subcatalog is already held in an interactive data base, which can be accessed via the U.K. Joint Academic Computer Network (JANET). This network, in turn, can be reached from the United States on the Space Physics Analysis Network (SPAN).

2.2 Incoherent Scatter Radar

The incoherent scatter radar transmits very high power pulses at frequencies much higher than ionospheric plasma frequencies. Therefore the radar signals can travel through the whole ionosphere from bottom to top. Total reflection does not occur, and the whole ionosphere (including the topside and the E-F-valley region) can be explored from the ground. Only a very small part of the transmitted power, however, is scattered back to the receiver. The scattering occurs at small-scale electron density fluctuations [Walker et al., 1987]. The scattered power is proportional to the electron density in the scattering volume; this effectively determines the lower and upper altitude boundaries of incoherent scatter soundings. Below about 100 km and above about 800 km, the ionospheric electron densities become so low that the signal-to-noise ratio is no longer acceptable for reliable data reduction. Mathews [1984] has discussed incoherent scatter radar as a tool for D-region studies.

The high sensitivity requirements make incoherent scatter radars a rather large and expensive research tool. Only a few radars are operational in the whole world (see Table 2.4 on page 17). The recorded density profile is usually calibrated with the F peak density measured by a local ionosonde. The shape and Doppler broadening of the received spectrum allow determination of ion and electron temperature and the shift against the transmitter frequency indicates the ion drift.

In summary, the parameters calculated from incoherent scatter radar soundings include: electron density, electron temperature, line-of-sight ion velocity, ion temperature, ion-neutral collision frequency, and ion composition. Bi-

TABLE 2.2 Soviet Ionosonde Data in Digital Form Available at WDC-B2

Station	Code	Longitude	Latitude	Period
Alma Ata	AA343	76.9	43.2	1957-1988
Arkhangelsk	AZ163	40.5	64.4	1969-1988
Ashkhabad	AS237	58.3	37.9	1957-1985
Gorky	GK156	44.3	56.1	1958-1988
Irkutsk	IR352	104.0	52.5	1957-1988
Kaliningrad	KL154	20.6	54.7	1964-1988
Karaganda	KR250	73.1	49.8	1964-1988
Khabarovsk	KB538	135.1	48.5	1959-1982
Kiev	KV151	30.5	50.5	1964-1988
Leningrad	LD160	30.7	59.9	1958-1987
Magadan	MG560	151.0	60.0	1968-1988
Moscow	M0155	37.3	55.5	1957-1988
Murmansk	MM168	33.0	69.0	1957-1977
Novokazalinsk	NK246	62.1	45.8	1972-1988

static and tristatic radars (one transmitter and two or three receivers) like the Malvern, St. Santin, and EISCAT facilities allow measurements of all velocity vector components. In addition, simple aeronomic theory together with a geomagnetic field model is often used to derive the vector ion velocity, electric field, meridional neutral wind, vector neutral wind, exospheric temperature, neutral temperature, atomic oxygen density, heat flux at high altitude, energy loss from electrons to ions and neutrals, energy input from thermal conduction, Hall conductivity, Pedersen conductivity, current perpendicular to the magnetic field, Birkeland current, Joule heating, ion-electron production rate, energy deposition by auroral electrons, energy spectrum of electrons, and several optical emissions. It must be noted that the underlying assumptions are not always true, particularly during disturbed conditions. Perrant et al. [1984 a, b] were able to obtain experimental evidence of non-isotropic ion velocity and temperature distributions from EISCAT measurements.

Excellent reviews of the theory and practice of the incoherent scatter technique were published by Evans [1969, 1975]. Most of the radar facilities are described in a special issue of *Radio Science 9*, 2,1974. Radar studies have made an outstanding contribution to our understanding

TABLE 2.3 Locations of Digisonde Stations, Operating and Planned, March 1988

Station	North Latitude	East Longitude
Baguio	16.3	120.6
Ramey	18.5	292.9
Maui	20.5	203.7
Karachi	24.8	67.1
Patrick AFB	28.2	279.4
Central Texas	29.4	261.7
Bermuda	32.4	295.3
Islamabad	33.8	72.9
Vandenberg AFB	34.7	239.4
Xinxiang	35.3	113.9
Kokubbunji	35.7	139.5
Kunsan	36.0	126.6
Sao Miguel Is.	37.5	334.5
Wallops Is.	37.9	284.5
Diyarbakir	37.9	40.2
Beijing	39.9	116.5
Roquetes	40.8	0.3
Lowell	42.6	288.5
Camp Darby	43.5	10.3
Argentia	47.6	307.3
Munchen	48.2	11.6
Dourbes	50.1	4.6
Croughton	52.0	358.8
Attu	52.6	186.9
Goose Bay	53.3	299.5
Slough	51.5	359.4
Sitka	57.0	224.8
College	64.9	212.2
Sondrestrom	67.0	309.0
Qaanaaq	77.5	290.8
Learmonth	-22.1	114.0
Sao Paulo	-23.5	313.5
La Trobe	-37.8	145.0

TABLE 2.4 Incoherent Scatter Radar Facilities

Site Name	Location of Transmitter	North Latitude	East Longitude	Period of Operation	Data at NCAR
Jicamarca	Near Lima, Peru	-11.9	284.0	1965	66-69 84-
Arecibo	Arecibo, Puerto Rico	18.3	293.2	1963-	66-77 81
St. Santin de Maurs*	St. Santin de Maurs, France	44.6	2.2	1965-	66-
Millstone Hill	Westford, MA, USA	42.6	288.5	1960-	78-
Chatanika†	Near Fairbanks, Alaska, USA	65.1	212.6	1971- 1982	81
EISCAT*	Trømso, Norway	69.6	19.2	1981-	84-
Sondrestrom	Sondre Stromfjord, Greenland	67.0	309.0	1983-	83-

* These stations operate with separate transmitter and receiver facilities. The observation volume is determined by the intersection of transmitter and receiver beams. All other stations determine the altitude from the signal time delay.

† Moved to Sondre Stromfjord

Notes

1. The Royal Radar Establishment operated an incoherent scatter radar at Great Malvern, Worcestershire, U.K., from 1968 into the 1970s.

2. A midlatitude radar in the Soviet Union has been used by the Department of Radio Physics of the Kharkov State University for incoherent scatter measurements since 1970. It is located near the Radio Physical Observatory in Gaudari, about 60 km from Kharkov.

3. The Altair radar on Kwajalein Island was used for incoherent scatter measurements during brief periods from 1977 to 1980.

4. A Japanese incoherent scatter facility became operational in 1987, at a site southeast of Kyoto.

5. The Southern Hemisphere Incoherent Scatter (SHISCAT) group hopes that Australia, New Zealand, and South Africa will combine forces to build and operate an incoherent scatter radar in the southern hemisphere.

6. The Millstone Hill, Chatanika, and Altair radars are able to scan the ionosphere over a region extending hundreds of kilometers horizontally from the radar.

of ionospheric plasma processes [Blanc, 1979]. EISCAT's contributions to high-latitude ionosphere physics have been reviewed in a special issue of *Journal of Atmospheric and Terrestrial Physics 50*, 4/5, 1987.

Measurements are usually conducted during 2 to 3 days each month, preferably during Regular World Days (RWD); RWDs are selected by an international advisory group (see IUWDS in Appendices D and E). The temporal and spatial resolution of incoherent scatter data depends on the measurement mode used: long integration times provide high sensitivity but low time resolution; large backscatter volumes provide good signal-to-noise ratios but bad altitude resolution. Typically the time resolution ranges from 1 to 30 minutes and the altitude resolution from a few to 100 km.

In 1985 the NCAR Incoherent-Radar Data Base was established at the National Center for Atmospheric Research, Boulder, as a cooperative project between NCAR and the institutions that operate incoherent scatter radars. NCAR archives raw and reduced data obtained from the different stations and gives access to this data base. Table 2.4 on page 17 indicates the time periods for which data are currently available from NCAR. In addition, the personnel can

TABLE 2.5 Information Sources for Incoherent Radar Stations

Site Name	Contact
NCAR	Arthur D. Richmond, HAO/NCAR, P.O. Box 3000, Boulder, CO 80307
Sondrestrom or Chatanika	Vincent B. Wickwar, Radio Physics Laboratory, SRI International, Menlo Park, CA 94025
EISCAT	Jürgen Röttger, EISCAT Scientific Association, Box 705, S-981 27, Kiruna, Sweden
Millstone Hill	John C. Foster, MIT Haystack Observatory, Westford, MA 01886
St. Santin	Christine Mazaudier, C.R.P.E., 4, avenue de Neptune, 94107 Saint-Maur CEDEX, France
Arecibo	Craig Tepley, Arecibo Ionospheric Observatory, P.O. Box 995, Arecibo, Puerto Rico 00612
Jicamarca	Bela G. Fejer, School of Electrical Engineering, Phillips Hall, Cornell University, Ithaca, NY 14853
Malvern	P.J.S. Williams, University College of Wales, Penglais, Aberystwyth, Dyfed, SY23 3B2, U.K.
Altair	R. Tsunoda, SRI International, Radio Physics Laboratory, 333 Ravenswood Avenue, Menlo Park, CA 94025
Kyoto	S. Kato, Ionosphere Research Laboratory, Kyoto University, Kyoto, Japan
U.S.S.R.	V.A. Misyura, Kharkov State University, Department of Radio Physics, Kharkov-77, U.S.S.R.
SHISCAT	J. A. Gledhill, Department of Physics and Electronics, Rhodes University, P.O. Box 94, Grahamstown 6140, South Africa

TABLE 2.6 Ionospheric Absorption Stations

Station	N. Lat.	E. Long.	Start Date	A1	A2	A3
Station Nord, Greenland	81.6	343.3			x	
Nyaalesund, Norway	79.0	12.0	1966			
Thule, Greenland	77.5	290.8			x	
Danmarkshavn, Greenland	76.7	341.4			x	
Bear Island, Norway	74.5	19.2	1968		x	
Daneborg, Greenland	74.3	399.2			x	
Heiss Island, USSR	73.8		1964		x	
Jan Mayen, Norway	70.9	8.74	1979		x	
Scoresbysund, Greenland	70.5	338.0			x	
Cape Zhelaniza, USSR	70.3				x	
Trømso, Norway	69.7	19.0			x	
Ramfjordmoen, Norway	79.6	19.2	1975		x	
Godhavn, Greenland	69.3	306.5			x	
Norilsk, USSR	69.0	88.0	1964		x	
Kiruna, Sweden	67.8	20.4	1958		x	
Apatity, USSR	67.5	33.3	1967		x	
Dixon, USSR	67.2		1964		x	
Sondre Stromfjord, Greenland	67.0	309.3			x	
Fort Yukon, USA	66.6	214.8	1961		x	
Tjornes, Iceland	66.2	342.9			x	
Dolgoschelie, USSR	66.0	43.2				x
Poker Flat, USA	65.1	212.5	1971		x	
Angmagssalik, Greenland	65.6	322.3			x	
College, USA	64.9	212.2	1964		x	
Arkhangelsk, USSR	64.6	40.5			x	
Lycksele, Sweden	64.6	18.7	1962		x	
Godthab, Greenland	64.2	308.3			x	
Keflavik, Iceland	64.0	337.3	1979			x
Anderma, USSR	63.9		1964		x	
Thorshavn, Faeroe Islands	62.0	353.2			x	
Narssarssuaq, Greenland	61.2	314.6			x	
Andoya, Norway	60.3	16.0	1962		x	
Uppsala, Sweden	59.8	17.6	1962		x	
Juliusruh, GDR	54.6	13.4	1957	x		
Kühlungsborn, GDR	54.1	11.8	1948			x
Norddeich, FRG	53.6	7.1	1970			x
DeBilt, The Netherlands	52.1	5.2	1957	x		
Belsk, Poland	51.8	20.8	1975		x	
Panska Ves, Czechoslovakia	50.6	14.6	1961			x
Upice, Czechoslovakia	50.3	16.0			x	
Dourbes, Belgium	50.1	4.6	1957	x		
Rostov, USSR	47.2	39.7	1958	x		
Genova, Italy	44.6	9.0				x
McMath-Hulbert, USA	42.7	276.7	1957		x	
Ebro, Spain	40.8	0.5	1967			x
Akita, Japan	39.7	140.1	1964			x
Lajes, Azores	38.8	333.8	1977			x
Ashkhabad, USSR	37.9	58.4	1957	x		
Hiraiso, Japan	36.4	140.6	1957		x	x
Tulsa, USA	35.9	264.2	1961		x	

TABLE 2.6 (continued) Ionospheric Absorption Stations

Station	N. Lat.	E. Long.	Start Date	A1	A2	A3
Naval Ocean Systems Center, USA	32.7	242.7	1978			x
Lunping, Taiwan	25.0	121.2	1973			x
Udaipur, India	24.5	73.7	1971	x		
Ahmedabad, India	23.0	72.6	1972	x		
Sabana Seca, Puerto Rico	18.4	293.8	1977			x
Kodaikanal, India	10.2	77.5				x
Colombo, Sri Lanka	6.9	79.87	1976	x		
Monrovia, Liberia	6.43	349.2	1976			x
Sydney, Australia	-31.5	150.7	1974	x		x
Hermanus, Rep. of S. Africa	-34.3	19.2	1962		x	
Buenos Aires, Argentina	-34.5	301.5	1983	x		
Auckland, New Zealand	-37.0	175.0			x	
Hobart, Australia	-42.88	147.33	1983	x		
Trelew, Argentina	-43.2	294.7	future	x		
Port aux Francais, Kerguelen	-49.3	70.3	1962		x	
Campbell Island	-52.6	169.1	1965		x	
MacQuarie Island	-54.5	158.9	1964		x	
Ushuaia, Argentina	-54.8	291.7			x	
Novolasarevskaya, Antarctica	-66.2				x	
Casey, Antarctica	-66.5	110.4	1975		x	
Terre Adelie, Antarctica	-66.7	140.0	1965		x	x
Mawson, Antarctica	-67.6	62.9	1968		x	
Molodezhnaya, Antarctica	-67.6				x	
Davis, Antarctica	-68.6	78.0	1969		x	
Syowa, Antarctica	-69.0	39.3	1966		x	
Sanae, Antarctica	-70.3	357.6	1979		x	
Halley Bay, Antarctica	-75.5	321.2	1962		x	
Mirny, Antarctica	-76.8		1961		x	
General Belgrano, Antarctica	-78.0	321.2	1962		x	

assist in obtaining earlier measurements and information about software, analysis procedure, and related questions. They can also provide information on how to log on to the NCAR gateway computer.

The people and organizations listed in Table 2.5 (see page 18) can provide further information about the data from a particular radar.

2.3 Absorption

Ionosondes can record the ionospheric electron density from the F peak down to E region altitudes. Below the E peak, absorption caused by the high neutral densities weakens the reflected signal. Monitoring of the ionosphere in the D region and lower E region is done with absorption measurements. In general, absorption measurements record the amplitude variation at a fixed frequency in relation to a minimal-loss case.

The methods of absorption measurements are documented and discussed in the *Manual on Ionospheric Absorption Measurements* edited by Rawer [1976]. Three different techniques are widely used:

(A1) Pulse Echo: echo amplitude observation at normal incidence on frequencies which are preferentially reflected in the E-region.

(A2) Riometer (Relative Ionospheric Opacity Meter): observation of the absorption of cosmic radio noise by the ionosphere (fixed frequency in the range 20 to 80 MHz).

(A3) CW (Continuous Wave) Field Strength: Wave field strength observation at oblique incidence in the frequency range 2 to 3 MHz. (Receiver and transmitter are typically separated by 200 to 400 km.)

Absorption data are used for radio wave propagation forecasts, in particular for field strength estimation at HF or decameter wavelengths. Rare but severe disturbance of HF communications at high latitudes arises from polar cap absorption (PCA) events, in which intense ionization created by solar protons blankets both polar caps for several days. Results of auroral riometer measurements were reviewed by Hargreaves [1969].

The problems encountered in calculating electron density profiles from absorption measurements are numerous and not yet fully resolved [Serafimov et al., 1985]. The absorption recordings are, however, our only data source for investigating the global and long-term variations in the ionosphere below the E peak.

Since these techniques are relatively simple, stable, and technically reliable, long-term observation records exist at several facilities worldwide (see Table 2.6 on pages 19 and 20). Station parameters, data availability, and contact addresses for all three techniques are listed in the *Directory of Solar-Terrestrial Physics Monitoring Stations* by Shea et al. [1984]. Data sets are available as tabulated hourly absorption loss (in dB)* and as copies of the original paper stripcharts. Some of the stations have also started digital recording of absorption on magnetic tape. Tape recordings from several high-latitude stations are archived at WDC-A-STP, Boulder.

* dB = 10 log (p/p_0) where p = signal power

2.4 Other Techniques

In addition to the techniques already mentioned, several other methods of ground-based ionospheric measurements have been used in the past. In general the data records of these experiments are much smaller and less consistent.

Drift observations make use of fluctuation patterns in the reflecting ionospheric layers. These irregularities can be recognized in the echo field strength at the ground and their drift velocity can thus be monitored [Rawer, 1968]. Ionospheric drifts have also been deduced from meteor trail observations. A summary description of the average drifts was established by Kazimirovsky et al. [1985].

In the so-called whistler mode, waves with very low frequencies (VLF) are guided along the magnetic field lines from the ionosphere through the magnetosphere into the magnetically conjugate ionosphere. The whistling signals (1 to 20 kHz) had been received on long telephone lines long before the ionosphere was systematically studied. Whistler stations monitor natural (lightning) and man-made VLF signals. Some conclusions concerning the electron density in the outermost ionosphere have been obtained from these measurements [Carpenter, 1988; Tarcsai et al., 1988]. Helliwell and Gehrels [1958] were able to prove the existence of a magneto-electronic duct by receiving artificial radio signals at a conjugate receiver. Controlled injection of VLF signals from a ground-based transmitter have been shown to produce modulation effects in electrons precipitating from the radiation belts [Imhof et al., 1983]. Whistler signals have also been observed on Venus [Scarf et al., 1988]. Whistler monitoring stations record the structured noise in the 0.2

TABLE 2.7 Numbers of Stations Listed in *Directory*

Technique	Number of Stations
Whistlers and VLF emissions	35
Ionospheric drift	6
All-sky camera	28
Airglow (photometers, interferometer)	22

40 kHz band. Atmospheric radio noise stations record electromagnetic disturbances at higher frequencies.

Optical instruments have been used to monitor auroral features and airglow. The all-sky camera uses a lens with a 160° field of view to record bright auroras over a circle of 1000 km diameter. Photometers measure absolute intensities of isolated spectral lines and bands of interest. Fabry-Perot interferometers measure spectral line broadening and Doppler shifts of airglow emissions. These parameters can yield information about densities, temperatures, and bulk motions of some neutral and ionic species.

Stations monitoring the ionosphere with these techniques are listed in the *Directory of Solar-Terrestrial Physics Monitoring Stations* by Shea et al. [1984] as summarized in Table 2.7 on page 21.

Ionospheric modifications caused by powerful ground-based radio transmitters (heating) and by booster rocket exhausts have been studied with ground-based experiments. Information and references can be found in the proceedings of several international conferences [10,12].

New techniques and results of high-latitude radio wave research can be found in *Radio Science*, Vol. 18, 6, Nov.-Dec. 1983 (see especially the overview article by Greenwald and Hunsucker).

Chapter 3 Spacecraft Measurements

Ionospheric satellite experiments can be classified in three general categories: in situ, topside sounder, and beacon. In situ techniques measure the plasma parameters at the satellite position, topside sounders measure the electron density from the satellite altitude down to the F peak maximum, and radio beacons measure the electron content between satellite and receiving station.

The relatively simple beacon experiments were the first satellite-borne diagnostic tools for ionospheric research. The technique was first applied with the identification signals of the early Sputnik (U.S.S.R.) and Explorer (U.S.A.) satellites. Since then, with considerably improved instrumentation, beacons have supplied electron content measurements over the lifetime of a variety of satellites (Section 3.1).

The classical ionospheric in situ instruments are the Langmuir probe (LP), the retarding potential analyzer (RPA), the impedance probe (IP) and the ion mass spectrometer (IMS). They are the basic equipment of the ionospheric observatories that have been launched since the mid-sixties (such as ESRO, AEROS, and AE). These experiments have undergone substantial improvements and refinement in technical design and in data analysis techniques since their early beginnings. All four instruments allow determination of electron density. In addition, the LP measures electron temperature, the RPA measures ion and electron temperature and energetic electron fluxes, and the IMS measures ion densities (Section 3.2).

Topside sounder instruments are basically ionosondes carried aboard satellites. From the early Alouette to the recent ISS-b satellites, this technique has shaped our understanding of the topside ionosphere (Section 3.3).

Other ground-based experiments that have been successfully flown on spacecraft are VLF (whistler) receivers, all-sky cameras for observation of auroral structure, and Fabry-Perot interferometers to monitor airglow.

All internationally identified ionospheric spacecraft are listed in Appendix A together with the experiments flown on these satellites. A large amount of ionospheric satellite data is archived and distributed by NASA's National Space Science Data Center and World Data Center A for Rockets and Satellites (NSSDC/WDC-A-R&S). These data sets are also listed in Appendix A.

The data sets, experiments, and spacecraft are described in detail in NSSDC's *Data Catalog* series as listed in Table 3.1. Most ionospheric satellite experiments and data are described in Volume 3. Volume 1 contains the spacecraft that observed planetary ionospheres. Beacon

experiments were flown mostly on geostationary satellites, which are included in Volume 2.

NSSDC/WDC-A-R&S also assists and advises requesters who inquire about data sets not currently archived at NSSDC.

Ionospheric data from the numerous satellites launched by the U.S. Air Force (e.g. DMSP, S3, and OV series) are held at the different Air Force facilities. Some of the data are available to the interested science community.

Not much has been published on the availability of data from the ionospheric satellites launched by the Soviet Union in their Cosmos and Intercosmos satellite series. More information might be available from the Institute of Terrestrial Magnetism, Ionosphere, and Radio Wave Propagation (IZMIRAN) or from the Institute of Space Research (IKI), both in Moscow (Appendix E).

Japan has sent several ionospheric observatories into orbit since it joined the club of satellite-launching nations in 1970. The satellites are supported by the Institute of Space and Astronautical Science (ISAS) and by the National Space Development Agency (NASDA). ISAS satellites are Taiyo, Kyokko, Hinotori, and Ohzora. The ETS (Kiku) 1, 2, 3, 4 and ISS satellites were developed and launched by NASDA for the Radio Research Laboratories (RRL).

The most recent ionospheric/magnetospheric satellites include Viking, HiLat, Polar BEAR (all in polar orbits), and San Marco (equatorial orbit).

3.1 Beacons

The first satellite in orbit, Sputnik 1, was successfully used as a beacon satellite. Satellite beacons transmit linearly polarized radio waves with frequencies around 20 MHz. At the ground stations the Faraday rotation of the plane of polarization is measured, which allows determination of the total ionospheric electron content between satellite and ground receiver. See Evans [1977] and Davies [1980] for review.

Beacons were flown on several medium- and high-altitude and interplanetary spacecraft as listed in Table 3.2. In recent years geostationary satellites specifically designed as radio beacons, like ATS-6 and ETS 2, have enabled us to observe the electron content with high time resolution (<1s).

Single-frequency beacons can only determine the ionospheric electron content (up to about 2000 km). The Faraday rotation technique depends on the magnetic field strength, which decreases with the inverse cube of altitude and, therefore, is not sensitive to plasmaspheric electrons. The total electron content including ionospheric and plasmaspheric contributions

TABLE 3.1 Data Sets, Experiments, and Spacecraft in NSSDC/WDC-A-R&S Data Catalogs

Volume	Title	Report No.	Date
Spacecraft and Experiments			
1A	Planetary and Heliocentric	82-21	1982
2A	Geostationary and High-Altitude Scientific	82-22	1982
3A	Low- and Medium-Altitude Scientific	83-03	1983
4A	Meteorological and Terrestrial Applications	85-03	1985
5A	Astronomy, Astrophysics, and Solar Physics	88-12	1988
Data Sets			
1B	Planetary and Heliocentric	87-03	1987
2B	Geostationary and High-Altitude Scientific	88-11	1988
3B	Low- and Medium-Altitude Scientific	86-01	1986
5B	Astronomy, Astrophysics, and Solar Physics	88-12	1988

TABLE 3.2 Beacon Satellites

Satellite	Country	Experiment ID	Form (Quantity) of Data Sets at NSSDC
VANGUARD 1	USA	58-002B-01	
SPUTNIK 3	USSR	58-004B-12	Fiche (2)
EXPLORER 6	USA	59-004A-09	
TRANSIT 2A	USA	60-007A-03	Fiche (3)
TRANSIT 4A	USA	61-015A-03	Fiche (2), Microfilm (1)
DISCOVERER 32	USA	61-027A-03	
ECHO 2	USSR	64-004A-01	
ELECTRON 1	USSR	64-006A-03	
SYNCOM 3	USA	64-047A-01	Plots, Tabulation (2)
OGO 1	USA	64-054A-05	Fiche (2)
EXPLORER 22	USA	64-064A-01	Book (27), Microfilm (4), Fiche (4)
ORBIS LOW	USA	64-075A-01	
SAN MARCO 1	Italy/USA	64-084A-02	
EARLY BIRD	USA	65-028A-01	
EXPLORER 27	USA	65-032A-01	Tape (1), Microfilm (1)
PIONEER 6*	USA	65-105A-04	Tape (1), Microfilm (1)
OGO 3	USA	66-049A-16	
PIONEER 7*	USA	66-075A-04	Tape (1), Microfilm (1)
ATS 1	USA	66-110A-15	Tape (1), Fiche (14)
SAN MARCO 2	Italy/USA	67-038A-03	
MARINER 5*	USA	67-060A-02	Tape (1)
ATS 3	USA	67-111A-02	
PIONEER 8*	USA	67-123A-03	Tape (1)
OV2-5	USA	68-081A-07	
PIONEER 9*	USA	68-100A-03	Tape (2), Microfilm (1)
OV1-17A	USA	69-025D-01	
ISIS 1	Canada/USA	69-009A-09	
ATS 5	USA	69-069A-12	
INTERCOSMOS 2	USSR	69-110A-01	
ISIS 2	Canada/USA	71-024A-09	
ATS 6	USA	74-039A-09	
INTASAT	Spain/USA	74-089C-01	
ETS 1	Japan	75-082A-01	
INTERCOSMOS 14	USSR	75-115A-05	
ETS 2	Japan	77-014A-01	Book (3)
ETS 4	Japan	81-012A-01	
ETS 3	Japan	82-087A-01	
HILAT	USA	83-063A-01	
UOSAT 2	USA	84-021B-04	

* These interplanetary spacecraft carried receivers for the 423.3 and 49.8 MHz signal transmitted from Stanford University. They measured the combined ionospheric, plasmaspheric, and interplanetary electron content.

TABLE 3.3 Digital Hourly TEC Data at NGDC

Station	Months of Data by Year																	
	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85
Anchorage, AK														4	12	12	12	12	8
Athens, Greece														12	12	12	12	12	8
Boulder, CO														12	12	12	12	12	8
Goose Bay, Labrador														12	12	12	12	12	8
La Posta, CA														12	12	12	12	12	8
Osan, Korea														12	12	12	12	12	8
Palehua, HI														12	12	12	12	12	8
Patrick, FL														12	12	12	12	12	8
Ramey, PR									5					12	12	12	12	12	8
Sagamore Hill, MA	2	12	12	12	12	12								12	12	12	12	12	8
Shemya, AK														12	12	12	12	12	8
Sydney, Australia	4	12	11	11	12	12	12	12	1										
Taiwan														12	12	12	12	12	8
Total:	6	24	23	23	24	24	12	12	6	0	0	0	0	136	144	144	144	144	96

Note: Taiwan data are also available on one magnetic tape as 15-minute values from December 1979 to July 1985.

can be obtained with experiments using more than one frequency. The difference in the (phase) propagation delay between waves of different frequencies allows determination of the total electron content. This technique has often been called the differential Doppler technique. See Davies [1980] for description and references.

Beacon studies have the disadvantage of being limited to locations where appropriately equipped receivers exist. The operating beacon stations throughout the world are listed in the *Directory of Solar-Terrestrial Physics Monitoring Stations* [Shea et al., 1984]. Most of these stations have operated since the late 1960s and provide hourly electron content data for the times of satellite coverage. Several data sets are archived and distributed by:

NSSDC Table 3.1 and Appendix A (by satellite)
NGDC Table 3.3 (listed by receiving station)

Suitable satellites for ionospheric beacon studies are listed in the COSPAR information bulletin (Appendix C). The ionospheric electron content can also be monitored with transmissions that are not specifically designed for ionospheric investigations, e.g., satellite tracking signals.

Beacon measurements have been used to investigate the global and temporal morphology of electron content and scintillations [Aarons, 1973, 1977] [10, 12]. Scintillations are rapid noiselike fluctuations in the amplitude, frequency, polarization, or direction of an observed beacon signal. They can disturb ground-to-satellite links and are dangerous for some sophisticated radio location methods. Scintillation observations in the UHF (GHz), made at Ascension Island from 1980 through 1982, were published by Mullen et al. [1985]. Global results are reported by Basu et al. [1987].

The contribution of beacon measurements to ionospheric and plasmaspheric studies is documented in the proceedings of several beacon symposia:

The Geophysical Use of Satellite Beacon Observations, M. Mendillo (ed.), Boston University, 1976.

Measurements of Plasmaspheric and Ionospheric Properties, P. F. Checcacci (ed.), IROE, Florence, Italy, 1979.

Scientific and Engineering Use of Satellite Radio Beacons, A. W. Wernik (ed.), Warszawa, Lodz, Poland, 1981.

Ionospheric Studies by Means of Beacon Satellites, New Delhi, India, *Radio Science*, Vol. 19, No. 3, 685-805, 1984.

International Beacon Satellite Symposium and Technical Workshop, 2 vols., University of Oulu, Finland, 1986 (ISBN 951-42-2256-3).

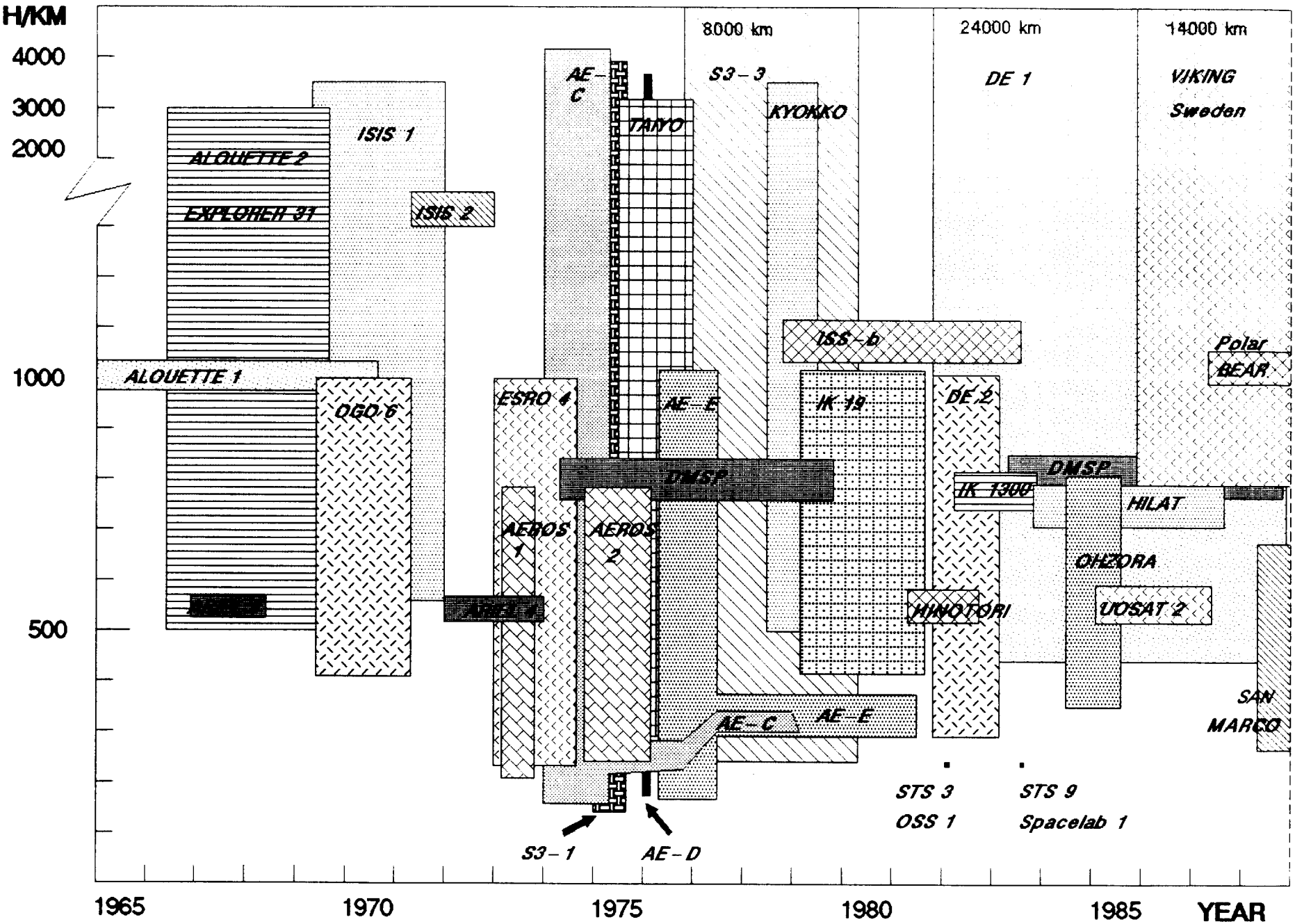
3.2 In Situ Experiments

In situ instruments measure the local plasma parameters at the spacecraft's position in the ionosphere. Unlike all the other methods described in this report they do not apply remote sensing techniques. In situ instruments are all well-known tools of laboratory plasma research and include: Langmuir probe, impedance probe, retarding potential analyzer, ion mass spectrometer, magnetometer, EUV (photon) spectrometer, and electron flux spectrometer. In designing these instruments for spacecraft applications one has to consider the disturbing influence of spacecraft motion and charging. In-flight investigation of these disturbances started with the simultaneously launched Alouette 2 and Explorer 31 satellites [Brace and Findlay, 1969]. Detailed diagnostics studies were made on several Space Shuttle flights [Shawhan and Murphy, 1984].

The preflight calibration in the laboratory environment does not always guarantee reliable absolute measurements, especially during long-lasting satellite missions. Therefore, most of the more recent (roughly since the early seventies) instruments employ some form of in-flight calibration.

The different in situ instruments are described in detail in several dedicated publications as listed in Table 3.4 on page 30.

The satellites with in situ experiments are shown in Figure 3.1, indicating the time span and altitude range for which in situ data are available. See also Appendix A.



Note: Alouette 1, 2; ISIS 1, 2; IK 19; and ISS-b also carried topside sounders measuring the electron density from satellite altitude down to the F peak; ionograms from the ISIS topside sounders were recorded into the mid-80s (see Section 3.3).

Figure 3.1 Altitude/time chart of satellite data from in situ experiments

In situ measurements have been crucial to our understanding of local plasma processes. Providing simultaneous measurements of densities, temperatures, electric and magnetic field strength, solar EUV intensities, ionospheric UV intensities, and energetic electron fluxes, they allowed the identification of the atomic and molecular processes that result from the absorption of solar radiation. They enabled quantitative evaluation of the effects of solar energy: chemical changes, ionization, luminosity, and thermal energy.

The spatial and temporal resolution of data sets from in situ instruments depends on the satellite orbit characteristics, on data transmission times, and on the instrument's sampling rate. From the very beginning most satellite missions have avoided the spatial limitations of real time transmission with the help of onboard recording equipment. In situ instruments have sampling intervals of a few seconds, however, power supply considerations affect their operational time.

Most ionospheric satellites have been launched into high-inclination elliptical or circular orbits. Such orbits have the obvious limitation in local time, if elliptical, or in altitude, if circular. Low-inclination orbits, on the other hand, limit the latitudinal extent of a satellite mission; the maximum latitudes reached by a satellite in the northern and southern hemisphere are roughly equal to the inclination angle. The need for a useful lifetime has generally precluded perigees below 250 km because atmospheric drag causes the orbit altitude to decay rapidly. Some examples:

1. The AEROS satellites were injected into elliptical (250 km to 800 km) orbits at an inclination of 96.9°; at such high inclinations the orbit is stable in local time (2 a.m. and 2 p.m.).

2. The AE-C satellite spent most of its mission time in circular orbits providing an almost complete global and temporal (local time, seasons) picture of the ionosphere at altitudes of 300 and 400 km.

3. The low-inclination satellites AE-E and Taiyo have monitored the low-latitude ionosphere in the greatest detail. Investigation of the equatorial ionosphere continues with the Italian-American San Marco satellite, which was launched on March 25, 1988, into an elliptical (250 to 700 km), very low inclination (2.89°) orbit and re-entered in December 1988.

Orbital limitations have been largely overcome with the fleet of Atmosphere Explorer satellites (C, D, E), which were launched into complementary orbits. In addition, the onboard propulsion system allowed circularization of the initially elliptical orbits of these satellites.

The coupling between ionosphere and atmosphere can be explored with a single well-equipped aeronomy satellite (e.g. AEROS, AE). Multisatellite missions, however, are necessary to investigate the couplings among ionosphere, magnetosphere, and solar wind. The Dynamics Explorer (DE 1and 2) satellites were launched into coplanar orbits providing data at ionospheric and magnetospheric altitudes within common magnetic flux tubes. The coupling processes are also studied with coordinated satellite and ground-based measurement campaigns (see Appendix B).

In the International Solar-Terrestrial Program (ISTP) the U.S.A., U.S.S.R., E.S.A, and Japan plan to launch 12 satellites for simultaneous measurements in different regions of the Earth-sun system.

3.3 Topside Sounder

Ionosonde-carrying satellites were the first satellites dedicated exclusively to ionospheric research. Whereas ground-based ionosondes looking upward measure the bottomside electron density, satellite ionosondes looking downward measure the topside electron density from the satellite altitude down to the F peak (topside sounder). The two measurements together provide the whole ionospheric electron density profile. There are, however, major differences:

1. Topside sounder data cover the whole globe, whereas ground ionosonde data are available only for the stations shown in Figure 2.2.

2. Inversion of topside ionograms (into electron density profiles) is facilitated by the facts that the topside density decreases monotoni-

cally and that the electron density at the starting altitude can be measured with in situ techniques.

3. A topside sounder transmitter needs much less power (a few hundred watts) than a ground-based ionosonde (several kilowatts) because the ionosphere shields the spacecraft from ground-based interference.

Determination of the plasma frequency at the F peak, however, is more difficult from the topside ionogram trace than from the bottomside trace. Only the most recent topside sounders (ISS-b for example) allowed determination of the F peak density.

Topside ionograms exhibit several plasma resonance features, which provide valuable insights into plasma physics and can be used to calculate electron density at the satellite altitude [Benson, 1977].

Topside sounder satellites are included in Figure 3.1 (see page 28) and Appendix A. A huge number of topside ionograms covering the period 1962-1978 were collected by the long-lasting U.S.-Canadian satellite missions

TABLE 3.4 References for In Situ Instruments

Satellite	Reference
Alouette 1, Explorer 31, ISIS 1, 2	*Proceedings of the IEEE*, Vol. 57, No. 6, 1969
OGO 1, 2, 3, 4, 5, 6	OGO Program Summary, NASA SP-7601, 1975
Alouette 1, 2; ISIS 1, 2	Alouette ISIS Program Summary, NSSDC/WDC-A-R&S Report 80-09, 1986
Explorer 22,23	*Space Research X*, 663-651, 1970
Atmospheric Explorer C, D, E	*Radio Science*, Vol.8, No. 4, 1973
AEROS A, B	*Journal of Geophysics*, Vol. 40, No. 5, 1974
Taiyo (SRATS)	*Journal of Geomagnetism and Geoelectricity*, Vol. 27, No. 2, 1975
ESRO 4	*Planetary and Space Science*. Vol. 24, 873-881, 1976
Dynamics Explorer 1, 2	*Space Science Instrumentation*, Vol. 5, No. 4, 1981
Viking (Sweden)	*Annales Geophysicae*,Vol. 5A, No.4, 1987 (results) *Eos Transactions*, Vol. 67, No. 42, 1986
DMSP	Air Force Geophysical Laboratory Reports AFGL-TR-80-0152 (1980), AFGL-TR-78-0071 (1978), AFGL-TR-86-0121 (1981), Hanscom AFB, MA *Eos Transactions*, Vol. 66, No. 26, 1985
HiLat	*Radio Science*, Vol. 20, No. 3, 1985 *Johns Hopkins APL Technical Digest*, Vol.5, No. 2, 1984
Polar BEAR	*Johns Hopkins APL Technical Digest*, Vol.8, No. 3, 1987

Alouette 1 and 2, and ISIS 1 and 2. Typically, ionograms were recorded once every 14 to 29 seconds for 6 to 8 hours per day. Latitude resolution is 1-2°.

About four million ionograms together with the needed ephemeris tables are archived and distributed by NSSDC/WDC-A-R&S. (See data users' note by Jackson [1988]). About one hundred thousand of these (~2.5%) have been inverted into electron density profiles and are available on magnetic tape or as tabulated data. NSSDC also provides software to reduce topside ionograms. A program summary of the Alouette and ISIS missions and a general review of results from the Alouette and Explorers 20 and 31 were compiled for NSSDC by Jackson [1986, 1988]. Data sets and software products related to these missions are listed in Appendix A.

Topside sounding instruments, data reduction techniques, results, and comparison with other techniques are described in the special issue: *Proceedings of the IEEE*, Vol. 57, No. 6, 1969. A review of topside sounding was presented by Jackson et al. [1980].

Japan has successfully launched two topside sounder satellites: ISS-b and OHZORA. ISS-b has provided valuable information about the topside ionosphere during the very high levels of solar activity reached in 1978/79 [Wakai and Matuura, 1980; Matuura et al., 1981].

Fixed frequency sounders, both bottomside and topside (Explorer 20, ISIS 1), have been used to study temporal changes in plasma resonances and small-scale ionospheric structures.

3.4 Rockets

Rocket launchings were the first technological step towards deployment of satellites into Earth orbit. All early space experiments were first tested on rockets. Rocket measurements are also our only means of exploring the ionospheric plasma below about 200 km, where high neutral densities and low electron densities make satellite and ground-based observations difficult. The limitations and the reliability of different measurement techniques for the lower ionosphere were assessed in a special COSPAR Symposium in 1973 [Rawer, 1974].

Individual rocket experiments and multirocket campaigns are usually designed to study a specific aspect of plasma physics, for example spread F [Kelley et al., 1986] or Alfvén critical velocity [Wescott et al., 1986]. They have also provided much information about the chemical composition of the numerous ion species in this region, which depends strongly on time and altitude.

Rocket data sets are not of the same general interest to the science community as data sets from long-lasting satellite missions and from continuously operating ground-based facilities. Rockets, however, are important elements in coordinated satellite/rocket/ground-based campaigns (see Appendix B). For example, solar EUV measurements aboard the Atmosphere Explorer satellites were recalibrated with rocket measurements midway through their lifetime.

Several compilations of ionospheric rocket data have been published:

R. E. Bourdeau, J. H. Chapman, and K. Maeda [1960]. Reviews early rocket measurements and explains the different spacecraft measurement techniques.

K. Maeda [1972]. Midlatitude electron density profiles around noon for each season and different solar activities.

K. Hirao and K. Oyamo [1972]. Nine electron temperature profiles measured at the Kagoshima Space Centre, Japan.

E. A. Mechtly, S. A. Bowhill, and L. G. Smith [1972]. Several density profiles from Wallops Island showing solar activity variation.

A. D. Danilow and V. K. Semenov [1973]. Describes the data base for the low altitude ion composition of the International Reference Ionosphere. The latitude resolution is rather limited.

L. F. McNamara [1978a]. Presents electron density profiles from a wide variety of differ-

ent techniques. There is, however, not enough information to assess the reliability of the different samples.

B. H. Subbaraya, S. Paskash, and S. P. Gupta [1983]. Langmuir probe measurements of electron density in the equatorial lower ionosphere made at Thumba, southern India, during the years 1966-1978.

Sounding Rocket Data in Japan, Vol. 1, 1958-1972, Vol. 2, 1960-1975. (Available from NSSDC on microfiche, data set RX-11A.)

A summary of international rocket launchings is published irregularly by NSSDC/WDC-A-R&S: *Launch Summary for 1973-77* (NSSDC/WDC-A-R&S Report 78-02, 1978); *Launch Summary for 1978-82* (NSSDC/WDC-A-R&S Report 84-01, 1984).

3.5 Other Techniques

Photometers and interferometers have been flown on several satellites to measure auroral and airglow emissions. (See review by Hayes et al. [1988]).

Visible and ultraviolet imagers (scanning photometers) have been flown on a number of satellites including the DMSP satellites (visible and IR), HiLat (UV), DE 1 (visible and UV), Viking Sweden (UV), and Polar BEAR (visible and UV). These measurements have helped to map out the auroral oval [Gussenhoven, 1982; Frank et al., 1986]. A combination of eight optical instruments was proposed by McCoy et al. [1986] for a launch on a TIROS spacecraft in the early 1990s. The limb scanning experiment will allow remote sensing of neutral and ion composition.

All satellite experiments are listed in Appendix A.1, as are the data sets that are available from NSSDC. DMSP auroral images can be obtained from NGDC on 35mm film. (See Appendix A.3.)

Chapter 4 Comparisons and Data Set Compatibility

Comparisons among the results of different ionospheric measurement techniques have played an important role in recognizing and eliminating error sources for the different techniques. Improved and refined instrument design and data reduction methods have in most cases led to agreement and have explained earlier discrepancies. In this section we review the results of comparative studies, thus enabling the user of past ionospheric records to judge the compatibility and limitations of different data sets.

4.1 Electron Density

Ionospheric electron densities are measured by topside and bottomside sounders (ionosonde), by incoherent scatter radar, and by satellite and rocket in situ probes.

Ionosondes are best suited for measuring peak plasma frequencies and electron densities (E, Es, F1, F2). The difficulties in determining bottomside electron density profiles from inograms have been pointed out earlier. (See Section 2.1, Jackson [1971], McNamara [1978b], and Titheridge [1987].) The largest discrepancies are to be expected close to the height of the F layer, where altitudes from ionogram analysis are typically less than those from incoherent scatter measurements by 10 km or more. No systematic assessment of these errors has yet been published. The few comparisons of ionosonde data with incoherent scatter profiles [Smith, 1970] and with rocket measurements [Wright and Paul, 1974] tended to focus on the conditions under which agreement is found.

Reduction of topside sounder ionograms encounters fewer problems and error sources than analysis of bottomside ionograms. (See Section 3.3.) An early comparison among Alouette data and simultaneous incoherent scatter and rocket measurements indicated that below 600 km the difference was as much as 20 km [Bauer et al., 1964]. This finding was later confirmed in Jackson's [1969] comparative study. Fleury and Taieb [1971] found discrepancies of less than 15 km during 20 satellite passes (Alouette, ISIS) near the incoherent scatter radar at St. Santin, France. Electron densities calculated from ISIS topside soundings agreed with AEROS in situ measurements to within about 20% [Dumbs et al., 1979]. A recent comparison [Hoegy and Benson, 1988] between ISIS topside sounder measurements and DE 2 Langmuir probe data showed agreement within 30%.

On several ionospheric satellites the electron density was measured by more than one instrument. Langmuir probe, retarding potential analyzer, impedance probe, and ion mass spectrometer all measure the total electron or ion density. Comparisons among the results of different instruments on the same satellite have mostly been used for recalibration

purposes. Some comparisons of independent results can be found in the final reports prepared by the scientific investigators for the sponsor agency. For AEROS as well as AE-C, good agreement was found between the different in situ techniques.

The AEROS and AE-C density results agree well with each other, as is shown for average values in Figure 4.1. Rich and Smiddy [1986] found good agreement between DMSP and ESRO-4 density measurements at altitudes of 600-700 km during similar solar activity conditions. Their DMSP measurements also compare well with ISS-b results at 1100 km altitude. However, the ISS-b measurements show a significant longitudinal dependence not expected from DMSP results.

For the lower ionosphere (D region and lower E region), there are conflicting results from different measurement techniques. (See Rawer [1974] and Ramanamurty [1985].) These discrepancies are extremely large (orders of magnitude) for the very low electron densities during nighttime. During the 1973 COSPAR symposium, the following conclusions were reached [Rawer, 1974]:

1. D-region profiles of greatest accuracy are derived from measurements of differential absorption and/or differential phase (Faraday rotation) of radio waves propagating between the ground and ascending rockets. Improved resolution is possible when Langmuir dc probes are flown on the same rockets.

2. All the ground-based techniques (VLF, LF, partial reflection, and wave interaction) begin with assumed profiles of electron concentration and collision frequency for the inversion of propagation integrals. Available measurements are never sufficiently comprehensive to determine unique profiles.

4.2 Electron and Ion Temperature

Early Langmuir probe measurements (Alouette 2, Explorer 31 and 32) gave electron temperatures that were substantially different from the values obtained by incoherent scatter radar [Hanson et al., 1969; Carlson and Sayers, 1970]. The satellite-to-radar ratio was 1.7 for Jicamarca (Peru), 1.4 for Millstone Hill (Massachusetts), and 1.4 for Arecibo (Puerto Rico). For the ion temperature, the ratio ranged from 1.2 to 1.4. Better agreement with incoherent scatter data was found for plasma temperatures measured during nighttime by OGO 6 [McClure et al., 1973]. ISIS 1 electron temperature measurements seem to be 10 to 20% higher than incoherent scatter and ISIS 2 measurements [Köhnlein, 1986].

With improved instrument design and data reduction techniques, the discrepancies became smaller. AEROS and AE-C temperatures differed only slightly (2 to 10%) from simultaneous incoherent scatter measurements [Benson et al., 1977; Spenner and Rawer, 1978]. Large systematic discrepancies have been observed between ESRO-4 and Malvern incoherent scatter data, whereas AE-C and ISIS 2 temperatures compare well with the Malvern data [McPherson, 1977].

Spenner et al. [1979] compared electron temperature measurements from the retarding potential analyzers aboard AEROS-B and TAIYO when the two satellites were close to each other. Good agreement was found during nighttime, whereas the daytime TAIYO temperatures exceeded the AEROS temperatures by 10%. Figure 4.1 shows that the AEROS and AE-C temperature averages agree well with each other.

Summarizing these comparisons, Table 4.1 lists the data sets of in situ plasma temperatures that can be regarded as most reliable.

TABLE 4.1 Widely Used Satellite Data Sets: Langmuir Probe (LP) and Retarding Potential Analyzer (RPA)

Satellite	Instrument	Measurement Period	Temperature Electron	Temperature Ion	Altitude Range (km) (Year)	Diurnal Range	Solar Activity
ISIS-1*	LP	1/69 - 5/71	X		600 - 3500	All hours	High
OGO-6	RPA	6/69 - 4/71		X	410 - 1080	Mostly night	High
ISIS-2	LP	4/71 - 3/73	X		1400 ± 50	All hours	Medium
AEROS-A	RPA	1/73 - 8/73	X	X	300 - 700	2 a.m., 2 p.m.	Low
AE-C	LP, RPA	12/73 -12/78	X	X	150 - 4300 (74)	All hours	Low
					300 (75, 76)		
					400 (77, 78)		
AEROS-B	RPA	7/74 - 9/75	X	X	300 - 700	2 a.m., 2 p.m.	Medium
AE-D	RPA	10/75 - 1/76		X	140 - 1000	All hours	Medium
AE-E	RPA	11/75 - 6/81		X	140 - 1000	All hours	Medium
ISS-b	RPA	2/78 - 4/83	X	X	1100 ± 100	Mostly night	High
DE-2	LP, RPA	8/81 - 1/83	X	X	300 - 1100	All hours	High

* In Köhnlein's [1981] comparison at 600 km altitude ISIS-1 electron temperature data exceed incoherent scatter data by ~400 K.

