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THE NIMBUS 6 DATA CATALOG

VOLUME 12 (FINAL)

1 MAY 1977 THROUGH 30 JUNE 1977

DATA ORBITS 9227 THROUGH 10043

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GODDARD SPACE FLIGHT CENTER

GREENBELT, MARYLAND

THE NIMBUS 6 DATA CATALOG

Volume 12 (Final)

1 May 1977 through 30 June 1977
Data Orbits 9227 through 10043

Prepared by

Management and Technical Services Company
Beltsville, Maryland

For the

Landsat/Nimbus Project

March 1978

GODDARD SPACE FLIGHT CENTER
Greenbelt, Maryland

FOREWORD

This is the twelfth and final volume of a series of catalogs published by the National Aeronautics and Space Administration documenting data acquired from the Nimbus 6 meteorological satellite. The inclusive period of coverage for the data in this volume is 1 May 1977 through 30 June 1977. This volume also includes various subsystem wrap-up summaries that cover different time periods from launch date through the present data catalog series.

Background information concerning the Nimbus 6 meteorological satellite system and a description of the experiments and data formats was published separately in The Nimbus 6 User's Guide. Post-launch User's Guide information changes and corrections have been included in each series of data catalogs. The Nimbus 6 catalogs presented the type of data available, anomalies in the data, if any, and geographic location and time of the data.

The assembly and editing of this catalog was accomplished by the Management and Technical Services Company (MATSCO), Beltsville, Maryland, under contract number NAS5-23740 with the Goddard Space Flight Center, NASA, Greenbelt, Maryland.

Ronald K. Browning
Project Manager
Landsat/Nimbus Project
Goddard Space Flight Center

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CONTENTS

LIST OF FIGURES

LIST OF FIGURES (Continued)

LIST OF TABLES

LIST OF TABLES (Continued)

SECTION 1

SUMMARY OF OPERATIONS

1.1 Introduction

Nimbus 6 was successfully launched from the Western Test Range, Vandenberg Air Force Base, California at 08 hr. 12 min. 00 sec. GMT on 12 June 1975. The orbit was nearly circular at 1093 x 1105 km. Satellite operations from launch through 14 July (orbit 425) consisted of engineering evaluation of all spacecraft systems. As a result of that effort, data reception, accountability and processing were intermittent during that period. Therefore, Volume 1 in this catalog series mainly reflects documentation from orbit 426 (14 July 1975) through orbit 1082 (31 August 1975). Volume 2 through Volume 12 reflect the operational changes that occurred to each individual subsystem on a bi-monthly basis. Additionally, Volume 12 incorporates significant findings and various subsystem summaries as detailed by the respective experimenter. During orbit 9793 (12 June 1977) Nimbus 6 successfully completed two years of operations. Table 1-1 is a summary of the documentation for each Nimbus 6 Data Catalog volume.

Because the spacecraft power is limited, all experiments are not on at the same time. During this catalog period the THIR (see Table 2-2), ERB, PMR, and TWERLE/RAMS (Random Access Measurement System) were recorded for almost all orbits. Full time operations of the ESMR subsystem will be resumed during the winter solstice of the Northern Hemisphere. Special severe storm coverage will be scheduled as

Table 1-1

Nimbus 6 Catalog Documentation Summary

Volume	Dates	Orbits
1	12 June 75-31 Aug. 75	1-1082
2	1 Sept. 75-31 Oct. 75	1083-1900
3	1 Nov. 75-31 Dec. 75	1901-2717
4	1 Jan. 76-29 Feb. 76	2718-3521
5	1 Mar. 76-30 Apr. 76	3522-4338
6	1 May 76-30 Jun. 76	4339-5155
7	1 July 76-31 Aug. 76	5156-5985
8	1 Sept. 76-31 Oct. 76	5986-6802
9	1 Nov. 76-31 Dec. 76	6803-7619
10	1 Jan. 77-28 Feb. 77	7620-8409
11	1 Mar. 77-30 Apr. 77	8410-9226
12 (FINAL)	1 May 77-30 Jun. 77	9227-10043

required. ESMR data quality from both Horizontal and Vertical channels was good through orbit 6183 (15 September 1976). After orbit 6184 (15 September), the Horizontal channel output went to zero and telemetry information indicates a failure of the Ferrite Dicke switch. The Vertical channel remains in good working order with data being collected and processed. These data are being used in the analysis of hurricanes and tropical storms. The SCAMS subsystem ceased functioning during orbit 4751 (31 May 1976) due to a scan mechanism anomaly and is currently in a non-operational mode. The HIRS subsystem failed during orbit 4697 (27 May 1976) when a filter chopper motor anomaly occurred. As a precautionary measure, the HIRS subsystem was turned off and remains in this mode through this reporting period. Due to the depletion of methane in the cryogenic cooler, the last useable data from the LRIR experiment was received during orbit 2801 (7 January 1976). Thus, as we formerly conclude the Nimbus 6 Data Catalog series, we close this volume with approximately 66% of the original subsystems still active and operating satisfactorily. The on-off cycle for each experiment is shown in Table 2-2.

Because of an anomaly in the functioning of the High Data Range Storage subsystem (HDRSS) B, first noted during orbit 33 (14 June), HDRSS B has been limited to 65 minutes of record capability (out of a possible 120 minutes). With only HDRSS B available for full-time use, there was occasional periods when global experiment coverage was not obtained. (These occurred when the Orroral, Australia STDN station was not available for playback of recorded experiment data.) The areas not covered have usually been over the western part of the Pacific Ocean and/or the eastern part of the Atlantic Ocean. During orbit 4641 the HDRSS A recorder failed to record. Prior to

Table 1-2

Summary of Temperature Humidity Infrared Radiometer Operations During the Period 26 October 1976 through 24 May 1977

Mode			
Non-Operational		Operational	
Orbit Number	Date	Orbit Number	Date
6732-6808	26 Oct. 76 - 1 Nov. 76	6809-8026	1 Nov. 76 - 31 Jan. 77
8027-8194	31 Jan. 77 - 12 Feb. 77	8185-8819	12 Feb. 77 - 31 Mar. 77
8820-9089	31 Mar. 77 - 20 Apr. 77	9090-9438	20 Apr. 77 - 16 May 77
9439-9441	16 May 77 - 17 May 77	9441-9540	17 May 77 - 24 May 77
9541-	24 May 77 (THIR Operations cease)		

the above date, HDRSS A was successfully used operationally 120 minutes every other orbit with HDRSS B providing 65 minutes of alternate coverage. Complete failure of HDRSS A occurred during orbit 4713 and despite many attempts to engage the system in a record mode, it has not recorded since orbit 4713 (28 May). The areas most affected by the lack of HDRSS A experiment coverage are the latitudes north of the Equator during the nighttime orbital passes. The daytime coverage remained virtually unchanged with the exception as noted in the above paragraph.

The pitch of the Nimbus 6 satellite has been made to alternate between +2.0 degrees, +0.6 degrees, and 0.0 degrees since launch. Table 1-3 lists the orbits when each pitch position was used.

A positive pitch angle of 0.6 degrees moves the nadir-looking position 11.5 kilometers ahead of the subsatellite point. A positive pitch angle of 2.0 degrees moves the nadir-looking position 38.3 kilometers ahead of the subsatellite point.

At these pitch angles, a scanner-type instrument no longer scans the earth along a great circle arc through the subpoint, but scans along the small circle formed by the intersection of the scan plane with the earth. Since the plane of the small circle is tilted with respect to the nominal scan plane, points on the arc are displaced farther from the great circle as the scan angle increases. As noted above, a pitch angle of 0.6 degrees causes a displacement of 11.5 kilometers at nadir, but when the scanner turns 45 degrees away from nadir the displacement increases slightly to 12.8 kilometers. Similarly, for a 2.0 degree pitch the displacement is 38.3 kilometers at nadir and increases to 42.6 kilometers at a 45 degree scan angle. Thus, although the instrument records in lines normal to the orbit plane (in the absence of yaw) the perpendicular displacement from the perfect-attitude scan line is not uniform across the scan line.

Subsections 1.2 through 1.10 of this catalog summarize the operational highlights of the individual experiments and call attention to known data anomalies. Section 2 lists the on-off times for each experiment and provides a method for determining the geographical coverage of each experiment. Section 3 briefly describes the current image processing status for the HIRS, SCAMS and ESMR experiments and Section 4 presents THIR montages. Section 5 presents corrections of The Nimbus 6 User's Guide.

The user is referred to The Nimbus 6 User's Guide for a complete description of each experiment and to Section 1.7 of that Guide for the requesting procedure and sources for all data. Sections 2, 3, and 4 of this Data Catalog should help users select data to meet their needs.

1.2 The Temperature Humidity Infrared Radiometer (THIR) Subsystem

The recurring THIR Radiometer Mirror anomaly first reported in Volume 8 (September-October 1976), has been instrumental in the decision to permanently shut

Table 1-3

Pitch Positions for Nimbus 6
1 May 1977 through 1 July 1977 (Orbit 9227-10047)

Pitch Change			Pitch Bias	
Date (1977)	Orbit and STDN	Time (GMT)	+0.6°	+0.0°
1 May	9233A*	1212		X
1 May	9239A	2245	X	
2 May	9248A	1503		X
2 May	9253A	2352	X	
3 May	9263A	1604		X
3 May	9266A	2308	X	
4 May	9273A	1154		X
4 May	9278A	2039	X	
5 May	9287A	1258		X
5 May	9292A	2145	X	
6 May	9300A	1218		X
6 May	9305A	2100	X	
7 May	9314A	1323		X
7 May	9319A	2206	X	
8 May	9327A	1239		X
8 May	9332A	2126	X	
9 May	9341A	1349		X
9 May	9346A	2229	X	
10 May	9354A	1302		X
10 May	9359A	2147	X	
11 May	9367A	1220		X
11 May	9373O*	2255	X	
12 May	9380A	1138		X
12 May	9385A	2025	X	
13 May	9393A	1057		X
13 May	9398A	1941	X	
14 May	9405A	0832		X
14 May	9411A	1900	X	
15 May	9421A	1306		X
15 May	9426A	2153	X	
16 May	9433A	1039		X
16 May	9439A	2114	X	
17 May	9447A	1144		X
17 May	9453A	2214	X	
18 May	9461A	1249		X

Table 1-3 (continued)

Pitch Change			Pitch Bias	
Date (1977)	Orbit and STDN	Time (GMT)	+0.6°	+0.0°
18 May	9466A	2134	X	
19 May	9474A	1206		X
19 May	9475A	1352	X	
19 May	9475A	1353		X
19 May	9479A	2051	X	
20 May	9487A	1125		X
20 May	9493A	2156	X	
21 May	9501A	1227		X
21 May	9505A	1930	X	
22 May	9512A	0816		X
22 May	9518A	1846	X	
23 May	9530A	1620		X
23 May	9534A	2327	X	
24 May	9544A	1727		X
25 May	9552A	0759	X	
26 May	9564R	0533		X
26 May	9573A	2119	X	
27 May	9582A	1343		X
27 May	9586A	2038	X	
28 May	9596A	1441		X
28 May	9601A	2320	X	
30 May	9618R*	0620		X
30 May	9626A	2017	X	
31 May	9635A	1237		X
31 May	9639A	1937	X	
1 Jun	9648A	1154		X
1 Jun	9653A	2043	X	
2 Jun	9660A	0928		X
2 Jun	9667A	2145	X	
3 Jun	9678A	1731		X
4 Jun	9685R	0623	X	
5 Jun	9700A	0909		X
5 Jun	9706A	1942	X	
6 Jun	9717A	1531		X
6 Jun	9720A	2047	X	
6 Jun	9720A	2048		X
7 Jun	9734A	2150	X	
8 Jun	9742A	1226		X

Table 1-3 (continued)

Pitch Change			Pitch Bias	
Date (1977)	Orbit and STDN	Time (GMT)	+0.6°	+0.0°
8 Jun	9746A	1922	X	
9 Jun	9755A	1143		X
9 Jun	9760A	2028	X	
10 Jun	9779R	0653		X
11 Jun	9786A	1910	X	
13 Jun	9804R	0345		X
13 Jun	9813A	1926	X	
14 Jun	9824A	1517		X
14 Jun	9827A	2031	X	
15 Jun	9837A	1438		X
15 Jun	9840A	1948	X	
16 Jun	9851A	1540		X
16 Jun	9855A	2242	X	
18 Jun	9872R	0530		X
18 Jun	9879A	1745	X	
19 Jun	9891A	1522		X
19 Jun	9893A	1852	X	
20 Jun	9903A	1256		X
20 Jun	9907A	1954	X	
21 Jun	9918A	1543		X
21 Jun	9921A	2058	X	
22 Jun	9931A	1504		X
22 Jun	9934A	2015	X	
23 Jun	9944A	1421		X
23 Jun	9947A	1934	X	
25 Jun	9968A	0923		X
25 Jun	9974A	2004	X	
27 Jun	9997A	1325		X
27 Jun	10002A	2208	X	
29 Jun	10024A	1348		X
29 Jun	10029A	2230	X	
1 Jul	10047R	0711		X

*A = Fairbanks, Alaska
O = Orroral, Australia
R = Rosman, North Carolina

down the THIR subsystem operations. The last Daily world montages of the THIR are presented in Section 4 of this catalog and conclude with orbit 9541 (24 May 1977). All processed THIR film is archived and available through the National Space Science Data Center, as is all available THIR digital data. The THIR digital products are processed to final format only on request. Users should refer to Section 4 of this catalog, and to Sections 1.7 and 2.4 of The Nimbus 6 User's Guide for a discussion of the formats and procedure to order these products.

1.3 The High Resolution Infrared Radiation Sounder (HIRS) Experiment

During this final reporting period, the HIRS subsystem did not operate. The last operational data was obtained during orbit 4691 (27 May 1976) when a subsystem anomaly (Filter Chopper motor failed) caused the instrument to be turned off as a precautionary move. Subsequent operations after orbit 4697 (27 May 1976) are to be construed as evaluations of the subsystem anomaly. Valid operational data are not available after the above date (27 May 1976).

1.4 The Scanning Microwave Spectrometer (SCAMS) Experiment

Due to major scan anomalies the SCAMS subsystem was turned off during orbit 4751 (31 May 1976). The scan mechanism failure was first experienced between orbit 3862 (26 March) and orbit 4268 (25 April), when the channel 2 (31.65 GHz) reflector movement did not align with channel 1 (22.2 GHz) and the O_2 channel reflector due to a posi-drive belt anomaly. The loss of data from channel 2 prevented retrieval of atmospheric water vapor and liquid water during the above mentioned period; however, the inversion matrices were redefined to exclude channel 2 and temperature retrievals were continued through 31 May 1976.

The following information is a review of the Scanning Microwave Spectrometer (SCAMS) experiment as submitted by the respective experimenters.*

The SCAMS experiment provided slightly more than 11 months of tropospheric temperature profile retrievals and 9 months of water vapor and liquid water retrievals.

Figure 1-1 shows global images of water vapor and liquid water produced from data obtained during the first half of October 1975. Similar images, as well as single-orbit images showing transient weather systems, were discussed by Staelin et al. (1977). The intertropical convergence zone is perhaps the most prominent feature in these images. Also prominent are the averaged traces of storms carrying moisture from the western tropical oceans into the midlatitudes of each hemisphere. Apparent large amounts of liquid water over the polar oceans are more likely the result of increased surface emissivity due to strong winds and low surface temperature. This statement also holds for the large polynya that can be seen in the Antarctic sea ice,

*P. W. Rosenkranz, D. H. Staelin, A. D. Fisher.

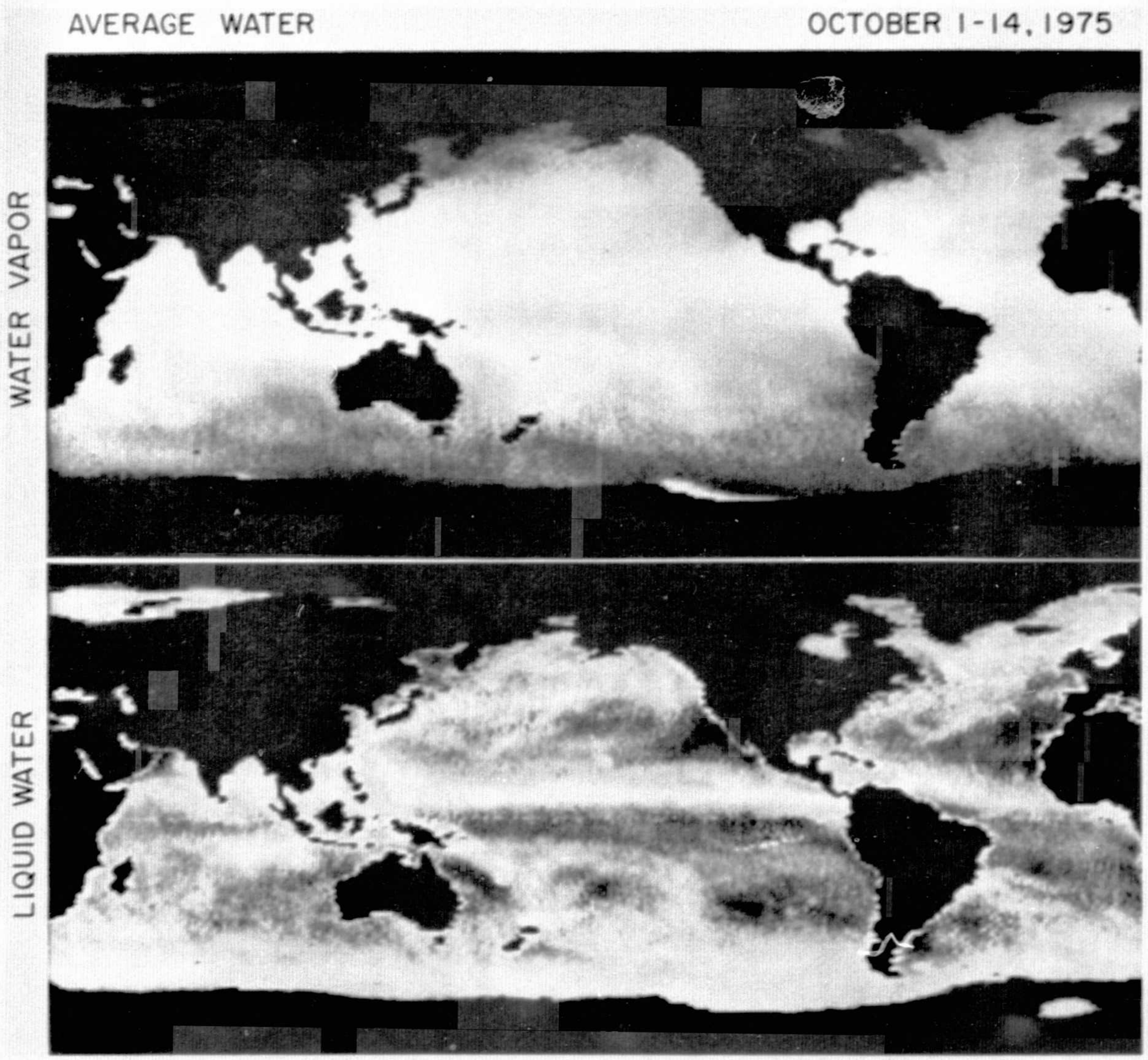

Figure 1-1. Water vapor (top) and liquid water (bottom) images over the oceans for October 1-14, 1975. White represents high humidity. The apparent fringes of liquid water around coastlines are artifacts of the data processing.

south of the Atlantic Ocean. Staelin et al. also discuss SCAMS data from the land and snow and ice-covered regions of the earth. Snow-free land, seasonal snow cover, sea ice, and glacial ice all have different signatures in the data. Fisher (1977) has provided a theoretical analysis of these effects.

Observations of typhoon June during the third week of November 1975 provided results that were new in several respects. The 55.45 GHz channel of SCAMS proved to be sensitive to the temperature increase within the core of the typhoon (Figure 1-2). The weighting function of this channel peaks near 200 mb. The data from the 22.23 and 31.65 GHz channels were used to infer the surface wind speed (from the sea state effect) inside the typhoon, by making the assumption that the troposphere was saturated with water vapor there (Rosenkranz et al., 1978). The results were consistent with the temperature measurements, in the sense that the latter are related to upper tropospheric winds by the thermal wind equation. Grody et al. (1978) show that this relation can be expressed as a wind weighting function for each channel. Correlation between the brightness temperature increase and the central pressure has also been shown for several tropical storms by Kidder et al. (1977). These measurements were limited by the rather coarse beamwidth of SCAMS, which did not entirely resolve the structure of the typhoon; and in the case of surface wind, by the rather restrictive assumptions necessary. Even so, they exceeded the experiment objectives, which had not originally included retrieval of wind speed.

Temperature profiles retrieved from SCAMS data have been compared with the National Meteorological Center (NMC) objective analyses over the regions of North America, Europe, and Japan, where conventional radiosonde measurements are abundant (Rosenkranz et al., 1976). No distinction between cloudy and clear atmospheres was made. Figure 1-3 plots the RMS discrepancies as a function of pressure level for 7-9 August 1975. Also plotted are RMS discrepancies between the two measurements of average temperatures of certain atmospheric layers. In the 100-250 mb layer, the errors in average temperature are far smaller than the level temperatures. This fact indicates the presence of unretrieved fine structure in the profile. Strong horizontal gradients also may not be fully retrieved (Grody and Pellegrino, 1977). Figure 1-4 plots the errors at two levels as a function of time. Retrievals have been carried to the end of May 1976, but have not been compared with NMC analyses beyond February. The errors plotted in Figures 1-3 and 1-4 were obtained with a conventional linear statistical retrieval, one spot at a time. Ledsham and Staelin (1978) have obtained reduced errors by using Kalman-Bucy filtering for retrievals.

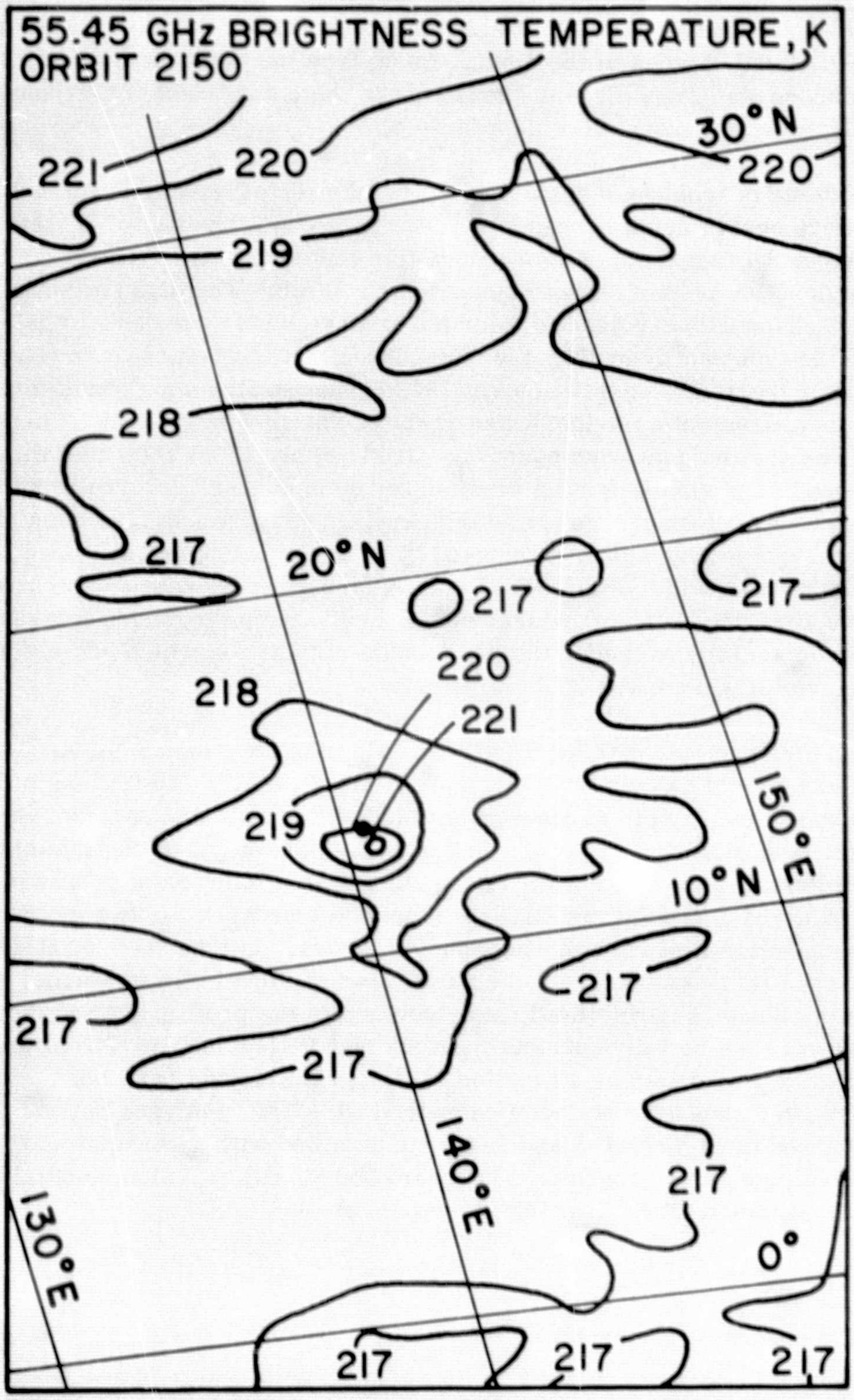

Figure 1-2. Contours of 55.45 GHz brightness temperatures around typhoon June on 19 November 1975 (Rosenkranz et al., 1978). The black dot marks the eye location reported by aircraft.

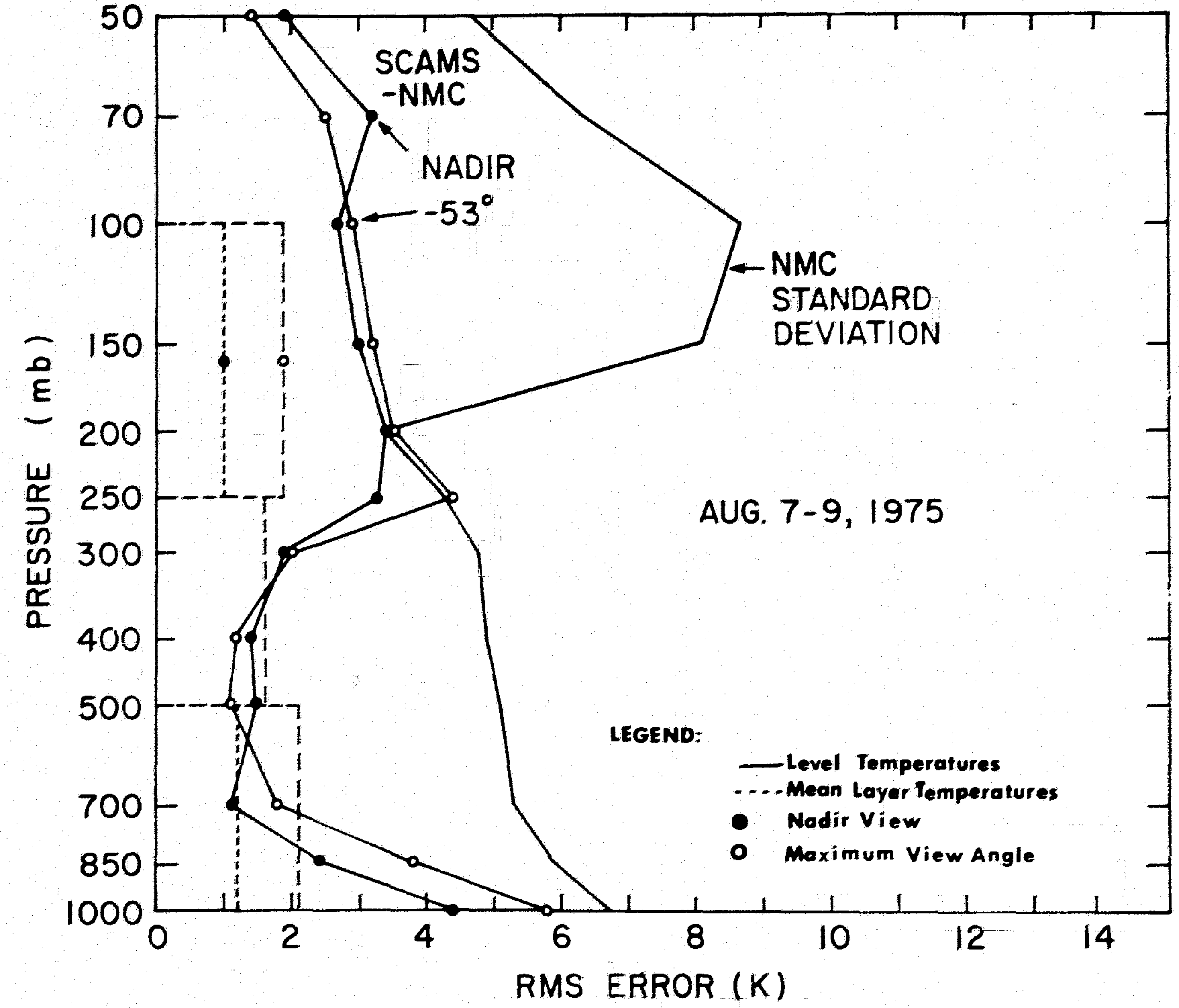

Figure 1-3. RMS discrepancies (including mean error) between SCAMS and NMC temperatures for selected verification regions, 7-9 August 1975.

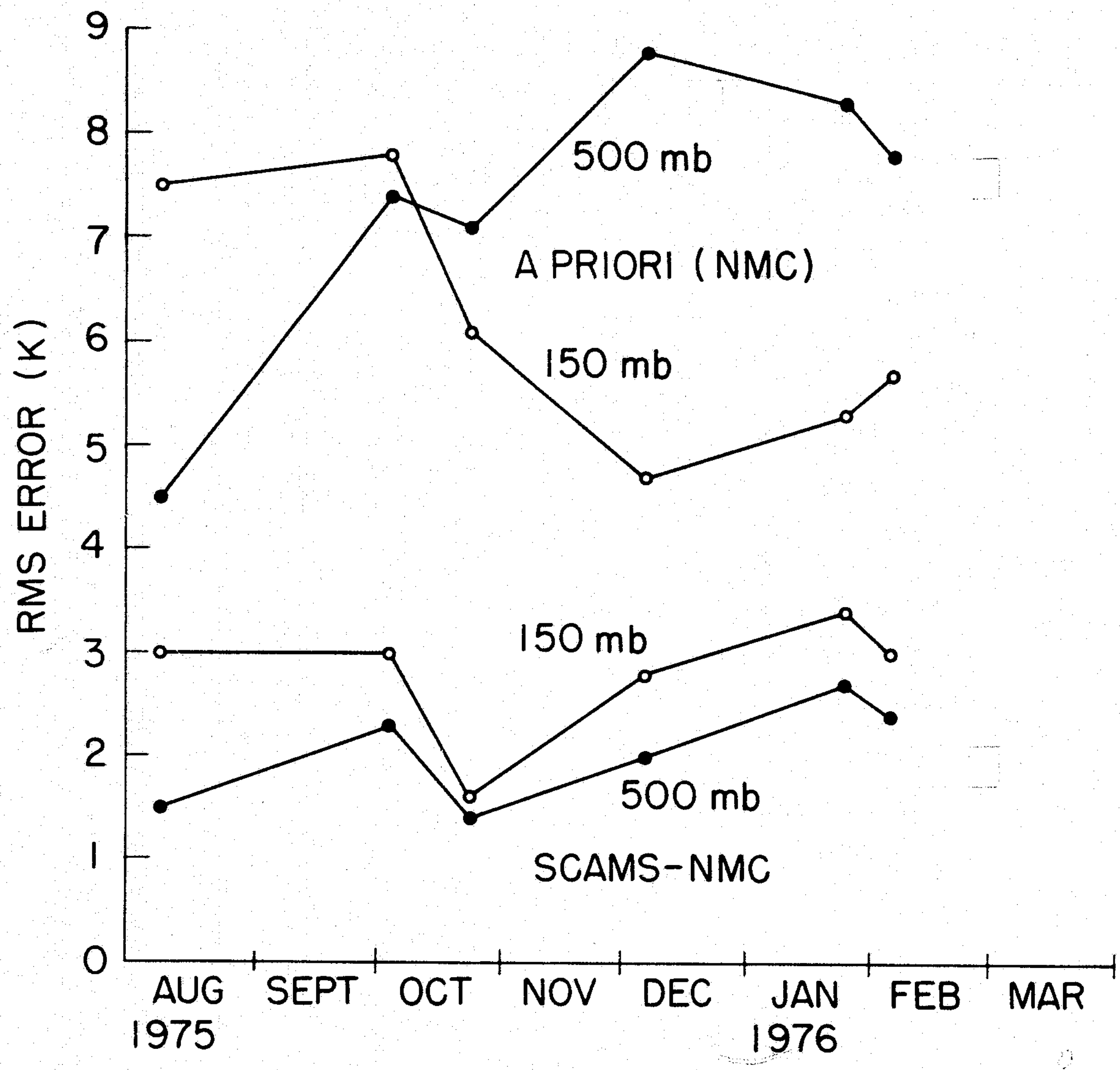

Figure 1-4. RMS discrepancies (including mean error) between SCAMS and NMC temperatures at two levels, for nadir view. The a priori values are standard deviations for NMC analyses.

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1.5 The Electrically Scanning Microwave Radiometer (ESMR) Experiment

The last operational information received from the ESMR instrument occurred during orbit 9091 (20 April 1977). Since the above mentioned date, the instrument has been in a non-operational mode and is scheduled to be turned on after the arrival of the winter solstice over the Northern Hemisphere. The ESMR performance was satisfactory through orbit 6183 (15 September 1976). After orbit 6184 (15 September 1976), the Horizontal channel output went to zero and telemetry information indicates a failure of the Ferrite Dicke switch. The Vertical channel has not been affected and data are being collected and processed. Due to the loss of the Horizontal channel, the Electronic Image System display was modified to process the data acquired from the Vertical channel. See Section 3 of this catalog for a new table of Vertical channel values.

1.6 The Earth Radiation Budget (ERB) Experiment

During orbit 8740 (25 March 1977) the ERB subsystem was commanded to perform an Electronics calibration test. Following this test, the scanhead was moved to the shortwave position. This maneuver is the first such movement of the scanhead since orbit 2878 (12 January 1976) when the scanhead was stowed in the longwave check position due to a mechanical scan anomaly. The scanhead remained in the shortwave position from orbit 8740 through orbit 8754 (26 March 1976). After orbit 8754 the scanhead was commanded to the nadir position where it continues to operate through this final reporting period. Data quality is good from the Solar and Total Earth Flux channels. The ERB sensor continues to operate full-time as power permits.

1.7 The Limb Radiance Inversion Radiometer (LRIR) Experiment*

LRIR is a four channel infrared detector, capable of measuring temperature, ozone mixing ratio, and H_2O-HNO_3 amounts as a function of pressure. The temperature measurements are made in the 15μ CO_2 band; wide and narrow channels provide the necessary information to firmly fix the pressure-temperature profile. The 9.6μ ozone band and the 22μ H_2O rotational band comprise the third and fourth channels. (See Table 7-2, volume 2 of Nimbus 6 Data Catalog.) LRIR was cryogenically cooled with the expected lifetime of the methane supply being 6-7 months. The instrument functioned successfully from June 12 to January 7 when the detector temperatures began to rise rapidly and it was shut off.

The limb viewing geometry provides a finer vertical resolution (less than 5 km) than previously possible with infrared nadir detectors. To accommodate both limb scanning and the necessary avoidance of direct solar radiation, LRIR was mounted so that it looked 32° off the orbital plane, allowing global coverage between 84°N and 64°S. This can be seen in figures 1-5 and 1-6.

Useable data from the LRIR was received throughout the period from orbit 36 to orbit 2801. Two limiting conditions controlled the actual amount of retrieved data. First LRIR was "on" slightly less than 50% of the time before October 15; after that date the duty cycle was nearly 100%. Second, practically all data played back to Orroral, Australia, was lost. This amounted to two orbits/day. The problems encountered with the shaft encoder (missed encoder pulses) produced a 25% loss of sampling data but because of over-sampling in the vertical and merging of down-up scan pairs, no retrievals were lost and the vertical resolution was not affected. Figure 1-7 shows the number of orbits of processed data per day available.

The stability of the instrument during its lifetime is shown in Figure 1-8. Detector temperature, noise equivalent radiance (NEN), and scale factor (the slope in the equation governing the conversion from voltage to watts) are plotted as a function of orbit number. The deterioration brought about by the loss of cryogen in January can readily be noted.

*Article contributed by LRIR Experiment Team.

Sample temperature and ozone retrievals (figures 1-9 and 1-10) demonstrate the quality of the LRIR produced results. In both sets of figures LRIR results are compared to correlated rocket borne measurements (time differences were less than 3 hours; spatial differences less than 2° latitude, equivalent longitude).

Both the accuracy and precision of the LRIR measurements have been initially evaluated. Precision is the ability to reproduce the same vertical profile for the same atmospheric conditions and can be readily tested by comparing the retrieved profiles for consecutive LRIR up-down scans. The scans are spaced four seconds apart, which translates to less than a 25 km motion on the planet. For temperature measurements the standard deviation is less than 1°K up to 45 km; above that altitude it increases slightly (to 2°K at 55 km and 2.5°K at 60 km) because of decreasing signal to noise ratio. A similar study for ozone measurements shows a 1% standard deviation at 10 mb, increasing to 3% at 40 km, 6% at 50 km, and finally 20% at 55 km, closely following the changes in signal to noise ratio. This precision is better than design specification.

The absolute accuracy of the measurements is more difficult to determine in the absence of accepted standards. However, an initial study of the standard and rms deviations between 24 LRIR and correlated rocket soundings of temperature was made. The standard deviation (LRIR-rocket) is less than -1°K and the rms differences are less than 3°K, well within the precision of the rocket soundings (Schmidlin, 1977). These studies are being continued and will include many more coincident soundings as well as improved inversion algorithms.

There are only four available independent ozone soundings over the full altitude range of LRIR. Statistics on these comparisons show the rms differences to be approximately 10%, about the stated accuracy of the rocket instruments. Ground based ozone observing techniques offer comparisons in the 100-10 mb range, and these will also be studied.

The end product of the LRIR globally distributed soundings is the production, interpretation, and implementation of maps of temperature, ozone, thickness, and, ultimately, geostrophic winds. The establishment of such confidence in the accuracy of the LRIR instrument and data reduction system gives added importance to the mapping program. A method of sequential estimation of Fourier coefficients is being used (after Rodgers, 1977), where each new sounding on a latitude circle (spaced four degrees apart) is added to the previous estimation array, leading to an updata of the coefficients. Figures 1-11 and 1-12 give preliminary temperature and ozone mixing ratio maps. These maps and latitudinally averaged cross sections of temperature and ozone will be included in the LRIR data products.

The data from the fourth LRIR channel has not yet been reduced to yield H_2O-HNO_3 amounts. A nonlinearity in the calibration coupled with a narrower wavelength filter than expected has delayed the analysis. However, it is probable that useful retrievals will be achieved.

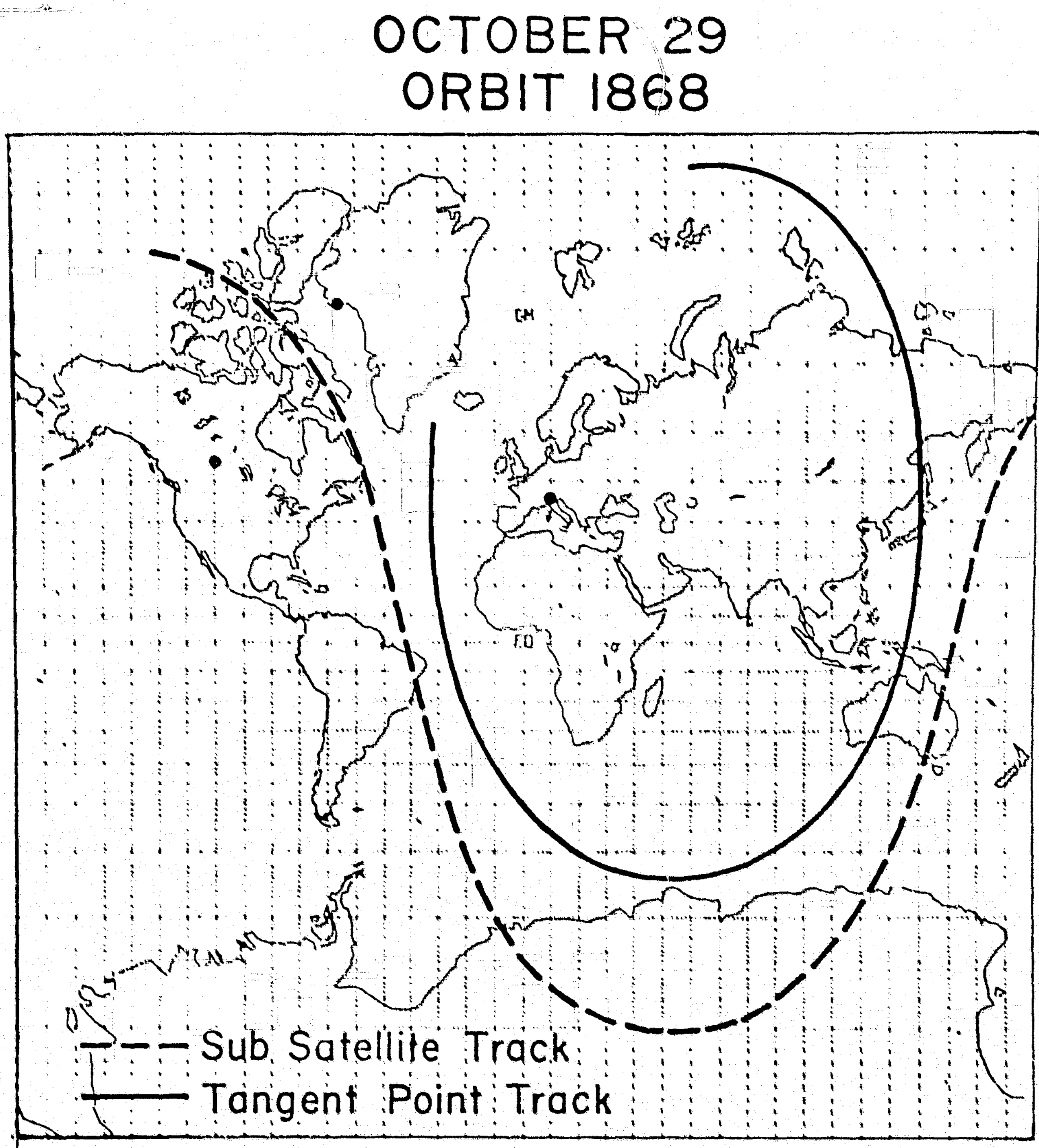


Figure 1-5. Plot of a NIMBUS-6 subsatellite track and the simultaneous LRIR-viewed tangent point track. LRIR looks behind and 32° off the orbital plane.

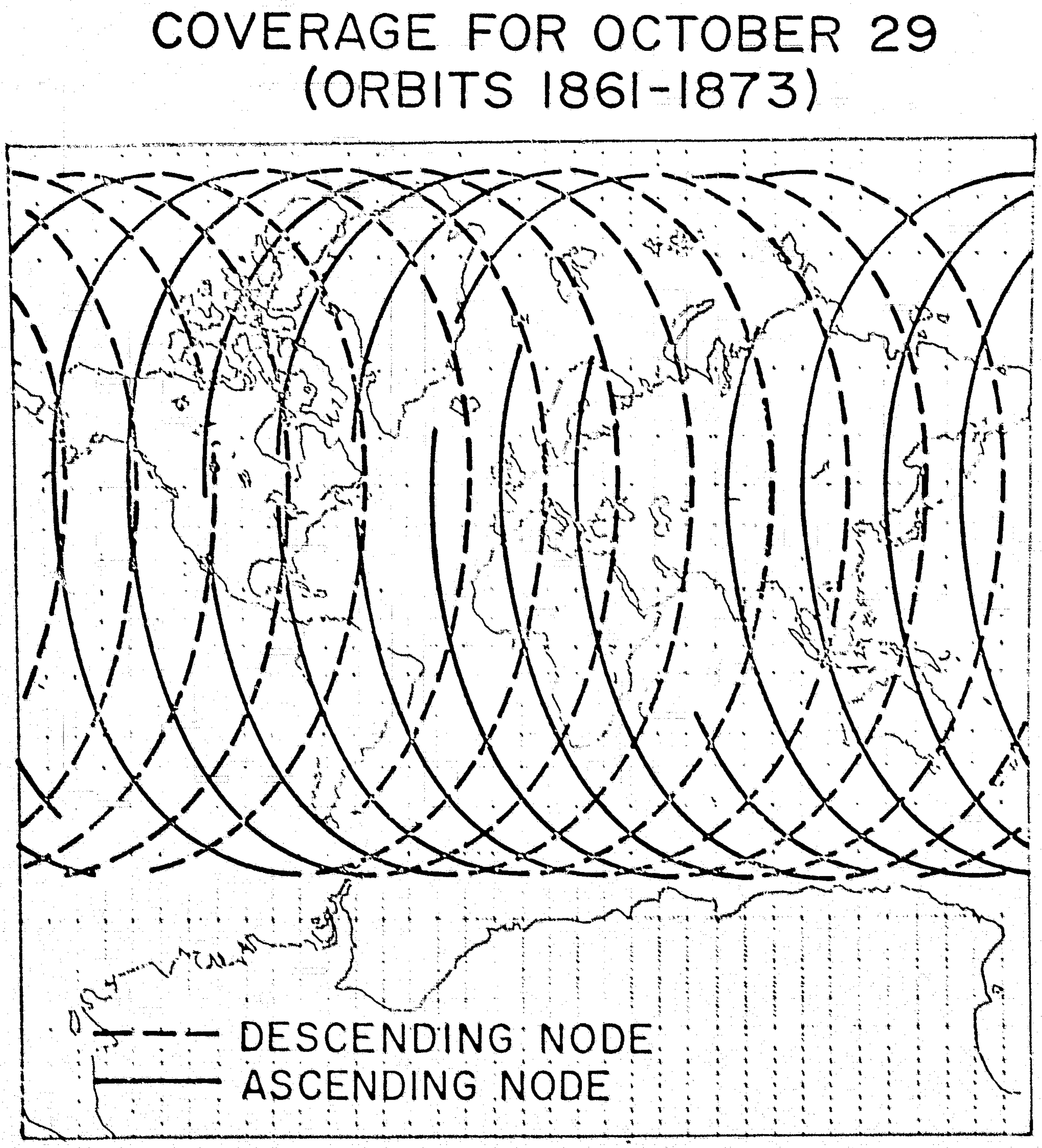


Figure 1-6. Plot of typical global coverage achieved by LRIR when operated at 100% duty cycle. Data gaps are brought about by the necessary transmission time to ground stations.

