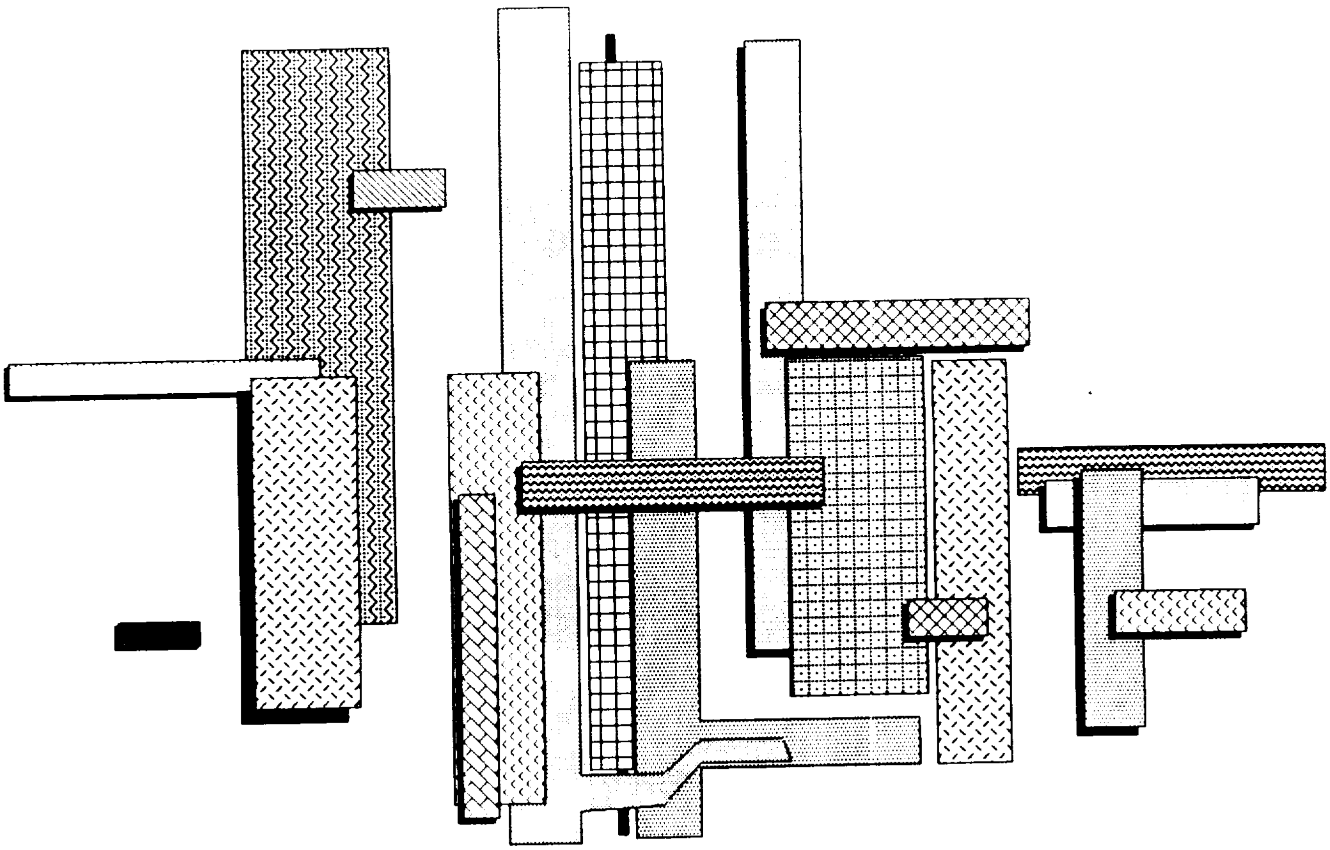
NSSDC/WDC-A-R&S 89-03

The Worldwide Ionospheric Data Base

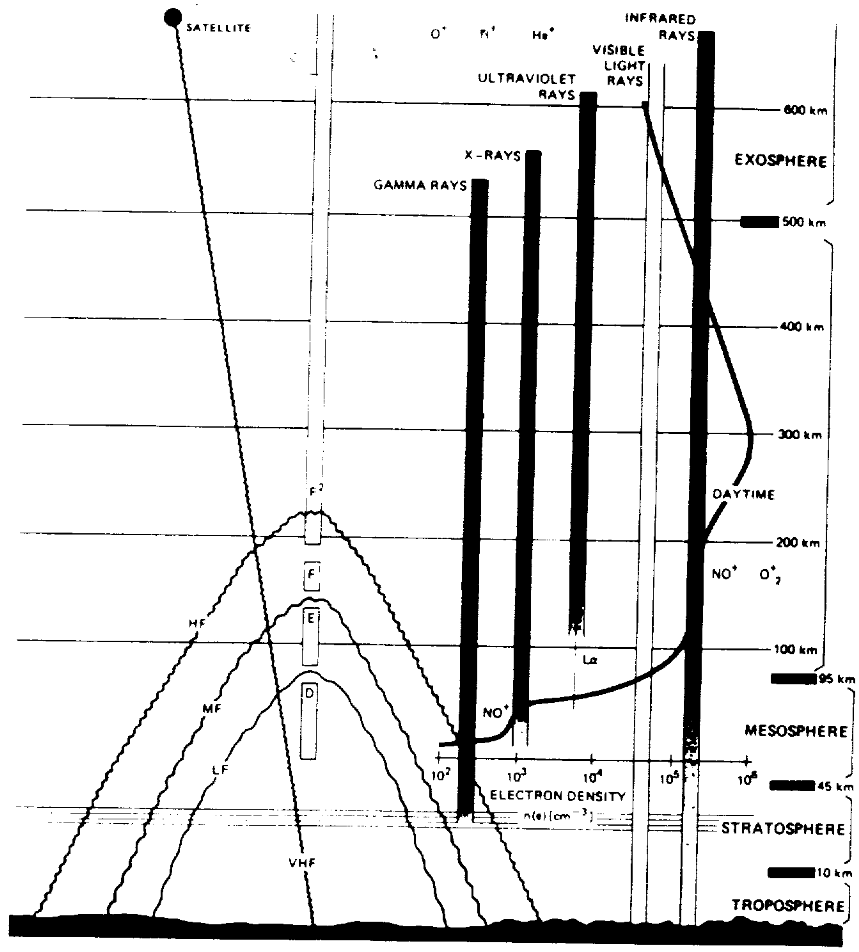


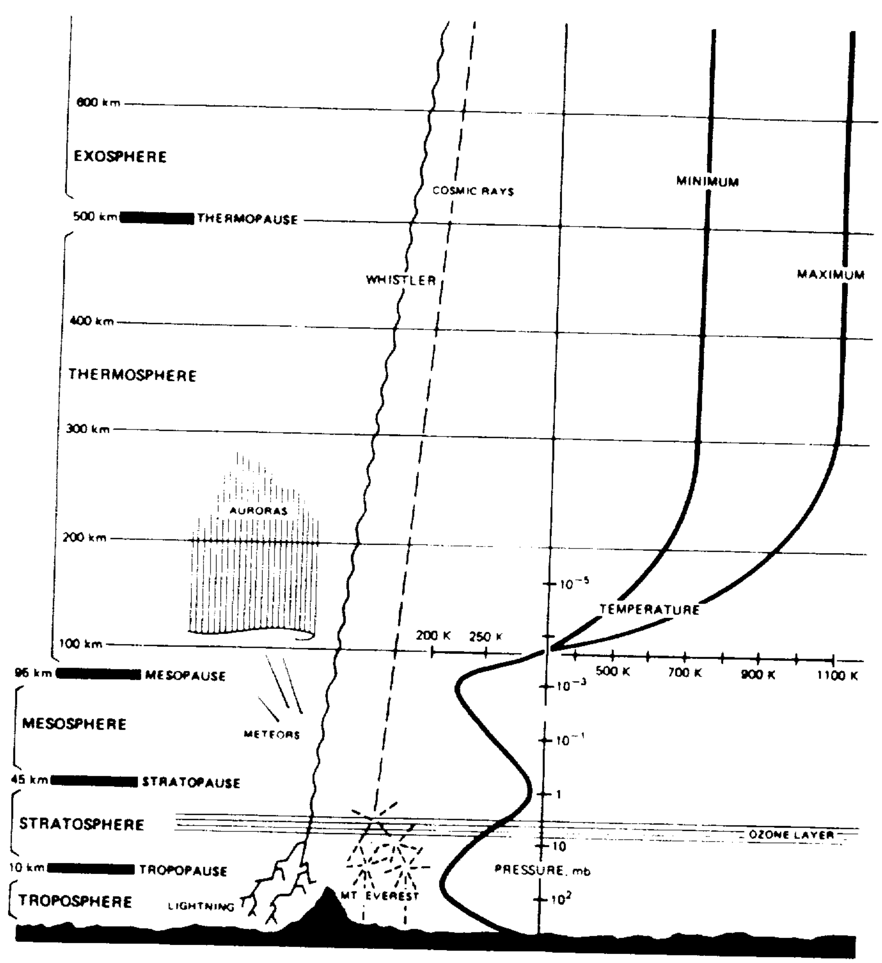
Dieter Bilitza

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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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)

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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 ionization. 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 ±20°, 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.)

```
******************************                          ITEM:   464
POITIERS, FRANCE                                        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 ------    LRN 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.
```

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**********************************                      ITEM:   302
PORT AUX FRANCAIS, KERGUELEN ISLANDS                    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
                           S49.30 E70.50).
```

```
******************************                          ITEM:  2336
PROVIDENIYA BAY, USSR                                   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 -----
```

```
******************************                          ITEM:   821
PRUHONICE, CZECHOSLOVAKIA                               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, Sporilov 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_oF2 (the *o* stands for ordinary trace), f_oF1, f_oE, *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