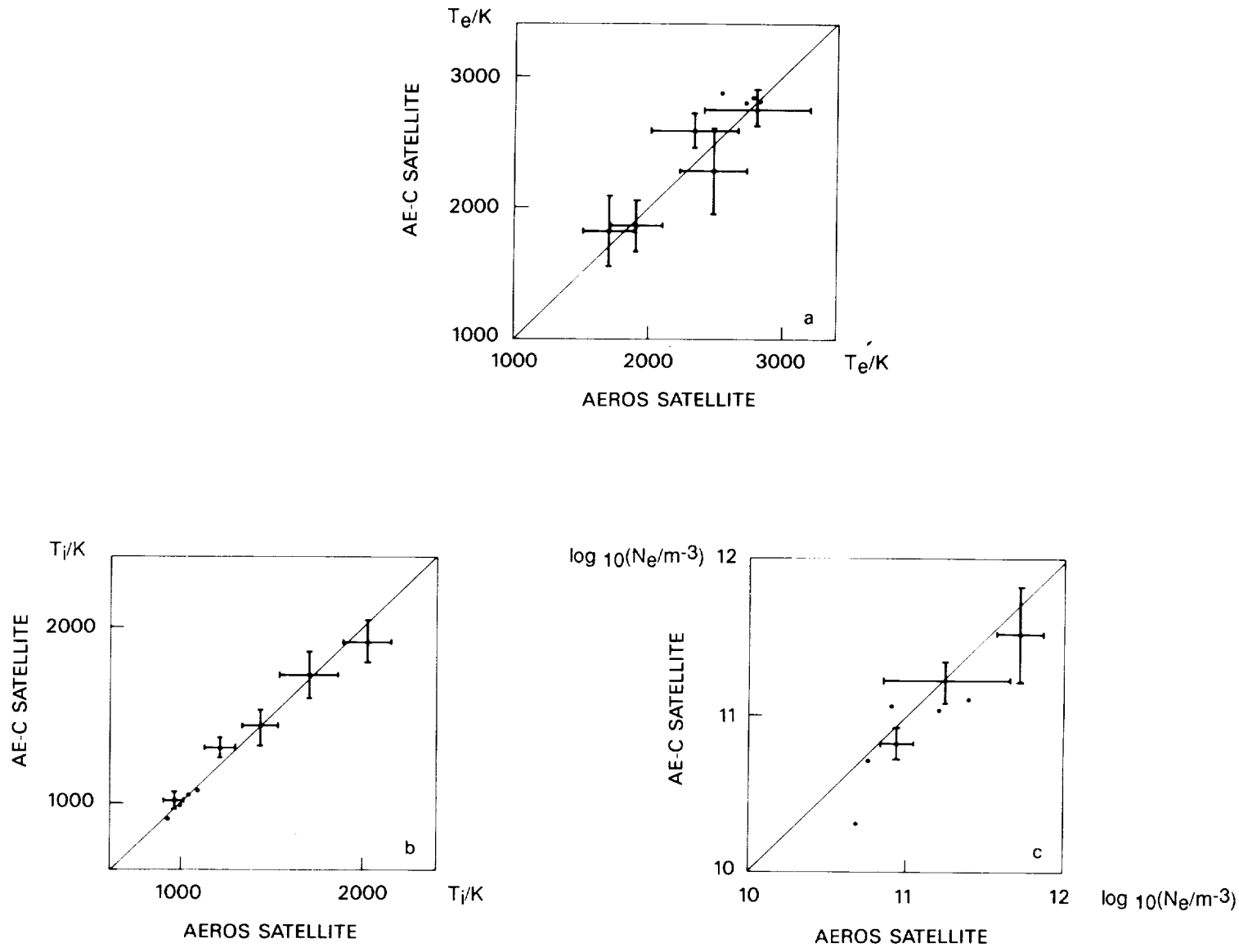


Figure 4.1 Comparison of results for ionospheric parameters from AEROS and AE-C satellites

Chapter 5

Modeling the Ionosphere

As in any geophysical discipline, modeling is an essential part of ionospheric physics. The two main goals are to understand the physical processes in the plasma and to be able to forecast ionospheric conditions. Empirical modeling tries to extract periodic behavior from past data records. Theoretical modeling tries to solve the Boltzman equation for the ionospheric gas. Both methods have been pursued over more than 30 years and have reached a high degree of sophistication. The major remaining challenge is the modeling of the auroral ionosphere with its coupling to magnetospheric and solar wind conditions [Schunk and Sojka, 1988; Gorney, 1987; Sisco, 1988].

Reviews of ionospheric modeling have been presented by Davies [1981], Rawer [1984], Rush [1986], and Schunk and Szuszczewicz [1988].

5.1 Theoretical Simulation

Theoretical simulations of the ionospheric environment start from the continuity, energy, and momentum equations for electrons and ions [Schunk, 1977]. The plasma densities, temperatures, and drifts are obtained numerically from the nonlinear coupled system of equations. Input parameters are the solar EUV radiation, the auroral particle precipitation, and the atmospheric and magnetospheric boundary conditions. In addition, various cross sections are needed for describing the interactions among the various species.

Over the past 15 years these computer simulations have been steadily improved in tune with our evolving understanding of the ionospheric plasma processes. Recent improvements of specific terms were reported by Hoegy [1984], Bilitza [1985], Richards et al. [1986], Gulcicek et al. [1988], and Grochulska [1988]. Ionospheric modeling has gone hand in hand with the modeling of the thermosphere and magnetosphere. The strong coupling in the magnetosphere/ionosphere/thermosphere system ultimately makes necessary a combined model of all three regions.

Several groups have pursued realistic simulations of the ionosphere. The most advanced computer simulations have been developed at the Utah State University [Young et al., 1980; Schunk et al., 1986]; at the University College London and the University of Sheffield [Quegan et al., 1982; Fuller-Rowell et al., 1987]; and at the National Center for Atmospheric Research in Boulder [Emery et al., 1985; Roble et al., 1988]. Self-consistent theoretical models including the global ionosphere and atmosphere are presently being developed by all three groups [e.g. Rees et al., 1987].

Theoretical models have proven their ability to simulate non-auroral densities and temperatures in comparison with measured values [Chandler et al., 1983; Roble et al., 1988]. Some discrepancies, however, remain. For example, the calculated photoelectron fluxes disagree

TABLE 5.1 Empirical Models of Ionospheric Electron Density

Model	Characteristics	Data Source
Models With CCIR Peak		
Bottomside Only		
Bradley and Dudeney [1973]	Parabolic and linear segments No F1, no valley, no D region	Ionosonde
Dudeney [1978]	Improved functional description No valley, no D region	Ionosonde
IONCAP [Lloyd et al., 1978]	Parabolic and linear segments Valley of constant density Exponential tail below E parabola	Ionosonde
Chasovitin et al. [1985]	Low- and mid-latitudes below 200 km	Incoherent scatter Rocket, Satellite
Top and Bottomside		
Bent and Llewellyn [1973]	Three exponential topside segments Bottomside bi-parabola	Satellite Ionosonde
International Reference Ionosphere [1978, 1981]	Analytical description of Bent's topside E valley, D region	Ionosonde Incoherent scatter Absorption Rocket, Satellite
Models Without CCIR Peak		
Ching and Chiu [1973] Chiu [1975]	Three superposed Elias-Chapman layers (E, F1, F2) Phenomenological description of peak parameters	Ionosonde
Köhnlein [1978]	One Elias-Chapman layer with parametrized scale height Phenomenological description of peak parameters	Incoherent scatter Topside sounder In situ

with measured fluxes by a factor of two [Hernandez et al., 1983; Richards and Torr, 1984].

Modeling of the auroral ionosphere has improved considerably in recent years [Quegan et al., 1982; Sojka and Schunk, 1988; Schunk and Sojka, 1988; Rasmussen et al., 1988]. However, all modeling attempts are still only case studies, limited by their use of globally smoothed input functions.

Further information can be found in the reviews by Schunk and Nagy [1980], Anderson [1981], Schunk [1983], Rawer [1984], and also in the *U.S. National Report to the International Union of Geodesy and Geophysics*, which is published in the *Review of Geophysics* every three years (see Bibliography).

The main disadvantage of using theoretical models for forecasting is the large amount of computer time needed. Several hours on a CRAY 1 computer are required to specify the electron density on a global scale. To overcome this limitation, Batten et al. [1987] suggested the creation of data bases of theoretically calculated ionospheric parameters similar to the data bases of actual measurements.

Anderson et al. [1985] have followed a similar approach with their semi-empirical, low-latitude ionospheric model (SLIM). They have calculated electron density profiles (180 to 1800 km) between 24°N and 24°S dip latitude based on Anderson's [1973] theoretical computations. The theoretical values were then approximated by Chapman-like profiles and the profile coefficients stored as the model matrix.

5.2 Empirical Modeling

Reviews of empirical models of the electron density were presented by Köhnlein [1978], Davies [1981], and Dudeny and Kressman [1986].

The first empirical models were developed for the F peak critical frequency *fo*F2. This parameter is very important for radio communication and can be easily obtained from ionosonde measurements. The International Radio Consultative Committee (CCIR) presently recommends the *fo*F2 model that is based on the pioneering work of Jones and Gallet [1962, 1965] and Jones and Obitts [1970]. It utilizes spherical harmonics and Fourier functions and needs 2867 coefficients per month. A similar model has been developed for the propagation factor M(3000)F2, which is related to the F peak altitude. (See Bilitza et al. [1979] for a review of this relationship.) It has long been known that the CCIR model has its shortcomings above the oceans and in the southern hemisphere, where ionosonde measurements are scarce or do not exist. Rush et al. [1983, 1984] have obtained a more balanced description by introducing theoretical values in regions of no measurements. Fox and McNamara [1986] have combined the Rush approach with a huge data base of ionosonde measurements and have calculated new coefficients. This new model was recently accepted as the new standard model by the International Union of Radio Science (URSI) and will probably be adopted by CCIR.

Several models of the ionospheric electron density profile (normalized to the CCIR F-peak density) have been developed, as listed in Table 5.1. The most widely used is the International Reference Ionosphere (IRI). IRI is a joint project of the Committee on Space Research (COSPAR) and URSI, and has by now undergone more than a decade of improvements and critical testing. Unlike all the other models, it also provides the electron and ion temperatures and the percentage ion densities. Progress in developing IRI is reported in several issues of *Advances in Space Research* [Vols. 2 (No. 10), 4 (1), 5 (7), 5 (10), 7 (6), and 8 (4)]. IRI is also the only model that takes advantage of all the different data sources described in Chapters 2 and 3.

Phenomenological descriptions of the peak parameters, as used in the last two models in Table 5.1, need fewer coefficients, but they cannot describe global variations in as much detail as the spherical harmonics development can. They have, however, the advantage of small computational effort and easy accessibility of global and temporal trends.

In general, empirical models describe average conditions (e.g. monthly or seasonal mean values) of the non-auroral, quiet ionosphere. Day-to-day deviations from these mean values can range from 10 to 30% for quiet magnetic conditions and even higher for magnetic storm

conditions. Introduction of real-time values at certain altitudes can improve the prediction quality of the models at all altitudes. The IRI model, for example, has an option for using real-time F peak density and altitude instead of the CCIR model values. (Several of the ionospheric forecasting centers listed in Appendix D provide predictions of *fo*F2 and M(3000)F2 on a weekly or monthly basis with daily update.)

An Ionospheric Conductivity and Electron Density (ICED) model is being developed by Tascione et al. [1988] for the USAF Air Weather Service. Their plan is to use real-time data from a network of digital ionosondes for the F peak density and imager data from the DMSP satellite for the auroral boundary.

Models for the electron and ion temperatures are summarized in Table 5.2. The mission-specific models are restricted by the orbit characteristics of the specific satellites. The IRI model combines the mission models into a single analytical model with the help of Epstein functions. In addition, IRI users have the option of improving prediction accuracy by switching to a model that uses the strong anti-correlation between electron temperature and density. This is only recommended when measured (real-time) electron density values are available.

TABLE 5.2 Empirical Models of Ionospheric Plasma Temperatures

Authors	Characteristics	Data Base
Electron temperature models for specific satellite missions		
Spenner and Plugge [1979]	300 - 700 km; 3 a.m. and 3 p.m.	AEROS-A
Brace and Theis [1981]	300, 400, 1400 and 3000 km All local times	AE-C ISIS 1, 2
Smilauer and Atonin [1985]	500-1000 km; high solar activity	Interkosmos-19
Electron and ion temperature models		
IRI, Bilitza [1981] Bilitza et al. [1985]	Combines the first three models with incoherent scatter results	Several satellites and several incoherent scatter radars
Köhnlein [1986]	Large number of coefficients fitted simultaneously	Several satellites and several incoherent scatter radars
Models of electron temperature/density anticorrelation		
Brace and Theis [1978]	Depends on altitude	AE-C
Bilitza [1983]	Depends on altitude and dip latitude	AE-C, AEROS-B, incoherent scatter radar

TABLE 5.3 Empirical Models of Interest for Ionospheric Physics

Subject	Name/Author	Characteristics
Atmosphere	CIRA [1972]	Neutral densities and temperature of the atmosphere
	MSIS, Hedin [1987]	Neutral densities and temperature of middle and upper atmosphere
	Hedin et al. [1988]	Horizontal thermospheric winds
Earth's magnetic field	IGRF, Barraclough [1987]	Magnetic field without external sources
	Tsyganenko [1987]	Magnetic field with external sources
Earth's electric field	Heppner [1977] Heppner and Maynard [1987]	High-latitude ionospheric electric fields
	Volland [1973, 1978]	Large-scale magnetospheric electric field
	Richmond et al. [1980]	Ionospheric electric field at middle and low latitudes
	Heelis et al. [1982]	High-latitude ionospheric convection
	Reiff and Burch [1985]	High-latitude convection and Birkeland currents
Auroral oval	Holzworth and Meng [1975]	Mathematical representation of oval
	Hardy et al. [1985]	Auroral electron precipitation
	Foppiano and Bradley [1983]	Auroral absorption of HF waves
Radiation belts	Sawyer et al. [1976] Teague et al. [1979]	Trapped electron and proton fluxes in the magnetosphere
Scintillation	Fremouw and Secan [1984]	Global distribution of scintillation
Conductances	Wallis and Budzinski [1981]	Height-integrated conductivities
	Spiro et al. [1982]	Auroral zone conductances
	Whalen [1983]	Spatial distribution and energy flux of aurora
	Brekke and Hall [1988]	Auroral quiet summer ionospheric conductances
Venus ionosphere	Theis et al. [1984]	Electron density and temperature

Table 5.3 on page 41 lists empirical models of parameters which are related to ionospheric physics.

International efforts to improve forecasting of ionospheric conditions are summarized in the proceedings of the Solar-Terrestrial Predictions Workshops (Boulder, 1979 [14]; Meudon, 1984 [18]; Sydney, 1989).

The software packages for several of the empirical models listed in Tables 5.1, 5.2, and 5.3 are available from NSSDC (see Appendix A.3) on tape, diskette (for PCs), or on line on the Space Physics Analysis Network (SPAN; address: NCF::REQUEST).

Chapter 6

References

Aarons, J., (ed.), Total Electron Content and Scintillation Studies of the Ionosphere, AGARD-AG-166, 1973. (Available from NTIS.)

Aarons, J., Review of equatorial scintillations, *IEEE Trans. AP-25*, 729, 1977.

Anderson, D. N., A theoretical study of the ionospheric F region equatorial anomaly, *Planet. Space Sci. 21*, 409-442, 1973.

Anderson, D. N., Modeling the ambient, low latitude F region ionosphere—A review, *J. Atmos. Terr. Phys. 43*, 753-762, 1981.

Anderson, D. N., M. Mendillo, and B. Herniter, *A Semi-Empirical, Low-Latitude Ionospheric Model*, Air Force Geophysics Laboratory Technical Report AFGL-TR-85-0254, Hanscom AFB, Massachusetts, 1985.

Barraclough, D. R., International Geomagnetic Reference Field Revision 1987, *J. Geomag. Geoelectr. 39*, 773-779, 1987.

Basu, Sa., E. M. MacKenzie, Su. Basu, E. Costa, P. I. Fougere, H. C. Carlson, and H. E. Whitney, 250 MHz/GHz scintillation parameters in the equatorial, polar, and auroral environments, *IEEE J. on Selected Areas in Communication*, SAC-5, 1987.

Batten, S., D. Rees, and J. Fuller-Rowell, A numerical and data base for VAX and personal computers for the storage, reconstruction, and display of global thermospheric and ionospheric models, *Planet. Space Sci. 35*, 1167-1179, 1987.

Bauer, S. S., L. J. Blumle, J. L. Donley, R. J. Fitzenreiter, and J. E. Jackson, Simultaneous rocket and satellite measurements of the topside ionosphere, *J. Geophys. Res. 69*, 186-189, 1964.

Benson, R. F., Stimulated plasma waves in the ionosphere, *Radio Science 12*, 861-878, 1977.

Benson, R. F., et al., Electron and ion temperature—A comparison of ground-based incoherent scatter and AE-C satellite measurements, *J. Geophys. Res. 82*, 36-42, 1977.

Bent, R. B., and S. K. Llewellyn, *Documentation and Description of the Bent Ionospheric Model*, Report AFGL-TR-73-0657, Hanscom AFB, Massachusetts, 1973.

Bilitza, D., *Models for Ionospheric Electron and Ion Temperature*, World Data Center A for Solar-Terrestrial Physics Report UAG-82, 11-16, Boulder, Colorado, 1981.

Bilitza, D., New descriptive temperature model, *Adv. Space Res. 2* (10), 237-245, 1983.

Bilitza, D., Heat balance of the ionosphere: implications for the International Reference Ionosphere, *Adv. Space Res. 5* (10), 123-130, 1985.

Chapter 6

Bilitza, D., N. M. Sheikh, and R. Eyfrig, A global model for the height of the F2-peak using M 3000 values from the CCIR numerical map, *Telecomm. J. 46*, 549-554, 1979.

Bilitza, D., L. H. Brace, and R. F. Theis, Modeling of ionospheric temperature profiles, *Adv. Space Res. 5* (7), 53-58, 1985.

Blanc, M., Electrodynamics of the ionosphere from incoherent scatter—A review, *J. Geomag. Geoelectr. 31*, 137-164, 1979.

Booker, H. G., and E. K. Smith, A comprehensive study of ionospheric measurement techniques, *J. Atmos. Terr. Phys. 32*, 467-497, 1970.

Bourdeau, R. E., J. H. Chapman, and K. Maeda, Ionospheric research by rockets and satellites, *Radio Science 3*, 6-10, 1960.

Brace, L. H., and J. A. Findlay, Comparison of cylindrical electrostatic probe measurements on Alouette II and Explorer XXXI satellites, *Proc. IEEE 57*, 1057-1060, 1969.

Brace, L. H., and R. F. Theis, An empirical model of the interrelationship of electron temperature and density in the daytime thermosphere at solar minimum, *Geophys. Res. Lett. 5*, 275-278, 1978.

Brace, L. H., and R. F. Theis, Global empirical models of ionospheric electron temperature in the upper F-region and plasmasphere based on in situ measurements from the Atmosphere Explorer-C, ISIS 1, and ISIS 2 satellites, *J. Atmos. Terr. Phys. 43*, 1317-1343, 1981.

Bradley, P. A., and J. R. Dudeney, A simple model of the vertical distribution of electron concentration in the ionosphere, *J. Atmos. Terr. Phys. 35*, 2131-2146, 1973.

Brekke, A., and C. Hall, Auroral ionospheric quiet summer time conductances, *Annales Geophysicae 6* (4), 361-376, 1988.

Carlson, H. C., and J. Sayers, Discrepancy in electron temperatures deduced from Langmuir probes and from incoherent scatter radars, *J. Geophys. Res. 75*, 4883-4886, 1970.

Carpenter, D. L., Remote sensing of the magnetospheric plasma by means of whistler-mode signals, *Rev. Geophys. 26*, 535-549, 1988.

Chandler, M. O., R. A. Behnke, A. F. Nagy, E. G. Fontheim, P. G. Richards, and D. G. Torr, Comparison of measured and calculated low-latitude ionospheric properties, *J. Geophys. Res. 88*, 9187-9196, 1983.

Chasovitin, Yu. K., V. B. Shushkova, P. F. Denisenko, T. N. Sykilinda, V. V. Sotsky, and N. E. Shejdakov, An empirical model of electron density for low and middle latitudes below 200 km, *Adv. Space Res. 5* (7), 21-24, 1985.

Ching, B. K., and Y. T. Chiu, A phenomenological model of global ionospheric electron density in the E-, F1- and F2-regions, *J. Atmos. Terr. Phys. 35*, 1615-1630, 1973.

Chiu, Y. T., An improved phenomenological model of ionospheric density, *J. Atmos. Terr. Phys. 37*, 1563-1570, 1975.

CIRA, COSPAR International Reference Atmosphere 1972, Akademie-Verlag, Berlin, 1972. [For later improvements see *Adv. Space Res. 2* (10), *5* (7), *7* (10), and *8* (5-6).].

Cole, K. D., The world ionosphere-thermosphere study, *Eos Transactions, AGU 68* (46), 1594, Nov. 17, 1987.

Conkright, R., M. Ertle, M. Hapgood, A. Feldstein, and N. Matuura, *Combined Catalog of Ionosphere Vertical Soundings Data*, World Data Center A for Solar-Terrestrial Physics, Report UAG-91, Boulder, Colorado, 1984.

Danilov, A. D., and V. K. Semenov, Atmospheric ion composition measurements up to a height of 170 km, *Space Research XIII*, 493, Akademie-Verlag, Berlin, 1973.

Davies, K., Recent progress in satellite beacon studies with particular emphasis on the ATS-6 radio beacon experiment, *Space Sci. Rev. 25*, 357-430, 1980.

Davies, K., Review of recent progress in ionospheric predictions, *Radio Science 16*, 1407-1430, 1981.

Demars, H. G., and R. W. Schunk, Temperature anisotropies in the terrestrial ionosphere and plasmasphere, *Rev. Geophys. 25*, 1659-1679, 1987.

Dudeney, J. R., An improved model of the variation of electron concentration with height in the ionosphere, *J. Atmos. Terr. Phys. 40*, 195-203, 1978.

Dudeney, J. R., and R. I. Kressman, Empirical models of the electron concentration of the ionosphere and their value for radio communication purposes, *Radio Science 21*, 319-330, 1986.

Dumbs, A., G. Emmenegger, R. Kist, D. Klumpar, E. Neske, J. Slavik, K. Spenner, and H. Wolf, Results from the plasma experiments on AEROS, *J. Geomag. Geoelectr. 31*, 2125-2139, 1979.

Emery, B. A., R. G. Roble, E. C. Ridley, T. L. Killeen, M. H. Rees, J. D. Winningham, G. R. Carignan, P. H. Hays, R. A. Heelis, W. B. Hanson, N. W. Spencer, L. H. Brace, and M. Sugiura, Thermospheric and ionospheric structure of the southern hemisphere polar cap on October 21, 1981, as determined from Dynamics Explorer 2 satellite data, *J. Geophys. Res. 90*, 6553-6566, 1985.

Evans, J. V., Theory and practice of ionosphere study by Thompson scatter radar, *Proc. IEEE 57*, 496, 1969.

Evans, J. V., High-power radar studies of the ionosphere, *Proc. IEEE 63*, 1636, 1975.

Evans, J. V., Satellite beacon contribution to ionospheric studies, *Rev. Geophys. 15*, 325, 1977.

Fejer, B. G., and M. C. Kelley, Ionospheric irregularities, *Rev. Geophys. 18*, 401-454, 1980.

Feldstein, Y. I., A quarter of a century with the auroral oval, *Eos Transactions, AGU 67* (40), 761, Oct. 7, 1986.

Feldstein, Y. I., and Y. I. Galperin, The auroral luminosity structure in the high-latitude upper atmosphere: Its dynamics and relationship to the large-scale structure of the earth's magnetosphere, *Rev. Geophys. 23*, 217, 1985.

Fleury, L., and C. Taieb, Simultaneous measurements of electronic density using topside soundings and incoherent scatter soundings, *J. Atmos. Terr. Phys. 33*, 909-918, 1971.

Foppiano, A. J., and P. A. Bradley, Prediction of auroral absorption of high-frequency waves at oblique incidence, *Telecomm. J. 50*, 547-560, 1983.

Forbes, J. M., The equatorial electroject, *Rev. Geophys. 19*, 469-504, 1981.

Fox, M. W., and L. F. McNamara, *Improved Empirical World Maps of foF2: 1. The Method*, Ionospheric Prediction Service, Technical Report IPS-TR-86-03, Sydney, Australia, 1986.

Frank, L. A., et al., The theta aurora, *J. Geophys. Res. 91*, 3177-3224, 1986.

Fremouw, E. J., and J. A. Secan, Modelling and scientific application of scintillation results, *Radio Science 19*, 687-694, 1984.

Friedman, H., The legacy of the IGY, *Eos Transactions, AGU 64* (32), 497, Aug. 9, 1983.

Fuller-Rowell, T. J., D. Rees, S. Quegan, R. J. Moffett, and G. J. Bailey, Interactions between neutral thermospheric composition and the polar ionosphere-thermosphere model, *J. Geophys. Res. 92*, 7744-7748, 1987.

Goodman, J. M., and M. Daehler, The NRL data base of oblique-incidence soundings of the ionosphere, Naval Research Laboratory, Memorandum Report 6337, Washington, DC, 1988.

Gorney, O. J., U.S. Progress in auroral research: 1983-1986, *Rev. Geophys. 25*, 555-569, 1987.

Grochulska, J., The effect of the large ion temperature differences on the solutions of diffusion and continuity equations, *J. Atmos. Terr. Phys. 50*, 33-40, 1988.

Gulcicek, E. E., et al., Absolute differential and integral electron excitation cross sections for

atomic oxygen, *J. Geophys. Res. 93*, 5879-5889, 1988 (and earlier publications).

Gussenhoven, M. S., Extremely high latitude auroras, *J. Geophys. Res. 87*, 2401-2412, 1982.

Hanson, W. B., L. H. Brace, P. L. Dyson, and J. P. McClure, Conflicting electron temperature measurements in the upper F region, *J. Geophys. Res. 74*, 400, 1969.

Hardy, D. A., M. S. Gussenhoven, and E. Holeman, A statistical model of auroral electron precipitation, *J. Geophys. Res. 90*, 4229-4248, 1985.

Hargreaves, J. K., Auroral absorption of HF radio waves in the ionosphere—A review of results from the first decade of riometry, *Proc. IEEE 57*, 1348-1373, 1969.

Hartle, R. E., Earth Observing System: Concepts and implementation strategy, *Space Technology, 7* (4), 337-344, 1987.

Hays, P. B., V. J. Albreu, S. C. Solomon, and J. H. Kee, The visible airglow experiment—A review, *Planet. Space Sci. 36*, 21-35, 1988.

Hedin, A. E., MSIS-86 Thermospheric Model, *J. Geophys. Res. 92*, 4649, 1987.

Hedin, A. E., N. W. Spencer, and T. L. Killeen, Empirical global model of upper thermosphere winds based on Atmosphere and Dynamics Explorer satellite data, *J. Geophys. Res. 93*, 9959-9978, 1988.

Heelis, R. A., J. K. Lowell, and R. W. Spiro, A model of the high-latitude ionospheric convection pattern, *J. Geophys. Res. 87*, 6339, 1982.

Helliwell, R. A., and E. Gehrels, *Proc. Institute Radio Engineers N.Y. 46*, 785-787, 1958.

Heppner, J. P., Empirical models of high-latitude electric fields, *J. Geophys. Res. 82*, 1115-1125, 1977.

Heppner, J. P., and M. C. Maynard, Empirical high latitude electric field models, *J. Geophys. Res. 92*, 4467, 1987.

Hernandez, S. P., J. P. Doering, J. Abreu, and G. A. Victor, Comparison of absolute photoelectron fluxes measured on AE-C and AE-E with theoretical fluxes and predicted and measured N22PG 3371 Å volume emission rates, *Planet. Space Sci. 31*, 221, 1983.

Hirao, K., and K. Oyama, Profiles of electron temperature in the ionosphere observed with electron temperature probe on a rocket, *Space Research XII*, 1335-1339, Akademie-Verlag, Berlin, 1972.

Hoegy, W. R., Thermal electron heating rate: A derivation, *J. Geophys. Res. 89*, 977-985, 1984.

Hoegy, W. R., and R. F. Benson, DE/ISIS conjunction comparisons of high latitude electron density features, *J. Geophys. Res. 93*, 5947-5945, 1988.

Holzworth, R. H., and C. I. Meng, Mathematical representation of the auroral oval, *Geophys. Res. Lett. 2*, 377-380, 1975.

International Reference Ionosphere 1978, URSI report, Brussels, 1978.

International Reference Ionosphere 1979, WDC-A for Solar-Terrestrial Physics Report UAG-82, 1981.

Imhof, W. L., J. B. Regan, H. D. Voss, E. E. Gaines, D. W. Datlowe, J. Mobilia, R. A. Helliwell, U. S. Inan, J. Katsufrakis, and R. G. Joiner, Direct observation of radiation belt electrons precipated by the controlled injection of VLF signals from a ground-based transmitter, *Geophys. Res. Lett. 10*, 361 and 615, 1983.

Jackson, J. E., Comparisons between topside and ground-based soundings, *Proc. IEEE 57*, 976-985, 1969.

Jackson, J. E. , *The P(f) to N(h) Inversion Problem in Ionospheric Soundings*, Goddard Space Flight Center Report X-625-71-186, Greenbelt, Maryland, 1971.

Jackson, J. E., *Alouette-ISIS Program Summary*, National Space Science Data Center, NSSDC/WDC-A-R&S 86-09, Greenbelt, Maryland, 1986.

Jackson, J. E., *Calibration and Identification of Alouette and ISIS Topside Ionograms*, National Space Science Data Center Data Users'

Note, NSSDC/WDC-A-R&S 88-06, Greenbelt, Maryland, 1988.

Jackson, J. E., *Results from Alouette 1, Explorer 20, Alouette 2, and Explorer 31*, National Space Science Data Center, NSSDC/WDC-A-R&S 88-10, Greenbelt, Maryland, 1988.

Jackson, J. E., E. R. Schmerling, and J. H. Whittaker, Mini-review on topside sounding, *IEEE Trans. Antennas Propag. AP-28*, 284-288, 1980.

Jones, W. B., and R. M. Gallet, The representation of diurnal and geographic variations of ionospheric data by numerical methods, *Telecomm. J. 29*, 129, 1962, and *32*, 18, 1965.

Jones, W. B., and D. L. Obitts, *Global representation of annual and solar cycle variation of foF2 monthly median 1954-1958*, National Technical Information Service, OT/ITS Research Report 3, COM 75-11/43/AS, Springfield, Virginia, 1970.

Kazimirovsky, E. S., E. I. Zhovty, and M. A. Chernigovskaya, Modelling of ionospheric drifts in view of IRI, *Adv. Space Res. 5* (7), 95-96, 1985.

Kelley, M. C., et al., The Condor equatorial spread F campaign: Overview and results of the large-scale measurements, *J. Geophys. Res. 91*, 5487-5503, 1986.

Killeen, T. L., D. G. Torr, B. A. Tinsley, and R. A. Behnke, CEDAR: An aeronomy initiative, *Eos Transactions, AGU 68* (2), 19, Jan. 13, 1987.

Köhnlein, W., Electron density models of the ionosphere, *Rev. Geophys. 16*, 341-354, 1978.

Köhnlein, W., A model of the electron and ion temperatures in the ionosphere, *Planet. Space Sci. 34*, 609-630, 1986.

Korösmezey, A., T. E. Cravens, T. I. Gambosi, A. F. Nagy, D. A. Mendis, K. Szegö, B. E. Gribov, R. Z. Sagdeev, V. D. Shapiro, and V. I. Shevdenko, A new model of cometary ionospheres, *J. Geophys. Res. 92*, 7331-7340, 1987.

Lloyd, J. L., G. W. Haydon, D. L. Lucas, and L. R. Teters, *Estimating the Performance of Telecommunication Systems Using the Ionospheric Transmission Channel*, National Telecommunication and Information Administration, Boulder, Colorado, 1978.

Maeda, K., E region electron density profiles, *Space Research XII*, 1229-1240, Akademie-Verlag, Berlin, 1972.

Mathews, J. D., The incoherent scatter radar as a tool for studying the ionospheric D-region, *J. Atmos. Terr. Phys. 46*, 975-986, 1984.

Matuura, N., M. Kotaki, S. Miyazaki, E. Sagawa, and I. Iwamoto, ISS-b experimental results on global distribution of ionospheric parameters and thunderstorm activity, *Acta Astronautica 8*, 527-548, 1981.

McClure, J. P., et al., Comparison of Te and Ti from OGO 6 and from various incoherent scatter radars, *J. Geophys. Res. 78*, 197-205, 1973.

McCoy, R. P., et al., The remote atmospheric and ionospheric detection system, Society of Photo-Optical Instrumentation Engineers, SPIE 687, *Ultraviolet Technology*, 142, 1986.

McNamara, L. F., *A Collection of Computer-Accessible Experimental Profiles of the D and Lower E Regions*, World Data Center A for Solar-Terrestrial Physics, Report UAG-67, Boulder, Colorado, 1978a.

McNamara, L. F., *A Comparative Study of Methods of Electron Density Profile Analysis*, World Data Center A for Solar-Terrestrial Physics, Report UAG-68, Boulder, 1978b.

McPherson, P. H., F-Region temperatures measured simultaneously by satellite and incoherent scatter radar, *J. Atmos. Terr. Phys. 39*, 1459-1464, 1977.

Mechtley, E. A., S. A. Bowhill, and L. G. Smith, Changes of lower ionosphere electron concentrations with solar activity, *J. Atmos. Terr. Phys. 34*, 1899-1907, 1972.

Mullen, J. P., E. MacKenzie, Sa. Basu, and H. Whitney, UHF/GHz scintillation observed at

Ascension Island, from 1980 through 1982, *Radio Science 20*, 357-365, 1985.

Ossakow, S. L., Spread-F theories—A review, *J. Atmos. Terr. Phys. 43*, 437-452, 1981.

Ossakow, S. L., W. Burke, H. C. Carlson, P. Gary, R. Heelis, M. Keskinen, N. Maynard, C. Meng, and E. Szuszczewicz, High latitude ionospheric structure, in *Solar Terrestrial Physics Present and Future*, NASA Reference Publication 11200, Washington, DC, 1984.

Oyama, K. I., and K. Schlegel, Observation of electron temperature anisotropy in the ionosphere—A review, *Annales Geophysicae 6* (4), 389-400, 1988.

Perrant, S., A. Brekke, M. Baron, and D. Hubert, EISCAT measurements of ion temperatures which indicate non-isotropic ion velocity distributions, *J. Atmos. Terr. Phys. 46*, 531-543, 1984.

Perrant, S., N. Bjorna, A. Brekke, M. Baron, W. Kofman, C. Lathuilliere, and G. Lejeune, Experimental evidence of non-isotropic temperature distribution of ions observed by EISCAT in the auroral F-region, *Geophys. Res. Lett. 11*, 519-522, 1984.

Piggott, W. R., and K. Rawer, *URSI Handbook of Ionogram Interpretation and Reduction*, World Data Center A for Solar-Terrestrial Physics, Report UAG-23, Boulder, Colorado, 1972.

Quegan, S., G. J. Bailey, R. J. Moffett, R. A. Heelis, T. J. Fuller-Rowell, D. Rees, and R. W. Spiro, A theoretical study of the distribution of ionization in the high-latitude ionosphere and the plasmasphere: First results on the mid-latitude trough and light-ion trough, *J. Atmos. Terr. Phys. 44*, 719-640, 1982.

Ramanamurty, Y. V., Input from station-oriented observations and its assimilation into the new formula for the International Reference Lower Ionosphere, *Adv. Space Res. 5* (10), 79-88, 1985.

Rasmussen, C. E., J. J. Sojka, R. W. Schunk, V. B. Wickwar, O. de la Beaujardiere, J. Foster, and J. Holt, Comparison of simultaneous Chatanika and Millstone Hill temperature measurements with ionospheric model predictions, *J. Geophys. Res. 93*, 1922-1932, 1988.

Rawer, K., Ionosphere: Drift measurements, *Ann. IQSY 1*, 119-125, 1968.

Rawer, K. (ed.), *Methods of Measurements and Results of Lower Ionosphere Structure*, Akademie-Verlag, Berlin, 1974.

Rawer, K. (ed.), *Manual of Ionospheric Absorption Measurements*, World Data Center A for Solar-Terrestrial Physics, Report UAG-57, Boulder, Colorado, 1976.

Rawer, K., Modelling of Neutral and Ionized Atmospheres, in *Encyclopedia of Physics, 49/7*, Springer-Verlag, Berlin, 1984.

Rawer, K., and K. Suchy, Radio Observations of the Ionosphere, in *Encyclopedia of Physics 49/2*, S. Fluegge (ed.), Springer-Verlag, Berlin, 1967.

Rees, D., T. J. Fuller-Rowell, S. Quegan, R. J. Moffett, and G. J. Bailey, Thermospheric dynamics: Understanding the unusual disturbances by means of simulations with a fully-coupled global thermosphere/high-latitude ionosphere model, *Annales Geophysicae 5A*, 303-328, 1987.

Reiff, P. H., and J. L. Burch, IMF By-dependent plasma flow and Birkeland currents in the dayside magnetosphere: 2, A global model for northward and southward IMF, *J. Geophys. Res. 90*, 1595-1609, 1985.

Reinisch, B. W., New techniques in ionospheric sounding, *Radio Science 21*, 331-341, 1986.

Rich, F. J., and M. Smiddy, *Plasma Densities and Irregularities at 830 km Altitude Based on Observations During 1979*, Air Force Geophysical Laboratory, Report AFGL-TR-86-0121, Hanscom AFB, Massachusetts, 1986.

Richards, P. G., and D. G. Torr, An investigation of the consistency of the ionospheric measurements of the photoelectron flux and solar EUV flux, *J. Geophys. Res. 89*, 5625-5635, 1984.

Richards, P. G., D. G. Torr, and W. A. Abdou, Effects of vibrational enhancement of N2 on the

cooling rate of ionospheric thermal electrons, *J. Geophys. Res. 9*, 304-310, 1986.

Richmond, A. D., Ionospheric wind dynamo theory—A review, *J. Geomag. Geoelectr. 31*, 287-310, 1979.

Richmond, A. D., M. B. Blanc, A. Emery, R. H. Wand, B. G. Fejer, R. I. Woodman, S. Ganguly, P. Amayenc, R. A. Behnke, C. Calderon, and J. V. Evans, An empirical model of quiet-day ionospheric electric fields at middle and low latitudes, *J. Geophys. Res. 85*, 4658-4664, 1980.

Roble, R. G., T. L. Killeen, N. W. Spencer, R. A. Heelis, P. H. Reiff, and J. D. Winningham, Thermospheric dynamics during November 21-22, 1981: Dynamics Explorer measurements and thermospheric general circulation model predictions, *J. Geophys. Res. 93*, 209-225, 1988.

Rush, C. M., Ionospheric radio propagation models and predictions—A mini-review, *IEEE Transactions on Antennas and Propagation AP-34*, 1163-1169, 1986.

Rush, C. M., M. Pokempner, D. N. Anderson, F. G. Stewart, and J. Perry, Improving ionospheric maps using theoretically derived values of *f*oF2, *Radio Science 18*, 95-107, 1983.

Rush, C. M., M. Pokempner, D. N. Anderson, J. Perry, F. G. Stewart, and R. Reasoner, Maps of *f*oF2 derived from observations and theoretical data, *Radio Science 19*, 1083-1097, 1984.

Sawyer, D. M., and J. I. Vette, AP-8 trapped proton environment for solar maximum and solar minimum, *NSSDC/WDC-A-R&S Report 76-06*, Greenbelt, Maryland, 1976.

Scarf, F. L., K. F. Jordan, C. T. Russell, Distribution of Whistler mode bursts on Venus, *J. Geophys Res.*, 1988.

Schunk, R. W., Mathematical structure of transport equations for multispecies flows, *Rev. Geophys. 15*, 427-445, 1977.

Schunk, R. W., The terrestrial ionosphere, in *Solar-Terrestrial Physics*, R. L. Carovillano and J. M. Forbes (eds.), D. Reidel Publishing Company, Boston, 1983.

Schunk, R. W., and J. C. G. Walker, The theory of charged particle temperatures in the upper atmosphere, in *High Temperature Physics and Chemistry*, C. A. Rouse (ed.), Pergamon Press, New York, 1973.

Schunk, R. W., and A. F. Nagy, Electron temperatures in the F region of the ionosphere: Theory and observation, *Rev. Geophys. 16*, 355-399, 1978.

Schunk, R. W., and A. F. Nagy, Ionospheres of the terrestrial planets, *Rev. Geophys. 18*, 813-852, 1980.

Schunk, R. W., J. J. Sojka, and M. D. Bowline, Theoretical study of the electron temperature in the high-latitude ionosphere for solar maximum and winter conditions, *J. Geophys. Res. 91*, 12041-12054, 1986.

Schunk, R. W., and J. J. Sojka, Ionospheric climate and weather modeling, *Eos Transactions, AGU 69* (11), 153, March 15, 1988.

Schunk, R. W., and E. P. Szuszczewicz, First principal and empirical modelling of the global-scale ionosphere, *Annales Geophysicae 6*, 19-30, 1988.

Serafimov, K. B., M. K. Seragimova, Y. V. Ramanamurty, and K. Rawer, A note on the use of absorption measurements for improving the IRI electron density distribution in the lower ionosphere, *Adv. Space Res. 5* (10), 99-102, 1985.

Shawhan, S. D., and G. B. Murphy, *Plasma Diagnostics Package Assessment of the STS-3 Orbiter Environment and Systems for Science*, American Institute of Aeronautics and Astronautics, AIAA-83-0253, New York, 1983, and *J. Spacecraft Rockets 21*, 387, 1984.

Shea, M. A., S. A. Militello, H. E. Coffey, and J. H. Allen, *Directory of Solar-Terrestrial Physics Monitoring Stations*, Air Force Geophysics Laboratory and World Data Center A for Solar-Terrestrial Physics, AFGL-TR-84-0237, Special Report No. 239, Hanscom AFB, Bedford, Massachusetts, 1984.

Siscoe, G. L., Quantitative modeling of magnetosphere-ionosphere coupling processes—A

symposium review, *J. Geomag. Geoelectr. 40*, 367-386, 1988.

Smilauer, J., and V. V. Afonin, An experimental and empirical model of electron temperature for altitudes of 500 to 1000 km and for a high solar activity period, *Adv. Space Res. 5* (7), 69-72, 1985.

Smith, D. H., The comparison of electron density profiles obtained from backscatter observations and ionogram analysis, *Radio Science 5*, 685-692, 1970.

Sojka, J. J., C. E. Rasmussen, and R. W. Schunk, An interplanetary magnetic field dependent model of the ionospheric convection electric field, *J. Geophys. Res. 91*, 11281-11290, 1986.

Sojka, J. J., and R. W. Schunk, A model study of how electric field structures affect the polar cap F region, *J. Geophys. Res. 93*, 884-896, 1988.

Spenner, K., and K. Rawer, F-region temperatures by AEROS-A satellite compared with incoherent scatter data, *J. Atmos. Terr. Phys. 40*, 969, 1978.

Spenner, K., and R. Plugge, Empirical model of global electron temperature distribution between 300 and 700 km based on data from AEROS-A, *J. Geophys. 46*, 43-56, 1979.

Spenner, K., H. Wolf, K. Hirao, and P. Lämmerzahl, Intercomparison of F-region electron temperatures measured by the satellites AEROS-B and TAIYO, *J. Geomag. Geoelectr. 31*, 521-529, 1979.

Spiro, R. W., P. F. Reiff, and L. J. Maher, Precipitating electron energy flux and auroral zone conductances: An empirical model, *J. Geophys. Res. 87*, 8215-8227, 1982.

Strobel, D. F., The ionospheres of the major planets, *Rev. Geophys. 17*, 1913-1922, 1979.

Subbaraya, B. H., S. Parkash, and S. P. Gupta, *Electron Densities in the Equatorial Lower Ionosphere From the Langmuir Probe Experiment Conducted at Thumba During the Years 1966-1978*, Scientific Report, ISRO-PRL-SR-15-83, Bangalore, India, 1983.

Szuszczewicz, E. P., Theoretical and experimental aspects of ionospheric structure: A global perspective on dynamics and irregularities, *Radio Science 21*, 351-362, 1986.

Tarcsai, G., P. Szemerédy, and L. Hegymegi, Average electron density profiles in the plasmasphere between L = 1.4 and 3.2 deduced from whistlers, *J. Atmos. Terr. Phys. 50*, 607-611, 1988.

Tascione, T. F., H. W. Kroehl, R. Creiger, J. W. Freeman, R. A. Wolf, R. W. Spiro, R. V. Hilmer, J. W. Shade, and B. A. Hausman, New ionospheric and magnetospheric specification models, *Radio Science 23*, 211-222, 1988.

Teague, M. J., N. J. Schofield, K. W. Chan, and J. I. Vette, *A Study of Inner Zone Electron Data and Their Comparison with Trapped Radiation Models*, National Space Science Data Center, NSSDC/WDC-A-R&S 79-06, Greenbelt, Maryland, 1979.

Theis, R. F., L. H. Brace, R. C. Elphic, and H. G. Mayr, New empirical models of the electron temperature and density in the Venus ionosphere with application to transterminator flow, *J. Geophys. Res. 89*, 1477-1488, 1984.

Titheridge, J. E., *Ionogram Analysis with the Generalized Program POLAN*, World Data Center A for Solar-Terrestrial Physics, UAG-93, Boulder, Colorado, 1985.

Titheridge, J. E., Numerical errors in the real-height analysis of ionograms at high latitudes, *Radio Science 22*, 715-727, 1987.

Tsyganenko, N. A., Global quantitative models of the geomagnetic field in the cislunar magnetosphere for different disturbance levels, *Planet. Space Sci. 35*, 1347-1358, 1987.

Volland, H., A semi-empirical model of the large-scale magnetospheric electric fields, *J. Geophys. Res. 78*, 171-180, 1973.

Volland, H., A model of the magnetospheric electric convection field, *J. Geophys. Res. 83*, 2695-2699, 1978.

Wakai, N., and N. Matuura, Operation and experimental results of the Ionosphere Sounding Satellite-b, *Acta Astronautica 7*, 999-1020, 1980.

Walker, A. D. M., R. A. Greenwald, and K. B. Baker, Determination of the fluctuation level of ionospheric irregularities from radar backscatter measurement, *Radio Science 22*, 689-705, 1987.

Wallis, D. D., and E. E. Budzinski, Empirical models of height-integrated conductivities, *J. Geophys. Res. 86*, 125-137, 1981.

Wescott, E. M., H. C. Stenback-Nielsen, T. Halliman, H. Foeppl, and A. Valenzuela, Star of Condor: A strontium critical velocity experiment, Peru, 1983, *J. Geophys Res. 91*, 9933-9938, 1986.

Wescott, E. M., H. C. Stenback-Nielsen, T. Halliman, H. Foeppl, and A. Valenzuela, Star of Lima: Overview and optical diagnostics of a barium Alfvén critical velocity experiment, *J. Geophys. Res. 91*, 9923-9931, 1986.

Whalen, J. A., A quantitative description of the spatial distribution and dynamics of the energy flux in the continuous aurora, *J. Geophys. Res. 88*, 7155-7169, 1983.

Wright, J. W., and A. K. Paul, Electron density profiles from ionograms: Comparisons with rocket profiles, in: *Methods of Measurements and Results of Lower Ionosphere Structure*, K. Rawer (ed.), 39-50, Akademie-Verlag, Berlin, 1974.

Young, E. R., D. G. Torr, P. Richards, and A. F. Nagy, A computer simulation of the midlatitude plasmasphere and ionosphere, *Planet. Space Sci. 28*, 881-893, 1980.

Chapter 7

Bibliography

General Introduction

1. Rishbeth, H., and O. K. Garriott, *Introduction to Ionospheric Physics*, Academic Press, New York, 1969.

2. Ratcliffe, J. A., *An Introduction to the Ionosphere and Magnetosphere*, Cambridge University Press, 1972.

3. Banks, P. M., and G. Kockarts, *Aeronomy*, parts A and B, Academic Press, New York, 1973.

4. Bauer, S., *Physics of Planetary Ionospheres*, Springer-Verlag, Berlin, 1973.

5. Atreya, S. K., *Atmospheres and Ionospheres of the Outer Planets and Their Satellites*, Springer-Verlag, Berlin, 1986.

6. Chamberlain, J. W., and D. M. Hunten, *Theory of Planetary Atmospheres: An Introduction to their Physics and Chemistry*, second edition, International Geophysics Series, Volume 35, Academic Press, New York, 1987.

Radio Wave Propagation

7. Davies, K., *Ionospheric Radio Propagation*, Dover Publications Inc., New York, 1966.

8. Aarons, J. (ed.), Ionospheric Radio Wave Propagation, Chapter 10, 1983 Revision, *Handbook of Geophysics and Space Environments*, Air Force Geophysics Laboratory, AFGL-TR-84-0141, Environmental Research Paper No. 879, Hanscom AFB, Massachusetts, 1984.

9. Budden, K. G., *The Propagation of Radio Waves*, Cambridge University Press, 1985.

10. Soicher, H. (ed.), Propagation Effects on Military Systems in the High Latitude Region, *NATO-AGARD Conference Proceedings*, No. 382, NTIS, Springfield, Virginia, 1985.

11. Flock, W. L., *Propagation Effects on Satellite Systems at Frequencies Below 10 GHz, A Handbook for Satellite Systems Design*, second edition, NASA Reference Publication 1108 (02), Washington, DC, 1987.

12. Goodman, J. M. (ed.), Proceedings of Ionospheric Effects Symposium: Effect of the Ionosphere on Radiowave Systems, 1981; Effect of the Ionosphere on C^3I Systems, 1984; The Effect of the Ionosphere on Communication, Navigation, and Surveillance Systems, 1988; NTIS, Springfield, Virginia. Selected papers from the 1984 symposium may be found in the May/June 1985 issue of *Radio Science*

and selected papers from the 1987 symposium may be found in the May/June 1988 issue of *Radio Science.*

Solar-Terrestrial Physics

13. Akasofu, S. I., and S. Chapman, *Solar-Terrestrial Physics*, Clarendon Press, Oxford, 1972.

14. Donnelly, R. F. (ed.), Solar-Terrestrial Predictions Proceedings, Volume 1: *Predictions Group Reports*, Volume 2: *Working Group Reports and Reviews*, Volume 3: *Solar Activity Predictions*, Volume 4: *Prediction of Terrestrial Effects of Solar Activity*, U. S. Government Printing Office, Washington, DC, 1979. (Summary of results concerning ionospheric prediction by Davies, 1981.)

15. The Physical Basis of the Ionosphere in the Solar-Terrestrial System, *NATO-AGARD Conference Proceedings*, No. 295, 1980.

16. Carovillano, R. L., and J. M. Forbes (eds.), *Solar-Terrestrial Physics: Principles and Theoretical Foundations*, D. Reidel Publishing Company, Dordrecht, 1983.

17. Butler, D. M., and K. Papadopoulos (eds.), *Solar Terrestrial Physics: Present and Future*, NASA Reference Publication 1120, 1984.

18. Simon, P., A. G. Heckman, and M. A. Shea (eds.), Solar-Terrestrial Predictions, *Proceedings NOAA/AFGL*, Meudon, 1984.

19. Kamide, Y., and J. A. Slavin (eds.), *Solar Wind-Magnetosphere Coupling*, Terra Scientific Publishing Co., Tokyo, 1986.

20. Hultqvist, B., D. Rees, and U. von Zahn, (eds.), Solar-Terrestrial Physics 1986, *Proceedings of the SCOSTEP Sixth International Solar-Terrestrial Physics Symposium, Physica Scripta*, T18, Alden Press, Oxford, 1987.

Special Topics Related to Ionospheric Physics

21. Helliwell, R. A., *Whistlers and Related Ionosphere Phenomena*, Stanford University Press, 1965.

22. Gurevich, A. V., *Nonlinear Phenomena in the Ionosphere*, Springer-Verlag, Berlin, 1978.

23. Eather, R. H., *Majestic Lights: The Aurora in Science, History, and the Arts*, AGU, Washington, DC, 1980.

24. Hultqvist, B., and T. Hagfors (ed.), *High-Latitude Space Plasma Physics*, Plenum Press, New York, 1983.

25. Merill, R. T., and M. S. McElhinny, *The Earth's Magnetic Field*, Academic Press, New York, 1983.

26. Potemra, T. A. (ed.), *Magnetospheric Currents*, AGU, Washington, DC, 1984.

27. Bittencourt, J. A., *Fundamentals of Plasma Physics*, Pergamon Press, New York, 1986.

28. Chang, T. (ed.), *Ion Acceleration in the Magnetosphere and Ionosphere*, AGU, Washington, DC, 1986.

29. Moore, T. E., and J. H. Waite (eds.), *Modeling Magnetospheric Plasma*, Geophysical Monograph Series, Volume 44, AGU, Washington, DC, 1988.

Encyclopedia of Physics

Geophysics III, S. Flügge (ed.), Springer-Verlag, Berlin.

30. Volume 49/1: Akasofu, S-I., S. Chapman, and A. B. Meinel, *The Aurora.*

31. Volume 49/2: Rawer, K., and K. Suchy, *Radio Observations of the Ionosphere*, 1967.

32. Volume 49/3: *Morphology and Observations of the Earth's Magnetic Field* (8 contributions).

33. Volume 49/4: Poeverlein, H., *The Earth's Magnetosphere;* Hess, W. N., *The Earth's Radiation Belt;* Ginzburg, V. L., and A. A. Ruhadze, *Waves and Resonances in Magneto-Active Plasma*, 1972.