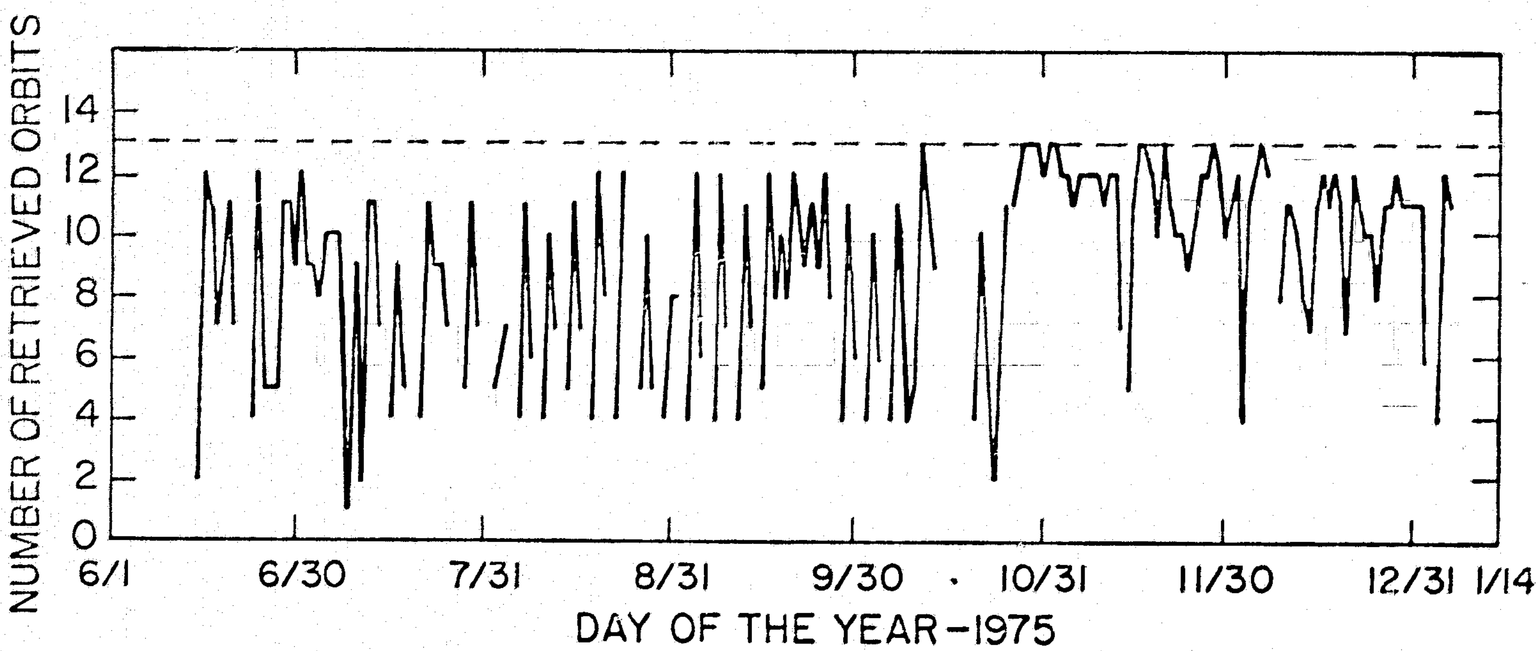


Figure 1-7. Plot of the number of orbits of processed LRIR data available for each day. The maximum number (13) is marked by the dashed line.

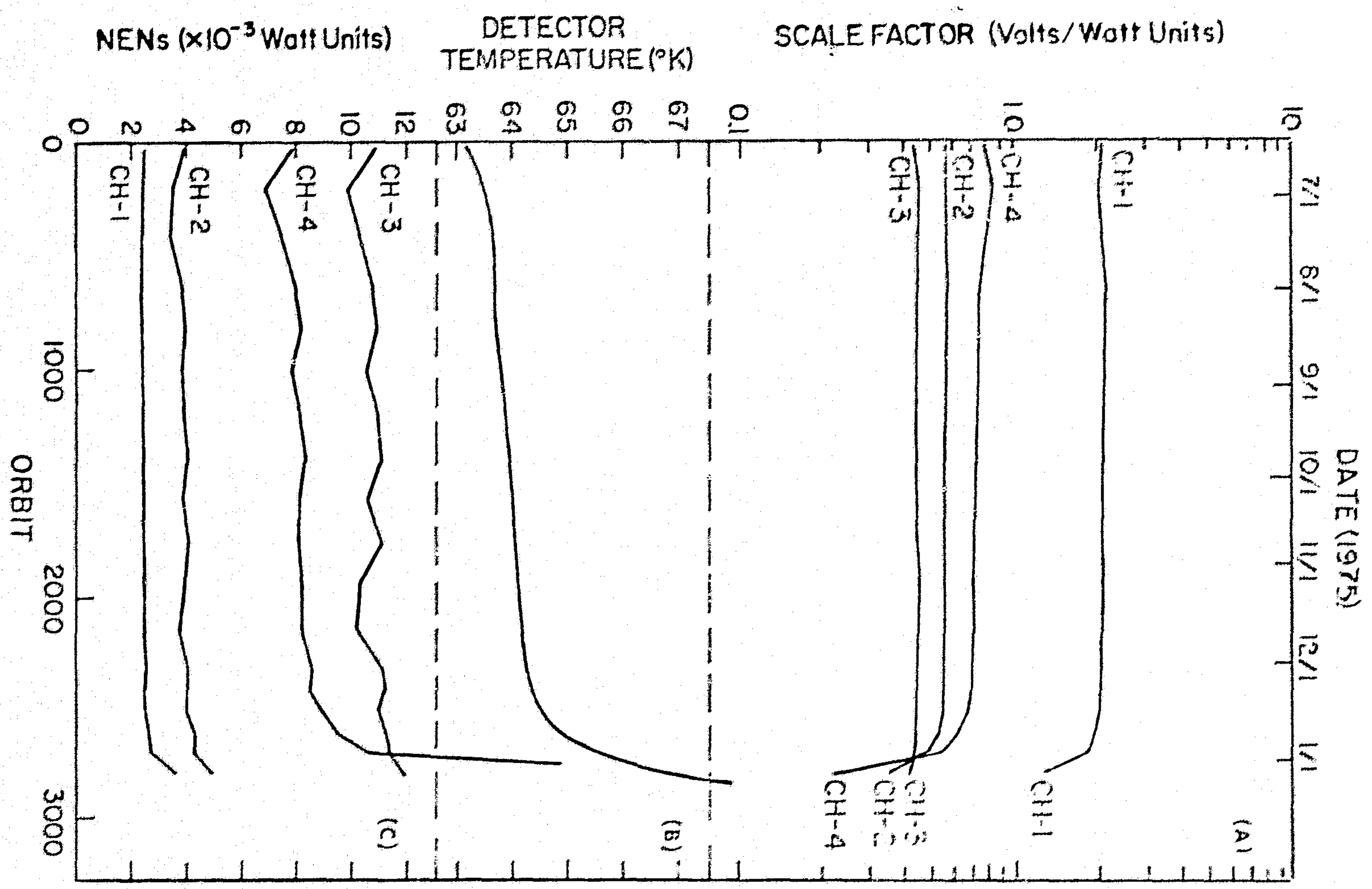


Figure 1-8. (A) Scale factor (slope of the equation governing conversion from voltage to watts) as a function of orbit and date.
(B) Detector temperature (specified at 65°K before flight) as a function of orbit and date.
(C) Calculated noise equivalent radiance (NEN's) for each channel as a function of orbit and date. All plotted parameters remain stable until the loss of cryogen becomes severe around orbit 2800. The instrument was turned off on January 7, 1976.

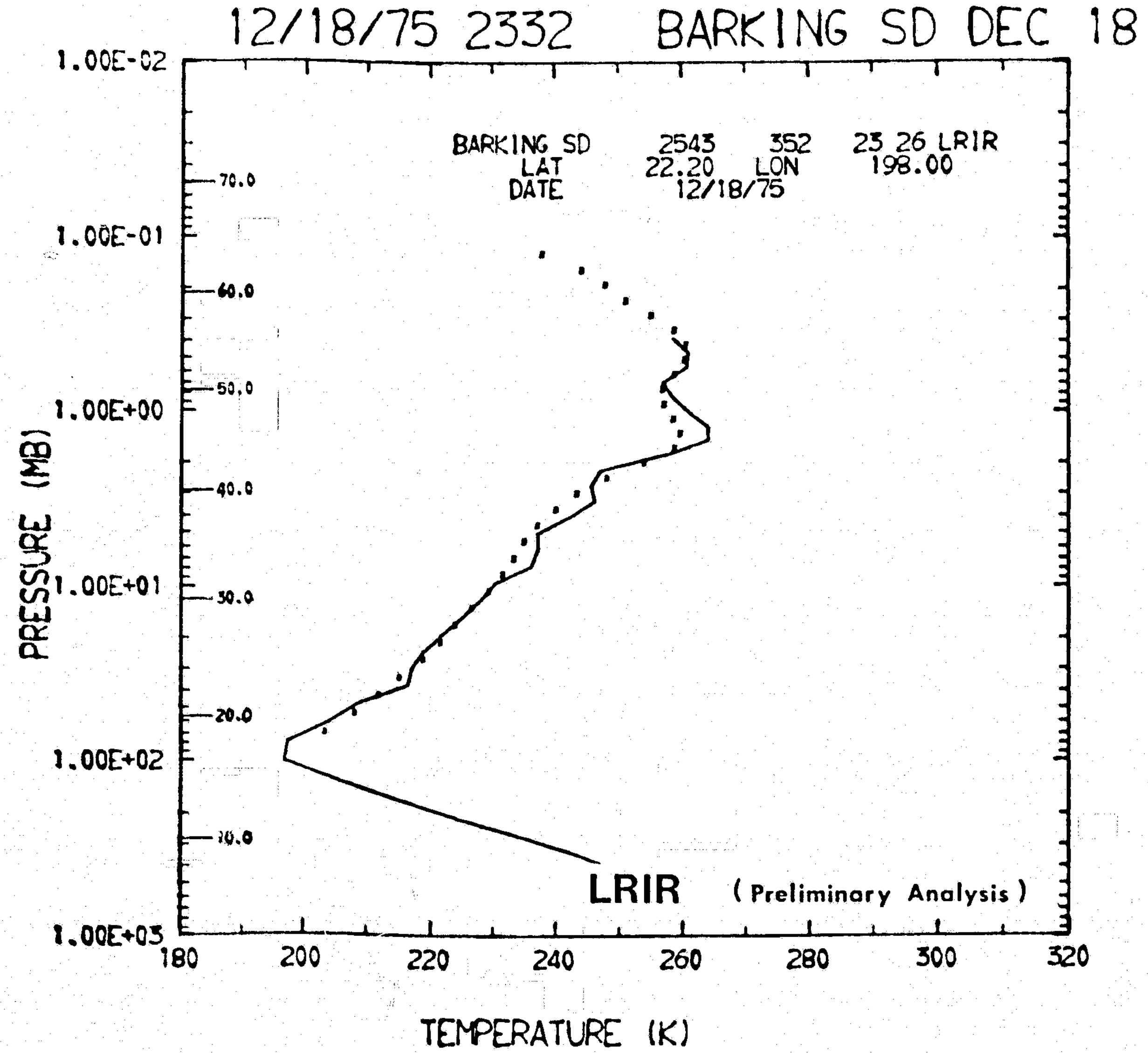


Figure 1-9. A typical plot of coincident temperature measurements made by LRIR (x's) and an insitu rocketsonde (solid line). The ability of LRIR to follow the general vertical structure measured by rockets is consistent for all seasons and latitudes. No attempt at normalizing has been made. The standard deviation for a set of 24 such comparison measurements is less than 1°K.

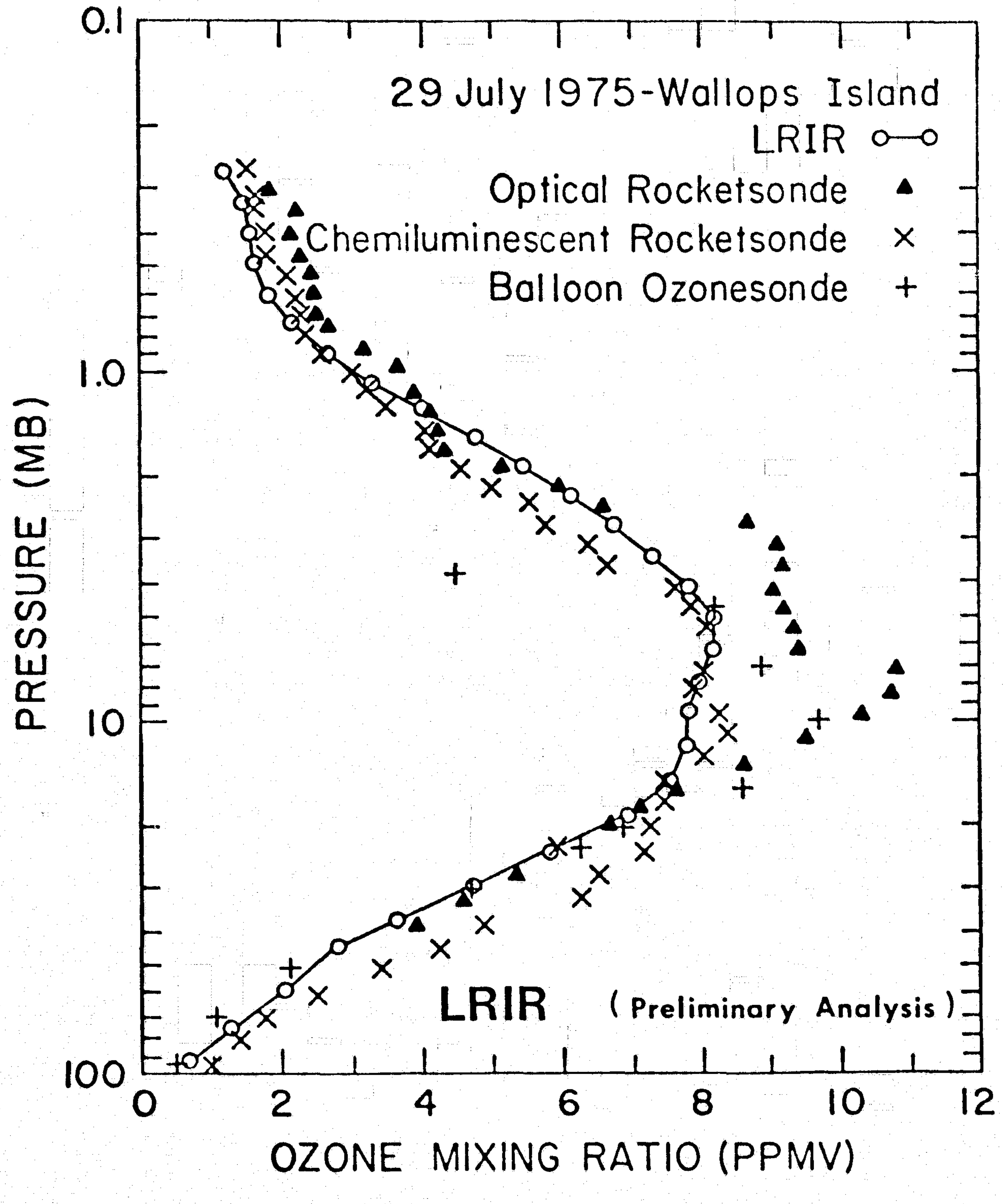
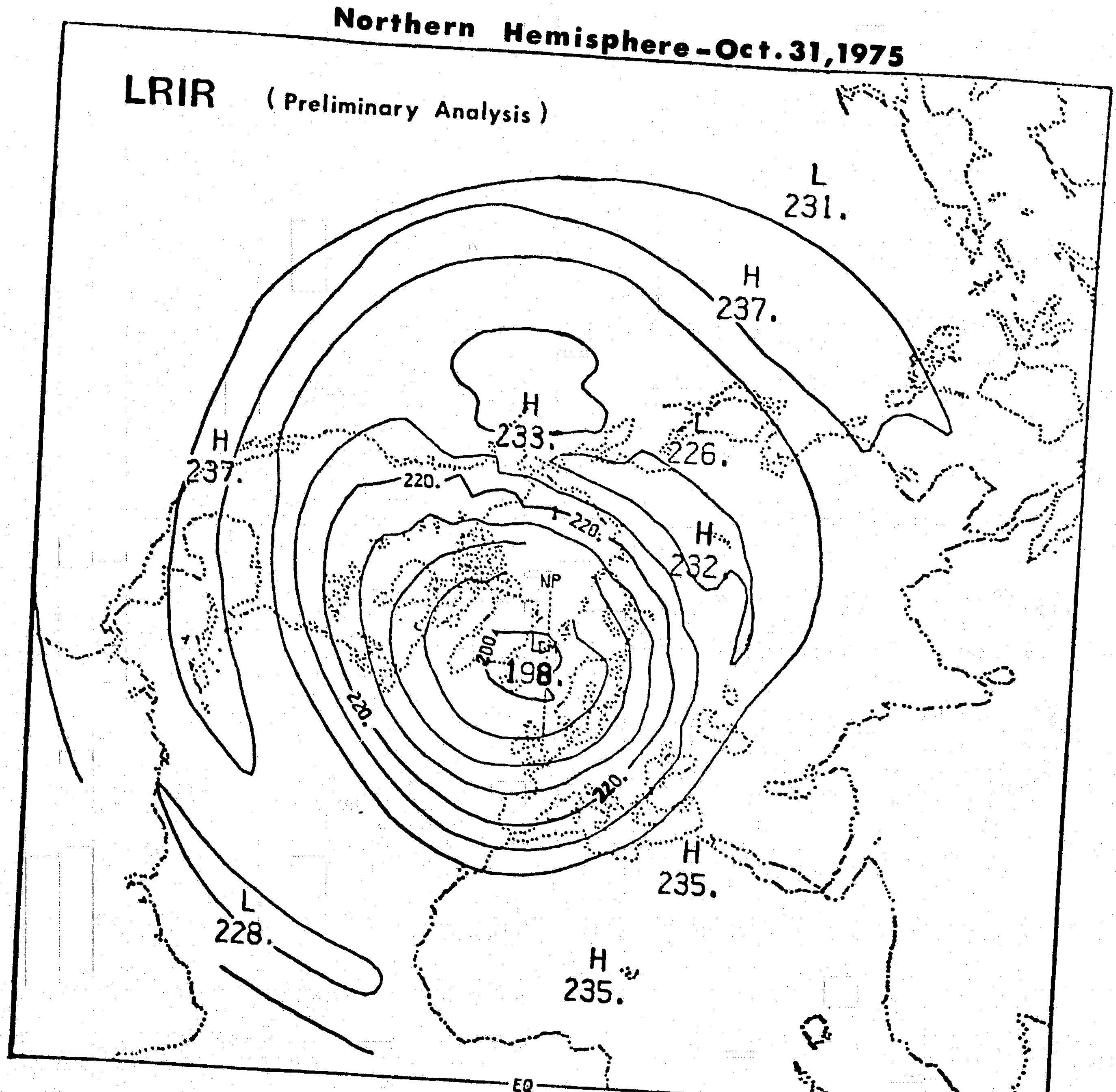


Figure 1-10. A plot of coincident ozone mixing ratio measurements made by LRIR (solid line) and three insitu techniques. The rms difference between LRIR and the chemiluminescent values is about 10%. The other available comparison dates also show agreement to within 10%.



10 MB TEMPERATURE MAP

Figure 1-11. A preliminary temperature map for the 10 mb pressure level, northern hemisphere. Maps will be made for 10 standard pressure levels between 100 and .1 mb. The sequential estimation mapping technique functions best when the data are reasonably consecutive for a period of days.

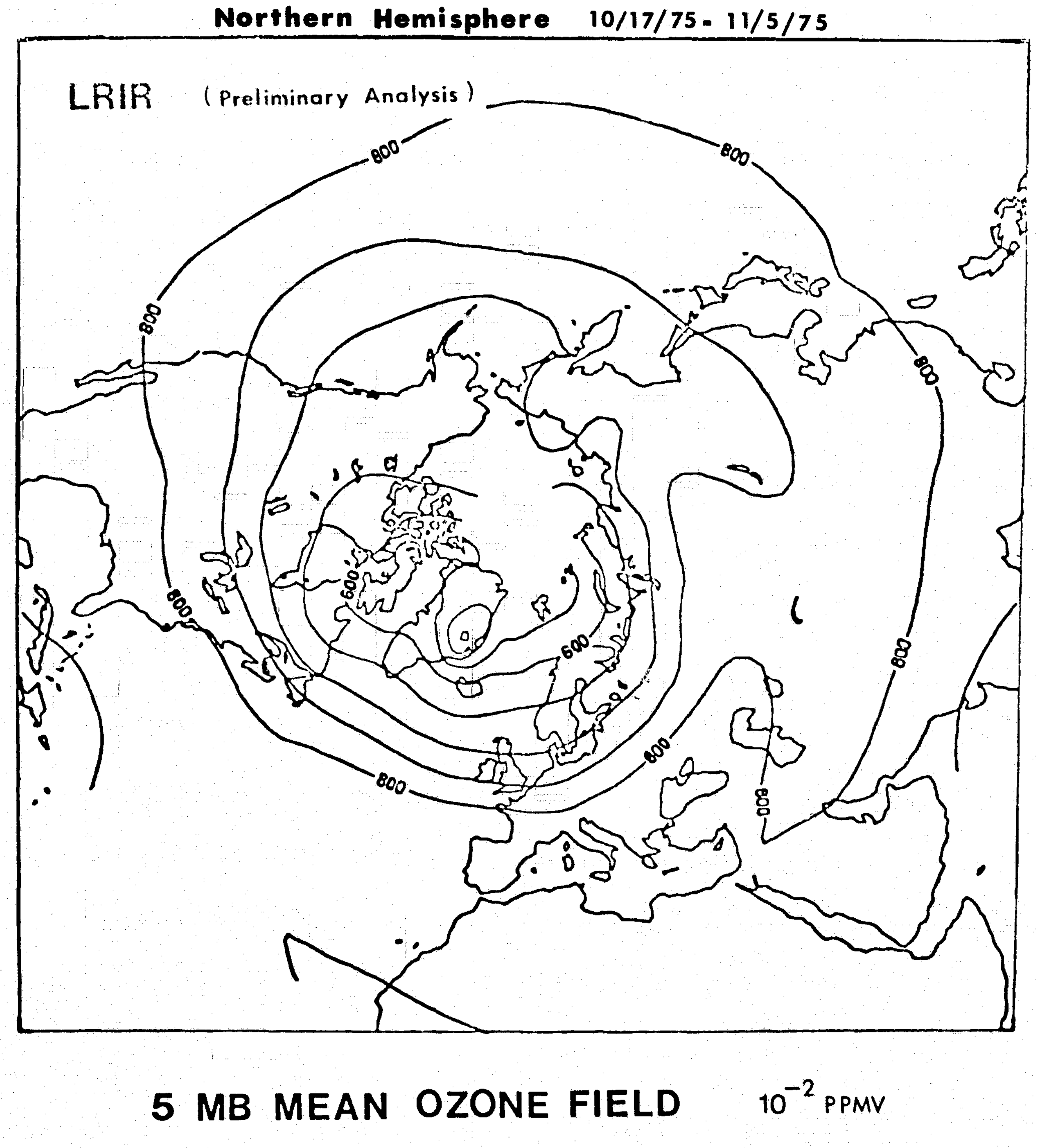


Figure 1-12. A preliminary ozone mixing ratio map for the 5 mb pressure level, northern hemisphere. In addition to O_3 and T maps, thickness plots and geopotential winds will be estimated.

REFERENCES

1. Rodgers, C. D., Statistical Principles of Inversion Theory, Inversion Methods in Atmospheric Remote Sounding, A. Deepak (editor), Academic Press, 1977.

2. Schmidlin, F. J., Rocketsonde Repeataility of Temperature and Wind Measurements as Obtained from Rocketsonde Network Systems, COSPAR XX, IV-VI, b, 2, 1977.

1.8 The Pressure Modulator Radiometer (PMR) Experiment*

The instrument continues to perform satisfactorily. After several tests, scanning on channel 1 was resumed in orbit 5634 (5 August 1976). Since orbit 1727 (19 October 1975) channel 1 had been operated in the nadir-looking mode owing to a fault in the scanning mechanism which has apparently corrected itself. No further scanning problems have been encountered.

Some examples of scan data and polar stereographic radiance fields from the first few months' observations were given in Vol. 1 of this series.

The penetration of large scale planetary waves up to mesopause levels has been observed in both hemispheres both on a daily basis (see Figure 1 from ref. (2)) (1,2,3,4) and in a monthly mean analyses (3, 5). During the northern hemisphere winter temperature wave amplitudes in the upper mesosphere appear to be about half those at stratopause levels (4). The westward tilt with height of wavenumbers 1 and 2 in the winter stratosphere extends into the mesosphere (Figure 1-13), indicating poleward heat transport. Westward tilt with decreasing latitude has been observed in the mesosphere during a northern hemisphere winter (3),and in September 1975 in the southern hemisphere, although during July and August 1975 phase change with latitude in the southern hemisphere was very small (5).

The well-known observations of the warm winter and cold summer poles in the middle and upper mesosphere have been confirmed. A secondary minimum in the meridional distribution of zonal mean temperature occurs in low latitudes of the winter hemisphere (5, 3). The observations from single locations of high latitude mesospheric cooling accompanying stratospheric warming have been shown to hold true in the zonal mean (3, 4). However, low latitude temperature changes opposite in sign to those at high latitudes are not evident in the upper mesosphere. Preliminary analysis of the minor warming during late December 1975 showed cooling at all

*Article contributed by A. J. Crane, member of the PMR Experiment Team.

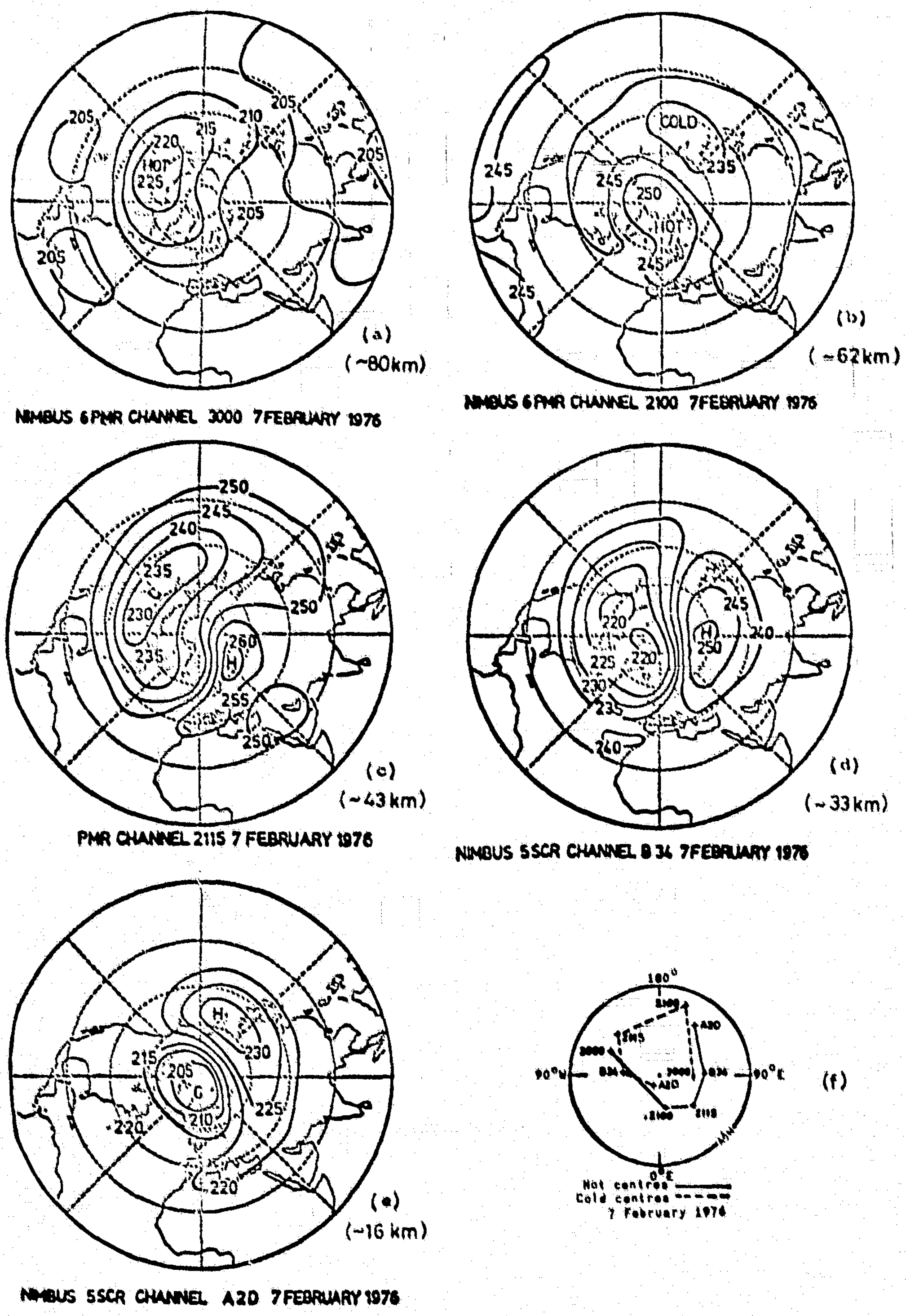


Figure 1-13. Northern hemisphere polar stereographic projections of radiance equivalent temperature on 7 February 1976 as observed by Nimbus 5 SCR and Nimbus 6 PMR (K) (a - e) and positions of hot and cold centres (f) (after Austen et al, 1976 (2)).

latitudes in association with high latitude warming and low latitude cooling in the stratosphere (3). A comparison of 80°N and equatorial radiances in the lower and upper stratosphere and upper mesosphere is shown in Figure 1-14 (after ref. (4)) for the period Nov. 1976-Jan. 1977. Note the opposite changes in channels 2115 and 3000 throughout the period. The polar warming in channel 3000 and cooling in channel 2115 following the major stratospheric warming in late December led to a very unusual polar temperature profile with the mesopause about 10K warmer than the stratopause.

The consistent performance of the PMR is well illustrated in Figures 1-15 and 1-16. Figure 1-15 shows the march of zonal mean radiance at 68°N, 0° and 68°S for channels 2115 (~43 km), 2100 (~ 62 km) and 3000 (~ 80 km) during the first 18 months of operation. Figure 1-16 shows the wavenumber 1 radiance amplitude for these channels at (a) 56°N and (b) 56°S. (The gap in late December 1976 is due to finally reprocessed data not being available at the time these figures were drawn.) Many of the features described above are evident.

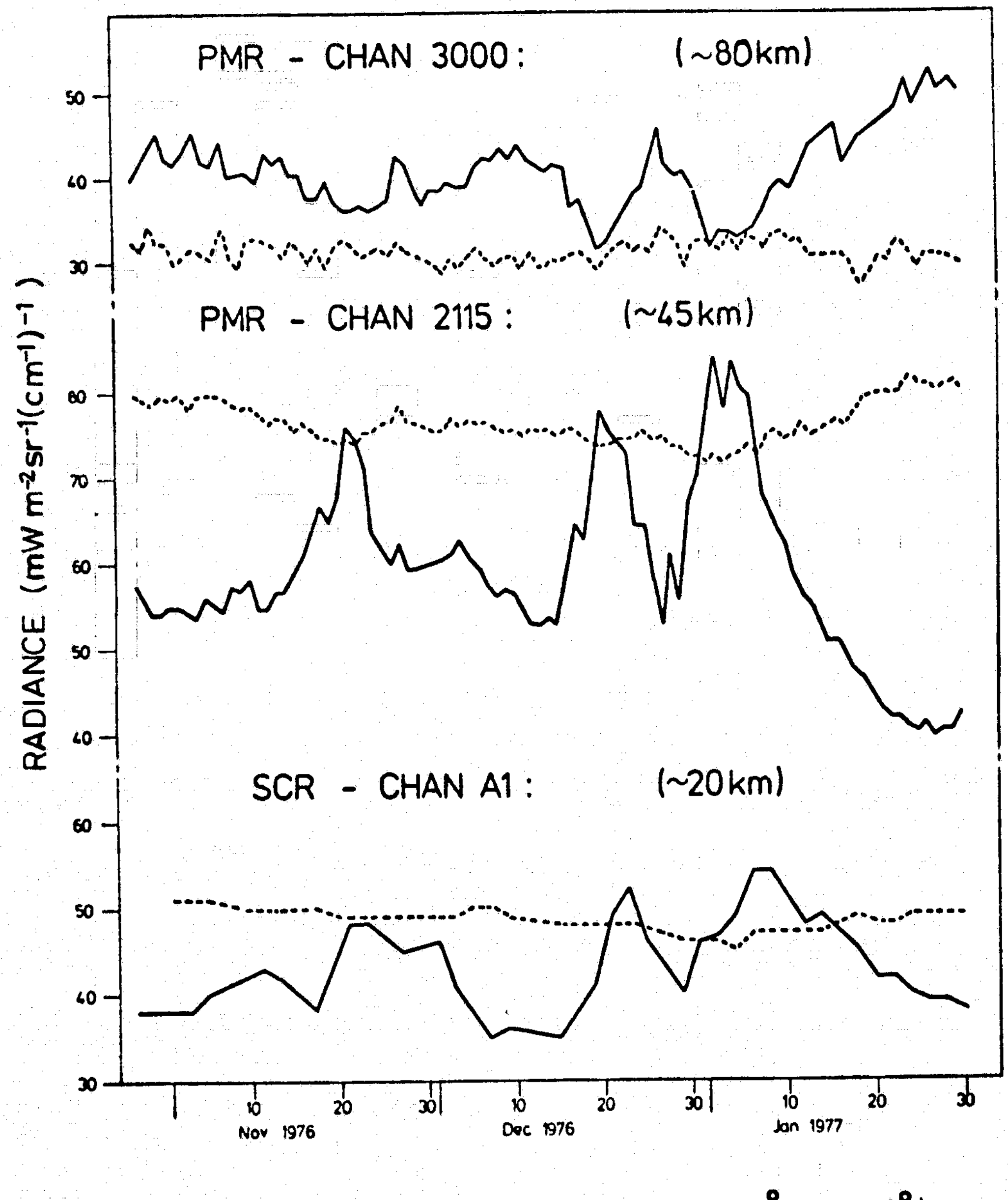


Figure 1-14. March of zonal mean radiance (mW m^{-2} sr^{-1} $(cm^{-1})^{-1}$) at 80°N and 0° in channels 3000 and 2115 of Nimbus 6 PMR and channel A1 of Nimbus 5 SCR for November 1976 through January 1977 (after Houghton, 1978).

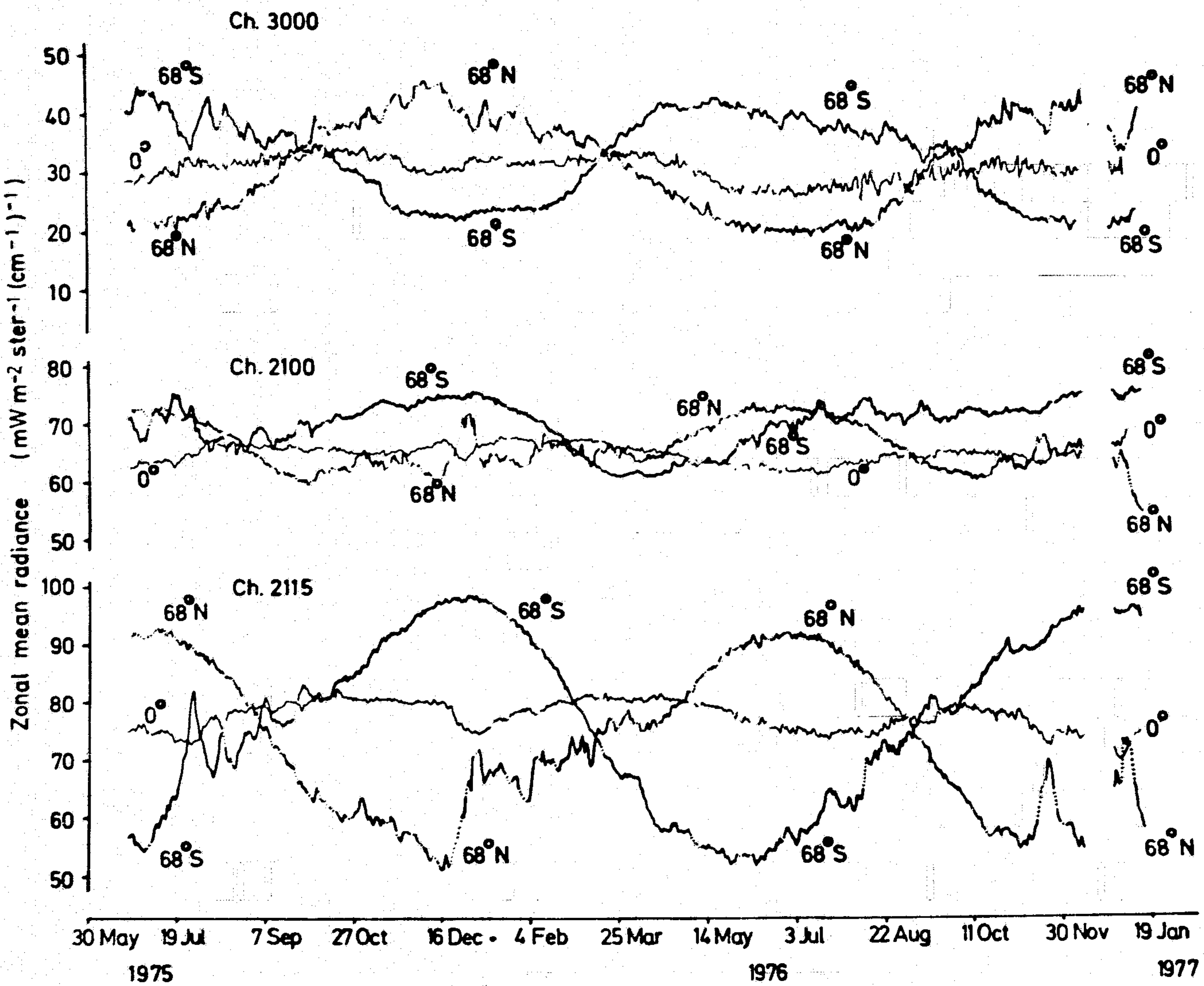


Figure 1-15. March of zonal mean radiance (mW m^{-2} sr^{-1} $(cm^{-1})^{-1}$) at 68°N, 0° and 68°S in PMR channels 2115, 2100 and 3000 for June 1975 through January 1977.

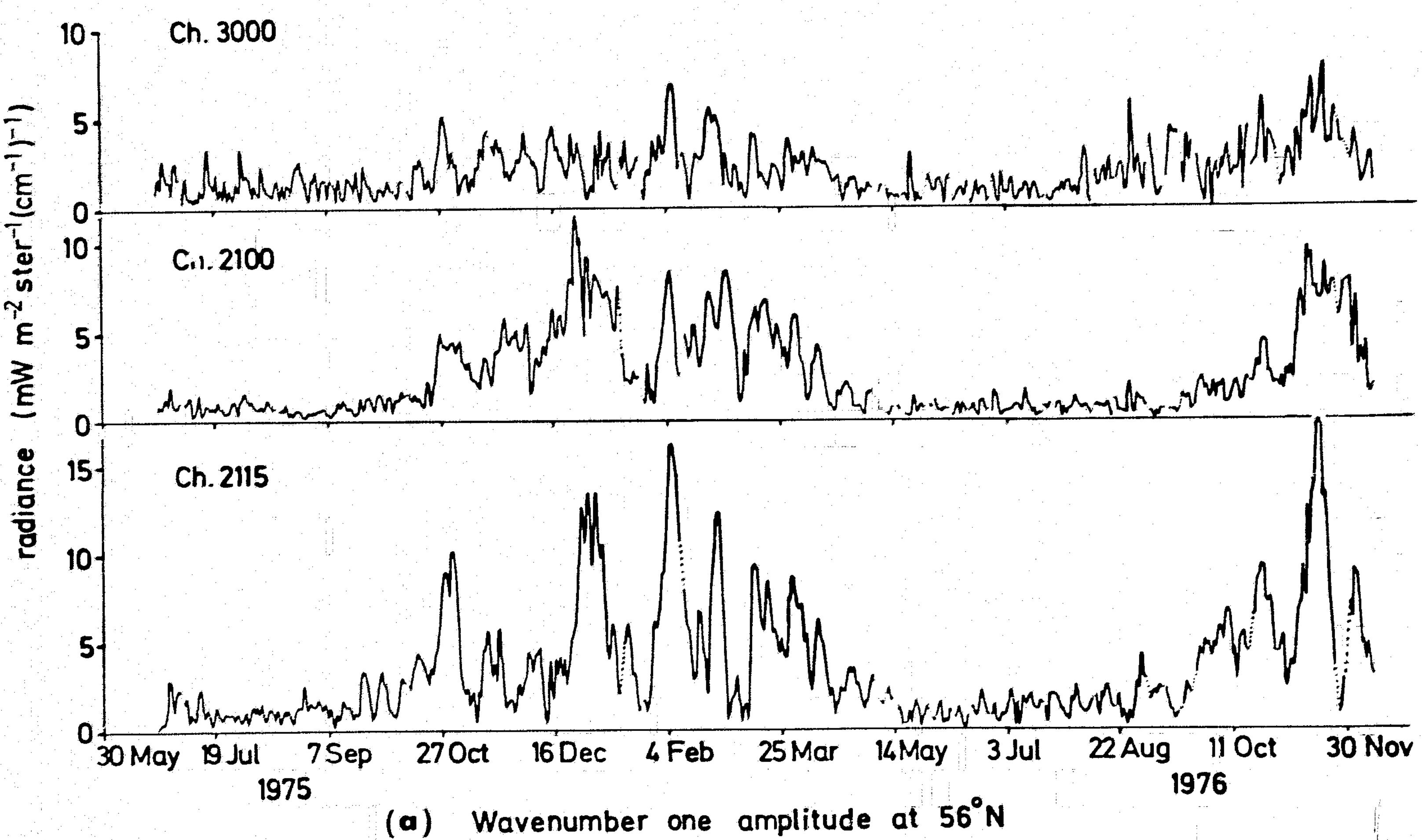


Figure 1-16a. Wavenumber one radiance amplitude (mW m^{-2} sr^{-1} (cm^{-1})$^{-1}$) in PMR channels 2115, 2100 and 3000 at (a) 56°N and (b) 56°S for June 1975 through January 1977.

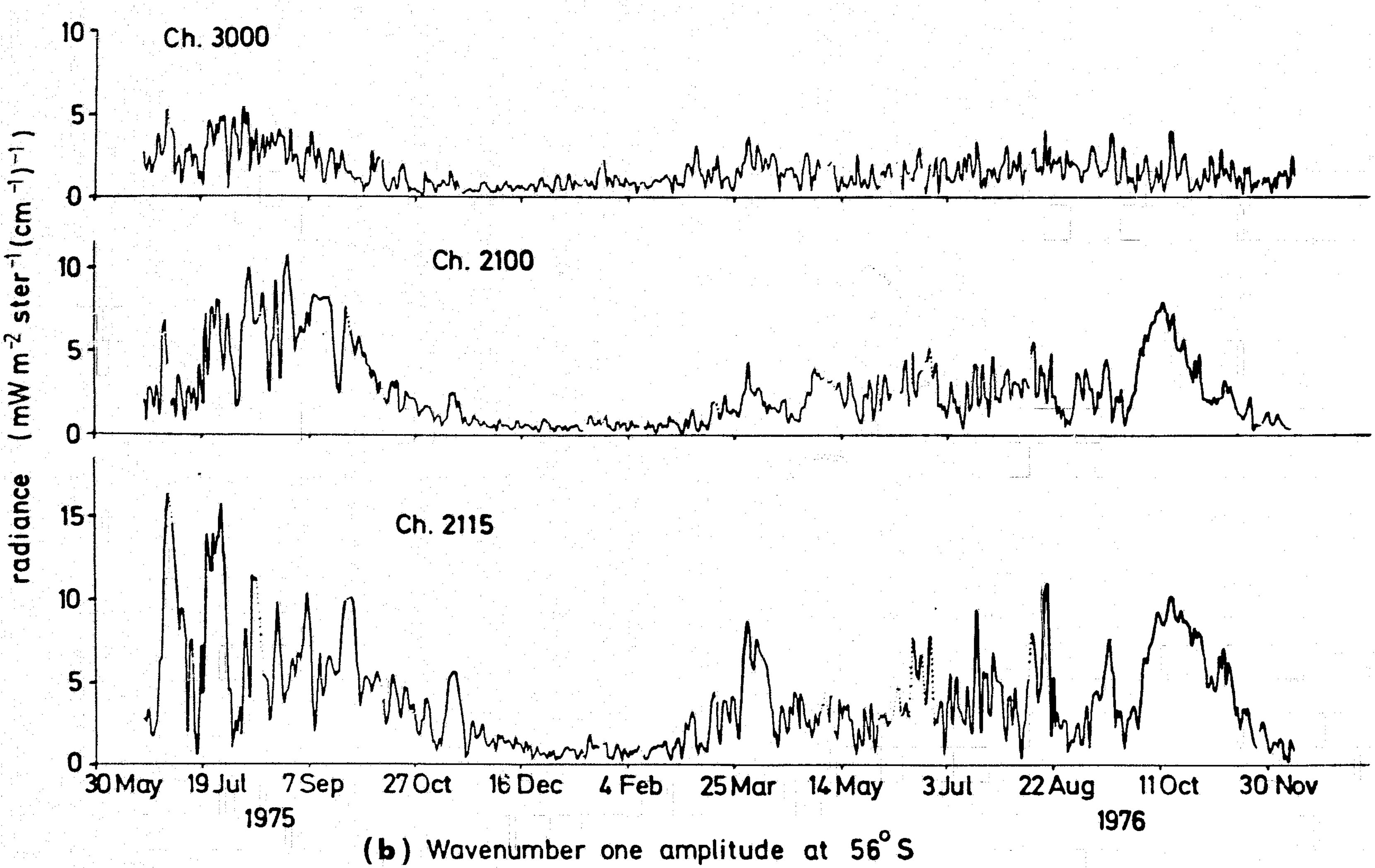


Figure 1-16b. Wavenumber one radiance amplitude (mW m^{-2} sr^{-1} (cm^{-1})$^{-1}$) in PMR channels 2115, 2100 and 3000 at (a) 56°N and (b) 56°S for June 1975 through January 1977.

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1. Austen, M. D. et al, Nature 260, 594-596 (1976).
2. Austen, M. D. et al, XIXth COSPAR meeting, Philadelphia (1976).
3. Hirota, I. and Barnett, J. J., Quart. J. R. Met. Soc., 103, 487-498 (1977).
4. Houghton, J. T., Quart. J. R. Met. Soc., 104 (in press) (1978).
5. Barnett, J. J., Phil. Trans. R. Soc. Lond. B279, 247-259 (1977).