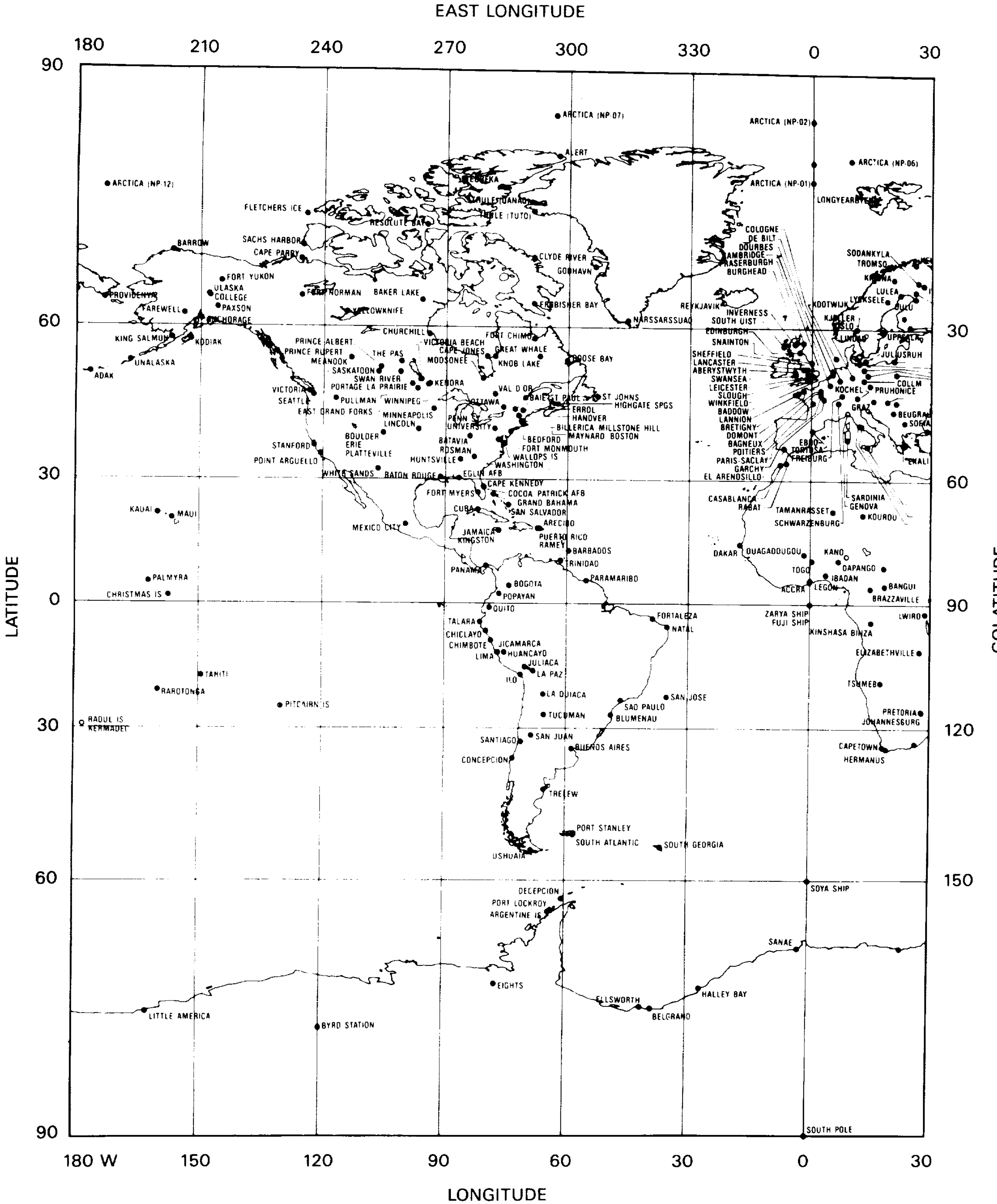


Figure 2.2 Location of all ionosondes known to have operated

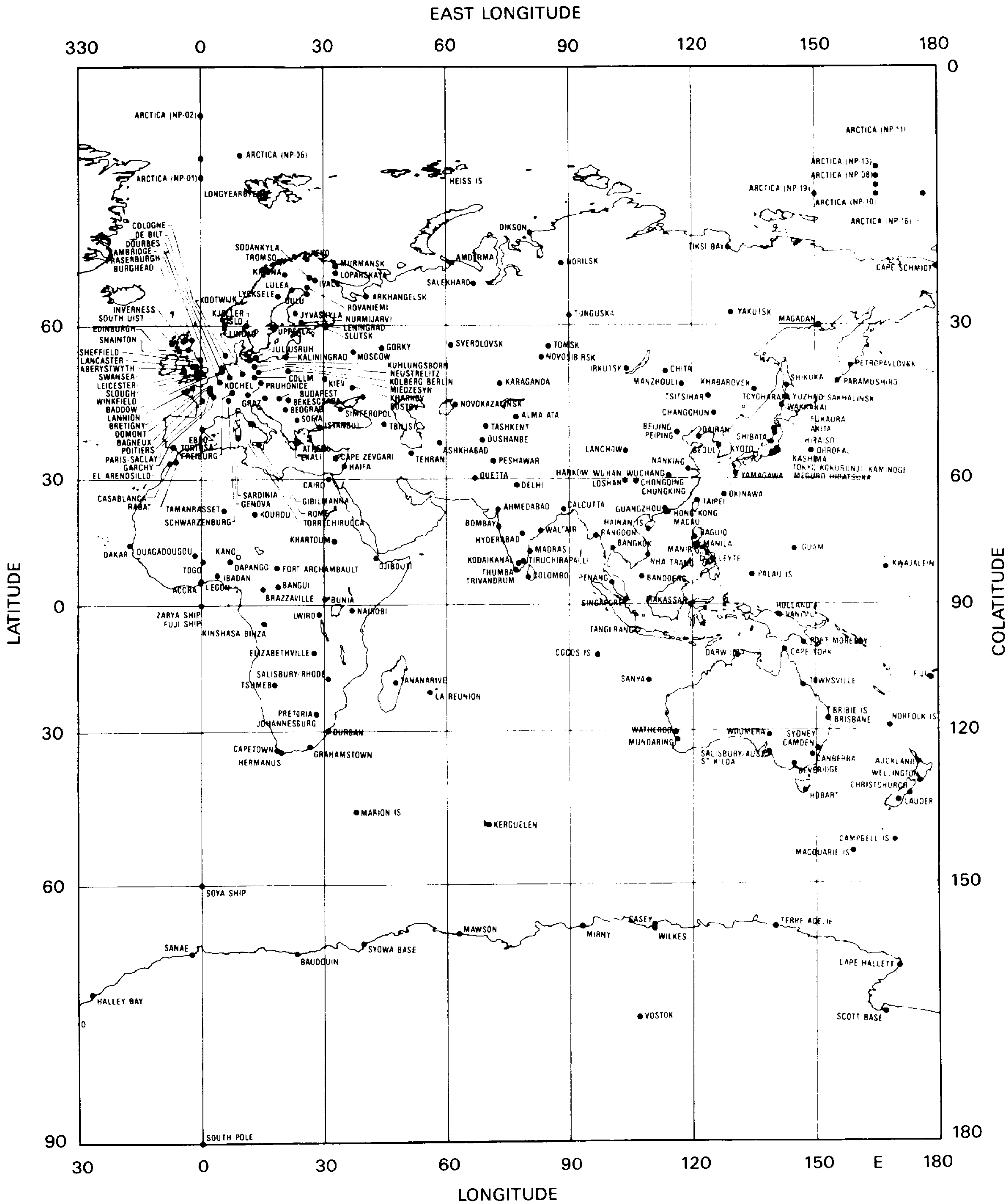


Figure 2.2 (continued) Location of all ionosondes known to have operated

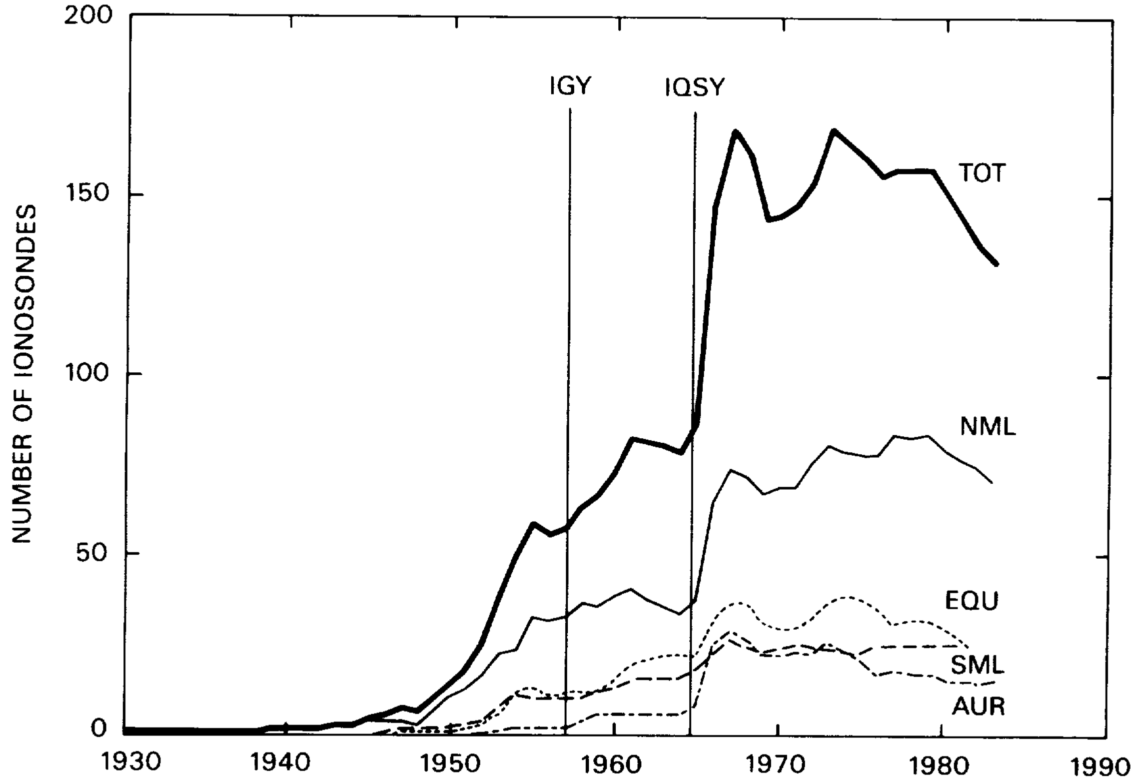


Figure 2.3 Number of ionosondes operational from 1930 to 1984: TOT = total number, NML = number of ionosondes at northern midlatitudes, EQU = at equatorial latitudes, SML = at southern midlatitudes, AUR = at auroral latitudes, IGY = International Geophysical Year, IQSY = International Quiet Sun Year