34. Volume 49/5: Vassy, A. T. (French, The Nightglow); Alpert, J. L., *Wave-like Phenome-*

na in the Near Earth Plasma and Interactions with Man-Made Bodies; Gringauz, K. I., and T. K. Breus, *Some Characteristic Features of the Ionosphere of Near-Earth Planets,* 1976.

35. Volume 49/6: Thomas, L. *The Neutral and Ion Chemistry of the Upper Atmosphere;* Yonezawa, T., *Diffusion in the High Atmosphere;* Stubbe, P., *Interaction of Neutral and Plasma Motions in the Ionosphere,* 1982.

36. Volume 49/7: Schmidtke, G., *Modelling of the Solar Extreme Ultraviolet Irradiance for Aeronomic Applications;* Suchy, K., *Transport Coefficients and Collision Frequencies for Aeronomic Plasmas;* Rawer, K., *Modeling of Neutral and Ionized Atmospheres,* 1984.

Reviews of Progress

37. Lanzerotti, L. J., and C. G. Park (eds.), *Upper Atmosphere Research in Antarctica,* Antarctic Research Series, Volume 29, AGU, Washington, DC, 1978.

38. *U.S. National Report to the International Union of Geodesy and Geophysics* (IUGG). IUGG general assemblies are held every four years (last 1987); the report summaries activities between assemblies. The parts interesting for ionospheric physics can be found in *Reviews of Geophysics* (last: Vol. 25, No. 3, 1987; previously: Vol. 21, No. 2, 1983).

39. *Review of Radio Science.* Summarizes progress in radio science between general assemblies of URSI (every 3 years; last: 1987). Published by URSI.

Appendix A Satellites, Experiments, and Data Sets

Appendix A provides information about

- All satellites which carried ionospheric experiments
- All experiments flown on board these satellites (including non-ionospheric)
- All data sets collected by these experiments that are available from NSSDC

Appendix A contains three sections:

A.1 Alphabetic listing of satellite names together with the international identification number. This listing also includes alternate satellite names. The identification number helps to locate the specific satellite within the main listing (A.2).

A.2 Chronological listing of satellites, experiments, and data sets.

A.3 Discipline oriented listing of software packages available from NSSDC and NGDC.

Appendix A.1

Alphabetical

NSSDC ID International identification number XX-YYYZ-UUW

XX	=		Year when satellite was launched
YYY	=	001	For first satellite launched
	=	002	For second satellite launched, and so on
Z	=	A, B, . .	Distinguishes satellites launched simultaneously by the same launch vehicle
UU	=	01, 02, . .	Experiment number
W	=	A, B, . .	Data set letter

IONOSPHERIC PHYSICS LISTING BY SPACECRAFT NAME

SATELLITE NAME	NSSDC ID
1958 BETA 2	58-002B
1958 DELTA 2	58-004B
1959 DELTA 1	59-004A
1959 IOTA 1	59-009A
1960 ETA 1	60-007A
1960 XI 1	60-014A
1961 ALPHA EPSILON 1	61-029A
1961 ALPHA GAMMA 1	61-027A
1961 ALPHA KAPPA 1	61-034A
1961 ETA 1	61-007A
1961 OMICRON 1	61-015A
1961 SIGMA 1	61-018A
1962 ALPHA BETA 1	62-026A
1962 ALPHA CHI 1	62-046A
1962 ALPHA CHI 1/ERS 2	62-046A
1962 ALPHA ETA 1	62-031A
1962 ALPHA GAMMA 1	62-027A
1962 ALPHA KAPPA 1	62-034A
1962 BETA ALPHA 1	62-049A
1962 BETA KAPPA	62-058A
1962 BETA RHO 1	62-065A
1962 BETA TAU 2	62-067B
1962 CHI 1	62-022A
1962 LAMBDA 1	62-011A
1962 OMICRON 1	62-015A
1962 PHI 1	62-021A
1962 PI 1	62-016A
1964-045A	64-045A
1965-027E	65-027E
1F1	65-028A
625-A2	72-100A
A 27	64-047A
A 52	63-024A
ABLE 3	59-004A
AE 5	75-107A
AE-A	63-009A
AE-B	66-044A
AE-C	73-101A
AE-D	75-096A
AE-E	75-107A
AEROS	72-100A
AEROS 2	74-055A
AEROS-B	74-055A
AIMP 1	66-058A
ALOUETTE 1	62-049A
ALOUETTE 2	65-098A
ALOUETTE-A	62-049A
ALOUETTE-B	65-098A
ANCHORED IMP 1	66-058A
ARIABAT	75-033A
ARIEL 1	62-015A
ARIEL 3	67-042A
ARIEL 4	71-109A
ARSP 68 1	68 059A
ARYABHATA	75-033A
ASTRO-A	81-017A
ASTRONOMICAL SATELLITE-A	81-017A
ATCOS 2	67-120A
ATMOSPHERE EXPLORER-A	63-009A
ATMOSPHERE EXPLORER-B	66-044A
ATMOSPHERE EXPLORER-C	73-101A
ATMOSPHERE EXPLORER-D	75-096A
ATMOSPHERE EXPLORER-E	75-107A
ATS 1	66-110A
ATS 2	67-031A
ATS 3	67-111A
ATS 5	69-069A
ATS 6	74-039A
ATS-A	67-031A
ATS-B	66-110A
ATS-C	67-111A
ATS-E	69-069A
ATS-F	74-039A
AURORAE	68-084A
BE-B	64-064A
BE-C	65-032A
BOREALIS	69-083A
BOREAS	69-083A
COSMOS 184	67-102A
COSMOS 320	70-005A
COSMOS 378	70-097A
COSMOS 381	70-102A
COSMOS 900	77-023A
DAPP(73-054A)	73-054A
DAPP(75-043A)	75-043A
DE 1	81-070A
DE 2	81-070B
DE-A	81-070A
DE-B	81-070B
DENPA	72-064A
DG7-2	68-081A
DIAL/WIKA	70-017A
DIAMANT-B NO 1	70-017A
DISCOVERER 32	61-027A
DISCOVERER 34	61-029A
DISCOVERER 36	61-034A
DME-A	65-098B
DMSP 7529	73-054A
DMSP 10533	75-043A
DMSP 13536	77-044A
DMSP 15539	79-050A
DMSP 5B/F4	73-054A

IONOSPHERIC PHYSICS LISTING BY SPACECRAFT NAME

SATELLITE NAME	NSSDC ID
DMSP 5C/F2	75-043A
DMSP 5D-1/F2	77-044A
DMSP 5D-1/F4	79-050A
DMSP BLOCK 5B	73-054A
DMSP BLOCK 5C	75-043A
DMSP BLOCK 5D-1	77-044A
DMSP BLOCK 5D-1	79-050A
DMSP-F2	77-044A
DMSP-F4	79-050A
DMSP5D1	77-044A
DMSP5D1	79-050A
DSAP(73-054A)	73-054A
DSAP(75-043A)	75-043A
DYNAMICS EXPLORER 1	81-070A
DYNAMICS EXPLORER 2	81-070B
DYNAMICS EXPLORER-A	81-070A
DYNAMICS EXPLORER-B	81-070B
EARLY BIRD	65-028A
EGO 5	68-014A
ELECTRON 1	64-006A
ELECTRON 2	64-006B
ENGINEERING TEST SAT. 3	82-087A
ENGINEERING TEST SAT.-1	75-082A
ENGINEERING TEST SAT.-2	77-014A
EOGO 1	64-054A
EOGO 3	66-049A
EOGO 5	68-014A
ESRO 1A	68-084A
ESRO 1B	69-083A
ESRO 4	72-092A
ETS	75-082A
ETS 1	75-082A
ETS 2	77-014A
ETS 3	82-087A
ETS 4	81-012A
EXOS A	78-014A
EXOS-B	78-087A
EXOS-C	84-015A
EXOSPHERIC SAT. A	78-014A
EXOSPHERIC SAT. C	84-015A
EXPLORER 6	59-004A
EXPLORER 7	59-009A
EXPLORER 8	60-014A
EXPLORER 17	63-009A
EXPLORER 20	64-051A
EXPLORER 22	64-064A
EXPLORER 25	64-076B
EXPLORER 27	65-032A
EXPLORER 31	65-098B
EXPLORER 32	66-044A
EXPLORER 33	66-058A
EXPLORER 38	68-055A
EXPLORER 40	68-066B
EXPLORER 49	73-039A
EXPLORER 51	73-101A
EXPLORER 54	75-096A
EXPLORER 55	75-107A
FR 1	65-101A
FRANCE-1	65-101A
GEMINI 10	66-066A
GEMINI 11	66-081A
GEMINI 12	66-104A
GEOPHYSICAL RESEARCH SAT	63-026A
GRS-A2	72-100A
HILAT	83-063A
HINOTORI	81-017A
I1F1	65-028A
IE-A	64-051A
IK BULGARIA 1300	81-075A
IK- 2	69-110A
IK- 3	70-057A
IK-14	75-115A
IMP-D	66-058A
INDIAN SCIENTIFIC SAT.	75-033A
INJUN 2B	62-067B
INJUN 3	62-067B
INJUN 4	64-076B
INJUN 5	68-066B
INJUN IE-C	68-066B
INJUN-C	68-066B
INTA SATELLITE	74-089C
INTASAT	74-089C
INTERCOSMOS 2	69-110A
INTERCOSMOS 3	70-057A
INTERCOSMOS 14	75-115A
INTERCOSMOS 19	79-020A
INTERCOSMOS BULGAR 1300	81-075A
IONO-IK	79-020A
IONOSONDE-IK	79-020A
IONOSP SOUNDING SAT 2	78-018A
ISIS 1	69-009A
ISIS 2	71-024A
ISIS-A	69-009A
ISIS-B	71-024A
ISIS-X	65-098A
ISIS-X	65-098B
ISS-2	78-018A
ISS-B	78-018A
JIKIKEN	78-087A
KIKU	75-082A
KIKU 2	77-014A
KIKU-4	82-087A

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SATELLITE NAME	NSSDC ID
KOSMOS 184	67-102A
KOSMOS 320	70-005A
KYOKKO	78-014A
LAMBDA 4S-5	70-011A
LOFTI 1	61-007A
MARINER 5	67-060A
MARINER VENUS 67	67-060A
MIDAS 3	61-018A
MS-F2	71-080A
MU-4S-3	71-080A
MU-4S-4	72-064A
NA I	61-027A
NA II	61-034A
NORA-ALICE 1	61-027A
NORA-ALICE 2	61-034A
OGO 1	64-054A
OGO 2	65-081A
OGO 3	66-049A
OGO 4	67-073A
OGO 5	68-014A
OGO 6	69-051A
OGO-A	64-054A
OGO-B	66-049A
OGO-C	65-081A
OGO-D	67-073A
OGO-E	68-014A
OGO-F	69-051A
OHSUMI	70-011A
OHZORA	84-015A
ORBIS 2	64-075A
ORBIS CAL II	69-025D
ORBIS LOW	64-075A
OSS-1/STS-3	82-022A
OV1-14	68-026B
OV1-15	68-059A
OV1-17	69-025A
OV1-17A	69-025D
OV1-18	69-025B
OV1-20	71-067A
OV2-5	68-081A
OV3-1	66-034A
OV3-2	66-097A
OV3-6	67-120A
OV4-3	66-099A
OV5-9	69-046C
OVAL	77-023A
P78-1	79-017A
P78-2	79-007A
P83-1	83-063A
PIONEER 6	65-105A
PIONEER 7	66-075A
PIONEER 8	67-123A
PIONEER 9	68-100A
PIONEER 11	73-019A
PIONEER VENUS 1	78-051A
PIONEER VENUS 1978	78-078A
PIONEER VENUS 1978 ORBIT	78-051A
PIONEER VENUS 2	78-078A
PIONEER VENUS ORBITER	78-051A
PIONEER-A	65-105A
PIONEER-B	66-075A
PIONEER-C	67-123A
PIONEER-D	68-100A
PIONEER-E	73-019A
POGO 1	65-081A
POGO 2	67-073A
POGO 3	69-051A
POLAR BEAR	86-088A
PROGNOZ 4	75-122A
R68-3	69-046C
RADIO ASTRONOMY EXPLORER	68-055A
RADIO ASTRONOMY EXPLORER	73-039A
RAE 1	68-055A
RAE-A	68-055A
RAE-B	73-039A
REX	72-064A
REXS	72-064A
S 1A	59-009A
S 6	63-009A
S 6A	66-044A
S 6C	73-101A
S 6D	75-096A
S 6E	75-107A
S 27	62-049A
S 27A	62-049A
S 27B	65-098A
S 30	60-014A
S 30A	65-098B
S 48	64-051A
S 49	64-054A
S 49A	66-049A
S 50	65-081A
S 50A	67-073A
S 51	62-015A
S 53	67-042A
S 59	68-014A
S 60	69-051A
S 66B	64-064A
S 66C	65-032A
S3-1	74-085C
S3-2	75-114B
S3-3	76-065B

IONOSPHERIC PHYSICS LISTING BY SPACECRAFT NAME

SATELLITE NAME	NSSDC ID
S74-2	76-065B
S81-1	82-041A
SAN MARCO 1	64-084A
SAN MARCO 2	67-038A
SAN MARCO-A	64-084A
SAN MARCO-B	67-038A
SCATHA	79-007A
SESP 70-2A	71-067A
SESP P73-5	74-085C
SESP P78-2A	79-007A
SESP S73-6	75-114B
SESP S74-2A	76-065B
SHINSEI	71-080A
SHUTTLE OFT-3	82-022A
SOLWIND	79-017A
SPACE TEST PROGRAM P78-1	79-017A
SPACE TRANSPORT SYS-3	82-022A
SPACE TRANSPORT SYS-9	83-116A
SPACELAB 1	83-116A
SPACELAB 1/STS 9	83-116A
SPADES 1968-059A	68-059A
SPUTNIK 3	58-004B
SRATS	75-014A
SS74-2A	76-065B
STARAD	62-058A
STARFISH	62-058A
STP P78-1	79-017A
STP P78-2	79-007A
STP P83-1	83-063A
STP S81-1	82-041A
STS 3/OSS-1	82-022A
STS 9/SPACELAB 1	83-116A
SYNCOM 3	64-047A
TAIYO	75-014A
TIROS 7	63-024A
TIROS-G	63-024A
TOPSI	64-051A
TRANSIT 2A	60-007A
TRANSIT 3B	61-007A
TRANSIT 4A	61-015A
TRS 1	62-046A
TRS 1(A)	62-046A
UK 3	67-042A
UK 4	71-109A
UK-E	67-042A
UK1	62-015A
UME 2	78-018A
UOSAT 2	84-021B
VANGUARD 1	58-002B
VANGUARD TV4	58-002B
VENUS-67	67-060A
VIKING	86-019B
VIKING 1 ORBITER	75-075A
VIKING 2 ORBITER	75 083A
VIKING SWEDEN	86 019B
VIKING-A ORBITER	75-083A
VIKING-B ORBITER	75-075A
VIKNG-A	75-083A
VIKNG-B	75-075A
WIKA	70-017A

Appendix A.2 Chronological

Satellites:

COUNTRY	The country primarily responsible for the satellite
LAUNCH DATE	Month/Day/Year when satellite was launched
INOP DATE	Month/Day/Year when satellite became inoperable
PERIAPSIS	Perigee in kilometers at mission beginning
APOAPSIS	Apogee in kilometers at mission beginning
INCLINATION	Satellite orbit inclination in degrees

Experiments:

PI	Principal investigator for a specific experiment/investigation
AGENCY	Affiliation of PI

Data Sets:

QUANTITY	Number of tapes, microfiche, rolls of microfilm. QUANTITY = 0 indicates that the data set is held at a different institution but can be made available through NSSDC.
TIME SPAN	Time span covered by the data set (MMDDYY)
NSSDC ID	International identification number XX-YYYZ-UUW

XX =		Year when satellite was launched
YYY =	001	For first satellite launched
=	002	For second satellite launched and so on
Z =	A,B,. .	Distinguishes satellites launched simultaneously by the same launch vehicle
UU =	01,02,. .	Experiment number
W =	A,B,. .	Data set letter

AIM FILE IONOSPHERIC PHYSICS LISTING

SATELLITE NAME / INVESTIGATION NAME / DATA SET NAME	ALTERNATE NAMES	COUNTRY	LAUNCH DATE	INOP DATE	PERIAPSIS	APOAPSIS	INCLINATION	PI / AGENCY	QUANTITY	TIME SPAN	NSSDC ID
VANGUARD 1	1958 BETA 2	UNTST	03/17/58		650.--	4010.--	34.25				58-002B
PREDICTED WORLD MAPS									21	031858 120963	58-002B-00A
REFINED WORLD MAPS									1	020562 040262	58-002B-00B
RADIO BEACON								UNKNOWN			58-002B-01
SATELLITE DRAG ATMOSPHERIC DENSITY											58-002B-02
ATMOSPHERIC DENSITY VALUES FROM SATELLITE DRAG MEASUREMENTS									6	051758 101061	58-002B-02A
SPUTNIK 3	1958 DELTA 2	USSRN	05/15/58		217.--	1864.--	65.18				58-004B
FLUXGATE MAGNETOMETER											58-004B-01
SCINTILLATOR DETECTOR ELECTRONS 10 KEV UP											58-004B-02
CR PROTONS, NAI SCINTILLATOR DETECTOR											58-004B-03
MAGNETIC PRESSURE GAGE											58-004B-04
IONIZATION PRESSURE GAGE											58-004B-05
SPHERICAL ION TRAPS											58-004B-06
GEN. ELECT. FIELD METER											58-004B-07
R. F. MASS SPECTROMETER											58-004B-08
CR HEAVY NUCLEI											58-004B-09
PRIMARY CR MONITOR											58-004B-10
MICROMETEORITE MICROPHONE											58-004B-11
BEACON											58-004B-12
TOTAL ELECTRON CONTENT DATA ON MICROFICHE									2	083058 122159	58-004B-12A
EXPLORER 6	ABLE 3	UNTST	08/07/59	10/06/59	237.000	41900.0	47.0				59-004A
MASTER ORBIT WORLD MAPS									1	080759 091159	59-004A-00C
EPHEMERIS, POSITION, VELOCITY AND B MODEL ON MAGNETIC TAPE									1	080759 080959	59-004A-00D
RAW MULTI-EXPT. DIGITAL TELEMETRY DATA LISTINGS AND EPHEMERIS DATA ON MICROFILM									3	080759 090459	59-004A-00E
MICROFILM PLOTS OF GEOMAGNETIC LATITUDE VS RANGE									1	080759 100759	59-004A-00F
POSITIONS IN MAGNETIC, GEOGRAPHIC, AND CARTESIAN COORDINATES ON MICROFILM									2	081759 101159	59-004A-00G
PROPORTIONAL COUNTER TELESCOPE								U OF CHICAGO			59-004A-01
SINGLE AND TRIPLE COINCIDENCE COUNT RATES VS TIME ON MICROFILM									1	080759 100659	59-004A-01A
TABLES OF TRIPLE COINCIDENCE COUNTS (TIME ORDERED) ON MICROFILM									1	080759 100259	59-004A-01B
SCINTILLATION COUNTER								U OF ARIZONA			59-004A-02
PUBLISHED PLOTS OF REDUCED COUNT RATE VS TIME ON MICROFILM									1	080859 091059	59-004A-02A
RAW MULTI-EXPT. DIGITAL TELEMETRY DATA LISTINGS AND EPHEMERIS DATA ON MICROFILM									3	080759 100259	59-004A-02B
SANBORN OSCILLOGRAMS OF RAW TELEMETRY CHANNEL DATA ON MICROFILM									29	080859 100359	59-004A-02C
SANBORN OSCILLOGRAMS OF RAW TELEMETRY CHANNEL DATA (FILTERED) ON MICROFILM									13	080859 092059	59-004A-02D
L-ORDERED AND L-INTERPOLATED COUNT RATES VS TIME, ON MAGNETIC TAPE									1	080859 090459	59-004A-02F
ION CHAMBER AND GM COUNTER								U OF MINNESOTA			59-004A-03
LISTING OF COUNTS AND PULSES ON MICROFILM									2	080759 100659	59-004A-03A
CALIBRATED DIGITAL GM TUBE AND ION CHAMBER COUNT RATE DATA ON MICROFILM									2	080759 100259	59-004A-03B
PLOTS OF ELECTRON COUNT RATES AND ION PULSE RATES ON MICROFILM									2	080759 100659	59-004A-03C
MERGED L-ORDERED COUNT RATES ON TAPE									1	080759 100659	59-004A-03D
SEARCH-COIL MAGNETOMETER								U OF ARIZONA			59-004A-04
PLOTS OF REDUCED MAGNETIC FIELD DATA ON MICROFILM									1	080859 091059	59-004A-04A
SANBORN OSCILLOGRAM PLOTS OF RAW TELEMETRY CHANNEL DATA ON MICROFILM									29	080859 100359	59-004A-04B
SANBORN OSCILLOGRAM PLOTS OF RAW TELEMETRY DATA (FILTERED) ON MICROFILM									13	080859 092059	59-004A-04C
RAW MULTI-EXPT. DIGITAL TELEMETRY DATA LISTINGS AND EPHEMERIS DATA ON MICROFILM									3	080759 100259	59-004A-04D
TV OPTICAL SCANNER								UTAH STATE U			59-004A-05
MICROMETEORITE								NASA-GSFC			59-004A-06
VLF RECEIVER (15.5 KHZ)								STANFORD U			59-004A-07
FLUXGATE MAGNETOMETER								U OF CALIF, LA			59-004A-08
BEACON (108 + 378 MHZ)								TRW SYSTEMS GROUP			59-004A-09
EXPLORER 7	1959 IOTA 1	UNTST	10/13/59	8/24/61	573.--	1073.--	50.27				59-009A
PREDICTED WORLD MAPS									2	091761 010862	59-009A-00A
REFINED WORLD MAPS									8	101359 091761	59-009A-00B
THERMAL RADIATION								U OF WISCONSIN			59-009A-01
SELECTED WHITE SENSOR TEMPERATURE (NIGHTTIME) VALUES ON TAPE									1	111559 052460	59-009A-01A
TEMPERATURE VALUES FROM ALL SENSORS ON TAPE									2	101959 060460	59-009A-01B
SOLAR X-RAY (2-8A) AND LYMAN-ALPHA (1030-1350A) RADIATION								US NAVAL RESEARCH LAB			59-009A-02
HEAVY PRIMARY COSMIC RAYS								U OF DELAWARE			59-009A-03
COUNTING RATES OF HEAVY PRIMARY COSMIC RAYS ON MAGNETIC TAPE									1	101359 053160	59-009A-03A
TRAPPED RADIATION AND SOLAR PROTONS								U OF IOWA			59-009A-04
COUNT RATE AND ORBITAL DATA ON MAGNETIC TAPE									14	101359 022861	59-009A-04A
MICROMETEORITE								NASA-GSFC			59-009A-05
GROUND BASED IONOSPHERIC								U OF ILLINOIS			59-009A-06
TRANSIT 2A	1960 ETA 1	UNTST	06/22/60		628.--	1047.--	66.69				60-007A
PREDICTED WORLD MAPS									1	040961 050461	60-007A-00A
REFINED WORLD MAPS									2	011161 041161	60-007A-00B
INFRARED SCANNER								UNKNOWN			60-007A-01
COSMIC NOISE RECIEVER								UNKNOWN			60-007A-02
TRANSIT 2A-IONOSPHERIC BEACON								UNKNOWN			60-007A-03
PLOTS OF ELECTRON CONTENT (AND DOPPLER SHIFT OFFSET) VS TIME NEAR STANFORD									3	072360 101360	60-007A-03A
EXPLORER 8	1960 XI 1	UNTST	11/03/60		417.--	2288.--	50.0				60-014A
REFINED WORLD MAPS									2	110360 122560	60-014A-00B
R F IMPEDANCE								NASA-GSFC			60-014A-01
ION TRAPS								NASA-GSFC			60-014A-02
LANGMUIR PROBE								NASA-GSFC			60-014A-03
MICROMETEORITE PHOTOMULTIPLIER								NASA-GSFC			60-014A-04
MICROMETEORITE MICROPHONE								NASA-GSFC			60-014A-05
ELECTRIC FIELD METER								NASA-GSFC			60-014A-06
SATELLITE DRAG ATMOSPHERIC DENSITY								SAO			60-014A-07
SATELLITE DRAG ATMOSPHERIC DENSITY VALUES									4	110760 032070	60-014A-07A
TRANSIT 3B	1961 ETA 1	UNTST	02/22/61		150.000	847.000	28.360				61-007A
REFINED WORLD MAPS									3	022261 040261	61-007A-00B
VLF RECEIVER (18 KHZ)								UNKNOWN			61-007A-01
TRANSIT 4A	1961 OMICRON 1	UNTST	06/29/61		881.--	998.--	66.81				61-015A
PREDICTED WORLD MAPS									2	123162 031963	61-015A-00A
REFINED WORLD MAPS									18	090361 122462	61-015A-00B

AIM FILE IONOSPHERIC PHYSICS LISTING

SATELLITE NAME / INVESTIGATION NAME / DATA SET NAME	ALTERNATE NAMES	COUNTRY	LAUNCH DATE	INOP DATE	PI	PERIAPSIS	APOAPSIS	INCLINATION	AGENCY / QUANTITY	TIME SPAN	NSSDC ID
					UNKNOWN				UNKNOWN		61-015A-01
					UNKNOWN				ATOMIC ENERGY COMM		61-015A-02
IONOSPHERIC BEACON					UNKNOWN				APPLIED PHYSICS LAB		61-015A-03
IONOSPHERIC TOTAL ELECT. CONTENT ON 35-MM FILM									1	091361 122461	61-015A-03A
TOTAL ELECTRON CONTENT AND SLAB THICKNESS NEAR BANGKOK DURING 1964									2	032564 121864	61-015A-03B
MIDAS 3	1961 SIGMA 1	UNTST	07/12/61	61	IMHOF	3358.00	3534.00	91.2	LOCKHEED PALO ALTO		61-018A
PLASMA SCINTILLATION COUNTER					IMHOF				LOCKHEED PALO ALTO		61-018A-01
COSMIC RAY MONITOR					SMART				USAF GEOPHYS LAB		61-018A-02
RETARDING POTENTIAL ANALYZER					HINTEREGGER				USAF GEOPHYS LAB		61-018A-03
SCANNING RADIOMETER					JURSA				USAF GEOPHYS LAB		61-018A-04
MICROMETEORITE DETECTOR					DELLA LUCCA				USAF GEOPHYS LAB		61-018A-05
DISCOVERER 32	1961 ALPHA GAMMA 1	UNTST	10/13/61								61-027A
COSMIC RADIATIONS(EMULSIONS AND METALS)					FILZ				USAF GEOPHYS LAB		61-027A-01
ELECTRON AND ION DENSITY (PLASMA PROBES)					SAGALYN				USAF GEOPHYS LAB		61-027A-02
RAPID BEACON					UNKNOWN				UNKNOWN		61-027A-03
					UNKNOWN				UNKNOWN		61-027A-04
DISCOVERER 34	1961 ALPHA EPSILON 1	UNTST	11/05/61								61-029A
COSMIC RADIATIONS (EMULSIONS AND METALS)					FILZ				USAF GEOPHYS LAB		61-029A-01
SPATIAL AND TEMPORAL ELECTRONS (DENSITY VARIATIONS)					ULWICK				USAF GEOPHYS LAB		61-029A-02
DISCOVERER 36	1961 ALPHA KAPPA 1	UNTST	12/12/61								61-034A
COSMIC RADIATION (EMULSIONS AND METALS)					FILZ				USAF GEOPHYS LAB		61-034A-01
COSMIC RAY MONITOR (CRM-9A)					KATZ				USAF GEOPHYS LAB		61-034A-02
COSMIC RAY MONITOR (CRM-8A)					KATZ				USAF GEOPHYS LAB		61-034A-03
SPATIAL AND TEMPORAL ELECTRONS (DENSITY VARIATIONS)					ULWICK				USAF GEOPHYS LAB		61-034A-04
1962 LAMBDA 1	00276	UNTST	04/18/62	5/25/62	FILZ				USAF GEOPHYS LAB		62-011A
COSMIC RADIATION (NUCLEAR EMULSIONS)					FILZ				USAF GEOPHYS LAB		62-011A-01
NEUTRON ALBEDO MEASUREMENTS					LOCKWOOD				U OF NEW HAMPSHIRE		62-011A-02
SPATIAL AND TEMPERAL ELECTRON DENSITY VARIATIONS					ULWICK				USAF GEOPHYS LAB		62-011A-03
SCANNING RADIOMETER					JURSA				USAF GEOPHYS LAB		62-011A-04
RETARDING POTENTIAL ANALYZER					KNUDSEN				LOCKHEED PALO ALTO		62-011A-05
ARIEL 1	UK1	UNTST	04/26/62	11/09/64		389.	1214.	53.85			62-015A
PREDICTED WORLD MAPS									7	123063 100565	62-015A-00A
REFINED WORLD MAPS									13	042662 120963	62-015A-00B
RADIO FREQUENCY CAPACITANCE PROBE					SAYERS				U OF BIRMINGHAM		62-015A-01
ELECTRON DENSITY DATA ON TAPE									1	042762 070862	62-015A-01A
ANALYZED ELECTRON DENSITY DATA ON MICROFILM									1	042762 070862	62-015A-01B
ELECTRON TEMPERATURE GAUGE					BOYD				U COLLEGE LONDON		62-015A-02
COSMIC-RAY DETECTOR					ELLIOT				IMPERIAL COLLEGE		62-015A-03
REDUCED COUNT RATE AND ORBITAL DATA ON MAGNETIC TAPE									1	042762 071262	62-015A-03A
ION MASS SPHERE					BOYD				U COLLEGE LONDON		62-015A-04
LYMAN ALPHA GAUGE					BOWLES				U COLLEGE LONDON		62-015A-05
X-RAY					BOYD				U COLLEGE LONDON		62-015A-06
1962 PI 1	00286	UNTST	04/26/62	4/28/62		170.	350.	74.			62-016A
COSMIC RAY EMULSION					FILZ				USAF GEOPHYS LAB		62-016A-01
NEUTRON ALBEDO					LOCKWOOD				DOC-CRC		62-016A-02
RETARDING POTENTIAL ANALYZER					HINTEREGGER				USAF GEOPHYS LAB		62-016A-03
ELECTRON DENSITY					ULWICK				USAF GEOPHYS LAB		62-016A-04
SCANNING RADIOMETER					JURSA				USAF GEOPHYS LAB		62-016A-05
1962 PHI 1	00302	UNTST	05/30/62								62-021A
COSMIC RADIATION (NUCLEAR EMULSIONS AND METALS)					FILZ				USAF GEOPHYS LAB		62-021A-01
RETARDING POTENTIAL ANALYZER					HINTEREGGER				USAF GEOPHYS LAB		62-021A-02
ION AND ELECTRON MEASUREMENTS					SAGALYN				USAF GEOPHYS LAB		62-021A-03
BETA-GAMMA MEASUREMENTS					PFISTER				USAF GEOPHYS LAB		62-021A-04
ELECTRON DENSITY (IMPEDANCE PROBE)					ULWICK				USAF GEOPHYS LAB		62-021A-05
1962 CHI 1	00304	UNTST	06/02/62								62-022A
RETARDING POTENTIAL ANALYZER					HINTEREGGER				USAF GEOPHYS LAB		62-022A-01
IMPEDANCE PROBE					ULWICK				USAF GEOPHYS LAB		62-022A-02
ION AND ELECTRON MEASUREMENTS					SAGALYN				USAF GEOPHYS LAB		62-022A-03
COSMIC RAY STUDIES (EMULSIONS AND METALS)					SAGALYN				USAF GEOPHYS LAB		62-022A-04
BETA-GAMMA MEASUREMENTS					UNKNOWN				UNKNOWN		62-022A-05
1962 ALPHA BETA 1	00315	UNTST	06/23/62								62-026A
IMPEDANCE PROBE MEASUREMENTS					ULWICK				USAF GEOPHYS LAB		62-026A-01
ION AND ELECTRON MEASUREMENTS					SAGALYN				USAF GEOPHYS LAB		62-026A-02
BETA-GAMMA MEASUREMENTS					PFISTER				USAF GEOPHYS LAB		62-026A-03
INFRARED MEASUREMENTS OF AGENA PLUME					UNKNOWN				UNKNOWN		62-026A-04
RADIO NOISE					HUGUENIN				HARVARD COLLEGE OBS		62-026A-05
1962 ALPHA GAMMA 1	00316	UNTST	06/28/62								62-027A
COSMIC RADIATION (NUCLEAR EMULSIONS)					FILZ				USAF GEOPHYS LAB		62-027A-01
SATELLITE MAGNETIC MEASUREMENTS					SHUMAN				USAF GEOPHYS LAB		62-027A-02
ION AND ELECTRON MEASUREMENTS					SAGALYN				USAF GEOPHYS LAB		62-027A-03
BETA GAMMA MEASUREMENTS					PFISTER				USAF GEOPHYS LAB		62-027A-04
MICROMETEORITE DETECTOR					SOBERMAN				GENERAL ELECTRIC CO		62-027A-05
ELECTRON DENSITY (IMPEDANCE PROBE)					ULWICK				USAF GEOPHYS LAB		62-027A-06
1962 ALPHA ETA 1	00344	UNTST	07/21/62								62-031A
SPHERICAL ION TRAP					SAGALYN				USAF GEOPHYS LAB		62-031A-01
COSMIC RAY MONITOR					KATZ				USAF GEOPHYS LAB		62-031A-02
GALACTIC RADIO NOISE					HUGUENIN				HARVARD COLLEGE OBS		62-031A-03
COSMIC RAY EMULSION					FILZ				USAF GEOPHYS LAB		62-031A-04
1962 ALPHA KAPPA 1	00360	UNTST	08/02/62								62-034A
ELECTRON DENSITY (IMPEDANCE PROBE)					ULWICK				USAF GEOPHYS LAB		62-034A-01
ION AND ELECTRON MEASUREMENTS					SAGALYN				USAF GEOPHYS LAB		62-034A-02

AIM FILE IONOSPHERIC PHYSICS LISTING

SATELLITE NAME / INVESTIGATION NAME / DATA SET NAME	ALTERNATE NAMES	COUNTRY	LAUNCH DATE	INOP DATE	PERIAPSIS	APOAPSIS	INCLINATION	NSSDC ID
		PI			AGENCY			
					QUANTITY	TIME SPAN		
BETA-GAMMA SPECTROMETRIC MEASUREMENTS			PFISTER		USAF GEOPHYS LAB			62-034A-03
MICROMETEORITE DETECTOR			SOBERMAN		GENERAL ELECTRIC CO			62-034A-04
SATELLITE MAGNETIC MEASUREMENTS			SHUMAN		USAF GEOPHYS LAB			62-034A-05
COSMIC RADIATION (NUCLEAR EMULSIONS)			FILZ		USAF GEOPHYS LAB			62-034A-06
1962 ALPHA CHI 1/ERS 2-------TRS 1----------UNTST----09/17/62-----					-----	--	--	-----62-046A
PREDICTED WORLD MAPS					1	091862	092262	62-046A-00A
COSMIC RAY EMULSION			FILZ		USAF GEOPHYS LAB			62-046A-01
LANGMUIR PROBE			ULWICK		USAF GEOPHYS LAB			62-046A-02
EARTH IR BACKGROUND			UNKNOWN		UNKNOWN			62-046A-03
NEUTRON ALBEDO			KATZ		USAF GEOPHYS LAB			62-046A-04
SOLAR CELL DAMAGE			DENNEY		TRW SYSTEMS GROUP			62-046A-05
ALOUETTE 1----------1962 BETA ALPHA 1---------UNTST----09/29/62-----				9/29/72-----	996.--	1032.--	80.5-----62-049A	
PREDICTED WORLD MAPS					1	122971	032872	62-049A-00A
GSFC REFINED WORLD MAPS ON MICROFILM					27	092962	062071	62-049A-00B
GSFC EXTENDED WORLD MAPS ON MICROFILM					71	070164	022872	62-049A-00C
TIME CHARTS OF ALOUETTE 1 OPERATIONS ON MAGNETIC TAPE (DRTE DATA)					2	092962	121666	62-049A-00D
EXTENDED WORLD MAPS ON MAGNETIC TAPE					67	120367	022872	62-049A-00E
TIME CHARTS OF ALOUETTE 1 OPERATIONS ON MICROFICHE (DRTE DATA)					39	092962	123165	62-049A-00F
CRC INDEX OF EXPERIMENT 'DATA AVAILABLE' ON TAPE					2	010166	123167	62-049A-00G
CRPL EXTENDED WORLD MAPS ON MICROFILM					17	092962	063064	62-049A-00H
CRC PUBLISHED INDEX OF EXPERIMENT "DATA AVAILABLE" ON MICROFICHE					5	010166	123168	62-049A-00I
GSFC ORBIT ELEMENTS AT ABOUT 2 WEEK INTERVALS ON MAGNETIC TAPE					1	100762	021372	62-049A-00J
SWEEP-FREQUENCY SOUNDER			WHITTEKER		DOC-CRC			62-049A-01
SWEEP-FREQUENCY IONOGRAMS ON MICROFILM					5067	092962	113070	62-049A-01A
ALOUETTE SYNOPTIC (ALOSYN) SCALED DATA ON MICROFILM					9	092962	083164	62-049A-01B
ALOUETTE SYNOPTIC (ALOSYN) SCALED DATA ON TAPE					6	092962	063067	62-049A-01C
RRS ELECTRON DENSITY VALUES AT 10-KM INTERVALS ON MICROFICHE					9	112662	073163	62-049A-01E
DRTE ELECTRON DENSITY VALUES AT LAMINA BOUNDARIES ON MICROFICHE					73	093062	072868	62-049A-01F
NASA-ARC ELECTRON DENSITY AND SCALE HEIGHT SUMMARIES					1	103162	012764	62-049A-01I
NASA-ARC ELECTRON DENSITY VALUES AT 50-KM INTERVALS ON MICROFICHE					71	110162	012864	62-049A-01J
ALOUETTE SYNOPTIC (ALOSYN) SCALED DATA ON MICROFICHE					311	092962	123168	62-049A-01K
CRC ELECTRON DENSITY VALUES AT 50-KM INTERVALS ON MICROFICHE					47	093062	072868	62-049A-01L
IONOGRAM INVENTORY ON TAPE					6	092962	113070	62-049A-01O
UCLA INTERPOLATED ELECTRON DENSITY PROFILES AT 25-KM INTERVALS ON TAPE					2	093062	050264	62-049A-01P
INDEX OF IONOGRAMS SHOWING DUCTED ECHOES ON MAGNETIC TAPE					1	120162	123168	62-049A-01Q
RSRS ELECTRON DENSITY (AND SCALE HEIGHT) PLOTS AND LISTINGS WITH PASS SUMMARY PLOTS					7	100362	090466	62-049A-01R
IONOSONDE RECEIVER SIGNAL AMPLITUDE VERSUS TIME PLOTS					51	012163	062764	62-049A-01S
CRC ELECTRON DENSITY VS HEIGHT AT SCALED POINTS ONLY, ON MAGNETIC TAPE					2	092962	033066	62-049A-01T
CRC N(H) DATA GIVING DENSITY AT END OF LAMINATIONS AND HEIGHT COEFFICIENTS, TAPE					1	111962	110671	62-049A-01U
ENERGETIC PARTICLES DETECTORS			MCDIARMID		NATL RES COUNC OF CAN			62-049A-02
TEN-SEC AVERAGED COUNT RATES ON TAPE FOR E GT 40 KEV, P GT 500 KEV					2	092962	032664	62-049A-02A
VLF RECEIVER			BELROSE		DOC-CRC			62-049A-03
COSMIC RADIO NOISE			HARTZ		DOC-CRC			62-049A-04
COSMIC RADIO NOISE - AGC LEVELS PLOTTED ON 35-MM MICROFILM, MERGED WITH IONOGRAMS					5067	092962	113070	62-049A-04A
STARAD----------1962 BETA KAPPA----------UNTST----10/26/62-----					-----	--	--	-----62-058A
TRAPPED PARTICLE MEASUREMENTS			KATZ		USAF GEOPHYS LAB			62-058A-01
ELECTRON DENSITY (IMPEDANCE PROBE)			ULWICK		USAF GEOPHYS LAB			62-058A-02
CHARGED PARTICLE DETECTOR			IMHOF		LOCKHEED PALO ALTO			62-058A-03
ELECTRON MAGNETIC SPECTROMETER			UNKNOWN		UNKNOWN			62-058A-04
1962 BETA RHO 1----------00481----------UNTST----11/24/62-----					-----	--	--	-----62-065A
ELECTRON DENSITY			ULWICK		USAF GEOPHYS LAB			62-065A-01
EARTH IR BACKGROUND			LOVETTE		USAF GEOPHYS LAB			62-065A-02
INJUN 3----------1962 BETA TAU 2----------UNTST----12/13/62-----					-----	235.--	2785.--	70.38-----62-067B
PREDICTED WORLD MAPS						1	110463	120363	62-067B-00A
REFINED WORLD MAPS						5	121362	110363	62-067B-00B
GEIGER TUBE DETECTORS			O'BRIEN		DEPT OF ENVIRON PROT			62-067B-01
TABULATION OF 2- TO 12-A SOLAR SOFT X-RAY DATA						1	122062	101363	62-067B-01A
MASTER FILE ON MAGNETIC TAPE, GM COUNTS						5	121462	102863	62-067B-01B
GM COUNTER PARTICLE FLUX PLOTS ON MICROFILM						1	010163	102063	62-067B-01C
PULSE SCINTILLATOR			O'BRIEN		DEPT OF ENVIRON PROT			62-067B-02
MASTER FILE ON MAGNETIC TAPE, PULSE SCINTILLATOR COUNTS						5	121462	102863	62-067B-02A
MAGNETIC DIFFERENTIAL ELECTRON SPECTROMETER			O'BRIEN		DEPT OF ENVIRON PROT			62-067B-03
MASTER FILE ON MAGNETIC TAPE, ELECTRON SPECTROMETER COUNTS						5	121462	102863	62-067B-03A
MAGNETIC DIFFERENTIAL ELECTRON SPECTROMETER FLUX PLOTS ON MICROFILM						1	010163	051563	62-067B-03B
INTEGRAL MAGNETIC ELECTRON SPECTROMETER			O'BRIEN		DEPT OF ENVIRON PROT			62-067B-04
MASTER FILE ON MAGNETIC TAPE, GM COUNTS (STARFISH)						5	121462	102563	62-067B-04A
DC SCINTILLATOR			O'BRIEN		DEPT OF ENVIRON PROT			62-067B-05
MASTER FILE ON MAGNETIC TAPE, DC SCINTILLATOR COUNTS						5	121462	103163	62-067B-05A
ELECTRON MULTIPLIER			O'BRIEN		DEPT OF ENVIRON PROT			62-067B-06
MASTER FILE ON MAGNETIC TAPE, ELECTRON MULTIPLIER COUNTS						5	121462	102563	62-067B-06A
PROTON SPECTROMETER			O'BRIEN		DEPT OF ENVIRON PROT			62-067B-07
MASTER FILE ON MAGNETIC TAPE, P-N COUNTS						5	121462	103163	62-067B-07A
AURORAL AND AIRGLOW PHOTOMETERS			O'BRIEN		DEPT OF ENVIRON PROT			62-067B-08
MASTER FILE ON MAGNETIC TAPE, PHOTOMETER COUNTS						5	121462	102863	62-067B-08A
VLF ELECTROMAGNETIC RADIATION			GURNETT		U OF IOWA			62-067B-09
MASTER FILE ON MAGNETIC TAPE, NARROW-BAND DATA						5	122562	102563	62-067B-09A
VLF AURAL RECORDINGS (0.5-7.0 KHZ) ON ANALOG TAPE						2468	121362	112063	62-067B-09B
VLF WIND BAND RECEIVER (0-10KHZ)			GURNETT		U OF IOWA			62-067B-12
SATELLITE DRAG ATMOSPHERIC DENSITY			JACCHIA		SAO			62-067B-13
SATELLITE DRAG-ATMOSPHERIC DENSITY VALUES						3	121562	041567	62-067B-13A
AE-A----------EXPLORER 17----------UNTST----04/03/63-----				7/10/63-----	255.--	916.--	57.6-----63-009A	
PREDICTED WORLD MAPS					1	071563	081363	63-009A-00A
REFINED WORLD MAPS					2	040363	072163	63-009A-00B
MASS SPECTROMETER			REBER		NASA-GSFC			63-009A-01
ATMOSPHERIC COMPOSITION DENSITY DATA IN TABULAR FORM ON MICROFICHE					2	040363	060163	63-009A-01A
LANGMUIR PROBES			BRACE		NASA-GSFC			63-009A-02
TABLES OF ELECTRON TEMPERATURES AND ION DENSITIES ON MICROFILM					1	040463	071063	63-009A-02A
PRESSURE GAUGE			NEWTON		NASA HEADQUARTERS			63-009A-03

AIM FILE IONOSPHERIC PHYSICS LISTING

SATELLITE NAME / INVESTIGATION NAME / DATA SET NAME	ALTERNATE NAMES	COUNTRY	LAUNCH DATE / PI	INOP DATE	PERIAPSIS / APOAPSIS / INCLINATION / AGENCY	QUANTITY	TIME SPAN	NSSDC ID
NEUTRAL DENSITY DATA IN TABULAR FORM ON MICROFICHE						1	040363 060863	63-009A-03A
TIROS 7----------A 52----------		UNTST	06/19/63	2/03/67	621.-- 649.-- 58.23			63-024A
PREDICTED WORLD MAPS						27	061963 122667	63-024A-00A
TIROS VII ATTITUDE SUMMARY						10	061963 082865	63-024A-00D
LOW-RESOLUTION OMNIDIRECTIONAL RADIOMETER	SUOMI				U OF WISCONSIN			63-024A-01
LOW-RESOLUTION OMNIDIRECTIONAL RADIOMETER TEMPERATURE TAPES						9	061963 082963	63-024A-01A
SCANNING RADIOMETER	BARKSDALE				NASA-GSFC			63-024A-02
FINAL METEOROLOGICAL RADIATION TAPES (FMRT)						692	061963 061965	63-024A-02A
RADIATION DATA CATALOG AND USERS' MANUAL ON MICROFICHE						14	061963 061965	63-024A-02B
LANGMUIR PROBE	BRACE				NASA-GSFC			63-024A-03
TABLE OF ELECTRON DENSITIES ON MICROFILM						1	061963 070963	63-024A-03A
TELEVISION CAMERA SYSTEM	NESDIS STAFF				NOAA-NESDIS			63-024A-04
GEOPHYSICAL RESEARCH SAT-----00612----------		UNTST	06/28/63					63-026A
PREDICTED WORLD MAPS						2	062863 090863	63-026A-00A
AEROSPACE COMPOSITION	NARCISI				USAF GEOPHYS LAB			63-026A-01
RETARDING POTENTIAL ANALYZER	HINTEREGGER				USAF GEOPHYS LAB			63-026A-02
PERSONAL HAZARDS ASSOC. WITH SPACE RADIATION	UNKNOWN				UNKNOWN			63-026A-03
ELECTRON 1----------00746----------		USSRN	01/30/64					64-006A
SOFT PARTICLE COUNTER								64-006A-01
LOW-ENERGY (1 TO 30 MEV) PROTON DETECTOR	SOSNOVETS				INST NUCLEAR PHYSICS			64-006A-02
RADIO BEACON								64-006A-03
MICROMETEORITE DETECTOR								64-006A-04
MASS SPECTROMETER (1-34 AMU)								64-006A-05
SOLAR CELL TECHNOLOGY								64-006A-06
ELECTRON 2----------00748----------		USSRN	01/30/64					64-006B
FLUXGATE MAGNETOMETER	DOLGINOV				IZMIRAN			64-006B-01
LOW-ENERGY (1 TO 30 MEV) PROTON DETECTOR	SOSNOVETS				INST NUCLEAR PHYSICS			64-006B-02
ELECTROSTATIC SPHERICAL ANALYZER								64-006B-03
SOLAR X-RAY COUNTER (2-18A)								64-006B-04
MASS SPECTROMETER (1-34AMU)								64-006B-05
SOLAR CELL TECHNOLOGY								64-006B-06
COSMIC RAY COMPOSITION + FLUX								64-006B-07
RADIO NOISE, 725 + 1525 KHZ								64-006B-08
SPHERICAL ANALYZER								64-006B-09
1964-045A----------00850----------		UNTST	08/14/64					64-045A
FARADAY CUP	UNKNOWN				UNKNOWN			64-045A-01
SYNCOM 3----------A 27----------		UNTST	08/19/64					64-047A
PREDICTED WORLD MAPS						12	082064 010675	64-047A-00A
FARADAY ROTATION	DAROSA				STANFORD U			64-047A-01
TOTAL ELECTRON CONTENT, PLOTS AND TABULATIONS						2	092064 071666	64-047A-01B
IE-A----------EXPLORER 20----------		UNTST	08/25/64	12/29/65	864.-- 1025.-- 79.9			64-051A
PREDICTED WORLD MAPS						2	010466 040566	64-051A-00A
GSFC REFINED WORLD MAPS ON MICROFILM						9	082564 010866	64-051A-00B
MASTER ORBIT WORLD MAPS						1	072466 080766	64-051A-00C
FIXED-FREQUENCY IONOSONDE	KNECHT				NATL BUREAU OF STD			64-051A-01
TIME-ORDERED FIXED-FREQUENCY IONOGRAMS ON MICROFILM						1017	082564 122965	64-051A-01A
SINGAPORE AND WINKFIELD TIME-ORDERED, FIXED-FREQUENCY IONOGRAMS ON MICROFILM						110	082764 122265	64-051A-01C
IONOGRAM INVENTORY ON TAPE						1	082564 122265	64-051A-01D
SPHERICAL ION-MASS SPECTROMETER	BOYD				U COLLEGE LONDON			64-051A-02
COSMIC NOISE	STONE				NASA-GSFC			64-051A-03
OGO 1----------EOGO 1----------		UNTST	09/05/64		281.--149385.-- 31.2			64-054A
PREDICTED WORLD MAPS						18	010565 021572	64-054A-00A
REFINED WORLD MAPS						1	102768 120968	64-054A-00B
GSFC EXTENDED MASTER ORBIT WORLD MAPS ON MICROFILM						23	090564 103068	64-054A-00C
PLOTS OF EQUATORIAL PITCH ANGLE, LOCAL TIME, AND L VERSUS R ON MICROFILM						1	090764 060467	64-054A-00D
LISTING OF ONE MIN AVERAGES OF ORBIT PARAMETERS ON MICROFILM						5	090764 060467	64-054A-00E
PLOTS OF L AGAINST EQUATORIAL PITCH ANGLE AND LOCAL TIME ON MICROFILM						1	090764 060467	64-054A-00F
ANALYZED, CONDENSED, ORBIT/ATTITUDE TAPE						1	090764 120264	64-054A-00G
MULTICOORDINATE SYSTEM EPHEMERIS PLOTS						2	090764 060367	64-054A-00H
TRIAXIAL SEARCH-COIL MAGNETOMETER	SMITH				NASA-JPL			64-054A-01
36.864-SEC AVERAGED SEARCH-COIL MAGNETOMETER DATA ON TAPE						29	092364 111767	64-054A-01A
SEARCH-COIL MAGNETOMETER SQUISH PLOTS ON MICROFILM						1	092364 060567	64-054A-01B
MAGNETIC FIELD MAGNITUDE AND DIRECTION NORMAL TO THE SPACECRAFT SPIN AXIS ON FILM						1	090564 092966	64-054A-01C
INDEXES FOR TAPES IN DATA SET 64-054A-01A ON MICROFILM						1	092364 111767	64-054A-01D
MAGNETIC SURVEY USING TWO MAGNETOMETERS	HEPPNER				NASA-GSFC			64-054A-02
SPHERICAL ION AND ELECTRON TRAP	SAGALYN				USAF GEOPHYS LAB			64-054A-03
PLANAR ION AND ELECTRON TRAP	WHIPPLE				U OF CALIF, SAN DIEGO			64-054A-04
RADIO PROPAGATION	LAWRENCE				NOAA-ERL			64-054A-05
IONOSPHERIC AND EXOSPHERIC ELECTRON CONTENT ON MICROFICHE						2	121264 052067	64-054A-05A
POSITIVE ION COMPOSITION	TAYLOR, JR.				NASA-GSFC			64-054A-06
INTERPLANETARY DUST PARTICLES	BOHN				TEMPLE U			64-054A-07
WIDEBAND AND NARROW-BAND STEP FREQUENCY VLF RECEIVERS	HELLIWELL				STANFORD U			64-054A-08
VLF SPECTROGRAMS, LOW-RESOLUTION ON 35-MM PAPER						39	111064 121565	64-054A-08A
SELECTED HIGH-RESOLUTION VLF SPECTROGRAMS ON MICROFILM						16	032165 112465	64-054A-08B
VLF SIGNAL STRENGTH VS FREQUENCY ON 16-MM CINE FILM						46	090764 122965	64-054A-08C
RADIO ASTRONOMY	HADDOCK				U OF MICHIGAN			64-054A-09
GEOCORONAL LYMAN-ALPHA SCATTERING	MANGE				US NAVAL RESEARCH LAB			64-054A-10
GEGENSCHEIN PHOTOMETRY	WOLFF				NASA-GSFC			64-054A-11
SOLAR COSMIC RAYS	ANDERSON				U OF CALIF, BERKELEY			64-054A-12
ORIGINAL REDUCED SOLAR COSMIC RAY COUNT DATA ON MAGNETIC TAPE						1	093065 050366	64-054A-12A
ELECTROSTATIC PLASMA ANALYSIS (PROTONS .1-18KEV).	WOLFE				NASA-ARC			64-054A-13
PLASMA PROBE, FARADAY CUP	BRIDGE				MASS INST OF TECH			64-054A-14
POSITRON SEARCH AND GAMMA RAY SPECTRUM	CLINE				NASA-GSFC			64-054A-15
TRAPPED RADIATION SCINTILLATION COUNTER	KONRADI				NASA-JSC			64-054A-16
ALL PROTON-ELECTRON COUNT RATES, ANALYSED						4	090764 111665	64-054A-16A
HIGH BIT RATE REDUCED PROTON-ELECTRON						7	090764 120264	64-054A-16B