1.9 The Tropical Wind Energy Conversion and Reference Level Experiment (TWERLE)/Random Access Measurement System (RAMS)

With the successful conclusion of the TWERL Experiment, data transmission to the National Center for Atmospheric Research was terminated on 10 August 1976. A summary report detailing various aspects of the experiment has been published and may be found in the following publication authored by: Julian, P., Massnon, M., Levanson, N.: The TWERL Experiment, Bulletin of the American Meteorological Society, vol. 58, no. 9, September 1977, pp. 936-948.

The TWERL Experiment was a significant part of the work load of the Random Access Measurement Subsystem (RAMS). However, the RAMS continues to be used to track and monitor various experiment platforms.

As of 12 June 1976, (Nimbus 6 one year anniversary) over 700 platforms had been activated. Table 1-4 shows distribution of these platforms. The full address of each experimenter is given in Table 9-2 in the Nimbus 6 User's Guide. (Corrected addresses for many of these experimenters, and addresses for several new experimenters, are given in Section 5.8 of this catalog.) Anyone interested in results from a particular experiment should write to the principal investigator for that experiment.

1.10 The Tracking and Data Relay Experiment (T&DRE)

The T&DRE subsystem has not been powered since orbit 7401 (15 December 1976) when an anomaly caused the T&DRE to cease operations. Specifically, the lower (Y) gimbal aligned along the spacecraft pitch axis remains locked at plus 36 degrees. Significant accomplishments of the T&DRE are discussed in Data Catalog Volume 1, Section 1.10.

Table 1-4

TWERLE Platform Activity

Principal Investigator	Platform			
	Type	Active	Inactive	Total
Dr. Paul R. Julian Boulder, Colorado	Balloons	81	275	356
Professor Norbert Untersteiner Seattle, Washington	Ice Buoys	26	6	32
Dr. Hanson Miami, Florida	Drifting Buoys	12	33	45
Mr. Vincent Lally Boulder, Colorado	Balloons	0	21	21
Dr. P. Richardson Woods Hole, Massachusetts	Drifting Buoys	0	1	1
Arnold Gordon Palisades, New York	Drifting Buoys	4	20	24
Tim P. Barnett La Jolla, California	Drifting Buoys	3	13	16
Mr. Robert Kee Washington, D. C.	Drifting Buoys	0	2	2
Mr. R. E. Vockeroth Ontario, Canada	Buoys	2	0	2
Mr. Jack Lentfer Anchorage, Alaska	Polar Bears	1	1	2
Mr. B. M. Buck Santa Barbara, California	Drifting Buoys	3	2	5
Mr. Fernando DeMendonca Sao Paulo, Brazil	Buoys	0	2	2
Mr. George Cresswell Cronulla, Australia	Drifting Buoys	9	5	14
Dr. A. Dyer Mordialloc, Australia	Drifting Buoys	0	3	3
Professor Lacombe Paris, France	Drifting Buoys	1	4	5

Table 1-4 (Continued)

Principal Investigator	Platform			
	Type	Active	Inactive	Total
Mr. C. K. Jenson/J. Nordo Oslo, Norway	Buoys	2	0	2
Mr. T. Haegh/T. Vinje Oslo, Norway	Ice Buoys	5	5	10
Mr. Frank Anderson Congella, South Africa	Drifting Buoys	5	5	10
Professor H. Stommel Cambridge, Massachusetts	Drifting Buoys	0	6	6
Dr. A. D. Kirwan, Jr. College Station, Texas	Drifting Buoys	0	12	12
Mr. H. N. Brann Melbourne, Australia	Drifting Buoys	1	5	6
Professor Morel Paris, France	Balloons & Buoys	0	47	47
Dr. John Garrett Victoria, B. C. Canada	Drifting Buoys	2	33	35
Professor Tchernia Paris, France	Drifting Buoys	3	2	5
Mr. R. R. Dickson Lowestoft, Suffolk, U. K.	Drifting Buoys	1	5	6
Dr. Michael Hall Bay St. Louis, Mississippi	Buoys	9	10	19
Mr. David Thomas, Jr. Hampton, Virginia	Buoys	0	6	6
Dr. J. Williamson La Jolla, California	Balloons	0	1	1
Mr. J. C. O'Rourke Calgary, Canada	Buoys	2	0	2
Mr. Robert Oehlkers Madison, Wisconsin	Buoys	2	8	10
Capt. E. A. Delaney Washington, D. C.	Buoys	1	0	1

Table 1-4 (Continued)

Principal Investigator	Platform			
	Type	Active	Inactive	Total
Dr. R. H. Goodman Alberta, Canada	Buoys	1	1	2
Dr. D. Halpern Seattle, Washington	Buoys	2	1	3
TOTALS		178	535	713

SECTION 2

THE ORBITAL ELEMENTS AND DATA AVAILABILITY ON-OFF TIMES

This section presents the Nimbus orbital elements for selected epochs, tabulates the time when each of the experiments was recording data, and gives procedures for determining the time and orbit when the satellite is over a given geographical area (and thus determining the location of coverage for each experiment).

The Nimbus 6 Brouwer Mean Orbital elements for selected epochs during May and June 1977 are listed in Table 2-1.

Table 2-1

Nimbus 6 Brouwer Mean Orbital Elements for May and June 1977

Epoch	GMT	11 May 77 00 00 00	24 May 77 00 00 00	14 Jun. 77 00 00 00	28 Jun. 77 00 00 00
Semi-Major Axis	Km	7485.321	7485.319	7485.317	7485.315
Eccentricity		.000773	.000732	.000723	.000740
Inclination	Degrees	99.945	99.946	99.944	99.943
Argument of Perigee	Degrees	4.987	331.500	277.868	239.659
Right Ascension of Ascending Node	Degrees	42.695	55.442	76.026	89.753
Height of Perigee	Km	1101.37	1101.68	1101.74	1101.61
Height of Apogee	Km	1112.94	1112.63	1112.56	1112.69
Anomalistic Period	Minutes	107.41703	107.41693	107.41694	107.41690
Motion of Perigee	Deg. per Day	-2.4205	-2.4204	-2.4206	-2.4207

As previous elements indicated, the orbital period was slowly increasing (approximately 22 milliseconds per day) and the satellite was moving into a slightly higher orbit. This effect was attributed to the thrust given by the solid methane and ammonia sublimating from the LRIR solid cooler. Since 26 May 1976, the orbital period appears to have stabilized and has remained constant at 107.417 minutes. Thus with the depletion of the solid methane and ammonia now complete; the predicted (Vol. 4, Sec. 2) stabilization of the orbital period by mid-1976 has been confirmed. The elements listed in Table 2-1 do not account for this effect. When these elements are used more than seven days from epoch, location errors of greater than 60 km (about ten seconds of time), can be expected. If more accurate ephemeris are needed for a specific time period, write to the Nimbus Project, Code 430, Goddard Space Flight Center, Greenbelt, Maryland 20771.

The data availability on-off times, listed in Table 2-2, are the times when the data from each experiment was recorded on a HDRSS and processed through the Meteorological Data Handling System (MDHS) at Goddard Space Flight Center. The Table 2-2 header labels and their meaning are as follows:

- INT ORBIT AND STDN

  The satellite orbit number in progress when the satellite data is relayed to a ground station is called the interrogation orbit (INT ORBIT). The ground stations receiving the Nimbus 6 satellite data are part of the Spacecraft and Tracking Data Network (STDN). There are four STDN stations receiving Nimbus 6 experiment data: Fairbanks, Alaska (denoted by the letter "A"); Rosman, North Carolina (R); Orroral, Australia (O); and Winkfield, England (W).

- HDRS

  The HDRS (High Data Rate Storage System - HDRSS) is the acronym for the satellite tape recorder system. Recorder "A" or "B" (or both) is played back during each STDN station interrogation.

- HDRSS TIME ON-OFF

  The HDRSS ON and OFF times are given in GMT to the nearest minute. The ON time is the time the (A or B) HDRSS begins recording experiment measurements; the OFF time is when it stops recording. Usually, the ON and OFF times occurs when the satellite is within acquisition range on one of the four STDN stations. The time span between each ON and OFF usually covers part of two DATA ORBITS.

- LRIR, THIR, TDRE, SCAM, ESMR, ERB, PMR, TWRL, HIRS

  These are the acronyms for each of the experiments on Nimbus 6. (Acronyms longer than four letters have been shortened.) The column beneath each acronym contains a series of "X's" or "blanks." Each "X" in the column indicates that the data for that experiment was processed at GSFC. A "blank" usually indicates that the experiment was turned off for the HDRSS ON-OFF in that line. A single "blank" in the middle of a series of "X's" frequently means that the experiment was on during that time span but the data has not been processed, or is unavailable for any of several reasons.

- DATA ORBIT

  A DATA ORBIT begins when the satellite crosses the equator heading in a northbound direction, and ends after the satellite has circled the earth and is about to cross the equator heading in a northbound direction. The DATA ORBIT number increases by one with each successive northbound equator crossing. The ASCENDING NODE and DESCENDING NODE information is referenced to the DATA ORBIT number.

- ASCENDING NODE TIME (and) LONG

  The ASCENDING NODE is the point in the orbit when the satellite crosses the equator heading in a northbound direction. The TIME of ASCENDING NODE is given in hours (HR), minutes (MN), and seconds (SS) GMT. The longitude (LONG) of ASCENDING NODE is given to the nearest tenth of a degree of east (E) or west (W) longitude. For Nimbus 6, the ascending node crossings always occur during the daytime portion of the orbit at approximately 11:45 a.m. local time.

- DESCENDING NODE TIME (and) LONG

  The DESCENDING NODE is the point within a DATA ORBIT when the satellite crosses the equator heading in a southbound direction. The TIME of DESCENDING NODE is given in hours (HR), minutes (MN), and seconds (SS) GMT. The longitude (LONG) of DESCENDING NODE is given to the nearest tenth of a degree of east (E) or west (W) longitude. The descending node crossings always occur during the nighttime portion of each orbit at approximately 1 1:45 p.m. local time.

Table 2-2 together with the World Map (Figure 2-1) and the vellum Subsatellite Tracks Overlay attached to the back of this catalog, can be used to determine approximate geographic coverages and times for experiment data that the user may wish to order. The Overlay contains 14 correctly spaced satellite subpoint tracks, which end

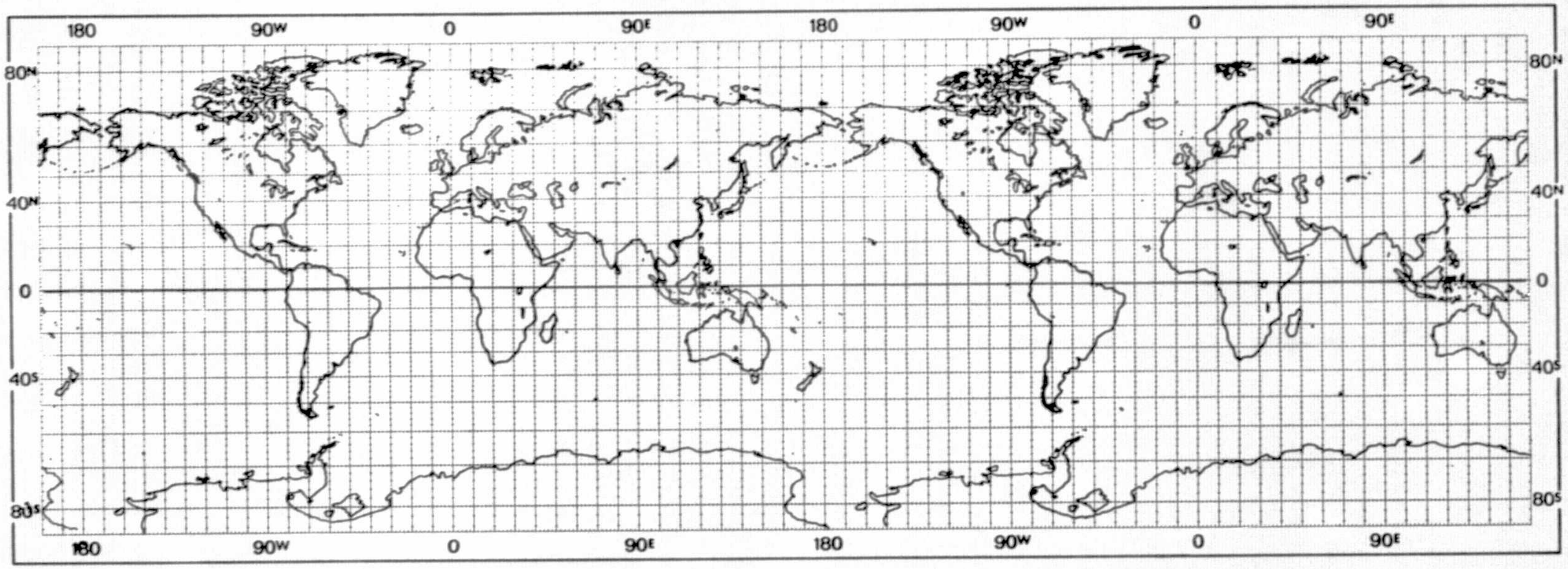

Figure 2-1. World Map

at the approximate earth day-to-night transitions. The tracks contain time ticks spaced 5 minutes apart, appropriately annotated at the edge of the overlay and referenced to the equator.

A Subsatellite Tracks Overlay is correctly oriented with the World Map when the ascending or descending node line (equator) on the overlay coincides with the 0-degree latitude line (equator) of the World Map.

Orbital coverage for all orbits on any day is then determined by placing one of the orbit tracks on the overlay at its appropriate ascending node (for daytime data) or descending node (for nighttime data) longitude. (The nodes for each day are listed in Table 2-2.) The orbit track (or tracks) which covers the area of interest is readily apparent.

The time (GMT) of satellite passage over an area of interest is calculated by adding or subtracting the minutes from equator crossing (as determined from the overlay) to the appropriate node time (derived from Table 2-2). For daytime orbits, time is added to the ascending node for areas north of the equator, and subtracted from the ascending node for areas south of the equator. For nighttime orbits, time is subtracted from the descending node for areas north of the equator, and added to the descending node for areas south of the equator.

To determine if an experiment was ON during the calculated orbit and time of interest, the user must first "fit" the calculated time into the correct ON-OFF interval of an interrogation orbit listed in Table 2-2. Then the user must check the appropriate experiment column for that line. If an "X" is in the column, the experiment was on and the data has been processed. If the column is "blank", the experiment was off (or the data was not processed) and no data for that orbit is available.

An alternate method of determining geographic coverage and time of data is to use the method described in Section 4. The THIR montages and the vellum Location Guides (attached in the back of this catalog) are used to locate the geographical coverages of each orbit of THIR. The data coverage from other experiments will be within the limits of each THIR swath. The TIME of coverage over a particular area is obtained by using Table 4-1 and adding or subtracting this computed time to the appropriate ascending or descending node time given in Table 2-2.

Each request for data should contain, as a minimum, the name of the experiment for which data is requested, the calendar date of the data, the orbit, the time (GMT) interval of the data needed, and the geographic limits of the area of interest. The procedures described above will provide this information.

The nature and format of the data available from each experiment are explained in detail in the respective sections of The Nimbus 6 User's Guide. The appropriate sources for requesting the various data types are listed in Section 1.7 of the same manual.

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
01 MAY 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
92260	B	2331	0032						X	X	X		9227	005422	E160.5	014802	W032.9
92270	B	0046	0151						X	X	X		9228	024153	E133.6	033534	W056.8
9229R	B	0358	0521		X				X	X	X		9229	042625	E106.8	052305	W086.7
9230R	B	0545	0705		X				X	X	X		9230	061657	E079.9	071037	W113.5
9231A	B	0725	0844		X				X	X	X		9231	080429	E053.0	085809	W140.4
9232A	B	0911	1034		X				X	X	X		9232	095200	E026.1	104540	W167.3
9233A	B	1057	1220		X				X	X	X		9233	113932	W000.8	123312	E165.8
9234A	B	1243	1404		X				X	X	X		9234	132704	W027.6	142044	E138.9
9235A	B	1427	1547		X				X	X	X		9235	151435	W054.5	160816	E112.0
9236A	B	1610	1733		X				X	X	X		9236	170207	W081.4	175547	E085.2
9237A	B	1756	1919		X				X	X	X		9237	184939	W108.3	194319	E058.3
9238A	B	1944	2105		X				X	X	X		9238	203710	W135.2	213051	E031.4
9239A	B	2130	2249		X				X	X	X		9239	222442	W162.1	231822	E004.5

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
02 MAY 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
92400	B	0009	0113						X	X	X		9240	001214	E171.1	010554	W022.4
92410	B	0149	0302						X	X	X		9241	015946	E144.2	025326	W049.2
9242R	B	0335	0439		X				X	X	X		9242	034717	E117.3	044058	W076.1
9243R	B	0504	0625		X				X	X	X		9243	053449	E090.4	062829	W103.0
9244A	B	0644	0803		X				X	X	X		9244	072221	E063.5	081601	W129.9
9245A	B	0829	0951		X				X	X	X		9245	090952	E036.7	100333	W156.8
9246A	B	1016	1138		X				X	X	X		9246	105724	E009.7	115104	E176.3
9247A	B	1202	1324		X				X	X	X		9247	124456	W017.1	133836	E149.5
9248A	B	1346	1507		X				X	X	X		9248	143227	W044.0	152608	E122.6
9249A	B	1530	1648		X				X	X	X		9249	161959	W070.9	171340	E095.7
9250A	B	1714	1837		X				X	X	X		9250	180731	W097.8	190111	E068.8
9251A	B	1901	2023		X				X	X	X		9251	195502	W124.7	204843	E041.9
9252A	B	2049	2209		X				X	X	X		9252	214234	W151.6	223615	E015.1
9253A	B	2238	2354		X				X	X	X		9253	233006	W178.4	002346	W011.9

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
03 MAY 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
92530	B	2351	0055						X	X	X		9254	011738	E154.7	021118	W038.7
92540	B	0111	0215						X	X	X		9255	030509	E127.8	035850	W065.6
9255R	B	0251	0354		X				X	X	X		9256	045241	E101.0	054622	W092.5
9257A	B	0603	0718		X				X	X	X		9257	064013	E074.0	073353	W119.4
9258A	B	0748	0909		X				X	X	X		9258	082744	E047.2	092125	W146.3
9259A	B	0934	1057		X				X	X	X		9259	101516	E020.3	110857	W173.2
9260A	B	1121	1243		X				X	X	X		9260	120248	W006.6	125628	E160.0
9261A	B	1305	1427		X				X	X	X		9261	135020	W033.5	144400	E133.1
9262A	B	1449	1610		X				X	X	X		9262	153751	W060.4	163132	E106.2
9263A	B	1633	1755		X				X	X	X		9263	172523	W087.3	181904	E079.3
9264A	B	1818	1942		X				X	X	X		9264	191255	W114.1	200635	E052.4
9265A	B	2106	2128		X				X	X	X		9265	210026	W141.0	215407	E025.6
9266A	B	2154	2313		X				X	X	X		9266	224758	W167.9	234139	W001.3

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
04 MAY 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
92660	B	2310	0013						X	X	X		9267	003530	E165.2	012910	W028.2
92670	B	0029	0132						X	X	X		9268	022301	E138.3	031642	W055.1
9269R	B	0340	0502		X				X	X	X		9269	041033	E111.5	050414	W082.0
9270R	B	0526	0647		X				X	X	X		9270	055805	E084.6	065145	W108.9
9271A	B	0707	0827		X				X	X	X		9271	074537	E057.7	083917	W135.7
9272A	B	0853	1015		X				X	X	X		9272	093308	E030.8	102649	W162.6
9273A	B	1039	1201		X				X	X	X		9273	112040	E003.9	121421	E170.5
9274A	B	1224	1345		X				X	X	X		9274	130812	W023.0	140152	E143.6
9275A	B	1409	1529		X				X	X	X		9275	145543	W049.9	154924	E116.7
9276A	B	1553	1714		X				X	X	X		9276	164315	W076.8	173656	E089.9
9277A	B	1737	1859		X				X	X	X		9277	183047	W103.6	192427	E063.0
9278A	B	1925	2046		X				X	X	X		9278	201818	W130.5	211159	E036.1
9279A	B	2111	2232		X				X	X	X		9279	220550	E157.4	225931	E009.2
													9280	235322	E175.8	004703	W017.7

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
05 MAY 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
92800	B	2350	0054						X	X	X		9281	014053	E148.9	023434	W044.6
92810	B	0135	0239						X	X	X		9282	032825	E122.0	042206	W071.4
9282R	B	0315	0419		X				X	X	X		9283	051557	E095.1	060938	W098.3
9283R	B	0444	0606		X				X	X	X		9284	070329	E068.2	075709	W125.2
9284A	B	0625	0742		X				X	X	X		9285	085100	E041.3	094441	W152.1
9285A	B	0811	0932		X				X	X	X		9286	103832	E014.5	113213	W179.0
9286A	B	0957	1119		X				X	X	X		9287	122604	W012.4	131945	E154.2
9287A	B	1143	1306		X				X	X	X		9288	141335	W039.3	150716	E127.3
9288A	B	1329	1449		X				X	X	X		9289	160107	W066.2	165448	E100.4
9289A	B	1457	1618		X				X	X	X		9290	174839	W093.1	184220	E073.5
9290R	B	1646	1805		X				X	X	X		9291	193611	W120.0	202951	E046.6
9291A	B	1841	2005		X				X	X	X		9292	212342	W146.9	221723	E019.7
9292A	B	2029	2151		X				X	X	X		9293	231114	W173.7	000455	W007.2
9293A	B	2218	2337		X				X	X	X						

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
06 MAY 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAN	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9296R	B	0402	0524		X				X	X	X		9294	005846	E159.4	015227	W034.1
9297R	B	0549	0654		X				X	X	X		9295	024617	E132.5	033958	W060.9
9298A	B	0729	0851		X				X	X	X		9296	043349	E105.6	052730	W087.8
9299A	B	0915	1038		X				X	X	X		9297	062121	E078.7	071502	W114.7
9300A	B	1101	1224		X				X	X	X		9298	080852	E051.9	090233	W141.6
9301A	B	1247	1407		X				X	X	X		9299	095624	E025.0	105005	W168.5
9302A	B	1431	1552		X				X	X	X		9300	114356	W001.9	123737	E164.7
9303A	B	1614	1737		X				X	X	X		9301	133128	W028.8	142508	E137.8
9304A	B	1800	1921		X				X	X	X		9302	151859	W055.7	161240	E110.9
9305A	B	1948	2109		X				X	X	X		9303	170631	W082.6	180012	E084.0
9306A	B	2134	2239		X				X	X	X		9304	185403	W109.4	194744	E057.2
													9305	204134	W136.3	213515	E030.3
													9306	222906	W163.2	232247	E003.4

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
07 MAY 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
93070	B	0012	0117						X	X	X		9307	001638	E169.9	011019	W023.5
93080	B	0159	0303						X	X	X		9308	020409	E143.0	025750	W050.4
9309R	B	0340	0443		X				X	X	X		9309	035141	E116.2	044522	W077.3
9310R	B	0508	0630		X				X	X	X		9310	053913	E089.3	063254	W104.2
9311A	B	0648	0804		X				X	X	X		9311	072644	E062.4	082026	W131.0
9312A	B	0834	0954		X				X	X	X		9312	091416	E035.5	100757	W157.9
9313A	B	1021	1141		X				X	X	X		9313	110148	E008.6	115529	E175.2
9314A	B	1206	1328		X				X	X	X		9314	124920	W018.3	134301	E148.3
9315A	B	1351	1512		X				X	X	X		9315	143651	W045.1	153032	E121.4
9316A	B	1534	1655		X				X	X	X		9316	162423	W072.0	171804	E094.5
9317A	B	1718	1842		X				X	X	X		9317	181155	W098.9	190536	E067.7
9318A	B	1905	2027		X				X	X	X		9318	195926	W125.8	205308	E040.8
9319A	B	2053	2214		X				X	X	X		9319	214658	W152.7	224039	E013.9
9320A	B	2243	2358		X				X	X	X		9320	233430	W179.5	002811	W013.0

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
08 MAY 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
93200	B	2356	0059						X	X	X		9321	012203	E153.6	021544	W039.9
93210	B	0116	0221						X	X	X		9322	030934	E126.7	040316	W066.8
9322R	B	0257	0359		X				X	X	X		9323	045706	E099.8	055047	W093.6
9323R	B	0425	0548		X				X	X	X		9324	064438	E072.9	073819	W120.5
9324A	B	0607	0723		X				X	X	X		9325	083209	E046.0	092551	W147.4
9325A	B	0753	0911		X				X	X	X		9326	101941	E019.2	111322	W174.3
9326A	B	0939	1100		X				X	X	X		9327	120713	W007.7	130054	E158.8
9327A	B	1124	1247		X				X	X	X		9328	135445	W034.6	144826	E132.0
9328A	B	1303	1431		X				X	X	X		9329	154216	W061.5	163558	E105.1
9329A	B	1453	1614		X				X	X	X		9330	172948	W088.4	182329	E078.2
9330A	B	1637	1800		X				X	X	X		9331	191750	W115.3	201101	E051.3
9331A	B	1823	1946		X				X	X	X		9332	210451	W142.1	215833	E024.4
9332A	B	2011	2132		X				X	Y	X		9333	225223	W169.0	234604	W002.5
9333A	B	2158	2317		X				X	X	X						

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
09 MAY 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRF	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
93330	B	2314	0018						X	X	X		9334	003955	E164.1	013336	W029.3
93340	B	0031	0135						X	X	X		9335	022727	E137.2	032108	W056.2
9336R	B	0334	0505		X				X	X	X		9336	041458	E110.3	050839	W083.1
9337R	B	0530	0651		X				X	X	X		9337	060230	E083.5	065611	W110.0
9338A	B	0711	0946		X				X	X	X		9338	075002	E056.6	084343	W136.9
9339A	B	0857	1019		X				X	X	X		9339	093733	E029.7	103115	W163.7
9340A	B	1043	1206		X				X	X	X		9340	112505	E002.8	121846	E169.4
9341A	B	1229	1351		X				X	X	X		9341	131237	W024.1	140618	E142.5
9342A	B	1413	1534		X				X	X	X		9342	150008	W051.0	155350	E115.6
9343A	B	1557	1718		X				X	X	X		9343	164740	W077.9	174121	E088.7
9344A	B	1741	1905		X				X	X	X		9344	183511	W104.8	192853	E061.8
9345A	B	1929	2050		X				X	X	X		9345	202244	W131.6	211625	E035.0
9346A	B	2115	2219		X				X	X	X		9346	221015	W158.5	230357	E008.1
													9347	235746	W174.6	005128	W018.8

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
10 MAY 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
93470	B	2353	0058						X	X	X		9348	014519	E147.8	023900	W045.7
93480	B	0136	0241						X	X	X		9349	033250	E120.9	044632	W072.6
9349R	B	0318	0422		X				X	X	X		9350	052022	E094.0	061403	W099.5
9350R	B	0449	0611		X				X	X	X		9351	070754	E067.1	080135	W126.4
9351A	B	0630	0735		X				X	X	X		9352	085525	E040.2	094907	W153.2
9352A	B	0815	0935		X				X	X	X		9353	104257	E013.3	113639	E179.9
9353A	B	1001	1124		X				X	X	X		9354	123029	W013.6	132410	E153.0
9354A	B	1147	1310		X				X	X	X		9355	141801	W040.5	151142	E126.1
9355A	B	1333	1453		X				X	X	X		9356	160532	W067.3	165914	E099.3
9356A	B	1516	1637		X				X	X	X		9357	175304	W094.2	184645	E072.4
9357A	B	1700	1823		X				X	X	X		9358	194036	W121.1	203417	E045.5
9358A	B	1846	2007		X				X	X	X		9359	212807	W148.0	222149	E018.6
9359A	B	2034	2139		X				X	X	X		9360	231539	W174.9	000921	W008.3
9360A	B	2223	2327		X				X	X	X						

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TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
11 MAY 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDFE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
93600	B	2337	0041						X	X	X		9361	010311	E158.3	015652	W035.1
93610	B	0057	0201						X	X	X		9362	025042	E131.4	034424	W062.0
9363R	B	0407	0527		X				X	X	X		9363	043814	E104.5	053156	W088.9
9364R	B	0555	0712		X				X	X	X		9364	062546	E077.6	071927	W115.8
9365A	B	0734	0855		X				X	X	X		9365	081318	E050.7	090659	W142.7
9366A	B	0921	1043		X				X	X	X		9366	100049	E023.8	105431	W169.6
9367A	B	1108	1229		X				X	X	X		9367	114821	W003.0	124203	E163.5
9368A	B	1251	1413		X				X	X	X		9368	133552	W029.9	142934	E136.6
9369A	B	1435	1554		X				X	X	X		9369	152324	W056.8	161706	E109.8
9370A	B	1619	1740		X				X	X	X		9370	171056	W083.7	180438	E082.9
9371A	B	1805	1925		X				X	X	X		9371	185828	W110.6	195209	E056.0
9372A	B	1952	2114		X				X	X	X		9372	204559	W137.4	213941	E029.2
													9373	223331	W164.3	232713	E002.2

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
12 MAY 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDFE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
93740	B	0015	0119						X	X	X		9374	002103	E168.8	011445	W024.6
93750	B	0203	0307						X	X	X		9375	020835	E141.9	030216	W051.5
9376R	B	0347	0448		X				X	X	X		9376	035606	E115.0	044948	W078.4
9377R	B	0513	0634		X				X	X	X		9377	054338	E088.1	063720	W105.3
9378A	B	0652	0812		X				X	X	X		9378	073110	E061.3	082451	W132.2
9379A	B	0838	1001		X				X	X	X		9379	091841	E034.4	101223	W159.1
9380A	B	1024	1147		X				X	X	X		9380	110613	E007.5	115955	E174.1
9381A	B	1210	1331		X				X	X	X		9381	125345	W019.4	134726	E147.2
9382A	B	1335	1516		X				X	X	X		9382	144116	W046.3	153458	E120.3
9383A	B	1539	1700		X				X	X	X		9383	162848	W073.2	172230	E093.4
9384A	B	1723	1846		X				X	X	X		9384	181620	W100.1	191002	E066.5
9385A	B	1910	2032		X				X	X	X		9385	190352	W126.9	205733	E039.7
9386A	B	2057	2217		X				X	X	X		9386	215123	W153.8	224505	E012.8
9387A	B	2248	0004		X				X	X	X		9387	233855	E179.3	003237	W014.1

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
13 MAY 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9390R	B	0429	0552		X				X	X	X		9388	012027	E152.4	022008	W041.0
9391A	B	0624	0728		X				X	X	X		9389	031358	E125.6	040740	W067.9
9392A	B	0757	0918		X				X	X	X		9390	050130	E098.7	055512	W094.8
9393A	B	0944	1106		X				X	X	X		9391	064902	E071.8	074244	W121.6
9394A	B	1129	1252		X				X	X	X		9392	083633	E044.9	093015	W148.5
9395A	B	1314	1435		X				X	X	X		9393	102405	E018.0	111747	W175.4
9396A	B	1457	1619		X				X	X	X		9394	121137	W008.9	130519	E157.7
9397A	B	1642	1804		X				X	X	X		9395	135909	W035.8	145250	E130.8
9398A	B	1828	1950		X				X	X	X		9396	154640	W062.6	164022	E104.0
9399A	B	2015	2135		X				X	X	X		9397	173412	W089.5	182754	E077.1
9400A	B	2203	2322		X				X	X	X		9398	192144	W116.4	201526	E050.2
													9399	210915	W143.3	220257	E023.3
													9400	225647	W170.2	235029	W003.6

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
14 MAY 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9400C	B	2320	0021						X	X	X		9401	004419	E163.0	013801	W030.5
9401C	B	0035	0140						X	X	X		9402	023150	E136.1	032532	W057.3
9403R	B	0349	0510		X				X	X	X		9403	041922	E109.2	051304	W084.2
9404R	B	0535	0656		X				X	X	X		9404	060654	E082.3	070036	W111.1
9405A	B	0716	0836		X				X	X	X		9405	075425	E055.4	084808	W138.0
9406A	B	0901	1023		X				X	X	X		9406	094157	E028.5	103539	W164.9
9407A	B	1047	1209		X				X	X	X		9407	112929	E001.7	122311	E168.3
9408A	B	1234	1355		X				X	X	X		9408	131701	W025.2	141043	E141.4
9409A	B	1417	1534		X				X	X	X		9409	150432	W052.1	155814	E114.5
9410A	B	1600	1723		X				X	X	X		9410	165204	W079.0	174546	E087.6
9411A	B	1746	1909		X				X	X	X		9411	183936	W105.9	193318	E060.7
9412A	B	1934	2055		X				X	X	X		9412	202707	W132.7	212050	E033.8
9413A	B	2120	2241		X				X	X	X		9413	221439	W159.6	230821	E007.0

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TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
15 MAY 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9415O	B	0141	0248						X	X	X		9414	000213	E173.5	005555	W019.9
9416R	B	0325	0429		X				X	X	X		9415	014945	E146.6	024327	W046.8
9417R	B	0454	0616		X				X	X	X		9416	033716	E119.7	043059	W073.7
9418A	B	0634	0752		X				X	X	X		9417	052448	E092.9	061830	W100.6
9419A	B	0845	0941		X				X	X	X		9418	071220	E066.0	080602	W127.5
9420A	B	1006	1129		X				X	X	X		9419	085952	E039.1	095334	W154.3
9421A	B	1152	1314		X				X	X	X		9420	104723	E012.2	114105	E178.8
9422A	B	1336	1441		X				X	X	X		9421	123455	W014.7	132837	E151.9
9423A	B	1520	1641		X				X	X	X		9422	142227	W041.6	151609	E125.0
9424A	B	1704	1827		X				X	X	X		9423	160958	W068.5	170341	E098.1
9425A	B	1850	2013		X				X	X	X		9424	175730	W095.4	185112	E071.2
9426A	B	2038	2157		X				X	X	X		9425	194502	W122.2	203844	E044.4
9427A	B	2228	2345		X				X	X	X		9426	213233	W149.1	222616	E017.5
													9427	232005	W176.0	001347	W009.4

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
16 MAY 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9427O	B	2342	0044						X	X	X		9428	010737	E157.1	020119	W036.3
9428O	B	0057	0202						X	X	X		9429	025509	E130.2	034851	W063.2
9430R	B	0411	0533		X				X	X	X		9430	044240	E103.4	053623	W090.1
9431R	B	0558	0717		X				X	X	X		9431	063012	E076.5	072354	W117.0
9432A	B	0738	0900		X				X	X	X		9432	081744	E049.6	091126	W143.8
9433A	B	0924	1046		X				X	X	X		9433	100515	E022.7	105858	W170.7
9434A	B	1110	1232		X				X	X	X		9434	115247	W004.2	124629	E162.4
9435A	B	1256	1417		X				X	X	X		9435	134018	W031.0	143401	E135.5
9436A	B	1440	1601		X				X	X	X		9436	152751	W057.9	162133	E108.7
9437A	B	1623	1746		X				X	X	X		9437	171522	W084.8	180905	E081.8
9438A	B	1809	1932		X				X	X	X		9438	190254	W111.7	195636	E054.9
9439A	B	1957	2118		X				X	X	X		9439	205026	W138.6	214408	E028.0
9440A	B	2144	2304		X				X	X	X		9440	223757	W165.5	233140	E001.1

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
17 MAY 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
94410	B	0020	0125						X	X	X		9441	002529	E167.7	011911	W025.8
94420	B	0200	0312						X	X	X		9442	021301	E140.8	030643	W052.7
9443R	B	0349	0452		X				X	X	X		9443	040033	E113.9	045415	W079.5
9444R	B	0516	0638		X				X	X	X		9444	054804	E087.0	064147	W106.4
9445A	B	0657	0816		X				X	X	X		9445	073536	E060.1	082918	W133.3
9446A	B	0939	1004		X				X	X	X		9446	092308	E033.2	101650	W160.2
9447A	B	1029	1151		X				X	X	X		9447	111039	E006.4	120422	E172.9
9448A	B	1216	1336		X				X	X	X		9448	125811	W020.5	135153	E146.0
9449A	B	1400	1520		X				X	X	X		9449	144543	W047.4	153925	E119.2
9450A	B	1542	1644		X				X	X	X		9450	163314	W074.3	172657	E092.3
9451A	B	1727	1850		X				X	X	X		9451	182046	W101.2	191429	E065.4
9452A	B	1914	2035		X				X	X	X		9452	200818	W128.1	210200	E038.5
9453A	B	2101	2220		X				X	X	X		9453	215550	W155.0	224932	E011.6
9454A	B	2253	0007		X				X	X	X		9454	234321	W178.2	003704	W015.3

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
18 MAY 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
94550	B	0006	0109						X	X	X		9455	013053	E151.3	022436	W042.1
9456R	B	0306	0407		X				X	X	X		9456	031824	E124.4	041207	W069.0
9457R	B	0434	0557		X				X	X	X		9457	050556	E097.5	055939	W095.9
9458A	B	0617	0733		X				X	X	X		9458	065328	E070.7	074711	W122.8
9459A	B	0801	0922		X				X	X	X		9459	084100	E043.8	093442	W149.7
9460A	B	0947	1109		X				X	X	X		9460	102832	E016.9	112214	W176.5
9461A	B	1133	1255		X				X	X	X		9461	121603	W010.0	130946	E156.6
9462A	B	1318	1439		X				X	X	X		9462	140335	W036.9	145718	E129.7
9463A	B	1502	1623		X				X	X	X		9463	155107	W063.8	164449	E102.8
9464A	B	1646	1809		X				X	X	X		9464	173838	W090.7	183221	E075.9
9465A	B	1831	1955		X				X	X	X		9465	192610	W117.5	201953	E049.0
9466A	B	2019	2140		X				X	X	X		9466	211342	W144.4	220724	E022.2
9467A	B	2209	2327		X				X	X	X		9467	230113	W171.3	235456	W004.7

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TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
19 MAY 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
94670	B	2323	0026						X	X	X		9468	004845	E161.8	014228	W031.6
94680	B	0042	0146						X	X	X		9469	023617	E134.9	033000	W058.5
9470R	B	0353	0513		X				X	X	X		9470	042349	E108.1	051731	W085.4
9471R	B	0540	0700		X				X	X	X		9471	061120	E081.2	070503	W112.2
9472A	B	0723	0837		X				X	X	X		9472	075852	E054.3	085235	W139.1
9473A	B	0905	1028		X				X	X	X		9473	094624	E027.4	104006	W166.0
9474A	B	1053	1214		X				X	X	X		9474	113355	E000.5	122738	E167.1
9475A	B	1237	1254		X				X	X	X		9475	132127	W026.4	141510	E140.2
9476A	B	1421	1542		X				X	X	X		9476	150859	W053.2	160242	E113.3
9477A	B	1605	1726		X				X	X	X		9477	165631	W080.1	175013	E086.5
9478A	B	1750	1913		X				X	X	X		9478	184402	W107.0	193745	E059.6
9479A	B	1938	2055		X				X	X	X		9479	203134	W133.9	212517	E032.7
9480A	B	2125	2245		X				X	X	X		9480	221906	W160.8	231248	E005.8

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
20 MAY 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9483R	B	0313	0433		X				X	X	X		9481	000637	E172.4	010020	W021.1
9484R	B	0458	0620		X				X	X	X		9482	015409	E145.5	024752	W047.9
9485A	B	0638	0757		X				X	X	X		9483	034141	E118.6	043524	W074.8
9486A	B	0824	0940		X				X	X	X		9484	052913	E091.7	062255	W101.7
9487A	B	1010	1132		X				X	X	X		9485	071644	E064.8	081027	W128.6
9488A	B	1157	1314		X				X	X	X		9486	090416	E037.9	095759	W155.5
9489A	B	1341	1500		X				X	X	X		9487	105148	E011.1	114530	E177.6
9490A	B	1524	1644		X				X	X	X		9488	123919	W015.8	133302	E150.8
9491A	B	1709	1823		X				X	X	X		9489	142651	W042.7	152034	E123.8
9492A	B	1855	2016		X				X	X	X		9490	161423	W069.6	170806	E097.0
9493A	B	2042	2157		X				X	X	X		9491	180154	W096.5	185537	E070.1
9494A	B	2233	2349		X				X	X	X		9492	194926	W123.3	204309	E043.2
													9493	213658	W150.2	223041	E016.4
													9494	232430	W177.1	001813	W010.6

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
21 MAY 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LHIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
94940	B	2345	0047						X	X	X		9495	011201	E156.0	020544	W037.4
94950	B	0106	0211						X	X	X		9496	025933	E129.1	035316	W064.3
9497R	B	0415	0528		X				X	X	X		9497	044705	E102.2	054048	W091.2
9498R	B	0603	0722		X				X	X	X		9498	063436	E075.4	072819	W118.1
9499A	B	0742	0903		X				X	X	X		9499	082208	E048.5	091551	W145.0
9500A	B	0929	1051		X				X	X	X		9500	100940	E021.6	110323	W171.9
9501A	B	1114	1227		X				X	X	X		9501	115712	W005.3	125055	E161.3
9502A	B	1259	1421		X				X	X	X		9502	134443	W032.2	143826	E134.4
9503A	B	1445	1605		X				X	X	X		9503	153215	W059.0	162558	E107.5
9504A	B	1627	1750		X				X	X	X		9504	171947	W086.0	181330	E080.6
9505A	B	1813	1936		X				X	X	X		9505	190718	W112.8	200101	E053.7
9506A	B	2001	2122		X				X	X	X		9506	205450	W139.7	214833	E026.9
9507A	B	2149	2308		X				X	X	X		9507	224222	W166.6	233605	000.0

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
22 MAY 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LHIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
95070	B	2307	0009						X	X	X		9508	002949	E166.5	012332	W026.9
95080	B	0026	0118						X	X	X		9509	021721	E139.6	031104	W053.8
9510R	B	0335	0456		X				X	X	X		9510	040453	E112.7	045836	W080.7
9511R	B	0521	0643		X				X	X	X		9511	055224	E085.9	064607	W107.6
9512A	B	0701	0815		X				X	X	X		9512	073956	E059.0	083339	W134.5
9513A	B	0846	1009		X				X	X	X		9513	092728	E032.1	102111	W161.3
9514A	B	1033	1154		X				X	X	X		9514	111459	E005.2	120842	E171.8
9515A	B	1219	1341		X				X	X	X		9515	130231	W021.7	135614	E144.9
9516A	B	1403	1524		X				X	X	X		9516	145003	W048.6	154346	E118.0
9517A	B	1547	1702		X				X	X	X		9517	163734	W075.4	173118	E091.1
9518A	B	1731	1854		X				X	X	X		9518	182506	W102.3	191849	E064.3
9519A	B	1919	2037		X				X	X	X		9519	201238	W129.2	210621	E037.4
9520A	B	2106	2224		X				X	X	X		9520	220010	W156.1	225353	E010.5
9521A	B	2257	0011		X				X	X	X		9521	234741	E177.0	004124	W016.4

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
23 MAY 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
95210	B	0010	0114						X	X	X		9522	013513	E150.2	022856	W043.3
95220	B	0127	0230						X	X	X		9523	032245	E123.3	041627	W070.2
9523R	B	0310	0413		X				X	X	X		9524	051016	E096.4	060359	W097.0
9524R	B	0438	0602		X				X	X	X		9525	065748	E069.5	075131	W123.9
9525A	B	0621	0737		X				X	X	X		9526	084520	E042.6	093903	W150.8
9526A	B	0805	0926		X				X	X	X		9527	103251	E015.7	112635	W177.7
9527A	B	0951	1114		X				X	X	X		9528	122023	W011.1	131406	E155.4
9528A	B	1137	1300		X				X	X	X		9529	140755	W038.0	150138	E128.6
9529A	B	1322	1442		X				X	X	X		9530	155526	W064.9	164910	E101.7
9530A	B	1506	1627		X				X	X	X		9531	174258	W091.8	183641	E074.8
9531A	B	1650	1812		X				X	X	X		9532	193030	W118.7	202413	E047.9
9532A	B	1837	1959		X				X	X	X		9533	211801	W145.6	221145	E021.0
9533A	B	2025	2145		X				X	X	X		9534	230533	W172.4	235916	W005.9
9534A	B	2213	2330		X				X	X	X						

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
24 MAY 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
95340	B	2328	0030						X	X	X		9535	005305	E160.7	014648	W032.8
95350	B	0047	0150						X	X	X		9536	024037	E133.8	033420	W059.6
9537R	B	0357	0518		X				X	X	X		9537	042808	E106.9	052151	W086.5
9538R	B	0553	0704		X				X	X	X		9538	061540	E080.0	070923	W113.4
9539A	B	0724	0837		X				X	X	X		9539	080312	E053.2	085655	W140.3
9540A	B	0910	1031		X				X	X	X		9540	095043	E026.3	104427	W167.2
9541A	B	1057	1210						X	X	X		9541	113815	W000.6	123158	E166.0
9542A	B	1242	1357						X	X	X		9542	132547	W027.5	141930	E139.1
9543A	B	1426	1541						X	X	X		9543	151318	W054.4	160702	E112.2
9544A	B	1609	1731						X	X	X		9544	170050	W081.3	175433	E085.3
9545A	B	1754	1916						X	X	X		9545	184822	W108.1	194205	E058.4
9546A	B	1942	2053						X	X	X		9546	203553	W135.0	212937	E031.5
9547A	B	2129	2241						X	X	X		9547	222325	W161.9	231708	E004.7

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
25 MAY 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
95480	B	0006	0111						X	X	X		9548	001057	E171.2	010440	W022.2
95490	B	0153	0256						X	X	X		9549	015828	E144.3	025212	W049.1
9550R	B	0334	0438						X	X	X		9550	034600	E117.5	043943	W076.0
9551R	B	0502	0625						X	X	X		9551	053332	E090.6	062715	W102.9
9552A	B	0643	0801						X	X	X		9552	072103	E063.7	081447	W129.8
9553A	B	0829	0950						X	X	X		9553	090835	E036.8	100219	W156.6
9554A	B	1014	1136						X	X	X		9554	105607	E009.9	114950	E176.5
9555A	B	1201	1323						X	X	X		9555	124339	W017.0	133722	E149.6
9556A	B	1345	1506						X	X	X		9556	143110	W043.9	152454	E122.7
9557A	B	1529	1650						X	X	X		9557	161842	W070.7	171225	E095.8
9558A	B	1713	1836						X	X	X		9558	180614	W097.6	185957	E069.0
9560A	B	2047	2208						X	X	X		9559	195345	W124.5	204729	E042.1
9561A	B	2237	2354						X	X	X		9560	214117	W151.4	223500	E015.2
													9561	232849	W178.3	002232	W011.7