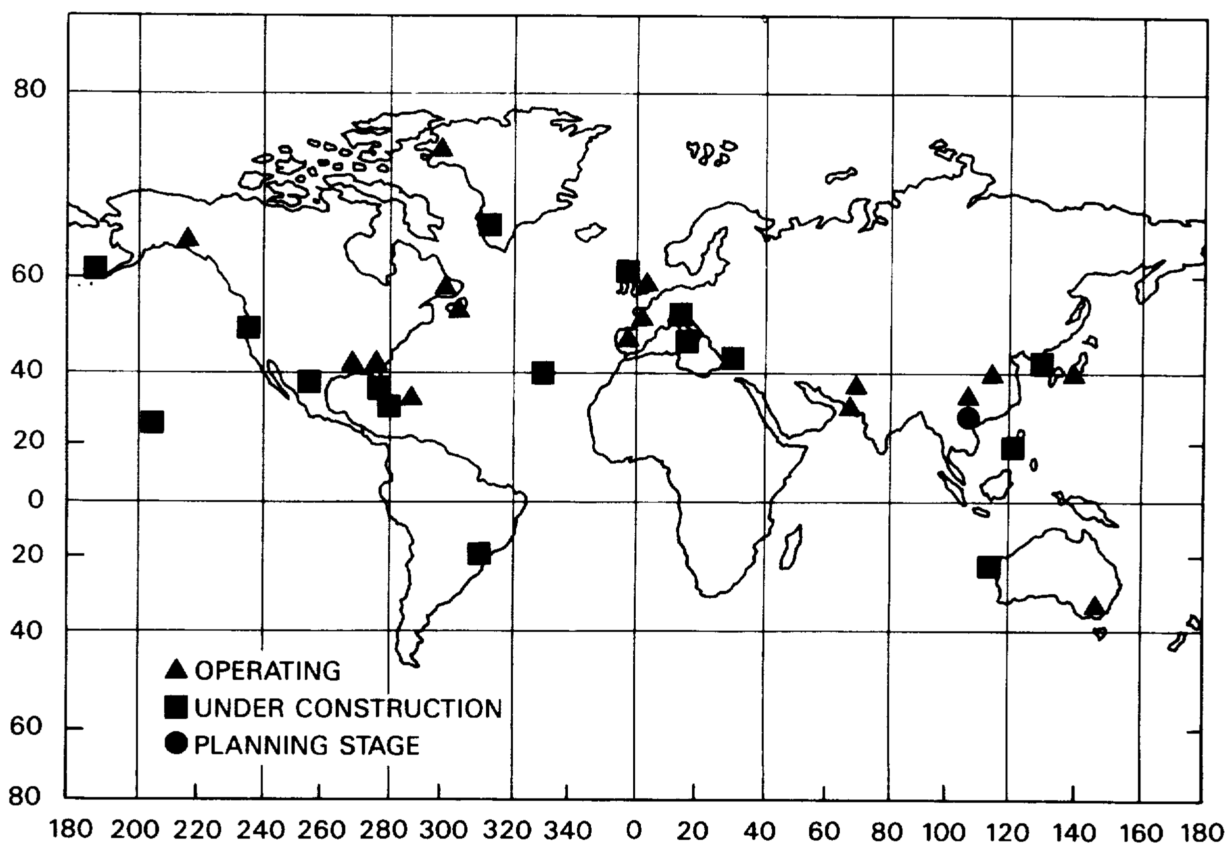


Figure 2.4 Global Digisonde 256 network as of July 1988

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	MO155	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).

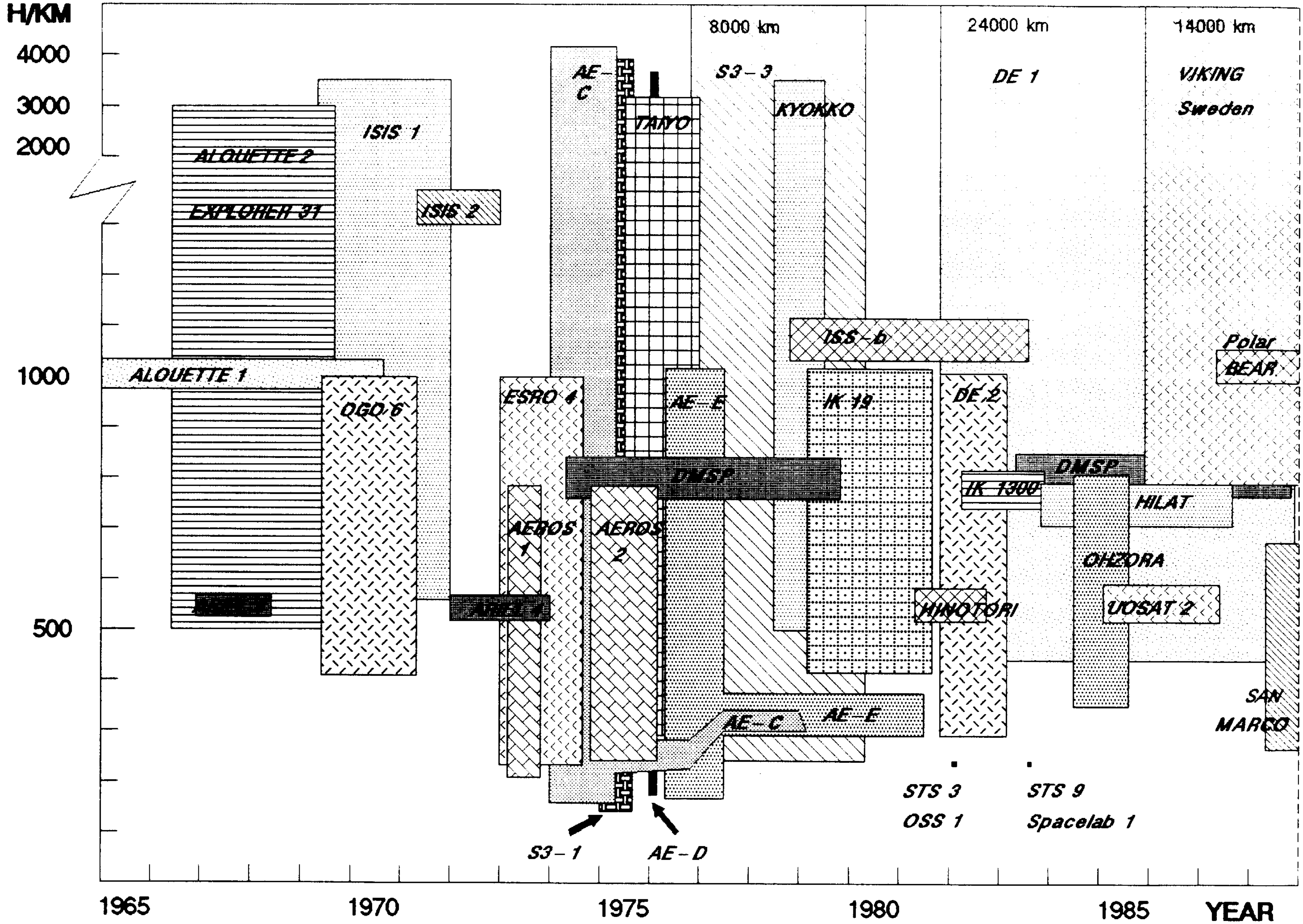
3.2 In Situ Experiments

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 multi-rocket 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 different 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.