AIM FILE IONOSPHERIC PHYSICS LISTING

SATELLITE NAME / INVESTIGATION NAME / DATA SET NAME	ALTERNATE NAMES	COUNTRY	LAUNCH DATE	INOP DATE	PERIAPSIS	APOAPSIS	INCLINATION	PI / AGENCY	QUANTITY	TIME SPAN	NSSDC ID
COSMIC-RAY ISOTOPIC ABUNDANCE								MCDONALD / NASA-GSFC			64-054A-17
COSMIC-RAY SPECTRA AND FLUXES								SIMPSON / U OF CHICAGO			64-054A-18
REDUCED COUNT RATE DATA ON MAGNETIC TAPE									35	090664 112567	64-054A-18A
SELECTED 1/2-HR AVERAGE DIGITAL AND ANALOG COUNT RATE PLOTS ON MICROFILM									1	090764 112567	64-054A-18B
PULSE HEIGHT ANALYZER DATA ON MAGNETIC TAPE									3	090466 112567	64-054A-18C
U OF CHICAGO COUNTING RATE TAPE LOG FOR									1	090564 112567	64-054A-18D
U OF CHICAGO PULSE HEIGHT ANALYZER TAPE									1	090466 112567	64-054A-18E
TRAPPED RADIATION AND HIGH-ENERGY PROTONS								VAN ALLEN / U OF IOWA			64-054A-19
IONIZATION CHAMBER								WINCKLER / U OF MINNESOTA			64-054A-20
PLOTS OF 1-MIN AVERAGED PULSE RATES VS TIME ON MICROFILM									1	091264 060567	64-054A-20A
ORIGINAL REDUCED PULSE RATES ON TAPE									17	090564 120667	64-054A-20B
ATLAS OF 10- TO 50-KEV SOLAR FLARE X RAYS ON MICROFILM									1	050265 052867	64-054A-20C
PLOTS OF 1-MIN AVERAGED PULSE RATES VS L ON MICROFILM									1	090764 060467	64-054A-20D
TABULATIONS OF HOURLY AVERAGED PULSE RATES ON MICROFILM									1	090564 120667	64-054A-20E
TABULATIONS OF 1-MIN AVERAGED PULSE RATES ON MICROFILM									4	090564 120667	64-054A-20F
PLOTS OF 2-MIN AVERAGED PULSE RATES VS SPACECRAFT RADIAL DISTANCE ON MICROFILM									1	090764 060467	64-054A-20G
PLOTS OF 2-MIN AVERAGED PULSE RATES VS TIME ON MICROFILM									1	091064 060567	64-054A-20H
PLOTS OF 2-MIN AVERAGED PULSE RATES VS TIME ON MICROFILM									1	090764 060567	64-054A-20I
PLOTS OF 1-MIN AVERAGED PULSE RATES VS TIME (NEAR PERIGEE) ON MICROFILM									1	091564 052766	64-054A-20J
ION.CHAMBER PULSE RATE TAPES(64-054A-20B) REFORMATTED AS A STANDARD TAPE DATA SET									7	090564 120667	64-054A-20K
ELECTRON SPECTROMETER								WINCKLER / U OF MINNESOTA			64-054A-21
PLOTS OF 2-MIN AVERAGED COUNT RATES VS TIME (RADIATION BELTS) ON MICROFILM									1	091564 052766	64-054A-21A
PLOTS OF COUNT RATES VS R ON MICROFILM									1	090764 060467	64-054A-21B
ORIGINAL REDUCED ELECTRON SPECTROMETER ACCUMULATED COUNT DATA ON MAGNETIC TAPE									11	090764 120667	64-054A-21C
TABULATION OF 5-MIN AVERAGED COUNT RATES ON MICROFILM									6	090764 060567	64-054A-21D
2- AND 5-MINUTE AVERAGED ELECTRON COUNT RATES PLOTTED VS L, ON MICROFILM									1	090764 060467	64-054A-21E
TABULATIONS OF ELECTRON COUNT RATES VS TIME AT DISCRETE L VALUES ON MICROFILM									1	091564 120565	64-054A-21F
PLOTS OF 5-MIN AVERAGED ELECTRON COUNT RATES VS T NEAR PERIGEE ON MICROFILM									1	090764 060567	64-054A-21G
PLOTS OF COUNT RATES VS TIME FOR DISCRETE L VALUES ON MICROFILM									1	092164 120565	64-054A-21H
REDUCED L-INTERPOLATED COUNT RATES ON MAGNETIC TAPE									1	091564 070767	64-054A-21I
ELECTRON SPECTR. COUNT DATA (64-054A-21C) REFORMATTED AS A STANDARD TAPE DATA SET									5	090764 120667	64-054A-21J
BE-B / EXPLORER 22			10/10/64	2/00/70	889.--	1081.--	79.7				64-064A
PREDICTED WORLD MAPS									3	021069 071569	64-064A-00A
REFINED WORLD MAPS									27	101064 021469	64-064A-00B
RADIO FREQUENCY BEACON								BLUMLE / NASA-GSFC			64-064A-01
TOTAL ELECTRON CONTENT DATA ON MICROFILM									4	101364 041769	64-064A-01A
TOTAL ELECTRON CONTENT, HARDCOPY									27	101664 123167	64-064A-01B
LATITUDE VERSUS TOTAL ELECTRON CONTENT OVER ILLINOIS, MICHIGAN AND MONTANA, MECHE									4	102164 031765	64-064A-01C
LANGMUIR PROBE								BRACE / NASA-GSFC			64-064A-02
TABULATIONS OF ELECTRON DENSITY DATA ON MICROFILM									1	101064 053165	64-064A-02A
LASER TRACKING REFLECTOR								PLOTKIN / NASA-GSFC			64-064A-03
SAO LASER REFLECTOR DATA ON MAGNETIC TAPE									1	031066 062667	64-064A-03A
NASA LASER REFLECTOR DATA ON MAGNETIC TAPE									1	051267 071471	64-064A-03B
RADIO DOPPLER SYSTEM								ANDERLE / USN SURFACE WEAPNS CTR			64-064A-04
US NAVY DOPPLER DATA ON MAGNETIC TAPE									1	111164 033065	64-064A-04A
ORBIS LOW / ORBIS 2			11/18/64								64-075A
10.004 MHZ BEACON								UNKNOWN / UNKNOWN			64-075A-01
INJUN 4 / EXPLORER 25			11/21/64		522.--	2494.--	81.4				64-076B
PREDICTED WORLD MAPS									3	060865 090666	64-076B-00A
REFINED WORLD MAPS									10	112164 071966	64-076B-00B
SPHERICAL RETARDING POTENTIAL ANALYZER								SAGALYN / USAF GEOPHYS LAB			64-076B-02
RETARDING POTENTIAL ANALYZER RATE DATA ON MAGNETIC TAPE									47	021365 071966	64-076B-02A
GEIGER-MUELLER COUNTER								VAN ALLEN / U OF IOWA			64-076B-03
MASTER FILE ON MAGNETIC TAPE, GM COUNTS									47	021365 071966	64-076B-03A
SOLID-STATE DETECTOR								VAN ALLEN / U OF IOWA			64-076B-04
MASTER FILE ON MAGNETIC TAPE, P-N COUNTS									47	021365 071966	64-076B-04A
PROTON COUNT RATE PLOTS ON MICROFILM									11	112364 071966	64-076B-04B
CADMIUM SULFIDE DETECTORS								VAN ALLEN / U OF IOWA			64-076B-05
MASTER FILE ON MAGNETIC TAPE, CDS COUNTS									47	021365 071966	64-076B-05A
PLASTIC SCINTILLATOR PARTICLE DETECTORS								VAN ALLEN / U OF IOWA			64-076B-06
MASTER FILE ON MAGNETIC TAPE, PLASTIC SCINTILLATOR COUNTS									47	021365 071966	64-076B-06A
SAN MARCO 1 / SM-A			12/15/64								64-084A
PREDICTED WORLD MAPS									1	121564 122964	64-084A-00A
REFINED WORLD MAPS									1	122964 010565	64-084A-00B
ATMOSPHERE								BROGLIO / NATL RES COUNC ITALY			64-084A-01
ELECTRON CONTENT-BEACON								CARRARA / U OF FLORENCE			64-084A-02
1965-027E			04/03/65								65-027E
ATMOSPHERIC DENSITY								MCISAAC / USAF GEOPHYS LAB			65-027E-01
PLASMA DETECTOR								SAGALYN / USAF GEOPHYS LAB			65-027E-02
IMPEDANCE PROBE								ULWICK / USAF GEOPHYS LAB			65-027E-03
MICROMETEORITE DETECTOR								SOBERMAN / GENERAL ELECTRIC CO			65-027E-04
EARLY BIRD / I1F1			04/06/65								65-028A
PREDICTED WORLD MAPS									1	040765 041065	65-028A-00A
RADIO BEACON								UNKNOWN / UNKNOWN			65-028A-01
BE-C / EXPLORER 27			04/29/65		927.--	1320.--	41.1				65-032A
PREDICTED WORLD MAPS									33	081268 112679	65-032A-00A
REFINED WORLD MAPS									21	042965 081268	65-032A-00B
RADIO BEACON								BLUMLE / NASA-GSFC			65-032A-01
TOTAL ELECTRON CONTENT DATA ON MICROFILM									1	050365 021068	65-032A-01A
LANGMUIR PROBE								BRACE / NASA-GSFC			65-032A-02
LASER TRACKING REFLECTOR								BERBERT / NASA-GSFC			65-032A-03
SAO LASER REFLECTOR DATA ON MAGNETIC TAPE									1	012566 062467	65-032A-03A
NASA LASER REFLECTOR DATA ON MAGNETIC TAPE									1	040367 050270	65-032A-03B
NASA LASER DATA ON TAPE									99	040175 063082	65-032A-03C
SAO LASER DATA ON TAPE									36	010175 053182	65-032A-03D
GERMAN LASER WETTZEL STATION DATA ON MAGNETIC TAPE									2	072478 100881	65-032A-03E
RADIO DOPPLER SYSTEM								ANDERLE / USN SURFACE WEAPNS CTR			65-032A-04

AIM FILE IONOSPHERIC PHYSICS LISTING

SATELLITE NAME / INVESTIGATION NAME / DATA SET NAME	ALTERNATE NAMES	COUNTRY	LAUNCH DATE	INOP DATE	PERIAPSIS	APOAPSIS	INCLINATION	NSSDC ID
		PI	AGENCY	QUANTITY	TIME SPAN			
US NAVY DOPPLER DATA ON MAGNETIC TAPE				1	050265 022466			65-032A-04A
OGO 2	OGO-C	UNTST	10/14/65	2/00/68	414.--	1510.--	87.4	65-081A
PREDICTED WORLD MAPS				3	061967 022468			65-081A-00A
GSFC EXTENDED MASTER ORBIT WORLD MAPS ON MICROFILM				16	101465 100367			65-081A-00C
RADIO ASTRONOMY		HADDOCK	U OF MICHIGAN					65-081A-01
VLF NOISE AND PROPAGATION		HELLIWELL	STANFORD U					65-081A-02
VLF SPECTROGRAMS, LOW RESOLUTION ON 35-MM PAPER ROLLS				226	101765 090266			65-081A-02B
VLF MEASUREMENT-2		MORGAN	DARTMOUTH COLLEGE					65-081A-03
TRIAXIAL SEARCH-COIL MAGNETOMETER		SMITH	NASA-JPL					65-081A-04
RUBIDIUM VAPOR MAGNETOMETER		CAIN	US GEOLOGICAL SURVEY					65-081A-05
UNCOMPRESSED 0.5-SEC MAGNETIC FIELD AVERAGES ON TAPE				10	101465 123066			65-081A-05B
MICROFILM PLOTS OF REDUCED MAGNETIC AND DELTA FIELD (CAIN 12/66 GSFC MODEL) DATA				1	101465 012266			65-081A-05C
0.5-SEC MAGNETIC FIELD AVERAGES ON COMPRESSED TAPES				4	101465 122266			65-081A-05E
MICROFILM PLOTS OF REDUCED MAGNETIC AND DELTA FIELD (CAIN 10/68 POGO MODEL) DATA				2	101465 100267			65-081A-05F
COMPRESSED 0.5-SEC REDUCED MAGNETIC FIELD AVERAGES ON TAPE				4	101465 100267			65-081A-05G
0.5-SEC AVERAGES OF MAGNETIC FIELD MAGNITUDE SAMPLED EVERY 10 SEC ON TAPE				1	101465 100267			65-081A-05H
COSMIC-RAY IONIZATION		ANDERSON	SCIENCE APPL, INC					65-081A-06
MICROFILM PLOTS OF TOTAL IONIZATION RATES AND SATELLITE ALT VS INVARIANT LAT				5	101465 040266			65-081A-06A
LOW-ENERGY PROTON, ALPHA PARTICLE MEASUREMENT		SIMPSON	U OF CHICAGO					65-081A-07
REDUCED COSMIC-RAY COUNT RATE AND ORBITAL DATA MERGED ON MAGNETIC TAPE				22	101465 110365			65-081A-07A
COUNT RATE PLOTS (R VS ENERGY LOSS) AND ORBITAL DATA ON MICROFILM				6	101565 121366			65-081A-07B
GALACTIC AND SOLAR COSMIC RAY		WEBBER	U OF NEW HAMPSHIRE					65-081A-08
REDUCED PARTICLE COUNT RATES 50-2000 MEV/NUCLEON				1	101565 102465			65-081A-08A
PLOTS OF REDUCED PARTICLE COUNT RATES ON MICROFILM				1	101565 102465			65-081A-08B
NSSDC STANDARD TAPE VERSION OF PHA PART OF DATA SET 65-081A-08A				1	101565 102465			65-081A-08C
SCINTILLATION DETECTOR		HOFFMAN	NASA-GSFC					65-081A-09
AIRGLOW STUDY		REED	NASA-GSFC					65-081A-10
LYMAN-ALPHA AND UV AIRGLOW		MANGE	US NAVAL RESEARCH LAB					65-081A-11
AIRGLOW STUDY		BARTH	U OF COLORADO					65-081A-12
NEUTRAL PARTICLE AND ION COMPOSITION		JONES	U OF MICHIGAN					65-081A-13
INTERPLANETARY DUST PARTICLES		NILSSON	FLINDERS U OF S AUST					65-081A-14
ANALYZED MICROMETEORITE DATA PUBLISHED IN SAO CONTRACT REPORT	NAS 5-1107			1	101665 040866			65-081A-14A
IONOSPHERIC COMPOSITION		TAYLOR, JR.	NASA-GSFC					65-081A-15
SOLAR X-RAYS		KREPLIN	US NAVAL RESEARCH LAB					65-081A-16
SOLAR X-RAY DATA 0.5 TO 60A IN 4 RANGES				1	101465 102365			65-081A-16A
SOLAR UV SPECTROMETER		HINTEREGGER	USAF GEOPHYS LAB					65-081A-17
CORPUSCULAR RADIATION		VAN ALLEN	U OF IOWA					65-081A-18
POSITIVE ION STUDY		DONLEY	NASA-GSFC					65-081A-19
NEUTRAL PARTICLE STUDY		NEWTON	NASA HEADQUARTERS					65-081A-20
ELECTRON DENSITY MEASUREMENTS		HADDOCK	U OF MICHIGAN					65-081A-21
TRAPPED AND DUMPED ELECTRONS		VAN ALLEN	U OF IOWA					65-081A-22
ALOUETTE 2	ALOUETTE-B	UNTST	11/29/65		505.--	2987.--	79.8	65-098A
PREDICTED WORLD MAPS				2	051069 042571			65-098A-00A
REFINED WORLD MAPS				13	061167 033173			65-098A-00B
GSFC EXTENDED WORLD MAPS ON MICROFILM				62	112965 033173			65-098A-00C
EXTENDED WORLD MAPS ON MAGNETIC TAPE				91	080667 033173			65-098A-00D
CRC INDEX OF EXPERIMENT 'DATA AVAILABLE' ON TAPE				1	112965 123166			65-098A-00E
CRC PUBLISHED INDEX OF EXPERIMENT "DATA AVAILABLE", FICHE				7	112965 123168			65-098A-00F
GSFC ORBIT ELEMENTS AT ABOUT 2 WEEK INTERVALS, ON MAGNETIC TAPE				1	120565 032173			65-098A-00G
SWEEP-FREQUENCY SOUNDER		WHITTEKER	DOC-CRC					65-098A-01
SWEEP-FREQUENCY IONOGRAMS ON MICROFILM				2571	112965 013175			65-098A-01A
RRL PUBLISHED ELECTRON DENSITY AND SCALE HEIGHT PROFILES ON MICROFICHE				22	101266 122768			65-098A-01D
INDEXING INFORMATION FOR SWEEP-FREQUENCY IONOGRAMS WITH DUCTED ECHOES				2	120165 042169			65-098A-01E
PHOTOGRAPHIC PRINTS OF SWEEP-FREQUENCY IONOGRAMS WITH DUCTED ECHOES				2451	120165 042169			65-098A-01F
CRC INTERPOLATED ELECTRON DENSITY PROFILES ON MICROFICHE				6	121565 030970			65-098A-01G
CRC ELECTRON DENSITY VALUES AT LAMINA BOUNDARIES ON MICROFICHE				10	121565 030970			65-098A-01H
IONOGRAM INVENTORY ON TAPE				3	112965 042373			65-098A-01I
NASA-ARC ELECTRON DENSITIES INTERPOLATED TO 100-KM INTERVALS ON (PACKED) TAPE				2	112965 060872			65-098A-01J
NASA-ARC ELECTRON DENSITIES INTERPOLATED TO 100 KM INTERVALS ON MICROFILM				8	112965 031170			65-098A-01K
NSSDC STANDARD TAPE FORMAT DATA SET FROM DATA SET 65-098A-01J				1	112965 031170			65-098A-01M
INDEX OF IONOGRAMS SHOWING DUCTED ECHOES				1	112965 103071			65-098A-01N
CRC ELECTRON DENSITY PROFILES AT SCALED POINTS ON MAGNETIC TAPES				3	121565 071072			65-098A-01O
RSRS ELECTRON DENSITY (AND SCALE HEIGHT) PLOTS AND LISTINGS WITH PASS SUMMARY PLOTS				5	121265 081168			65-098A-01P
VLF RECEIVER		BELROSE	DOC-CRC					65-098A-02
VLF EMISSION INTENSITY OBSERVATIONS AT 6 NARROW BAND FREQUENCIES OVER KASHIMA				1	022571 092671			65-098A-02B
COSMIC RADIO NOISE		HARTZ	DOC-CRC					65-098A-03
COSMIC RADIO NOISE - AGC LEVELS PLOTTED ON 35-MM MICROFILM, MERGED WITH IONOGRAMS				2188	112965 060073			65-098A-03A
SUMMARY OF COSMIC RADIO NOISE STRIP CHARTS PLUS DOCUMENTATION, ON MICROFILM				1	063066 070169			65-098A-03B
COSMIC RADIO NOISE ON STRIP CHARTS				1625	063066 070169			65-098A-03C
ENERGETIC PARTICLE DETECTORS		MCDIARMID	NATL RES COUNC OF CAN					65-098A-04
REDUCED COUNT RATE DATA ON MAGNETIC TAPE				8	112965 061869			65-098A-04A
ANALYZED SELECTED BOUNDARY DATA ON MAGNETIC TAPE				1	112965 061869			65-098A-04B
CYLINDRICAL ELECTROSTATIC PROBES		BRACE	NASA-GSFC					65-098A-05
ELECTRON DENSITY AND TEMPERATURE ON TAPE				1	022166 111367			65-098A-05A
ELECTRON DENSITY AND TEMPERATURE ON MICROFILM				1	022166 111367			65-098A-05B
ELECTRON DENSITY AND TEMPERATURE PLOTS ON MICROFILM				1	022166 030167			65-098A-05C
DME-A	EXPLORER 31	UNTST	11/29/65	1/15/71	505.--	2978.--	79.8	65-098B
PREDICTED WORLD MAPS				4	063069 102070			65-098B-00A
REFINED WORLD MAPS				16	112965 070169			65-098B-00B
THERMAL ION PROBE		MAIER	NASA-GSFC					65-098B-01
GRAPHS OF THERMAL ION PROBE DATA ON MICROFILM				2	121465 060269			65-098B-01A
TABULATED MEASURED GEOPHYSICAL QUANTITIES ON 16MM MICROFILM				3	010166 060969			65-098B-01B
PARTIALLY REDUCED EXPERIMENT MEASUREMENTS ON MICROFILM				1179	122565 083167			65-098B-01C
CYLINDRICAL ELECTROSTATIC PROBES		BRACE	NASA-GSFC					65-098B-02
ELECTRON TEMPERATURE		WILLMORE	U OF BIRMINGHAM					65-098B-03
ION MASS SPECTROMETER		WILLMORE	U OF BIRMINGHAM					65-098B-04
MAGNETIC ION-MASS SPECTROMETER		HOFFMAN	U OF TEXAS, DALLAS					65-098B-05
ION COMPOSITION AND DENSITY PLOTS ON MICROFILM				66	120165 030368			65-098B-05A
ION COMPOSITION AND DENSITY MEASUREMENTS ON MAGNETIC TAPE				100	120165 030368			65-098B-05B
INDEX OF ION DENSITY DATA ON MICROFILM				1	120165 030368			65-098B-05C
THERMAL ELECTRON PROBE		MAIER	NASA-GSFC					65-098B-06

AIM FILE IONOSPHERIC PHYSICS LISTING

SATELLITE NAME / INVESTIGATION NAME / DATA SET NAME	ALTERNATE NAMES	COUNTRY	LAUNCH DATE	INOP DATE	PERIAPSIS	APOAPSIS	INCLINATION	NSSDC ID
		PI	AGENCY		QUANTITY	TIME SPAN		
THERMAL ELECTRON PROBE DATA ON MICROFILM					2	121465 060269		65-098B-06B
TABULATED MEASURED GEOPHYSICAL QUANTITIES ON MICROFILM					3	010666 060969		65-098B-06C
PARTIALLY REDUCED EXPERIMENT MEASUREMENTS ON MICROFILM					1179	121465 060969		65-098B-06D
ENERGETIC ELECTRON CURRENT MONITOR		MAIER	NASA-GSFC					65-098B-07
ENERGETIC ELECTRON CURRENT (RETARDING POTENTIAL ANALYZER) DATA ON MICROFILM					42	120265 030666		65-098B-07A
FR 1	FRANCE-1	UNTST	12/06/65	8/26/68	746.--	762.--	75.87	65-101A
PREDICTED WORLD MAPS					11	120665 091167		65-101A-00A
VLF RECEIVER		STOREY	IONOSPHERIC RES GROUP					65-101A-01
QUICK-LOOK VLF MAGNETIC FIELD DATA ON MICROFILM					2	120765 080168		65-101A-01A
ELECTRON DENSITY		SAYERS	U OF BIRMINGHAM					65-101A-02
PIONEER 6	PIONEER-A	UNTST	12/16/65		0.813--	0.983--	0.168	65-105A
PLOT OF PIONEER 6 AND 7 TRAJECTORY IN FIXED SUN-EARTH LINE COORDINATES					1	121665 031170		65-105A-00D
MULTI-COORDINATE SYSTEM EPHEMERIS TAPES					9	121665 051672		65-105A-00E
COMPRESSED EPHEMERIS DATA ON MAGNETIC TAPE					1	121665 051672		65-105A-00F
COROTATION DELAY TIME PLOTS AND LISTINGS ON MICROFILM					1	120165 050172		65-105A-00G
UNIAXIAL FLUXGATE MAGNETOMETER		NESS	NASA-GSFC					65-105A-01
30-SEC AVERAGED VECTOR MAGNETIC FIELD DATA ON TAPE					3	012666 072666		65-105A-01A
HOURLY AVERAGED VECTOR MAGNETIC FIELD DATA ON MICROFILM					1	121765 090567		65-105A-01B
TIME SEQUENCED INTERSPERSED PIONEER 6 + 7 HR AVERAGED MAGNETIC FIELD DATA ON TAPE					1	121565 091567		65-105A-01C
SOLAR WIND PLASMA FARADAY CUP		BRIDGE	MASS INST OF TECH					65-105A-02
PLOTS OF HOURLY AVERAGED SOLAR WIND PLASMA PARAMETERS ON MICROFILM					1	121865 040369		65-105A-02A
HOURLY AVERAGED VELOCITY AND DENSITY VALUES IN SGD BULLETINS					11	030169 022870		65-105A-02B
1-HR AVG SOLAR WIND DATA FROM THE EXPERIMENTS ON PIONEER 6 AND PIONEER 7					8	121665 051871		65-105A-02C
HOURLY AVERAGED PLASMA PARAMETERS ON BCD 7-TRACK MAGNETIC TAPE					1	121665 050971		65-105A-02D
COSMIC-RAY TELESCOPE		SIMPSON	U OF CHICAGO					65-105A-03
REDUCED COUNT RATE AND PULSE HEIGHT ANALYZER DATA ON MAGNETIC TAPE					10	121665 123070		65-105A-03A
COUNT RATE PLOTS AND TRAJECTORY PLOT ON MICROFILM					1	121665 122668		65-105A-03D
COSMIC-RAY PROTON COUNTING RATES PUBLISHED IN 'SOLAR GEOPHYSICAL DATA'					39	030769 050575		65-105A-03E
TWO-FREQUENCY BEACON RECEIVER		ESHLEMAN	STANFORD U					65-105A-04
HOURLY VALUES OF REDUCED TOTAL ELECTRON CONTENT DATA ON MAGNETIC TAPE					1	121665 071166		65-105A-04A
HOURLY VALUES OF REDUCED TOTAL ELECTRON CONTENT DATA ON MICROFILM					1	121665 071166		65-105A-04B
DIGITAL VALUES OF SOLAR WIND ELECTRON DENSITY VS TIME NORMALIZED TO 1 AU ON TAPE					1	010966 052566		65-105A-04D
DIGITAL VALUES OF SOLAR WIND ELECTRON DENSITY VS TIME NORMALIZED TO 1AU (MFILM)					1	011066 060166		65-105A-04E
COSMIC-RAY ANISOTROPY		MCCRACKEN	CSIRO					65-105A-05
COUNT RATE LISTINGS ON MICROFILM					1	121665 020667		65-105A-05A
COUNT RATE PLOTS ON MICROFILM					1	121665 012567		65-105A-05B
ELECTROSTATIC ANALYZER		WOLFE	NASA-ARC					65-105A-06
PLOTS OF ANALYZED PLASMA PARAMETERS ON MICROFILM					22	121665 031874		65-105A-06A
PUBLISHED PRELIMINARY SOLAR WIND PARAMETERS					71	121665 050575		65-105A-06B
HOURLY AVERAGED PLASMA PARAMETERS					2	121865 030466		65-105A-06C
HOURLY AVERAGED PLASMA PARAMETERS ON MICROFILM					1	121865 030466		65-105A-06D
CELESTIAL MECHANICS		ANDERSON	NASA-JPL					65-105A-07
DOPPLER RADIO TRACKING DATA ON TAPE					2	121865 092467		65-105A-07A
SUPERIOR CONJUNCTION FARADAY ROTATION		LEVY	NASA-JPL					65-105A-08
SUPERIOR CONJUNCTION FARADAY ROTATION DATA ON TAPE					1	101266 112466		65-105A-08A
SPECTRAL BROADENING		GOLDSTEIN	NASA-JPL					65-105A-09
RELATIVITY INVESTIGATION		ANDERSON	NASA-JPL					65-105A-10
OV3-1	02150	UNTST	04/22/66					66-034A
COSMIC RADIATION		KATZ	USAF GEOPHYS LAB					66-034A-01
PROTON SPECTROMETER		KATZ	USAF GEOPHYS LAB					66-034A-02
ELECTRON SPECTROMETER		KATZ	USAF GEOPHYS LAB					66-034A-03
LOW ENERGETIC ELECTRON ANALYZER		SAGALYN	USAF GEOPHYS LAB					66-034A-04
GEIGER COUNTERS		UNKNOWN	UNKNOWN					66-034A-05
MAGNETOMETERS		UNKNOWN	UNKNOWN					66-034A-06
AE-B	EXPLORER 32	UNTST	05/25/66	3/22/67	276.--	2725.--	64.67	66-044A
REFINED WORLD MAPS					4	052566 041867		66-044A-00B
ION MASS SPECTROMETER		BRINTON	NASA HEADQUARTERS					66-044A-01
ION MASS SPECTROMETER DATA ON MAGNETIC TAPE					1	060966 011767		66-044A-01A
ION MASS SPECTROMETER DATA ON MICROFILM					1	060966 011767		66-044A-01B
NEUTRAL PARTICLE MAGNETIC MASS SPECTROMETER		REBER	NASA-GSFC					66-044A-02
NEUTRAL PARTICLE DENSITIES IN TABULAR FORM					1	052666 053166		66-044A-02A
SATELLITE DRAG ATMOSPHERIC DENSITY		WULF-MATHIES	U OF TUBINGEN					66-044A-03
SATELLITE DRAG ATMOSPHERIC DENSITY VALUES					4	122366 082571		66-044A-03A
PRESSURE GAUGES		NEWTON	NASA HEADQUARTERS					66-044A-04
ELECTRON TEMPERATURE AND DENSITY		BRACE	NASA-GSFC					66-044A-05
OGO 3	OGO-B	UNTST	06/07/66	2/29/72	295.--	122219.--	31.4	66-049A
PREDICTED WORLD MAPS					10	081268 032172		66-049A-00A
REFINED WORLD MAPS ON MICROFILM					1	091871 111771		66-049A-00B
MASTER ORBIT WORLD MAPS					24	060766 030172		66-049A-00C
PLOTS OF EQUATORIAL PITCH ANGLE, LOCAL TIME, AND L VERSUS R ON MICROFILM					2	060966 040268		66-049A-00D
LISTING OF ONE MIN AVERAGES OF ORBIT PARAMETERS ON MICROFILM					5	060766 042368		66-049A-00E
PLOTS OF L AGAINST EQUATORIAL PITCH ANGLE AND LOCAL TIME ON MICROFILM					2	061066 040268		66-049A-00F
ANALYZED, CONDENSED, ORBIT/ATTITUDE TAPE					1	060766 012967		66-049A-00G
MULTICOORDINATE SYSTEM EPHEMERIS PLOTS					3	060766 040268		66-049A-00H
SOLAR COSMIC RAYS		ANDERSON	U OF CALIF, BERKELEY					66-049A-01
SOLAR COSMIC RAY PARTICLE COUNT ACCUMULATIONS ON MAGNETIC TAPE					30	062466 022767		66-049A-01A
COSMIC-RAY ISOTOPIC ABUNDANCE		MCDONALD	NASA-GSFC					66-049A-02
COSMIC-RAY SPECTRA AND FLUXES		SIMPSON	U OF CHICAGO					66-049A-03
REDUCED COSMIC RAY PARTICLE COUNT RATES ON MAGNETIC TAPE					65	060966 120169		66-049A-03A
1/2-HR AVG DIGITAL AND ANALOG COUNT RATE PLOTS ON MICROFILM					2	060966 120169		66-049A-03B
PULSE HEIGHT ANALYZER DATA ON MAGNETIC TAPE					27	060966 081668		66-049A-03C
U OF CHICAGO LOG OF DATA SET 66-049A-03A					1	060966 120169		66-049A-03D
U OF CHICAGO LOG OF DATA SET 66-049A-03C					1	060966 081668		66-049A-03E
POSITRON SEARCH AND GAMMA-RAY SPECTROMETER		CLINE	NASA-GSFC					66-049A-04
ELECTROSTATIC PLASMA ANALYSIS (PROTONS .1-20KEV).		WOLFE	NASA-ARC					66-049A-05
PLASMA PROBE, FARADAY CUP		BRIDGE	MASS INST OF TECH					66-049A-06
LOW ENERGY PROTON MEASUREMENT		EVANS	NOAA-ERL					66-049A-07
LOW-ENERGY ELECTRONS AND PROTONS		FRANK	U OF IOWA					66-049A-08
LOW ENERGY PROTON AND ELECTRON SPECTRA SURVEY OF THE MAGNETOSPHERE ON MOVIE FILM					400	071466 071666		66-049A-08A

AIM FILE IONOSPHERIC PHYSICS LISTING

SATELLITE NAME / INVESTIGATION NAME / DATA SET NAME	ALTERNATE NAMES	COUNTRY	LAUNCH DATE	INOP DATE	PERIAPSIS	APOAPSIS	INCLINATION	NSSDC ID
		PI	AGENCY					
			QUANTITY	TIME SPAN				
TRAPPED RADIATION SCINTILLATION COUNTER			KONRADI		NASA-JSC			66-049A-10
ALL PROTON-ELECTRON COUNT RATES, ANALYSED					14	060966 012667		66-049A-10A
HIGH BIT RATES OF REDUCED					9	060966 011667		66-049A-10B
MAGNETIC SURVEY USING TWO MAGNETOMETERS			HEPPNER		NASA-GSFC			66-049A-11
FIELD MAGNITUDE AS MEASURED BY THE GSFC RUBIDIUM VAPOR MAGNETOMETER, ON MICROFILM					32	060966 081468		66-049A-11A
MICROFILM LISTINGS OF 30-SEC AVG MAGNETIC FIELD MEASUREMENTS IN SEVERAL COORDINATES					3	060966 072166		66-049A-11B
TRIAXIAL SEARCH-COIL MAGNETOMETER			SMITH		NASA-JPL			66-049A-12
36.864-SEC AVERAGED SEARCH-COIL MAGNETOMETER DATA ON MAGNETIC TAPE					41	060966 042768		66-049A-12A
SEARCH-COIL MAGNETOMETER SQUISH PLOTS ON MICROFILM					1	060966 021268		66-049A-12B
INDEXES FOR TAPES IN DATA SET 66-049A-12A ON MICROFILM					1	060966 042768		66-049A-12C
SPHERICAL ION AND ELECTRON TRAP			SAGALYN		USAF GEOPHYS LAB			66-049A-13
PLANAR ION ELECTRON TRAP			WHIPPLE		U OF CALIF, SAN DIEGO			66-049A-14
POSITIVE ION CONCENTRATION			TAYLOR, JR.		NASA-GSFC			66-049A-15
ION CONCENTRATIONS VS L -5X8 FILM					167	072466 101767		66-049A-15A
RADIO PROPAGATION			FRITZ		NOAA-ERL			66-049A-16
VLF NOISE AND PROPAGATION			HELLIWELL		STANFORD U			66-049A-17
RADIO ASTRONOMY			HADDOCK		U OF MICHIGAN			66-049A-18
4- TO 2-MHZ SOLAR BURST LIST ON MICROFILM					1	061366 092967		66-049A-18A
4- TO 2-MHZ RADIO NOISE DATA ON MICROFILM					86	060966 081668		66-049A-18B
DATA SET CATALOG FOR 66-049A-18B ON MICROFILM					1	060966 100367		66-049A-18C
GEOCORONAL LYMAN-ALPHA SCATTERING			MANGE		US NAVAL RESEARCH LAB			66-049A-19
GEGENSCHEIN PHOTOMETRY			WOLFF		NASA-GSFC			66-049A-20
INTERPLANETARY DUST PARTICLES			BOHN		TEMPLE U			66-049A-21
ELECTRON SPECTROMETER			WINCKLER		U OF MINNESOTA			66-049A-22
PLOTS OF 2-MIN AVERAGED COUNT RATES VS TIME (NEAR RADIATION BELTS) ON MICROFILM					2	061166 042768		66-049A-22A
PLOTS OF 15-MIN AVGD. SPECTROMETER COUNT RATES VS S/C RADIAL DISTANCE ON MICROFILM					2	060966 040268		66-049A-22B
ORIGINAL REDUCED ELECTRON SPECTROMETER COUNTS ON CONDENSED MAGNETIC TAPES					18	060966 050368		66-049A-22C
TABULATIONS OF 5-MIN AVERAGED COUNT RATES ON MICROFILM					7	060966 050168		66-049A-22D
PLOTS OF 2- AND 5-MIN AVERAGED COUNT RATES VS L ON MICROFILM					2	061166 040268		66-049A-22E
TABULATIONS OF COUNT RATES VS TIME AT DISCRETE L VALUES ON MICROFILM					1	061166 122767		66-049A-22F
PLOTS OF 5-MIN AVERAGED COUNT RATES VS TIME ON MICROFILM					2	060966 043068		66-049A-22G
PLOTS OF COUNT RATES VS EQUATORIAL PITCH ANGLE FOR DISCRETE L VALUES ON MICROFILM					1	010067 120067		66-049A-22H
PITCH ANGLE NORMALIZED COUNT RATE VS T PLOTS FOR DISCRETE L VALUES, ON MICROFILM					1	120066 060067		66-049A-22I
PLOTS OF COUNT RATES VS TIME FOR DISCRETE INNER ZONE L VALUES ON MICROFILM					1	060066 020068		66-049A-22J
REDUCED L-INTERPOLATED COUNT RATES ON MAGNETIC TAPES					1	061166 122767		66-049A-22K
REFORMATTED ELECT SPECTROMETER COUNT DATA ON NSSDC STANDARD TAPES OF 66-049A-22C					6	060966 050368		66-049A-22L
IONIZATION CHAMBER			WINCKLER		U OF MINNESOTA			66-049A-23
PLOTS OF 1-MIN AVERAGED ION CHAMBER PULSE RATES VS TIME ON MICROFILM					3	060866 081168		66-049A-23A
ORIGINAL REDUCED ION CHAMBER PULSE RATES ON MAGNETIC TAPES					31	060966 081268		66-049A-23B
PLOTS OF 1-MIN AVERAGED PULSE RATES VS L ON MICROFILM					2	061166 040268		66-049A-23C
ATLAS OF 10- TO 50-KEV SOLAR FLARE X RAYS ON MICROFILM					1	062566 122967		66-049A-23D
PLOTS OF 2-MIN AVERAGED PULSE RATES VS SPACECRAFT RADIAL DISTANCE ON MICROFILM					2	060966 040268		66-049A-23E
TABULATIONS OF HOURLY AVERAGED PULSE RATES ON MICROFILM					1	060966 081068		66-049A-23F
PLOTS OF 2-MIN AVERAGED PULSE RATES VS TIME ON MICROFILM					2	060966 081068		66-049A-23G
TABULATIONS OF 1-MIN AVERAGED PULSE RATES ON MICROFILM					5	060966 081068		66-049A-23H
PLOTS OF 1-MIN AVERAGED PULSE RATES VS TIME NEAR PERIGEE ON MICROFILM					2	061166 081068		66-049A-23J
PLOTS OF 2-MIN AVERAGED PULSE RATES VS TIME ON MICROFILM					2	060966 081068		66-049A-23K
REFORMATTED ION CHAMBER PULSE RATES (FROM DATA SET 66-049A-23B) ON STANDARD TAPES					11	060966 081068		66-049A-23L
IMP-D----------EXPLORER 33----------UNTST----07/01/66----- 9/21/71-----265680.--480763.-- 24.4-----66-058A								
PREDICTED WORLD MAPS					17	070266 111671		66-058A-00A
SOLAR ECLIPTIC AND SOLAR MAGNETOSPHERIC EPHEMERIS PLOTS ON MICROFILM					1	070166 102971		66-058A-00D
SOLAR ECLIPTIC EPHEMERIS PLOTS					2	070166 022870		66-058A-00E
MULTICOORDINATE SYSTEM EPHEMERIS TAPES					49	070166 030170		66-058A-00F
12-HOUR SOLAR ECLIPTIC EPHEMERIS PARAMETER LISTING ON MICROFILM					1	070166 022870		66-058A-00G
COMPACTED VERSION OF DATA SET 66-058A-00F					5	070166 123170		66-058A-00H
GSFC MAGNETOMETER			NESS		NASA-GSFC			66-058A-01
5.12-SEC VECTOR MAGNETIC FIELD DATA ON TAPE					59	070166 100568		66-058A-01A
NSSDC STANDARD TAPES OF 66-058A-01A					47	070166 100568		66-058A-01B
82-SEC AVERAGED VECTOR MAGNETIC FIELD DATA ON MAGNETIC TAPE					15	070166 100568		66-058A-01C
MULTI-SPACECRAFT HOURLY AVERAGED INTER- PLANETARY MAGNETIC FIELD VECTORS ON TAPE					1	070166 100568		66-058A-01D
81.92-SEC VECTOR MAGNETIC FIELD PLOTS ON MICROFILM					3	070166 102868		66-058A-01E
MERGED NESS/SONETT 82 SECOND AVERAGED MAGNETOMETER DATA ON MAGNETIC TAPE					3	070166 080368		66-058A-01F
LOW-ENERGY INTEGRAL SPECTRUM MEASUREMENT EXPERIMENT			SERBU		NASA-GSFC			66-058A-02
AMES MAGNETIC FIELDS			SONETT		U OF ARIZONA			66-058A-03
AVERAGED MAGNETIC FIELD VECTOR PLOTS ON MICROFILM					4	070166 091370		66-058A-03A
HOURLY AVERAGED INTERPLANETARY MAGNETIC FIELD DATA ON TAPE					1	010167 123169		66-058A-03B
81.92-SEC VECTOR MAGNETIC FIELD DATA ON MAGNETIC TAPES					20	070166 091470		66-058A-03C
5.12 SEC VECTOR MAGNETIC FIELD DATA ON MAGNETIC TAPES					195	070166 091470		66-058A-03D
MERGED NESS/SONETT 82 SECOND AVERAGED MAGNETOMETER DATA ON MAGNETIC TAPE					3	070166 080368		66-058A-03E
REBLOCKED 82 SECOND AVERAGED MAGNETIC FIELD VECTORS ON MAGNETIC TAPE					20	070166 091470		66-058A-03F
ION CHAMBER AND GM COUNTERS			ANDERSON		U OF CALIF, BERKELEY			66-058A-04
ORIGINAL REDUCED ION CHAMBER AND GM COUNTS ON TAPE					7	070166 060967		66-058A-04A
ELECTRON AND PROTON DETECTORS			VAN ALLEN		U OF IOWA			66-058A-05
PLOTS OF 2- TO 12-A SOLAR SOFT X-RAY FLUXES ON MICROFILM					2	070266 092668		66-058A-05A
2- TO 12-A SOLAR SOFT X-RAY FLUXES ON TAPE					2	070266 092668		66-058A-05B
SOLAR SOFT X-RAY FLUX LISTINGS ON MICROFILM					8	070266 092668		66-058A-05C
SOLAR SOFT X-RAY BURST DATA ON TAPE					1	070366 072567		66-058A-05D
LISTING OF SOLAR SOFT X-RAY BURST DATA ON MICROFILM					1	070366 072567		66-058A-05E
SOLAR SOFT X-RAY DATA COVERAGE ON MICROFILM					1	070266 072667		66-058A-05F
PLOTS OF X-RAY AND PARTICLE DATA ON MICROFILM					18	070166 123168		66-058A-05G
HALF HOUR SUMMARY OF ALL DETECTORS ON MAGNETIC TAPE					3	063066 110271		66-058A-05H
PLASMA PROBE			BRIDGE		MASS INST OF TECH			66-058A-06
HOURLY AVERAGED INTERPLANETARY PLASMA PARAMETERS ON TAPE AS SUPPLIED BY MIT					1	070166 093069		66-058A-06A
3-MIN INTERPLANETARY PLASMA PARAMETERS ON MAGNETIC TAPE					2	070666 101471		66-058A-06B
PLOTS OF HOURLY AVERAGED PLASMA PARAMETERS ON FICHE					1	070666 042071		66-058A-06C
HOURLY AVERAGED INTERPLANETARY PLASMA DATA ON TAPE WITH BLOCKS OF ZEROS REMOVED					1	070666 092369		66-058A-06D
LISTINGS OF HOURLY AVERAGED INTERPLANETARY PLASMA PARAMETERS					1	070666 092369		66-058A-06F
SOLAR CELL DAMAGE			SLIFER, JR.		NASA-GSFC			66-058A-07
LUNAR IONOSPHERE AND RADIO PROPAGATION EXPERIMENT			PETERSON		STANFORD U			66-058A-08
SELENODESY			KAULA		U OF CALIF, LA			66-058A-09
GEMINI 10----------02349----------UNTST----07/18/66----- 7/21/66----- 391.-- 400.-- 28.86-----66-066A								
ZODIACAL LIGHT PHOTOGRAPHY			NEY		U OF MINNESOTA			66-066A-01

AIM FILE IONOSPHERIC PHYSICS LISTING

SATELLITE NAME / INVESTIGATION NAME / DATA SET NAME	ALTERNATE NAMES	COUNTRY	LAUNCH DATE	INOP DATE	PERIAPSIS	APOAPSIS	INCLINATION	NSSDC ID
		PI			AGENCY			
					QUANTITY	TIME SPAN		
ZODIACAL LIGHT PHOTOGRAPHY ON 35-MM FILM					1	071866 072166		66-066A-01A
70-MM HASSELBLAD SYNOPTIC TERRAIN PHOTOGRAPHS		LOWMAN, JR.			NASA-GSFC			66-066A-02
SYNOPTIC WEATHER PHOTOGRAPHY		NAGLER			NOAA-NMC			66-066A-03
AGENA MICROMETEORITE COLLECTION		HEMENWAY			DUDLEY OBS			66-066A-04
MICROMETEORITE COLLECTION		HEMENWAY			DUDLEY OBS			66-066A-05
UV STAR FIELD CAMERA		HENIZE			NASA-JSC			66-066A-06
ION WAKE MEASUREMENT		MEDVED			ELECTRO-OPT SYSTEMS			66-066A-07
STAR OCCULATION NAVIGATION		VALLERIE			USAF AVIONICS LAB			66-066A-08
TRI-AXIS MAGNETOMETER		WOMACK			NASA-JSC			66-066A-09
LUNAR UV SPECTRAL REFLECTANCE		STOKES			NASA-JSC			66-066A-10
BETA SPECTROMETER		MARBACK			LOCKHEED ELECTRONICS			66-066A-11
BREMSSTRAHLUNG SPECTROMETER		LINDSEY			NASA-JSC			66-066A-12
LANDMARK CONTRAST MEASUREMENT		UNKNOWN			UNKNOWN			66-066A-13
POSITIVE ION SENSING		SMIDDY			USAF GEOPHYS LAB			66-066A-14
PIONEER 7	PIONEER-B	UNTST	08/17/66		1.009	1.125	0.098	66-075A
PLOT OF PIONEER 6 AND 7 TRAJECTORY IN FIXED SUN-EARTH LINE COORDINATES					1	081766 070971		66-075A-00D
MULTI-COORDINATE SYSTEM EPHEMERIS TAPES					9	081766 010272		66-075A-00E
COMPRESSED EPHEMERIS DATA ON MAGNETIC TAPE					1	081766 010272		66-075A-00F
COROTATION DELAY TIME PLOTS AND LISTINGS ON MICROFILM					1	080166 010072		66-075A-00G
SINGLE-AXIS MAGNETOMETER		NESS			NASA-GSFC			66-075A-01
VECTOR MAGNETIC FIELD DATA, 30-SEC AVERAGES ON TAPE					4	081766 022567		66-075A-01A
HOURLY AVERAGED VECTOR MAGNETIC FIELD DATA ON MICROFILM					1	081766 102967		66-075A-01B
TIME SEQUENCED INTERSPERSED PIONEER 6 + 7 HR AVERAGED MAGNETIC FIELD DATA ON TAPE					1	081766 102767		66-075A-01C
SOLAR WIND PLASMA FARADAY CUP		BRIDGE			MASS INST OF TECH			66-075A-02
PLOTS OF HOURLY AVERAGED SOLAR WIND PLASMA PARAMETERS ON MICROFILM					1	081866 120268		66-075A-02A
HOURLY AVERAGED VELOCITY AND DENSITY VALUES IN SGD BULLETINS					5	060269 103169		66-075A-02B
1-HR AVG SOLAR WIND DATA FROM THE EXPERIMENTS ON PIONEER 6 AND PIONEER 7					8	081866 120268		66-075A-02C
HOURLY AVERAGED PLASMA PARAMETERS ON BCD 7-TRACK MAGNETIC TAPE					1	081966 112968		66-075A-02D
LISTINGS OF MAGNETOTAIL HIGH RESOLUTION FLUXES ON MICROFILM					1	091966 093066		66-075A-02E
ELECTROSTATIC ANALYZER		WOLFE			NASA-ARC			66-075A-03
PLOTS OF ANALYZED PLASMA PARAMETERS ON MICROFILM					11	081766 020969		66-075A-03A
PUBLISHED PRELIMINARY SOLAR WIND PARAMETERS					56	052175 052175		66-075A-03B
HOURLY AVERAGED PLASMA PARAMETERS					1	081966 112866		66-075A-03C
HOURLY AVERAGED PLASMA PARAMETERS ON MICROFILM					1	081966 112866		66-075A-03D
TWO-FREQUENCY BEACON RECEIVER		ESHLEMAN			STANFORD U			66-075A-04
HOURLY VALUES OF REDUCED TOTAL ELECTRON CONTENT DATA ON TAPE					1	081866 112967		66-075A-04A
HOURLY VALUES OF REDUCED TOTAL ELECTRON CONTENT DATA ON MICROFILM					1	081866 112967		66-075A-04B
DIGITAL VALUES OF SOLAR WIND ELECTRON DENSITY VS TIME NORMALIZED TO 1 AU ON TAPE					1	081766 102667		66-075A-04D
DIGITAL VALUES OF SOLAR WIND ELECTRON DENSITY VS TIME NORMALIZED 1AU (MICROFILM)					1	091266 052069		66-075A-04E
COSMIC-RAY ANISOTROPY		MCCRACKEN			CSIRO			66-075A-05
COUNT RATE LISTINGS ON MICROFILM					1	081866 013167		66-075A-05A
COUNT RATE PLOTS ON MICROFILM					1	081766 012867		66-075A-05B
COSMIC-RAY TELESCOPE		SIMPSON			U OF CHICAGO			66-075A-06
REDUCED COUNT RATE AND PULSE HEIGHT ANALYZER DATA ON MAGNETIC TAPE					8	081766 122967		66-075A-06A
COUNT RATE PLOTS (COUNTS/SEC VS DAY NUMBER) AND TRAJECTORY PLOT ON MICROFILM					1	081766 122768		66-075A-06D
COSMIC-RAY PROTON COUNTING RATES PUBLISHED IN 'SOLAR GEOPHYSICAL DATA'					32	030769 080771		66-075A-06E
CELESTIAL MECHANICS		ANDERSON			NASA-JPL			66-075A-07
SUPERIOR CONJUNCTION FARADAY ROTATION		LEVY			NASA-JPL			66-075A-08
SUPERIOR CONJUNCTION FARADAY ROTATION DATA ON TAPE					1	061367 071967		66-075A-08A
GEMINI 11	02415	UNTST	09/12/66	9/15/66	161.	280.	28.83	66-081A
NUCLEAR EMULSION		SHAPIRO			US NAVAL RESEARCH LAB			66-081A-01
AIRGLOW HORIZON PHOTOGRAPHY		KOOMEN			US NAVAL RESEARCH LAB			66-081A-02
UV STAR FIELD CAMERA		HENIZE			NASA-JSC			66-081A-03
ION-WAKE MEASUREMENT		MEDVED			ELECTRO-OPT SYSTEMS			66-081A-04
LUNAR UV SPECTRAL REFLECTANCE		STOKES			NASA-JSC			66-081A-05
SYNOPTIC TERRAIN PHOTOGRAPHS		LOWMAN, JR.			NASA-GSFC			66-081A-06
SYNOPTIC WEATHER PHOTOGRAPHY		NAGLER			NOAA-NMC			66-081A-07
DUST AND PARTICULATE MATTER BEHIND AND AHEAD OF THE MOON'S PATH		MORRIS			US GEOLOGICAL SURVEY			66-081A-08
SYNERGISTIC EFFECTS OF RADIATION AND ZERO-G ON WHITE BLOOD + NEURBENDER					HOLIFIELD NATL LAB			66-081A-09
IMAGE ORTHICON OBSERVATIONS OF ASTRONOMICAL PHENOMENA		HEMENWAY			DUDLEY OBS			66-081A-10
OV3-2	02517	UNTST	10/28/66					66-097A
2 ELECTROSTATIC ANALYZERS		UNKNOWN			UNKNOWN			66-097A-01
2 RETARDING POTENTIAL ANALYZERS		UNKNOWN			UNKNOWN			66-097A-02
IMPEDENCE PROBE		UNKNOWN			UNKNOWN			66-097A-03
MASS SPECTROMETER POSITIVE ION		UNKNOWN			UNKNOWN			66-097A-04
PLASMA PROBES		UNKNOWN			UNKNOWN			66-097A-05
ATMOSPHERIC DRAG		WULF-MATHIES			U OF BONN			66-097A-06
OV4-3	02524	UNTST	11/02/66					66-099A
HEAT TRANSER APL 601		DELANEY			USAF AEROPROPUL LAB			66-099A-01
MICROMETERITE DETECTOR CRL 574		SOBERMAN			GENERAL ELECTRIC CO			66-099A-02
BIO CELL SAM 501		IRVINE			USAF AEROSPACE MED			66-099A-03
ORBIS(LOW) CRLF 738		MULLEN			USAF GEOPHYS LAB			66-099A-04
FUEL CELL APL 704		HAROOTYAN, JR.			USAF AEROPROPUL LAB			66-099A-05
GEMINI 12	02566	UNTST	11/11/66	11/15/66	243.	310.	28.78	66-104A
FROG EGG GROWTH		UNKNOWN			UNKNOWN			66-104A-01
SYNOPTIC TERRAIN PHOTOGRAPHS		LOWMAN, JR.			NASA-GSFC			66-104A-02
SYNOPTIC WEATHER PHOTOGRAPHY		NAGLER			NOAA-NMC			66-104A-03
MICROMETEOROID CRATERING		HEMENWAY			DUDLEY OBS			66-104A-04
AIRGLOW HORIZON PHOTOGRAPHY		KOOMEN			US NAVAL RESEARCH LAB			66-104A-05
MICROMETEORITES		HEMENWAY			DUDLEY OBS			66-104A-06
UV STAR FIELD CAMERA		HENIZE			NASA-JSC			66-104A-07
EARTH MOON LIBRATION REGION PHOTOGRAPHY		MORRIS			US GEOLOGICAL SURVEY			66-104A-08
SODIUM CLOUD PHOTOGRAPHY		BLAMONT			CNRS-SA			66-104A-09
TRI AXIS MAGNETOMETER		WOMACK			NASA-JSC			66-104A-10
LUNAR UV SPECTRAL REFLECTANCE		STOKES			NASA-JSC			66-104A-11
BETA SPECTROMETER		MARBACK			LOCKHEED ELECTRONICS			66-104A-12
BREMSSTRAHLUNG SPECTROMETER		UNKNOWN			UNKNOWN			66-104A-13
POSITIVE ION SENSING		SMIDDY			USAF GEOPHYS LAB			66-104A-14
UV PICTURES OF THE INNER CORONA		TOUSEY			US NAVAL RESEARCH LAB			66-104A-15