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
26 MAY 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
95610	B	2351	0053						X	X	X		9562	011620	E154.9	021004	W038.6
95620	B	0111	0215						X	X	X		9563	030352	E128.0	035735	W065.5
9563R	B	0251	0342						X	X	X		9564	045124	E101.1	054507	W092.3
9564R	B	0420	0543						X	X	X		9565	063855	E074.2	073239	W119.2
9565A	B	0602	0718						X	X	X		9566	082627	E047.3	092011	W146.1
9566A	B	0748	0908						X	X	X		9567	101359	E020.4	110742	W173.0
9567A	B	0933	1055						X	X	X		9568	120130	W006.4	125514	E160.1
9568A	B	1119	1242						X	X	X		9569	134902	W033.3	144246	E133.3
9569A	B	1305	1426						X	X	X		9570	153634	W060.2	163017	E106.4
9570A	B	1449	1609						X	X	X		9571	172405	W087.1	181749	E079.5
9571A	B	1633	1753						X	X	X		9572	191137	W114.0	200521	E052.6
9572A	B	1817	1940						X	X	X		9573	205909	W140.9	215252	E025.7
9573A	B	2005	2126						X	X	X		9574	224640	W167.7	234024	W001.2
9574A	B	2153	2312						X	X	X						

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TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
27 MAY 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIP	TDRE	SCAM	ESMR	ERB	PMP	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9577R	B	0339	0443						X	X	X		9575	003412	E165.4	012756	W028.1
9578R	B	0525	0630						X	X	X		9576	022144	E138.5	031527	W054.9
9579A	B	0705	0823						X	X	X		9577	040916	E111.6	050259	W081.8
9580A	B	0851	1012						X	X	X		9578	055647	E084.7	065031	W108.7
9581A	B	1037	1200						X	X	X		9579	074419	E057.9	083803	W135.6
9582A	B	1223	1345						X	X	X		9580	093151	E031.0	102534	W162.5
9583A	B	1409	1528						X	X	X		9581	111922	E004.1	121306	E170.7
9584A	B	1551	1713						X	X	X		9582	130654	W022.8	140038	E143.8
9585A	B	1737	1858						X	X	X		9583	145426	W049.7	154809	E116.9
9586A	B	1923	2045						X	X	X		9584	164157	W076.6	173541	E090.0
9587A	B	2110	2230						X	X	X		9585	182929	W003.4	192313	E063.1
													9586	201701	W030.3	211044	E036.2
													9587	220432	W157.2	225816	E009.4
													9588	235204	E175.9	004548	W017.5

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
28 MAY 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9590R	B	0259	0417						X	X	X		9589	013936	E149.0	023319	W044.4
9591R	B	0443	0547						X	X	X		9590	032707	E122.2	042051	W071.3
9592A	B	0625	0742						X	X	X		9591	051439	E095.3	060823	W098.2
9593A	B	0810	0929						X	X	X		9592	070211	E068.4	075555	W125.1
9594A	B	0957	1118						X	X	X		9593	084942	E041.5	094326	W151.9
9595A	B	1142	1305						X	X	X		9594	103714	E014.6	113058	W178.8
9596A	B	1327	1448						X	X	X		9595	122446	W012.3	131830	E154.3
9597A	B	1511	1631						X	X	X		9596	141217	W039.2	150601	E127.4
9598A	B	1655	1817						X	X	X		9597	155949	W066.0	165333	E100.5
9599A	B	1841	2004						X	X	X		9598	174721	W092.9	184105	E073.7
9600A	B	2029	2150						X	X	X		9599	193453	W119.8	202836	E046.8
9601A	B	2217	2335						X	X	X		9600	212224	W146.7	221608	E019.9
													9601	230956	W173.6	000340	W007.0

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
29 MAY 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9604R	B	0401	0523						X	X	X		9602	005734	E159.5	015118	W033.9
9605R	B	0549	0708						X	X	X		9603	024506	E132.7	033850	W060.8
9606A	B	0728	0848						X	X	X		9604	043238	E105.8	052621	W087.7
9607A	B	0914	1037						X	X	X		9605	062009	E078.9	071353	W114.5
9608A	B	1101	1223						X	X	X		9606	080741	E052.0	090125	W141.4
9609A	B	1246	1107						X	X	X		9607	095513	E025.1	104857	W168.3
9610A	B	1436	1551						X	X	X		9608	114245	W001.8	123628	E164.8
9611A	B	1613	1736						X	X	X		9609	133016	W028.6	142400	E137.9
9612A	B	1759	1921						X	X	X		9610	151748	W055.5	161132	E111.1
9613A	B	1947	2108						X	X	X		9611	170520	W082.4	175904	E084.2
9614A	B	2134	2254						X	X	X		9612	185251	W109.3	194635	E057.3
													9613	204023	W136.2	213407	E030.4
													9614	222755	W163.1	232139	E003.5

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
30 MAY 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9617R	B	0321	0441						X	X	X		9615	001527	E170.1	010910	W023.4
9618R	B	0528	0627						X	X	X		9616	020258	E143.2	025642	W050.3
9619A	B	0647	0806						X	X	X		9617	035030	E116.3	044414	W077.1
9620A	B	0920	0945										9618	053802	E089.4	063146	W104.0
9621A	B	1019	1133						X	X	X		9619	072533	E062.5	081917	W130.9
9622A	B	1206	1327						X	X	X		9620	091305	E035.7	100649	W157.8
9623A	B	1349	1511						X	X	X		9621	110037	E008.8	115421	E175.3
9624A	B	1533	1655						X	X	X		9622	124809	W018.1	134152	E148.5
9625A	B	1717	1841						X	X	X		9623	143540	W045.0	152924	E121.6
9626A	B	1905	2008						X	X	X		9624	162312	W071.9	171656	E094.7
9627A	B	2051	2213						X	X	X		9625	181044	W098.8	190428	E067.8
9628A	B	2242	2359						X	X	X		9626	195815	W125.6	205159	E040.9
													9627	214547	W152.5	223931	E014.0
													9628	233319	W179.4	002703	W012.8

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
31 MAY 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9630R	B	0242	0359						X	X	X		9629	012050	E153.7	021434	W039.7
9631R	B	0425	0546						X	X	X		9630	030822	E126.8	040206	W066.6
9632A	B	0606	0722						X	X	X		9631	045554	E100.0	054938	W093.5
9633A	B	0752	0913						X	X	X		9632	064326	E073.1	073710	W120.4
9634A	B	0937	1059						X	X	X		9633	083057	E046.2	092441	W147.3
9635A	B	1123	1246						X	X	X		9634	101829	E019.3	111213	W174.1
9636A	B	1309	1429						X	X	X		9635	120601	W007.6	125945	E159.0
9637A	B	1453	1614						X	X	X		9636	135332	W034.5	144716	E132.1
9638A	B	1637	1759						X	X	X		9637	154104	W061.4	163448	E105.2
9639A	B	1821	1920						X	X	X		9638	172836	W088.2	182220	E078.3
9640A	B	2010	2109						X	X	X		9639	191608	W115.1	200952	E051.5
9641A	B	2157	2302						X	X	X		9640	210339	W142.0	215723	E024.6
													9641	225111	W168.9	234455	W002.3

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
01 JUNE 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9644R	B	0343	0504						X	X	X		9642	003843	E164.2	013227	W029.2
9645R	B	0529	0651						X	X	X		9643	022614	E137.4	031958	W056.1
9646A	B	0710	0829						X	X	X		9644	041346	E110.5	050730	W083.0
9647A	B	0857	1017						X	X	X		9645	060118	E083.6	065502	W109.8
9648A	B	1042	1204						X	X	X		9646	074850	E056.7	084234	W136.7
9649A	B	1227	1349						X	X	X		9647	093621	E029.8	103005	W163.6
9650A	B	1413	1533						X	X	X		9648	112353	E002.9	121737	E169.5
9651A	B	1555	1718						X	X	X		9649	131125	W023.9	140509	E142.6
9652A	B	1741	1903						X	X	X		9650	145856	W050.8	155240	E115.7
9653A	B	1929	2039						X	X	X		9651	164628	W077.7	174012	E088.9
9654A	B	2114	2235						X	X	X		9652	183400	W104.6	192744	E062.0
													9653	202131	W131.5	211516	E035.1
													9654	220903	W158.4	230247	E008.2
													9655	235635	E174.8	005019	W018.7

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
02 JUNE 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDFE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9655A	B	2307	0021						X	X	X		9656	014407	E147.9	023751	W045.6
9657R	B	0303	0421						X	X	X		9657	033138	E121.0	042523	W072.4
9658R	B	0447	0609						X	X	X		9658	051910	E094.1	061254	W099.3
9659A	B	0629	0746						X	X	X		9659	070642	E067.2	080026	W126.2
9660A	B	0814	0935						X	X	X		9660	085413	E040.4	094758	W153.1
9661A	B	1000	1122						X	X	X		9661	104145	E013.5	113529	W180.0
9662A	B	1146	1308						X	X	X		9662	122917	W013.4	132301	E153.2
9663A	B	1331	1452						X	X	X		9663	141649	W040.3	151033	E126.3
9664A	B	1541	1636						X	X	X		9664	160420	W067.2	165804	E099.4
9665A	B	1659	1822						X	X	X		9665	175152	W094.1	184536	E072.5
9666A	B	1845	2006						X	X	X		9666	193924	W120.9	203308	E045.6
9667A	B	2032	2154						X	X	X		9667	212655	W147.8	222040	E018.7
9668A	B	2221	2340						X	X	X		9668	231427	W174.7	000811	W008.1

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
03 JUNE 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDFE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9671R	B	0405	0528						X	X	X		9669	010159	E158.4	015543	W035.0
9672R	B	0553	0711						X	X	X		9670	024931	E131.5	034315	W061.9
9673A	B	0732	0853						X	X	X		9671	043702	E104.6	053046	W088.8
9674A	B	0919	1041						X	X	X		9672	062434	E077.8	071818	W115.7
9675A	B	1106	1227						X	X	X		9673	081206	E050.9	090550	W142.6
9676A	B	1250	1412						X	X	X		9674	095937	E024.0	105322	W169.4
9677A	B	1434	1555						X	X	X		9675	114709	W002.9	124053	E163.7
9678A	B	1618	1740						X	X	X		9676	133441	W029.8	142825	E136.8
9679A	B	1803	1926						X	X	X		9677	152213	W056.7	161557	E109.9
9680A	B	1951	2112						X	X	X		9678	170944	W083.5	180329	E083.0
9681A	B	2138	2257						X	X	X		9679	185716	W110.4	195100	E056.2
													9680	204448	W137.3	213832	E029.3
													9681	223219	W164.2	232604	E002.4

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TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
04 JUNE 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9684R	B	0325	0445						X	X	X		9682	001951	E168.9	011335	W024.5
9685R	B	0511	0632						X	X	X		9683	020723	E142.1	030107	W051.4
9686A	B	0652	0810						X	X	X		9684	035454	E115.2	044839	W078.3
9687A	B	0838	0959						X	X	X		9685	054226	E088.3	063610	W105.1
9688A	B	1023	1146						X	X	X		9686	072958	E061.4	082342	W132.0
9689A	B	1209	1331						X	X	X		9687	091730	E034.5	101114	W158.9
9690A	B	1354	1515						X	X	X		9688	110501	E007.6	115846	E174.2
9691A	B	1538	1659						X	X	X		9689	125233	W019.2	134617	E147.3
9692A	B	1722	1844						X	X	X		9690	144005	W046.1	153349	E120.4
9693A	B	1909	2031						X	X	X		9691	162736	W073.0	172121	E093.6
9694A	B	2055	2216						X	X	X		9692	181508	W099.9	190852	E066.7
9695A	B	2246	2351						X	X	X		9693	200240	W126.8	205624	E039.8
													9694	215012	W153.7	224356	E012.9
													9695	233743	E179.5	003128	W014.0

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
05 JUNE 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9697R	B	0246	0402						X	X	X		9696	012512	E152.6	021856	W040.8
9698R	B	0428	0552						X	X	X		9697	031243	E125.7	040628	W067.7
9699A	B	0610	0726						X	X	X		9698	050015	E098.8	055359	W094.6
9700A	B	0755	0916						X	X	X		9699	064747	E071.9	074131	W121.5
9701A	B	0942	1104						X	X	X		9700	083518	E045.1	092903	W148.4
9702A	B	1128	1250						X	X	X		9701	102250	E018.2	111634	W175.3
9703A	B	1312	1434						X	X	X		9702	121022	W008.7	130406	E157.9
9704A	B	1456	1618						X	X	X		9703	135753	W035.6	145138	E131.0
9705A	B	1640	1803						X	X	X		9704	154525	W062.5	163910	E104.1
9706A	B	1826	1949						X	X	X		9705	173258	W089.4	182641	E077.2
9707A	B	2014	2135						X	X	X		9706	192029	W116.2	201413	E050.3
9708A	B	2202	2320						X	X	X		9707	210800	W143.1	220145	E023.5
													9708	225532	W170.0	234916	W003.4

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
06 JUNE 1977

INT ORBIT AND STDN	H D R S	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	L R I R	T H I R	T D R E	S C A M	E S M R	E R B	P M R	T W R L	H I R S	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LON DEGRI
9711R	B	0347	0509						X	X	X		9709	004304	E163.1	013648	W030.
9712R	B	0534	0653						X	X	X		9710	023035	E136.2	032420	W057.
9713A	B	0714	0835						X	X	X		9711	041807	E109.4	051151	W084.
9714A	B	0900	1022						X	X	X		9712	060539	E082.5	065923	W111.
9715A	B	1046	1209						X	X	X		9713	075311	E055.6	084655	W137.
9716A	B	1241	1354						X	X	X		9714	094042	E028.7	103427	W164.7
9717A	B	1416	1520						X	X	X		9715	112814	E001.8	122158	E168.4
9718A	B	1559	1722						X	X	X		9716	131546	W025.1	140930	E141.5
9719A	B	1744	1907						X	X	X		9717	150317	W051.9	155702	E114.6
9720A	B	1932	2052						X	X	X		9718	165049	W078.8	174433	E087.7
9721A	B	2119	2239						X	X	X		9719	183821	W105.7	193205	E060.9
													9720	202552	W132.6	211937	E034.0
													9721	221324	W159.5	230708	E007.1

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
07 JUNE 1977

INT ORBIT AND STDN	H D R S	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	L R I R	T H I R	T D R E	S C A M	E S M R	E R B	P M R	T W R L	H I R S	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9724R	B	0307	0428						X	X	X		9722	000056	E173.7	005440	W019.8
9725R	B	0452	0615						X	X	X		9723	014827	E146.8	024212	W046.7
9726A	B	0633	0751						X	X	X		9724	033559	E119.9	042944	W073.6
9727A	B	0818	0940						X	X	X		9725	052331	E093.0	061715	W100.4
9728A	B	1004	1127						X	X	X		9726	071102	E066.2	080447	W127.3
9729A	B	1150	1313						X	X	X		9727	085834	E039.2	095219	W154.2
9730A	B	1335	1457						X	X	X		9728	104606	E012.3	113950	E178.9
9731A	B	1519	1640						X	X	X		9729	123338	W014.5	132722	E152.0
9732A	B	1703	1826						X	X	X		9730	142109	W041.4	151454	E125.2
9733A	B	1850	1954						X	X	X		9731	160841	W068.3	170225	E098.3
9734A	B	2038	2157						X	X	X		9732	175613	W095.2	184957	E071.4
9735A	B	2226	2340						X	X	X		9733	194344	W122.1	203729	E044.5
													9734	213116	W148.9	222500	E017.6
													9735	231848	W175.8	001232	W009.3

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
08 JUNE 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9738R	B	0410	0533						X	X	X		9736	010619	E157.3	020004	W036.1
9739R	B	0557	0716						X	X	X		9737	025351	E130.4	034736	W063.0
9740A	B	0737	0858						X	X	X		9738	044123	E103.5	053507	W089.9
9741A	B	0923	1045						X	X	X		9739	062854	E076.6	072239	W116.8
9742A	B	1109	1232						X	X	X		9740	081626	E049.8	091011	W143.7
9743A	B	1254	1416						X	X	X		9741	100358	E022.9	115742	W170.6
9744A	B	1438	1559						X	X	X		9742	115130	W004.0	124514	E162.6
9745A	B	1622	1744						X	X	X		9743	133901	W030.9	143246	E135.7
9746A	B	1807	1930						X	X	X		9744	152633	W057.8	162017	E108.8
9747A	B	1955	2116						X	X	X		9745	171405	W084.7	180749	E081.9
9748A	B	2142	2302						X	X	X		9746	190136	W111.5	195521	E055.0
													9747	204908	W138.4	214253	E028.2
													9748	223640	W165.3	233024	E001.3

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
09 JUNE 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9751R	B	0329	0451						X	X	X		9749	002411	E167.8	011756	W025.6
9752R	B	0515	0637						X	X	X		9750	021143	E140.9	030528	W052.5
9753A	B	0656	0815						X	X	X		9751	035915	E114.1	045259	W079.4
9754A	B	0841	1003						X	X	X		9752	054646	E087.2	064031	W106.3
9755A	B	1027	1150						X	X	X		9753	073418	E060.3	082803	W133.2
9756A	B	1214	1335						X	X	X		9754	095150	E033.4	101534	W160.0
9757A	B	1341	1519						X	X	X		9755	110922	E006.5	120306	E173.1
9758A	B	1541	1702						X	X	X		9756	125653	W020.4	135038	E146.2
9759A	B	1726	1848						X	X	X		9757	144425	W047.2	153810	E119.3
9760A	B	1913	2035						X	X	X		9758	163157	W074.1	172541	E092.4
9761A	B	2100	2219						X	X	X		9759	181928	W101.0	191313	E065.6
9762A	B	2251	0005						X	X	X		9760	200700	W127.9	210045	E038.7
													9761	215432	W154.8	224817	E011.8
													9762	234203	E178.4	003548	W015.1

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
10 JUNE 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRF	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9764R	B	0250	0408						X	X	X		9763	012935	E151.5	022320	W042.0
9765R	B	0433	0555						X	X	X		9764	031707	E124.6	041051	W068.9
9766A	B	0615	0732						X	X	X		9765	050439	E097.7	055823	W095.7
9767A	B	0800	0921						X	X	X		9766	065210	E070.8	074555	W122.6
9768A	B	0947	1108						X	X	X		9767	083942	E043.9	093326	W149.5
9769A	B	1132	1248						X	X	X		9768	102714	E017.1	112058	W176.4
9770A	B	1317	1438						X	X	X		9769	121445	W009.8	130830	E156.7
9771A	B	1500	1622						X	X	X		9770	140217	W036.7	145602	E129.9
9772A	B	1645	1801						X	X	X		9771	154949	W063.6	164333	E103.0
9773A	B	1830	1952						X	X	X		9772	173720	W090.5	183105	E076.1
9774A	B	2018	2139						X	X	X		9773	192452	W117.4	201837	E049.2
9775A	B	2206	2322						X	X	X		9774	211224	W144.2	220608	E022.3
													9775	225955	W171.1	235340	W004.6

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
11 JUNE 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRF	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9778R	B	0352	0513						X	X	X		9776	004727	E162.0	014112	W031.4
9779R	B	0538	0654						X	X	X		9777	023459	E135.1	032843	W058.3
9780A	B	0718	0839						X	X	X		9778	042230	E108.2	051615	W085.2
9781A	B	0904	1026						X	X	X		9779	061002	E081.3	070347	W112.1
9782A	B	1050	1213						X	X	X		9780	075734	E054.5	085119	W139.0
9783A	B	1236	1357						X	X	X		9781	094506	E027.6	103850	W165.9
9784A	B	1420	1541						X	X	X		9782	113237	E000.7	122622	E167.3
9785A	B	1630	1726						X	X	X		9783	132009	W026.2	141354	E140.4
9786A	B	1750	1911						X	X	X		9784	150741	W053.1	160125	E113.5
9787A	B	1938	2056						X	X	X		9785	165512	W080.0	174857	E086.6
													9786	184244	W106.8	193629	E059.7
													9787	203016	W133.7	212400	E032.9
													9788	221747	W160.6	231132	E006.0

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TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
12 JUNE 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRF	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9791R	B	0311	0426						X	X	X		9789	000521	E172.5	005906	W020.9
9792R	B	0456	0618						X	X	X		9790	015253	E145.6	024637	W047.8
9793A	B	0637	0755						X	X	X		9791	034024	E118.8	043409	W074.7
9794A	B	0823	0944						X	X	X		9792	052756	E091.9	062141	W101.6
9795A	B	1009	1131						X	X	X		9793	071528	E065.0	080913	W128.5
9796A	B	1155	1317						X	X	X		9794	090300	E038.1	095644	W155.3
9797A	B	1339	1500						X	X	X		9795	105031	E011.2	114416	E177.8
9798A	B	1523	1645						X	X	X		9796	123803	W015.7	133148	E150.9
9799A	B	1707	1828						X	X	X		9797	142535	W042.5	151919	E124.0
9800A	B	1854	2016						X	X	X		9798	161306	W069.4	170651	E097.1
9801A	B	2042	2203						X	X	X		9799	180038	W096.3	185423	E070.3
9802A	B	2231	2349						X	X	X		9800	194810	W123.2	204154	E043.4
													9801	213541	W150.1	222926	E016.5
													9802	232313	W177.0	001658	W010.4

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
13 JUNE 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRF	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9804R	B	0232	0349						X	X	X		9803	011045	E156.2	020430	W037.3
9805R	B	0414	0536						X	X	X		9804	025817	E129.3	035201	W064.2
9807A	B	0742	0902						X	X	X		9805	044548	E102.4	053933	W091.0
9809A	B	1114	1232						X	X	X		9806	063320	E075.5	072705	W117.9
9810A	B	1259	1417						X	X	X		9807	082052	E048.6	091436	W144.8
9811A	B	1442	1602						X	X	X		9808	100823	E021.8	110208	W171.7
9812A	B	1614	1736						X	X	X		9809	115555	W005.1	124940	E161.4
9813A	B	1812	1935						X	X	X		9810	134327	W032.0	143711	E134.6
9814A	B	2000	2121						X	X	X		9811	153058	W058.9	162443	E107.7
9815A	B	2147	2307						X	X	X		9812	171830	W085.8	181215	E080.8
													9813	190602	W112.7	195947	E053.9
													9814	205334	W139.5	214718	E027.0
													9815	224105	W166.4	233450	E000.1

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
14 JUNE 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9818R	B	0334	0455						X	X	X		9816	002837	E166.7	020430	W026.8
9819R	B	0520	0641						X	X	X		9817	021609	E139.8	035201	W053.6
9820A	B	0700	0819						X	X	X		9818	040340	E112.9	053933	W080.5
9822A	B	1032	1155						X	X	X		9819	055112	E086.0	072705	W107.4
9823A	B	1218	1335						X	X	X		9820	073844	E059.2	091436	W134.3
9824A	B	1402	1523						X	X	X		9821	092615	E032.3	110208	W161.2
9825A	B	1549	1707						X	X	X		9822	111347	E005.4	124940	E172.0
9826A	B	1730	1854						X	Y	X		9823	130119	W021.5	143711	E145.1
9827A	B	1918	2034						X	X	X		9824	144850	W048.4	162443	E118.2
9828A	B	2104	2226						X	X	X		9825	163622	W075.3	173007	E091.3
9829A	B	2256	0011						X	X	X		9826	182354	W102.1	191739	E064.4
													9827	201126	W129.0	210510	E037.6
													9828	215857	W155.9	225242	E010.7
													9829	234629	E177.2	004014	W016.2

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
15 JUNE 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9831R	B	0254	0413						X	X	X		9830	013401	E150.3	022945	W043.1
9832R	B	0437	0600						X	X	X		9831	032132	E123.5	041517	W070.0
9833A	B	0619	0736						X	X	X		9832	050904	E096.6	060249	W096.9
9834A	B	0804	0926						X	X	X		9833	065636	E069.7	075021	W123.8
9836A	B	1136	1259						X	X	X		9834	084407	E042.8	093752	W150.6
9837A	B	1347	1425						X	X	X		9835	103139	E015.9	112524	W177.5
9838A	B	1505	1620						X	X	X		9836	121911	W011.0	131256	E155.6
9839A	B	1649	1812						X	X	X		9837	140643	W037.8	150027	E128.7
9840A	B	1835	1958						X	X	X		9838	155414	W064.7	164759	E101.8
9841A	B	2022	2134						X	X	X		9839	174146	W091.6	183531	E075.0
9842A	B	2211	2330						X	X	X		9840	192918	W118.5	202302	E048.1
													9841	211649	W145.4	221034	E021.2
													9842	230421	W172.3	235806	W005.7

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
16 JUNE 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9845R	B	0356	0510						X	X	X		9843	005153	E160.9	014538	W032.6
9846R	B	0542	0703						X	X	X		9844	023924	E134.0	033309	W059.5
9847A	B	0725	0843						X	X	X		9845	042656	E107.1	052041	W086.3
9849A	B	1055	1217						X	X	X		9846	061428	E080.2	070813	W113.2
9850A	B	1240	1352						X	X	X		9847	080200	E053.3	085544	W140.1
9851A	B	1424	1545						X	X	X		9848	094931	E026.5	104316	W167.0
9852A	B	1608	1731						X	X	X		9849	113703	W000.4	123048	E166.1
9853A	B	1753	1916						X	X	X		9850	132435	W027.3	141819	E139.3
9854A	B	1942	2055						X	X	X		9851	151206	W054.2	160551	E112.4
9855A	B	2127	2248						X	X	X		9852	165938	W081.1	175323	E085.5
													9853	184710	W108.0	194054	E058.6
													9854	203441	W134.8	212826	E031.7
													9855	222213	W161.7	231558	E004.8

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
17 JUNE 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9858R	B	0316	0436						X	X	X		9856	000945	E171.4	010330	W022.1
9859R	B	0502	0623						X	X	X		9857	015716	E144.5	025101	W048.9
9860A	B	0641	0757						X	X	X		9858	034448	E117.6	043833	W075.8
9862A	B	1013	1128						X	X	X		9859	053220	E090.7	062605	W102.7
9863A	B	1159	1321						X	X	X		9860	071952	E063.9	081336	W129.6
9864A	B	1344	1504						X	X	X		9861	090723	E037.0	100108	W156.5
9865A	B	1527	1649						X	X	X		9862	105455	E010.1	114840	E176.7
9866A	B	1712	1831						X	X	X		9863	124227	W016.8	133611	E149.8
9867A	B	1858	2009						X	X	X		9864	142958	W043.7	152343	E122.9
9868A	B	2046	2206						X	X	X		9865	161730	W070.6	171115	E096.0
9869A	B	2235	2352						X	X	X		9866	180502	W097.4	185847	E069.1
													9867	195233	W124.3	204618	E042.3
													9868	214005	W151.2	223350	E015.4
													9869	232737	W178.1	002122	W011.5

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
18 JUNE 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9871R	B	0236	0353						X	X	X		9870	011509	E155.0	020853	W038.4
9872R	B	0418	0542						X	X	X		9871	030240	E128.2	035625	W065.3
9873A	B	0600	0704						X	X	X		9872	045012	E101.3	054357	W092.2
9874A	B	0748	0906						X	X	X		9873	063744	E074.4	073129	W119.1
9875A	B	0932	1054						X	X	X		9874	082515	E047.5	091900	W145.9
9876A	B	1118	1240						X	X	X		9875	101247	E020.6	110632	W172.8
9877A	B	1302	1424						X	X	X		9876	120019	W006.3	125404	E160.3
9878A	B	1447	1608						X	X	X		9877	134750	W033.1	144135	E133.4
9880A	B	1816	1939						X	X	X		9878	153522	W060.0	162907	E106.5
9881A	B	2005	2125						X	X	X		9879	172254	W086.9	181639	E079.7
9882A	B	2151	2310						X	X	X		9880	191026	W113.8	200410	E052.8
													9881	205757	W140.7	215142	E025.9
													9882	224529	W167.6	233914	W001.0

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
19 JUNE 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9885R	B	0338	0459						X	X	X		9883	003300	E165.6	012645	W027.9
9886R	B	0524	0645						X	X	X		9884	022032	E138.7	031417	W054.8
9887A	B	0704	0836						X	X	X		9885	040804	E111.8	050148	W081.6
9888A	B	0851	1011						X	X	X		9886	055535	E084.9	064920	W108.5
9889A	B	1036	1159						X	X	X		9887	074307	E058.0	083652	W135.4
9890A	B	1222	1343						X	X	X		9888	093039	E031.2	102423	W162.3
9891A	B	1406	1527						X	X	X		9889	111810	E004.3	121155	E170.8
9892A	B	1550	1710						X	X	X		9890	130542	W022.6	135927	E144.0
9893A	B	1735	1857						X	X	X		9891	145314	W049.5	154659	E117.1
9894A	B	1922	2043						X	X	X		9892	164046	W076.4	173430	E090.2
9895A	B	2108	2229						X	X	X		9893	182817	W103.3	192202	E063.3
9896A	B	2301	0014						X	X	X		9894	201549	W130.1	210934	E036.4
													9895	220321	W157.0	225705	E009.5
													9896	235052	E176.1	004437	W017.3

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TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
20 JUNE 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9898R	B	0258	0418						X	X	X		9897	013824	E149.2	023209	W044.2
9899R	B	0442	0605						X	X	X		9898	032556	E122.3	041940	W071.1
9900A	B	0623	0741						X	X	X		9899	051327	E095.5	060712	W098.0
9901A	B	0808	0930						X	X	X		9900	070059	E068.6	075444	W124.9
9902A	B	0955	1117						X	X	X		9901	084831	E041.7	094215	W151.8
9904A	B	1325	1446						X	X	X		9902	103602	E014.8	112947	W178.6
9905A	B	1510	1631						X	X	X		9903	122334	W012.1	131719	E154.5
9906A	B	1654	1816						X	X	X		9904	141106	W039.0	150451	E127.6
9907A	B	1839	2002						X	X	X		9905	155838	W065.9	165222	E100.7
9908A	B	2027	2147						X	X	X		9906	174609	W092.7	183954	E073.8
9909A	B	2215	2332						X	X	X		9907	193341	W119.6	202726	E047.0
													9908	212113	W146.5	221457	E020.1
													9909	230844	W173.4	000229	W006.8

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
21 JUNE 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9912R	B	0400	0522						X	X	X		9910	005616	E159.7	015001	W033.7
9913R	B	0547	0707						X	X	X		9911	024348	E132.9	033732	W060.6
9914A	B	0727	0845						X	X	X		9912	043119	E106.0	052504	W087.5
9915A	B	0914	1035						X	X	X		9913	061851	E079.1	071236	W114.3
9916A	B	1059	1222						X	X	X		9914	080623	E052.2	090008	W141.2
9917A	B	1245	1403						X	X	X		9915	095354	E025.3	104739	W168.1
9918A	B	1430	1550						X	X	X		9916	114126	W001.6	123511	E165.0
9919A	B	1612	1734						X	X	X		9917	132858	W028.4	142243	E138.1
9920A	B	1757	1920						X	X	X		9918	151630	W055.3	161014	E111.3
9921A	B	1945	2106						X	X	X		9919	170401	W082.2	175746	E084.4
9922A	B	2132	2252						X	X	X		9920	185122	W109.1	194518	E057.5
													9921	203905	W136.0	213249	E030.6
													9922	222636	W162.9	232021	E003.7

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
22 JUNE 1977

INT ORBIT AND STDN	H D R S	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	L R I R	T H I R	T D R E	S C A M	E S M R	E R B	P M R	T W R L	H I R S	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9925R	B	0320	0441						X	X	X		9923	001408	E170.3	010753	W023.2
9926R	B	0505	0627						X	X	X		9924	020140	E143.4	025524	W050.1
9927A	B	0646	0805						X	X	X		9925	034911	E116.5	044256	W076.9
9928A	B	0831	0953						X	X	X		9926	053643	E089.6	063028	W103.8
9929A	B	1018	1140						X	X	X		9927	072415	E062.7	081759	W130.7
9930A	B	1203	1319						X	X	X		9928	091146	E035.9	100531	W157.6
9931A	B	1348	1509						X	X	X		9929	105918	E009.0	115303	E175.5
9932A	B	1532	1642						X	X	X		9930	124650	W017.9	134034	E148.7
9933A	B	1716	1838						X	X	X		9931	143422	W044.8	152806	E121.8
9934A	B	1903	2018						X	X	X		9932	162153	W071.7	171538	E094.9
9935A	B	2050	2211						X	X	X		9933	180925	W098.6	190310	E068.0
9936A	B	2240	2356						X	X	X		9934	195657	W125.4	205041	E041.1
													9935	214428	W152.3	223813	E014.2
													9936	233200	W179.2	002545	W012.6

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
23 JUNE 1977

INT ORBIT AND STDN	H D R S	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	L R I R	T H I R	T D R E	S C A M	E S M R	E R B	P M R	T W R L	H I R S	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9938R	B	0242	0357						X	X	X		9937	011932	E153.9	021316	W039.5
9939R	B	0423	0545						X	X	X		9938	030703	E127.0	040048	W066.4
9940A	B	0605	0720						X	X	X		9939	045435	E100.2	054820	W093.3
9941A	B	0750	0903						X	X	X		9940	064207	E073.3	073552	W120.2
9942A	B	0936	1050						X	X	X		9941	082938	E046.4	092323	W147.1
9943A	B	1122	1236						X	X	X		9942	101710	E019.5	111055	W173.9
9944A	B	1307	1422						X	X	X		9943	120442	W007.4	125826	E159.2
9945A	B	1451	1607						X	X	X		9944	135214	W034.3	144558	E132.3
9946A	B	1635	1748						X	X	X		9945	153945	W061.1	163330	E105.4
9947A	B	1820	1936						X	X	X		9946	172717	W088.0	182102	E078.5
9948A	B	2008	2119						X	X	X		9947	191449	W114.9	200833	E051.7
9949A	B	2156	2311						X	X	X		9948	210220	W141.8	215605	E024.8
													9949	224952	W168.7	234337	W002.1

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
24 JUNE 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9952R	B	0342	0503						X	X	X		9950	003724	E164.4	013108	W029.0
9953R	B	0528	0649						X	X	X		9951	022455	E137.6	031840	W055.9
9954A	B	0708	0828						X	X	X		9952	041227	E110.7	050612	W082.8
9955A	B	0854	1016						X	X	X		9953	055959	E083.8	065343	W109.6
9956A	B	1040	1203						X	X	X		9954	074730	E056.9	084115	W136.5
9957A	B	1226	1339						X	X	X		9955	093502	E030.0	102847	W163.4
9958A	B	1411	1531						X	X	X		9956	112234	E003.2	121618	E169.7
9959A	B	1555	1715						X	X	X		9957	131005	W023.7	140350	E142.8
9960A	B	1739	1901						X	X	X		9958	145737	W050.6	155122	E116.0
9961A	B	1927	2032						X	X	X		9959	164509	W077.5	173853	E089.1
9962A	B	2114	2233						X	X	X		9960	183241	W104.4	192625	E062.2
9963A	B	2306	0009						X	X	X		9961	202012	W131.3	211357	E035.3
													9962	220744	W158.2	230129	E008.4
													9963	235516	E175.0	004900	W018.5

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
25 JUNE 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9965R	B	0302	0420						X	X	X		9964	014247	E148.1	023632	W045.4
9966R	B	0446	0551						X	X	X		9965	033019	E121.2	042404	W072.2
9967A	B	0627	0744						X	X	X		9966	051751	E094.3	061135	W099.1
9969A	B	0959	1114						X	X	X		9967	070522	E067.4	075907	W126.0
9970A	B	1146	1307						X	X	X		9968	085254	E040.6	094639	W152.9
9971A	B	1330	1451						X	X	X		9969	104026	E013.7	113410	W179.8
9972A	B	1514	1635						X	X	X		9970	122757	W013.2	132142	E153.4
9973A	B	1658	1820						X	X	X		9971	141529	W040.1	150914	E126.5
9974A	B	1843	2006						X	X	X		9972	160301	W067.0	165645	E099.6
9975A	B	2031	2152						X	X	X		9973	175033	W093.9	184417	E072.7
9976A	B	2220	2337						X	X	X		9974	193804	W120.7	203149	E045.8
													9975	212536	W147.6	221920	E019.0
													9976	231303	W174.5	000652	W007.9

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
26 JUNE 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9979R	B	0404	0518						X	X	X		9977	010039	E158.6	015424	W035.8
9980R	B	0551	0705						X	X	X		9978	024811	E131.7	034156	W061.7
9981A	B	0731	0852						X	X	X		9979	043543	E104.9	052927	W088.6
9982A	B	0918	1039						X	X	X		9980	062314	E078.0	071659	W115.5
9983A	B	1103	1226						X	X	X		9981	081046	E051.1	090431	W142.4
9984A	B	1250	1411						X	X	X		9982	095818	E024.2	105202	W169.2
9985A	B	1434	1554						X	X	X		9983	114549	W002.7	123934	E163.9
9986A	B	1616	1733						X	X	X		9984	133321	W029.6	142706	E137.0
9987A	B	1802	1924						X	X	X		9985	152053	W056.4	161437	E110.1
9988A	B	1950	2110						X	X	X		9986	170825	W083.3	180209	E083.2
9989A	B	2136	2256						X	X	X		9987	185556	W110.2	194941	E056.4
													9988	204328	W137.1	213712	E029.5
													9989	223100	W164.0	232444	E002.6

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
27 JUNE 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
9992R	B	0324	0437						X	X	X		9990	001831	E169.1	011216	W024.3
9993R	B	0510	0624						X	X	X		9991	020603	E142.3	025947	W051.2
9994A	B	0650	0810						X	X	X		9992	035335	E115.4	044719	W078.1
9995A	B	0836	0958						X	X	X		9993	054106	E088.5	063451	W104.9
9996A	B	1022	1144						X	X	X		9994	072838	E061.6	082223	W131.8
9997A	B	1208	1330						X	X	X		9995	091610	E034.7	100954	W158.7
9998A	B	1352	1513						X	X	X		9996	110341	E007.9	115726	E174.4
9999A	B	1536	1658						X	X	X		9997	125113	W019.0	134458	E147.5
10000A	B	1720	1843						X	X	X		9998	143845	W045.9	153229	E120.7
10001A	B	1914	2011						X	X	X		9999	162617	W072.8	172001	E093.8
10002A	B	2054	2211						X	X	X		10000	181348	W099.7	190733	E066.9
10003A	B	2246	0000						X	X	X		10001	200120	W126.6	205504	E040.0
													10002	214852	W153.4	224236	E013.1
													10003	233623	E179.7	003008	W013.8

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TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
28 JUNE 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRF	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
10005R	B	0246	0356						X	X	X		10004	012359	E152.8	021745	W041.0
10006R	B	0427	0550						X	X	X		10005	031131	E125.9	040517	W067.5
10007A	B	0610	0725						X	X	X		10006	045902	E099.0	055248	W094.4
10008A	B	0754	0916						X	X	X		10007	064634	E072.2	074020	W121.2
10009A	B	0940	1044						X	X	X		10008	083406	E045.3	092752	W148.1
10010A	B	1129	1249						X	X	X		10009	102137	E018.4	111523	W175.0
10011A	B	1311	1432						X	X	X		10010	120909	W008.5	130255	E158.1
10012A	B	1455	1617						X	X	X		10011	135641	W035.4	145027	E131.2
10013A	B	1639	1802						X	X	X		10012	154413	W062.3	163759	E104.3
10014A	B	1824	1947						X	X	X		10013	173144	W089.2	182530	E077.4
10015A	B	2014	2133						X	X	X		10014	191916	W116.0	201302	E050.6
10016A	B	2200	2315						X	X	X		10015	210648	W142.9	220034	E023.7
													10016	225419	W169.8	234801	W003.2

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
29 JUNE 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
10019R	B	0346	0508						X	X	X		10017	004151	E163.3	013537	W030.1
10020R	B	0532	0653						X	X	X		10018	022923	E136.4	032309	W057.0
10021A	B	0714	0833						X	X	X		10019	041654	E109.6	051040	W083.8
10022A	B	0859	1020						X	X	X		10020	060426	E082.7	065812	W110.7
10023A	B	1046	1207						X	X	X		10021	075158	E055.8	084544	W137.6
10024A	B	1231	1352						X	X	X		10022	093930	E028.9	103316	W164.5
10025A	B	1415	1536						X	X	X		10023	112701	E002.0	122047	E168.6
10026A	B	1558	1720						X	X	X		10024	131433	W024.9	140819	E141.7
10027A	B	1743	1906						X	X	X		10025	150205	W051.7	155551	E114.9
10028A	B	1931	2052						X	X	X		10026	164936	W078.6	174322	E088.0
10029A	B	2118	2222						X	X	X		10027	183708	W105.5	193054	E061.1
													10028	202440	W132.4	211826	E034.2
													10029	221212	W159.3	230558	E007.3
													10030	235943	E173.9	005329	W019.5

TABLE 2-2
DATA AVAILABILITY ON-OFF TIMES
30 JUNE 1977

INT ORBIT AND STDN	HDRS	HDRSS TIME ON HRMN	HDRSS TIME OFF HRMN	LRIR	THIR	TDRE	SCAM	ESMR	ERB	PMR	TWRL	HIRS	DATA ORBIT	ASCENDING NODE TIME HRMNSS	ASCENDING NODE LONG DEGREE	DESCENDING NODE TIME HRMNSS	DESCENDING NODE LONG DEGREE
10032R	B	0306	0426						X	X	X		10031	014715	E147.0	024101	W046.4
10033R	B	0451	0612						X	X	X		10032	033447	E120.1	042833	W073.3
10034A	B	0632	0750						X	X	X		10033	052218	E093.2	061604	W100.2
10035A	B	0817	0939						X	X	X		10034	070950	E066.3	080336	W127.1
10036A	B	1003	1126						X	X	X		10035	085722	E039.4	095108	W154.0
10037A	B	1150	1303						X	X	X		10036	104453	E012.6	113839	E179.2
10038A	B	1334	1455						X	X	X		10037	123225	W014.3	132611	E152.3
10039A	B	1518	1639						X	X	X		10038	141957	W041.2	151343	E125.4
10040A	B	1702	1825						X	X	X		10039	160729	W068.1	170115	E098.5
10041A	B	1848	2011						X	X	X		10040	175500	W095.0	184846	E071.6
10042A	B	2035	2156						X	X	X		10041	194232	W121.9	203618	E044.7
10043A	B	2226	2343						X	X	X		10042	213004	W148.7	222350	E017.9
													10043	231735	W175.6	001121	W009.0

SECTION 3

CURRENT STATUS REPORT OF THE AVAILABLE IMAGE DISPLAYS FOR THE HIRS, SCAMS AND ESMR SUBSYSTEMS

This section briefly describes the HIRS, SCAMS and ESMR experiments, explains the current status of the image displays as pertains to the Electronic Image System and presents information relative to data availability. Complete descriptions of the HIRS, SCAMS, and ESMR experiments are found in Sections 3, 4, and 5, respectively, of The Nimbus 6 User's Guide.

The HIRS is a 17-channel radiometer. Sixteen channels have central wavelengths between 3.7 μm and 15 μm, and one is centered at 0.69 μm to measure reflected sunlight. Spatial resolution at the nadir on the earth's surface is about 25 km (13 n.m.).

The SCAMS is a 5-channel scanning radiometer. Channel 1 lies on a water vapor line near 22 GHz. Channel 2 is on an atmospheric window near 32 GHz. Channels 3, 4, and 5 are within the oxygen band near 54 GHz. Spatial resolution varies from about 145 km (80 n.m.) near nadir to about 330 km (180 n.m.) at the scan limits.

The ESMR is a two-channel scanning radiometer receiving microwave radiation in a 250 MHz band centered at 37 GHz. One channel is used to measure the vertical polarization of the radiation, and the other measures the horizontal polarization. The antenna beam scans ahead of the spacecraft along a conical surface with a constant angle of 45 degrees with respect to the antenna axis. Spatial resolution of each element is about 20 km in the cross-track direction by 45 km in the direction parallel to the subpoint track.

All HIRS, SCAMS, and ESMR data are converted to 4" x 5" black and white images. Selected EIS images for each HIRS and SCAMS for the period June 1975 through June 1976 may be found in Section 3, Data Catalog Volumes 1 through 6 respectively. ESMR image data are available through orbit 9091 (20 April 1977) Data Catalog Volume 11. Complete coverage times for each experiment are listed in the Data Availability On-Off Times Table 2-2 for each respective Catalog mentioned above. For a complete set of Tables as previously presented in this section for the HIRS, SCAMS, and ESMR subsystems, please refer to Section 5 of this catalog.

SECTION 4

TEMPERATURE HUMIDITY INFRARED RADIOMETER MONTAGES

The Nimbus 6 Temperature Humidity Infrared Radiometer (THIR) subsystem is of the same design and operation as the THIR flown on Nimbus 4 and 5. The two-channel scanning radiometer measures earth radiation in two spectral bands. A 10.3 μm to 12.5 μm window channel provides an image of the cloud cover, and temperatures of the cloud tops, land, and ocean surfaces. A 6.5 μm to 7.1 μm (6.7 μm) channel provides information on the moisture content of the upper troposphere and stratosphere, and the location of jet streams and frontal systems. Ground resolution at the satellite subpoint is 8.2 km for the 11.5 μm channel and 22.5 km for the 6.7 μm channel. Both channels operate continuously to provide day and night global coverage. However, with only HDRSS recorder (B) available for part-time use on the satellite, gaps in global coverage occur over "blind" orbit areas, and sometimes over the Rosman and Alaska STDN stations, when the tape data are being transmitted to the ground. The blind orbits occur during a daytime pass over the western part of the Pacific Ocean and during a nighttime pass over the eastern part of the Atlantic Ocean. (Additionally, with the limited part-time (65 minutes) coverage by the HDRSS (B), nighttime passes north of the Equator are of limited duration.) These blind orbit areas happen when the Orroral, Australia is not available for playback of recorded data. Then the time between successive playbacks of the tape recorder becomes longer than the reduced record capability of HDRSS (B).

This section pictorially documents the data from the THIR. Section 4.1 contains all nighttime THIR 11.5 μm and 6.7 μm montages and Section 4.2 contains all daytime THIR 11.5 μm and 6.7 μm montages, arranged in chronological order. Key latitudes can be read from the superimposed grids. Grid points are identified where each swath crosses 60°N, 30°N, EQUATOR, 30°S and 60°S.

Vellum Location Guide overlays, attached to the back of this document, are to be used for general orientation with the data presented in each THIR montage. Proper alignment of the overlay grid is accomplished by matching the grid indices on the equator with the two "T" marks on each montage.

THIR photographic data and/or digital data can be ordered through the National Space Science Data Center (NSSDC), Code 601, Goddard Space Flight Center, Greenbelt, Maryland 20771.

THIR photographic data consist of 70 mm film strips produced from the radiometer output signals. The gray shades in each image correspond to temperature variations of the land, sea, and clouds. On a film positive the lightest tones represent cold temperatures, while the darkest tones represent warm temperatures. THIR photographic data are archived in separate 6.7 μm and 11.5 μm daytime and nighttime swaths. The approximate coverage of a full swath is from pole to pole.

When ordering THIR photographic data from NSSDC the following information should be given:

- Satellite (e.g. Nimbus 6)
- Date of data
- Data orbit number, channel (11.5 μm or 6.7 μm), and whether day or night data
- Data format, i.e., positive or negative transparencies, or prints
- Area of interest defined by latitude and longitude

In addition to the THIR film strips, photographic copies of the daily day or night montages prepared from film strips can be obtained.