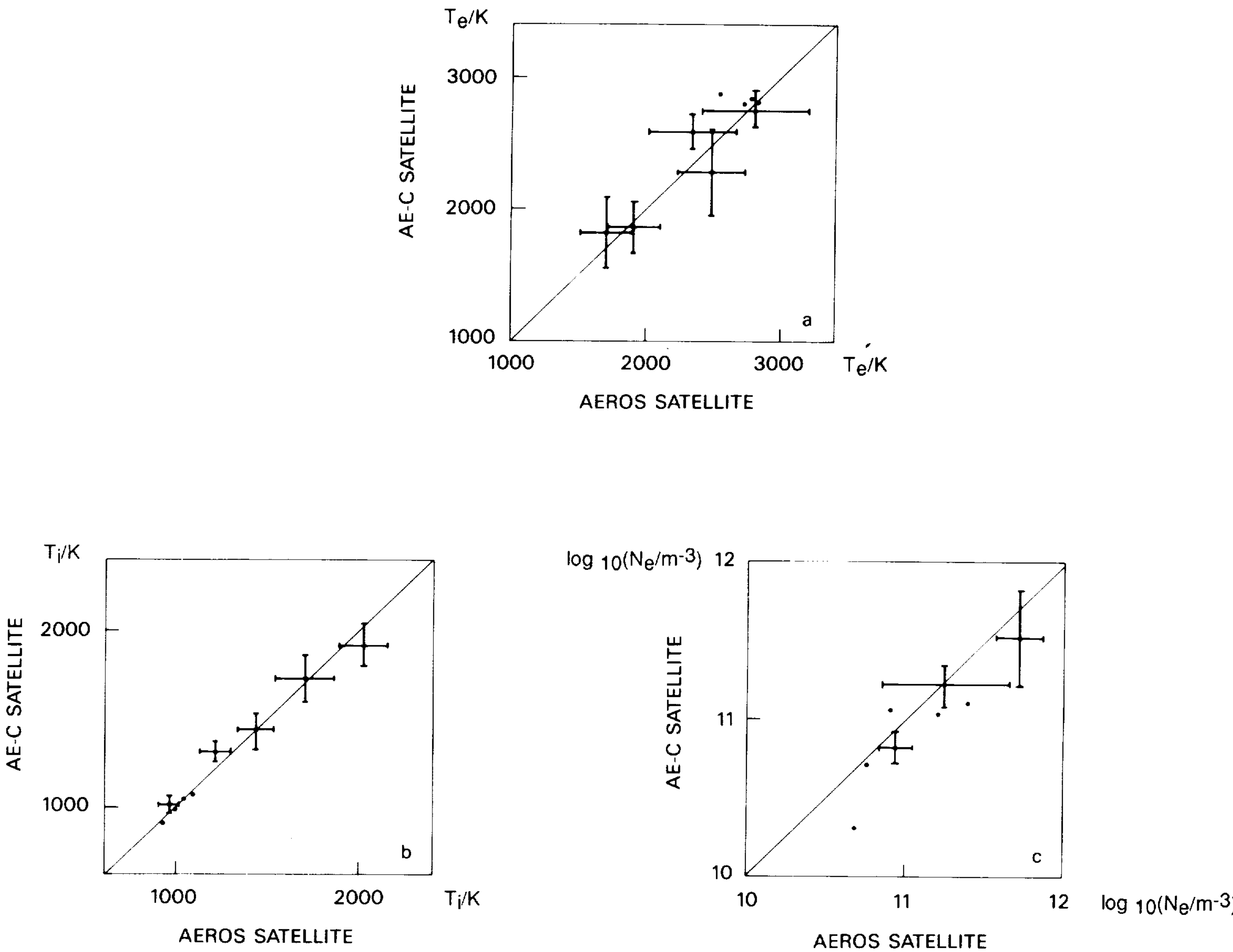


Figure 4.1 Comparison of results for ionospheric parameters from AEROS and AE-C satellites

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
<u>Electron temperature models for specific satellite missions</u>		
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
<u>Electron and ion temperature models</u>		
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
<u>Models of electron temperature/density anticorrelation</u>		
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

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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

IONOSPHERIC PHYSICS LISTING BY SPACECRAFT NAME

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-G	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
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

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

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SATELLITE NAME            ALTERNATE NAMES          COUNTRY  LAUNCH DATE  INOP DATE  PERIAPSIS  APOAPSIS  INCLINATION
     INVESTIGATION NAME                                      PI                      AGENCY
        DATA SET NAME                                                                   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          UNKNOWN                       58-002B-01
  SATELLITE DRAG ATMOSPHERIC DENSITY                            JACCHIA          SAO                           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                                         DOLGINOV         IZMIRAN                       58-004B-01
  SCINTILLATOR DETECTOR ELECTRONS 10 KEV UP                     KRASSOVSK        UNKNOWN                       58-004B-02
  CR PROTONS, NAI SCINTILLATOR DETECTOR                         VERNOV           MOSCOW STATE U                58-004B-03
  MAGNETIC PRESSURE GAGE                                        UNKNOWN          UNKNOWN                       58-004B-04
  IONIZATION PRESSURE GAGE                                      UNKNOWN          UNKNOWN                       58-004B-05
  SPHERICAL ION TRAPS                                           GRINGAUZ         IKI                           58-004B-06
  GEN. ELECT. FIELD METER                                       UNKNOWN          UNKNOWN                       58-004B-07
  R. F. MASS SPECTROMETER                                       ISTOMINA         SAS-IPA                       58-004B-08
  CR HEAVY NUCLEI                                               UNKNOWN          UNKNOWN                       58-004B-09
  PRIMARY CR MONITOR                                            UNKNOWN          UNKNOWN                       58-004B-10
  MICROMETEORITE MICROPHONE                                     NAZAROVA         SOVIET ACAD OF SCI            58-004B-11
  BEACON                                                        UNKNOWN                                        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                                SIMPSON          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                                         SONETT           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                                    WINCKLER         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                                      SONETT           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                                            BAKER            UTAH STATE U                  59-004A-05
  MICROMETEORITE                                                DUBIN            NASA-GSFC                     59-004A-06
  VLF RECEIVER (15.5 KHZ)                                       HELLIWELL        STANFORD U                    59-004A-07
  FLUXGATE MAGNETOMETER                                         COLEMAN, JR.     U OF CALIF, LA                59-004A-08
  BEACON (108 + 378 MHZ)                                        GRAVES           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                                             SUOMI            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     FRIEDMAN         US NAVAL RESEARCH LAB         59-009A-02
  HEAVY PRIMARY COSMIC RAYS                                     POMERANTZ        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                           VAN ALLEN        U OF IOWA                     59-009A-04
     COUNT RATE AND ORBITAL DATA ON MAGNETIC TAPE                                        14  101359 022861     59-009A-04A
  MICROMETEORITE                                                LAGOW            NASA-GSFC                     59-009A-05
  GROUND BASED IONOSPHERIC                                      SWENSON, JR.     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          UNKNOWN                       60-007A-01
  COSMIC NOISE RECIEVER                                         UNKNOWN          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                                                 KANE             NASA-GSFC                     60-014A-01
  ION TRAPS                                                     BOURDEAU         NASA-GSFC                     60-014A-02
  LANGMUIR PROBE                                                BERG             NASA-GSFC                     60-014A-03
  MICROMETEORITE PHOTOMULTIPLIER                                BERG             NASA-GSFC                     60-014A-04
  MICROMETEORITE MICROPHONE                                     MCCRACKEN        NASA-GSFC                     60-014A-05
  ELECTRIC FIELD METER                                          DONLEY           NASA-GSFC                     60-014A-06
  SATELLITE DRAG ATMOSPHERIC DENSITY                            JACCHIA          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          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
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SATELLITE NAME / INVESTIGATION NAME / DATA SET NAME — ALTERNATE NAMES — COUNTRY — LAUNCH DATE — INOP DATE — PERIAPSIS — APOAPSIS — INCLINATION	PI	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 -----3358.00---3534.00-- 91.2-----					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----- -- -- -----					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