AIM FILE IONOSPHERIC PHYSICS LISTING

SATELLITE NAME / INVESTIGATION NAME / DATA SET NAME	ALTERNATE NAMES	COUNTRY	LAUNCH DATE	INOP DATE	PERIAPSIS	APOAPSIS	INCLINATION	NSSDC ID
		PI			AGENCY			
					QUANTITY	TIME SPAN		
DUST PARTICLES IN THE UPPER ATMOSPHERE			HEMENWAY		DUDLEY OBS			66-104A-16
ATS 1	ATS-B	UNTST	12/07/66		35782.--	35793.--	0.1	66-110A
PREDICTED WORLD MAPS					27	120766 120379		66-110A-00A
SUPRATHERMAL ION DETECTOR			FREEMAN		RICE U			66-110A-01
SUPRATHERMAL ION DATA FROM THE ATS-1 SPECTROMETER ON BCD MAGNETIC TAPE					55	121066 021867		66-110A-01A
BIAXIAL FLUXGATE MAGNETOMETER			COLEMAN, JR.		U OF CALIF, LA			66-110A-02
2.5-MIN AVG VECTOR MAGNETOMETER DATA FROM SYNCHRONOUS ALTITUDE ON FILM					2	111767 122968		66-110A-02B
2.5-MIN AVG VECTOR MAGNETOMETER DATA FROM SYNCHRONOUS ALTITUDE ON TAPE					3	120766 122968		66-110A-02C
15-SEC AVG VECTOR MAGNETOMETER DATA FROM SYNCHRONOUS ALTITUDE ON FILM					4	121066 122968		66-110A-02D
15-SEC AVG VECTOR MAGNETOMETER DATA FROM SYNCHRONOUS ALTITUDE ON TAPE					22	120766 122968		66-110A-02E
ATS-1 COMMAND LOG ON FILM					1	120766 123068		66-110A-02F
SPACECRAFT AND EXPERIMENT COMMAND LOG AS					1	120766 123168		66-110A-02G
OMNIDIRECTIONAL SPECTROMETER			PAULIKAS		AEROSPACE CORP			66-110A-03
PROTON AND ELECTRON FLUX VALUES ON TAPE					49	121766 120568		66-110A-03A
PROTON AND ELECTRON FLUX VALUES ON REFORMATTED TAPE					10	121766 120568		66-110A-03C
HOURLY AVERAGED PROTON FLUXES PUBLISHED IN 'SOLAR-GEOPHYSICAL DATA'					32	010170 083172		66-110A-03D
ELECTRON SPECTROMETER			WINCKLER		U OF MINNESOTA			66-110A-04
6-MIN AVERAGED COUNT RATES ON MAGNETIC TAPE					1	121966 123067		66-110A-04A
6-MIN AVERAGED COUNT RATE PLOTS ON MICROFILM					1	121966 123067		66-110A-04B
PARTICLE TELESCOPE			BROWN		BELL TELEPHONE LAB			66-110A-05
PLOTS OF REDUCED PARTICLE COUNT RATES ON MICROFILM					7	120966 030167		66-110A-05A
SOLAR CELL RADIATION DAMAGE			WADDEL		NASA-GSFC			66-110A-06
THERMAL COATING DEGRADATION			TRIOLO		NASA-GSFC			66-110A-07
RANGE RATE BEACON (NASA-GSFC)			UNKNOWN		UNKNOWN			66-110A-08
SPIN-SCAN CLOUDCOVER CAMERA (SSCC)			SUOMI		U OF WISCONSIN			66-110A-09
THE ATS METEOROLOGICAL DATA CONTROL ON MICROFICHE					42	010167 052570		66-110A-09A
COMMUNICATION MICROWAVE TRANSPONDER (HUGHES CO.)			UNKNOWN		UNKNOWN			66-110A-10
COMMUNICATION VHF TRANSPONDER (HUGHES CO.)			UNKNOWN		UNKNOWN			66-110A-11
NUTATION SENSOR			UNKNOWN		UNKNOWN			66-110A-12
RESISTO-JET THRUSTER			UNKNOWN		UNKNOWN			66-110A-13
ELECTROSTATIC PARTICLE ANALYZER (CANCELLED)			HARRISON		TRW SYSTEMS GROUP			66-110A-14
FARADAY ROTATION			DAROSA		STANFORD U			66-110A-15
PUBLISHED PLOTS OF ANALYZED TOTAL ELECTRON CONTENT DATA					4	010167 123170		66-110A-15A
TOTAL ELECTRON CONTENT, PLOTS AND TABULATIONS					14	010171 123171		66-110A-15B
TOTAL ELECTRON CONTENT DATA ON MAGNETIC TAPE					1	010170 123071		66-110A-15C
METEOROLOGICAL DATA RELAY SYSTEM			WISHNA		NASA-GSFC			66-110A-16
ATS 2	ATS-A	UNTST	04/06/67	9/00/68	178.--	11124.--	28.40	67-031A
PREDICTED WORLD MAPS					3	040667 092468		67-031A-00A
RADIO ASTRONOMY			STONE		NASA-GSFC			67-031A-01
SEVEN-STEP 0.5- TO 3-MHZ RADIO FLUXES ON MAGNETIC TAPE					34	040667 102267		67-031A-01A
RADIO FLUX LISTING ON MICROFILM					3	040767 102367		67-031A-01B
PLOTS OF SINGLE FREQUENCY FLUX VS TIME ON MICROFILM					8	040967 102367		67-031A-01C
PLOTS OF MULTIFREQUENCY FLUX VS TIME ON MICROFILM					1	040767 102367		67-031A-01D
MAGNETOSPHERIC ELECTRIC FIELDS			AGGSON		NASA-GSFC			67-031A-02
ELECTRON MAGNETIC DEFLECTION SPECTROMETER			WINCKLER		U OF MINNESOTA			67-031A-03
PARTICLE TELESCOPE			BROWN		BELL TELEPHONE LAB			67-031A-04
OMNIDIRECTIONAL PROTON AND ELECTRON DETECTORS			MCILWAIN		U OF CALIF, SAN DIEGO			67-031A-05
REDUCED ELECTRON AND PROTON COUNT RATES ON MAGNETIC TAPE					31	040767 102367		67-031A-05A
VLF RECEIVER			BROWN		BELL TELEPHONE LAB			67-031A-06
EARTH'S ALBEDO (DOD)			UNKNOWN		UNKNOWN			67-031A-07
COMMUNICATION MICROWAVE TRANSPONDER (HUGHES CO.)			UNKNOWN		UNKNOWN			67-031A-08
GRAVITY GRADIANT STABILIZATION (GEN. ELECT. CO.)			UNKNOWN		UNKNOWN			67-031A-09
ADVANCED VIDICON CAMERA SYSTEM (AVCS)			OSTROW		NASA-GSFC			67-031A-10
THERMAL COATING DEGRADATION			TRIOLO		NASA-GSFC			67-031A-11
SOLAR CELL DEGRADATION			WADDEL		NASA-GSFC			67-031A-12
SAN MARCO 2	SAN MARCO-B	KENYA	04/26/67	8/14/67	--	--		67-038A
PREDICTED WORLD MAPS					1	081167 082367		67-038A-00A
REFINED WORLD MAPS					2	042667 081467		67-038A-00B
RADIO BEACON			BROGLIO		NATL RES COUNC ITALY			67-038A-01
ATMOSPHERIC DRAG DENSITY ACCELEROMETER			BROGLIO		NATL RES COUNC ITALY			67-038A-02
20MC BEACON			CARRARA		U OF FLORENCE			67-038A-03
ARIEL 3	UK 3	UNTST	05/05/67	12/14/70	497.--	608.--	80.17	67-042A
PREDICTED WORLD MAPS					15	050567 121571		67-042A-00A
REFINED ORBIT ELEMENTS AT 3 DAY INTERVALS					2	050667 121370		67-042A-00D
LANGMUIR PROBE			SAYERS		U OF BIRMINGHAM			67-042A-01
ELECTRON TEMPERATURE VALUES ON MAGNETIC TAPE					1	050567 101267		67-042A-01A
ELECTRON TEMPERATURE PLOTS ON MICROFILM					11	050567 041468		67-042A-01B
ELECTRON DENSITY AND TEMPERATURE PLOTS ON MICROFILM					12	050567 041568		67-042A-01C
ELECTRON DENSITY AND TEMPERATURE LISTINGS ON MICROFILM					3	050667 123167		67-042A-01D
GALACTIC RADIO NOISE SOURCES			SMITH		U OF CAMBRIDGE			67-042A-02
MOLECULAR OXYGEN DISTRIBUTION			STEWART		METEOROLOGICAL OFFICE			67-042A-03
MOLECULAR OXYGEN SMOOTHED VOLTAGE OUTPUT TAPES					2	050567 011268		67-042A-03A
PRINTOUT OF MOLECULAR OXYGEN DENSITY PROFILES ON MICROFILM					1	050567 112167		67-042A-03B
TERRESTRIAL RADIO (THUNDERSTORM) NOISE			MURPHY		UNKNOWN			67-042A-04
THUNDERSTORM NOISE DATA ON MAGNETIC TAPE					53	050567 041468		67-042A-04A
PLOTS OF THUNDERSTORM NOISE VS LATITUDE ON MICROFILM					11	050567 041468		67-042A-04B
VLF RECEIVER, FIXED-FREQUENCY SIGNAL STRENGTH			KAISER		U OF SHEFFIELD			67-042A-05
MINIMUM, MAXIMUM, AND MEAN VLF SIGNAL STRENGTH VALUES ON MICROFILM					4	050567 093067		67-042A-05A
MINIMUM, MAXIMUM, AND MEAN VLF SIGNAL STRENGTH VALUES ON TAPE					29	050567 041468		67-042A-05B
RADIO FREQUENCY CAPACITANCE PROBE			SAYERS		U OF BIRMINGHAM			67-042A-06
PLASMA FREQUENCY VALUES ON MAGNETIC TAPE					53	050567 041468		67-042A-06A
PLASMA FREQUENCY PLOTS ON MICROFILM					11	050567 041468		67-042A-06B
MARINER 5	MARINER VENUS 67	UNTST	06/14/67	11/21/67	--	--		67-060A
S-BAND OCCULATION			KLIORE		NASA-JPL			67-060A-01
TWO-FREQUENCY BEACON RECEIVER			ESHLEMAN		STANFORD U			67-060A-02
HOURLY VALUES OF REDUCED TOTAL ELECTRON CONTENT DATA ON PUNCHED CARDS					1	061467 112167		67-060A-02A
HOURLY VALUES OF REDUCED TOTAL ELECTRON CONTENT DATA ON MICROFILM					1	061467 112167		67-060A-02B
DIGITAL VALUES OF SOLAR WIND ELECTRON DENSITY VS TIME NORMALIZED TO 1AU					1	090167 102667		67-060A-02C
INTERPLANETARY ION PLASMA PROBE FOR			BRIDGE		MASS INST OF TECH			67-060A-03

AIM FILE IONOSPHERIC PHYSICS LISTING

SATELLITE NAME / INVESTIGATION NAME / DATA SET NAME	ALTERNATE NAMES	COUNTRY	LAUNCH DATE	INOP DATE	PERIAPSIS	APOAPSIS	INCLINATION	NSSDC ID
		PI	AGENCY	QUANTITY	TIME SPAN			
HOURLY AVERAGED PROTON PLASMA PARAMETERS ON 16-MM MICROFILM				1	061467 112167			67-060A-03A
HOURLY AVERAGED PROTON PLASMA PARAMETERS ON 7-TRACK BCD MAGNETIC TAPE				1	061467 112167			67-060A-03B
LISTINGS OF COUNTS/FRAME-FINE TIME RESOLUTION ON MICROFILM				1	061467 112167			67-060A-03C
HIGH TIME RESOLUTION PLASMA PARAMETERS MERGED WITH MAGNETIC FIELD VECTORS ON TAPE				1	061467 112167			67-060A-03D
TRAPPED RADIATION DETECTOR		VAN ALLEN	U OF IOWA					67-060A-04
TRIAXIAL LOW FIELD HELIUM MAGNETOMETER		SMITH	NASA-JPL					67-060A-05
FINE-TIME SCALE MAGNETOMETER DATA ON TAPE				1	061467 112167			67-060A-05A
1-, 3-, AND 24-HOUR AVERAGES OF INTERPLANETARY MAGNETIC FIELD VECTORS				1	061467 112167			67-060A-05B
1-DAY, 3-HR, AND 1-HR AVG PLOTS OF TRIAXIAL MAGNETOMETER DATA ON MICROFILM				1	061467 112167			67-060A-05C
TRIAXIAL MAGNETIC FIELD MEASUREMENTS FOR THE MARINER ENCOUNTER WITH VENUS				1	101967 101967			67-060A-05D
MAGNETIC FIELD VECTORS MERGED WITH HIGH TIME RESOLUTION PLASMA PARAMETERS ON TAPE				1	061467 112167			67-060A-05E
ULTRAVIOLET PHOTOMETER		BARTH	U OF COLORADO					67-060A-06
CELESTIAL MECHANICS		ANDERSON	NASA-JPL					67-060A-07
DOPPLER RADIO TRACKING DATA ON TAPE				2	061467 112067			67-060A-07A
OGO 4----------OGO-D----------UNTST----07/28/67----- 2/00/70-----				412.--	908.--	86.-----		67-073A
PREDICTED WORLD MAPS				6	012769 102171			67-073A-00A
MASTER ORBIT WORLD MAPS				11	072867 080669			67-073A-00C
ORBIT ATTITUDE DATA ON MAGNETIC TAPE				2	072867 050868			67-073A-00D
RADIO ASTRONOMY		HADDOCK	U OF MICHIGAN					67-073A-01
VLF NOISE AND PROPAGATION		HELLIWELL	STANFORD U					67-073A-02
VLF RECEIVER, DARTMOUTH		MORGAN	DARTMOUTH COLLEGE					67-073A-03
TRIAXIAL SEARCH-COIL MAGNETOMETER		SMITH	NASA-JPL					67-073A-05
MAGNETIC SURVEY, RUBIDIUM VAPOR MAGNETOMETER		CAIN	US GEOLOGICAL SURVEY					67-073A-06
RUBIDIUM MAGNETOMETER DATA				11	072967 011969			67-073A-06A
COSMIC-RAY IONIZATION		ANDERSON	SCIENCE APPL, INC					67-073A-07
MICROFILM PLOTS OF TOTAL IONIZATION RATES AND SATELLITE ALT. VS INVARIANT LAT.				1	073067 081167			67-073A-07A
LOW-ENERGY PROTON, ALPHA PARTICLE MEASUREMENT		SIMPSON	U OF CHICAGO					67-073A-08
REDUCED COSMIC-RAY COUNT RATE AND ORBITAL DATA MERGED ON MAGNETIC TAPE				291	072867 020269			67-073A-08A
COUNT RATE PLOTS (R VS ENERGY LOSS) AND ORBITAL DATA ON MICROFILM				15	072967 120768			67-073A-08B
GALACTIC AND SOLAR COSMIC RAYS		WEBBER	U OF NEW HAMPSHIRE					67-073A-09
REDUCED COSMIC-RAY DATA ON TAPE 50-2000 MEV/NUCLEON				2	073067 082767			67-073A-09A
PLOTS OF PARTICLE COUNT RATES ON MICROFILM				1	073067 082767			67-073A-09B
NSSDC STANDARD TAPE VERSION OF PHA PART OF DATA SET 67-073A-09A				1	073067 082767			67-073A-09C
LOW-ENERGY PROTON AND ELECTRON		VAN ALLEN	U OF IOWA					67-073A-10
LOW-ENERGY AURORAL PARTICLE DETECTOR		HOFFMAN	NASA-GSFC					67-073A-11
LOW-ENERGY (AURORAL) PARTICLE COUNT RATES ON MAGNETIC TAPE				77	073067 012569			67-073A-11A
REDUCED COUNT RATE DATA ON MAGNETIC TAPE				101	073067 012569			67-073A-11D
LISTINGS OF DATA ACQUISITION TIMES ON MICROFILM				1	073067 012569			67-073A-11E
PLOTS OF 0.576-MIN AVERAGED COUNT RATE DATA FROM THREE DETECTORS ON MICROFILM				5	073067 011469			67-073A-11F
MICROFILMED PLOTS OF PORTIONS OF THE SATELLITE ORBIT WHERE DATA WERE TAKEN				3	073067 012569			67-073A-11G
AIRGLOW PHOTOMETER		REED	NASA-GSFC					67-073A-12
AIRGLOW DATA MAPS AS COLOR TRANSPARENCIES				19	083067 011068			67-073A-12A
AIRGLOW DATA MAPS AS COLOR NEGATIVES				19	083067 011068			67-073A-12B
AIRGLOW INTENSITIES ON MAGNETIC TAPES				9	081967 011968			67-073A-12C
AIRGLOW DATA MAPS BY ORBIT ON MICROFILM				11	081967 012968			67-073A-12D
SECOND BY SECOND AIRGLOW DATA ON FILM				40	072967 122168			67-073A-12E
CALIBRATION DATA ON FILM				6	072867 123068			67-073A-12F
DIRECTORY PLOTS ON FILM				1	072967 071969			67-073A-12G
SYNOPTIC POLAR PLOTS ON FILM				18	072967 013168			67-073A-12H
LATITUDE-LONGITUDE PLOTS ON FILM				19	081967 012968			67-073A-12I
ELECTROMETER OUTPUTS VS LATITUDE ON FILM				16	083067 011668			67-073A-12J
ZONAL AVERAGES ON TAPE				1	072967 122168			67-073A-12K
CALIBRATION DATA ON TAPE				4	072867 123068			67-073A-12M
DIRECTORY DATA ON TAPE				9	072967 112468			67-073A-12N
PHOTOMETER OUTPUT MAP ON MAGNETIC TAPE				11	081967 012968			67-073A-12O
SECOND BY SECOND AIRGLOW DATA ON TAPE				46	072967 100268			67-073A-12P
SYNOPTIC AIRGLOW DATA ON TAPE				6	080167 013168			67-073A-12Q
LYMAN-ALPHA AND UV AIRGLOW STUDY		MANGE	US NAVAL RESEARCH LAB					67-073A-13
AIRGLOW RADIATION INTENSITY PLOTS ON MICROFILM				2	072967 021268			67-073A-13A
UV SPECTROMETER 1100-1750A, 1750-3400A		BARTH	U OF COLORADO					67-073A-14
OZONE DATA ON MAGNETIC TAPE				1	083067 022968			67-073A-14A
NEUTRAL PARTICLE AND ION MEASUREMENTS		JONES	U OF MICHIGAN					67-073A-15
POSITIVE ION COMPOSITION		TAYLOR, JR.	NASA-GSFC					67-073A-16
NEUTRAL PARTICLE MEASUREMENTS		NEWTON	NASA HEADQUARTERS					67-073A-17
INTERPLANETARY DUST PARTICLES		NILSSON	FLINDERS U OF S AUST					67-073A-18
POSITIVE ION STUDY		CHANDRA	NASA-GSFC					67-073A-19
SOLAR UV EMISSIONS		HINTEREGGER	USAF GEOPHYS LAB					67-073A-20
SOLAR X-RAY EMISSIONS		KREPLIN	US NAVAL RESEARCH LAB					67-073A-21
SOLAR X-RAY PLOTS ON MICROFILM				19	072967 071668			67-073A-21A
HOURLY AVERAGED SOLAR X-RAY FLUXES ON MAGNETIC TAPE				1	072967 071568			67-073A-21B
HOURLY AVERAGED SOLAR X-RAY FLUXES ON MICROFILM				1	072967 071568			67-073A-21C
PLOTS OF X-RAY FLUXES DURING SOLAR FLARES ON MICROFILM				1	073067 122067			67-073A-21D
SOLAR X-RAY FLUXES - FOUR BANDS ON MAGNETIC TAPE				4	100267 071568			67-073A-21E
NSSDC STANDARD TAPE OF 67-073A-21E				1	100267 071568			67-073A-21F
FOUR BAND SOLAR X-RAY 0.5-6 ANGSTROMS, MICROFILM				1	073067 122076			67-073A-21G
COSMOS 184----------KOSMOS 184----------USSRN----10/24/67----- 5/00/68-----				600.--	638.--	81.19-----		67-102A
DUAL VIDICON CAMERAS		UNKNOWN	SOVIET ACAD OF SCI					67-102A-01
SCANNING HRIR		UNKNOWN	SOVIET ACAD OF SCI					67-102A-02
ACTINOMETRIC INSTRUMENT		UNKNOWN	SOVIET ACAD OF SCI					67-102A-03
ION DETECTOR		UNKNOWN	UNKNOWN					67-102A-04
ION DETECTORS		PONOMAREV	UNKNOWN					67-102A-05
ATS 3----------ATS-C----------UNTST----11/05/67-----				----- 35776.--	35812.--	0.45-----		67-111A
PREDICTED WORLD MAPS				23	051270 052978			67-111A-00A
MULTICOLOR SPIN-SCAN CLOUDCOVER CAMERA (MSSCC)		SUOMI	U OF WISCONSIN					67-111A-01
METEOROLOGICAL DATA CATALOG FOR THE APPLICATIONS TECHNOLOGY SATELLITES				5	110567 052570			67-111A-01C
RADIO BEACON		DAROSA	STANFORD U					67-111A-02
TOTAL ELECTRON CONTENT, PLOTS AND TABULATIONS				10	120167 010272			67-111A-02A
TOTAL ELECTRON CONTENT FOR MAGNETIC STORM FROM 1967 THROUGH 1972 ON MICROFICHE				5	113067 121972			67-111A-02B
TOTAL ELECTRON CONTENT (AFCRL MEDIANS) NEAR 39 DEG N				5	110167 033174			67-111A-02C
IMAGE DISSECTOR CAMERA (IDC)		BRANCHFLOWER	SPAR AEROSPACE					67-111A-03
THE ATS METEROLOGICAL DATA CATALOG ON MICROFICHE				42	110767 073169			67-111A-03A

AIM FILE IONOSPHERIC PHYSICS LISTING

SATELLITE NAME / INVESTIGATION NAME / DATA SET NAME	ALTERNATE NAMES	COUNTRY	LAUNCH DATE	INOP DATE	PERIAPSIS	APOAPSIS	INCLINATION	NSSDC ID
		PI			AGENCY			
					QUANTITY	TIME SPAN		
COMMUNICATION MICROWAVE TRANSPONDER (HUGHES CO.)					UNKNOWN			67-111A-04
COMMUNICATION VHF RADIO TRANSPONDER (HUGHES CO.)					UNKNOWN			67-111A-05
SELF CONTAINED NAVIGATION EXPERIMENT (CDC CO.)					UNKNOWN			67-111A-06
REFLECTROMETER EXPERIMENT					UNKNOWN			67-111A-07
HYDRAZINE THRUSTER					UNKNOWN			67-111A-08
RESISTO-JET THRUSTER					UNKNOWN			67-111A-09
METEOROLOGICAL DATA RELAY SYSTEM					HOLMES			NOAA-NESDIS 67-111A-10
OMEGA POSITION AND LOCATION EQUIPMENT (OPLE)					LAUGHLIN			NASA-GSFC 67-111A-11
OV3-6	ATCOS 2		UNTST	12/05/67				67-120A
ATMOSPHERIC COMPOSITION					NARCISI			USAF GEOPHYS LAB 67-120A-01
ATMOSPHERIC DENSITY					CHAMPION			USAF GEOPHYS LAB 67-120A-02
RADIO PROPAGATION DETECTOR					UNKNOWN			UNKNOWN 67-120A-03
ELECTRIC FIELD DETECTOR					UNKNOWN			UNKNOWN 67-120A-04
COSMIC RAY ANISOTROPHY					UNKNOWN			UNKNOWN 67-120A-05
COSMIC RAY GRADIENT DETECTOR					UNKNOWN			UNKNOWN 67-120A-06
COSMIC DUST DETECTOR					UNKNOWN			UNKNOWN 67-120A-07
PIONEER 8	PIONEER-C		UNTST	12/13/67	0.992	1.088	0.057	67-123A
MULTI-COORDINATE SYSTEM EPHEMERIS TAPES					6	121367 111571		67-123A-00D
COMPRESSED EPHEMERIS DATA ON MAGNETIC TAPE					1	121367 111571		67-123A-00E
COROTATION DELAY TIME PLOTS AND LISTINGS ON MICROFILM					1	121367 110171		67-123A-00F
SINGLE-AXIS MAGNETOMETER					NESS			NASA-GSFC 67-123A-01
HOURLY AVERAGED VECTOR MAGNETIC FIELD PLOTS ON MICROFILM					1	122367 120768		67-123A-01A
MAGNETIC FIELD VECTOR 30-SEC AVERAGES ON TAPE					3	121367 120368		67-123A-01B
HOURLY AVERAGED MAGNETIC FIELD VECTORS ON MAGNETIC TAPE					1	121767 123069		67-123A-01C
ELECTROSTATIC ANALYZER					WOLFE			NASA-ARC 67-123A-02
ANALYZED PLASMA PARAMETERS ON MICROFILM					36	121467 010574		67-123A-02A
TWO-FREQUENCY BEACON RECEIVER					ESHLEMAN			STANFORD U 67-123A-03
HOURLY VALUES OF REDUCED TOTAL ELECTRON CONTENT DATA ON PUNCHED CARDS					1	121467 082569		67-123A-03A
HOURLY VALUES OF REDUCED TOTAL ELECTRON CONTENT DATA ON MICROFILM					1	121467 082569		67-123A-03B
DIGITAL VALUES OF SOLAR WIND ELECTRON DENSITY VS TIME NORMALIZED TO 1 AU ON TAPE					1	121967 030771		67-123A-03C
MICROFILM PLOTS OF SOLAR WIND ELECTRON DENSITY VS TIME NORMALIZED TO 1 AU					1	022068 083070		67-123A-03D
COSMIC DUST DETECTOR					BERG			NASA-GSFC 67-123A-04
COSMIC-RAY ANISOTROPY					MCCRACKEN			CSIRO 67-123A-05
7.5-MIN AND 1-HR COUNT RATES FOR ALL MODES ON MAGNETIC TAPE					6	121367 033169		67-123A-05A
7.5-MIN AND 1-HR COUNT RATES, ALL MODES, ON MICROFILM					3	032169 123170		67-123A-05B
COSMIC-RAY GRADIENT DETECTOR					WEBBER			U OF NEW HAMPSHIRE 67-123A-06
20-MIN AVERAGES OF PARTICLE COUNT RATES ON MICROFILM					1	121367 041068		67-123A-06A
8-HR AVERAGES OF ALPHA PARTICLE COUNT RATES ON MICROFILM					1	121367 042168		67-123A-06B
PROTON COUNT RATES PUBLISHED IN 'SOLAR-GEOPHYSICAL DATA'					52	120169 052875		67-123A-06C
DAILY AVERAGED COUNT RATE LISTINGS ON MICROFILM					1	121367 110571		67-123A-06D
DAILY AVERAGED COUNT RATE PLOTS ON MICROFILM					1	121367 110671		67-123A-06E
PLASMA WAVE DETECTOR					SCARF			TRW SYSTEMS GROUP 67-123A-07
REDUCED ELECTRIC FIELD DATA ON MICROFILM					16	121367 100768		67-123A-07A
SUMMARY PLOTS OF EACH EXPERIMENT CYCLE ON MICROFILM					2	121367 092368		67-123A-07B
CELESTIAL MECHANICS					ANDERSON			NASA-JPL 67-123A-08
OGO 5	OGO-E		UNTST	03/04/68	10/08/71	272.	148228.	31.1 68-014A
PREDICTED WORLD MAPS					2	010470 081272		68-014A-00A
MASTER ORBIT WORLD MAPS					24	030468 100971		68-014A-00C
MULTI-COORDINATE EPHEMERIS DATA ON MICROFILM					5	030468 100471		68-014A-00D
TABLE OF EPHEMERIS PARAMETERS ON MICROFILM					12	030468 042670		68-014A-00E
					30	030468 032769		68-014A-00F
SPHERICAL ELECTROSTATIC PROBE					BOYD			U COLLEGE LONDON 68-014A-01
PLASMA TEMPERATURE, DENSITY AND FLUX					SAGALYN			USAF GEOPHYS LAB 68-014A-02
LOW-ENERGY INTEGRAL SPECTRAL MEASUREMENT					SERBU			NASA-GSFC 68-014A-03
ENERGETIC RADIATIONS FROM SOLAR FLARES					ANDERSON			U OF CALIF, BERKELEY 68-014A-04
147-SECOND-AVERAGED ELECTRON AND X-RAY COUNT RATES ON MAGNETIC TAPE					3	053168 100469		68-014A-04A
40-SEC AVERAGED X-RAY COUNT RATES ON MAGNETIC TAPE					10	030868 100469		68-014A-04B
PROTON AND ALPHA PARTICLE COUNT RATES ON MAGNETIC TAPE					2	030868 111769		68-014A-04C
STUDY OF PROTONS, ELECTRONS, POSITRONS, AND GAMMA RAYS					CLINE			NASA-GSFC 68-014A-05
ELECTRON AND PROTON SPECTROMETER					WEST, JR.			LAWRENCE LIVERMORE LAB 68-014A-06
20-MIN COUNT RATE PLOTS ON MICROFILM					30	030468 061368		68-014A-06A
2-HR COUNT RATE PLOTS ON MICROFILM					93	030668 110671		68-014A-06B
PARTICLE COUNT RATE, EPHEMERIS, AND MAGNETIC FIELD DATA ON MAGNETIC TAPES					35	052368 050169		68-014A-06C
L-SORTED INNER-ZONE CORRECTED ELECTRON FLUXES, CHANNELS 1 TO 5, ON MAGNETIC TAPE					1			68-014A-06D
LOW-ENERGY PROTON AND ELECTRON DIFFERENTIAL ENERGY ANALYZER (LEPE					FRANK			U OF IOWA 68-014A-07
ENERGETIC PHOTONS IN PRIMARY COSMIC RAYS					HUTCHINSON			U OF SOUTHAMPTON 68-014A-08
COSMIC-RAY ELECTRONS					MEYER			U OF CHICAGO 68-014A-09
SELECTION OF VARIOUS PLOTS FOR PROTONS AND FOR ELECTRONS ON MICROFILM					1	030568 071372		68-014A-09A
PARTICLE ACCUMULATIONS AND PULSE HEIGHT ANALYSIS ON MAGNETIC TAPE					106	030568 071472		68-014A-09B
GALACTIC AND SOLAR COSMIC-RAY STUDIES					MCDONALD			NASA-GSFC 68-014A-10
TRIAXIAL ELECTRON ANALYZER					OGILVIE			NASA-GSFC 68-014A-11
MEASUREMENT OF THE ABSOLUTE FLUX AND ENERGY SPECTRUM OF ELECTRONS					VAN DE HULST			HUYGENS LAB 68-014A-12
DAILY AVERAGED COSMIC-RAY ELECTRON AND PROTON COUNT RATES					1	030568 083171		68-014A-12A
0.5 TO 10 GEV COSMIC RAY ELECTRON COUNT RATES ON MICROFILM					1	030568 083171		68-014A-12B
PARTICLE WAVE STUDY					COLEMAN, JR.			U OF CALIF, LA 68-014A-13
REAL TIME TELEMETERED ELECTRON DATA, 0.05 TO 1.2 MEV ON MAGNETIC TAPE					89	030568 042070		68-014A-13A
TAPE PLAYBACK ELECTRON DATA, 0.05 TO 1.2 MEV ON MAGNETIC TAPE					6	033068 021471		68-014A-13B
UCLA TRIAXIAL FLUXGATE MAGNETOMETER					COLEMAN, JR.			U OF CALIF, LA 68-014A-14
1-MIN AVERAGED VECTOR MAGNETIC FIELD DATA ON MICROFILM					16	030568 111869		68-014A-14A
1-MIN AVG VECTOR MAGNETIC FIELD AND RMS NOISE AMPLITUDE DATA TAPES IN S/C COORD.					14	030568 090168		68-014A-14B
4.608-SEC AVERAGED FLUXGATE MAGNETOMETER DATA IN SPACECRAFT COORDINATES ON TAPE					5	030568 011069		68-014A-14C
4.608-S AVERAGED FLUXGATE MAGNETOMETER B-FIELD PLOTS IN S/C COORDS ON MICROFILM					40	030568 080669		68-014A-14D
1-MIN AVG VECTOR MAGNETIC FIELD DATA ON TAPE IN GSE COORDINATES					14	030568 090168		68-014A-14E
1-MIN AVG VECTOR MAGNETIC FIELD DATA ON TAPE IN GSM COORDINATES					15	030568 050570		68-014A-14F
LISTING OF MAGNETOSPHERIC-B, MODEL-B, L, DIPOLE DATA ON MICROFILM					4	030668 083071		68-014A-14H
HIGHEST TIME RESOLUTION INTERPLANETARY B DATA FROM ORBITS 2 TO 7 FOR SPECTRUM ANAL.					15	030768 032168		68-014A-14I
MAGNETIC SURVEY USING TWO MAGNETOMETERS					HEPPNER			NASA-GSFC 68-014A-15
SCALAR RUBIDIUM MAGNETOMETER MAGNETIC FIELD MEASUREMENTS ON 35-MM MICROFILM					71	030568 051370		68-014A-15A
36.9-SEC AVG MAGNETIC FIELD VECTORS IN SPACECRAFT AND VARIOUS GEOPHYSICAL COORDS					141	031568 030870		68-014A-15B
AN INDEX TO TIMES WHEN DATA WAS RECORDED FROM THE RUBIDIUM MAGNETOMETER					1	030768 100372		68-014A-15C
TRIAXIAL SEARCH-COIL MAGNETOMETER					SMITH			NASA-JPL 68-014A-16

AIM FILE IONOSPHERIC PHYSICS LISTING

SATELLITE NAME / INVESTIGATION NAME / DATA SET NAME	ALTERNATE NAMES	COUNTRY	LAUNCH DATE	INOP DATE	PERIAPSIS	APOAPSIS	INCLINATION		
		PI			AGENCY				
					QUANTITY	TIME SPAN			NSSDC ID
2.5-MIN-AVG SEARCH-COIL MAGNETOMETER NOISE AMPLITUDES, 0.03-1000 HZ, MICROFILM					6	030768	030771		68-014A-16A
SEARCH-COIL MAGNETOMETER SUMMARY TAPES, 36.9-SEC TIME RESOLUTION					45	030768	010171		68-014A-16B
INDEX TO THE MAGNETIC TAPES CONTAINING SEARCH COIL 37 SEC. AVERAGED DATA					1	030768	021971		68-014A-16C
FREQUENCY TIME SPECTROGRAMS FOR 0-1000 HZ ANALOG SEARCH-COIL MAGNETOMETER, MICROFILM					27	030668	102768		68-014A-16D
MICROFILM INDEX TO FREQUENCY-TIME 0-1 KHZ SEARCH-COIL SPECTROGRAMS, 68-014A-16D					1	030668	042568		68-014A-16E
PLASMA SPECTROMETER		SNYDER			NASA-JPL				68-014A-17
PLOTS OF HOUR AVERAGED PROTON BULK SPEED, 27 DAYS PER FRAME ON MICROFICHE					2	030568	043071		68-014A-17A
HOUR-AVERAGED PLASMA PARAMETERS					2	030568	043071		68-014A-17B
LISTING OF HIGH TIME RESOLUTION INTER- PLANETARY PLASMA PARAMETERS ON MICROFILM					2	050868	043071		68-014A-17C
HIGH TIME RESOLUTION PLASMA DATA AND PLASMA PARAMETERS ON MAGNETIC TAPE					12	030568	043071		68-014A-17D
HIGH TIME RESOLUTION PLOTS OF SOME PLASMA PARAMETERS ON MICROFILM					5	030568	043071		68-014A-17E
LISTING OF HOURLY AVERAGED INTERPLANETARY PLASMA PARAMETERS					1	030568	043071		68-014A-17F
LIGHT ION MASS MAGNETIC SPECTROMETER		SHARP			NASA HEADQUARTERS				68-014A-18
OXYGEN, HELIUM, AND HYDROGEN ION CONCENTRATIONS AND EPHEM DATA ON MAG TAPE					14	030768	053169		68-014A-18A
50 KHZ TO 3.5 MHZ SOLAR RADIO ASTRONOMY IN EIGHT STEPS		HADDOCK			U OF MICHIGAN				68-014A-20
SOLAR RADIO EMISSIONS VS TIME FOR 8 FREQUENCY CHANNELS, ON MICROFILM					50	030568	093071		68-014A-20A
ULTRAVIOLET AIRGLOW		THOMAS			U OF COLORADO				68-014A-21
AIRGLOW INTENSITIES AT 1304 A AND 1216 A ON MAGNETIC TAPES					456	030468	062872		68-014A-21A
CALCOMP PLOTS OF UV AIRGLOW AT 1216 A AND 1304 A ON MICROFILM					1	032768	052069		68-014A-21B
GEOCORONAL LYMAN-ALPHA MEASUREMENT		BLAMONT			CNRS-SA				68-014A-22
LYMAN ALPHA GEOCORONAL DATA ON MAGNETIC TAPES					32	030568	123169		68-014A-22A
SOLAR X-RAY EMISSIONS		KREPLIN			US NAVAL RESEARCH LAB				68-014A-23
SOLAR X-RAY VARIATION ON MICROFILM					1	030868	122769		68-014A-23A
PLASMA WAVE DETECTOR		CROOK			GAINES M. CROOK ASSOC				68-014A-24
ORIGINAL ELECTRIC FIELD SONOGRAMS ON MICROFILM					40	031168	010371		68-014A-24A
TABULATED 3-MINUTE ELECTRIC AND MAGNETIC WAVE ENVELOPES ON MICROFILM					5	031168	011171		68-014A-24C
3.26-MIN-AVERAGED ELECTRIC AND MAGNETIC DIGITAL SPECTRUM ANALYSES ON MAGNETIC TAPE					5				68-014A-24D
SELECTED 0-10 KHZ SPECTRA, MAGNETOSPHERIC AND PLASMASPHERIC BOUNDARIES ON MICROFILM					14	031468	051269		68-014A-24E
OPEP 2-SCAN MECHANISM		BROWNING			NASA-GSFC				68-014A-25
ELECTRIC FIELD MEASUREMENT		AGGSON			NASA-GSFC				68-014A-26
LOW-ENERGY HEAVY COSMIC-RAY PARTICLES		SIMPSON			U OF CHICAGO				68-014A-27
HIGH-ATOMIC-WEIGHT, LOW-ENERGY COSMIC-RAY COUNT RATES & P.H.A. DATA ON MAGNETIC TAPE					6	030568	071472		68-014A-27A
HIGH-ATOMIC-WEIGHT, LOW-ENERGY COSMIC-RAY COUNT RATE PLOTS ON MICROFILM					1	030568	071372		68-014A-27B
OV1-14----------PL-682E----------UNTST----04/06/68-----				-----	--	--		-----	68-026B
OMNIDIRECTIONAL PROTON + ELECTRON SPECTROMETER		UNKNOWN			UNKNOWN				68-026B-01
MAGNETIC ELECTRON SPECTROMETER		UNKNOWN			UNKNOWN				68-026B-02
TRAPPED		UNKNOWN			UNKNOWN				68-026B-03
PROTON FLUXES + SPECTRA		UNKNOWN			UNKNOWN				68-026B-04
DE/DX+E PARTICLE TELESCOPE		UNKNOWN			UNKNOWN				68-026B-05
DE/DX+R PARTICLE TELESCOPE		UNKNOWN			UNKNOWN				68-026B-06
VERY LOW FREQUENCY + LOW FREQUENCY PLASMA WAVE		UNKNOWN			UNKNOWN				68-026B-07
LYMAN-ALPHA		UNKNOWN			UNKNOWN				68-026B-08
FARADAY CUP		UNKNOWN			UNKNOWN				68-026B-09
RAE-A----------RADIO ASTRONOMY EXPLORER--UNTST----07/04/68-----				-----	5851.--	5861.--	120.6	-----	68-055A
PREDICTED WORLD MAPS					1	063072	012973		68-055A-00A
REFINED WORLD MAPS					17	070768	070572		68-055A-00B
STEP FREQUENCY RADIOMETERS		STONE			NASA-GSFC				68-055A-01
RYLE-VONBERG RECEIVER PLOTS					308	092568	122572		68-055A-01A
RADIO BURSTS RECEIVERS		STONE			NASA-GSFC				68-055A-02
SWEPT FREQUENCY BURST RECEIVER CONTOUR PLOTS					79	052569	031371		68-055A-02A
SWEPT FREQUENCY BURST RECEIVER MULTIGRID PLOTS					530	092668	120372		68-055A-02B
BURST RECEIVER MULTIGRID TEN-MINUTE PLOTS					1041	072368	072071		68-055A-02C
FULL ORBIT BURST RECEIVER PLOTS					523	072368	122272		68-055A-02D
CAPACITANCE PROBE		STONE			NASA-GSFC				68-055A-03
IMPEDANCE PROBE		STONE			NASA-GSFC				68-055A-04
PLANAR ELECTRON TRAP		STONE			NASA-GSFC				68-055A-05
OV1-15----------PL-682F----------UNTST----07/11/68-----11/06/68-----					154.--	1818.--	89.88	-----	68-059A
TRIAXIAL ACCELEROMETER		CHAMPION			USAF GEOPHYS LAB				68-059A-01
TRIAXIAL ACCELEROMETER ATMOSPHERIC DENSITY PLOTS					1	071468	092868		68-059A-01A
ION DENSITY GUAGE		UNKNOWN			UNKNOWN				68-059A-02
2 QUAD MASS SPECTROMETERS		UNKNOWN			UNKNOWN				68-059A-03
NEUTRAL MASS SPECTROMETER (CICS)		UNKNOWN			UNKNOWN				68-059A-04
RAM ATMOSPHERE DENSITY GAUGE		ELLIOTT			SRI INTERNATIONAL				68-059A-05
ATMOSPHERIC DENSITY AT 250,300,350 AND 400 KM,FOR 13 AND 14 JUL 1968					1	071368	071468		68-059A-05A
SOLAR UV, 300 TO 2000 A		MORSE			AEROSPACE CORP				68-059A-06
SOLAR X RAYS, 1 TO 60 A		WALKER, JR.			STANFORD U				68-059A-07
ENERGETIC PARTICLE FLUX		UNKNOWN			UNKNOWN				68-059A-08
ION ATTITUDE SENSING		UNKNOWN			UNKNOWN				68-059A-09
BEACON TRACKING ATMOSPHERIC DRAG		CARTER			AEROSPACE CORP				68-059A-10
INJUN 5----------EXPLORER 40----------UNTST----08/08/68----- 5/31/70-----					665.--	2525.--	80.7	-----	68-066B
PREDICTED WORLD MAPS					8	080968	062370		68-066B-00A
LOW-ENERGY PROTON AND ELECTRON DIFFERENTIAL ENERGY ANALYZER (LEPE	FRANK				U OF IOWA				68-066B-01
MASTER FILE ON MAGNETIC TAPE, LEPEDEA COUNT RATES					949	080968	052970		68-066B-01A
VLF RECEIVER		GURNETT			U OF IOWA				68-066B-02
MASTER DATA TAPE, VLF SIGNAL STRENGTH					949	080968	052970		68-066B-02A
VLF DETECTOR DATA ON ANALOG TAPE					18016	090568	052670		68-066B-02B
SOLID-STATE PARTICLE DETECTOR		VAN ALLEN			U OF IOWA				68-066B-03
MASTER FILE ON MAGNETIC TAPE, PROTON, ELECTRON, AND ALPHA PARTICLE COUNT RATES					949	080968	052970		68-066B-03A
15-SEC AVERAGED EXPERIMENT-MODE PARTICLE 15-SEC AVERAGED PARTICLE					17	082968	053070		68-066B-03B
SPHERICAL RETARDING POTENTIAL ANALYZER		SAGALYN			USAF GEOPHYS LAB				68-066B-04
RETARDING POTENTIAL ANALYZER COUNT RATE DATA ON MAGNETIC TAPE					949	080968	052970		68-066B-04A
OV2-5----------PL-683G----------UNTST----09/26/68-----				-----	--	--		-----	68-081A
OMNIDIRECTIONAL ELECTRON FLUXES		UNKNOWN			UNKNOWN				68-081A-01
DE/DX+R PARTICLE TELESCOPE		UNKNOWN			UNKNOWN				68-081A-02
ELECTRON SPECTROMETER		UNKNOWN			UNKNOWN				68-081A-03
LOW ENERGY ELECTRON/PROTON		UNKNOWN			UNKNOWN				68-081A-04
LEMES		UNKNOWN			UNKNOWN				68-081A-05
ANGULAR DISTRIBUTION		UNKNOWN			UNKNOWN				68-081A-06
VERY LOW FREQUENCY RECEIVER		MCPHERSON			AEROSPACE CORP				68-081A-07