Quantitative digital data are obtained when the original analog signals are digitized with full fidelity, and processed by an IBM 360 computer, where calibration and geographic referencing are applied. Each reduced radiation data tape prepared by the IBM 360 is called a Nimbus Meteorological Radiation Tape-THIR (NMRT-THIR). The NMRT can be used to generate grid print maps or to accomplish special scientific analyses. The format of this tape may be found in The Nimbus 6 User's Guide, Section 2.

Due to the large volume and the long computer running time required for processing THIR into NMRTs, Nimbus 6 THIR digital data are not routinely reduced to final NMRT format. Only those data which are specifically requested by the user will be processed. Requests should be made through NSSDC. The user is urged to make full use of the film strips which are abundantly available in nearly real time from the NSSDC.

A series of programs at GSFC produce printed and contoured data referenced to a grid on Polar Stereographic or Mercator map bases. These are called grid print maps. The advantages of the grid print map presentation are the display of absolute values of temperatures in their approximate location and geographical rectification of the data. Grid print maps may be produced for either a single orbit or a composite of several orbits. The following standard options are available and should be specified when requesting grid print maps from NSSDC.

- Map and Approximate Scale

  a. Polar Stereographic, 1:30 million

  b. Polar Stereographic, 1:10 million

  c. Multi-resolution Mercator maps are available down to 1:1 million scale.

- Maximum Scan Angle (50 degrees is practical limit)

- Field Values and Contouring. Unless otherwise specified, all maps will include field values and contouring except Mercator maps of scales larger than 1:20 million. A data population map, indicating the number of individual measurements contained in each grid point average, as well as a latitude-longitude description for geographically locating the data, will be provided along with each grid print map.

When ordering grid print map data, the following identifying information should be given:

- Satellite (e.g., Nimbus 6)
- Sensor (THIR)
- Channel (6.7 μm or 11.7 μm)
- Data Orbit Number
- Calendar Date of Equator Crossing
- Beginning and Ending Times of Data in GMT
- Latitude and Longitude Limits of Area of Interest
- Map Type and Map Scale
- Scan Angle Limits
- Contouring or No Contouring of Data Points

When ordering NMRTs, the "Calendar Date of Equator Crossing" and "Map Type and Map Scale" can be omitted.

Beginning and ending times of data in GMT can be interpolated using Table 4-1 which gives the elapsed time from either ascending or descending node as a function of latitude. These elapsed time values can be appropriately added or subtracted from node times given in Table 2-2.

A complete description of the THIR experiment may be found in The Nimbus 6 User's Guide, Section 2.

Table 4-1

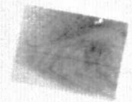
Latitude Versus Minutes From
Ascending or Descending Node

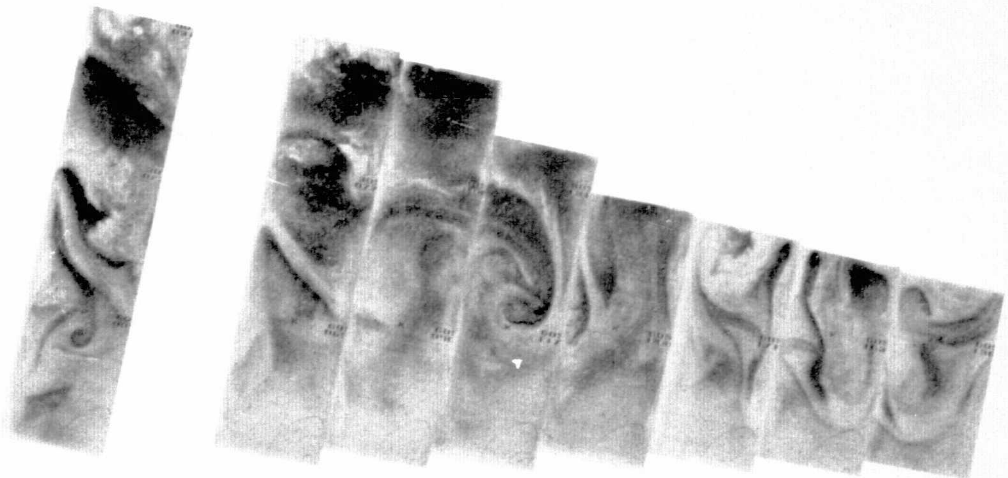
Latitude from AN or DN	Minutes and Seconds from AN or DN
0	0:00
5	1:31
10	3:02
15	4:33
20	6:03
25	7:34
30	9:05
35	10:36
40	12:08
45	13:40
50	15:12
55	16:44
60	18:18
65	19:52
70	21:33
75	23:26
78	24:44
80.1	26:49
78	29:00
75	30:09
70	31:51
65	33:35

SECTION 4.1

TEMPERATURE HUMIDITY INFRARED RADIOMETER

NIGHTTIME MONTAGES

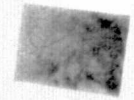


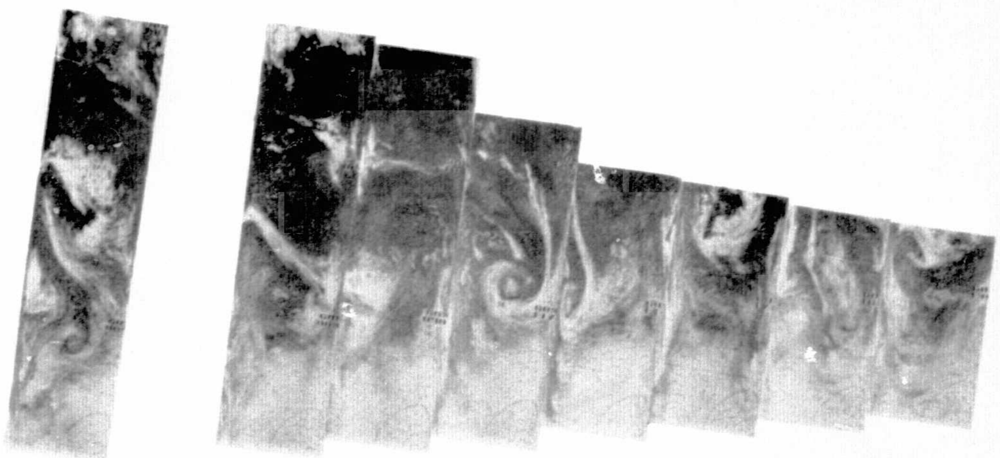


9239 9238 9237 9236 9235 9234 9233 9232 9231 9230 9229 9228 9227

1 MAY 1977

6.7μm

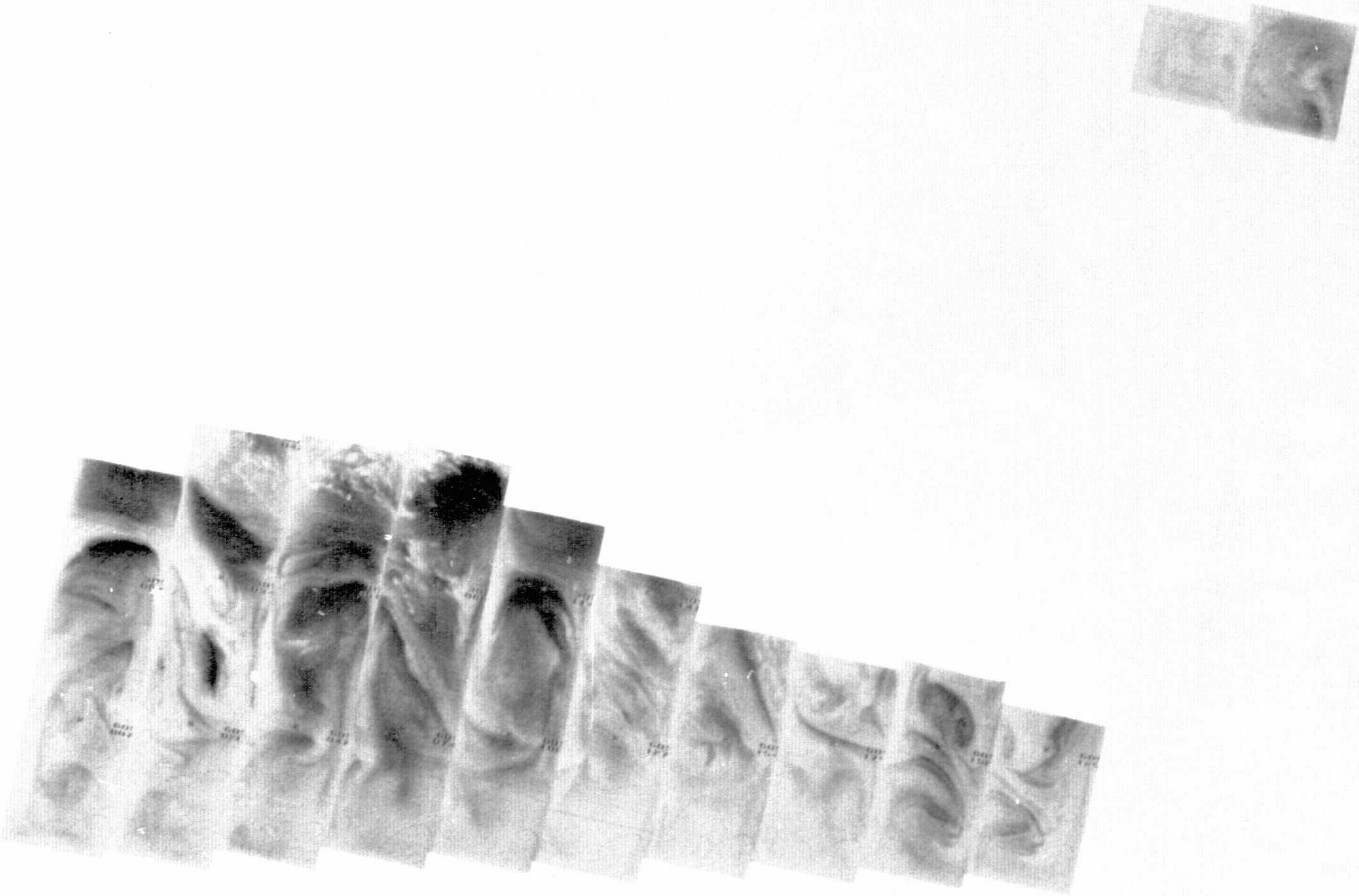




9239 9238 9237 9236 9235 9234 9233 9232 9231 9230 9229 9228 9227

1 MAY 1977

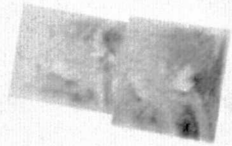
11.5μm

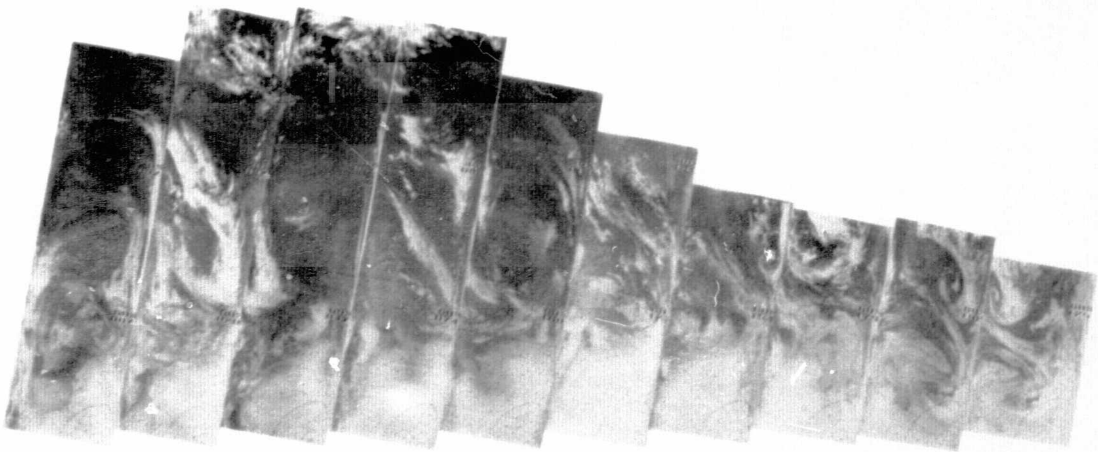


9253 9252 9251 9250 9249 9248 9247 9246 9245 9244 9243 9242 9241 9240

2 MAY 1977

6.7μm





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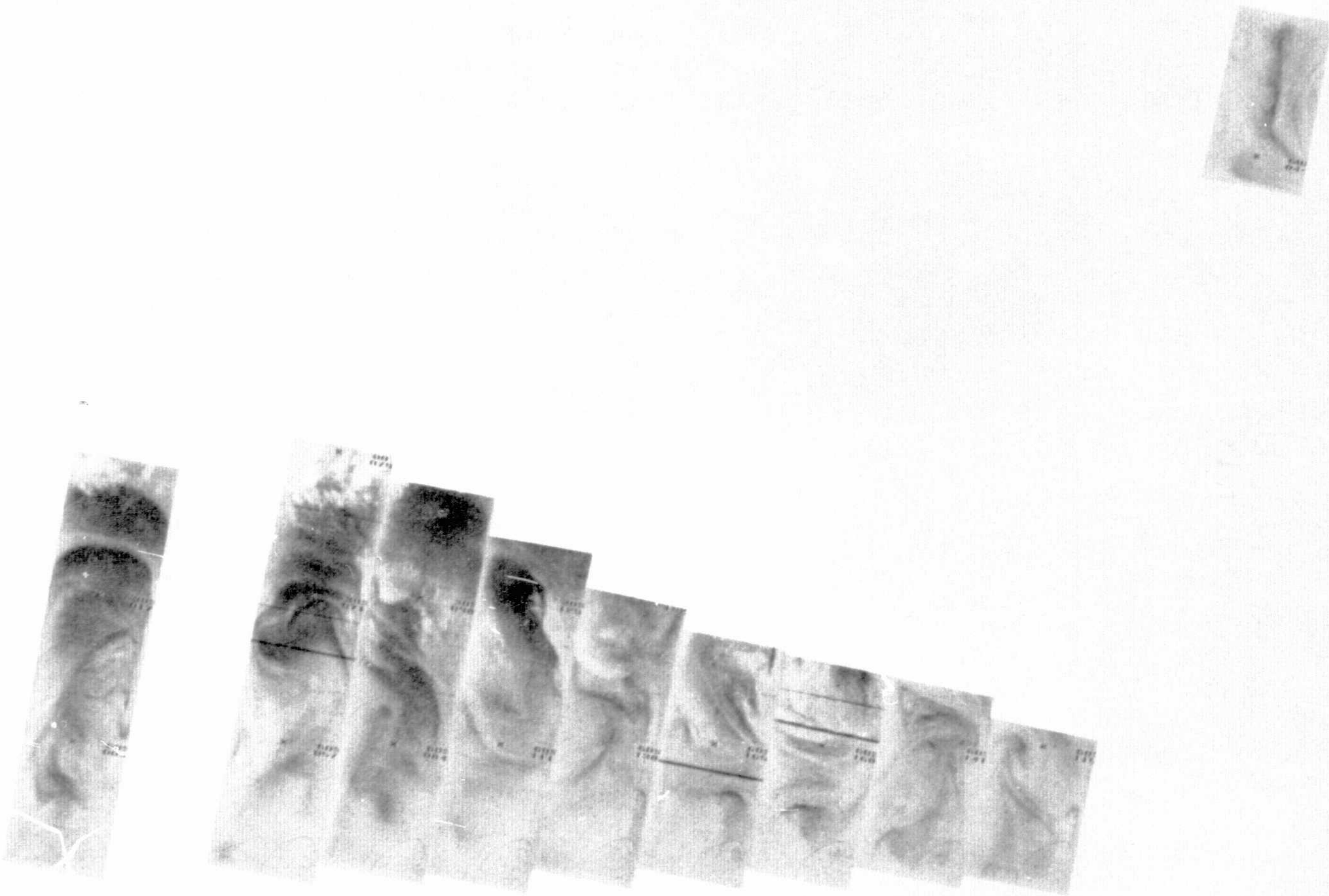
2 MAY 1977

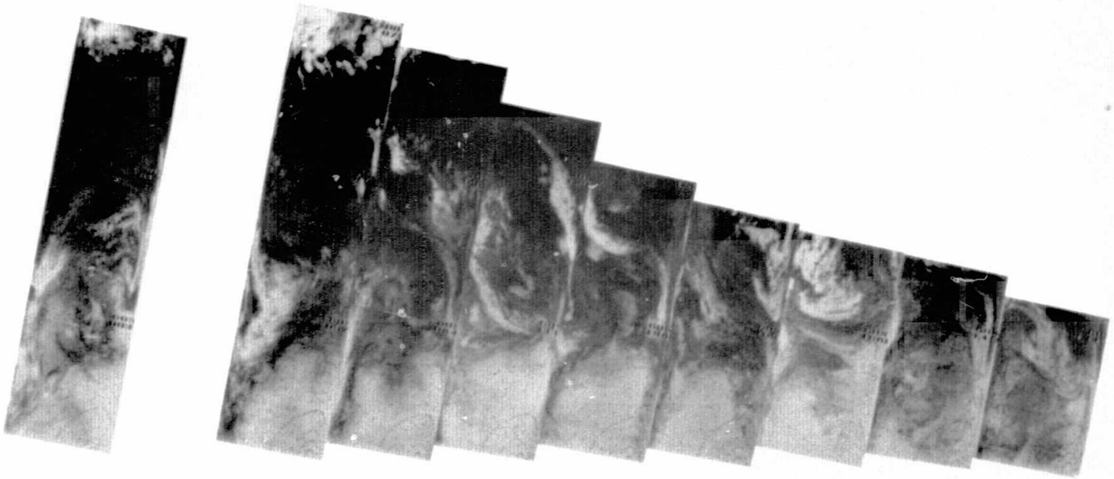
11.5μm

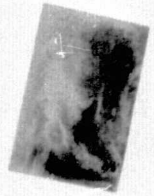


9266 9265 9264 9263 9262 9261 9260 9259 9258 9257 9256 9255 9254

3 MAY 1977

6.7μm





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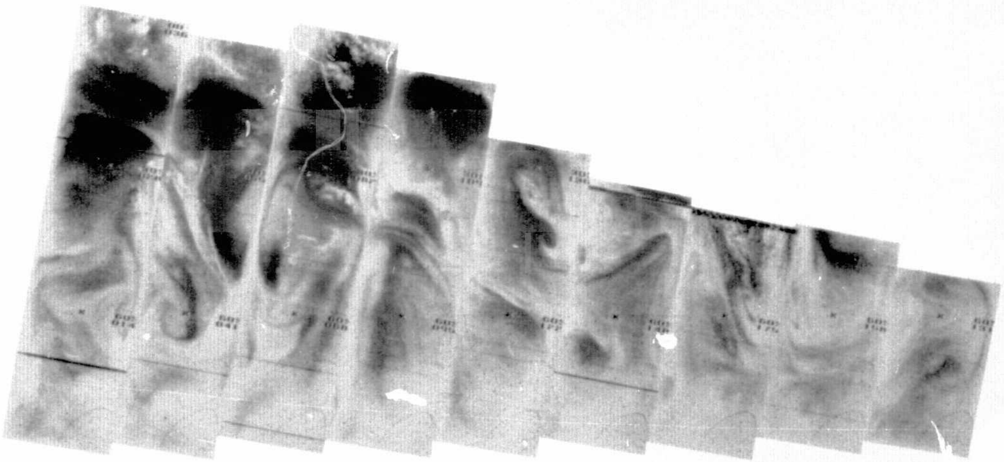
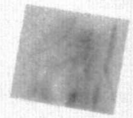
3 MAY 1977

11.5μm

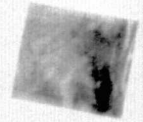


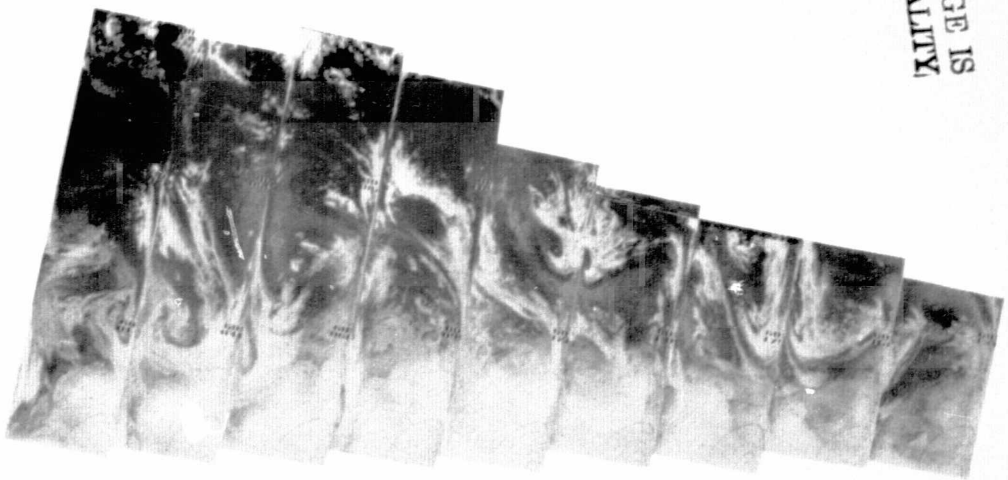


9280 9279 9278 9277 9276 9275 9274 9273 9272 9271 9270 9269 9268 9267

4 MAY 1977

6.7μm





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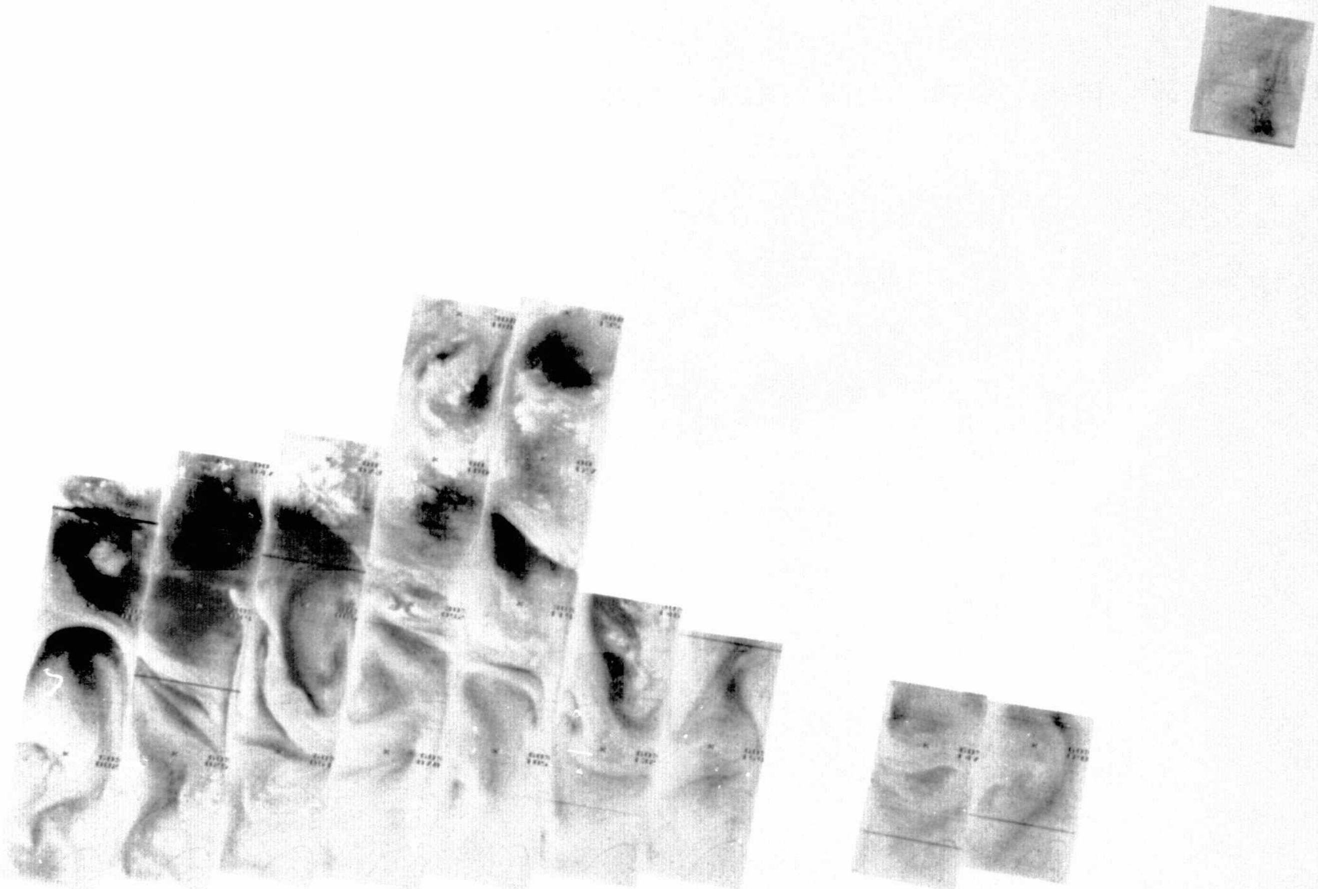
4 MAY 1977

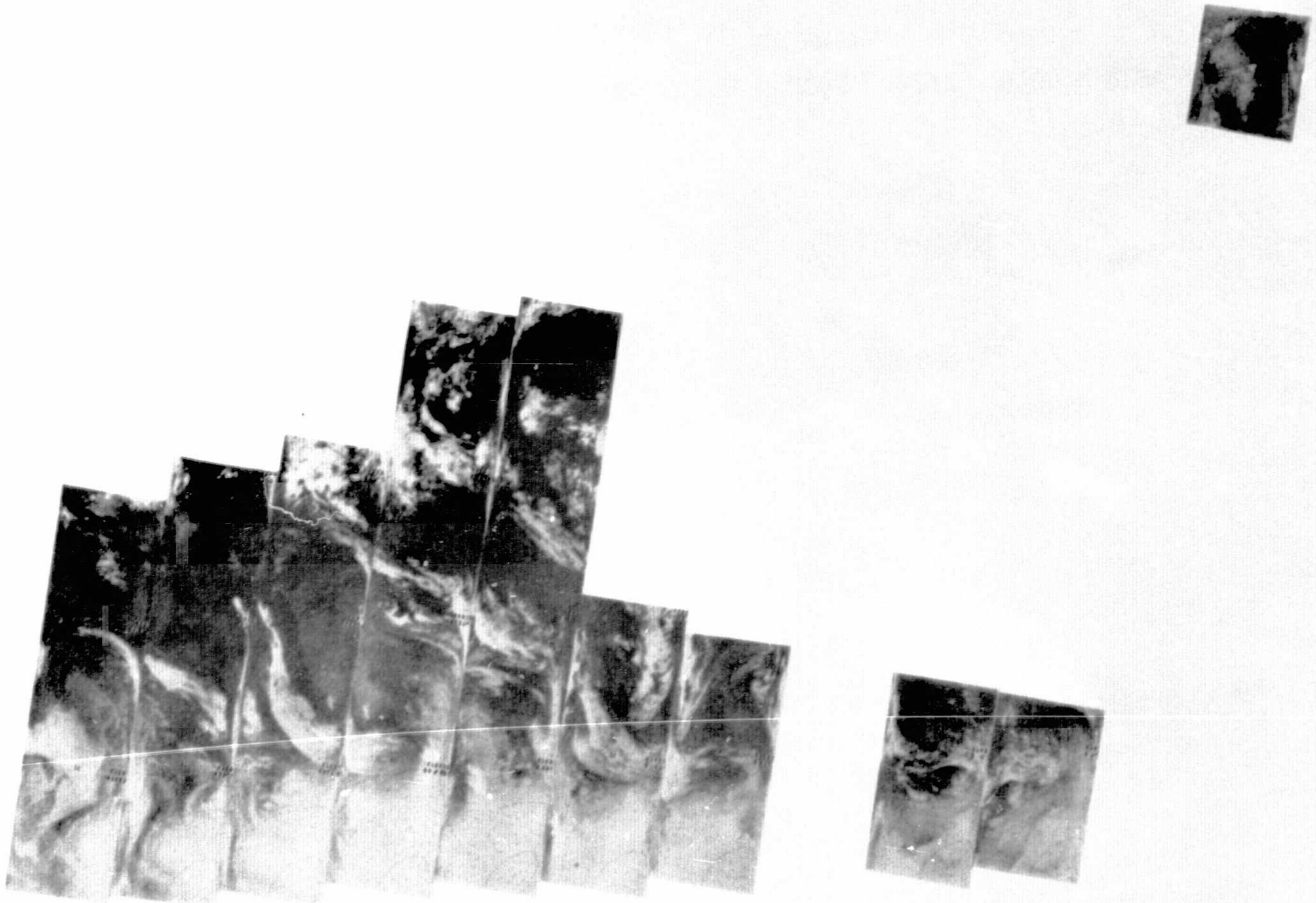
11.5μm



9293 9292 9291 9290 9289 9288 9287 9286 9285 9284 9283 9282 9281

5 MAY 1977

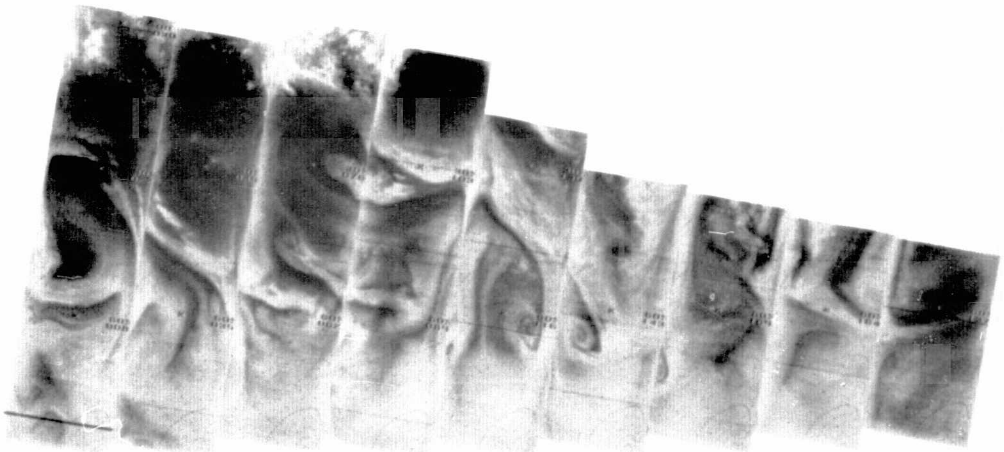
6.7μm



9293 9292 9291 9290 9289 9288 9287 9286 9285 9284 9283 9282 9281

5 MAY 1977

11.5μm



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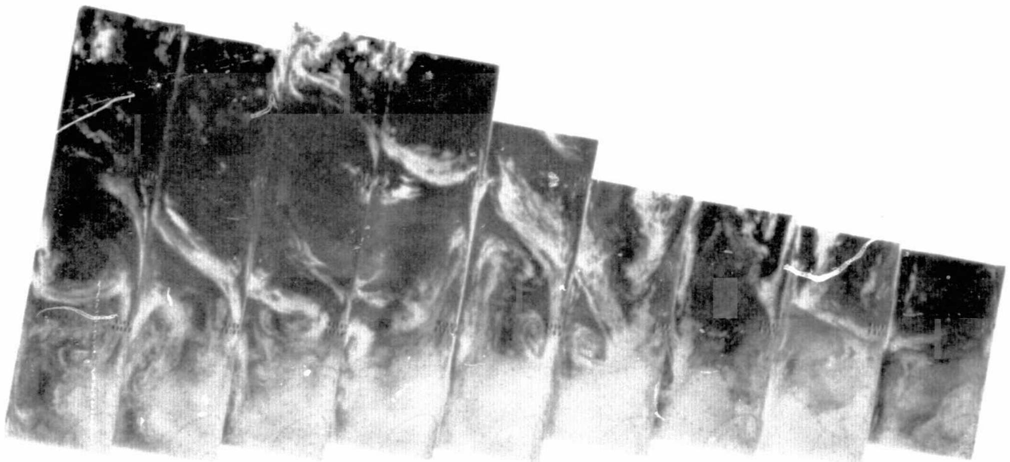
6 MAY 1977

6.7μm



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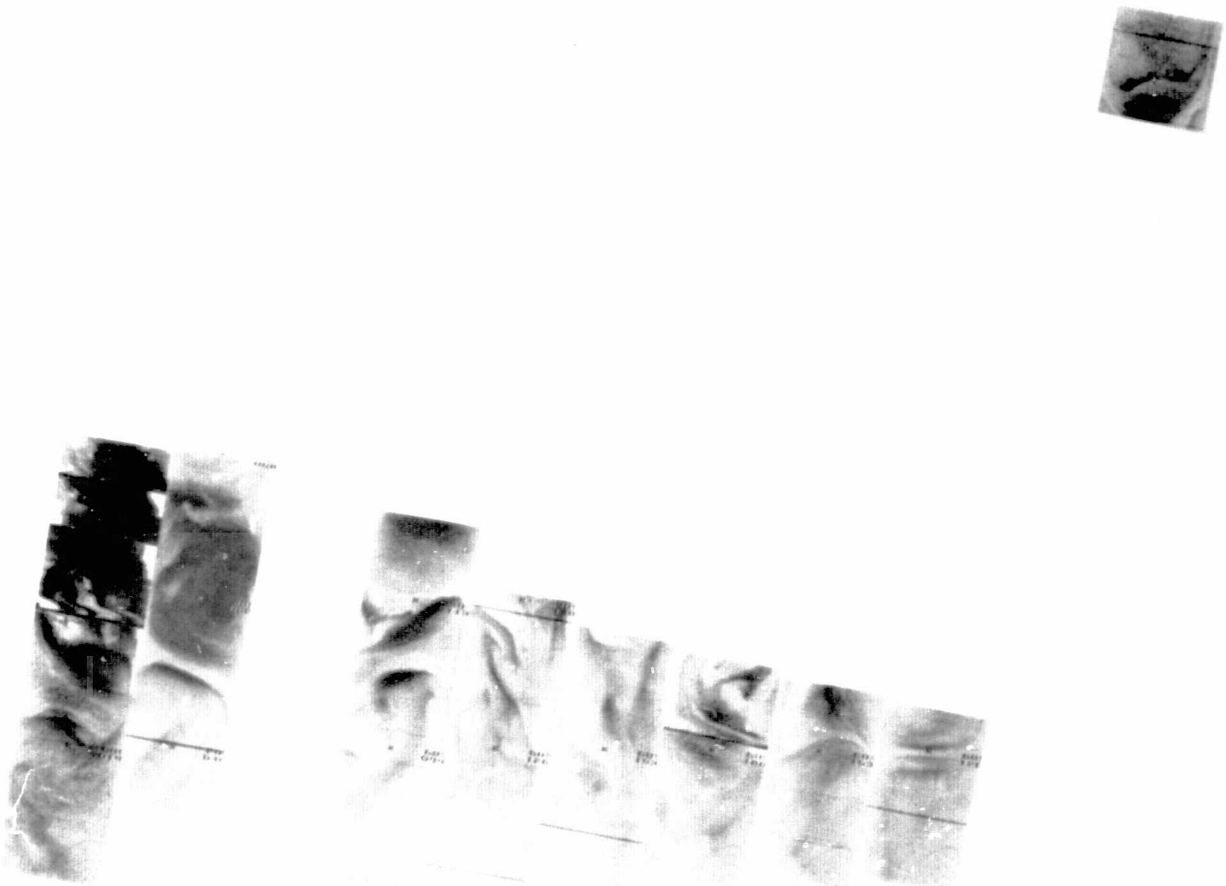
6 MAY 1977

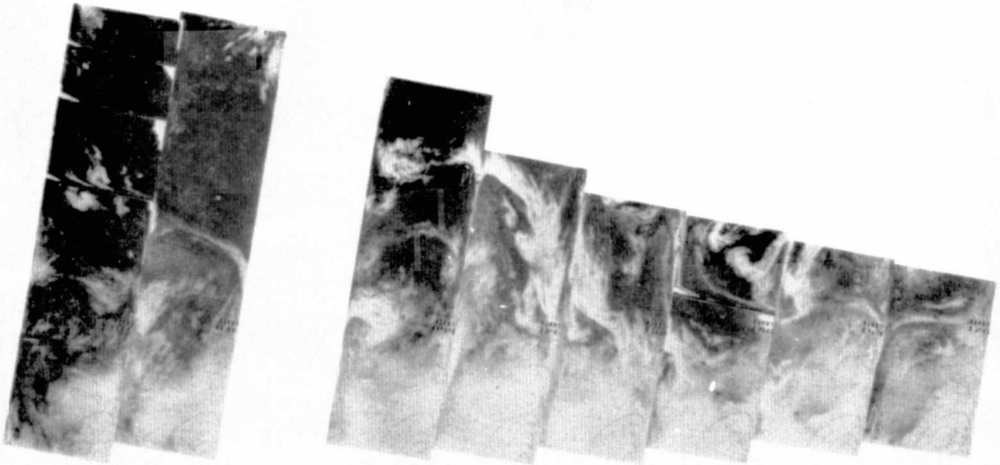
11.5μm

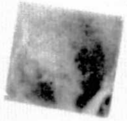


9320 9319 9318 9317 9316 9315 9314 9313 9312 9311 9310 9309 9308 9307

7 MAY 1977

6.7μm





9320 9319 9318 9317 9316 9315 9314 9313 9312 9311 9310 9309 9308 9307

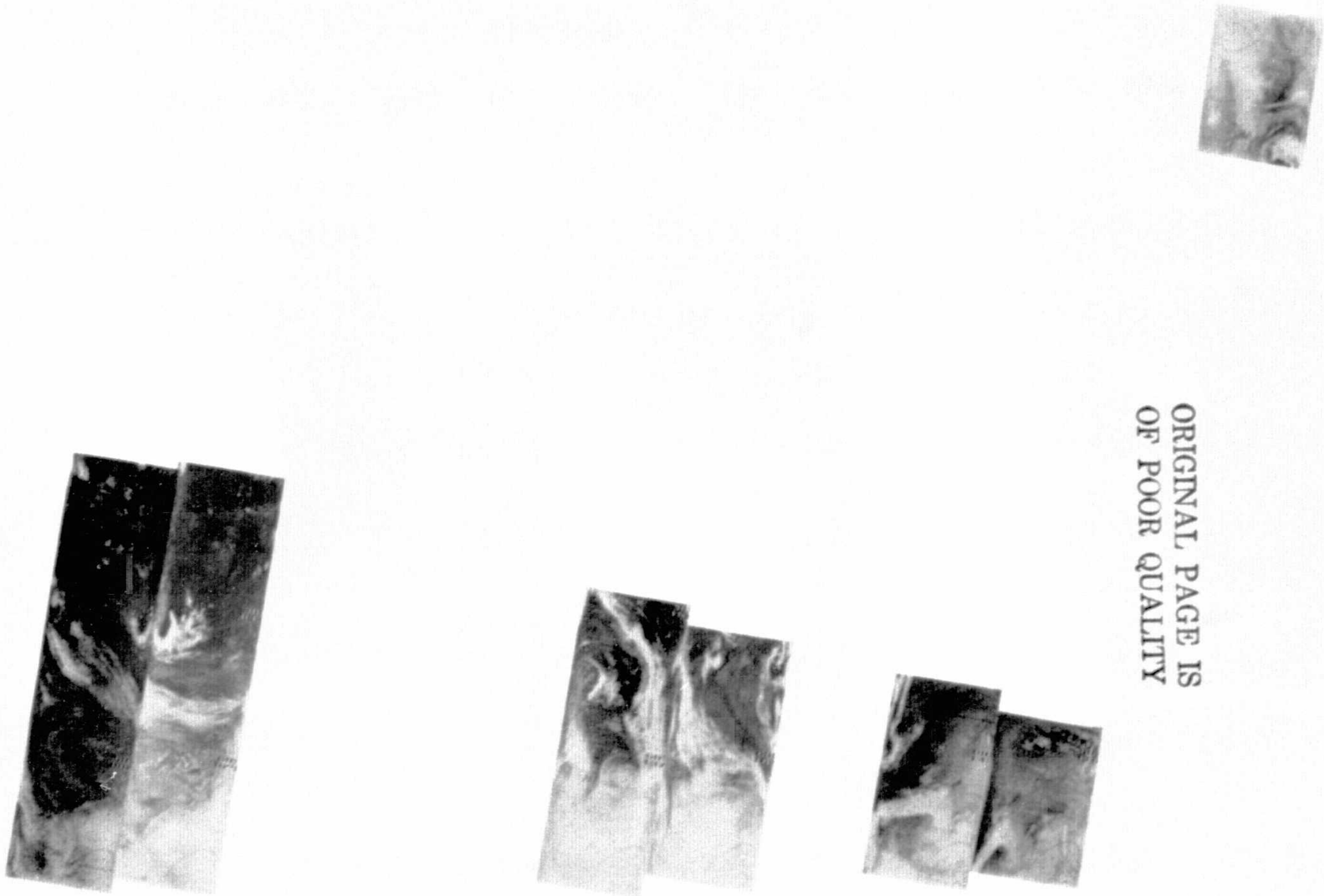
7 MAY 1977

11.5μm

9333 9332 9331 9330 9329 9328 9327 9326 9325 9324 9323 9322 9321

8 MAY 1977

6.7μm



9333 9332 9331 9330 9329 9328 9327 9326 9325 9324 9323 9322 9321

8 MAY 1977

11.5μm

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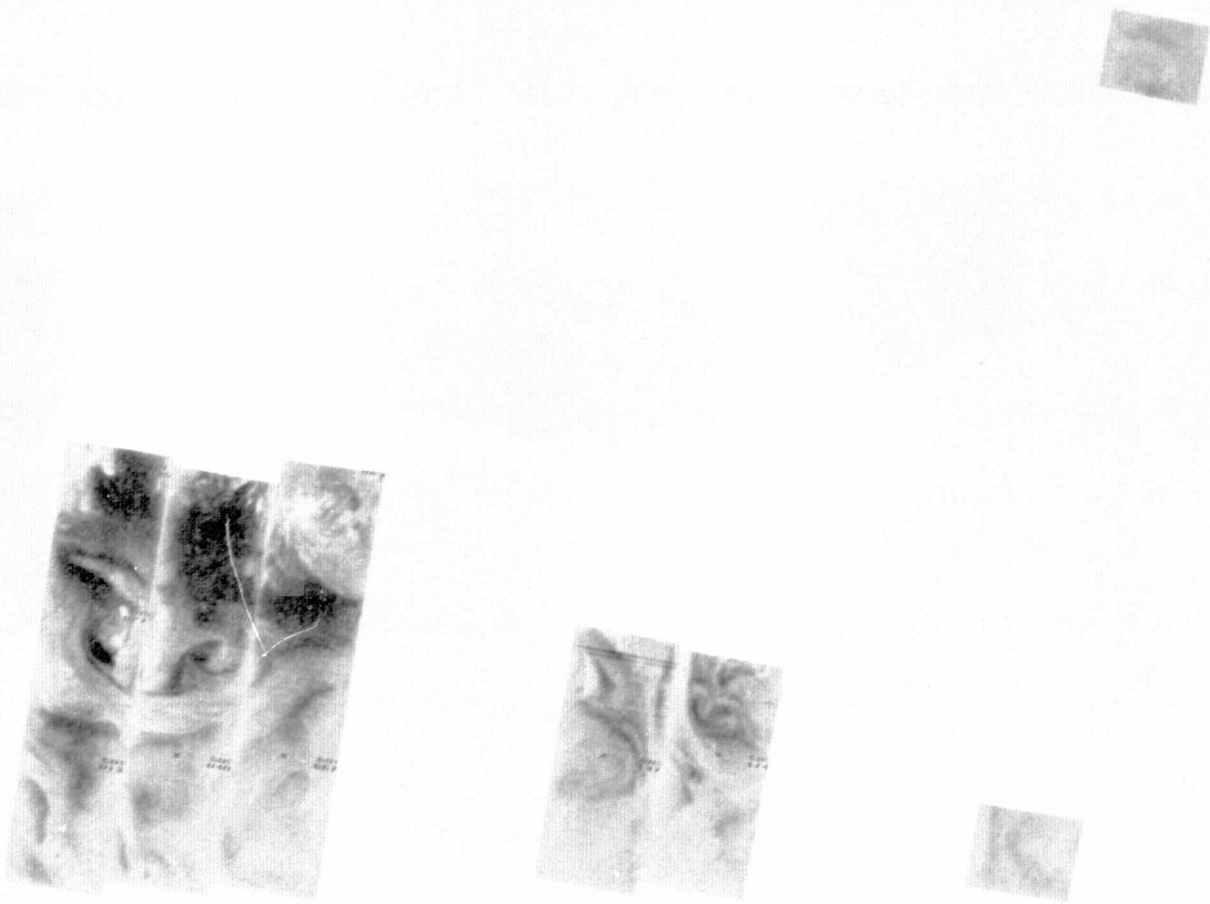

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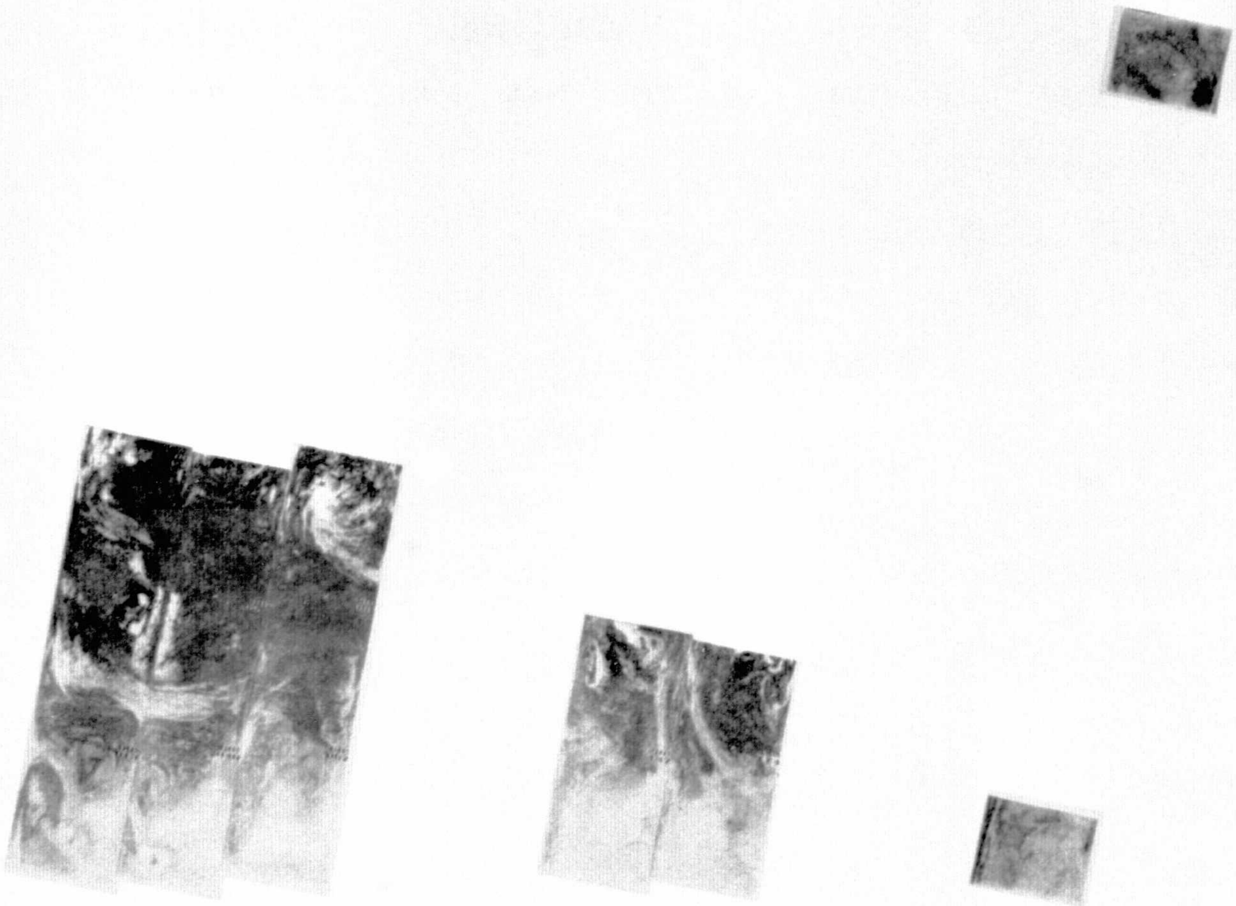
9 MAY 1977