SATELLITE NAME / ALTERNATE NAMES / COUNTRY / LAUNCH DATE / INOP DATE / PERIAPSIS / APOAPSIS / INCLINATION; INVESTIGATION NAME; DATA SET NAME	PI	AGENCY	QUANTITY	TIME SPAN	NSSDC ID
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

SATELLITE NAME | ALTERNATE NAMES | COUNTRY | LAUNCH DATE | INOP DATE | PERIAPSIS | APOAPSIS | INCLINATION
INVESTIGATION NAME | PI | AGENCY
DATA SET NAME | QUANTITY | TIME SPAN | NSSDC ID

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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

SATELLITE NAME / ALTERNATE NAMES / COUNTRY / LAUNCH DATE / INOP DATE / PERIAPSIS / APOAPSIS / INCLINATION
INVESTIGATION NAME / PI / AGENCY
DATA SET NAME / QUANTITY / TIME SPAN / NSSDC ID

SATELLITE NAME / INVESTIGATION NAME / DATA SET NAME	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---------------UNTST----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, MFCHE			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-------------------UNTST----11/18/64----- ----- -- -- -----					64-075A
10.004 MHZ BEACON	UNKNOWN	UNKNOWN			64-075A-01
INJUN 4---------------------EXPLORER 25---------------UNTST----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----------------------UNTST----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---UNTST----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----------------------UNTST----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---------------UNTST----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

SATELLITE NAME — ALTERNATE NAMES — COUNTRY — LAUNCH DATE — INOP DATE — PERIAPSIS — APOAPSIS — INCLINATION

INVESTIGATION NAME / DATA SET NAME	PI	AGENCY	QUANTITY	TIME SPAN	NSSDC ID
US NAVY DOPPLER DATA ON MAGNETIC TAPE			1	050265 022466	65-032A-04A

OGO 2------------------------OGO-C---------------------UNTST----10/14/65----- 2/0?/68----- 414.-- 1510.-- 87.4-----65-081A

INVESTIGATION NAME / DATA SET NAME	PI	AGENCY	QUANTITY	TIME SPAN	NSSDC ID
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 5-110?			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

INVESTIGATION NAME / DATA SET NAME	PI	AGENCY	QUANTITY	TIME SPAN	NSSDC ID
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

INVESTIGATION NAME / DATA SET NAME	PI	AGENCY	QUANTITY	TIME SPAN	NSSDC ID
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

SATELLITE NAME / INVESTIGATION NAME / DATA SET NAME	ALTERNATE NAMES	COUNTRY	LAUNCH DATE	INOP DATE	PERIAPSIS	APOAPSIS	INCLINATION	PI	AGENCY	QUANTITY	TIME SPAN	NSSDC ID
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

SATELLITE NAME / INVESTIGATION NAME / DATA SET NAME	ALTERNATE NAMES	COUNTRY	LAUNCH DATE	INOP DATE	PERIAPSIS	APOAPSIS	INCLINATION

INVESTIGATION NAME / DATA SET NAME	PI	AGENCY	QUANTITY	TIME SPAN	NSSDC ID
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	PI	AGENCY	QUANTITY	TIME SPAN	NSSDC ID
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 + NEU								RBENDER	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

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SATELLITE NAME           ALTERNATE NAMES            COUNTRY  LAUNCH DATE  INOP DATE  PERIAPSIS  APOAPSIS  INCLINATION
    INVESTIGATION NAME                                        PI                     AGENCY
      DATA SET NAME                                                                      QUANTITY   TIME SPAN      NSSDC ID

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  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
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SATELLITE NAME / ALTERNATE NAMES / COUNTRY / LAUNCH DATE / INOP DATE / PERIAPSIS / APOAPSIS / INCLINATION

INVESTIGATION NAME / DATA SET NAME	PI	AGENCY	QUANTITY	TIME SPAN	NSSDC ID
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

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SATELLITE NAME            ALTERNATE NAMES          COUNTRY  LAUNCH DATE  INOP DATE  PERIAPSIS  APOAPSIS  INCLINATION
    INVESTIGATION NAME                                          PI                   AGENCY
       DATA SET NAME                                                                   QUANTITY   TIME SPAN      NSSDC ID