AIM FILE IONOSPHERIC PHYSICS LISTING

SATELLITE NAME / INVESTIGATION NAME / DATA SET NAME	ALTERNATE NAMES	COUNTRY	LAUNCH DATE	INOP DATE	PERIAPSIS	APOAPSIS	INCLINATION	NSSDC ID
		PI			AGENCY	QUANTITY	TIME SPAN	
ALL SKY LYMAN ALPHA		UNKNOWN			UNKNOWN			68-081A-08
GEOMAGNETIC STORMS, ELECTRIC ANALYSIS		UNKNOWN			UNKNOWN			68-081A-09
RADIO FREQUENCY BEACON		MULLEN			USAF GEOPHYS LAB			68-081A-10
PLASMA WAVE		UNKNOWN			UNKNOWN			68-081A-11
MAGNETOMETER		GREENSTADT			TRW SYSTEMS GROUP			68-081A-12
AURORAE	ESRO 1A	UNTST	10/03/68					68-084A
PREDICTED WORLD MAPS						1	100268 110668	68-084A-00A
TRAPPED AND PRECIPITATED ELECTRON FLUX		DALZIEL			RUTHERFORD APPLETON L.			68-084A-01
HIGH LATITUDE PARTICLE ELECTROSTATIC ANALYZER		REIDLER			KIRUNA GEOPHYS INST			68-084A-02
TRAPPED AND PRECIPITATED PROTON SPECTRA		SORAAS			U OF BERGEN			68-084A-03
PITCH ANGLE DISTRIBUTION OF ELECTRONS		PETERSEN			ELEKTRONIKCENTRALEN			68-084A-04
FLUX AND ENERGY SPECTRA OF SOLAR PROTONS		DALZIEL			RUTHERFORD APPLETON L.			68-084A-05
AURORAL PHOTOMETERS		EGELAND			NORW INST OF COS PHYS			68-084A-06
LANGMUIR PROBE		WILLMORE			U OF BIRMINGHAM			68-084A-07
ION COMPOSITION AND TEMPERATURE		UNKNOWN			UNKNOWN			68-084A-08
PIONEER 9	PIONEER-D	UNTST	11/08/68	5/18/83	0.754	0.990	0.086	68-100A
MULTI-COORDINATE SYSTEM EPHEMERIS TAPES						6	110868 041672	68-100A-00D
COMPRESSED EPHEMERIS DATA ON MAGNETIC TAPE						1	110868 041672	68-100A-00E
COROTATION DELAY TIME PLOTS AND LISTINGS ON MICROFILM						1	110068 040172	68-100A-00F
CHARTS OF PRELIMINARY TRAJECTORIES						1	110868	68-100A-00G
TRIAXIAL MAGNETOMETER		SONETT			U OF ARIZONA			68-100A-01
30-SEC AVERAGED VECTOR MAGNETIC FIELD PLOTS ON MICROFILM						2	110868 061369	68-100A-01A
SOLAR PLASMA DETECTOR		WOLFE			NASA-ARC			68-100A-02
ANALYZED PLASMA PARAMETERS ON MICROFILM						16	110868 081874	68-100A-02A
TWO-FREQUENCY BEACON RECEIVER		ESHLEMAN			STANFORD U			68-100A-03
HOURLY VALUES OF REDUCED TOTAL ELECTRON CONTENT DATA ON PUNCHED CARDS						1	110868 071669	68-100A-03A
HOURLY VALUES OF REDUCED TOTAL ELECTRON CONTENT DATA ON MICROFILM						1	110968 071669	68-100A-03B
DIGITAL VALUES OF SOLAR WIND ELECTRON DENSITY VS TIME NORMALIZED TO 1 AU ON TAPE						1	111168 030771	68-100A-03C
MICROFILM PLOTS OF SOLAR WIND ELECTRON DENSITY VS TIME NORMALIZED TO 1 AU						1	040469 082770	68-100A-03D
PLOTS + LISTINGS OF BEACON AMPLITUDE SCINTILLATION DUE TO SOLAR WIND TURBULENCE						3		68-100A-03E
DIGITAL RECORDS OF BEACON AMPLITUDE SCINTILLATION DUE TO SOLAR WIND TURBULENCE						1		68-100A-03F
COSMIC DUST DETECTOR		BERG			NASA-GSFC			68-100A-04
COSMIC-RAY ANISOTROPY		MCCRACKEN			CSIRO			68-100A-05
7.5-MIN AND 1-HR COUNT RATES ON MICROFILM						2	110868 092570	68-100A-05A
COSMIC-RAY GRADIENT		WEBBER			U OF NEW HAMPSHIRE			68-100A-06
PROTON COUNT RATES PUBLISHED IN 'SOLAR-GEOPHYSICAL DATA'						49	120169 081874	68-100A-06A
DAILY AVERAGED COUNT RATE LISTINGS ON MICROFILM						1	110868 090471	68-100A-06B
DAILY AVERAGED COUNT RATE PLOTS ON MICROFILM						1	110868 090471	68-100A-06C
ELECTRIC FIELD DETECTOR		SCARF			TRW SYSTEMS GROUP			68-100A-07
PLOTS OF HOURLY AVERAGED BROADBAND AND 400-HZ WAVE LEVELS						1	110868 022769	68-100A-07A
MICROFILMED FINE TIME SCALE E-FIELD SPECTRUM DATA						9	110968 090769	68-100A-07B
FRAME SUMMARY PLOTS OF 100 HZ, 400 HZ, AND 30 KHZ E-FIELD AMPLITUDES ON FILM						2	120368 090669	68-100A-07C
FINE-TIME SCALE 100 HZ, 400 HZ, AND 30 KHZ ELECTRIC FIELD AMPLITUDES ON TAPE						4	110868 070369	68-100A-07D
CELESTIAL MECHANICS		ANDERSON			NASA-JPL			68-100A-08
ISIS 1	ISIS-A	UNTST	01/30/69		578.	3526.	88.42	69-009A
PREDICTED WORLD MAPS ON MICROFILM						1	093079 120379	69-009A-00A
REFINED WORLD MAPS						1	013069 050969	69-009A-00B
GSFC EXTENDED WORLD MAPS ON MICROFILM						155	051577 061579	69-009A-00C
EXTENDED WORLD MAPS ON MAGNETIC TAPE						100	060669 101973	69-009A-00D
GSFC ORBIT ELEMENTS AT ABOUT 2 WEEK INTERVALS ON MAGNETIC TAPE						1	020769 012375	69-009A-00E
SWEEP-FREQUENCY SOUNDER		JACKSON			NASA-GSFC			69-009A-01
SWEEP-FREQUENCY IONOGRAMS ON MICROFILM						2422	031669 123081	69-009A-01A
IONOGRAM INVENTORY ON TAPE						1	013069 101273	69-009A-01B
NASA-ARC ELECTRON DENSITIES INTERPOLATED TO 100-KM INTERVALS ON (PACKED) TAPE						1	021369 060772	69-009A-01C
INDEX OF IONOGRAMS SHOWING DUCTED ECHOES						1	020169 122771	69-009A-01E
CRC ELECTRON DENSITY PROFILES AT SCALED POINTS ON MAGNETIC TAPES						6	020169 053080	69-009A-01F
FIXED-FREQUENCY SOUNDER		CALVERT			U OF IOWA			69-009A-02
FIXED-FREQUENCY IONOGRAMS ON MICROFILM						2422	013069 101273	69-009A-02A
VLF RECEIVER		BARRINGTON			DOC-CRC			69-009A-03
VLF EMISSION INTENSITY DATA AT 6 NARROW BAND FREQUENCIES FROM	KASHIMA AND SYOWA					14	112172 082784	69-009A-03B
ENERGETIC PARTICLE DETECTORS		MCDIARMID			NATL RES COUNC OF CAN			69-009A-04
REDUCED COUNT RATE DATA ON MAGNETIC TAPE						35	020269 122969	69-009A-04A
SOFT-PARTICLE SPECTROMETER		HEIKKILA			U OF TEXAS, DALLAS			69-009A-05
SOFT PARTICLE SPECTROGRAMS OF ELECTRON AND PROTON DATA ON MICROFILM						32	020369 102769	69-009A-05A
POSITIVE ION MASS SPECTROMETER (1-20 AMU)		NARCISI			USAF GEOPHYS LAB			69-009A-06
CYLINDRICAL ELECTROSTATIC PROBES		BRACE			NASA-GSFC			69-009A-07
AVERAGED VALUES OF ELECTRON DENSITY AND TEMPERATURE ON MAGNETIC TAPE						1	013069 060171	69-009A-07A
AVERAGED VALUES OF ELECTRON DENSITY AND TEMPERATURE ON MICROFICHE						32	013069 060171	69-009A-07B
ELECTRON DENSITY AND TEMPERATURE PLOTS ON MICROFICHE						3	013069 060570	69-009A-07D
SPHERICAL ELECTROSTATIC ANALYZER		SAGALYN			USAF GEOPHYS LAB			69-009A-08
ION DENSITY ON 35-MM FILM						10	013169 112069	69-009A-08A
ION TEMPERATURE AND DENSITY ON MAGNETIC TAPE						4	013169 113069	69-009A-08B
RADIO BEACON		FORSYTH			WESTERN ONTARIO U			69-009A-09
COSMIC RADIO NOISE		HARTZ			DOC-CRC			69-009A-10
COSMIC RADIO NOISE, AGC LEVEL PLOTS ON 35-MM MICROFILM MERGED WITH IONOGRAMS						1196	013069 101273	69-009A-10A
OV1-17	03823	UNTST	03/18/69	3/05/70				69-025A
OXYGEN AND OZONE DISTRIBUTION		UNKNOWN			UNKNOWN			69-025A-01
CRYSTAL SPECTROMETER		WALKER, JR.			STANFORD U			69-025A-02
ULTRAVIOLET ATMOSPHERIC RADIATION 1150-1375 A		UNKNOWN			UNKNOWN			69-025A-03
ULTRAVIOLET DAY GLOW 1600-3000 A		UNKNOWN			UNKNOWN			69-025A-04
HORIZONTAL NIGHTGLOW 5577, 6300 A		UNKNOWN			UNKNOWN			69-025A-05
OMNIDIRECTIONAL PROTON AND ELECTRON FLUXES AND SPECTRA		FREDEN			NASA-GSFC			69-025A-06
DIRECTIONAL PROTON SPECTROMETER		UNKNOWN			UNKNOWN			69-025A-07
ELECTRIC FIELD MEASUREMENT		MOZER			U OF CALIF, BERKELEY			69-025A-08
METEOROLOGICAL TRAIL CALIBRATION		UNKNOWN			UNKNOWN			69-025A-09
PROPERTIES OF EXTREMELY LOW FREQUENCY IONS 1-100 HZ								69-025A-10
THERMAL COATINGS		UNKNOWN			UNKNOWN			69-025A-11
CADMIUM SULFIDE SOLAR CELLS		UNKNOWN			UNKNOWN			69-025A-12
DIRECTIONAL ELECTRON SPECTROMETER		UNKNOWN			UNKNOWN			69-025A-13
ELECTROSTATIC ANALYZER		UNKNOWN			UNKNOWN			69-025A-14

AIM FILE IONOSPHERIC PHYSICS LISTING

SATELLITE NAME / INVESTIGATION NAME / DATA SET NAME	ALTERNATE NAMES	COUNTRY	LAUNCH DATE	INOP DATE	PERIAPSIS	APOAPSIS	INCLINATION	PI / AGENCY / QUANTITY	TIME SPAN	NSSDC ID
OV1-18	03824	UNTST	03/18/69							69-025B
PLANAR ION TRAP								JOHNSON	LOCKHEED PALO ALTO	69-025B-01
MULTICHANNEL PARTICLE ANALYZERS								SHARP	LOCKHEED PALO ALTO	69-025B-02
RADIO FREQUENCY INTERFERENCE								ZAMITES	AEROSPACE CORP	69-025B-03
0.5 TO 10 MEV NEUTRON SPECTROMETER								HARRIS	LOCKHEED PALO ALTO	69-025B-04
ELECTRIC FIELD MEASUREMENT								MOZER	U OF CALIF, BERKELEY	69-025B-05
SCINTILLATION PHOTOMULTIPLIER THRESHOLD DETECTORS								SHARP	LOCKHEED PALO ALTO	69-025B-06
CROSSED FIELD ANALYZER								SHARP	LOCKHEED PALO ALTO	69-025B-07
PENETRATING RADIATION MONITOR								REAGAN	LOCKHEED PALO ALTO	69-025B-08
LANGMUIR PROBE								JOHNSON	LOCKHEED PALO ALTO	69-025B-09
OV1-17A	ORBIS CAL II	UNTST	03/18/69							69-025D
TWO HIGH FREQUENCY RADIO FREQUENCY BEACONS								UNKNOWN	UNKNOWN	69-025D-01
OV5-9	PL-684F	UNTST	05/23/69							69-046C
PREDICTED WORLD MAPS									6 060469 083171	69-046C-00A
ELECTROSTATIC ANALYZER								STEVENS	AEROSPACE CORP	69-046C-01
DE/DX, E TELESCOPE								BLAKE	AEROSPACE CORP	69-046C-02
SOLAR FLARE ELECTRON SPECTROMETER								VAMPOLA	AEROSPACE CORP	69-046C-03
CERENKOV TELESCOPE								VAMPOLA	AEROSPACE CORP	69-046C-04
VLF WAVES								UNKNOWN	UNKNOWN	69-046C-05
SOLAR X RAY FLUX (0.3 TO 15 A)								WALKER, JR.	STANFORD U	69-046C-06
OGO 6	OGO-F	UNTST	06/05/69	3/00/72	413.	1077.	82.			69-051A
PREDICTED WORLD MAPS ON MICROFIIM									2 011771 013172	69-051A-00A
EXTENDED WORLD MAPS (EPHEMERIDES) ON MICROFILM									13 060569 100571	69-051A-00C
MICROPHONE ATMOSPHERIC DENSITY GAUGE								SHARP	NASA HEADQUARTERS	69-051A-01
MICROPHONE DENSITY GAUGE DATA TAPES									8 061169 013170	69-051A-01A
LANGMUIR PROBES								NAGY	U OF MICHIGAN	69-051A-02
PLANAR ION AND ELECTRON TRAP								HANSON	U OF TEXAS, DALLAS	69-051A-03
PLOTS OF ION CONCENTRATION, ION									9 060769 042371	69-051A-03A
COMPOSITE(ION TEMP,ION/ELEC CONCENTRATION									13 060769 042371	69-051A-03B
ION DENSITY, FLUX AND TEMPERATURE SUMMARIES ON TAPE									30 060769 042371	69-051A-03C
NEUTRAL ATMOSPHERE COMPOSITION								REBER	NASA-GSFC	69-051A-04
ATMOSPHERIC COMPOSITION AND TEMPERATURE ON MICROFICHE									1 062769 051371	69-051A-04A
NEUTRAL ATMOSPHERIC COMPOSITION DATA ON TAPE									6 060669 062671	69-051A-04B
ION MASS SPECTROMETER								TAYLOR, JR.	NASA-GSFC	69-051A-05
BENNETT ION MASS SPECTROMETER DATA ON TAPE									10 061169 123170	69-051A-05A
ION MASS SPECTROMETER PLOTS ON MICROFILM									13 061169 123170	69-051A-05B
ION MASS SPECTROMETER								HANSON	U OF TEXAS, DALLAS	69-051A-06
ENERGY TRANSFER PROBE FOR ATMOSPHERIC DENSITY								MCKEOWN	FARADAY LAB	69-051A-07
SOLAR X-RAY EMISSIONS								KREPLIN	US NAVAL RESEARCH LAB	69-051A-08
SOLAR UV EMISSIONS								BEDO	USAF GEOPHYS LAB	69-051A-09
SOLAR UV SURVEY (1800 TO 3200 A)								REGENER	U OF NEW MEXICO	69-051A-10
AIRGLOW AND AURORAL EMISSIONS								BLAMONT	CNRS-SA	69-051A-11
LYMAN-ALPHA PHOTOMETER								CLARK	AEROSPACE CORP	69-051A-12
REDUCED PHOTOMETER CURRENTS, ATTITUDE AND EPHEMERIS DATA ON MAGNETIC TAPE									1 060869 060869	69-051A-12A
UV PHOTOMETER								BARTH	U OF COLORADO	69-051A-13
AIRGLOW INTENSITIES AT 1304 A AND 1216 A									110 060969 072470	69-051A-13A
CALCOMP PLOTS OF UV AIRGLOW DATA ON MICROFILM									1 060969 110570	69-051A-13B
LINE SHAPE OF THE 6300-A AIRGLOW EMISSION								BLAMONT	CNRS-SA	69-051A-14
AURORAL PARTICLE MEASUREMENT								EVANS	NOAA-ERL	69-051A-15
TRAPPED AND PRECIPITATING ELECTRONS UCLA								FARLEY	U OF CALIF, LA	69-051A-16
TRAPPED AND PRECIPITATING ELECTRONS GSFC								WILLIAMS	APPLIED PHYSICS LAB	69-051A-17
NEUTRON MONITOR								LOCKWOOD	U OF NEW HAMPSHIRE	69-051A-18
1-MINUTE AVERAGED NEUTRON MONITOR COUNT RATES ON MAGNETIC TAPE									2 060769 123169	69-051A-18A
LOW-ENERGY COSMIC-RAY MEASUREMENT								MASLEY	TRW SYSTEMS GROUP	69-051A-19
SOLAR-PARTICLE EVENT SUMMARY PLOTS ON MICROFILM									1 060769 082670	69-051A-19A
POLAR-PASS AND ENERGY-SPECTRAL PLOTS DURING SOLAR EVENTS, ON MICROFILM									38 060769 082670	69-051A-19B
COSMIC-RAY STUDY								STONE	CALIF INST OF TECH	69-051A-20
PARTICLE COUNT RATES AND PULSE HEIGHT ANALYSIS ON MAGNETIC TAPE									349 060769 052570	69-051A-20A
PARTICLE COUNT RATES AND EPHEMERIS PLOTS ON MICROFILM									37 060769 031771	69-051A-20B
MAGNETIC SURVEY, RUBIDIUM VAPOR MAGNETOMETER								CAIN	US GEOLOGICAL SURVEY	69-051A-21
TRIAXIAL SEARCH-COIL MAGNETOMETER								SMITH	NASA-JPL	69-051A-22
36-SEC AVERAGED MAGNETOMETER DATA, MICROFILMED PLOTS									5 061069 101370	69-051A-22A
ELECTRIC FIELD MEASUREMENTS								AGGSON	NASA-GSFC	69-051A-23
VLF NOISE AND PROPAGATION								HELLIWELL	STANFORD U	69-051A-24
WHISTLER AND LOW-FREQUENCY ELECTRIC FIELD STUDY								LAASPERE	DARTMOUTH COLLEGE	69-051A-25
SUMMARY PRINTOUTS OF 0.2-1000 KHZ WB AND NB (200 + 500 KHZ) VLF NOISE INTENSITY									8 123069 123170	69-051A-25B
VLF WHISTLER WAVE (AND RELATED TWO COMPONENT GROUND) SPECTROGRAMS									45 100671 011172	69-051A-25D
SODIUM AIRGLOW PHOTOMETER								DONAHUE	U OF MICHIGAN	69-051A-26
ATS 5	PL-692B	UNTST	08/12/69		35777.	35790.	2.5			69-069A
PREDICTED WORLD MAPS									24 081269 100879	69-069A-00A
ELECTRIC FIELDS MEASUREMENT								AGGSON	NASA-GSFC	69-069A-01
COSMIC RADIO NOISE, SOLAR RADIO BURSTS								STONE	NASA-GSFC	69-069A-02
OMNIDIRECTIONAL HIGH-ENERGY PARTICLE DETECTOR								MCILWAIN	U OF CALIF, SAN DIEGO	69-069A-03
TRI-DIRECTIONAL, MEDIUM-ENERGY PARTICLE DETECTOR								MOZER	U OF CALIF, BERKELEY	69-069A-04
FLUX OF ELECTRONS CENTERED AT 40,75,120 KEV & OF PROTONS AT 60,120,165 KEV ON TAPE									319 091669 040971	69-069A-04A
FLUX OF ELECTRONS CENTERED AT 40,75,120 KEV & OF PROTONS AT 60,120,165 KEV ON MFLM									3 091769 100170	69-069A-04B
PROTON ELECTRON DETECTOR								SHARP	LOCKHEED PALO ALTO	69-069A-05
MILLIMETER WAVE PROPAGATION EXPERIMENT								IPPOLITO	NASA-GSFC	69-069A-06
COMMUNICATION MICROWAVE TRANSPONDER (HUGHES CO.)								UNKNOWN	UNKNOWN	69-069A-07
COMMUNICATION L-BAND TRANSPONDER								UNKNOWN	UNKNOWN	69-069A-08
GRAVITY GRADIANT STABILIZATION (GEN. ELECT. CO.)								UNKNOWN	UNKNOWN	69-069A-09
ION ENGINE THRUSTOR								UNKNOWN	UNKNOWN	69-069A-10
BIDIRECTIONAL LOW-ENERGY PARTICLE DETECTOR								MCILWAIN	U OF CALIF, SAN DIEGO	69-069A-11
SPECTROGRAMS OF ELECTRON AND PROTON FLUXES									8 081869 123172	69-069A-11A
PLASMA SPECTROGRAMS DURING SPACECRAFT CHARGING AND NEUTRALIZATION ON MICROFILM									2 022575 040178	69-069A-11B
FIRST 4 MOMENTS OF DISTRIBUTION FUNCTION FOR ELECTRONS AND PROTONS DATA ON MAG TAPE									1 110869 112470	69-069A-11C
RADIO BEACON								GARRIOTT	NASA-JSC	69-069A-12
MAGNETIC FIELD MONITOR								SUGIURA	NASA-GSFC	69-069A-13
TRIAXIAL 1.5-MIN AVG MAGNETIC FIELD DATA UNCORRECTED FOR SPACECRAFT INTERFERENCE									1 120469 050970	69-069A-13A

AIM FILE IONOSPHERIC PHYSICS LISTING

SATELLITE NAME / INVESTIGATION NAME / DATA SET NAME	ALTERNATE NAMES	COUNTRY	LAUNCH DATE	INOP DATE	PI	PERIAPSIS / APOAPSIS / INCLINATION / AGENCY	QUANTITY	TIME SPAN	NSSDC ID
DAILY VARIATIONS IN HOURLY AVERAGED MAGNETIC FIELD PLOTTED IN PUBLISHED REPORT							1	090169 093071	69-069A-13B
MAGNETIC FIELD COMPONENTS SUPPLIED IN MCILWAINS PARTICLE DATA SET							8	081869 123172	69-069A-13C
BOREAS	BOREALIS	UNTST	10/01/69						69-083A
PREDICTED WORLD MAPS							1	100169 112369	69-083A-00A
TRAPPED AND PRECIPITATED ELECTRON FLUX					DALZIEL	RUTHERFORD APPLETON L.			69-083A-01
LOW-ENERGY AURORAL PARTICLE					REIDLER	KIRUNA GEOPHYS INST			69-083A-02
TRAPPED AND PRECIPITATED PROTON SPECTRA					SORAAS	U OF BERGEN			69-083A-03
PITCH ANGLE DISTRIBUTION OF ELECTRONS					PETERSEN	ELEKTRONIKCENTRALEN			69-083A-04
FLUX AND ENERGY SPECTRA OF SOLAR PROTONS					DALZIEL	RUTHERFORD APPLETON L.			69-083A-05
AURORAL PHOTOMETER					EGELAND	NORW INST OF COS PHYS			69-083A-06
LANGMUIR PROBES					WILLMORE	U OF BIRMINGHAM			69-083A-07
INTERCOSMOS 2	04285	USSRN	12/25/69						69-110A
RADIO BEACONS					UNKNOWN	UNKNOWN			69-110A-01
SPHERICAL ION TRAPS					SERAFIMOV	CLSR-BAS			69-110A-02
SPHERICAL HIGH FREQUENCY PROBES					SHMEZOVSK	UNKNOWN			69-110A-03
CYLINDRICAL LANGMUIR PROBES					SHMILAVER	UNKNOWN			69-110A-04
COSMOS 320	KOSMOS 320	USSRN	01/16/70	2/10/7(		240.-- 342.-- 48.5			70-005A
THREE-CHANNEL NARROW-ANGLE TELEPHOTOMETERS					UNKNOWN	SOVIET ACAD OF SCI			70-005A-01
NARROW-ANGLE IR RADIOMETER					UNKNOWN	SOVIET ACAD OF SCI			70-005A-02
THREE-CHANNEL WIDE-ANGLE RADIOMETERS					FORAPANOVA	SAS-IPA			70-005A-03
TV CAMERA SYSTEM					UNKNOWN	SOVIET ACAD OF SCI			70-005A-04
UPPER ATMOSPHERIC ION ANALYZER					DZHORDZHIO	SOVIET ACAD OF SCI			70-005A-05
OHSUMI	LAMBDA 4S-5	JAPAN	02/11/70			350.-- 5140.-- 31.			70-011A
SPHERICAL LANGMUIR PROBE					UNKNOWN	UNKNOWN			70-011A-01
ELECTRON TEMPERATURE PROBE					UNKNOWN	UNKNOWN			70-011A-02
ELECTRON DENSITY					UNKNOWN	UNKNOWN			70-011A-03
SOLAR RADIO NOISE					UNKNOWN	UNKNOWN			70-011A-04
ENERGETIC PARTICLE COUNTERS					UNKNOWN	UNKNOWN			70-011A-05
DIAL/WIKA	04344	FRNGN	03/10/70			328.-- 1629.-- 5.53			70-017A
GEOCORONA PHOTOMETER					BERAN	DFVLR			70-017A-01
IMPEDANCE PROBE					MELZNER	MPI-EXTRATERR PHYS			70-017A-02
CHARGED PARTICLE DETECTOR					FISCHER	U OF KIEL			70-017A-03
MAGNETOMETER					MUSMANN	BRAUNSCHWEIG TECH U			70-017A-04
INTERCOSMOS 3	04482	USSRN	08/07/70			207.-- 1320.-- 49.			70-057A
PROTONS 1-30 MEV AND ELECTRONS ABOVE 40 KEV					UNKNOWN	UNKNOWN			70-057A-01
VLF BROAD AND NARROW BAND					UNKNOWN	UNKNOWN			70-057A-02
COSMOS 378	04713	USSRN	11/17/70			241.-- 1763.-- 74.			70-097A
LANGMUIR PROBE					UNKNOWN	UNKNOWN			70-097A-01
HIGH FREQUENCY IMPEDANCE PROBE					UNKNOWN	UNKNOWN			70-097A-02
COSMOS 381	04783	USSRN	12/02/70			985.-- 1023.-- 74.			70-102A
COSMIC RAY DETECTOR					UNKNOWN	UNKNOWN			70-102A-01
VLF RECEIVER					UNKNOWN	UNKNOWN			70-102A-02
SOLAR ULTRAVIOLET (3 - 1500A)					UNKNOWN	UNKNOWN			70-102A-03
SPACE RADIATION DETECTOR					UNKNOWN	UNKNOWN			70-102A-04
HIGH FREQUENCY IMPEDANCE PROBE					UNKNOWN	UNKNOWN			70-102A-05
ISIS 2	ISIS-B	UNTST	04/01/71			1358.-- 1428.-- 88.1			71-024A
PREDICTED WORLD MAPS							9	022873 120379	71-024A-00A
EXTENDED WORLD MAPS ON MICROFILM							161	041771 061579	71-024A-00C
EXTENDED WORLD MAPS ON MAGNETIC TAPE							57	040171 102473	71-024A-00D
GSFC ORBIT ELEMENTS AT ABOUT 2 WEEK INTERVALS							1	040871 012375	71-024A-00E
EXPERIMENT OPERATION LOG, TAPE							1	120171 123174	71-024A-00F
EXPERIMENT OPERATION LOG, CHRONOLOGICAL LISTING ON MICROFILM.							1	010181 123182	71-024A-00G
LATITUDE VERSUS TIME PLOTS OF SATELLITE OPERATION (ON MICROFILM)							1	120171 063076	71-024A-00H
COORDINATED IONOSPHERIC + MAGNETOSPHERIC OBSERVATIONS FROM ISIS 2 (IN 4 VOLUMES)							4	102271 080272	71-024A-00I
SWEEP-FREQUENCY SOUNDER					TURNER	IONOSPHERIC PRED SERV			71-024A-01
SWEEP-FREQUENCY IONOGRAMS ON MICROFILM							2427	052871 061783	71-024A-01A
NSSDC INDEX OF IONOGRAMS ON TAPE							1	040871 113073	71-024A-01B
NASA-ARC ELECTRON DENSITIES INTERPOLATED TO 100-KM INTERVALS ON (PACKED) TAPE							1	040971 060772	71-024A-01C
INDEX OF IONOGRAMS SHOWING DUCTED ECHOES							1	040971 062272	71-024A-01E
CRC ELECTRON DENSITY PROFILES AT SCALED POINTS ON MAGNETIC TAPE							7	040871 082679	71-024A-01F
CRC ELECTRON DENSITY VALUES AT LAMINA BOUNDARIES (ON MICROFICHE)							8	040871 101372	71-024A-01G
COORDINATED IONOSPHERIC + MAGNETOSPHERIC OBSERVATIONS FROM ISIS 2 (IN 4 VOLUMES)							4	101371 121375	71-024A-01I
FIXED-FREQUENCY SOUNDER					CALVERT	U OF IOWA			71-024A-02
FIXED-FREQUENCY IONOGRAMS ON MICROFILM							2083	040871 070975	71-024A-02A
VLF RECEIVER					BARRINGTON	DOC-CRC			71-024A-03
VLF EMISSION INTENSITY DATA AT 6 NARROW BAND FREQUENCIES FROM KASHIMA AND SYOWA							14	110872 062383	71-024A-03B
COORDINATED IONOSPHERIC + MAGNETOSPHERIC OBSERVATIONS FROM ISIS 2 (IN 4 VOLUMES)							4	051571 010174	71-024A-03C
ENERGETIC PARTICLE DETECTORS					MCDIARMID	NATL RES COUNC OF CAN			71-024A-04
REDUCED COUNT RATE DATA ON MAGNETIC TAPE							176	041971 033078	71-024A-04A
INDEX OF PROCESSED SATELLITE PASSES FOR ENERGETIC PARTICLE DETECTOR ON ISIS 2							1	041971 042474	71-024A-04B
COORDINATED IONOSPHERIC + MAGNETOSPHERIC OBSERVATIONS FROM ISIS 2 (IN 4 VOLUMES)							4	070271 121375	71-024A-04C
SOFT-PARTICLE SPECTROMETER					HEIKKILA	U OF TEXAS, DALLAS			71-024A-05
SOFT PARTICLE SPECTROGRAMS OF ELECTRON AND PROTON DATA ON MICROFILM							102	042171 040273	71-024A-05A
COORDINATED IONOSPHERIC + MAGNETOSPHERIC OBSERVATIONS FROM ISIS 2 (IN 4 VOLUMES)							4	070271 101272	71-024A-05B
ION-MASS SPECTROMETER					HOFFMAN	U OF TEXAS, DALLAS			71-024A-06
ION MASS SPECTROMETER DATA ON MICROFILM							83	042171 111572	71-024A-06A
ION MASS SPECTROMETER DATA ON MAGNETIC TAPE							18	042171 123172	71-024A-06B
COORDINATED IONOSPHERIC + MAGNETOSPHERIC OBSERVATIONS FROM ISIS 2 (IN 4 VOLUMES)							4	101971 061873	71-024A-06C
CYLINDRICAL ELECTROSTATIC PROBES					BRACE	NASA-GSFC			71-024A-07
AVERAGED VALUE OF ELECTRON DENSITY AND TEMPERATURE ON MAGNETIC TAPE							8	041471 033173	71-024A-07A
AVERAGED VALUES OF ELECTRON DENSITY AND TEMPERATURE ON MICROFILM							8	041471 033173	71-024A-07B
COORDINATED IONOSPHERIC + MAGNETOSPHERIC OBSERVATIONS FROM ISIS 2 (IN 4 VOLUMES)							4	051571 121375	71-024A-07C
RETARDING POTENTIAL ANALYZER					MAIER	NASA-GSFC			71-024A-08
PLOTS OF O+, H+, HE+, AND TEMPERATURE VS TIME							2	042871 122272	71-024A-08A
LISTINGS OF O+, H+, HE+, AND TEMPERATURE VS TIME							2	042871 122272	71-024A-08B

AIM FILE IONOSPHERIC PHYSICS LISTING

SATELLITE NAME / INVESTIGATION NAME / DATA SET NAME	ALTERNATE NAMES	COUNTRY	LAUNCH DATE	INOP DATE	PERIAPSIS	APOAPSIS	INCLINATION	PI	AGENCY	QUANTITY	TIME SPAN	NSSDC ID
COORDINATED IONOSPHERIC + MAGNETOSPHERIC OBSERVATIONS FROM ISIS 2 (IN 4 VOLUMES)										4	051571 070473	71-024A-08C
RADIO BEACON								FORSYTH	WESTERN ONTARIO U			71-024A-09
COSMIC RADIO NOISE								HARTZ	DOC-CRC			71-024A-10
COSMIC RADIO NOISE, AGC LEVEL PLOTS ON 35-MM MICROFILM, MERGED WITH IONOGRAMS										1137	040871 113073	71-024A-10A
3914- AND 5577-A PHOTOMETER								ANGER	U OF CALGARY			71-024A-11
3914-A AND 5577-A INTENSITY MAPS ON TAPE										1	042371 123171	71-024A-11A
POLAR PLOTS OF OPTICAL EMISSION INTENSITIES (3914-A AND 5577-A)										1	010673 012974	71-024A-11B
COORDINATED IONOSPHERIC + MAGNETOSPHERIC OBSERVATIONS FROM ISIS 2 (IN 4 VOLUMES)										4	101771 121375	71-024A-11C
6300-A PHOTOMETER								SHEPHERD	YORK U			71-024A-12
6300-A INTENSITY MAPS ON MAGNETIC TAPE										1	042371 123171	71-024A-12A
POLAR PLOTS OF OPTICAL EMISSION INTENSITIES (6300-A)										1	010673 012974	71-024A-12B
COORDINATED IONOSPHERIC + MAGNETOSPHERIC OBSERVATIONS FROM ISIS 2 (IN 4 VOLUMES)										4	112371 121375	71-024A-12C
OV1-20	SESP 70-2A	UNTST	08/07/71									71-067A
PREDICTED WORLD MAPS										1	080771 081871	71-067A-00A
ENERGETIC PROTON ANALYZER								KOLASINSKI	AEROSPACE CORP			71-067A-01
THERMAL ION DETECTOR								MCPHERSON	AEROSPACE CORP			71-067A-02
SHINSEI	MS-F2	JAPAN	09/28/71	9/00/73	874.--	1871.--	32.-					71-080A
PREDICTED WORLD MAPS										1	092871 111671	71-080A-00A
SOLAR RADIO EMISSION RECEIVER, 5 + 8 MHZ								TAKAKURA	U OF TOKYO			71-080A-01
ENERGETIC ELECTRONS (100-400 KEV)								MIYAZAKI	INST PHYS + CHEM RES			71-080A-02
IONOSPHERIC PLASMA PROBE								HIRAO	U OF TOKYO			71-080A-03
ARIEL 4	UK 4	UNTST	12/11/71		480.--	590.--	83.0-					71-109A
PREDICTED WORLD MAPS										6	120971 080574	71-109A-00A
LANGMUIR PROBE								WILLMORE	U OF BIRMINGHAM			71-109A-01
LANGMUIR PROBE MERGED DATA ON MAGNETIC TAPE										476	120171 120973	71-109A-01A
MHZ BAND NOISE (E FIELD)								SMITH	U OF CAMBRIDGE			71-109A-02
MHZ BAND RADIO NOISE (E-F) MERGED DATA ON MAGNETIC TAPE										476	120171 120973	71-109A-02A
VLF-ELF RECEIVER								KAISER	U OF SHEFFIELD			71-109A-03
VLF/ELF PROPAGATION MERGED DATA ON MAGNETIC TAPE										476	120173 120973	71-109A-03A
LOW ENERGY PROTON AND ELECTRON DIFFERENTIAL ENERGY ANALYZER (LEPE								FRANK	U OF IOWA			71-109A-04
PARTICLE COUNT RATES ON MULTI-EXPERIMENT DATA TAPES										476	120171 120973	71-109A-04A
LANGMUIR PROBE								DALZIEL	RUTHERFORD APPLETON L.			71-109A-05
VLF IMPULSE COUNTER								HORNER	RUTHERFORD APPLETON L.			71-109A-06
DENPA	REXS	JAPAN	08/19/72		240.--	6570.--	31.-					72-064A
ELECTROMAGNETIC AND PLASMA WAVES								UNKNOWN	UNKNOWN			72-064A-01
IMPEDANCE PROBES								UNKNOWN	UNKNOWN			72-064A-02
CYCLOTRON INSTABILITY								UNKNOWN	UNKNOWN			72-064A-03
ELECTRON BEAM ANALYZER								UNKNOWN	UNKNOWN			72-064A-04
FLUXGATE MAGNETOMETER								UNKNOWN	UNKNOWN			72-064A-05
RUBIDIUM VAPOR MAGNETOMETER								UNKNOWN	UNKNOWN			72-064A-06
PLASMA WAVES								UNKNOWN	UNKNOWN			72-064A-07
ESRO 4	PL-724C	UNTST	11/22/72		252.--	1186.--	91.1-					72-092A
PREDICTED WORLD MAPS										4	112272 040874	72-092A-00A
POSITIVE ION SPECTROMETER								BOYD	U COLLEGE LONDON			72-092A-01
ION AND ELECTRON DATA ON TAPE										3	112272 041474	72-092A-01A
NEUTRAL MASS SPECTROMETER								VON ZAHN	U OF BONN			72-092A-02
AURORAL PARTICLE SPECTROMETER								HULTQVIST	KIRUNA GEOPHYS INST			72-092A-03
SOUTHERN POLAR CAP SOLAR PARTICLE								DE JAGER	U OF UTRECHT			72-092A-04
NORTHERN POLAR CAP SOLAR PARTICLE								LUST	MPI-EXTRATERR PHYS			72-092A-05
AEROS	GRS-A2	UNTST	12/16/72	8/22/73	223.0--	867.0--	96.9-					72-100A
PREDICTED WORLD MAPS										3	120872 082273	72-100A-00A
DENSITY AND COMPOSITION OF UPPER ATMOSPHERE (2-44 AMU)								KRANKOWSKY	MPI-NUCLEAR PHYS			72-100A-01
ENERGY DISTRIBUTION OF IONS AND								SPENNER	INST FUR PHYS WELTRAUM			72-100A-02
RETARDING POTENTIAL ANALYZER PLASMA MEASUREMENT DATA ON MAGNETIC TAPE										1	010473 080373	72-100A-02A
ELECTRON CONCENTRATION IN THE IONOSPHERE								NESKE	INST FUR PHYS WELTRAUM			72-100A-03
SOLAR EUV RADIATION								SCHMIDTKE	INST FUR PHYS WELTRAUM			72-100A-04
EUV SPECTRA DATA ON MAGNETIC TAPE										1	122372 080573	72-100A-04A
NEUTRAL GAS TEMPERATURE IN THE THERMOSPHERE								SPENCER	NASA-GSFC			72-100A-05
NEUTRAL DENSITY AND TEMPERATURE DATA ON MICROFILM										15	122672 080973	72-100A-05A
ATMOSPHERIC DRAG ANALYSIS								ROEMER	U OF BONN			72-100A-06
PIONEER 11	PIONEER-G	UNTST	04/06/73									73-019A
ATTITUDE AND HEC TRAJECTORY DATA ON MAGNETIC TAPE										1	042173 102287	73-019A-00E
ATTITUDE AND HEC TRAJECTORY DATA ON MAGNETIC TAPE										1	042173 102287	73-019A-00F
MAGNETIC FIELDS								SMITH	NASA-JPL			73-019A-01
MINUTE AND HOURLY AVERAGED VECTOR MAGNETIC FIELD PLOTS ON MICROFILM										1	040673 060273	73-019A-01A
ONE MINUTE, HOURLY, AND DAILY AVERAGES OF CRUISE VECTOR MAGNETIC FIELD DATA ON TAPE										71	040673 123182	73-019A-01B
HIGH TIME RESOLUTION (5.3 VECTORS/SEC) INTERPLANETARY DATA ON TAPE										16	043073 121474	73-019A-01C
SATURN ENCOUNTER,ONE MINUTE AVERAGED, PE COORDINATE DATA ON MAGNETIC TAPE										1	083079 090879	73-019A-01D
JUPITER ENCOUNTER INSIDE 7 RJ, JG COORDINATES DATA ON MAGNETIC TAPE										1	120374 120374	73-019A-01E
JUPITER ENCOUNTER 1 MINUTE AVERAGED DATA ON MAGNETIC TAPE										1	112474 122474	73-019A-01F
HOURLY & DAILY MAGNETIC FIELD AVERAGES ON MAGNETIC TAPE										1	040673 123180	73-019A-01G
CHARGED PARTICLE COMPOSITION								SIMPSON	U OF CHICAGO			73-019A-02
15-MIN ACCUMULATED PULSE-HEIGHT ANALYSIS DATA ON TAPE										53	040773 123187	73-019A-02A
5-MIN. ACCUMULATED SECTORED COUNTING-RATE SUMMARY TAPES										26	040773 123187	73-019A-02B
COUNT RATE PLOTS BY SOLAR ROTATIONS ON MICROFILM										1	040673 011474	73-019A-02C
ASTEROID/METEOROID ASTRONOMY								SOBERMAN	GENERAL ELECTRIC CO			73-019A-03
REFORMATTED REDUCED DATA ON SKY/ASTEROID/ METEROID LIGHT EMISSIONS ON MAG. TAPES										39	041173 122974	73-019A-03A
FINAL REPORT OF DATA ANALYSIS										5		73-019A-03B
METEOROID DETECTORS								KINARD	NASA-LARC			73-019A-04
METEOROID ENVIRONMENT DATA FOR JUPITER										4		73-019A-04A
RESULTS FROM METEOROID EXPERIMENT FOR SATURN										1		73-019A-04B
COMPLETE SET OF EVENT GROUND CONFIRM TIMES, CHANNELS 0 + 1, ON MICROFICHE										1	040673 030384	73-019A-04C
JOVIAN TRAPPED RADIATION								FILLIUS	U OF CALIF, SAN DIEGO			73-019A-05
JUPITER TRAPPED RADIATION DATA SUMMARY TAPES										4	112574 120974	73-019A-05A
JUPITER TRAPPED RADIATION DATA ANALYSIS TAPE										1	120274 120374	73-019A-05B
JOVIAN TRAPPED PARTICLE INTERPLANETARY DATA SUMMARIES ON MAGNETIC TAPE										2	041673 053177	73-019A-05C
TRAPPED RADIATION DETECTOR SATURN ENCOUNTER BINARY REDUCTION DATA ON TAPE										10	083079 090479	73-019A-05D

AIM FILE IONOSPHERIC PHYSICS LISTING

SATELLITE NAME / INVESTIGATION NAME / DATA SET NAME	ALTERNATE NAMES	COUNTRY	LAUNCH DATE	INOP DATE	PERIAPSIS	APOAPSIS	INCLINATION	PI / AGENCY	QUANTITY	TIME SPAN	NSSDC ID
INHOMOGENEOUS DAILY SUMMARY DATA AT VARIOUS BIT RATES ON MAGNETIC TAPE									1	041673 123180	73-019A-05E
INTERPLANETARY DATA PLOTS ON MICROFILM									1	041673 020982	73-019A-05F
24-HOUR COMPRESSED SUMMARY DATA ON MAGNETIC TAPE									1	020173 123186	73-019A-05G
ULTRAVIOLET PHOTOMETRY								JUDGE / U OF SOUTHERN CALIF			73-019A-06
EUV EDR PHOTON EMISSION DATA ON MAGNETIC TAPE									46	040673 052381	73-019A-06A
USC ULTRAVIOLET DATA PLOTS									1	043073 093080	73-019A-06B
IMAGING PHOTOPOLARIMETER (IPP)								GEHRELS / U OF ARIZONA			73-019A-07
COLOR PRESS RELEASE PHOTOGRAPHY									25		73-019A-07A
POLARIZATION DATA FOR JUPITER									256	053073 090579	73-019A-07B
BLACK AND WHITE PHOTOPOLARIMETER IMAGERY									288	113074 120474	73-019A-07C
PHOTOS FROM PIONEER 11 IMAGE PHOTOPOLARIMETER ON 8X10 NEGATIVE FILM									47	113074 120474	73-019A-07D
INDEX TO PHOTOS OF PIONEER 11 IMAGE PHOTOPOLARIMETER ON FICHE									1	112374 120674	73-019A-07E
IMAGING PHOTOPOLARIMETER POLARIZATION DATA ON MAG TAPE									12	053173 102976	73-019A-07F
JUPITER IMAGE LOG ON MICROFICHE									1	112374 120974	73-019A-07G
JUPITER COLOR IMAGERY									47	112974 120674	73-019A-07H
SATURN ENCOUNTER									82	082379 090579	73-019A-07J
SATURN ENCOUNTER DATA ON MAGNETIC TAPE									6	082579 090579	73-019A-07K
INDEX OF JUPITER IMAGES									4		73-019A-07L
INDEX OF SATURN IMAGES									4		73-019A-07M
BLACK AND WHITE PRESS RELEASE PHOTOGRAPHY									7		73-019A-07N
INFRARED RADIOMETER								INGERSOLL / CALIF INST OF TECH			73-019A-08
CELESTIAL MECHANICS								ANDERSON / NASA-JPL			73-019A-09
DOPPLER TRACKING DATA AT JUPITER ENCOUNTER ON MAGNETIC TAPE									1	041774 122574	73-019A-09A
DOPPLER TRACKING DATA SATURN ENCOUNTER DATA ON MAGNETIC TAPE									1	080179 091879	73-019A-09B
S-BAND OCCULTATION								KLIORE / NASA-JPL			73-019A-10
FINAL PLOTS AND LISTINGS OF JUPITER OCCULTATION DATA, ON MICROFILM									1	120374 120374	73-019A-10A
INTERMEDIATE DATA FILES OF JUPITER OCCULTATION DATA, ON MAGNETIC TAPE									1	120374 120374	73-019A-10B
REDUCED TELEMETRY SIGNALS FOR JUPITER OCCULTATION, ON MAGNETIC TAPE									3	120374 120374	73-019A-10C
JOVIAN CHARGED PARTICLES								VAN ALLEN / U OF IOWA			73-019A-11
JUPITER ENCOUNTER PROTON AND ELECTRON COUNT RATES ON TAPE									7	111974 121274	73-019A-11A
SATURN ENCOUNTER-CHARGED PARTICLES									1	083079 090579	73-019A-11B
ONE HOUR CRUISE AVERAGES ON MAGNETIC TAPE									3	040673 032988	73-019A-11C
24 HOUR CORRECTED CRUISE COUNT RATE AVERAGES WITH TRAJECTORY ON MAGNETIC TAPE									1	040673 032888	73-019A-11D
COSMIC-RAY SPECTRA								MCDONALD / NASA HEADQUARTERS			73-019A-12
15-MIN AVERAGED JUPITER ENCOUNTER DATA ON MAGNETIC TAPE									1	112674 120974	73-019A-12A
15-MIN AVERAGED SATURN ENCOUNTER DATA ON MAGNETIC TAPE.									1	083179 090479	73-019A-12B
6 HOUR AVERAGED INTERPLANETARY DATA ON MAGNETIC TAPE									1	040873 123187	73-019A-12C
QUADRISPHERICAL PLASMA ANALYZER								BARNES / NASA-ARC			73-019A-13
SOLAR WIND PROTON BULK SPEED DATA ON MAGNETIC TAPE									5	042173 123179	73-019A-13A
FULL HISTORY, SOLAR WIND PROTON PLASMA DATA ON MAGNETIC TAPE.									1	042173 050886	73-019A-13B
HOURLY AVERAGED SOLAR WIND PROTON PLASMA DATA AND MOMENTS ON MAGNETIC TAPE.									1	042173 050486	73-019A-13C
DAILY AVERAGED SOLAR WIND PROTON PLASMA DATA AND MOMENTS ON MAGNETIC TAPE.									1	042173 041786	73-019A-13D
FULL HISTORY SOLAR WIND PROTON PLOTS ON MICROFICHE									6	042173 120681	73-019A-13E
54-DAY SOLAR WIND PROTON T,N,V PLOTS ON MICROFICHE.									1	042173 120681	73-019A-13F
LISTING OF DAILY AVERAGES SOLAR WIND PROTON AND MOMENTS ON MICROFICHE									1	042173 120681	73-019A-13G
FULL HISTORY, SOLAR WIND PROTON, PLASMA DATA ON MAGNETIC TAPE									1	042173 050886	73-019A-13H
DAILY AVERAGED SOLAR WIND PROTON PLASMA DATA AND MOMENTS ON MAGNETIC TAPE									1	042173 050486	73-019A-13I
HOURLY AVERAGED SOLAR WIND PROTON PLASMA DATA AND MOMENTS ON MAGNETIC TAPE									1	042173 041786	73-019A-13J
JOVIAN MAGNETIC FIELD								ACUNA / NASA-GSFC			73-019A-14
FLUXGATE MAGNETOMETER JOVIAN ENCOUNTER 5 MINUTE AVERAGES ON MAGNETIC TAPE									1	120274 120374	73-019A-14A
SATURN ENCOUNTER 5 MINUTE AVERAGED DATA ON MAGNETIC TAPE									1	090179 090179	73-019A-14B
JOVIAN ENCOUNTER, 36-SEC FLUXGATE MAGNETOMETER AVERAGES, ON TAPE									1	120374 120374	73-019A-14C
SATURN ENCOUNTER,1-MIN 10-S + 2-MIN 26-S FLUXGATE MAGNETOMETER AVERAGES, ON TAPE									1	090179 090179	73-019A-14D
ZODIACAL-LIGHT TWO-COLOR PHOTOPOLARIMETRY								WEINBERG / SPACE ASTRONOMY LAB			73-019A-15
PIONEER 11 STARLIGHT/ZODIACAL LIGHT EXPERIMENT DATA ON MAGNETIC TAPE									1	052874 092474	73-019A-15A
HIGH-RESOLUTION PHOTO-IMAGING OF JUPITER'S CLOUD COVER								GEHRELS / U OF ARIZONA			73-019A-16
RAE-B----------RADIO ASTRONOMY EXPLORER--UNTST----06/10/73-----					-----1052.98--	1063.84--	55.7-----				73-039A
PREDICTED WORLD MAPS									11	061073 071177	73-039A-00A
STEP FREQUENCY RADIOMETERS								STONE / NASA-GSFC			73-039A-01
RYLE-VONBERG 24 HOUR PLOTS									8	103174 042677	73-039A-01A
RYLE-VONBERG 24-HOUR DATA ON MAGNETIC TAPE									11	071273 062875	73-039A-01B
RAPID-BURST RECEIVERS								STONE / NASA-GSFC			73-039A-02
DATA SUMMARY (10 MIN. INTERVALS) FROM BURST RECEIVER ON LOWER V ANTENNA, ON MFLM									1	071273 063075	73-039A-02A
DATA SUMMARY (10 MIN INTERVALS) FROM BURST RECEIVER ON LOWER V ANTENNA, ON TAPE									2	071273 030976	73-039A-02B
BURST RECEIVER HOURLY PLOTS ON MICROFILM									49	071273 042677	73-039A-02C
BURST RECEIVED 24-HOUR PLOTS									12	071273 042677	73-039A-02D
SPECTRAL BURST RECEIVER HOURLY PLOTS ON MICROFILM									1	050775 042477	73-039A-02E
IMPEDANCE PROBE								STONE / NASA-GSFC			73-039A-03
DMSP 5B/F4----------DAPP(73-054A)----------UNTST----08/17/73----- 8/09/74-----					811.0--	852.0--	98.9-----73-054A				
SCANNING RADIOMETER (SR)								AFGWC STAFF / GLOBAL WEATHER CTR			73-054A-01
AURORAL IMAGERY ON MICROFILM									50	092173 043077	73-054A-01A
NIGHTTIME POLAR IMAGERY ON 35MM MICROFILM									50	092173 043077	73-054A-01B
ELECTRON SPECTROGRAPH (SSJ)								ROTHWELL / USAF GEOPHYS LAB			73-054A-03
AE-C----------EXPLORER 51----------UNTST----12/16/73-----12/12/78-----					149.0--	4294.0--	68.1-----73-101A				
PREDICTED WORLD MAPS									29	121473 112978	73-101A-00A
CYLINDRICAL ELECTROSTATIC PROBES (CEP)								BRACE / NASA-GSFC			73-101A-01
CYLINDRICAL ELECTROSTATIC PROBE (CEP) DATA ON MAGNETIC TAPE									62	121673 121178	73-101A-01A
CYLINDRICAL ELECTROSTATIC PROBE DATA ON MICROFILM									8	121973 092375	73-101A-01B
ATMOSPHERIC DENSITY ACCELEROMETER (MESA)								CHAMPION / USAF GEOPHYS LAB			73-101A-02
MINIATURE ELECTROSTATIC ACCELEROMETER (MESA) DENSITY DATA									62	121673 121178	73-101A-02A
MINIATURE ELECTROSTATIC ACCELEROMETER (MESA) DENSITY DATA ON MICROFILM									8	121973 092375	73-101A-02B
PHOTOELECTRON SPECTROMETER (PES)								DOERING / JOHNS HOPKINS U			73-101A-03
PHOTOELECTRON SPECTROMETER (PES) DATA ON MAGNETIC TAPE									62	121673 121178	73-101A-03A
PHOTOELECTRON SPECTROMETER (PES) DATA ON MICROFILM									8	121973 092375	73-101A-03B
RETARDING POTENTIAL ANALYZER/DRIFT METER								HANSON / U OF TEXAS, DALLAS			73-101A-04
RETARDING POTENTIAL ANALYZER (RPA) DATA ON MAGNETIC TAPE									62	121673 121178	73-101A-04A
RETARDING POTENTIAL ANALYZER DATA ON MICROFILM									8	121973 092375	73-101A-04B
EXTREME SOLAR UV MONITOR (ESUM)								HEATH / NASA-GSFC			73-101A-05
ESUM DATA ON TAPE									62	121673 121178	73-101A-05A
ULTAVIOLET SOLAR FLUX MEASUREMENTS ON MICROFICHE									1	031474 112774	73-101A-05B
ABSOLUTE ULTRAVIOLET SOLAR FLUX									1	122073 123173	73-101A-05C