6.7μm



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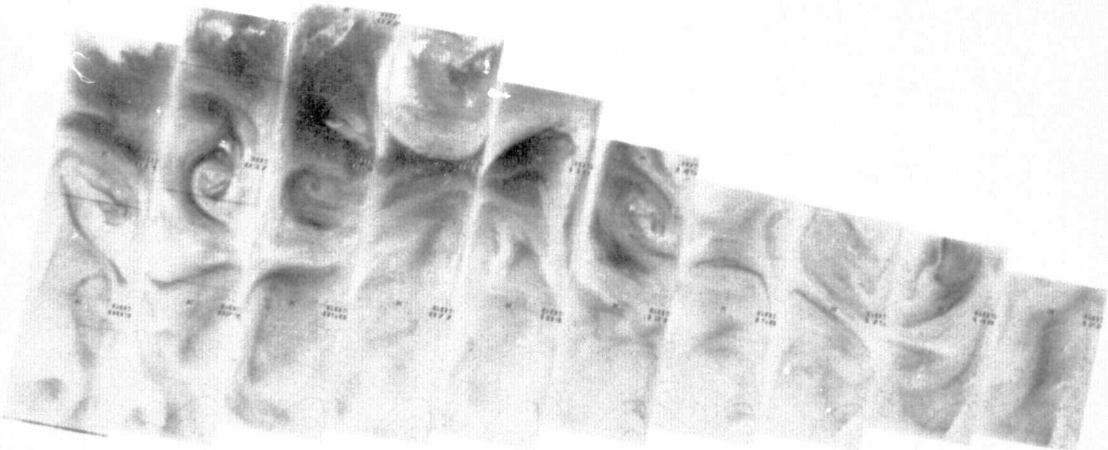
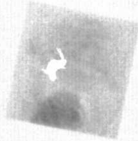
9 MAY 1977

11.5μm

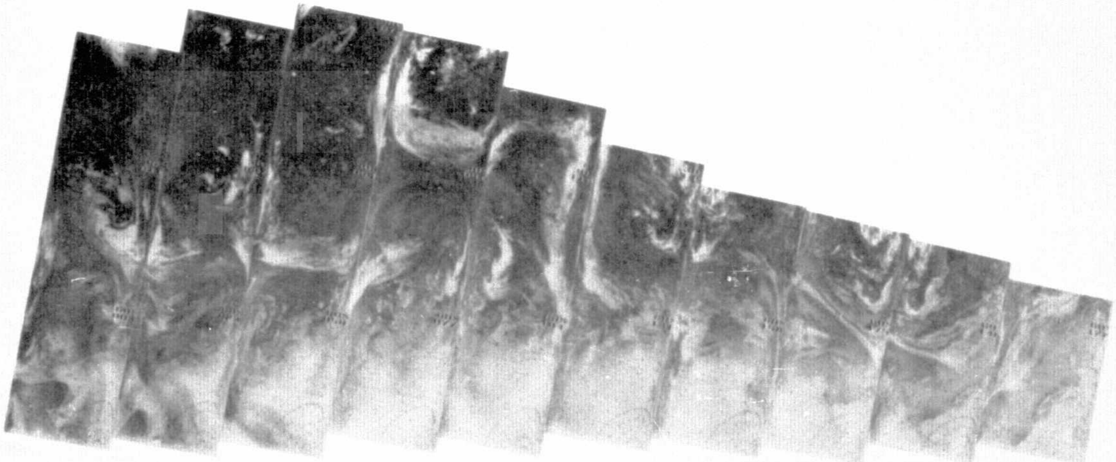


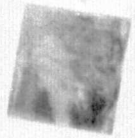


9360 9359 9358 9357 9356 9355 9354 9353 9352 9351 9350 9349 9348

10 MAY 1977

6.7μm





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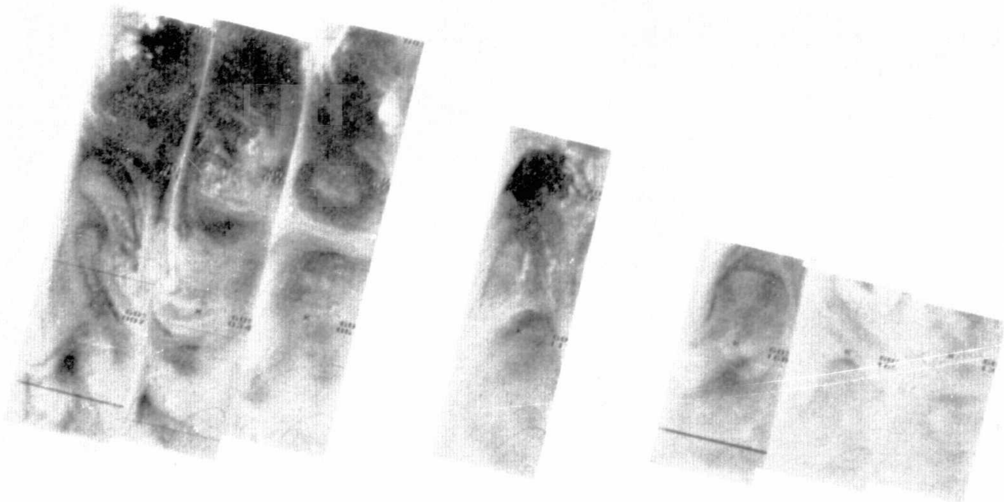
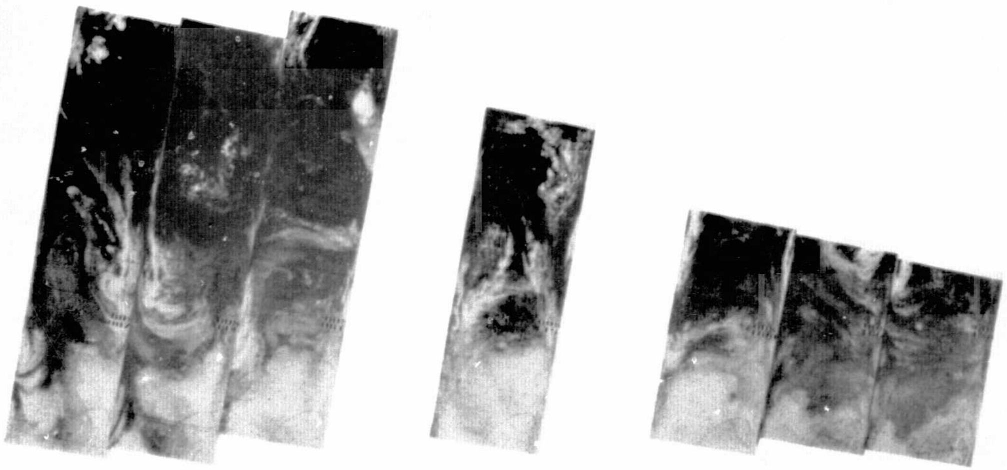
10 MAY 1977

11.5μm



11 MAY 1977

6.7μm



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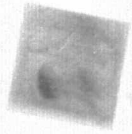
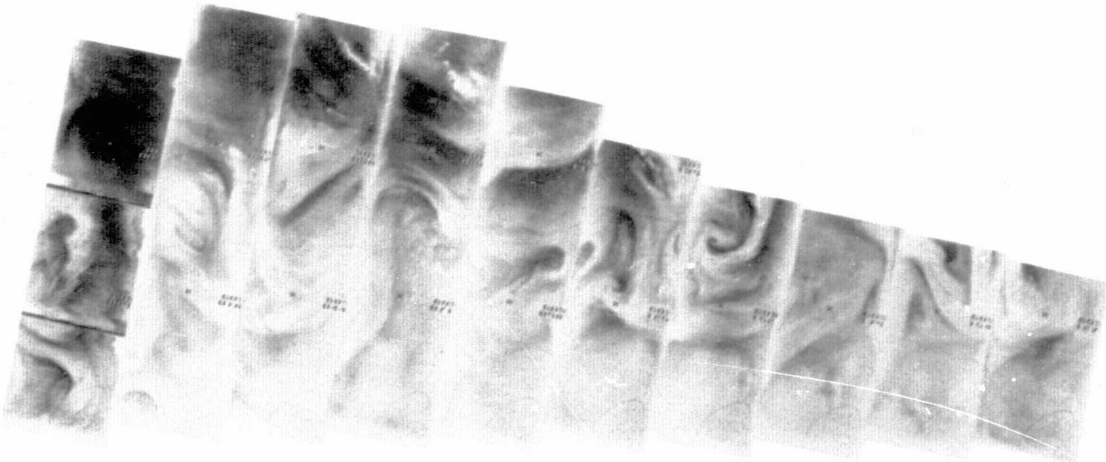
11 MAY 1977

11.5μm

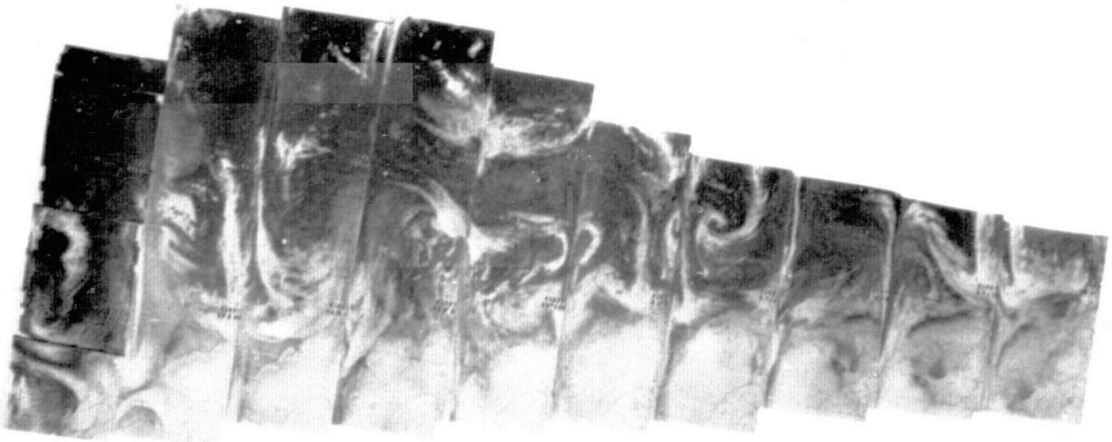




9387 9386 9385 9384 9383 9382 9381 9380 9379 9378 9377 9376 9375 9374

12 MAY 1977

6.7μm



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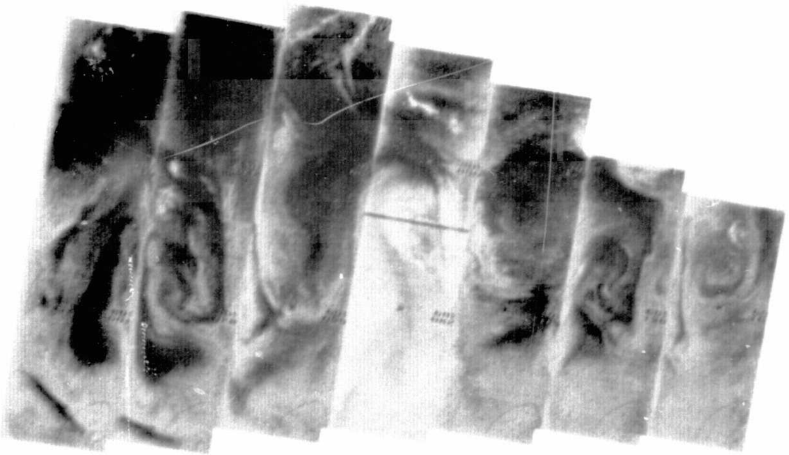
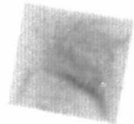
12 MAY 1977

11.5μm





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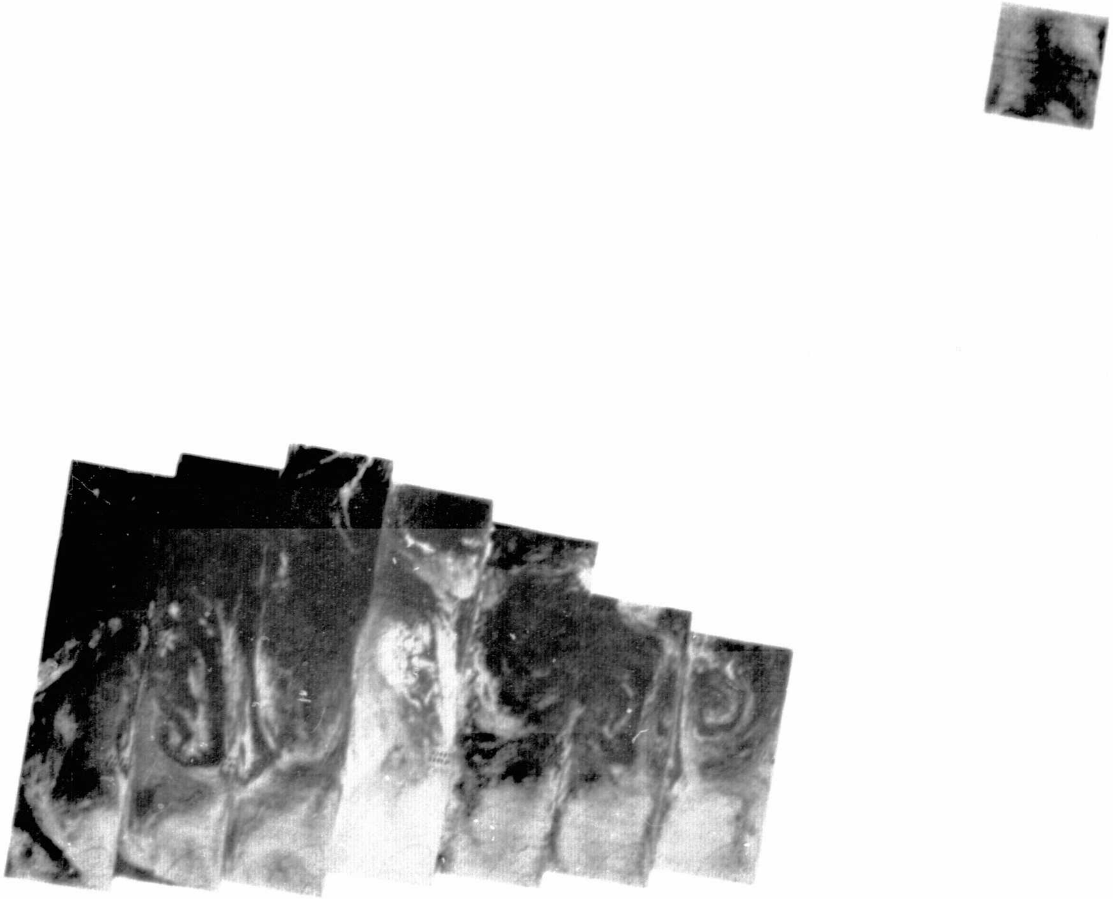
13 MAY 1977

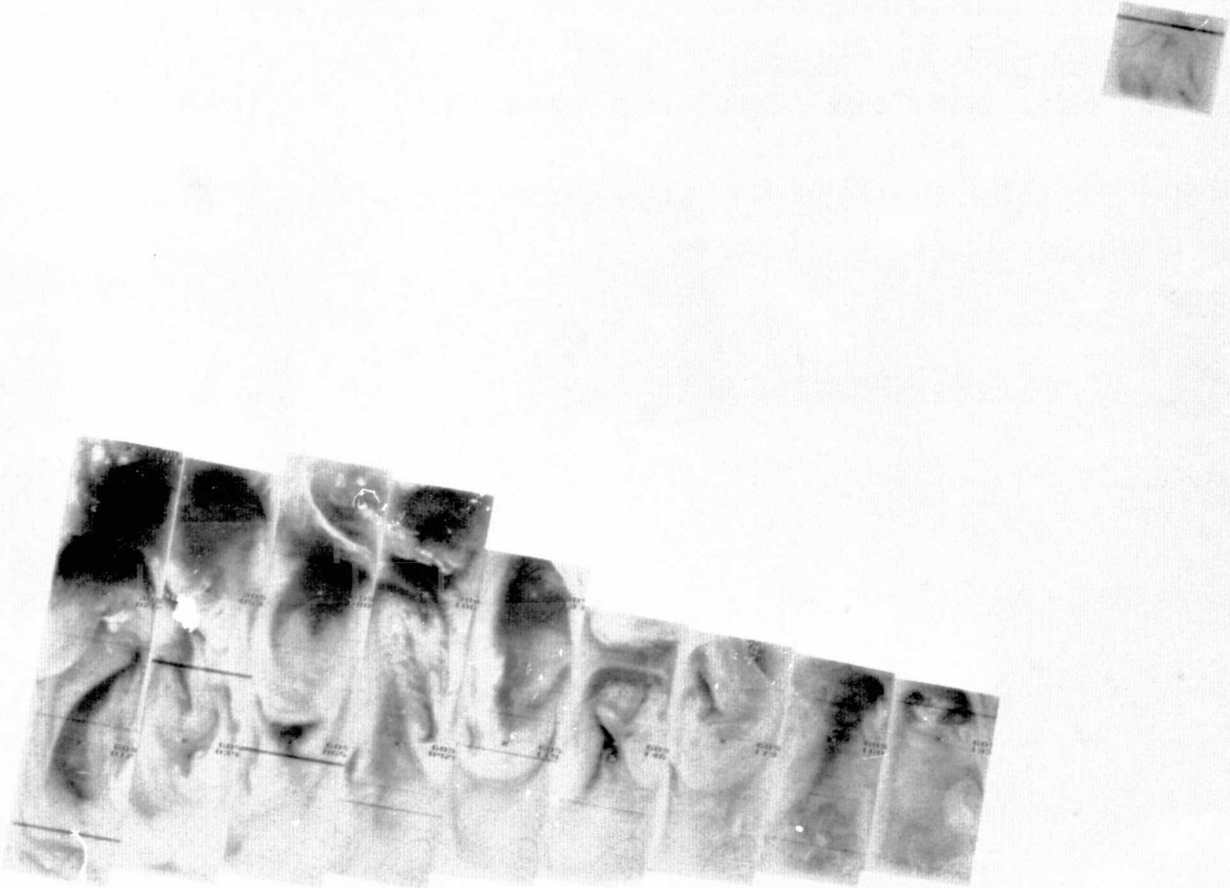
6.7μm



9400 9399 9398 9397 9396 9395 9394 9393 9392 9391 9390 9389 9388

13 MAY 1977

11.5μm



9413 9412 9411 9410 9409 9408 9407 9406 9405 9404 9403 9402 9401

14 MAY 1977

6.7μm

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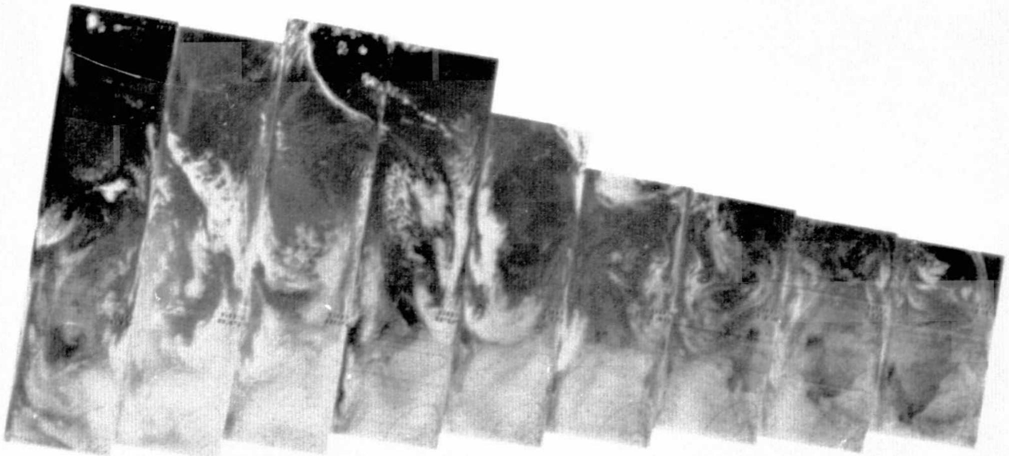


9413 9412 9411 9410 9409 9408 9407 9406 9405 9404 9403 9402 9401

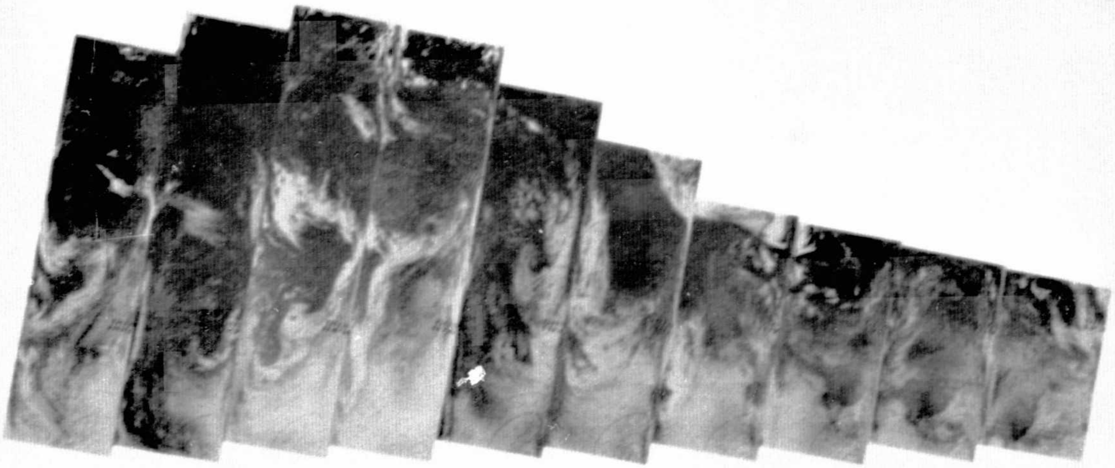
14 MAY 1977

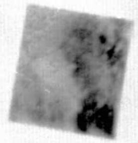
11.5μm

9427 9426 9425 9424 9423 9422 9421 9420 9419 9418 9417 9416 9415 9414

15 MAY 1977

6.7μm





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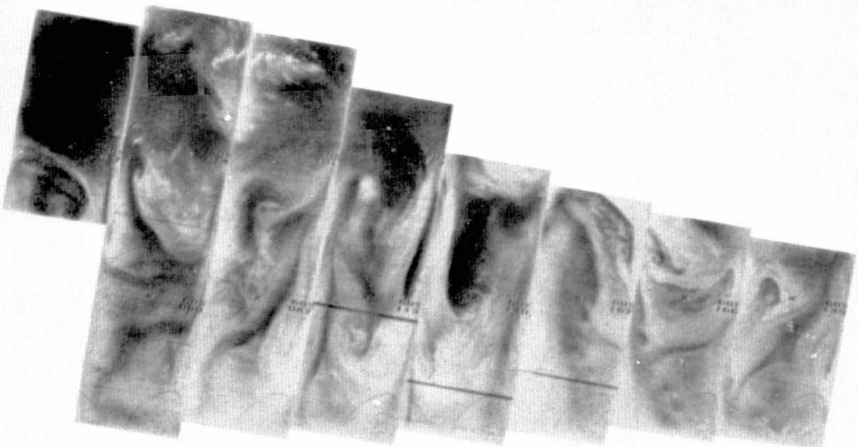
15 MAY 1977

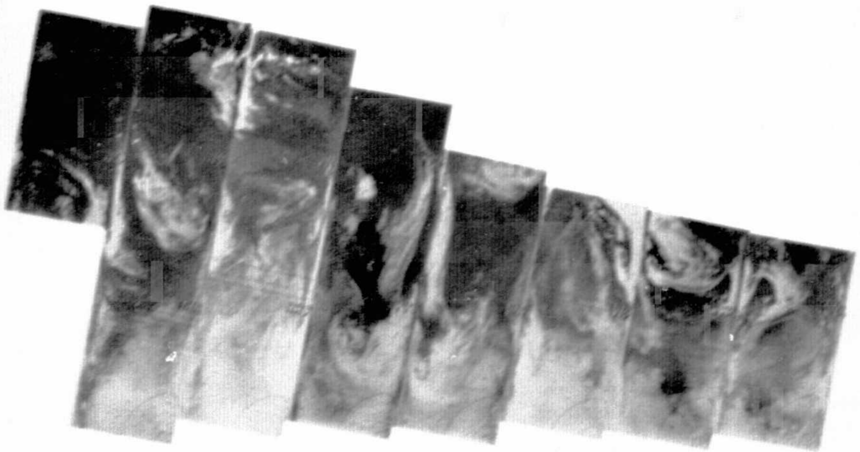
11.5μm



9440 9439 9438 9437 9436 9435 9434 9433 9432 9431 9430 9429 9428

16 MAY 1977

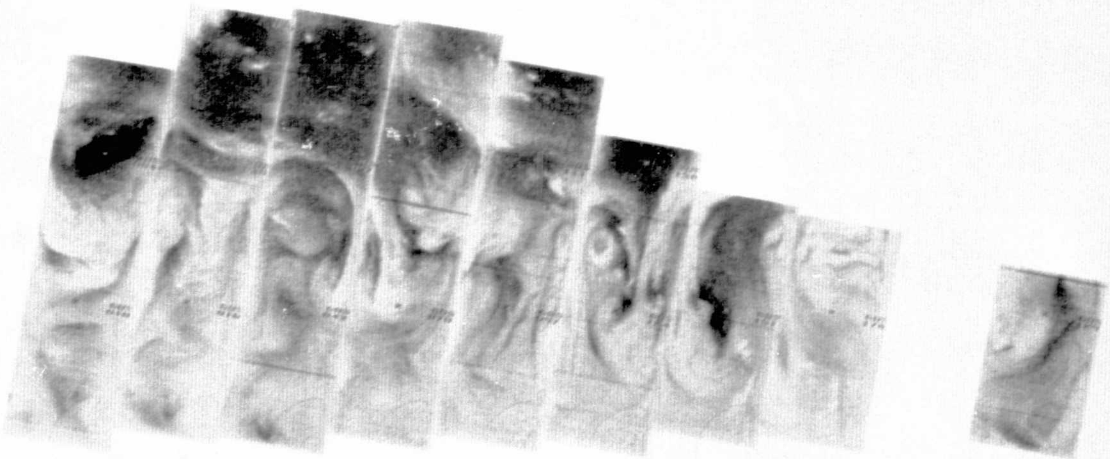
6.7μm



9440 9439 9438 9437 9436 9435 9434 9433 9432 9431 9430 9429 9428

16 MAY 1977

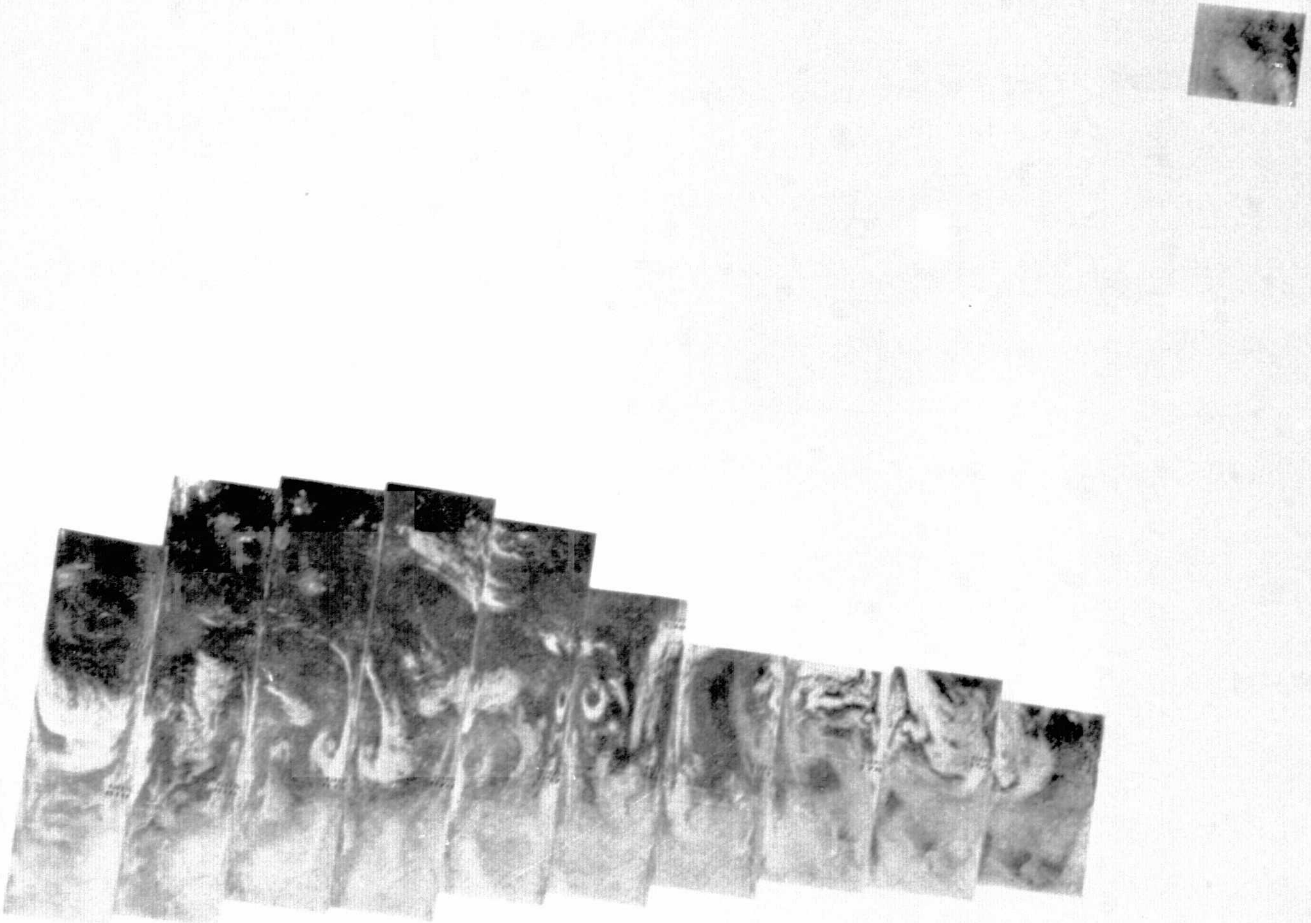
11.5μm



9454 9453 9452 9451 9450 9449 9448 9447 9446 9445 9444 9443 9442 9441

17 MAY 1977

$6.7 \mu m$



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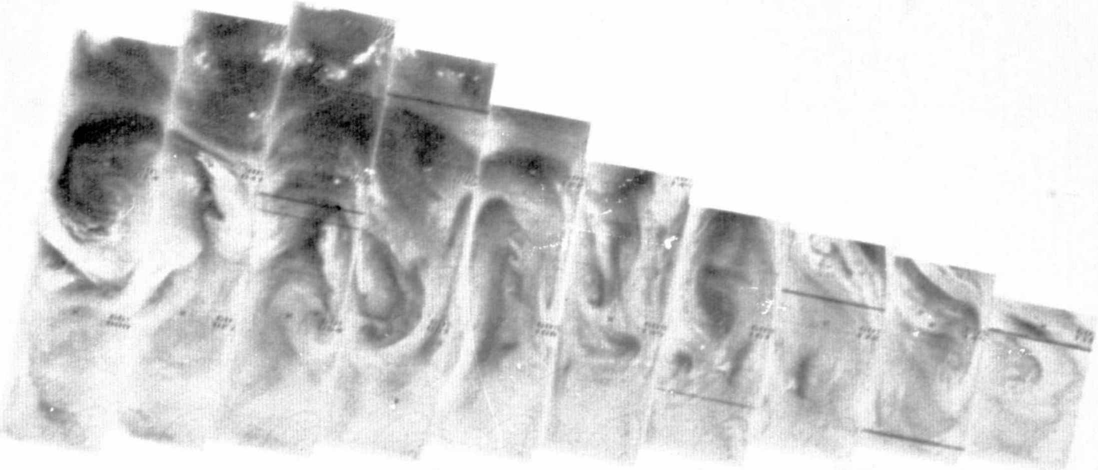
17 MAY 1977

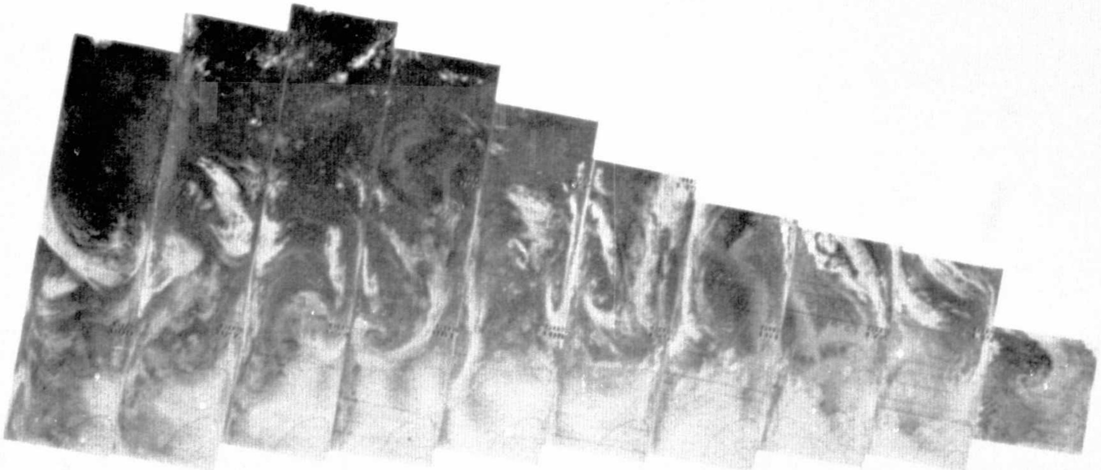
11.5μm

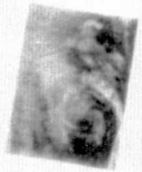


9467 9466 9465 9464 9463 9462 9461 9460 9459 9458 9457 9456 9455

18 MAY 1977

6.7μm

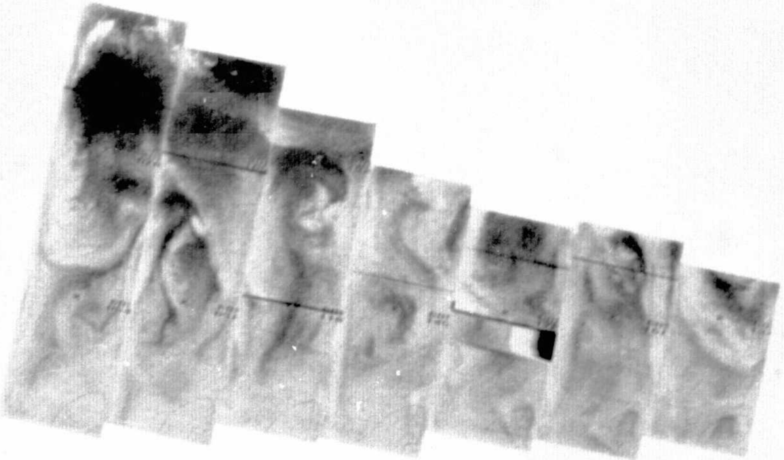


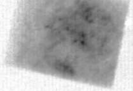


9467 9466 9465 9464 9463 9462 9461 9460 9459 9458 9457 9456 9455

18 MAY 1977

11.5μm

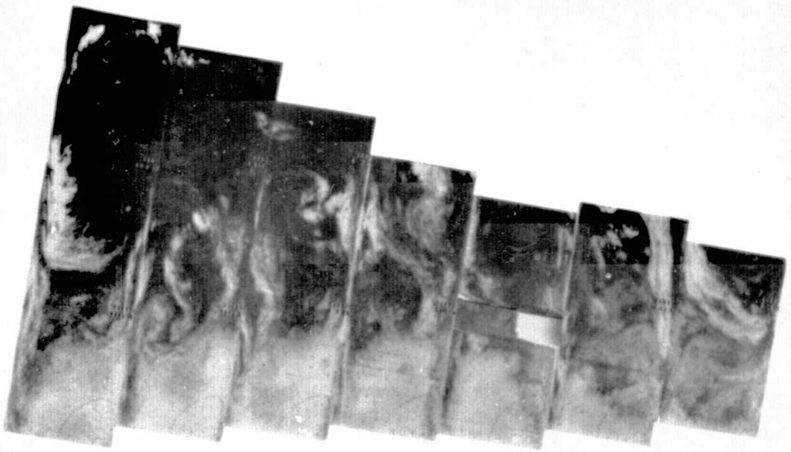


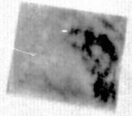


9480 9479 9478 9477 9476 9475 9474 9473 9472 9471 9470 9469 9468

19 MAY 1977

6.7μm

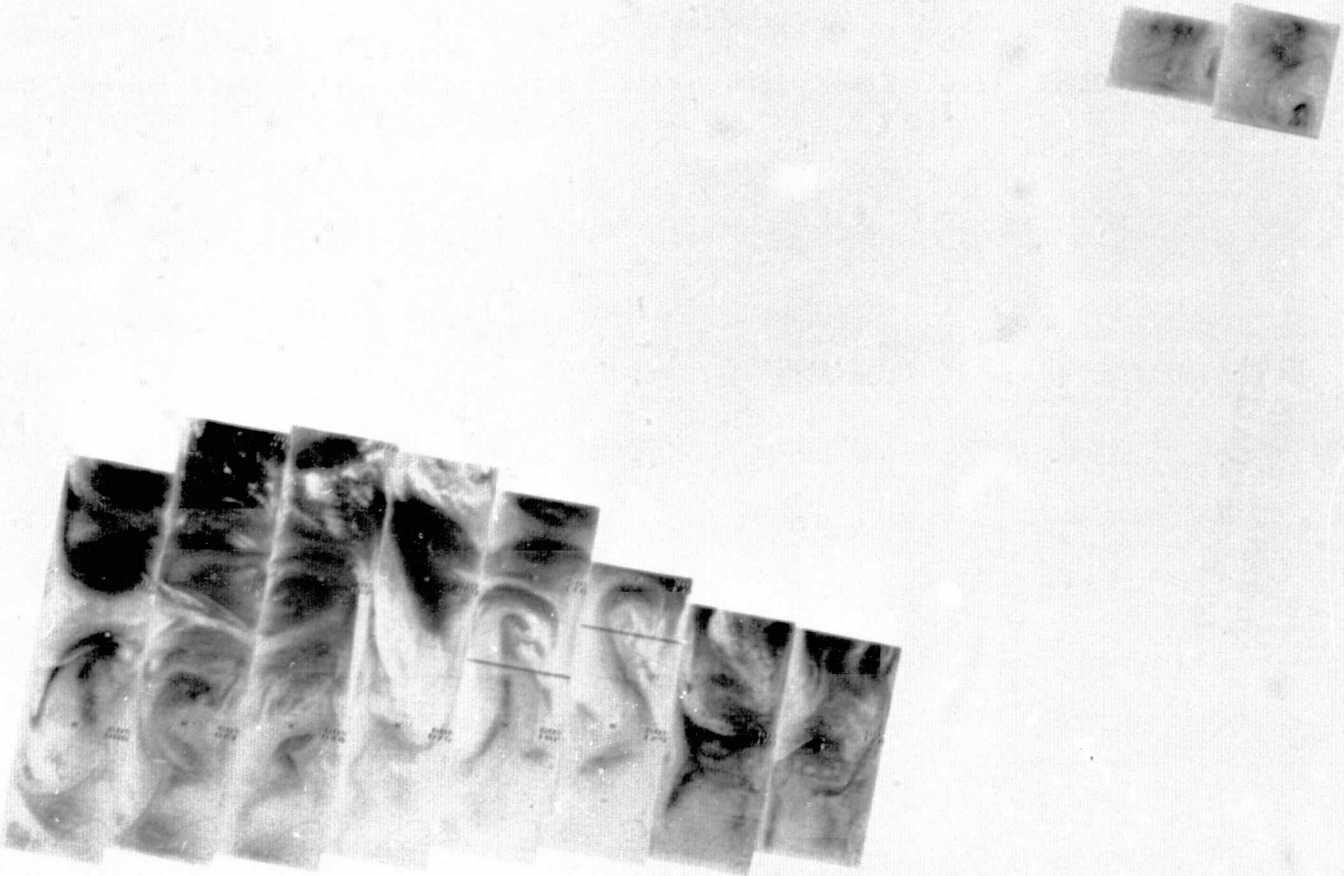




9480 9479 9478 9477 9476 9475 9474 9473 9472 9471 9470 9469 9468

19 MAY 1977

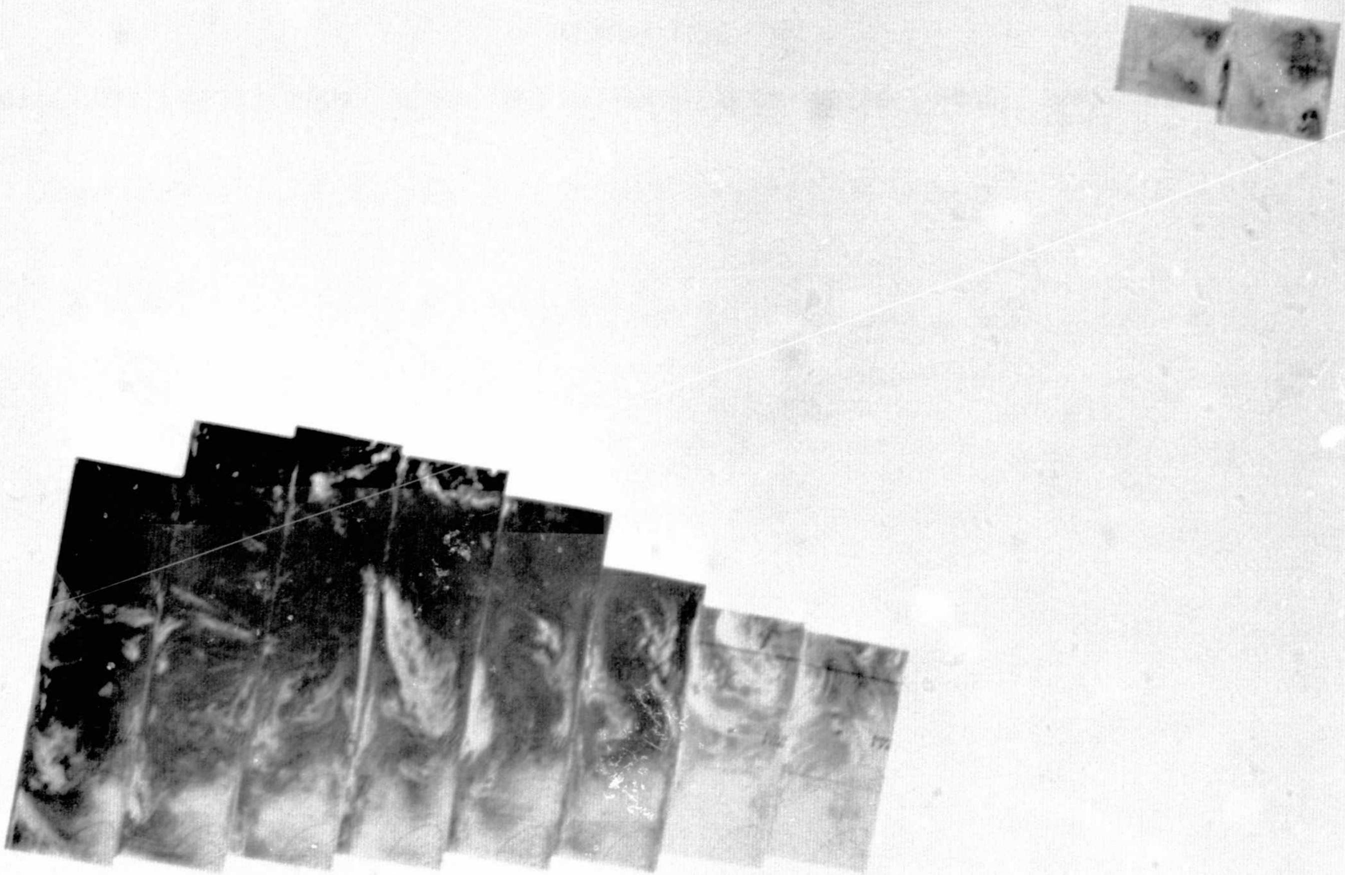
11.5μm



9494 9493 9492 9491 9490 9489 9488 9487 9486 9485 9484 9483 9482 9481

20 MAY 1977

6.7μm



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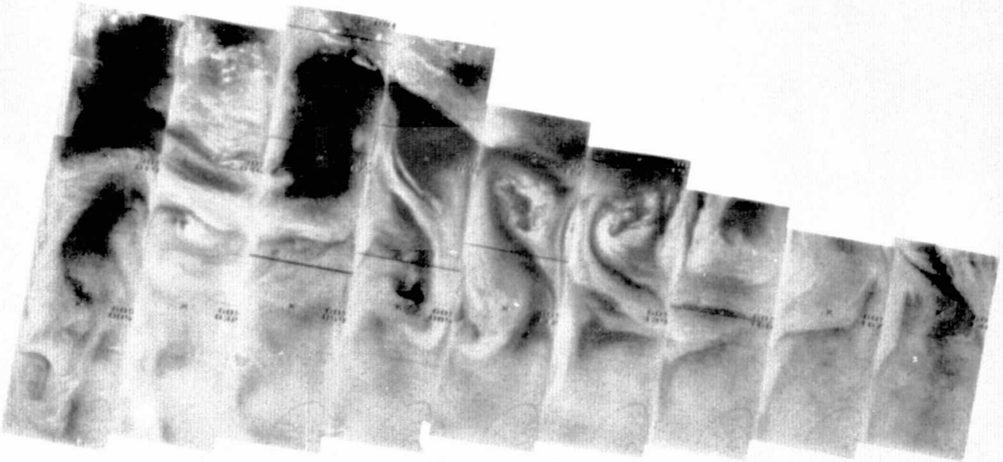
20 MAY 1977