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   COMMUNICATION MICROWAVE TRANSPONDER (HUGHES CO.)            UNKNOWN              UNKNOWN                        67-111A-04
   COMMUNICATION VHF RADIO TRANSPONDER (HUGHES CO.)            UNKNOWN              UNKNOWN                        67-111A-05
   SELF CONTAINED NAVIGATION EXPERIMENT (CDC CO.)              UNKNOWN              UNKNOWN                        67-111A-06
   REFLECTROMETER EXPERIMENT                                   UNKNOWN              UNKNOWN                        67-111A-07
   HYDRAZINE THRUSTER                                          UNKNOWN              UNKNOWN                        67-111A-08
   RESISTO-JET THRUSTER                                        UNKNOWN              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 (LEPEFRANK           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 ELECTRONSVAN 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
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SATELLITE NAME / ALTERNATE NAMES / COUNTRY / LAUNCH DATE / INOP DATE / PERIAPSIS / APOAPSIS / INCLINATION INVESTIGATION NAME DATA SET NAME	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 (LEPEFRANK		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

SATELLITE NAME / INVESTIGATION NAME / DATA SET NAME	ALTERNATE NAMES	COUNTRY	LAUNCH DATE	INOP DATE	PERIAPSIS	APOAPSIS	INCLINATION	PI	AGENCY	QUANTITY	TIME SPAN	NSSDC ID
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

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 MICROFILM										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

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SATELLITE NAME            ALTERNATE NAMES          COUNTRY  LAUNCH DATE  INOP DATE  PERIAPSIS  APOAPSIS  INCLINATION
    INVESTIGATION NAME                                       PI                    AGENCY
      DATA SET NAME                                                                   QUANTITY   TIME SPAN        NSSDC ID

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    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
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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

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----- 8/09/7?----- 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

SATELLITE NAME — ALTERNATE NAMES — COUNTRY — LAUNCH DATE — INOP DATE — PERIAPSIS — APOAPSIS — INCLINATION
INVESTIGATION NAME — PI — AGENCY
DATA SET NAME — QUANTITY — TIME SPAN — NSSDC ID

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SATELLITE NAME / INVESTIGATION NAME / DATA SET NAME	PI	AGENCY	QUANTITY	TIME SPAN	NSSDC ID
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 TRAPP	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.-- 879.-- 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

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SATELLITE NAME / ALTERNATE NAMES / COUNTRY / LAUNCH DATE / INOP DATE / PERIAPSIS / APOAPSIS / INCLINATION
INVESTIGATION NAME / PI / AGENCY
DATA SET NAME / QUANTITY / TIME SPAN / NSSDC ID

Name	PI	Agency / Quantity	Time Span	NSSDC ID
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 / PI	INOP DATE	PERIAPSIS / AGENCY	APOAPSIS / QUANTITY	INCLINATION / TIME SPAN	NSSDC ID
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

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SATELLITE NAME          ALTERNATE NAMES            COUNTRY  LAUNCH DATE  INOP DATE  PERIAPSIS  APOAPSIS  INCLINATION
   INVESTIGATION NAME                                          PI                   AGENCY
      DATA SET NAME                                                                    QUANTITY   TIME SPAN        NSSDC ID

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  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.--  7856.--  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.-- 35790.--     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
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AIM FILE IONOSPHERIC PHYSICS LISTING

SATELLITE NAME ALTERNATE NAMES COUNTRY LAUNCH DATE INOP DATE PERIAPSIS APOAPSIS INCLINATION
INVESTIGATION NAME PI AGENCY
DATA SET NAME QUANTITY TIME SPAN NSSDC ID

Name	PI	Agency	Quantity	Time Span	NSSDC ID
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
CD 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

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SATELLITE NAME            ALTERNATE NAMES          COUNTRY  LAUNCH DATE  INOP DATE  PERIAPSIS  APOAPSIS  INCLINATION
    INVESTIGATION NAME                                              PI                 AGENCY
       DATA SET NAME                                                                        QUANTITY   TIME SPAN      NSSDC ID

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     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
   QUARTZ 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
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AIM FILE IONOSPHERIC PHYSICS LISTING

SATELLITE NAME / INVESTIGATION NAME / DATA SET NAME	ALTERNATE NAMES / PI	COUNTRY / LAUNCH DATE / INOP DATE	PERIAPSIS / AGENCY	APOAPSIS / QUANTITY	INCLINATION / TIME SPAN	NSSDC ID
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	USSRN 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

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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 (Ne, Te) 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	No. of Coeff.	Degree	Date	Form	Quantity	NSSDC-ID

GEOMAGNETIC FIELD (cont.)

Magnetic Field Models (main field only)

Name	No. of Coeff.	Degree	Epoch	Form	Quantity	NSSDC-ID
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)

Name	Date	Form	Quantity	NSSDC-ID
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

Name	Date	Form	Quantity	NSSDC-ID
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

Name	Date	Form	Quantity	NSSDC-ID
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, programs, 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 magnetospheres, 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 Greenbelt, MD 20771, U.S.A.

WDC-A-STP	World Data Center A for Solar-Terrestrial Physics NOAA E/GC2 325 Broadway Boulder, CO 80303, U.S.A.	WDC-C1	World Data Center C1 for Solar-Terrestrial Physics Rutherford Appleton Laboratory Chilton, Didcot Oxfordshire OX11 OQX, U. K.
WDC-B2	World Data Center B2 Molodezhnaya 3 Moscow 117296, U.S.S.R.	WDC-C2	World Data Center C2 Radio Research Laboratories 2-1 Nukui Kitamachi,4-chome Koganei-shi Tokyo 184, Japan

National Aeronautics and
Space Administration

Goddard Space Flight Center