AIM FILE IONOSPHERIC PHYSICS LISTING

SATELLITE NAME / INVESTIGATION NAME / DATA SET NAME	ALTERNATE NAMES	COUNTRY	LAUNCH DATE	INOP DATE	PERIAPSIS	APOAPSIS	INCLINATION	NSSDC ID
		PI	AGENCY	QUANTITY	TIME SPAN			
SOLAR EUV SPECTROPHOTOMETER (EUVS)			HINTEREGGER	USAF GEOPHYS LAB				73-101A-06
SOLAR EUV FLUXES ON MAGNETIC TAPE				62	121673 121178			73-101A-06A
ATMOSPHERIC EUV ABSORPTION DATA, ON MAGNETIC TAPE				1	020274 022874			73-101A-06B
OPEN-SOURCE NEUTRAL MASS SPECTROMETER			NIER	U OF MINNESOTA				73-101A-07
OSS NEUTRAL ATMOSPHERE CONCENTRATIONS ON TAPE				62	121673 121178			73-101A-07A
OPEN SOURCE SPECTROMETER DATA ON MICROFILM				8	121973 092375			73-101A-07B
CLOSED-SOURCE NEUTRAL MASS SPECTROMETER			PELZ	NASA-GSFC				73-101A-08
CLOSED SOURCE NEUTRAL MASS SPECTROMETER COMPOSITION DATA ON TAPE				62	121673 121178			73-101A-08A
NACE NEUTRAL ATMOSPHERE COMPOSITION DATA ON MICROFILM				8	121973 092375			73-101A-08B
NEUTRAL ATMOSPHERE TEMPERATURE (NATE)			SPENCER	NASA-GSFC				73-101A-09
NEUTRAL ATMOSPHERE TEMPERATURE AND COMPOSITION				62	121673 121178			73-101A-09A
NEUTRAL ATMOSPHERE TEMPERATURE AND COMPOSITION DATA ON MICROFILM				8	121973 092375			73-101A-09B
MAGNETIC ION-MASS SPECTROMETER (MIMS)			HOFFMAN	U OF TEXAS, DALLAS				73-101A-10
MAGNETIC ION MASS SPECTROMETER DATA ON TAPE				62	121673 121178			73-101A-10A
MAGNETIC ION MASS SPECTROMETER DATA ON MICROFILM				8	121973 092375			73-101A-10B
BENNETT ION-MASS SPECTROMETER (BIMS)			BRINTON	NASA HEADQUARTERS				73-101A-11
ION SPECIES CONCENTRATIONS ON TAPE				62	121673 121178			73-101A-11A
BENNETT ION MASS SPECTROMETER DATA ON MICROFILM				8	121973 092375			73-101A-11B
LOW-ENERGY ELECTRONS (LEE)			HOFFMAN	NASA-GSFC				73-101A-12
LOW-ENERGY ELECTRON DATA, TAPE				62	121673 121178			73-101A-12A
LOW ENERGY ELECTRON DATA ON MICROFILM				8	121973 092375			73-101A-12B
ULTRAVIOLET NITRIC-OXIDE (UVNO)			BARTH	U OF COLORADO				73-101A-13
NITRIC OXIDE DATA ON TAPE				62	121673 121178			73-101A-13A
ULTRAVIOLET NITRIC OXIDE DATA ON MICROFILM				8	121973 092375			73-101A-13B
VISIBLE AIRGLOW PHOTOMETER (VAE)			HAYS	U OF MICHIGAN				73-101A-14
VISIBLE AIRGLOW PHOTOMETER DATA ON TAPE				62	121673 121178			73-101A-14A
VISIBLE AIRGLOW DATA ON MICROFILM				8	121973 092375			73-101A-14B
COLD CATHODE ION GAUGE			RICE	AEROSPACE CORP				73-101A-15
CAPACITANCE MANOMETER			RICE	AEROSPACE CORP				73-101A-16
MAGNETOMETER (SPACECRAFT)			ZMUDA	APPLIED PHYSICS LAB				73-101A-17
TEMPERATURE ALARM			CARUSO	NASA-GSFC				73-101A-18
ATS 6	PL-71A	UNTST	05/30/74		35763.0	35818.0	1.8	74-039A
PREDICTED WORLD MAPS				17	053074 043079			74-039A-00A
MEASUREMENT OF LOW-ENERGY PROTONS			KONRADI	NASA-JSC				74-039A-01
HIGH ENERGY PROTON DATA ON MAGNETIC TAPE				2	072877 121277			74-039A-01A
1-MINUTE AVERAGED PROTON AND HEAVY ION SUMMARY FLUX PLOTS ON MICROFILM				16	061174 090875			74-039A-01B
HIGH-RESOLUTION PROTON AND HEAVY ION FLUX PLOTS ON MICROFILM				150	061174 082775			74-039A-01C
MAGNETOMETER EXPERIMENT			COLEMAN, JR.	U OF CALIF, LA				74-039A-02
SIXTY-FOUR SEC. AVERAGE MAGNETIC FIELD VECTORS IN DIPOLE COORDINATES				1	053174 090975			74-039A-02A
SIXTY FOUR SEC. AVERAGE PC-1 BAND ULF INDEX				1	053174 090875			74-039A-02B
0.5 SECOND S/C X + Z COMPONENT MAGNETIC FIELD				1	072977 072977			74-039A-02E
LOW-ENERGY PROTON/ELECTRON EXPERIMENT			ARNOLDY	U OF NEW HAMPSHIRE				74-039A-03
LOW ENERGY PROTON AND ELECTRON PLASMA DATA ON MAGNETIC TAPE				2	072877 121277			74-039A-03A
LOW ENERGY ELECTRON-PROTON SPECTROGRAMS ON MICROFILM				1	063077 022179			74-039A-03B
PARTICLE ACCELERATION MECHANISMS AND DYNAMICS OF THE OUTER TRAPPI			WINCKLER	U OF MINNESOTA				74-039A-04
ELECTRON AND PROTON PLOTS VERSUS TIME ON MICROFILM				4	061474 033175			74-039A-04A
AURORAL PARTICLES EXPERIMENT			MCILWAIN	U OF CALIF, SAN DIEGO				74-039A-05
PLASMA SPECTROGRAMS DURING SPACECRAFT CHARGING AND NEUTRALIZATION ON MICROFILM				3	071874 040977			74-039A-05A
FIRST 4 MOMENTS OF DISTRIBUTION FUNCTION FOR ELECTRONS AND PROTONS DATA ON MAG TAPE				1	070574 021776			74-039A-05B
SOLAR COSMIC RAYS AND GEOMAGNETICALLY TRAPPED RADIATION			MASLEY	TRW SYSTEMS GROUP				74-039A-06
OMNIDIRECTIONAL SPECTROMETER			PAULIKAS	AEROSPACE CORP				74-039A-07
ENERGETIC PARTICLE SPECTROMETER DATA ON MAGNETIC TAPE				4	061474 123177			74-039A-07A
GEOSYNCHRONOUS VERY HIGH RESOLUTION RADIOMETER (GVHRR)			SHENK	NASA-GSFC				74-039A-08
BLACK AND WHITE VISUAL IMAGES ON FILM				750	060774 081574			74-039A-08A
BLACK AND WHITE INFRARED IMAGES ON FILM				750	060774 081574			74-039A-08B
GEOSYN. VERY HIGH RESOLUTION RADIOMETER INFRARED DIGITAL IMAGE DATA MAGNETIC TAPES				1176	061774 082074			74-039A-08C
RADIO BEACON			DAVIES	NOAA-ERL				74-039A-09
OBLIQUE TOTAL ELECTRON CONTENT AND PLASMASPHERIC ELEC CONTENT			TO BOULDER STA	1	070174 053175			74-039A-09A
RADIO FREQUENCY INTERFERENCE			PALAZZOLA	HUGHES AIRCRAFT CO				74-039A-11
MILLIMETER WAVE PROPAGATION			IPPOLITO	NASA-GSFC				74-039A-13
CESIUM BOMBARDMENT ION ENGINE EXPERIMENT			BARTLETT	NASA-GSFC				74-039A-14
SOLAR CELL RADIATION DAMAGE			DUNKERLY	HUGHES AIRCRAFT CO				74-039A-16
SATELLITE INSTRUCTIONAL TV			MILLER	NASA-GSFC				74-039A-17
TRACKING AND DATA RELAY			GALICINAO	NASA-GSFC				74-039A-18
POSITION, LOCATION AND AIRCRAFT COMMUNICATION			GALICINAO	NASA-GSFC				74-039A-19
SPACECRAFT ATTITUDE CONTROL			ISLEY	NASA-GSFC				74-039A-20
COMSAT PROPAGATION (13-AND 18-GHZ)			HYDE	COMMUN SATELLITE CORP				74-039A-21
ADVANCED THERMAL CONTROL FLIGHT			KIRKPATRICK	NASA-ARC				74-039A-22
QUARTZ CRYSTAL MICROBALANCE			ROGERS	NASA-GSFC				74-039A-23
HEALTH AND EDUCATION TELECOMMUNICATIONS			WHALEN	NASA-GSFC				74-039A-24
VERY HIGH RESOLUTION CAMERA SYSTEM FOR DAYLIGHT CLOUD PICTURES			HUBERT	NOAA				74-039A-25
GIMBAL GRAVITY GRADIENT BOOM EXPERIMENT			GATLIN	NASA-GSFC				74-039A-27
TELEVISION RELAY USING SMALL TERMINALS			MILLER	NASA-GSFC				74-039A-28
R.F.INTERFEROMETER SUBSYSTEM			KAMPINSKY	NASA-GSFC				74-039A-29
SPACECRAFT VIBRATION ACCELEROMETER			MATTSON	NASA-GSFC				74-039A-30
TELEVISION CAMERA			PATTERSON	NASA-GSFC				74-039A-31
AEROS 2	AEROS-B	UNTST	07/16/74	9/25/75	217.0	879.0	97.4	74-055A
PREDICTED WORLD MAPS				7	071674 092675			74-055A-00A
MASS SPECTROMETER (MS)			KRANKOWSKY	MPI-NUCLEAR PHYS				74-055A-01
ENERGY DISTRIBUTION OF IONS AND			SPENNER	INST FUR PHYS WELTRAUM				74-055A-02
RETARDING POTENTIAL ANALYZER PLASMA MEASUREMENT DATA ON MAGNETIC TAPE				5	072074 090475			74-055A-02A
ELECTRON CONCENTRATION IN THE IONOSPHERE			NESKE	INST FUR PHYS WELTRAUM				74-055A-03
ELECTRON DENSITY DATA ON MAGNETIC TAPE				2	072374 092575			74-055A-03A
SOLAR EUV RADIATION			SCHMIDTKE	INST FUR PHYS WELTRAUM				74-055A-04
EUV SPECTRA DATA ON MAGNETIC TAPE				1	072174 070375			74-055A-04A
NEUTRAL ATMOSPHERE TEMPERATURE			SPENCER	NASA-GSFC				74-055A-05
ATMOSPHERIC DRAG ANALYSIS			ROEMER	U OF BONN				74-055A-06
S3-1	SESP P73-5	UNTST	10/29/74	5/26/75	152.0	3795.0	97.0	74-085C
ACCELEROMETER DENSITY OBSERVATIONS			MARCOS	USAF GEOPHYS LAB				74-085C-01
ION DENSITY GAUGES			MCISAAC	USAF GEOPHYS LAB				74-085C-02
MASS SPECTROMETER			PHILBRICK	USAF GEOPHYS LAB				74-085C-03

AIM FILE IONOSPHERIC PHYSICS LISTING

SATELLITE NAME / INVESTIGATION NAME / DATA SET NAME	ALTERNATE NAMES	COUNTRY	LAUNCH DATE	INCP DATE	PERIAPSIS	APOAPSIS	INCLINATION	NSSDC ID
			PI		AGENCY			
					QUANTITY	TIME SPAN		
SOLAR UV EXPERIMENT			PRAG		AEROSPACE CORP			74-085C-04
ELECTROSTATIC ANALYZER			RICE		AEROSPACE CORP			74-085C-05
RETARDING POTENTIAL ANALYZER			RICE		AEROSPACE CORP			74-085C-06
ELF-VLF RECEIVER			KOONS		AEROSPACE CORP			74-085C-07
INTASAT	INTA SATELLITE	UNTST	11/15/74	10/06/76	1440.0	1457.0	101.7	74-089C
REFINED WORLD MAPS ON MICROFILM					19	111574 100776		74-089C-00B
IONOSPHERIC BEACON			SAGREDO		CONIE-INTA			74-089C-01
SRATS	TAIYO	JAPAN	02/24/75			249.	3129.	31.54	75-014A
SOLAR X-RAY MONITOR			MATSUOKA		U OF TOKYO			75-014A-01
SUMMARY PLOTS ON MICROFICHE					7	022575 051976		75-014A-01A
HYDROGEN LYMAN-ALPHA			OSHIO		OSAKA CITY U			75-014A-02
SUMMARY PLOTS ON MICROFICHE					7	022575 051976		75-014A-02A
GEOCORONAL UV GLOW AND EARTH UV ALBEDO			TOHMATSU		U OF TOKYO			75-014A-03
ELECTRON DENSITY MEASUREMENT			OYA		U OF TOHOKU			75-014A-04
SUMMARY PLOTS ON MICROFICHE					7	022575 051976		75-014A-04A
ELECTRON TEMPERATURE			HIRAO		U OF TOKYO			75-014A-05
SUMMARY PLOTS ON MICROFICHE					7	022575 051976		75-014A-05A
RETARDING POTENTIAL ANALYZER			MIYAZAKI		RADIO RESEARCH LAB			75-014A-06
IONIC COMPOSITION			FUGONO		RADIO RESEARCH LAB			75-014A-07
ARYABHATA	ARIABAT	INDIA	04/19/75	9/23/76	568.	611.	50.7	75-033A
X-RAY ASTRONOMY			RAO		ISRO SATELLITE CENTER			75-033A-01
SOLAR NEUTRON AND GAMMA RAYS			DANIEL		TATA INST OF FUND RES			75-033A-02
IONOSPHERIC ELECTRON TRAP AND UV CHAMBERS			PRAKASH		PHYSICAL RESEARCH LAB			75-033A-03
DMSP 5C/F2	DAPP(75-043A)	UNTST	05/24/75	4/01/77	813.	892.	98.93	75-043A
4 CHANNEL SCANNING RADIOMETER (SR)			AFGWC STAFF		GLOBAL WEATHER CTR			75-043A-01
AURORAL IMAGERY ON MICROFILM					34	053075 073177		75-043A-01A
NIGHTTIME POLAR IMAGERY ON 35MM MICROFILM					34	053075 073177		75-043A-01B
VERTICAL TEMPERATURE PROFILE RADIOMETER (SSE)			AFGWC STAFF		GLOBAL WEATHER CTR			75-043A-02
ELECTRON SPECTROMETER (SSJ/2)			ROTHWELL		USAF GEOPHYS LAB			75-043A-03
VIKING 1 ORBITER	PL-733B	UNTST	08/20/75	9/30/80	1513.	32600.	37.9	75-075A
BIBLIOGRAPHY OF THE VIKING MARS SCIENCES					1			75-075A-00D
ORBITER IMAGING			CARR		US GEOLOGICAL SURVEY			75-075A-01
BLACK AND WHITE PRESS RELEASE PHOTOGRAPHY					50	041276 112278		75-075A-01A
B/W RECTILINEAR PHOTOGRAPHY					33100	112076 081580		75-075A-01B
B/W ORTHOGRAPHIC PHOTOGRAPHY					16743	072376 051377		75-075A-01C
COLOR PRESS RELEASE PHOTOGRAPHY					7	061876 030377		75-075A-01D
SEDR PHOTOGRAPHIC SUPPORT DATA ON MICROFILM					4	062376 092076		75-075A-01E
MOSAICS MADE FROM THE BLACK AND WHITE RECTILINEAR AND ORTHOGRAPHIC PHOTOGRAPHY					504			75-075A-01F
B/W STEREO PAIRS					28	062376 042277		75-075A-01H
INDEX BY LATITUDE, LONGITUDE, AND 10 DEGREE BOX ON MICROFICHE					6			75-075A-01I
MOSAIC SUMMARY AND INDEX ON MICROFILM					1			75-075A-01J
PHOBOS, DEIMOS, STAR, TERMINATOR, AND LIMB IMAGES INDEX ON MICROFILM					1			75-075A-01K
RECTILINEAR AND ORTHOGRAPHIC PHOTOGRAPHY INDEX ORDERED BY ROLL/FILE NUMBER					4			75-075A-01L
INDEX OF IMAGES ORDERED BY QUADRANT, LATITUDE, AND LONGITUDE ON MICROFILM					1			75-075A-01M
IPL PROCESSING OF THE VIKING ORBITER IMAGES ON 5-INCH FILM					300	110876 032679		75-075A-01N
PRIME AND EXTENDED MISSION CATALOG ON MICROFICHE					503			75-075A-01O
IPL PROCESSED FALSE COLOR RECONSTRUCTED ORBITER IMAGES					25	073076 073076		75-075A-01P
USGS PHOTOMOSAIC COLOR NEGATIVES					94			75-075A-01Q
USGS PHOTO MOSAICS 5M					173			75-075A-01R
USGS PHOTOMOSAICS 7.5M					117			75-075A-01S
SEDR QUADRANT AND SUBQUADRANT PLOTS ON MICROFICHE					73			75-075A-01T
MARS IN 3D, MOVIEFILM					900			75-075A-01U
BLACK AND WHITE PHOTOMOSAICS 1:500,000					120			75-075A-01V
USGS PHOTOMOSAICS 1:2M					138			75-075A-01W
IMAGING DATA ON MAGNETIC TAPE					367	061876 081580		75-075A-01X
STEREO IMAGING CATALOG ON MICROFICHE					7			75-075A-01Y
COLOR COMPOSITES OF MARS					6			75-075A-01Z
INFRARED THERMAL MAPPING (IRTM)			KIEFFER		US GEOLOGICAL SURVEY			75-075A-02
DECALIBRATED INFRARED THERMAL MAPPING DATA ON MAGNETIC TAPE					36	062276 022379		75-075A-02A
MARS ATMOSPHERIC WATER DETECTION (MAWD)			FARMER		NASA-JPL			75-075A-03
ATMOSPHERIC WATER RADIANCE/GEOMETRY DATA ON TAPE					68	061876 061580		75-075A-03A
ORBITER RADIO SCIENCE			MICHAEL, JR.		NASA-LARC			75-075A-04
SURFACE ELECTRICAL PROPERTY DATA PLOTS ON MICROFILM					1	072176 100476		75-075A-04A
RADIO OCCULTATION OBSERVATIONS ON MAGNETIC TAPE					7	100676 110176		75-075A-04B
ETS	ETS 1	JAPAN	09/09/75			962.573	1092.51	46.993	75-082A
VIKING 2 ORBITER	PL-733A	UNTST	09/09/75	7/25/78	1499.	35800.	55.2	75-083A
BIBLIOGRAPHY OF THE VIKING MARS SCIENCES					10			75-083A-00D
ORBITER IMAGING			CARR		US GEOLOGICAL SURVEY			75-083A-01
BLACK AND WHITE PRESS RELEASE PHOTOGRAPHY					13			75-083A-01A
MOSAICS MADE FROM THE BLACK AND WHITE RECTILINEAR AND ORTHOGRAPHIC PHOTOGRAPHY					378			75-083A-01B
B/W RECTILINEAR PHOTOGRAPHY					20708	081276 062478		75-083A-01D
BLACK AND WHITE ORTHOGRAPHIC PHOTOGRAPHY					9649	081276 112777		75-083A-01E
B/W STEREO PAIRS					24	092276 042477		75-083A-01F
SEDR PHOTOGRAPHIC SUPPORT DATA ON MICROFILM					2	081176 072378		75-083A-01G
INDEX BY LATITUDE, LONGITUDE, AND 10 DEGREE BOX ON MICROFICHE					6			75-083A-01H
MOSAIC SUMMARY AND INDEX ON MICROFILM					1			75-083A-01I
PHOBOS, DEIMOS, STAR, LIMB, AND TERMINATOR IMAGES ON MICROFILM					1			75-083A-01J
RECTILINEAR AND ORTHOGRAPHIC PHOTOGRAPHY INDEXES ORDERED BY ROLL/FILE NUMBER					4			75-083A-01K
PRIME AND EXTENDED MISSION CATALOG ON MICROFICHE					516	080576 020277		75-083A-01L
INDEX OF IMAGES ORDERED BY QUADRANT, LATITUDE, AND LONGITUDE ON MICROFILM					1			75-083A-01M
IPL PROCESSED BLACK AND WHITE PHOTOGRAPHY					300	112476 070578		75-083A-01N
IPL PROCESSED FALSE COLOR RECONSTRUCTED ORBITER IMAGES					34	110476 053077		75-083A-01O
COLOR PRESS RELEASE PHOTOGRAPHY					1	061478 061478		75-083A-01P
USGS PHOTOMOSAICS 5M					173			75-083A-01Q
USGS PHOTOMOSAICS 7.5M					117			75-083A-01R
SEDR QUADRANT AND SUBQUADRANT PLOTS ON MICROFICHE					73			75-083A-01S
MARS IN 3D, MOVIE FILM					900			75-083A-01T

AIM FILE IONOSPHERIC PHYSICS LISTING

SATELLITE NAME / INVESTIGATION NAME / DATA SET NAME	ALTERNATE NAMES	COUNTRY	LAUNCH DATE	INOP DATE	PERIAPSIS	APOAPSIS	INCLINATION	NSSDC ID
		PI	AGENCY	QUANTITY	TIME SPAN			
USGS PHOTOMOSAICS 1:2M					138			75-083A-01V
IMAGING DATA ON MAGNETIC TAPE					179	081276	062478	75-083A-01W
STEREO IMAGING CATALOG ON MICROFICHE					7			75-083A-01X
COLOR COMPOSITES OF MARS					6			75-083A-01Y
INFRARED THERMAL MAPPING (IRTM)		KIEFFER	US GEOLOGICAL SURVEY					75-083A-02
DECALIBRATED INFRARED THERMAL MAPPING DATA ON MAGNETIC TAPE					20	081176	072478	75-083A-02A
MARS ATMOSPHERIC WATER DETECTION (MAWD)		FARMER	NASA-JPL					75-083A-03
ATMOSPHERIC WATER RADIANCE/GEOMETRY DATA ON TAPE					25	073176	072478	75-083A-03A
ORBITER RADIO SCIENCE		MICHAEL, JR.	NASA-LARC					75-083A-04
SURFACE ELECTRICAL PROPERTY DATA PLOTS ON MICROFILM					1	072176	100476	75-083A-04A
LINE OF SIGHT ACCELERATION LISTINGS AND PLOTS					1	100077	070078	75-083A-04F
ACCELERATION GRAVITY DATA ON MAGNETIC TAPE					1	121677	092879	75-083A-04G
AE-D----------EXPLORER 54----------UNTST----10/06/75----- 1/29/76-----				154.--	3816.--	90.1-----		75-096A
PREDICTED WORLD MAPS					3	100775	020276	75-096A-00A
CYLINDRICAL ELECTROSTATIC PROBE (CEP)		BRACE	NASA-GSFC					75-096A-01
CYLINDRICAL ELECTROSTATIC PROBE (CEP) DATA ON MAGNETIC TAPE					4	100675	012976	75-096A-01A
ATMOSPHERIC DENSITY ACCELEROMETER (MESA)		CHAMPION	USAF GEOPHYS LAB					75-096A-02
ATMOSPHERIC DENSITY ACCELEROMETER (MESA) DATA ON MAGNETIC TAPE					4	100675	012976	75-096A-02A
PHOTOELECTRON SPECTROMETER (PES)		DOERING	JOHNS HOPKINS U					75-096A-03
PHOTOELECTRON SPECTROMETER (PES) DATA ON MAGNETIC TAPE					4	100675	012976	75-096A-03A
RETARDING POTENTIAL ANALYZER/DRIFT METER		HANSON	U OF TEXAS, DALLAS					75-096A-04
RETARDING POTENTIAL ANALYZER (RPA) DATA ON MAGNETIC TAPE					4	100675	012976	75-096A-04A
SOLAR EUV SPECTROPHOTOMETER (EUVS)		HINTEREGGER	USAF GEOPHYS LAB					75-096A-06
OPEN-SOURCE NEUTRAL MASS SPECTROMETER		NIER	U OF MINNESOTA					75-096A-07
OPEN SOURCE NEUTRAL MASS SPECTROMETER (OSS) DATA ON MAGNETIC TAPE					4	100675	012976	75-096A-07A
NEUTRAL ATMOSPHERE COMPOSITION (NACE)		REBER	NASA-GSFC					75-096A-08
NEUTRAL ATMOSPHERIC COMPOSITION (NACE) DATA ON MAGNETIC TAPE					4	100675	012976	75-096A-08A
NEUTRAL ATMOSPHERE TEMPERATURE (NATE)		SPENCER	NASA-GSFC					75-096A-09
NEUTRAL ATMOSPHERIC TEMPERATURE (NATE) DATA ON MAGNETIC TAPE					4	100675	012976	75-096A-09A
MAGNETIC ION-MASS SPECTROMETER (MIMS)		HOFFMAN	U OF TEXAS, DALLAS					75-096A-10
MAGNETIC ION MASS SPECTROMETER (MIMS) DATA ON MAGNETIC TAPE					4	100675	012976	75-096A-10A
ULTRAVIOLET NITRIC-OXIDE EXPERIMENT		BARTH	U OF COLORADO					75-096A-11
UV NITRIC OXIDE (UVNO) DATA ON MAGNETIC TAPE					4	100675	012976	75-096A-11A
LOW-ENERGY ELECTRONS (LEE)		HOFFMAN	NASA-GSFC					75-096A-12
LOW ENERGY ELECTRON (LEE) DATA ON MAGNETIC TAPE					4	100675	012976	75-096A-12A
VISIBLE AIRGLOW PHOTOMETER (VAE)		HAYS	U OF MICHIGAN					75-096A-13
VISIBLE AIRGLOW EXPERIMENT (VAE) DATA ON MAGNETIC TAPE					4	100675	012976	75-096A-13A
CAPACITANCE MANOMETER		RICE	AEROSPACE CORP					75-096A-14
COLD CATHODE ION GAUGE		RICE	AEROSPACE CORP					75-096A-15
ELECTRIC FIELDS		MAYNARD	NASA-GSFC					75-096A-16
REFLECTED GAS (SPACECRAFT)		SCIALDONE	NASA-GSFC					75-096A-17
PLANETARY ATMOSPHERE COMPOSITION TEST		NIEMANN	NASA-GSFC					75-096A-18
AE-E----------EXPLORER 55----------UNTST----11/20/75----- 6/10/81-----				156.--	2983.--	19.7-----		75-107A
PREDICTED WORLD MAPS					23	112275	112579	75-107A-00A
CYLINDRICAL ELECTROSTATIC PROBE (CEP)		BRACE	NASA-GSFC					75-107A-01
CYLINDRICAL ELECTROSTATIC PROBE DATA ON MAGNETIC TAPE					68	112175	060781	75-107A-01A
ATMOSPHERIC DENSITY ACCELEROMETER (MESA)		CHAMPION	USAF GEOPHYS LAB					75-107A-02
MINIATURE ELECTROSTATIC ACCELEROMETER (MESA)DENSITY DATA ON MAGNETIC TAPE					68	112175	060781	75-107A-02A
PHOTOELECTRON SPECTROMETER (PES)		DOERING	JOHNS HOPKINS U					75-107A-03
PHOTOELECTRON SPECTROMETER DATA ON MAGNETIC TAPE					68	112175	060781	75-107A-03A
RETARDING POTENTIAL ANALYZER/DRIFT METER		HANSON	U OF TEXAS, DALLAS					75-107A-04
RETARDING POTENTIAL ANALYZER DATA ON MAGNETIC TAPE					68	112175	060781	75-107A-04A
EXTREME SOLAR UV MONITOR (ESUM)		HEATH	NASA-GSFC					75-107A-05
ESUM DATA ON TAPE					68	112175	123079	75-107A-05A
ULTRA VIOLET SOLAR FLUX MEASUREMENTS ON MICROFICHE					5	120375	092476	75-107A-05B
ABSOLUTE ULTRAVIOLET SOLAR FLUX					1	122073	123173	75-107A-05C
SOLAR EUV SPECTROPHOTOMETER (EUVS)		HINTEREGGER	USAF GEOPHYS LAB					75-107A-06
SOLAR EUV SPECTROMETER (EUVS) DATA ON MAGNETIC TAPE					68	112175	123079	75-107A-06A
EUV ABSORPTION DATA ON MAGNETIC TAPE					1	122776	123079	75-107A-06B
DETAILED REFERENCE SPECTRUM OF EUV IRRADIANCE DATA ON MAGNETIC TAPE					1	060377	092580	75-107A-06C
OPEN-SOURCE NEUTRAL MASS SPECTROMETER		NIER	U OF MINNESOTA					75-107A-07
OPEN-SOURCE NEUTRAL MASS SPECTROMETER COMPOSITION DATA ON MAGNETIC TAPE					68	112175	060781	75-107A-07A
NEUTRAL ATMOSPHERE COMPOSITION (NACE)		REBER	NASA-GSFC					75-107A-08
CLOSED-SOURCE NEUTRAL MASS SPECTROMETER DATA ON MAGNETIC TAPE					68	112175	060781	75-107A-08A
NEUTRAL ATMOSPHERE TEMPERATURE (NATE)		SPENCER	NASA-GSFC					75-107A-09
NEUTRAL ATMOSPHERE TEMPERATURE AND COMPOSITION DATA ON MAGNETIC TAPE					68	112175	060781	75-107A-09A
BENNETT ION-MASS SPECTROMETER (BIMS)		BRINTON	NASA HEADQUARTERS					75-107A-10
BENNETT ION-MASS SPECTROMETER DATA ON MAGNETIC TAPE					68	112175	060781	75-107A-10A
VISIBLE AIRGLOW PHOTOMETER (VAE)		HAYS	U OF MICHIGAN					75-107A-11
VISIBLE AIRGLOW PHOTOMETER (VAE) DATA ON MAGNETIC TAPE					68	112175	060781	75-107A-11A
CAPACITANCE MANOMETER		RICE	AEROSPACE CORP					75-107A-12
COLD CATHODE ION GAUGE		RICE	AEROSPACE CORP					75-107A-13
HELIUM AND HYDROGEN AIRGLOW (SIDS)		BOWYER	U OF CALIF, BERKELEY					75-107A-14
NITRIC OXIDE AIRGLOW (SIDS)		BARTH	U OF COLORADO					75-107A-15
BACKSCATTER UV SPECTROMETER (BUV)		HEATH	NASA-GSFC					75-107A-16
BACKSCATTER ULTRAVIOLET SPECTROMETER (BUV) DATA ON TAPE					68	112175	060781	75-107A-16A
TEMPERATURE ALARM (SPACECRAFT)		CARUSO	NASA-GSFC					75-107A-17
RADIATION DAMAGE		CLIFF	NASA-GSFC					75-107A-18
ENERGY ANALYZER SPECTROMETER TEST		HOFFMAN	U OF TEXAS, DALLAS					75-107A-19
ENERGY ANALYZER SPECTROMETER TEST DATA ON MAGNETIC TAPE					68	112175	060781	75-107A-19A
S3-2----------SESP S73-6----------UNTST----12/03/75----- 5/01/78-----				236.--	1558.--	96.3-----		75-114B
NEUTRAL DENSITY EXPERIMENTS (COLD AND		MCISAAC	USAF GEOPHYS LAB					75-114B-01
VELOCITY MASS SPECTROMETER		PHILBRICK	USAF GEOPHYS LAB					75-114B-02
NEUTRAL DENSITY EXPERIMENT (COLD CATHODE		RICE	AEROSPACE CORP					75-114B-03
LOW ENERGY PROTON SPECTROMETER		YATES	USAF GEOPHYS LAB					75-114B-04
PROTON-ALPHA PARTICLE DETECTOR		MOOMEY	LOS ALAMOS SCI LAB					75-114B-05
ENERGETIC ELECTRON (0.1- 1.0 MEV) SENSOR		MOOMEY	LOS ALAMOS SCI LAB					75-114B-06
8-STEP 36-317 KEV PROCESSED ELECTRON DATA BASE ON MAGNETIC TAPE					5			75-114B-06A
ELECTRIC FIELD OBSERVATIONS		SMIDDY	USAF GEOPHYS LAB					75-114B-07
MAGNETOMETER		SMIDDY	USAF GEOPHYS LAB					75-114B-08
ELECTROSTATIC ANALYZER (1-20 KEV)		SMIDDY	USAF GEOPHYS LAB					75-114B-09

AIM FILE IONOSPHERIC PHYSICS LISTING

SATELLITE NAME / INVESTIGATION NAME / DATA SET NAME	ALTERNATE NAMES	COUNTRY	LAUNCH DATE	INOP DATE	PERIAPSIS	APOAPSIS	INCLINATION	
		PI			AGENCY			
					QUANTITY	TIME SPAN		NSSDC ID
TRIAXIAL PIEZOELECTRIC ACCELEROMETER			MCISAAC		USAF GEOPHYS LAB			75-114B-10
RETARDING POTENTIAL ANALYZER (RPA)			RICE		AEROSPACE CORP			75-114B-11
SPHERICAL ELECTRON SENSOR AND PLANAR			WILDMAN		USAF GEOPHYS LAB			75-114B-12
ELECTROSTATIC ANALYZER (2-300 EV)			WILDMAN		USAF GEOPHYS LAB			75-114B-13
PROTON TIME-OF-FLIGHT AND PROTON ALPHA COUNTERS			FENNELL		AEROSPACE CORP			75-114B-14
INTERCOSMOS 14	IK-14	USSRN	12/11/75	6/28/76	345.	1707.	74.	75-115A
SPHERICAL ION TRAPS			GDALEVICH		IKI			75-115A-01
PERPENDICULAR AND PARALLEL ELECTRON TEMPERATURE			GRINGAUZ		IKI			75-115A-02
ELF/VLF RECEIVER			LIKHTER		IZMIRAN			75-115A-03
MICROMETEORITE DETECTOR			NAZAROVA		SOVIET ACAD OF SCI			75-115A-04
FOUR FREQUENCY BEACON			SCHMILAUER		CZECH ACAD OF SCI			75-115A-05
PROGNOZ 4		USSRN	12/22/75	3/11/76	634.	199000.	65.	75-122A
THREE AXIS FLUXGATE MAGNETOMETER			EROSHENKO		IZMIRAN			75-122A-01
PLASMA DETECTOR			GRINGAUZ		IKI			75-122A-02
SOLAR X-RAYS			KACHAROV		LENGRAD INST PHYS TECH			75-122A-03
ENERGETIC PARTICLES AND CHARGE COMPOSITION			LOGACHEV		INST NUCLEAR PHYSICS			75-122A-04
KILOMETRIC/HECTOMETRIC RECEIVER			GRIGORYEVA		STERNBERG ASTRON INST			75-122A-05
PROTON AND HEAVY NUCLEI SPECTROMETER			SKREBTSOV		LENGRAD INST PHYS TECH			75-122A-06
S3-3	SESP S74-2A	UNTST	07/08/76			246.	97.5	76-065B
DC ELECTRIC FIELDS			MOZER		U OF CALIF, BERKELEY			76-065B-01
VECTOR ELECTRIC FIELD MEASUREMENTS ON MAGNETIC TAPE					1	072877 072977		76-065B-01A
LOW-ENERGY PARTICLE SPECTROMETER			SHARP		LOCKHEED PALO ALTO			76-065B-02
LOW ENERGY PARTICLE SPECTROMETER BOUNDARY ENCOUNTERS DATA ON MAGNETIC TAPE					1	072877 072977		76-065B-02A
LOW-ENERGY PROTON SPECTROMETERS			YATES		USAF GEOPHYS LAB			76-065B-03
PROTON TELESCOPE			YATES		USAF GEOPHYS LAB			76-065B-04
ELECTRIC FIELDS-ION DRIFT			SAGALYN		USAF GEOPHYS LAB			76-065B-05
ELF/VLF RECEIVER			CAUFFMAN		LOCKHEED PALO ALTO			76-065B-06
ENERGETIC ELECTRON MAGNETIC SPECTROMETER			VAMPOLA		AEROSPACE CORP			76-065B-07
1 SECOND AVERAGED ENERGETIC ELECTRON AND PROTON MASS SPECTROMETER DATA ON TAPE					1	072877 073077		76-065B-07A
ION-ELECTRON MASS SPECTROMETER			FENNELL		AEROSPACE CORP			76-065B-08
ION-ELECTRON MASS SPECTROMETER DATA ON MAGNETIC TAPE					1	072877 073077		76-065B-08A
ETS 2	ENGINEERING TEST SAT.-2	JAPAN	02/23/77			35780.	0.1	77-014A
COSMOS 900	09898	USSRN	03/30/77	10/11/79	460.	523.	83.	77-023A
FLAT RETARDING POTENTIAL ANALYZER			AFONIN		IKI			77-023A-01
HIGH-FREQUENCY ELECTRON TEMPERATURE PROBE			AFONIN		IKI			77-023A-02
SPHERICAL ION TRAP WITH FLOATING POTENTIAL			GDALEVICH		IKI			77-023A-03
CYLINDRICAL ELECTROSTATIC PROBE			GDALEVICH		IKI			77-023A-04
DIFFERENTIAL ENERGY SPECTROMETER			SOSNOVETS		INST NUCLEAR PHYSICS			77-023A-05
ELECTRON AND PROTON DATA ON MAGNETIC TAPE					1	120177 121277		77-023A-05A
DIFFERENTIAL LOW ENERGY SPECTROMETER			TELTSOV		INST NUCLEAR PHYSICS			77-023A-06
PANORAMIC ELECTROSTATIC SPECTROMETER			SCHUTTE		IKI			77-023A-07
RELATIVISTIC PROTON AND ELECTRON COUNTER			GORTCHAKOV		INST NUCLEAR PHYSICS			77-023A-08
AURORAL PHOTOMETER			TULUPOV		INST NUCLEAR PHYSICS			77-023A-09
DMSP 5D-1/F2	DMSP 13536	UNTST	06/05/77	2/17/80	811.	869.	99.	77-044A
OPERATIONAL LINESCAN SYSTEM (OLS)			AFGWC STAFF		GLOBAL WEATHER CTR			77-044A-01
AURORAL IMAGERY ON MICROFILM					37	080177 060578		77-044A-01A
MULTICHANNEL FILTER RADIOMETER (SSH)			AFGWC STAFF		GLOBAL WEATHER CTR			77-044A-02
TOTAL OZONE AND CALIBRATED RADIANCE DATA					97	071377 021680		77-044A-02A
MFR TOTAL OZONE GRID POINT DATA ON MAGNETIC TAPE					2	071377 021680		77-044A-02B
PRECIPITATING ELECTRON SPECTROMETER			ROTHWELL		USAF GEOPHYS LAB			77-044A-03
PRECIPITATING ELECTRON SPECTROMETER PARTICLE DATA ON MAGNETIC TAPE					3	120177 040179		77-044A-03A
PASSIVE IONOSPHERIC MONITOR (SSI/P)			SNYDER		USAF GEOPHYS LAB			77-044A-04
IONOSPHERIC PLASMA MONITER (SSI/E)			SAGALYN		USAF GEOPHYS LAB			77-044A-05
REMOTE X-RAY SENSOR - PRECIPITATING ELECTRONS (SSB/O)			MIZERA		AEROSPACE CORP			77-044A-06
KYOKKO	EXOSPHERIC SAT. A	JAPAN	02/04/78	11/09/79	642.	3978.	65.4	78-014A
ELECTRON PROBES			OYAMA		ISAS			78-014A-01
ELECTRON TEMPERATURE AND DENSITY PLOTS ON MICROFILM					6	020478 062979		78-014A-01A
ELECTRON ENERGY ANALYZER			MUKAI		ISAS			78-014A-02
LOW-ENERGY ELECTRON FLUX SPECTROGRAMS ON MICROFILM					6	020478 062979		78-014A-02A
UV AURORAL TV IMAGING			KANEDA		ISAS			78-014A-03
ELECTROSTATIC PLASMA WAVE MEASUREMENT			YOSHINO		U OF ELECTRO-COMMUN			78-014A-04
PLASMA TIME-FREQUENCY SPECTROGRAMS ON MICROFILM					6	020478 062979		78-014A-04A
UV GLOW SPECTROPHOTOMETER			NAKAMURA		TSUKUBA U			78-014A-05
EXTREME ULTRAVIOLET AIRGLOW PLOTS ON MICROFILM					6	020478 062979		78-014A-05A
ION MASS SPECTROMETER			IWAMOTO		RADIO RESEARCH LAB			78-014A-06
ION COMPOSITION PLOTS ON MICROFILM					6	020478 062979		78-014A-06A
ISS-B	IONOSP SOUNDING SAT 2	JAPAN	02/16/78	4/01/83	972.	1225.	69.4	78-018A
SWEEP FREQUENCY TOPSIDE IONOSPHERIC			AIKYO		RADIO RESEARCH LAB			78-018A-01
ISS-B FOF2 MODELS FOR 6 4-MONTHS PERIOD EACH GIVES GLOBAL MAPS FOR UT=0,1,..,23					1	081178 121379		78-018A-01A
TOPSIDE IONOGRAMS ON MICROFICHE.					392	032478 070281		78-018A-01B
TOPSIDE SOUNDER SUMMARY PLOTS ON MICROFIC HE					18	061878 033180		78-018A-01C
RADIO NOISE NEAR 2.5, 5, 10, AND 25 MHZ			KATOH		RADIO RESEARCH LAB			78-018A-02
RADIO NOISE DATA ON MICROFICHE					375	022578 051082		78-018A-02A
MAPS OF THUNDERSTORM ACTIVITY					2	060178 053180		78-018A-02B
RETARDING POTENTIAL TRAP			SAGAWA		RADIO RESEARCH LAB			78-018A-03
ELECTRON DENSITY+TEMPERATURE, MEAN ION MA SS, ION TEMPERATURE+ION COMPOSITION					2	081178 043080		78-018A-03A
RETARDING POTENTIAL ANALYZER SUMMARY PLOT S ON MICROFICHE					18	081678 033180		78-018A-03B
ION MASS SPECTROMETER			IWAMOTO		RADIO RESEARCH LAB			78-018A-04
ATLAS OF PROTON, HELIUM, AND OXYGEN ION DENSITIES					1	102278 082279		78-018A-04A
ELECTRON DENSITY+TEMPERATURE,MEAN ION MAS S ION TEMPERATURE+ION COMPOSITION					2	081178 040380		78-018A-04B
ION MASS SPECTROMETER SUMMARY PLOTS ON MI CROFICHE					18	081678 033180		78-018A-04C
PIONEER VENUS 1	PIONEER VENUS 1978 ORBIT	UNTST	05/20/78			200.	66614.	105.	78-051A
ORBITAL PLOTS ON MICROFICHE					118	120578 032888		78-051A-00D
ATTITUDE-ORBIT LISTINGS ON MICROFICHE					667	120578 061688		78-051A-00E
IONOPAUSE AND BOWSHOCK CROSSINGS TIMES AND LOCATIONS					1	120578 111981		78-051A-00F

AIM FILE IONOSPHERIC PHYSICS LISTING

SATELLITE NAME / INVESTIGATION NAME / DATA SET NAME	ALTERNATE NAMES	COUNTRY	LAUNCH DATE	INOP DATE	PERIAPSIS	APOAPSIS	INCLINATION	NSSDC ID
		PI			AGENCY			
					QUANTITY	TIME SPAN		
IONOPAUSE AND BOWSHOCK INBOUND AND OUTBOUND CROSSING TIMES AND LOCATIONS					1	120578 111981		78-051A-00G
EPHEMERIS, TAKEN FROM SEDR, DATA ON MAGNETIC TAPE.					49	120578 081682		78-051A-00H
ELECTRON TEMPERATURE PROBE (OETP)		MCELROY			HARVARD U			78-051A-01
ELECTRON TEMPERATURE AND DENSITY (UADS-LFD FILE) DATA ON MAGNETIC TAPE					10	120578 112681		78-051A-01A
CD OBSERVED IONOPAUSE LOCATIONS DATA ON MAGNETIC TAPE					1	120578 080781		78-051A-01B
PIONEER VENUS ORB. ELECTRON TEMPERATURE AND DENSITY PROBE,12-S,(UADS-LFD)					1	120678 021884		78-051A-01C
RADAR MAPPER (ORAD)		BROWN, JR.			NASA-JPL			78-051A-02
TOPOGRAPHIC MAPS					1	052880 052880		78-051A-02A
RADAR MEASUREMENT (UADS-LFD FILE) DATA ON MAGNETIC TAPE					10	120578 112681		78-051A-02B
RADAR ALTIMETRY OF CRUST-FIXED LAT + LONG DATA ON MAGNETIC TAPE					1	120578 090181		78-051A-02C
ALTIMETRIC AND RADIOMETRIC, LOW FREQUENCY DATA ON MAGNETIC TAPE					1	120878 031981		78-051A-02D
GAS-PLASMA ENVIRONMENT-DUAL FREQUENCY EXPERIMENT (OGPE)		CROFT			SRI INTERNATIONAL			78-051A-03
GAS AND PLASMA ENVIRONMENT SIGNAL STRENGH LISTS					4	121278 112879		78-051A-03G
GAMMA BURST DETECTOR (OGBD)		EVANS			LOS ALAMOS NAT LAB			78-051A-05
OGBD SOLAR EVENTS DATA ON MAGNETIC TAPE					1			78-051A-05A
OGBD HOURLY AVERAGES ON MAGNETIC TAPE					1	052278 090783		78-051A-05B
OGBD HOURLY AVERAGES ON MICROFICHE					11	052278 090783		78-051A-05C
CLOUD PHOTOPOLARIMETER		STONE			MASS INST OF TECH			78-051A-06
COLOR PRESS RELEASE PHOTOGRAPHY					17	121378 052879		78-051A-06A
DIGITAL MAP IMAGES ON MAGNETIC TAPE					67	120878 051486		78-051A-06B
ORBITER CLOUD PHOTOPOLARIMETER IMAGERY					420	120578 071579		78-051A-06C
RETARDING POTENTIAL ANALYZER (ORPA)		KNUDSEN			LOCKHEED PALO ALTO			78-051A-07
PLASMA PARAMETER (UADS-LFD FILE) DATA ON MAGNETIC TAPE					10	120578 112681		78-051A-07A
NEUTRAL MASS SPECTROMETER (ONMS)		NIEMANN			NASA-GSFC			78-051A-11
NEUTRAL GAS COMPOSITION (UADS-LFD FILE) DATA ON MAGNETIC TAPE					10	120578 112681		78-051A-11A
ONMS VENUS SUMMARY LOW FREQUENCY DATA ON MAGNETIC TAPE					1	122478 081380		78-051A-11B
12-S SAMPLED NEUTRAL GAS DENSITY DATA PLOTS ON FILM					250			78-051A-11C
12-S SAMPLED ENERGETIC ION (40EV) DATA ON MAGNETIC TAPE					1			78-051A-11D
12-S SAMPLED ENERGETIC ION (140EV) DATA ON MICROFICHE					44	011282 110584		78-051A-11E
MAGNETOMETER (OMAG)		RUSSELL			U OF CALIF, LA			78-051A-12
24 SECOND AVERAGED (UADS-LFD FILE) DATA ON MAGNETIC TAPE					10	120578 112681		78-051A-12A
CD 32 SECOND TOTAL MAGNETIC FIELD DATA ON TAPE					1	040479 060379		78-051A-12B
CD 32 SEC MERGED MAGNETIC AND PEAK ELECTRIC FIELD DATA ON TAPE					1	060879 080879		78-051A-12C
SEDR LISTINGS OF EPHEMERIS DATA					95	030582 072383		78-051A-12D
HIGH-RESOLUTION, 12 SEC AND 2 MIN B AND E PLOTS ON MICROFICHE					1612	120578 090584		78-051A-12E
12-SEC B + E FIELD, PERIAPSIS DATA (VENUS IONOSPHERE) ON MAGNETIC TAPE.					4	120578 052883		78-051A-12F
2-MINUTE OVERLAPPED AVERAGED DATA TAKEN EVERY MINUTE ON MAGNETIC TAPE					24	120678 093084		78-051A-12G
ELECTRIC FIELD DETECTOR (OEFD)		SCARF			TRW SYSTEMS GROUP			78-051A-13
24 SECOND AVERAGED (UADS-LFD FILE) DATA ON MAGNETIC TAPE					10	120578 112681		78-051A-13A
CD 32 SEC MERGED MAGNETIC AND PEAK ELECTRIC FIELD DATA ON TAPE					1	060879 080879		78-051A-13B
HIGH-RESOLUTION, 12 SEC AND 2 MIN B AND E PLOTS ON MICROFICHE					1612	120578 090584		78-051A-13C
2-MINUTE OVERLAPPED AVERAGED DATA TAKEN EVERY MINUTE ON MAGNETIC TAPE.					24	120678 093084		78-051A-13D
12-SECOND AVERAGED MAGNETOMETER AND ELECTRIC FIELD DATA ON MAGNETIC TAPE.					4	120578 052883		78-051A-13E
PROGRAMMABLE ULTRAVIOLET SPECTROMETER		STEWART			U OF COLORADO			78-051A-15
FALSE COLOR IMAGES					4	052979 052979		78-051A-15A
AIRGLOW MEASUREMENT (UADS-LFD FILE) DATA ON MAGNETIC TAPE					10	120578 112681		78-051A-15B
INFRARED RADIOMETER (OIR)		TAYLOR			OXFORD U			78-051A-16
ORBITER INFRARED RADIOMETER RADIANCE DATA ON MAGNETIC TAPE					2	121278 021479		78-051A-16A
COMPUTER ENHANCEMENT OF THERMAL EMISSION					1			78-051A-16B
CO ZONAL AIM TEMPERATURE VS LATITUDE DATA ON MAGNETIC TAPE					1	120878 011379		78-051A-16C
ION MASS SPECTROMETER 1-60AMU (OIMS)		TAYLOR, JR.			NASA-GSFC			78-051A-17
12 SECOND AVERAGED ION DENSITY (UADS-LFD FILE) DATA ON MAGNETIC TAPE					10	120578 112681		78-051A-17A
POSITIVE ION COMPOSITION MEASUREMENTS ON MAGNETIC TAPE					3	120578 021887		78-051A-17B
OIMS HIGH-RESOLUTION DATA BASE ON MAGNETIC TAPE					8	120578 022587		78-051A-17C
SOLAR WIND PLASMA ANALYZER (OPA)		BARNES			NASA-ARC			78-051A-18
OPA (SED) DATE AND VELOCITY DATA (ORBIT 1-740) ON MAGNETIC TAPE					1	120578 102181		78-051A-18A
SOLAR WIND PLASMA ANALYZER DATA, DECEMBER 11, 1978					1	121178 121178		78-051A-18B
SOLAR WIND PLASMA (UADS-LFD FILE) DATA ON MAGNETIC TAPE					10	120578 112681		78-051A-18C
ATMOSPHERIC DRAG (OAD)		KEATING			NASA-LARC			78-051A-19
ATMOSPHERIC DRAG DENSITIES					1	120978 080779		78-051A-19A
OAD (SED) P/V ATMOSPHERIC DRAG MODEL ON MAGNETIC TAPE					1	120978 080779		78-051A-19B
OAD (SED) P/V ATMOSPHERIC DRAG OBSERVATIONS (OBITS 5-246) ON MAG. TAPE					1	120978 080779		78-051A-19C
RADIO OCCULTATION (ORO)		KLIORE			NASA-JPL			78-051A-20
S-BAND AND X-BAND RADIO OCCULTATION DATA ON MAGNETIC TAPE					3	120578 022779		78-051A-20A
CELESTIAL MECHANICS (OCM)		SHAPIRO			MASS INST OF TECH			78-051A-21
HIGH-RESOLUTION VENUS GRAVITY DATA ON MAGNETIC TAPE					1	042579 052879		78-051A-21A
GRAVITATIONAL POTENTIAL MODEL OF BETA REGIO ON MAGNETIC TAPE					1	042579 052879		78-051A-21B
ATMOSPHERIC AND SOLAR CORONA TURBULENCE		WOO			NASA-JPL			78-051A-22
RADIO OCCULTATION ATMOSPHERIC TURBULENCE (MTUR/OTUR) DATA ON MAGNETIC TAPE					1	121378 020579		78-051A-22A
INTERNAL DENSITY DISTRIBUTION (OIDD)		PHILLIPS			LUNAR + PLANETARY INST			78-051A-23
LINE-OF-SIGHT ACCELERATION PLOTS AND LISTINGS					2	030179 083080		78-051A-23A
HIGH RESOLUTION ACCELERATION GRAVITY DATA ON MAGNETIC TAPE					5	120979 082980		78-051A-23B
VENUS GRAVITY: ANALYSIS OF BETA REGIO					1			78-051A-23C
GRAVITY FIELD OF VENUS: A PRELIMINARY ANALYSIS					1			78-051A-23D
GRAVITY ANOMALIES ON VENUS					1			78-051A-23E
VENUS GRAVITY ANOMALIES AND CORRELATIONS WITH TOPOGRAPHY					1			78-051A-23F
LINE-OF-SIGHT DATA ON MAGNETIC TAPE					1			78-051A-23G
PIONEER VENUS 2----------PIONEER VENUS 1978--------UNTST----08/08/78-----12/09/78-----					--	--		-----78-078A
ION MASS SPECTROMETER (BIMS)		TAYLOR, JR.			NASA-GSFC			78-078A-02
BIMS DATA, 850-140KM DATA ON MAGNETIC TAPE					1	120978 120978		78-078A-02B
NEUTRAL MASS SPECTROMETER (BNMS)		VON ZAHN			U OF BONN			78-078A-03
THE UPPER ATMOSPHERE OF VENUS DURING MORNING CONDITIONS					2	120978 120978		78-078A-03B
JIKIKEN----------EXOS-B----------JAPAN----09/16/78----- 1/00/83-----					230.--	30558.--	31.-----78-087A	
STIMULATED PLASMA WAVE (SPW)		OYA			U OF TOHOKU			78-087A-01
VLF WAVE-PARTICLE INTERACTIONS OF SELECTED DATA ON MICROFICHE					1	071779 090179		78-087A-01A
NATURAL PLASMA WAVES (NPW)		OYA			U OF TOHOKU			78-087A-02
VLF WAVE-PARTICLE INTERACTIONS OF SELECTED DATA ON MICROFICHE					1	071779 090179		78-087A-02A
VLF DOPPLER PROPAGATION (DPL)		KIMURA			KYOTO U			78-087A-03
VLF WAVE-PARTICLE INTERACTIONS OF SELECTED DATA ON MICROFICHE					1	071779 090179		78-087A-03A
IMPEDANCE AND ELECTRIC FIELD (IEF)		NISHIDA			ISAS			78-087A-04
FLUXGATE MAGNETOMETER (MGF)		AOYAMA			TOKAI U			78-087A-05
ENERGY SPECTRUM OF PARTICLES (ESP)		KAWASHIMA			U OF TOKYO			78-087A-06