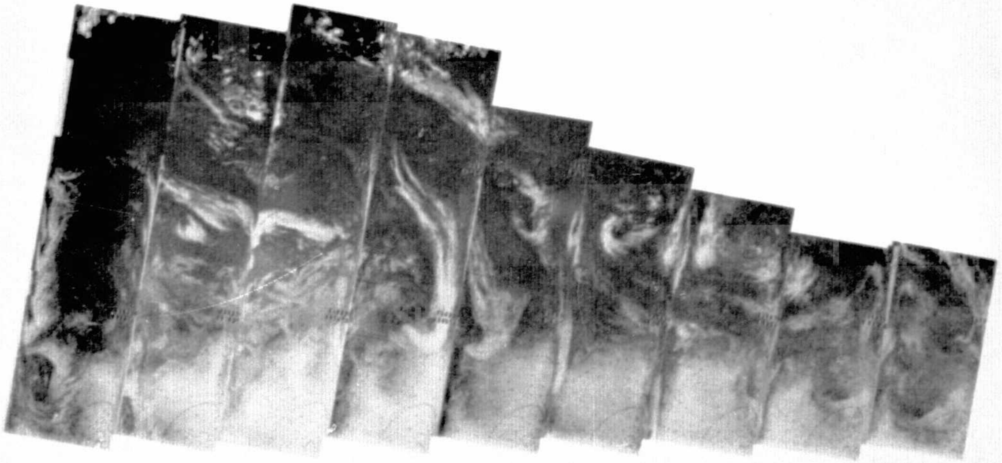
11.5μm



9507 9506 9505 9504 9503 9502 9501 9500 9499 9498 9497 9496 9495

21 MAY 1977

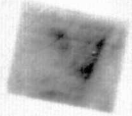
6.7μm

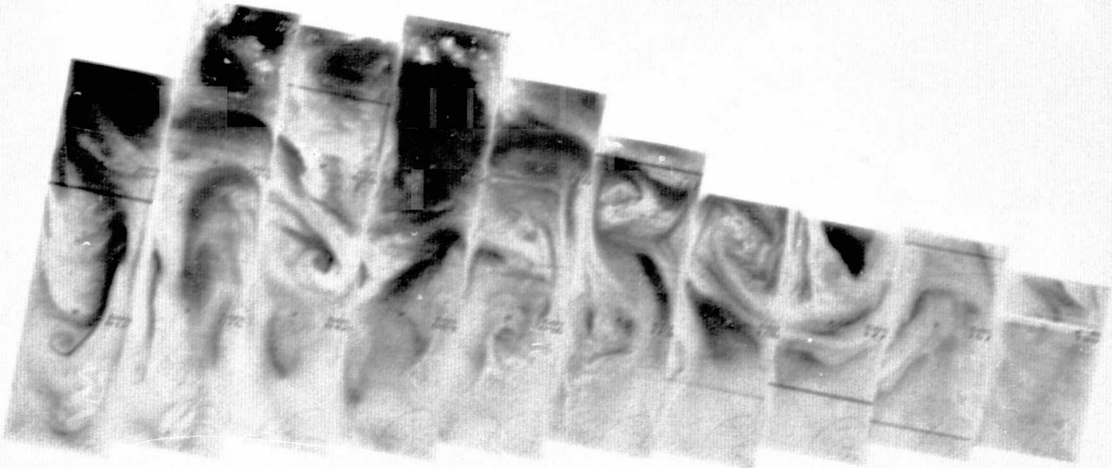


9507 9506 9505 9504 9503 9502 9501 9500 9499 9498 9497 9496 9495

21 MAY 1977

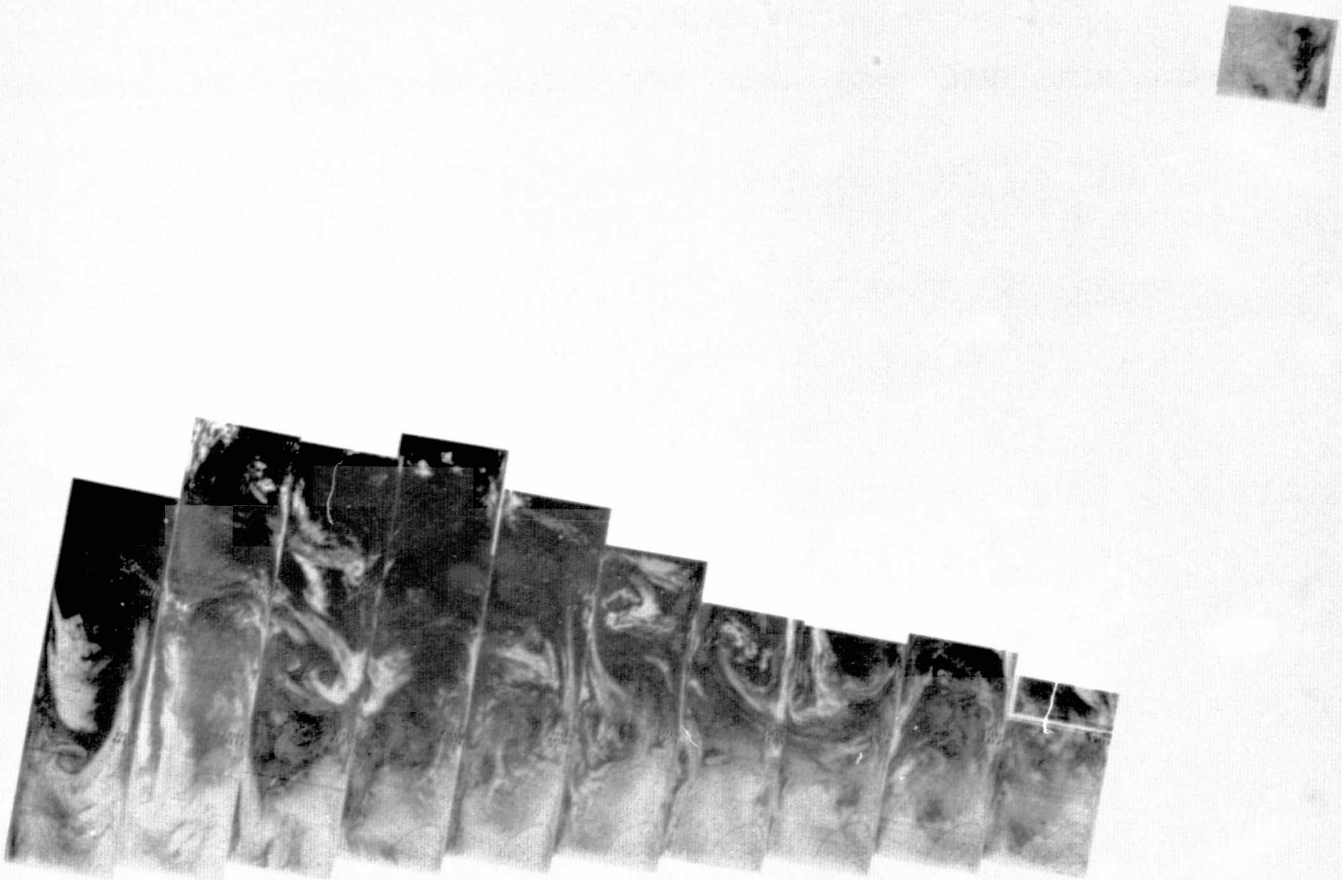
11.5μm





22 MAY 1977

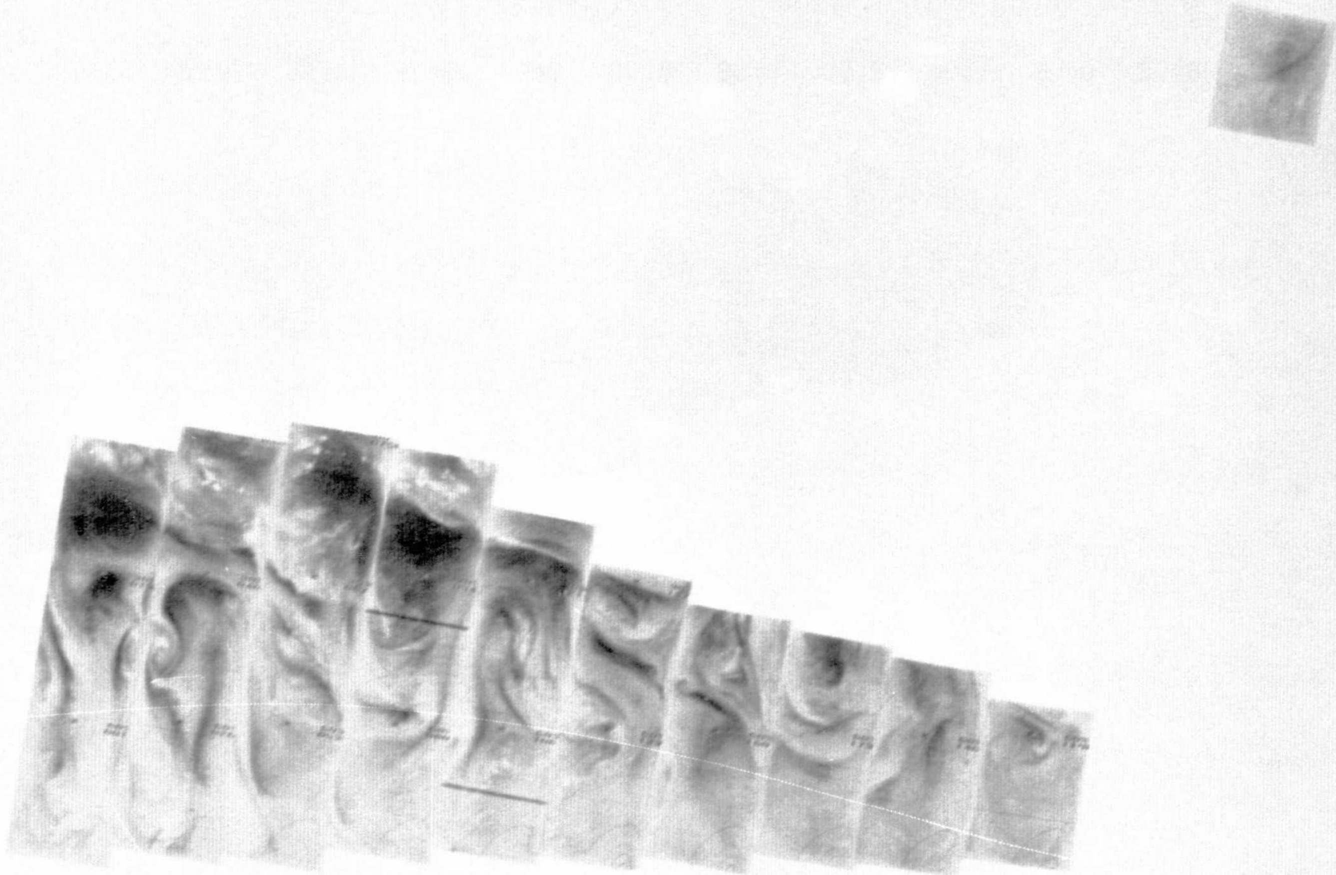
6.7μm



9521 9520 9519 9518 9517 9516 9515 9514 9513 9512 9511 9510 9509 9508

22 MAY 1977

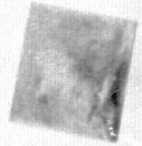
11.5μm

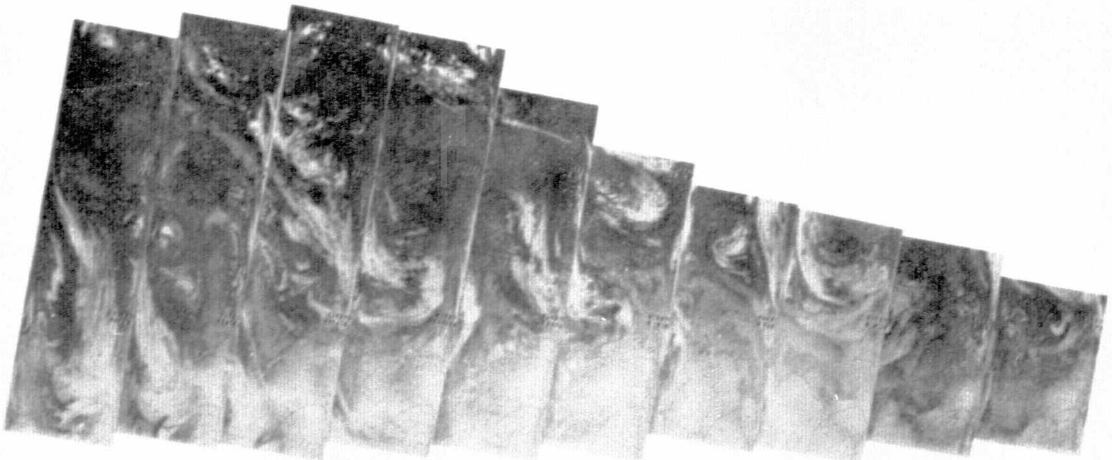


9534 9533 9532 9531 9530 9529 9528 9527 9526 9525 9524 9523 9522

23 MAY 1977

6.7μm

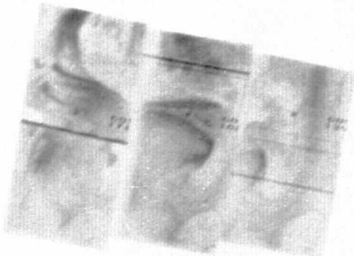




9534 9533 9532 9531 9530 9529 9528 9527 9526 9525 9524 9523 9522

23 MAY 1977

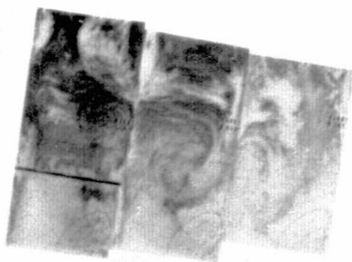
11.5μm



9547 9546 9545 9544 9543 9542 9541 9540 9539 9538 9537 9536 9535

24 MAY 1977

6.7μm



9547 9546 9545 9544 9543 9542 9541 9540 9539 9538 9537 9536 9535

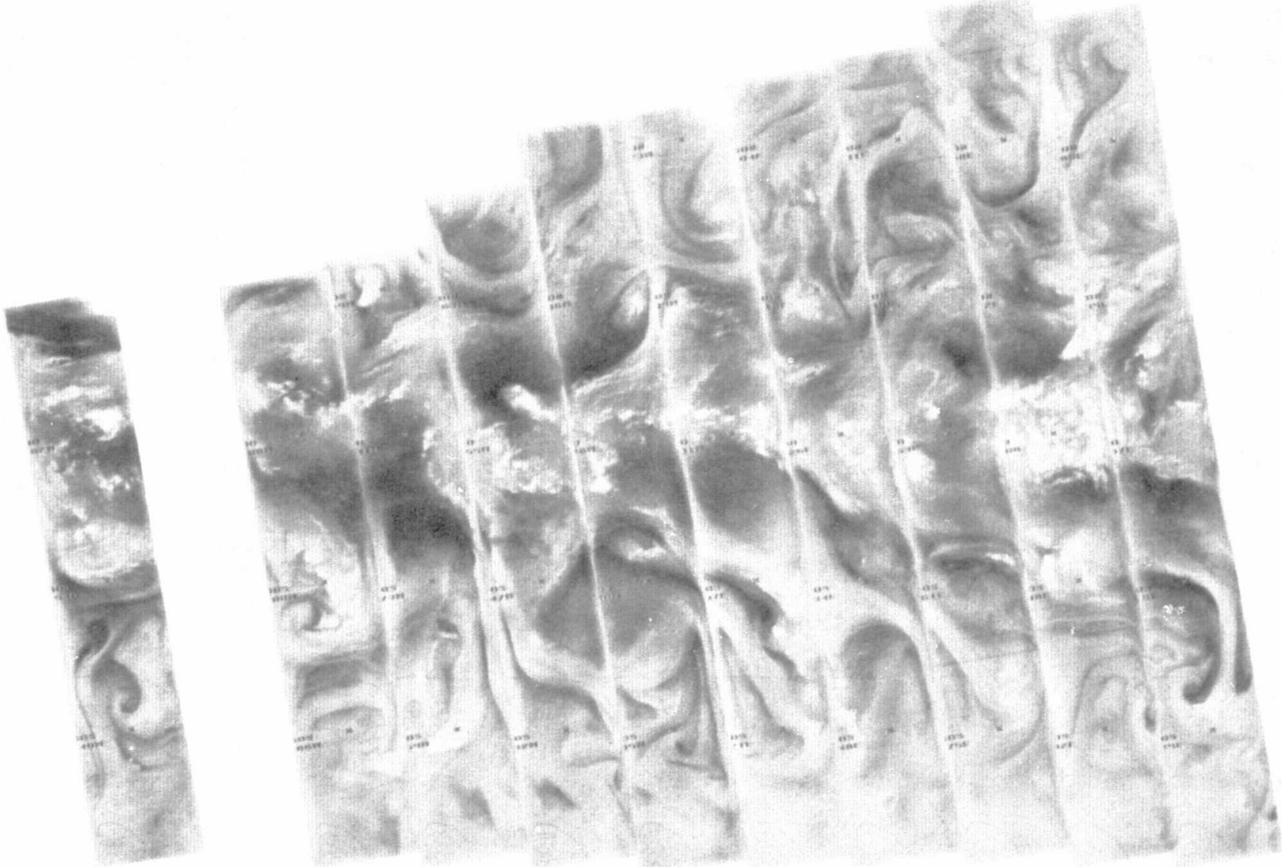
24 MAY 1977

11.5μm

SECTION 4.2

TEMPERATURE HUMIDITY INFRARED RADIOMETER

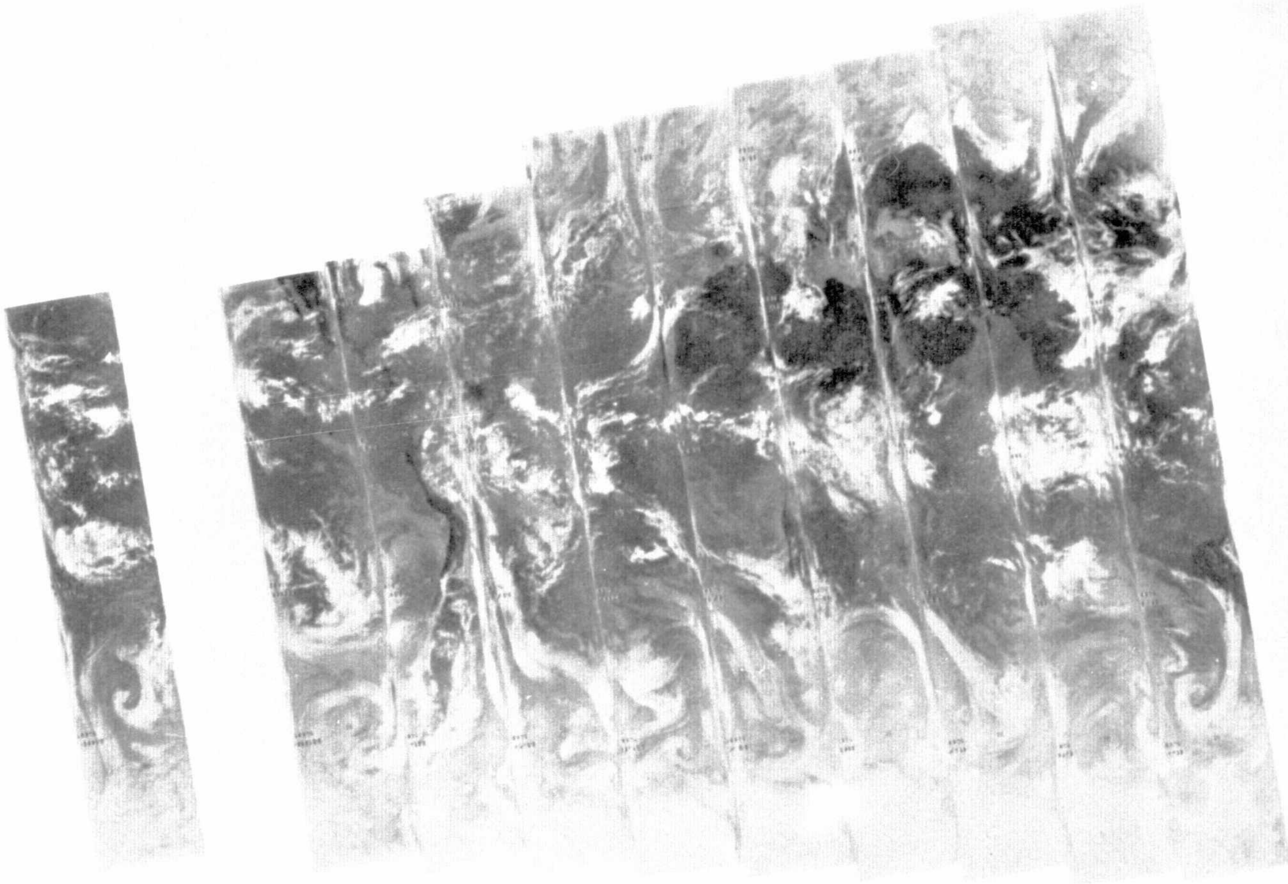
DAYTIME MONTAGES



9239 9238 9237 9236 9235 9234 9233 9232 9231 9230 9229 9228 9227

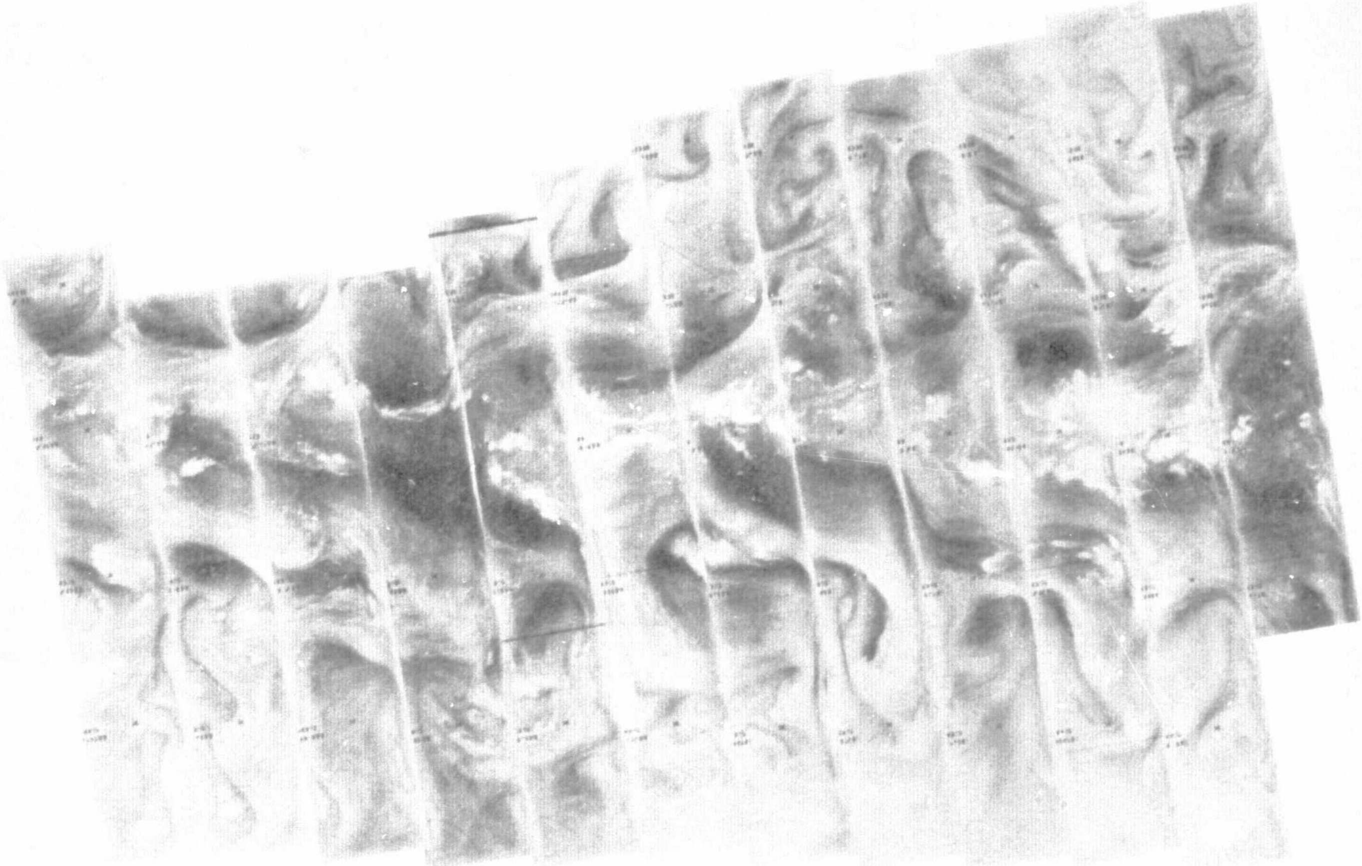
1 MAY 1977

6.7μm



1 MAY 1977

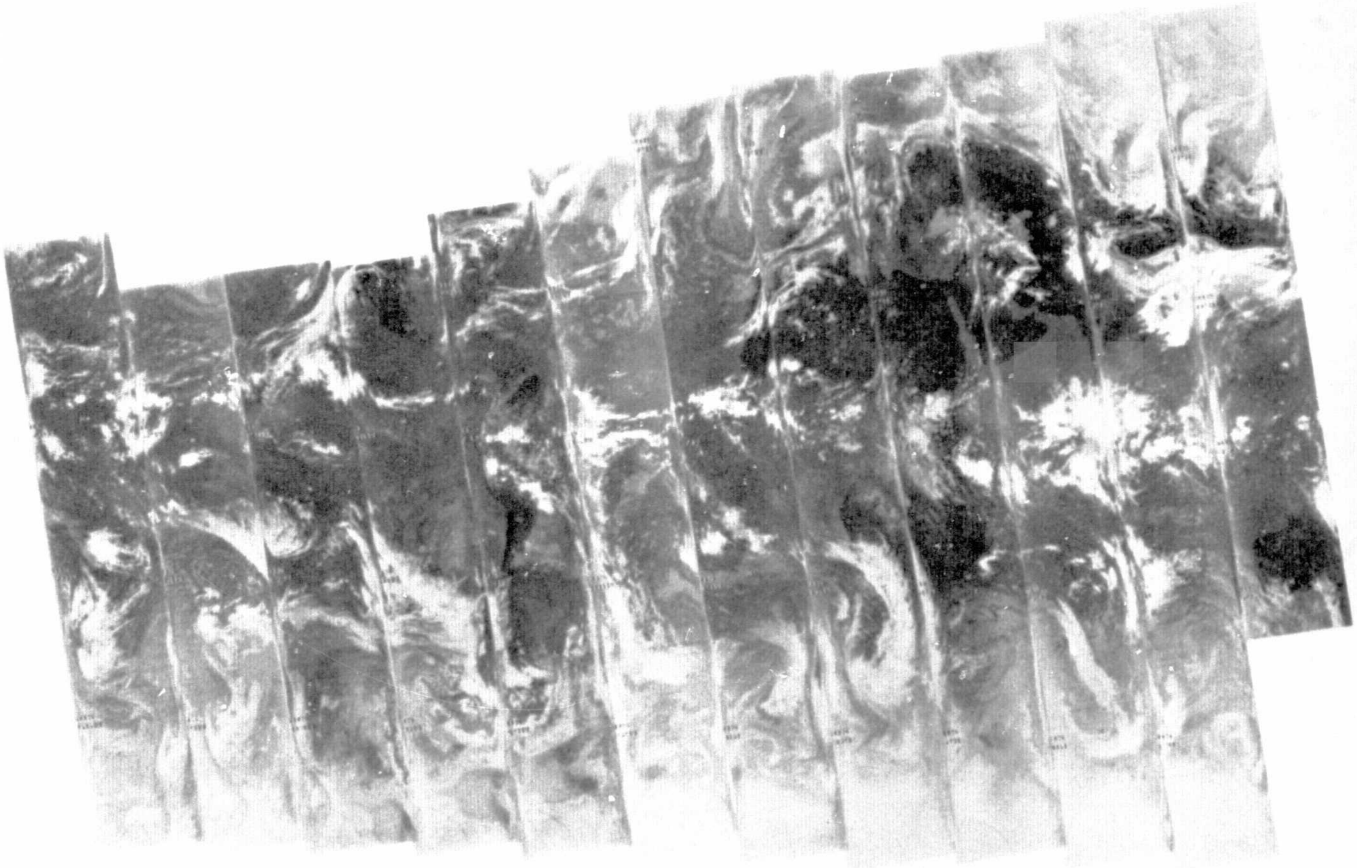
11.5μm



9253 9252 9251 9250 9249 9248 9247 9246 9245 9244 9243 9242 9241 9240

2 MAY 1977

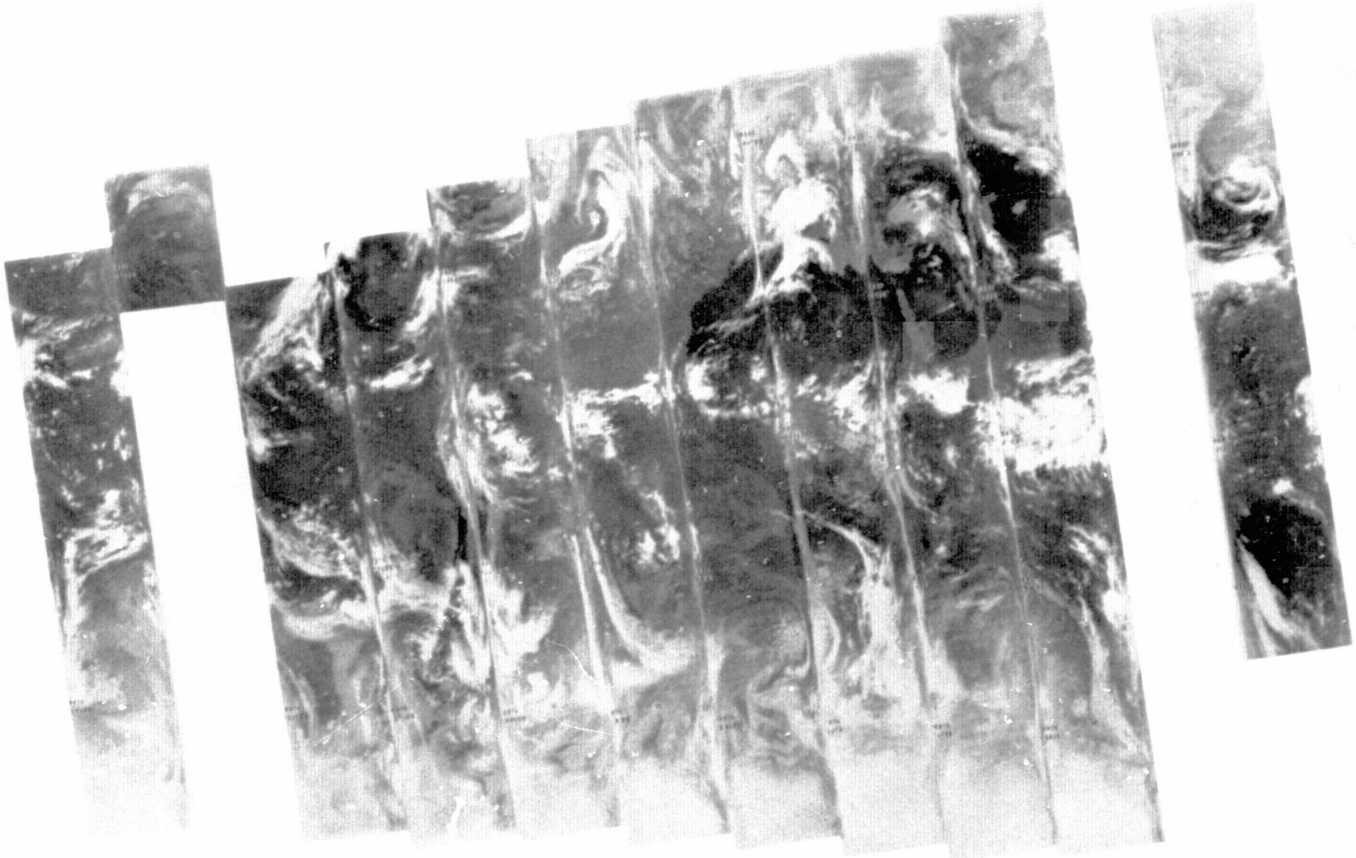
6.7μm



9253 9252 9251 9250 9249 9248 9247 9246 9245 9244 9243 9242 9241 9240

2 MAY 1977

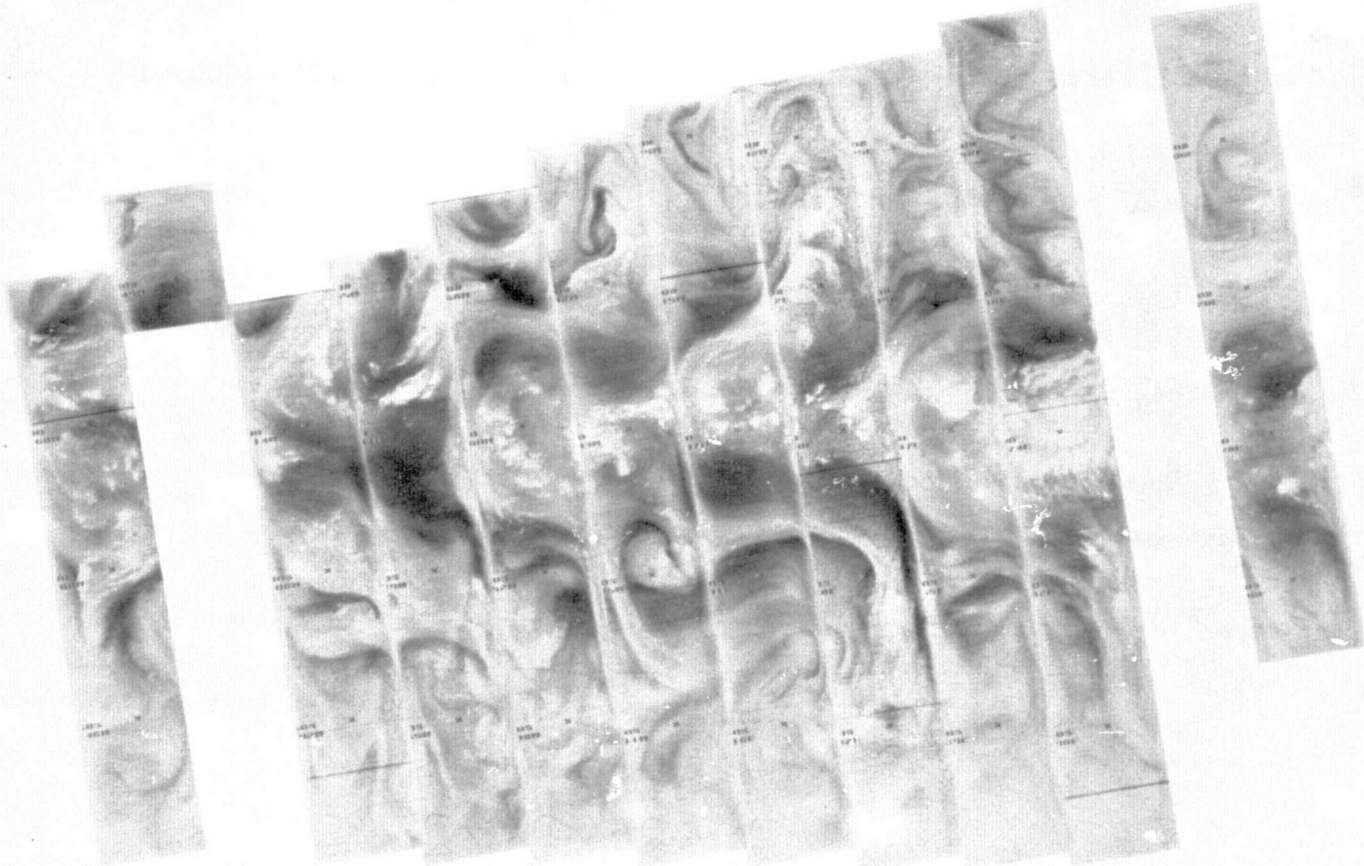
11.5μm



9266 9265 9264 9263 9262 9261 9260 9259 9258 9257 9256 9255 9254

3 MAY 1977

6.7μm

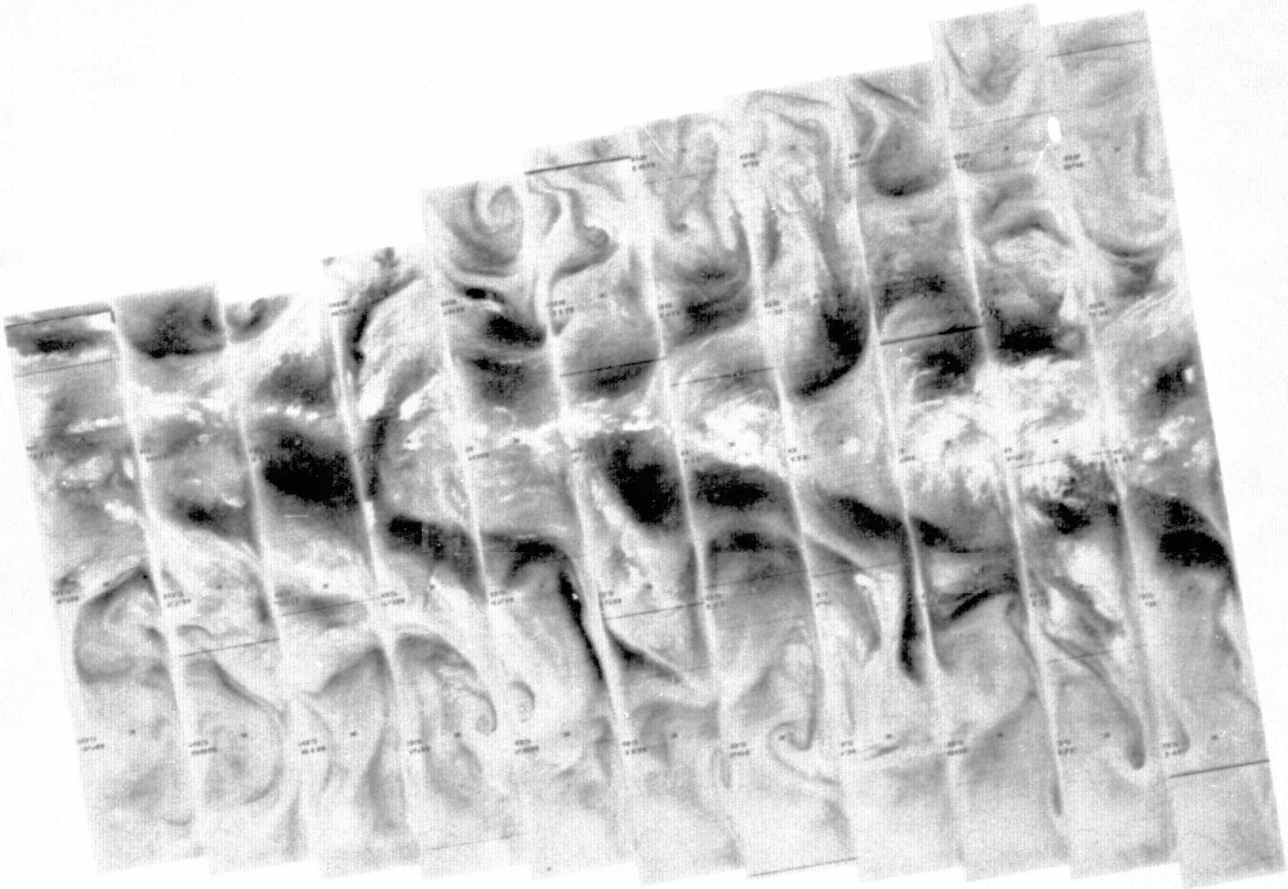


9266 9265 9264 9263 9262 9261 9260 9259 9258 9257 9256 9255 9254