AIM FILE IONOSPHERIC PHYSICS LISTING

SATELLITE NAME / INVESTIGATION NAME / DATA SET NAME	ALTERNATE NAMES	COUNTRY	LAUNCH DATE	INOP DATE	PERIAPSIS	APOAPSIS	INCLINATION	PI / AGENCY	QUANTITY	TIME SPAN	NSSDC ID
VLF WAVE-PARTICLE INTERACTIONS OF SELECTED DATA ON MICROFICHE									1	071779 090179	78-087A-06A
CONTROLLED ELECTRON BEAM EMISSIONS (CBE)								KAWASHIMA / U OF TOKYO			78-087A-07
STP P78-2	SESP P78-2A	UNTST	01/30/79		27553.--	43239.--	7.7				79-007A
PRINTOUT OF PREDICTED MAGNETIC CONJUNCTIONS ON MICROFILM									1	031579 021781	79-007A-00D
ORBITAL PLOTS FOR PROMIS PERIOD IN GSM COORDINATES, ON MICROFICHE									1	032986 061686	79-007A-00E
SPACECRAFT SURFACE POTENTIAL MONITOR								MIZERA / AEROSPACE CORP			79-007A-01
CHARGING ELECTRICAL EFFECTS ANALYZER								KOONS / AEROSPACE CORP			79-007A-02
QUART2 CRYSTAL MICROBALANCES IN RETARDING POTENTIAL ANALYZERS								HALL / AEROSPACE CORP			79-007A-03
THERMAL CONTROL SAMPLE MONITOR								HALL / AEROSPACE CORP			79-007A-04
ELECTRIC FIELD DETECTOR								AGGSON / NASA-GSFC			79-007A-05
ELECTRON FIELD COMPONENTS THREE FILES PER DAY DATA ON MAGNETIC TAPE									1	032279 040179	79-007A-05A
SPACECRAFT SHEATH FIELDS DETECTOR								FENNELL / AEROSPACE CORP			79-007A-06
SC2-3 PLASMA DATA									3	012883 062883	79-007A-06A
ELECTRON GUN-ION GUN								COHEN / USAF GEOPHYS LAB			79-007A-07
MAGNETIC FIELD MONITOR								LEDLEY / NASA-GSFC			79-007A-08
B FIELD ONE MINUTE AVERAGES ON MAGNETIC TAPE									2	032279 062883	79-007A-08A
LIGHT ION MASS SPECTROMETER								REASONER / NASA-MSFC			79-007A-09
PLASMA PROBE								SAGALYN / USAF GEOPHYS LAB			79-007A-10
UCSD CHARGED PARTICLE DETECTOR								WHIPPLE / U OF CALIF, SAN DIEGO			79-007A-11
CHARGED PARTICLE DETECTOR ON MAGNETIC TAPE									1	032279 040179	79-007A-11A
CHARGED PARTICLE DETECTOR AVERAGED DATA ON MAGNETIC TAPE									1	032279 040179	79-007A-11B
RAPID SCAN PARTICLE DETECTOR								HARDY / USAF GEOPHYS LAB			79-007A-12
SC5 FINAL ATLAS ELECTRONS AND IONS DATA ON MAGNETIC TAPE									1	032279 040179	79-007A-12A
ENERGETIC ION SPECTROMETER								JOHNSON / OF. OF SCI&TECH POLICY			79-007A-13
ENERGETIC ION SPECTROMETER ON MAGNETIC TAPE									1	032279 032279	79-007A-13A
H+ AND O+ ENERGY FLUX AND DENSITIES DATA ON MAGNETIC TAPE.									1	012883 032683	79-007A-13B
ENERGETIC PROTON DETECTOR								BLAKE / AEROSPACE CORP			79-007A-14
ENERGETIC PROTON FLUXES - ONE MINUTE AVERAGES ON MAGNETIC TAPE									2	012883 062883	79-007A-14A
HIGH-ENERGY PARTICLE DETECTOR								REAGAN / LOCKHEED PALO ALTO			79-007A-15
64-SECOND RESOLUTION DIFFERENTIAL ELECTRON FLUX DATA, ON MAGNETIC TAPE									1	032279 040179	79-007A-15A
TRANSIENT PULSE MONITOR								NANEVICZ / SRI INTERNATIONAL			79-007A-16
STP P78-1	SPACE TEST PROGRAM P78-1	UNTST	02/24/79		560.--	600.--	97.9				79-017A
PREDICTED WORLD MAPS ON MICROFILM									3	022879 012680	79-017A-00A
GAMMA RAY SPECTROMETER								IMHOF / LOCKHEED PALO ALTO			79-017A-01
SOLAR WIND MONITOR								MICHELS / US NAVAL RESEARCH LAB			79-017A-02
SOLAR X-RAY SPECTROMETER								KREPLIN / US NAVAL RESEARCH LAB			79-017A-03
EXTREME ULTRAVIOLET SPECTROMETER								BOWYER / U OF CALIF, BERKELEY			79-017A-04
HIGH LATITUDE PARTICLE SPECTROMETER								VANCOUR / USAF GEOPHYS LAB			79-017A-05
HIGH LATITUDE PARTICLE SPECTROMETER DATA ON MAGNETIC TAPE									1	032279 032279	79-017A-05A
X-RAY MONITOR								SHULMAN / US NAVAL RESEARCH LAB			79-017A-06
PRELIMINARY AEROSOL MONITOR								PEPIN / U OF WYOMING			79-017A-07
INTERCOSMOS 19	11285	USSRN	02/27/79	8/00/81	502.--	966.--	74.				79-020A
TOPSIDE SOUNDER								UNKNOWN			79-020A-01
ELECTROPHOTOMETER (EMO-1)								GOGOSHEV / CLSR-AO			79-020A-02
PLASMA EXPERIMENT								UNKNOWN			79-020A-03
WAVE EXPERIMENT								UNKNOWN			79-020A-04
PARTICLE EXPERIMENT								UNKNOWN			79-020A-05
DMSP 5D-1/F4	DMSP 15539	UNTST	06/06/79	8/08/80	817.--	839.--	98.7				79-050A
OPERATIONAL LINESCAN SYSTEM (OLS)								AFGWC STAFF / GLOBAL WEATHER CTR			79-050A-01
AURORAL IMAGERY ON MICROFILM									9	070179 093079	79-050A-01A
MULTICHANNEL FILTER RADIOMETER (SSH)								AFGWC STAFF / GLOBAL WEATHER CTR			79-050A-02
TOTAL OZONE AND CALIBRATED RADIANCE DATA									21	061779 020680	79-050A-02A
MFR TOTAL OZONE GRID POINT DATA ON MAGNETIC TAPE									2	061779 020680	79-050A-02B
PRECIPITATING ELECTRON SPECTROMETER (SSJ/3)								ROTHWELL / USAF GEOPHYS LAB			79-050A-03
PASSIVE IONOSPHERIC MONITOR (SSI/P)								SNYDER / USAF GEOPHYS LAB			79-050A-04
IONOSPHERIC PLASMA MONITOR (SSI/E)								SAGALYN / USAF GEOPHYS LAB			79-050A-05
MICROWAVE TEMPERATURE SOUNDER (SSM/T)								AFGWC STAFF / GLOBAL WEATHER CTR			79-050A-06
ATMOSPHERIC DENSITY SENSOR (SSD)								HICKMAN / AEROSPACE CORP			79-050A-07
SNOW/CLOUD DISCRIMINATOR SPECIAL SENSOR C (SSC)								AFGWC STAFF / GLOBAL WEATHER CTR			79-050A-08
ETS 4	12295	JAPAN	02/11/81		223.--	35824.--	28.6				81-012A
HINOTORI	ASTRONOMICAL SATELLITE-A	JAPAN	02/21/81		548.--	603.--	31.3				81-017A
SOLAR FLARE 5-40 KEV X-RAYS USING ROTATING MODULATION COLLIMATOR								TAKAKURA / ISAS			81-017A-01
SOLAR FLARE X-RAY BRAGG SPECTROSCOPY IN 1.7-2.0 A RANGE								TANAKA / ISAS			81-017A-02
TIME PROFILE AND SPECTRA OF X-RAY FLARES IN THE 2-20 KEV RANGE								MATSUOKA / ISAS			81-017A-03
SOLAR FLARE GAMMA-RAY DETECTOR IN 0.2-9.0 MEV RANGE								KONDO / U OF TOKYO			81-017A-04
ELECTRON FLUX ABOVE 100 KEV PARTICLE DETECTOR MONITOR								TAKEUCHI / U OF TOKYO			81-017A-05
PLASMA PROBES								HIRAO / ISAS			81-017A-06
DYNAMICS EXPLORER 1	DE-A	UNTST	08/03/81		567.6--	23289.--	89.9				81-070A
DAILY ORBIT PLOTS ON MICROFICHE									10	090181 022883	81-070A-00D
DYNAMICS EXPLORER MAGNETIC CONJUNCTIONS ON MICROFICHE									2	092081 021983	81-070A-00E
									3	032986 061686	81-070A-00F
OPERATION TIMES PLOTTED FOR OVERLAY ON AE INDEX PLOTS IN WDC-C2 GEOMAG DATA BOOKS									26	080481 021883	81-070A-00G
MAG CONJ W/VIK-SWED 3X180 BINS MFICHE									4	030186 063086	81-070A-00H
MAG CONJ W/VIK-SWEDEN 3X80 BINS ON MI CROFICHE									3	030186 063086	81-070A-00I
MAGNETIC FIELD OBSERVATIONS								SUGIURA / NASA-GSFC			81-070A-01
MAGNETOMETER DATA-6 SEC-CDAW-8 DATA ON MAGNETIC TAPE.									3	012883 062883	81-070A-01A
PLASMA WAVES								SHAWHAN / U OF IOWA			81-070A-02
GLOBAL AURORAL IMAGING AT VISIBLE AND ULTRAVIOLET WAVELENGTHS								FRANK / U OF IOWA			81-070A-03
RETARDING ION MASS SPECTROMETER								CHAPPELL / NASA-MSFC			81-070A-04
COLD PLASMA ION COUNT RATES DATA ON MAGNETIC TAPE.									3		81-070A-04A
HIGH ALTITUDE PLASMA INSTRUMENT								HOFFMAN / NASA-GSFC			81-070A-05
HOT PLASMA COMPOSITION								SHELLEY / LOCKHEED PALO ALTO			81-070A-06
ENERGETIC ION COMPOSITION SPECTROMETER (EICS) FLUX DATA ON MAGNETIC TAPE.									1		81-070A-06A
ENERGETIC ION COMPOSITION SPECTROMETER (E ICS) DENSITY DATA ON MAGNETIC TAPE.									1		81-070A-06B
CONTROLLED AND NATURALLY OCCURRING WAVE PARTICLE INTERACTIONS								HELLIWELL / STANFORD U			81-070A-08
DYNAMICS EXPLORER 2	DE-B	UNTST	08/03/81	2/19/83	309.--	1012.5--	89.9				81-070B

AIM FILE IONOSPHERIC PHYSICS LISTING

SATELLITE NAME / INVESTIGATION NAME / DATA SET NAME	ALTERNATE NAMES	COUNTRY	LAUNCH DATE	INOP DATE	PERIAPSIS / APOAPSIS / INCLINATION	NSSDC ID
			PI		AGENCY	
					QUANTITY TIME SPAN	
DAILY ORBIT PLOTS ON MICROFICHE					10 090181 022883	81-070B-00D
DYNAMICS EXPLORER MAGNETIC CONJUNCTIONS ON MICROFICHE					2 092081 021983	81-070B-00E
OPERATION TIMES PLOTTED FOR OVERLAY ON AE INDEX PLOTS IN WDC-C2 GEOMAG DATA BOOKS					26 080481 021883	81-070B-00F
DATA ACQUISITION TIMES ON MICROFICHE					2 080181 021883	81-070B-00G
MAGNETIC FIELD OBSERVATIONS			SUGIURA		NASA-GSFC	81-070B-01
MAGNETOMETER DATA-0.5 SEC DATA-CDAW-8,ON MAGNETIC TAPE.					2 012883 012983	81-070B-01A
ELECTRIC FIELD INVESTIGATIONS			MAYNARD		NASA-GSFC	81-070B-02
VECTOR E-FIELD INSTRUMENT DATA ON MAGNETIC TAPE.					1 012883 012983	81-070B-02A
NEUTRAL ATMOSPHERE COMPOSITION			CARIGNAN		U OF MICHIGAN	81-070B-03
WIND AND TEMPERATURE SPECTROMETER			SPENCER		NASA-GSFC	81-070B-04
FABRY-PEROT INTERFEROMETER			HAYS		U OF MICHIGAN	81-070B-05
ION DRIFT METER			HEELIS		U OF TEXAS, DALLAS	81-070B-06
RETARDING POTENTIAL ANALYZER			HANSON		U OF TEXAS, DALLAS	81-070B-07
LOW ALTITUDE PLASMA INSTRUMENT			KLUMPAR		U OF TEXAS, DALLAS	81-070B-08
LANGMUIR PROBE			BRACE		NASA-GSFC	81-070B-09
IK BULGARIA 1300	INTERCOSMOS BULGAR 1300	USSR		08/07/81	825.-- 906.-- 81.2	81-075A
ION DRIFT METER AND RETARDING POTENTIAL ANALYZER			BANKOV		CLSR-BAS	81-075A-01
SPHERICAL ELECTROSTATIC ION TRAP			IVANOVA		CLSR-BAS	81-075A-02
CYLINDRICAL LANGMUIR PROBE			IVANOVA		CLSR-BAS	81-075A-03
DOUBLE SPHERICAL ELECTRON TEMPERATURE			MARKOV		CLSR-BAS	81-075A-04
LOW-ENERGY ELECTRON-PROTON ELECTROSTATIC ANALYZER ARRAY IN 3 ORTH			DACHEV		CLSR-BAS	81-075A-05
ION ENERGY-MASS COMPOSITION ANALYZERS			NENOVSKI		CLSR-BAS	81-075A-06
PROTON SOLID-STATE TELESCOPE			KAZAKOV		CLSR-BAS	81-075A-07
VISIBLE AIRGLOW PHOTOMETERS			GOGOSHEV		CLSR-AO	81-075A-08
WAVELENGTH SCANNING UV PHOTOMETER			SARGOICHEV		CLSR-AO	81-075A-09
TRIAXIAL SPHERICAL VECTOR ELECTRIC FIELD PROBES			STANEV		CLSR-BAS	81-075A-10
TRIAXIAL FLUXGATE MAGNETOMETER			BOCHEV		CLSR-BAS	81-075A-11
STS 3/OSS-1	SHUTTLE OFT-3	UNTST		03/22/82	240.-- 240.-- 38.	82-022A
PLASMA DIAGNOSTIC PACKAGE			SHAWHAN		U OF IOWA	82-022A-01
AC WAVE,ION+ELEC SPECTRA,NEUT P,ION COMP+ CURR DEN+FLOW,DC ELEC+MAG FLD,ELEC FLUX					342 032282 032782	82-022A-01A
WIDE BAND ANALOG DATA (0-30 KHZ)					2240 032282 032882	82-022A-01B
SOLAR FLARE X-RAY POLARIMETER EXPERIMENT			NOVICK		COLUMBIA U	82-022A-02
SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR			BRUECKNER		US NAVAL RESEARCH LAB	82-022A-03
VEHICLE CHARGING AND POTENTIAL EXPERIMENT			BANKS		STANFORD U	82-022A-04
THERMAL CANISTER EXPERIMENT			OLLENDORF		NASA-GSFC	82-022A-05
CHARACTERISTICS OF SHUTTLE/SPACELAB INDUCED ATMOSPHERE			WEINBERG		U OF FLORIDA	82-022A-06
INFLUENCE OF WEIGHTLESSNESS IN LIGNIFICATION OF PLANT SEEDLINGS			COWLES		U OF HOUSTON	82-022A-07
MICROABRASION FOIL			MCDONNELL		U OF KENT, CANTERBURY	82-022A-08
CONTAMINATION MONITOR			TRIOLO		NASA-GSFC	82-022A-09
STP S81-1	S81-1	UNTST		05/11/82-12/05/82	177.-- 262.-- 96.4	82-041A
COSMIC RAY ISOTOPE EXPERIMENT-LOW ENERGY (ONR-602) (PHOENIX 1)			SIMPSON		U OF CHICAGO	82-041A-01
STIMULATED EMISSION OF ENERGETIC PARTICLES, ONR-804			IMHOF		LOCKHEED PALO ALTO	82-041A-02
HILAT	STP P83-1	UNTST		06/27/83	828.2-- 830.8-- 82.2	83-063A
COHERENT BEACON			RINO		SRI INTERNATIONAL	83-063A-01
PLASMA MONITOR			RICH		USAF GEOPHYS LAB	83-063A-02
THREE-AXIS FLUXGATE MAGNETOMETER			POTEMRA		APPLIED PHYSICS LAB	83-063A-03
ELECTRON SPECTROMETER			HARDY		USAF GEOPHYS LAB	83-063A-04
AURORAL IONOSPHERIC MAPPER			HUFFMAN		USAF GEOPHYS LAB	83-063A-05
ETS 3	13492	JAPAN		09/03/82	964.-- 1234.-- 45.	82-087A
STS 9/SPACELAB 1	SPACELAB 1/STS 9	UNTST		11/28/83	242.-- 254.-- 57.	83-116A
AN IMAGING SPECTROMETRIC OBSERVATORY			TORR		UTAH STATE U	83-116A-01
SPACE EXPERIMENTS WITH PARTICLE ACCELERATORS (SEPAC)			OBAYASHI		ISAS, U OF TOKYO	83-116A-02
ATMOSPHERIC EMISSION PHOTOMETRIC IMAGING			MENDE		LOCKHEED PALO ALTO	83-116A-03
ACTIVE CAVITY RADIOMETER SOLAR IRRADIANCE MONITOR			WILLSON		NASA-JPL	83-116A-04
FAR UV ASTRONOMY USING THE FAUST TELESCOPE			BOWYER		U OF CALIF, BERKELEY	83-116A-07
BEARING LUBRICANT WETTING, SPREADING AND OPERATING CHARACTERISTIC			PAN		COLUMBIA U	83-116A-09
RADIATION ENVIRONMENT MAPPING			BENTON		U OF CALIF, SAN FRANC.	83-116A-11
NUTATION OF HELIANTHUS ANNUUS			BROWN		U OF PENNSYLVANIA	83-116A-12
VESTIBULAR STUDIES			YOUNG		MASS INST OF TECH	83-116A-13
INFLUENCE OF SPACEFLIGHT ON ERYTHROKINETICS IN MAN			LEACH		NASA-JSC	83-116A-14
CHARACTERIZATION OF PERSISTING CIRCADIAN RHYTHMS			SULZMAN		STATE U OF NEW YORK	83-116A-15
VESTIBULO-SPINAL REFLEX MECHANISMS			RESCHKE		NASA-JSC	83-116A-16
EFFECTS OF PROLONGED WEIGHTLESSNESS ON THE HUMORAL IMMUNE RESPONS			VOSS, JR.		U OF ILLINOIS	83-116A-17
GRILLE SPECTROMETER			LIPPENS		IASB	83-116A-18
WAVES IN THE OH EMISSIVE LAYER			HERSE		CNRS-SA	83-116A-19
MEASUREMENT OF THE SOLAR SPECTRUM FROM 170 TO 3200 NANOMETERS			BLAMONT		CNRS-SA	83-116A-21
INVESTIGATION ON ATMOSPHERIC H AND D THROUGH THE MEASUREMENT OF L			BERTAUX		CNRS-SA	83-116A-22
DC AND LOW FREQUENCY VECTOR MAGNETOMETER			SCHMIDT		AUSTRIAN ACAD OF SCI	83-116A-23
STUDY OF LOW-ENERGY ELECTRON FLUX AND ITS REACTION TO ACTIVE EXPE			WILHELM		MPI-AERONOMY	83-116A-24
PHENOMENA INDUCED BY CHARGED PARTICLE BEAMS			BEGHIN		CNRS, CTR FOR SPECTROM	83-116A-25
ABSOLUTE MEASUREMENT OF THE SOLAR CONSTANT			CROMMELYNCK		ROYAL METEOR.INST BELG	83-116A-26
VERY WIDE FIELD GALACTIC CAMERA			COURTES		CNRS-LAS	83-116A-27
SPECTROSCOPY IN X-RAY ASTRONOMY			KELLOCK		MULLARD SPACE SCI LAB	83-116A-28
ISOTOPE STACK			ENGE		U OF KIEL	83-116A-29
MASS DISCRIMINATION DURING WEIGHTLESSNESS			ROSS		U OF STIRLING	83-116A-30
MEASUREMENT OF (CENTRAL) VENOUS PRESSURE BY PUNCTURING AN ARM VEI			KIRSCH		U OF BERLIN	83-116A-31
ADVANCED BIOSTACK EXPERIMENT			BUCKER		DFVLR	83-116A-32
BALLISTOCARDIOGRAPHIC RESEARCH IN WEIGHTLESSNESS			SCANO		U OF ROME	83-116A-33
MICRO-ORGANISMS AND BIOMOLECULES IN THE SPACE ENVIRONMENT			HORNECK		DFVLR	83-116A-34
ELECTRO-PHYSIOLOGICAL TAPE RECORDER			GREEN		CLINICAL RES CENTER	83-116A-35
LYMPHOCYTE PROLIFERATION IN WEIGHTLESSNESS			COGOLI		FEDERAL INST OF TECH	83-116A-36
COLLECTION BLOOD SAMPLES FOR DETERMINING A.D.H., ALDOSTERONE, AND			KIRSCH		U OF BERLIN	83-116A-37
METRIC CAMERA EXPERIMENT			REYNOLDS		ESA-TOULOUSE	83-116A-38
MICROWAVE REMOTE SENSING EXPERIMENT			DIETERLE		ESA-TOULOUSE	83-116A-39
EFFECTS OF RECTILINEAR ACCELERATION, OPTOKINETIC AND CALORIC STIM			VON BAUMGARTEN		JOHANNES GUTENBERG U	83-116A-41
MATERIALS SCIENCE			HUTH		ESA	83-116A-42
OHZORA	EXOSPHERIC SAT. C	JAPAN		02/14/84	354.-- 865.-- 74.6	84-015A

AIM FILE IONOSPHERIC PHYSICS LISTING

SATELLITE NAME / INVESTIGATION NAME / DATA SET NAME	ALTERNATE NAMES	COUNTRY	LAUNCH DATE	INOP DATE	PERIAPSIS	APOAPSIS	INCLINATION	PI	AGENCY	QUANTITY	TIME SPAN	NSSDC ID
ORBITAL ELEMENTS ON MICROFICHE										1	041984 102485	84-015A-00D
LIMB SCANNING IR RADIOMETER								MAKINO	RIKKYO U			84-015A-01
ULTRAVIOLET SPECTROMETER								OGAWA	ISAS			84-015A-02
INFRARED SOLAR SPECTROMETER								MATSUZAKI	ISAS			84-015A-03
PRECIPITATING PARTICLE ENERGY ANALYZER								MUKAI	ISAS			84-015A-04
SOLAR IMAGE-RADIOMETER								TAKAGI	NAGOYA U			84-015A-05
TOPSIDE PLASMA SOUNDER								OYA	U OF TOHOKU			84-015A-06
PLASMA PROBES								TAKAHASHI	U OF TOHOKU			84-015A-07
MONITOR OF HIGH ENERGY PARTICLES								DOKE	WASEDA U			84-015A-08
UOSAT 2	14781	UNTST	03/01/84		678.--	696.--	98.3					84-021B
TRIAXIAL FLUXGATE MAGNETOMETER								ACUNA	NASA-GSFC			84-021B-01
EARTH IMAGING								SWEETING	U OF SURREY			84-021B-02
CHARGE PARTICLES								FEREBEE	U OF SURREY			84-021B-03
HIGH FREQUENCY BEACON								SMITHERS	U OF SURREY			84-021B-04
MICROWAVE BEACON								SWEETING	U OF SURREY			84-021B-05
VIKING SWEDEN	VIKING	SWDEN	02/22/86		822.--	14000.--	98.7					86-019B
										3	032986 061686	86-019B-00D
MAG CONJ W/DE-1 3X180 BINS, FICHE										4	030186 063086	86-019B-00E
MAG CONJ W/CCE 3X180 BINS ON MICROFICHE										2	030186 063086	86-019B-00F
MAG CONJ W/CCE 6X12 BINS FICHE										2	030186 063086	86-019B-00G
MAG CONJ W/DE-1 3X80 BINS, FICHE										3	030186 063086	86-019B-00H
ULTRAVIOLET AURORAL IMAGER								ANGER	U OF CALGARY			86-019B-01
UV AURORAL QUICK LOOK PLOTS ON MICROFICHE										170	031786 051287	86-019B-01A
HIGH FREQUENCY WAVE EXPERIMENT								BAHNSEN	DANISH SPACE RES INST			86-019B-02
HIGH FREQUENCY WAVE, QUICK LOOK PLOTS ON MICROFICHE										170	031786 051287	86-019B-02A
LOW FREQUENCY WAVE EXPERIMENT								HOLBACK	UPPSALA IONOSPHER OBS			86-019B-03
VIKING LOW FREQUENCY WAVE QUICK LOOK PLOT S ON MFICHE										170	031786 051287	86-019B-03A
VECTOR ELECTRIC FIELD EXPERIMENT								BLOCK	ROYAL INST OF TECH			86-019B-04
VECTOR ELECTRIC FIELD QUICK LOOK PLOTS ON MICROFICHE										170	031786 051287	86-019B-04A
HOT PLASMA EXPERIMENT								LUNDIN	KIRUNA GEOPHYS INST			86-019B-05
HOT PLASMA QUICK LOOK PLOTS ON MICROFICHE										170	031786 051287	86-019B-05A
MAGNETIC FIELD EXPERIMENT								POTEMRA	APPLIED PHYSICS LAB			86-019B-06
POLAR BEAR	STP P87-A	UNTST	11/13/86		970.--	1012.--	89.55					86-088A
MULTI-FREQUENCY COHERENT RADIO BEACON								WITTWER	DEFENSE NUCLEAR AGENCY			86-088A-01
AURORAL/IONOSPHERIC REMOTE SENSOR								HUFFMAN	USAF GEOPHYS LAB			86-088A-02
SAN MARCO-D/L	19013		03/25/88		263.--	615.--	3.0					88-026A
DRAG BALANCE AND AIR DENSITY								BROGLIO	NATL RES COUNC ITALY			88-026A-01
AIRGLOW-SOLAR SPECTROMETER								SCHMIDTKE	INST FUR PHYS WELTRAUM			88-026A-02
ION VELOCITY INSTRUMENT (IVI) PLANAR RETARDING POTENTIAL ANALYZER								HANSON	U OF TEXAS, DALLAS			88-026A-03
WIND AND TEMPERATURE SPECTROMETER (WATS)								SPENCER	NASA-GSFC			88-026A-04
3-AXIS ELECTRIC FIELD INSTRUMENT (EFI)								MAYNARD	USAF GEOPHYS LAB			88-026A-05

Appendix A.3 Software Packages by Discipline

FORM CODES

CD	Compact Disk/Read Only Memory (CD/ROM)
CN	16-mm color negatives (quantity shows number of photos)
FD	5¼ inch floppy disk (3½ inch diskettes maybe available on request)
FT	unlabeled ASCII tape for use on systems other than VAX or IBM
HC	hard copy (quantity shows number of reports)
HP	hard copy (quantity shows number of pages)
IT	tape generated on IBM (or MODCOMP) mainframe
MF	microfiche (quantity shows number of microfiche cards)
MO	35-mm microfilm (quantity shows number of reels)
MP	16-mm microfilm (quantity shows number of reels)
PC	5¼ (or 3½) inch floppy disk ready for use on IBM compatible XT, AT
VT	tape generated on VAX mainframe in VMS

Most software packages (all FD, VT; some IT) can also be transferred electronically over the Space Physics Analysis Network (SPAN) or any network connected to it.

Name	Date	Form	Quantity	NSSDC-ID
		IONOSPHERE		
Ionospheric Models (whole)				
Bent & Llewellyn model	1972	MF	1	MI-91G
Rush & Miller model	1973	MF	1	MI-91B
Ching & Chiu model	1975	MF	1	MI-91A
IONCAP, telcomm. systems, NTIA 83-127	1983	PC	1	NOAA/NTIA
Brace & Theis, Venus (N_e, T_e) model	1984	VT,FT	1	MI-93A
Semi-empirical Low-Latitude (SLIM)	1985	HC	1	AFGL-TR-85-0254
QSTMUF, maximum useable frequency	1985	PC	1	NOAA/NGDC
International Reference Ionosphere (IRI)	1986	FT,VT,PC	1	MI-91C,D,E
Ionospheric Models (F2 peak)				
*fo*F2 & M(3000)F2 coeff. maps	1967 and 1976	IT	2	MI-92A,B
CCIR, *fo*F2 and M3000F2, coeff. maps	1967	VT,FD	1	MI-92C
URSI, *fo*F2, coeff. maps	1987	VT,FD	1	MI-92D
Ionogram Reduction				
Ionosonde (Jackson)	1971	IT	1	PI-11A
Topside Sounder (Jackson, short ver.)	1971	IT	1	PI-21A
Topside Sounder (Jackson, long ver.)	1973	IT	1	PI-21B
Ionosonde, POLAN, WDC-A-STP Rep. UAG-93	1985	HC	1	NGDC
Beacon Analysis				
M-factor calculation program	1970	IT	1	PI-31A
Auroral Imagery				
All sky camera, aurora	02/18/79 - 03/31/79	CN	200	GN-12A
DMSP, nighttime images	1972-1980,1982	MO		AWS/NGDC
DMSP, educational set	1984	SL	52	NGDC
All-sky camera, long data records from observ.		MO,MP		NGDC
DMSP, 0.2 - 20 keV	1975-1980,1983-	FT		NGDC
		GEOMAGNETIC FIELD		
Magnetic Field Models (with external sources)				
Olson & Pfitzer model	1974	IT	1	MG-23A
MDTILT package (O&P, McDonnell Douglas)	1974	IT	1	MG-22A
Mead & Fairfield model	1975	VT	1	MG-21A,B
Beard Geotail model	1979	IT	1	MG-24A
Tsyganenko & Usmanov model	1982	VT	1	MG-25A
Tsyganenko & Stern model	1987	VT	1	MG-25B

Name			Date	Form	Quantity	NSSDC-ID
			GEOMAGNETIC FIELD (cont.)			
Magnetic Field Models (main field only)						
	No. of Coeff.	Degree	Epoch			
Jensen & Cain	48	6	1960	IT	1	MG-11A
GSFC (09/65)	99	9	1960	IT	1	MG-12A
GSFC (12/66)	120	10	1960	IT	1	MG-13A
GSFC (09/80)	462	13	1980	IT	1	MG-12B
GSFC (11/87)	390	13	1982	VT	1	MG-12C
MAGSAT (03/80)	195	13	1980	IT	1	MG-1BA
MAGSAT (04/81)	258	13	1980	IT	1	MG-1BB
POGO (03/68)	99	9	1960	IT	1	MG-16A
POGO (10/68)	143	11	1960	IT	1	MG-17A
POGO (08/69)	120	10	1960	IT	1	MG-18A
POGO (08/71)	120	10	1960	IT	1	MG-19A
IGRF (DGRF45 - DGRF80)	120	10	1945,50	VT,PC	1	PG-18C
IGRF (IGRF85,IGRF85/90)	120	10	1985	VT,PC	1	PG-18C
USGS,Peddie (U.S. model)	24	4		1985		online at USGS
USGS,Peddie (Hawaii model)	8	2		1985		online at USGS
Magnetic Field Models (related software)						
INVAR: L-shell (McIlwain + later corr.)			1966	VT	1	PG-16A
FIELD,FIELDG: B,... (Cain,NSSDC 68-11)			1968	IT	1	PG-11A
FELDG,SHELLG,INTELG: B,L (Kluge,ESA)			1970	VT	1	PG-13A
ALLMAG,LINTRA: B,trac. (Stassinopoulos)			1972	IT	1	PG-12A,B
BLOLSON: B,L (Pfitzer)			1977	IT	1	PG-18A
TRAJLST: B,trac. (Sawyer,NSSDC/SSC)			1980	IT	1	PG-18B
BILCAL: B,B0,L,... (IGRF)			1987	FT,VT,PC	1	PG-18C
TSYKA: B, mag. coord., trac. (T&U, 1982)			1987	VT,PC	1	PG-18D
			ATMOSPHERE			
Reference Atmospheres and Models						
COSPAR Intern. Ref. Atmosphere (CIRA)			1961	HC	1	MN-11A
COSPAR Intern. Ref. Atmosphere (CIRA)			1965	HC	1	MN-15A
COSPAR Intern. Ref. Atmosphere (CIRA)			1972	HC	1	MN-16A
Jacchia Ref. Atmosphere for 1970			1970	MF	1	MN-30A
Jacchia Ref. Atmosphere for 1971			1971	MF	1	MN-31A
Jacchia Standard Atmosphere			1977	MF	1	MN-37A
U.S. Standard Atmosphere			1962	HC	1	MN-22A
U.S. Standard Atmosphere			1966	HC	1	MN-26A
U.S. Standard Atmosphere			1976	HC	1	MN-27A
MSIS-86 model (Hedin)			1986	VT,FT,PC	1	MN-61A,B,D
Hedin Neutral Wind Model			1988	VT,FD	1	MN-61E

Name	Date	Form	Quantity	NSSDC-ID
SOLAR AND MAGNETOSPHERIC PARTICLES				
Trapped Particle (Model Maps)				
AE-4, Electrons, outer zone	1972	HC,IT	1	MT-24A,B
AE-5, Electrons, inner zone, min	1974	HC,IT	1	MT-26A,B
AE-6, Electrons, inner zone, max	1976	HC,IT	1	MT-28A,B
AEI-7,Electrons, high, low	1978	HP,IT	3,2	MT-29A,B,C
AE-8, Electrons, latest model	1980	IT	2	MT-2AA,AB
AP-1, Protons, 30-50 MeV	1966	HC,IT	1,2	MT-11A,B
AP-5, Protons, 0.1-4 MeV	1967	MF,IT	14,2	MT-15A,B
AP-6, Protons, 4-30 MeV	1969	HC,IT	1,2	MT-16A,B
AP-7, Protons, above 50 MeV	1970	HC,IT	1,2	MT-17A,B
AP-8, Protons, 0.1-400 MeV, latest model	1979	HC,IT	1,2	MT-18A,B,C,D
Trapped Particle (Related Software)				
ORP: Orbital flux integ. (needs ORB)	1974	IT	1	PT-12A
SOFIP: Orbital flux integ. (Stassinopolous)	1979	HC,IT	1	PT-15A
SHIELDOSE:Shielding, rad. dose (Seltzer)	1980	HC,IT	1	PT-16A
RADBELT: AE-8, AP-8 fluxes for B/Bo,L	1988	FT,VT,PC	1	PT-11B
Solar Particle Flux Models				
SOLPRO: solar protons (King & Stassinopolous)	1975	HC	1	PZ-11A
Solar to trapped proton ratios		HC	1	MZ-13A
SOLAR-TERRESTRIAL INDICES				
Magnetic Indices				
AE,1.0 min	01/01/78 - 12/31/83	IT	1	GG-33C
AE,2.5 min	01/01/66 - 12/31/73	IT	7	GG-31C
AE,hourly	07/01/57 - 12/31/74	IT	10	GG-32B
DST,hourly	01/01/57 - 12/31/74	IT	1	GG-41B
DST,hourly	01/01/81 - 07/31/87	HP	87	GG-41A
DST,hourly	01/01/57 - 12/31/80	MF	8	GG-41C
Events list (IAGA Bull.)	01/01/57 - 12/31/64	HC	12	GG-71A
Rapid var. data (IAGA Bull.)	01/01/69 - 07/31/87	HP	138	GG-71A
Km,Am,Kn,An, WDC-A-STP	01/01/59 - 12/31/74	IT	1	GG-61C
Kp,Ap,Cp, ESRO	01/01/32 - 04/30/88	IT	1	GG-61B
Kp,Ap,Cp,Ci (IAGA Bull.)	09/01/69 - 09/30/87	HP	682	GG-61A
STP indices and data (see below)	1932-1987	CD	1	NGDC
Solar Activity Indices				
Sunspot numbers (Rep. UAG-95)	1610-1985	HC	1	NGDC
2800 MHz (10.7 cm) solar flux	1970-1987	FD	2	NGDC

Name	Date	Form	Quantity	NSSDC-ID
STP indices and data:	1987	CD	1	NGDC

Annual, daily, hourly magnetic field measurements from several observatories
AE (hourly, since 1957)
DST (hourly, 1957 to 1984)
Kp, Ap (3-hourly,1932 to 1987)
Solar flares (1955 to 1987)
Sunspot number (daily, monthly, yearly, 1749 to 1986)
IMF & solar wind (hourly, 1964-85, OMNItape)
Listing of operational periods of several magnetic observatories and ionosonde stations

CELESTIAL MECHANICS

Orbit Elements

COMSAT	11/24/72-08/30/82	MP	1	SX-71B
GSFC	01/04/72-05/19/85	HP,MP	695,9	SX-41A,B
NORAD	01/31/58-05/31/75	FT,MP	4	SX-32A,B
R.A.E	10/04/57-08/15/83	HP	198	SX-51A

Orbit Generation Programs

ORB program	1974	IT	1	PX-21A
GEODYN package		IT	21	PX-22A
ORBGEN program	1986	VT	1	PX-21C

Appendix B

Coordinated Projects

CEDAR. Coupling, Energetics, and Dynamics of the Atmosphere Regions. Aeronomy initiative of the U.S. National Science Foundation. Coordinated measurement programs of mostly ground-based instruments and some satellite experiments. Started in 1986. Data will be archived at NCAR.

Publications: Killeen et al. [1987]; *The CEDAR Post*, quarterly newsletter; *CEDAR, Volume I: Overview; Volume II: Detailed Facility Development; The First CEDAR Data Base Report. Journal of Atmospheric and Terrestrial Physics*, Vol. 50, No. 10/11, 1988.

Workshops are held once per year at NCAR. Several coordinated programs have been initiated by CEDAR or were conducted in connection with CEDAR:

- **GISMOS**. Global Ionospheric Simultaneous Measurement of Substorms (Jan. 84, Jul. 84, Mar. 85, Apr. 86, Sep. 86).
- **GITCAD**. Global Ionosphere Thermosphere Coupling and Dynamics (Jan. 87).
- **HLPS**. High Latitude Plasma Studies (Feb. 88).
- **LTCS**. Lower Thermosphere Coupling Study (Oct. 87).
- **MITHRAS**. Magnetosphere - Ionosphere - Thermosphere Radar Studies (Rasmussen et al., 1988) (May 81 to June 82).

CDAW. Coordinated Data Analysis Workshop. Started as centralized data base system for IMS. Computer-assisted workshops held at NSSDC mostly dealing with magnetospheric physics. (CDAW-6: *Journal of Geophysical Research*, Vol. 90, 1175-1375, 1985.) The most recent, CDAW-8, was devoted to the study of substorm effects in the deep magnetotail.

EOS. Earth Observing System. Remote sensing and in situ instruments for continuous monitoring of processes at the Earth's surface, in the atmosphere, in the ionosphere, and in the magnetosphere. Three instrument platforms (2 USA, 1 ESA) launched into low, polar, sun-synchronous orbits. Fifteen-year mission to begin in the mid-1990s [Hartle, 1987].

IACG. Inter-Agency Consultative Group. Formed in 1988 by IKI, ISAS, ESA, and NASA. Coordinates multinational satellite missions.

IGBP. International-Geosphere-Biosphere Program. A Study of Global Change. Synthesis of information about the atmosphere, biosphere, hydrosphere, and lithosphere on a global scale, to develop interactive models and prediction capabilities (ICSU programs are planned to begin in the early 1990s).

IGY. International Geophysical Year, 1957. Ionosonde, absorption, drift, airglow, solar activity, cosmic ray, and meteorological measurements. The measurement techniques, pro-

grams, and results are reported in the *Annales of IGY*. See also the review by Friedman [1983]. Period of high solar activity. Launch of first satellite, Sputnik 1.

IMS. International Magnetospheric Study. The scope and status of IMS are described in: *IMS Source Book*, C. Russell and D. Southwood (eds.), AGU, 1982. *The Scientific Satellite Program During the IMS*, K. Knobb and B. Battrick (eds.), D. Riedel Pub., Dordrecht, 1976. *Achievements of the IMS*, ESA SP-217, 1984, *IMS Bulletin*, SCOSTEP, 1975. Hard copies of the computer-based IMS Data Catalog are available from WDC-A-STP, Boulder, Colorado.

IQSY. International Quiet Sun Years, 1964/65. Period of low solar activity (solar cycle minimum). In addition to the techniques of the IGY, satellite and rocket experiments contributed substantially to the IQSY. Techniques, observational schedules, and treatment of data are discussed in the *Annales of IQSY*, M.I.T. Press, Cambridge, Massachusetts, 1968.

ISTP. International Solar-Terrestrial Physics Program. Collaboration among ISAS, ESA, and NASA to encourage progress in solar-terrestrial physics. Six spacecraft missions are planned for 1989 to 1993 for simultaneous measurements in the different regions of the Earth-sun system. A data networking system is planned to facilitate worldwide access to the ISTP data base. (International Solar-Terrestrial Physics Program, NASA, Washington, DC, 1984). ISTP and other satellite missions related to solar terrestrial physics are coordinated by IACG.

ISY. International Space Year. The year 1992 will mark the 500th anniversary of the landing in the New World by Christopher Columbus and the 35th anniversary of the IGY. ISY is supported by ICSU and the International Astronomical Academy and Federation. The proposed central theme will be "Understanding and Utilizing Space for Humanity."

MAC. Middle Atmosphere Cooperation. Continuation of MAP (1987-1988).

MAP. Middle Atmosphere Program. Ambitious international measurement program of stratospheric and mesospheric constituents, energy budget, and dynamics. Progress and measurement techniques are described in *Handbook of MAP*, published irregularly by SCOSTEP. A quarterly *MAP Newsletter* informs about the ongoing activities (1982-1986). The MAP project Winter (1983/84) in Northern Europe (WINE) is described in the *Journal of Atmospheric and Terrestrial Physics*, Vol. 49, No. 7/8, 1987.

PAD. Polar and Auroral Dynamics. SCOSTEP program to coordinate international efforts in studying high latitude solar-terrestrial physics. PAD is part of STEP.

PROMIS. Polar Region Outer Magnetosphere International Study. March to June 1986. Coordinated data acquisition of DE, Viking, ISEE 1 and 2, IMP 8, and AMPTE/IRM. Measurements in the magnetotail and solar wind simultaneously with auroral image sequences.

STEP. Solar-Terrestrial Energy Program. SCOSTEP's follow-up program to WITS (1990-1995). Ground-based, aircraft, balloon, and rocket experiments.

SUNDIAL. Worldwide study of interactive ionospheric processes and their roles in the transfer of energy and mass in the sun-earth system. (Oct. 84, Sep. 86, June 87, . . .) See special issue of *Annales Geophysicae*, Vol. 6, No. 1, 1988.

WAGS. World Acoustic Gravity Wave Study. The measurement periods of these campaigns are announced in the *International Geophysical Calendar* (see Appendix D).

WITS. World Ionosphere/Thermosphere Study. International three-year program organized by SCOSTEP; started in 1987. Coordinated measurement campaigns (mostly ground-based) and numerical modeling (Cole, 1987).

Information about the status of international projects can be found in the *Solar Terrestrial Physics (STP) Newsletter*, which is distributed for SCOSTEP by WDC-A-STP.

Appendix C

Journals and Newsletters

Advances in Space Research. The official journal of the Committee on Space Research (COSPAR). Proceedings of the general assemblies held every even year.
Pergamon Press,
Hedington Hill Hall,
Oxford OX3 OBW, England

Annales Geophysicae. The official journal of the European Geophysical Society (EGS). Six issues per year dealing with atmospheres, hydrospheres, and space science.
Gauthier-Villars,
17, rue Remy-Dumoncel,
B. P. 50, 75661 Paris,
CEDEX 14, France

COSPAR Information Bulletin. Information about COSPAR conferences and publications. News from the national space agencies. List of new satellites, of satellites particularly suited for international participation, and of satellite objects that are nearing their decay. Pergamon Press.

Eos Transactions. The newsletter for AGU members: news, book reviews, feature articles, abstracts. Weekly. AGU.

Geomagnetism and Aeronomy. The English edition of the bimonthly Soviet journal *Geomagnetism i Aeronomy.* Covers progress in ionospheric physics in the U.S.S.R. AGU.

Geophysical Research Letters. Short and interesting contributions of broad geophysical interest. Almost everything new in geophysics is printed here first. Monthly. AGU.

Ionospheric Data. Monthly median ionospheric data from selected ground stations. Published monthly from 1944 to 1974 by NGDC. Back issues available on microfiche.

Ionospheric Network Station Information Bulletin. Newsletter of INAG. Published quarterly by NGDC.

Journal of Atmospheric and Terrestrial Physics. Papers in ionospheric and atmospheric physics. Several special issues dedicated to certain measurement techniques or coordinated campaigns. Monthly. Pergamon Press.

Journal of Geomagnetism and Geoelectricity. The Society of Terrestrial Magnetism and Electricity of Japan. Fields of interest are geomagnetism, ionosphere, magnetosphere, solar-terrestrial physics.
Center for Academic Publications,
4-16, Yayoi 2-Chome, Bunkyo-ku,
Tokyo 113, Japan

Journal of Geophysical Research (Space Physics). Papers on aeronomy and magnetospheric physics, planetary atmospheres and magneto-

spheres, interplanetary and external solar physics, cosmic rays, and heliospheric physics. The most widely cited journal in space physics. Monthly. AGU.

Journal of Geophysics. Official journal of the German Geophysical Society. Strong orientation to geomagnetic research. Bimonthly.
Springer-Verlag,
Postfach 105280,
6900 Heidelberg 1, F.R.G.

NSSDC News. Information about the ongoing activities at the National Space Science Data Center. Quarterly. NSSDC.

Planetary and Space Science. Specific areas include planetary and terrestrial atmospheres, atomic processes, auroras, ionosphere, radiation belts, solar wind. Monthly. Pergamon Press.

Radio Science. All aspects of electromagnetic phenomena related to physical problems; propagation of electromagnetic waves through all kinds of geophysical media; remote sensing; telecommunications. Bimonthly. AGU.

Recommendations and Reports of the International Radio Consultative Committee (CCIR). Reports, resolutions, opinions, decisions, questions, and study programs of the CCIR plenary assemblies (every four years). For ionospheric physics, Volume VI (*Propagation in Ionized Media*) is particularly interesting. CCIR is a member of the International Telecommunication Union (ITU), Geneva. CCIR.

Reviews of Geophysics. Invited reviews and summaries in all fields of geophysic research. Eight times a year. AGU

Telecommunications Journal. Monthly journal of the International Telecommunications Union (ITU). English, French, and Italian editions. Scientific articles on ionospheric radio-wave propagation.
La Presse Technique SA,
3a rue due Vieux-Billard,
1205 Genève, Switzerland

URSI Information Bulletin. Information about the activities of the International Union of Radio Science (URSI) including conferences and publications. URSI.

Appendix D Prediction Services (Forecasts/Warnings/Alerts)

Reports and Circulars

Spacewarn Bulletin
Lists newly launched satellites, spacecraft suited for international participation, and satellite objects about to decay. Monthly. WDC-A-R&S.

Preliminary Report and Forecast of Solar Geophysical Data
Includes daily solar and geomagnetic indices, flare and energetic events forecasts and alerts. Weekly. SESC.

CCIR Circular of Basic Indices for Ionospheric Propagation
Monthly mean and 12-month running mean of solar indices. Distributed monthly by CCIR/ITU prior to publication in the *Telecommunication Journal.*

International Geophysical Calendar
Informs about the internationally recommended measurement periods for a variety of ground-based techniques; times of meteor showers and solar eclipses; times of satellite measurements in solar wind; intervals of global coordinated campaigns. Coordinated and distributed by IUWDS. New calendar is published at end of old year in *Eos Transactions* and in *COSPAR Bulletin.*

Telephone, Telex, and Remote Access Service (SESC)

Telephone Recording of Solar Activity:
A tape-recorded message of solar and geophysical activity and indices for the most recent 24 hours and for the next 24 hours, updated every 3 hours. Telephone numbers: commercial (303) 497-3235; FTS 320-3235.

WWV Recording of Solar Activity:
A 40-second message providing similar information, on WWV (2.5, 5,10, 15, 20, MHz) at 18 minutes past each hour.

SESC Satellite Broadcast:
Allows for data reception with a microstation consisting of a small (2-foot diameter) antenna and portable controller. The controller can be connected to a simple printer, video terminal, or any microcomputer of choice, which enables customers to collect and use the data for individual purposes. Serves continental United States, Canada, Alaska, and Hawaii.

Real-Time Alert:
Notification by telephone or teletype. Persons or organizations requiring notification of the prediction or occurrence of various solar geophysical phenomena are contacted when their event thresholds are met.

Direct Access to the SELDADS:
Using standard computer terminals, customers may access the SELDADS (Space Environment Laboratory Data Acquisitions and Display System) and obtain printouts of solar and geomagnetic variations data.

Public Bulletin Board System (PBBS):
SESC has been operating a remote-access Public Bulletin Board System 24 hours a day, 7 days a week since January 15, 1987. The PBBS operates unattended and regularly downloads solar and ionospheric forecasts and fresh daily values from a limited number of numerical data sets which are maintained in the SELDADS II data base. The SESC PBBS may be accessed at (303) 497-5000. The protocol is a conventional 9-bit data word with one stop bit and no parity. The PBBS will operate at both 300 and 1200 baud.

Agency by Country

Country	Organization
Argentina	LIARA Av. Liberador No. 327 Vicente Lopez
Australia	IPS
Belgium	Institut Royal Meteorologique 3, avenue Circulaire, Uccle, Brussels
Canada	Communications Research Center P. O. Box 11490, Ottawa, Ontario
France	CNET Service des Ursigrammes Observatoire de Paris, 92190 Meudon CNET, Mesures Ionosphériques Route de Trégastel, 2230 Lannion
FRG	FTZ, Forschungsinstitut
Japan	RRL
India	Radio Research Committee National Physical Laboratories Hillside Road, New Delhi, 12
Sweden	Central Administration of Swedish Telecommunication S-12386 Tarsta
U. K.	Rutherford Appleton Laboratory Chilton, Didcot Oxfordshire, OX11 OQX
U. S. A.	SESC/NOAA
U.S.S.R.	Hydrometeorological Services Institute for Applied Geophysics Glebovskaya 206, Moscow 107258

Appendix E Addresses and Abbreviations

AFGL Air Force Geophysics Laboratory
Hanscom AFB, MA 01731, U.S.A.

AGU American Geophysical Union
2000 Florida Avenue, NW
Washington, DC 20009, U.S.A.

CCIR International Radio Consultative Committee
Place des Nations
CH-1211 Geneve 20, Switzerland

CIRA COSPAR International Reference Atmosphere
(COSPAR Working Group)

CNET Centre Nationale d'Etudes des Telecommunications
3 Ave de la Republique
92130 Issy-les-Moulineaux, France

COSPAR Committee on Space Research
51 Boulevard de Montmorency
75016 Paris, France

EGS European Geophysical Society
G. M. Brown (Secretary General)
Department of Physics
The University College of Wales
Aberystwyth SY 23 3BZ, U.K.

FTZ Fernmeldetechnisches Zentralamt
Deutsche Bundespost
P. O. Box 5000
6100 Darmstadt, F.R.G.

IAGA International Association of Geomagnetism and Aeronomy
M. Gadsden (Secretary General)
Physics Department
Aberdeen University
Aberdeen AB9 2UE, U.K.

ICSU International Council of Scientific Unions
51 Boulevard de Montmorency
75016 Paris, France

IGRF International Geomagnetic Reference Field
(IAGA Working Group)

IKI Institute of Space Research
Academy of Sciences
Profsoyuznaya Ulitsa 88
Moscow V-485, 117810, U.S.S.R.

INAG International Ionospheric Network Advisory Group
Contact WDC-A-STP or AFGL (Ionospheric Branch) for more information

IPS — Ionospheric Prediction Service
P. O. Box 702
Darlinghurst, NSW 2010, Australia

IRI — International Reference Ionosphere
(COSPAR/URSI Working Group)

ISAS — Institute of Space and Astronautical Science
6-1, Komaba, 4-chome, Meguro-ku
Tokyo 153, Japan

ITU — International Telecommunication Union
Place des Nations
CH-1211 Geneve 20, Switzerland

IUGG — International Union of Geodesy and Geophysics
P. Melchior (Secretary General)
Observatoire Royal de Belgique
Avenue Circulaire 3
1180 Bruxelles, Belgium

IUWDS — International Ursigram and World Days Service
R. Thompson, IPS (Chairman)
H.E. Coffey, WDC-A-STP
(Secretary)

IZMIRAN — Institute of Terrestrial Magnetism, Ionosphere, and Radio Wave Propagation
Soviet Academy of Sciences
142092, Troitsk
Moscow Region, U.S.S.R.

MONSEE — Monitoring of Sun-Earth Environment Committee
M. A. Shea (Chairman)
Space Physics Division, AFGL

NCAR — National Center for Atmospheric Research
Boulder, CO 80307, U.S.A.

NGDC — National Geophysical Data Center
NOAA E/GC2,
325 Broadway
Boulder, CO 80303, U.S.A.

NOAA — National Oceanic and Atmospheric Administration
Boulder, CO 80303, U.S.A.

NSSDC — National Space Science Data Center
Goddard Space Flight Center
Code 630.2
Greenbelt, MD 20771, U.S.A.

PRL — Physical Research Laboratory
Ahmedabad - 380009, India

RRL — Radio Research Laboratories
Ministry of Posts and Telecommunications
2-1, Nukui-Kitamachi, 4-chome
Koganei-shi
Tokyo 184, Japan

SCAR — Scientific Committee on Antarctic Research
(Contact ICSU for address)

SCOSTEP — Scientific Committee on Solar Terrestrial Physics
J. G. Roederer (President)
Geophysical Institute
University of Alaska
Fairbanks, AK 99775-0800 U.S.A.

SESC — Space Environment Services Center, NOAA
325 Broadway, R/E/SE2
Boulder, CO 80303-3328 U.S.A.

URSI — International Union of Radio Science
Avenue Albert Lancaster 32
B 1180 Bruxelles, Belgium

USGS — U.S. Geological Survey
Denver, CO 80225 U.S.A.

WDC-A-R&S — World Data Center A for Rockets and Satellites
Goddard Space Flight Center
Code 630.2
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WDC-A-STP World Data Center A for Solar-Terrestrial Physics
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Boulder, CO 80303, U.S.A.

WDC-B2 World Data Center B2
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