3 MAY 1977

11.5μm

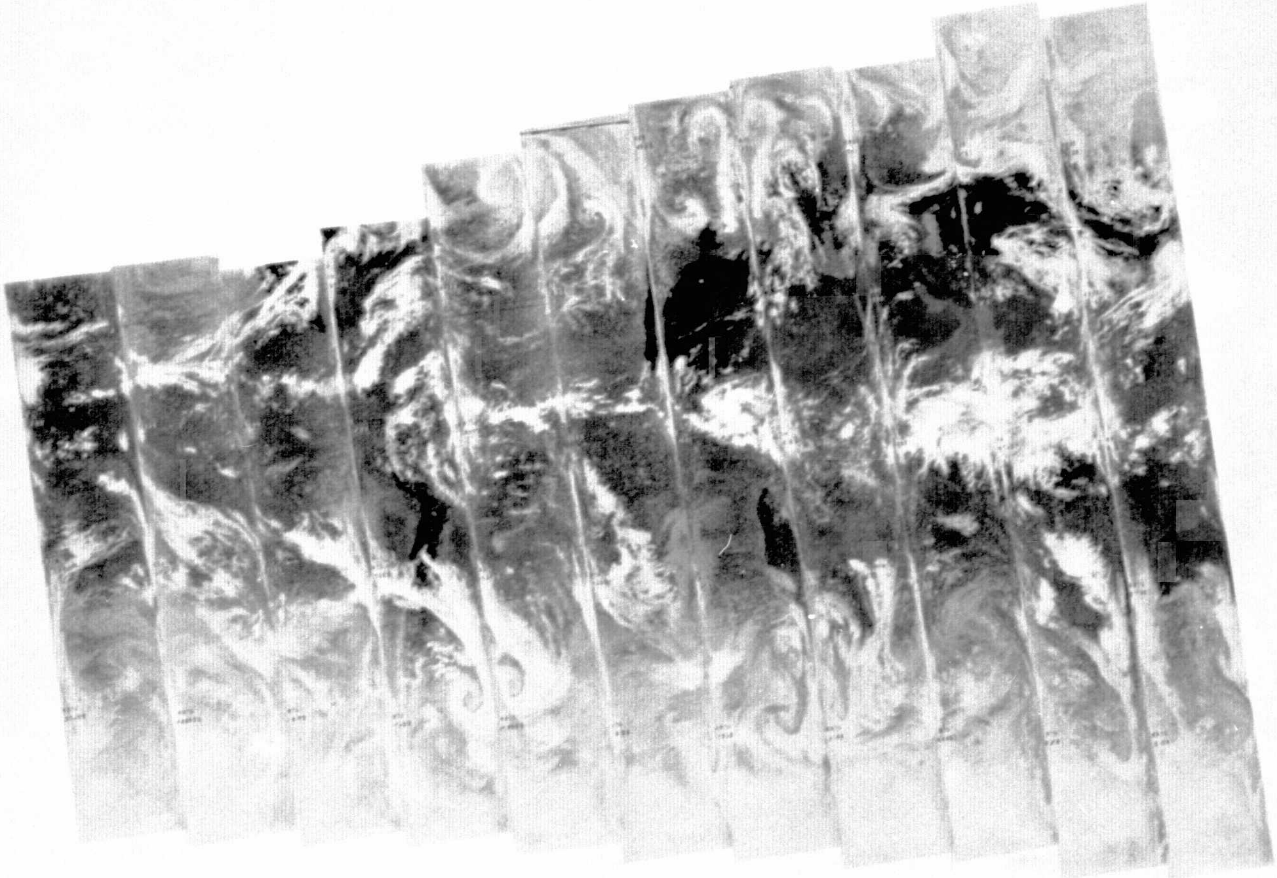
ORIGINAL PAGE IS OF POOR QUALITY



9280 9279 9278 9277 9276 9275 9274 9273 9272 9271 9270 9269 9268 9267

4 MAY 1977

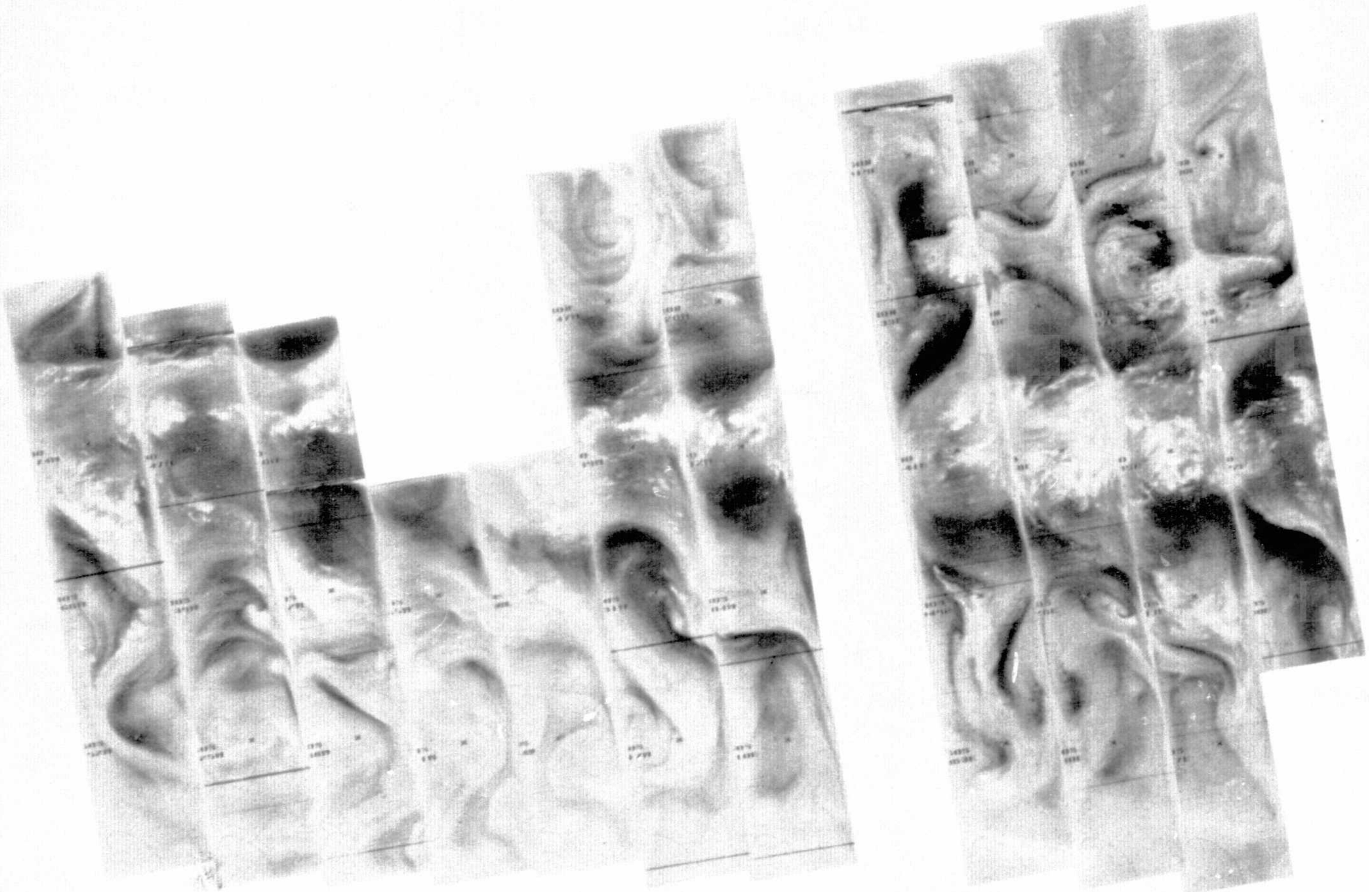
6.7μm



9280 9279 9278 9277 9276 9275 9274 9273 9272 9271 9270 9269 9268 9267

4 MAY 1977

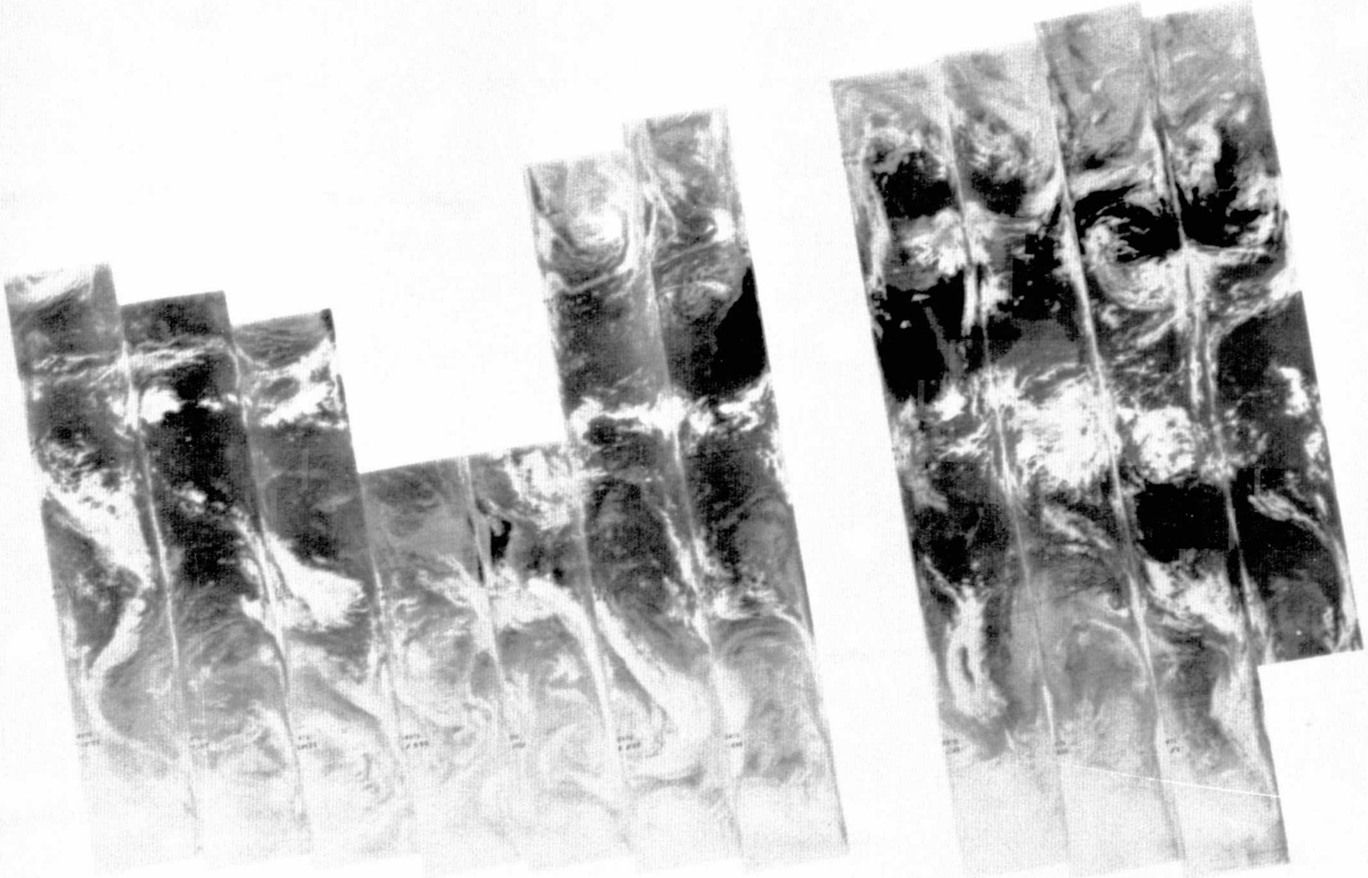
11.5μm



9293 9292 9291 9290 9289 9288 9287 9286 9285 9284 9283 9282 9281

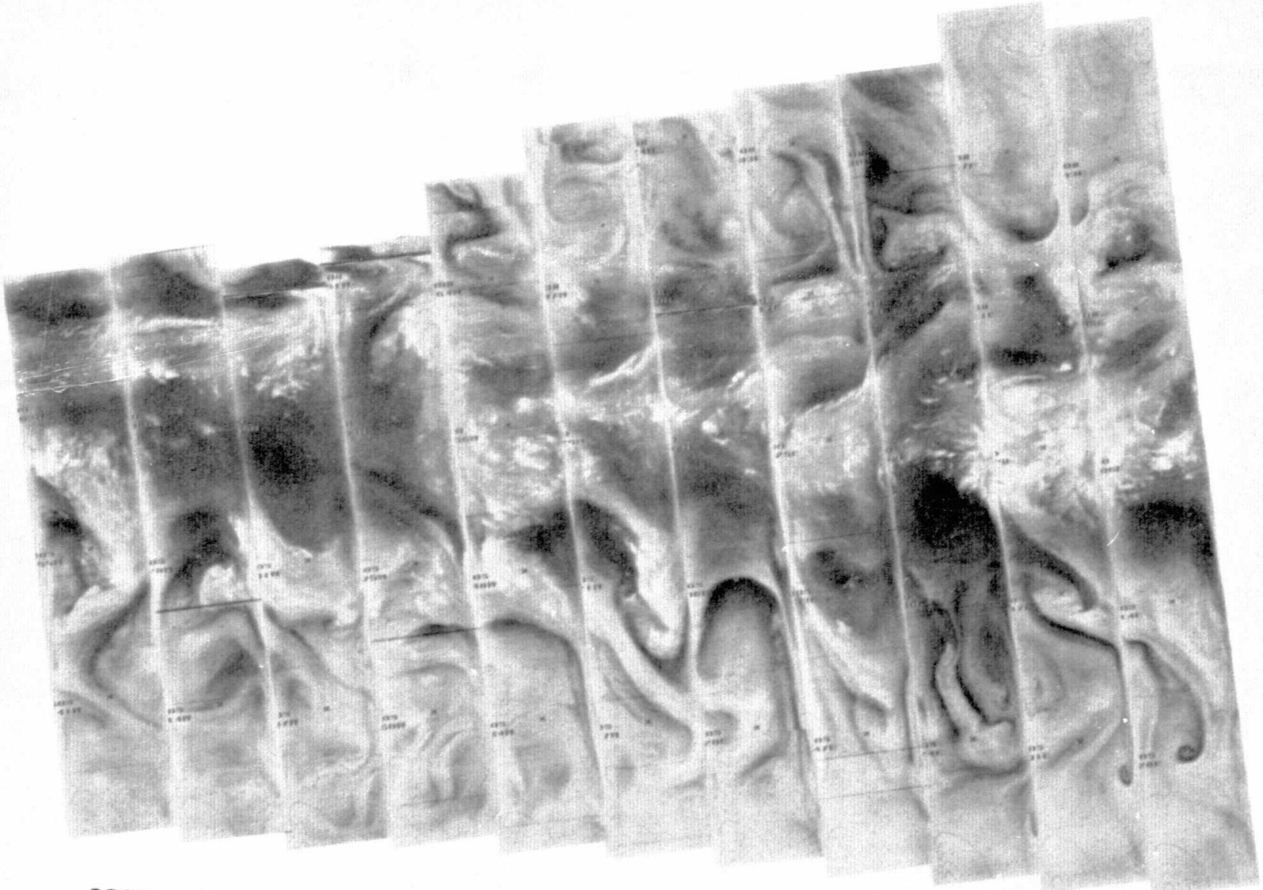
5 MAY 1977

6.7μm



5 MAY 1977

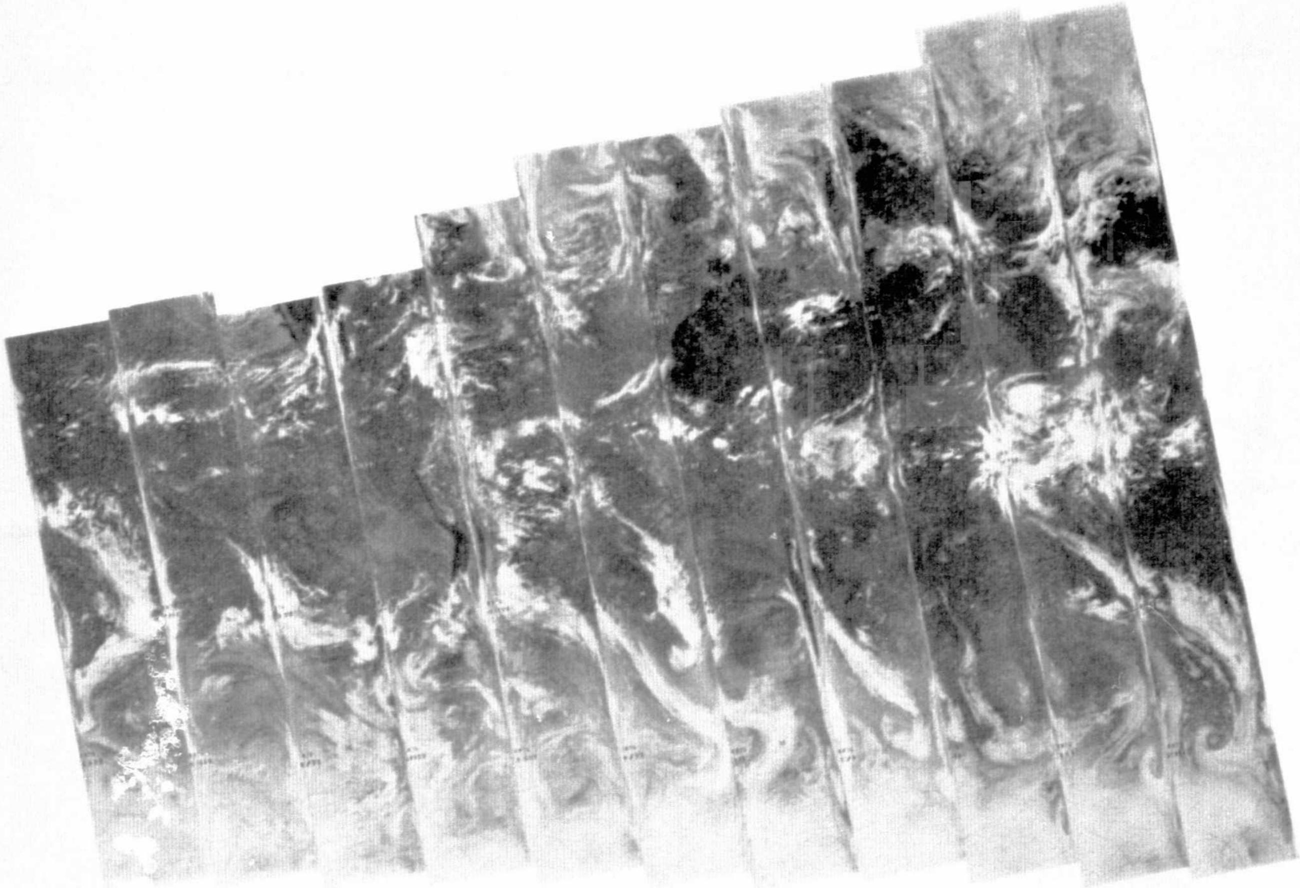
11.5μm



9306 9305 9304 9303 9302 9301 9300 9299 9298 9297 9296 9295 9294

6 MAY 1977

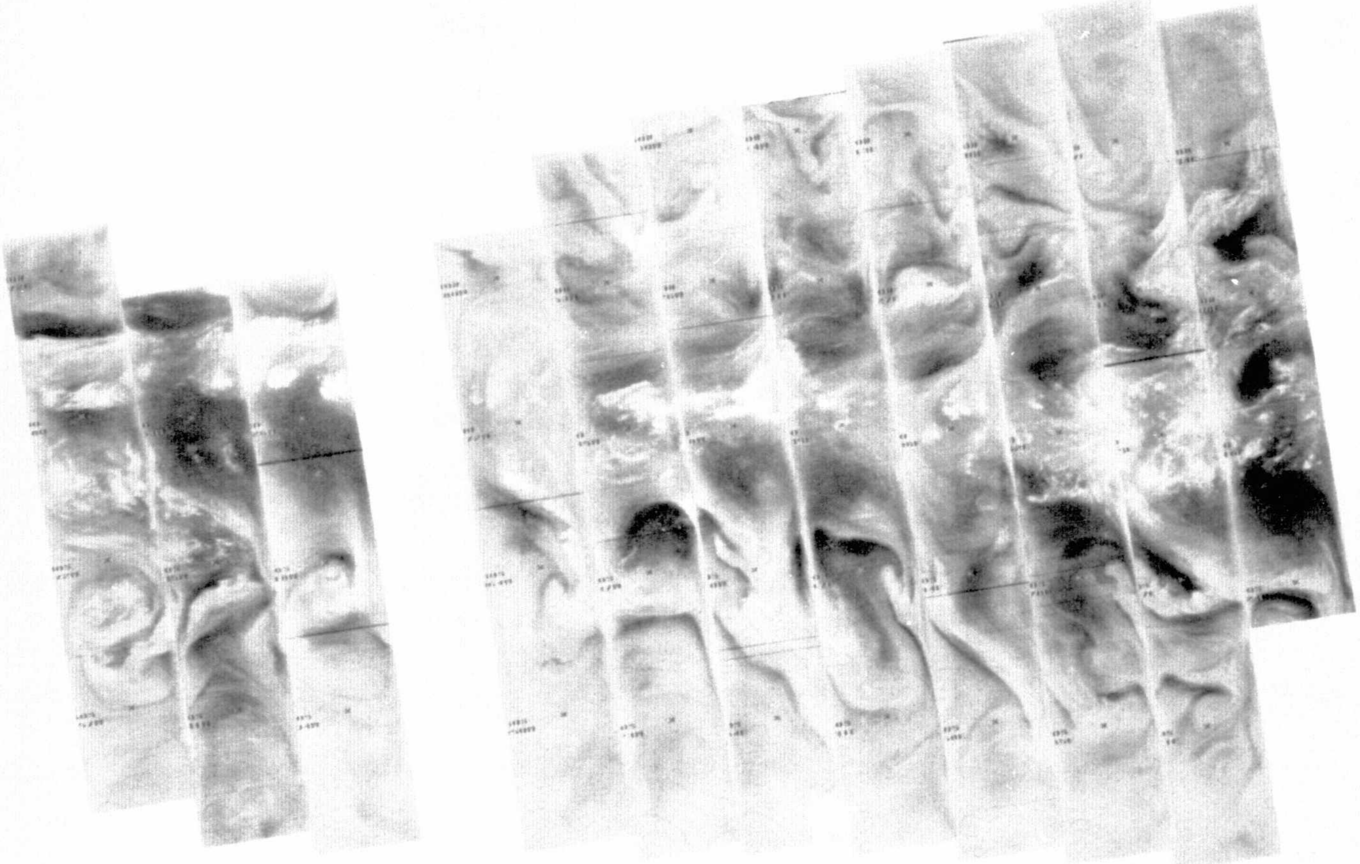
6.7μm



9306 9305 9304 9303 9302 9301 9300 9299 9298 9297 9296 9295 9294

6 MAY 1977

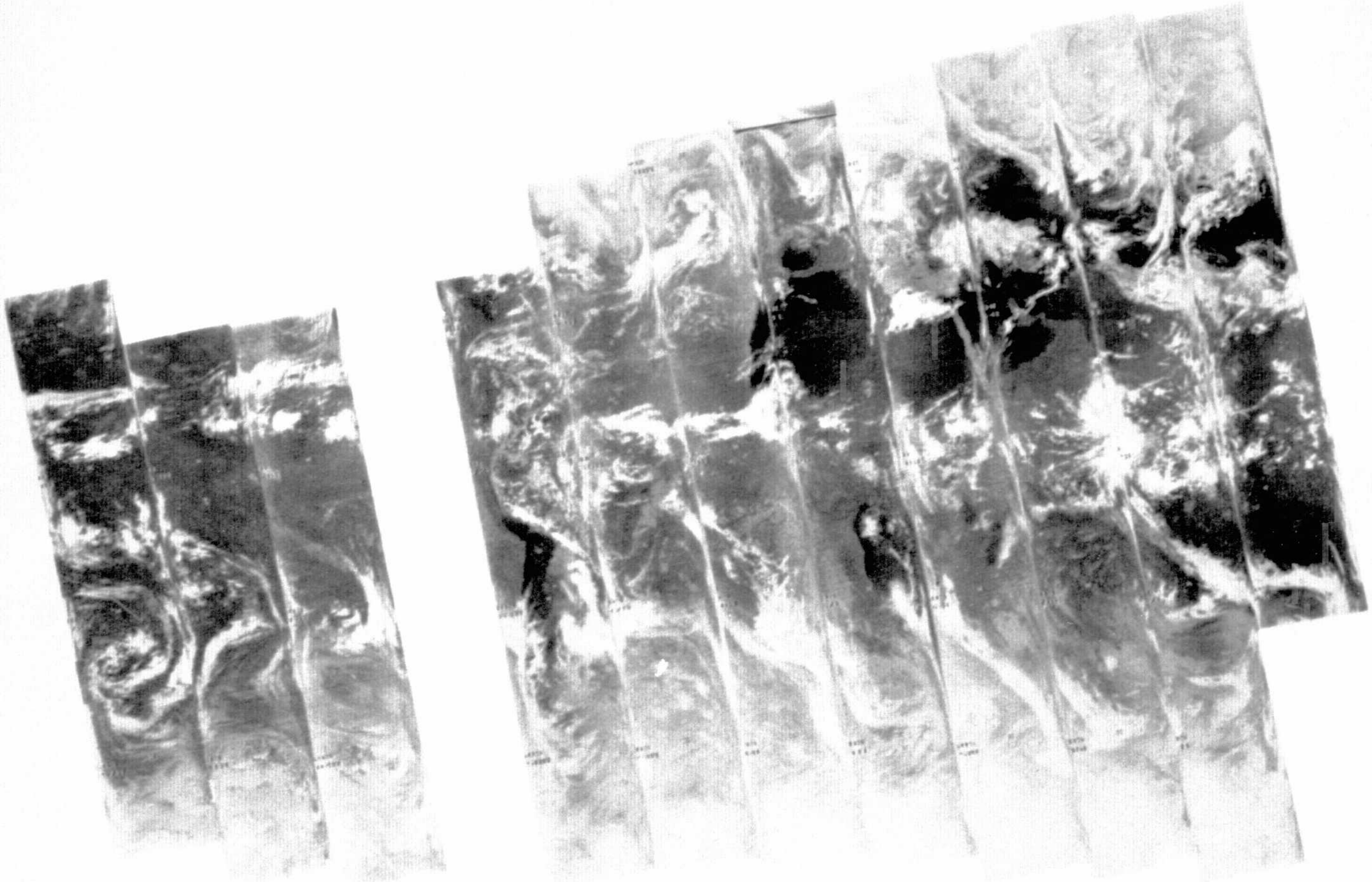
11.5μm



9320 9319 9318 9317 9316 9315 9314 9313 9312 9311 9310 9309 9308 9307

7 MAY 1977

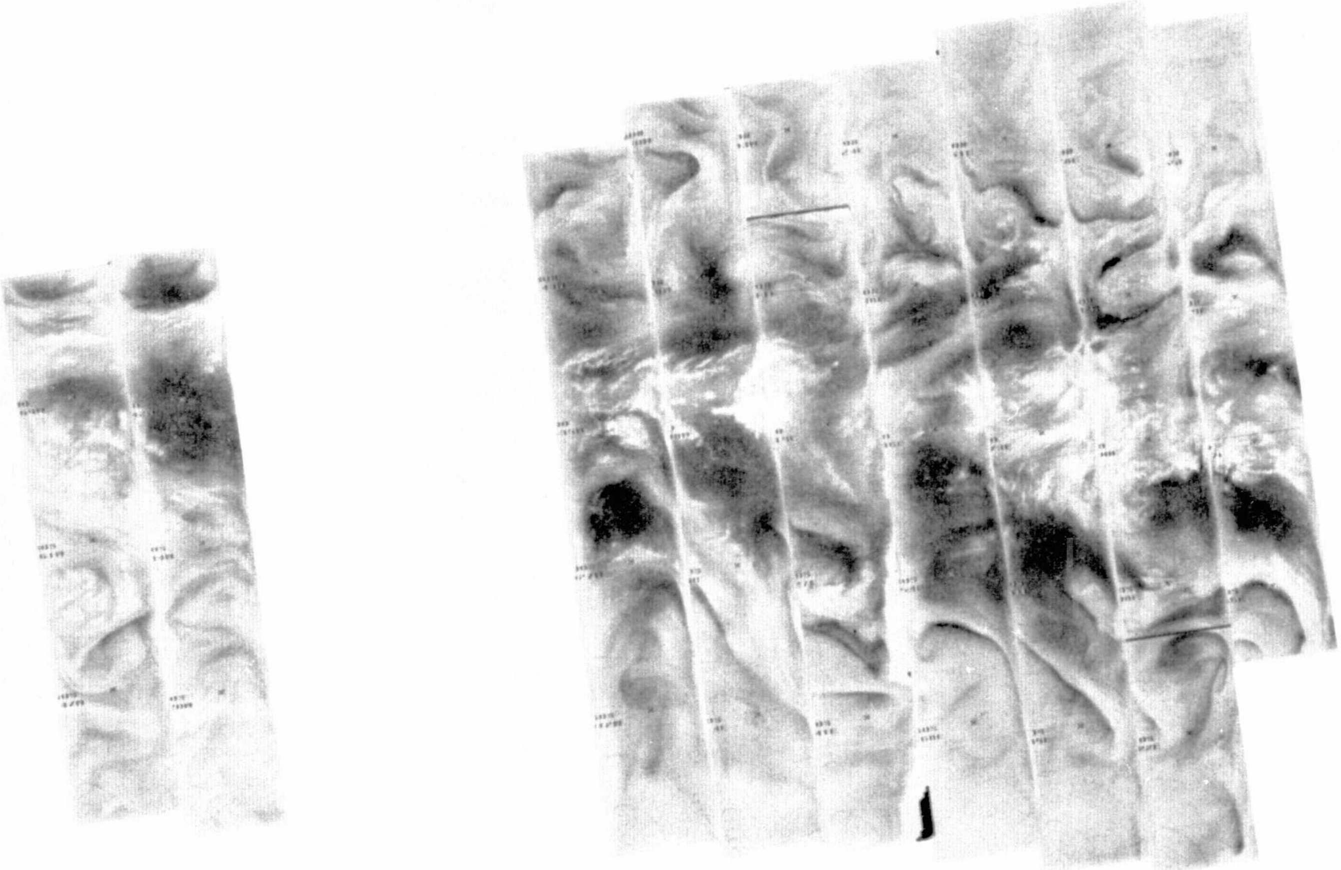
6.7μm



9320 9319 9318 9317 9316 9315 9314 9313 9312 9311 9310 9309 9308 9307

7 MAY 1977

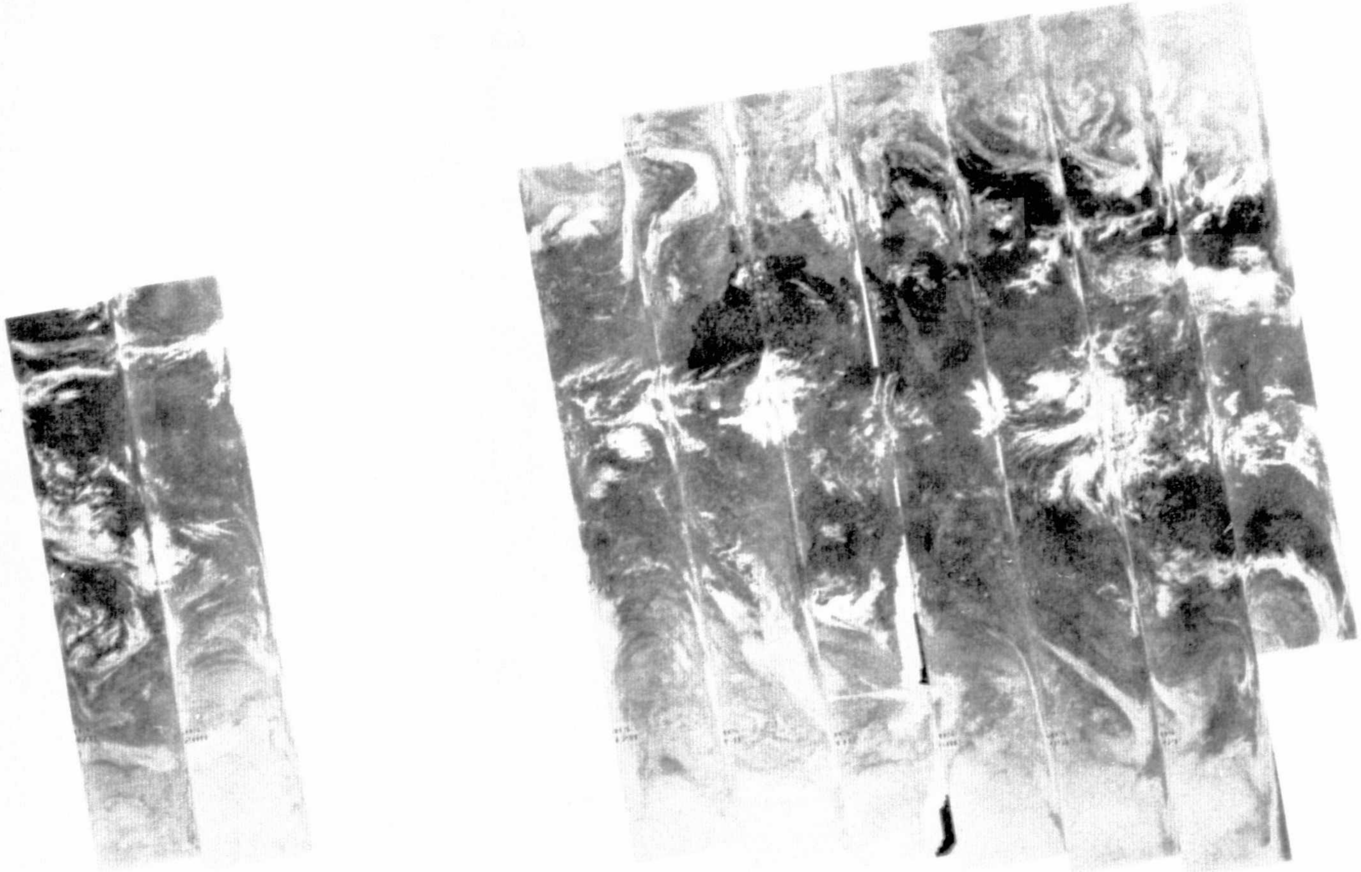
11.5μm



9333 9332 9331 9330 9329 9328 9327 9326 9325 9324 9323 9322 9321

8 MAY 1977

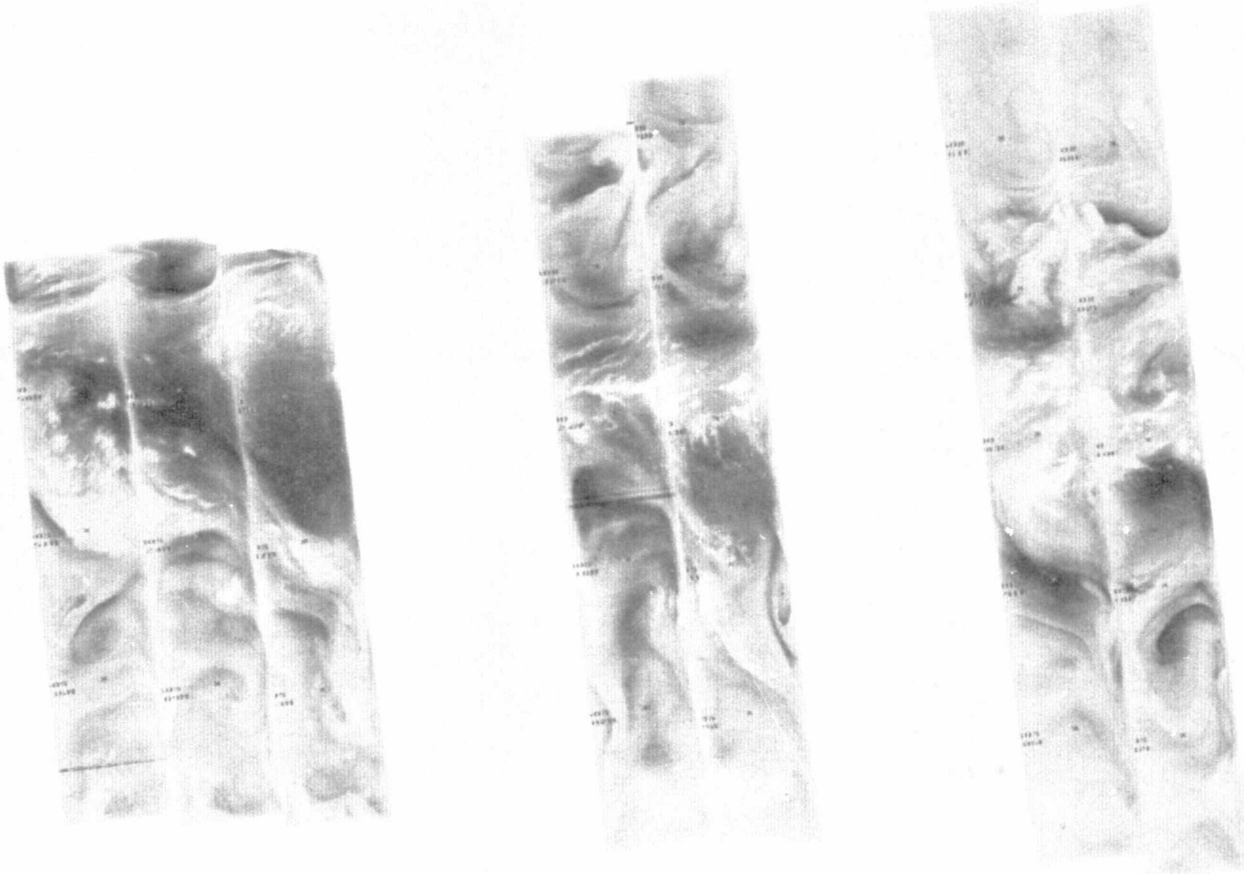
6.7μm



9333 9332 9331 9330 9329 9328 9327 9326 9325 9324 9323 9322 9321

8 MAY 1977

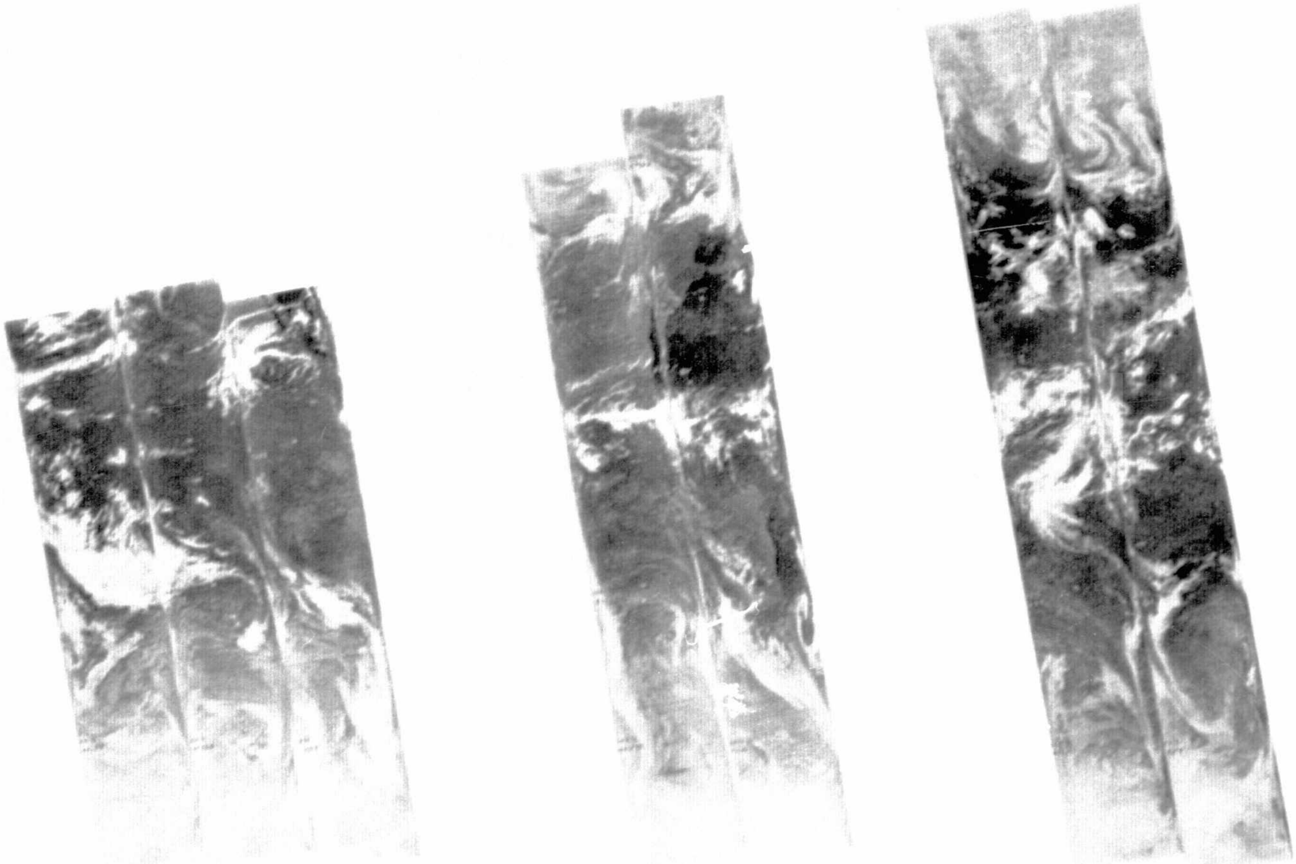
11.5μm



9347 9346 9345 9344 9343 9342 9341 9340 9339 9338 9337 9336 9335 9334

9 MAY 1977

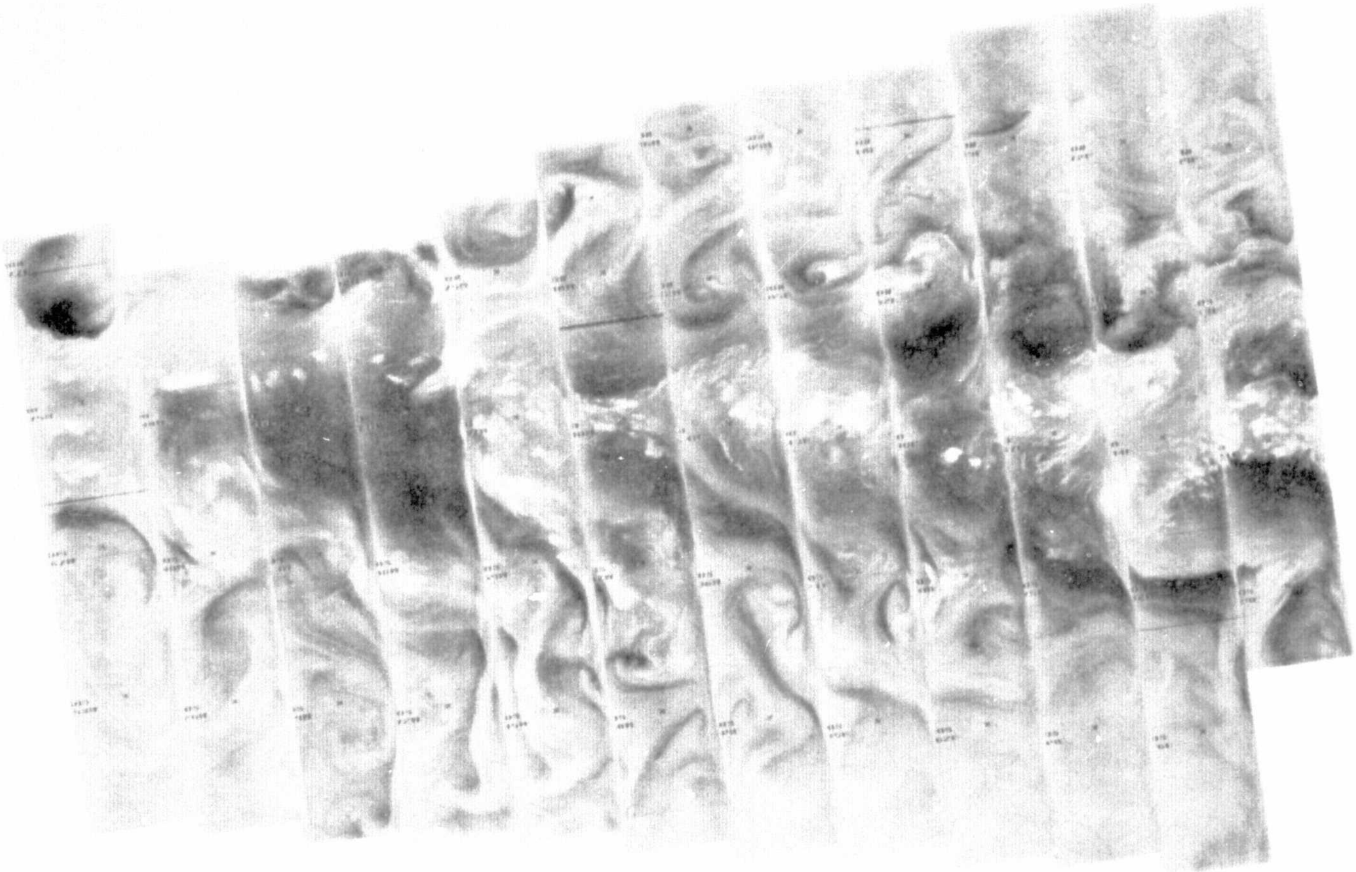
6.7μm



9347 9346 9345 9344 9343 9342 9341 9340 9339 9338 9337 9336 9335 9334

9 MAY 1977

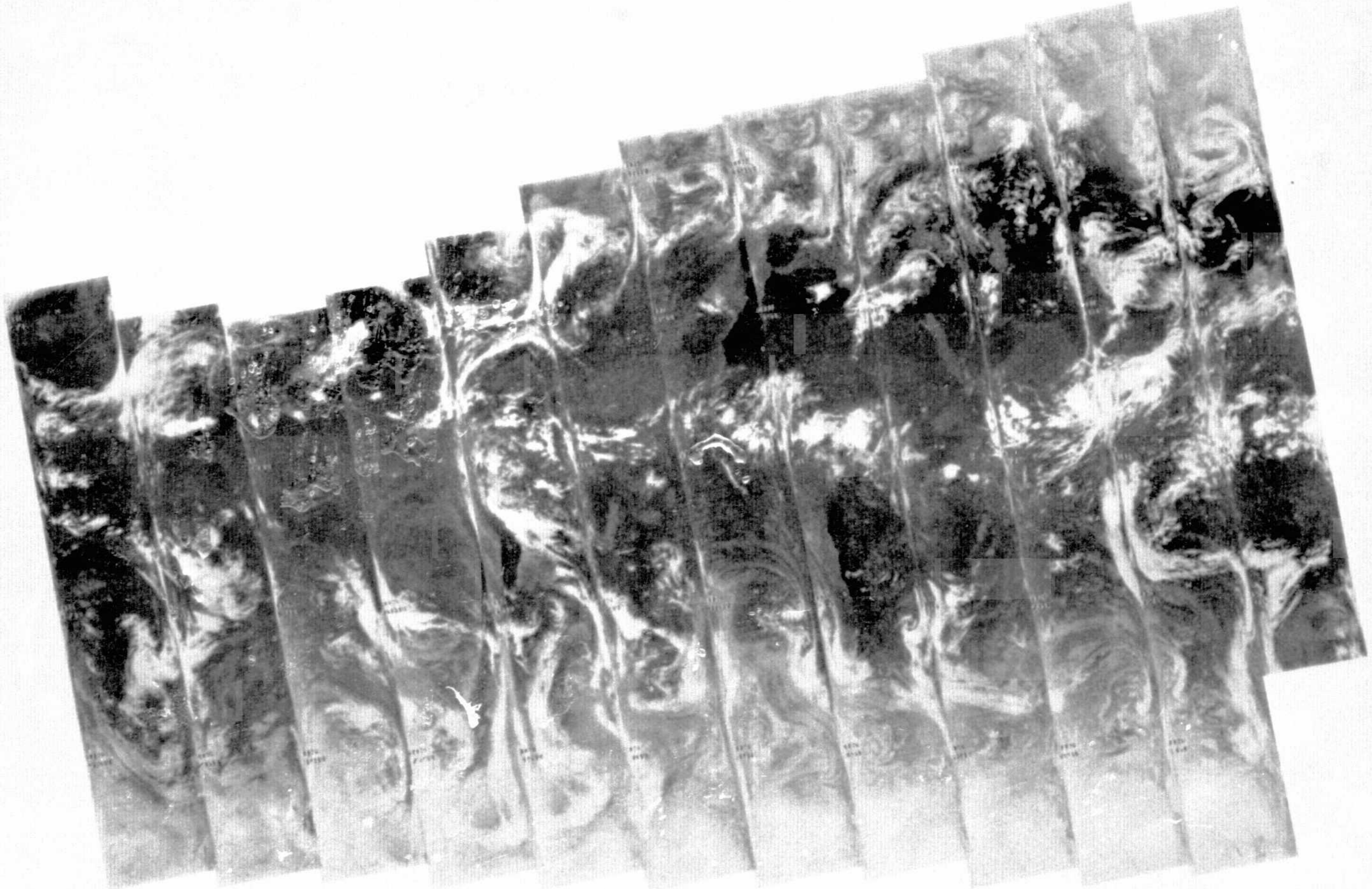
11.5μm



9360 9359 9358 9357 9356 9355 9354 9353 9352 9351 9350 9349 9348

10 MAY 1977

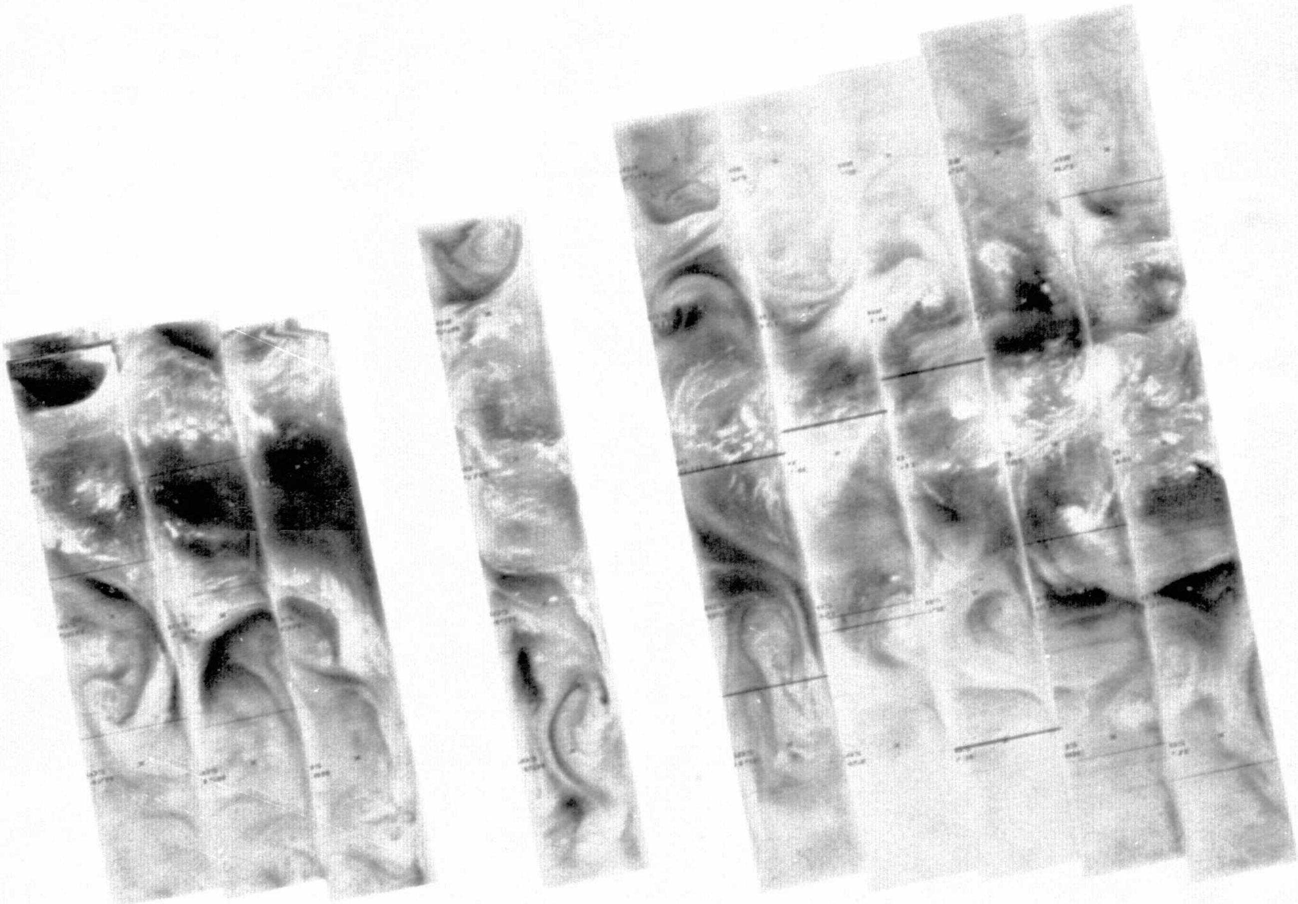
6.7μm



9360 9359 9358 9357 9356 9355 9354 9353 9352 9351 9350 9349 9348

10 MAY 1977

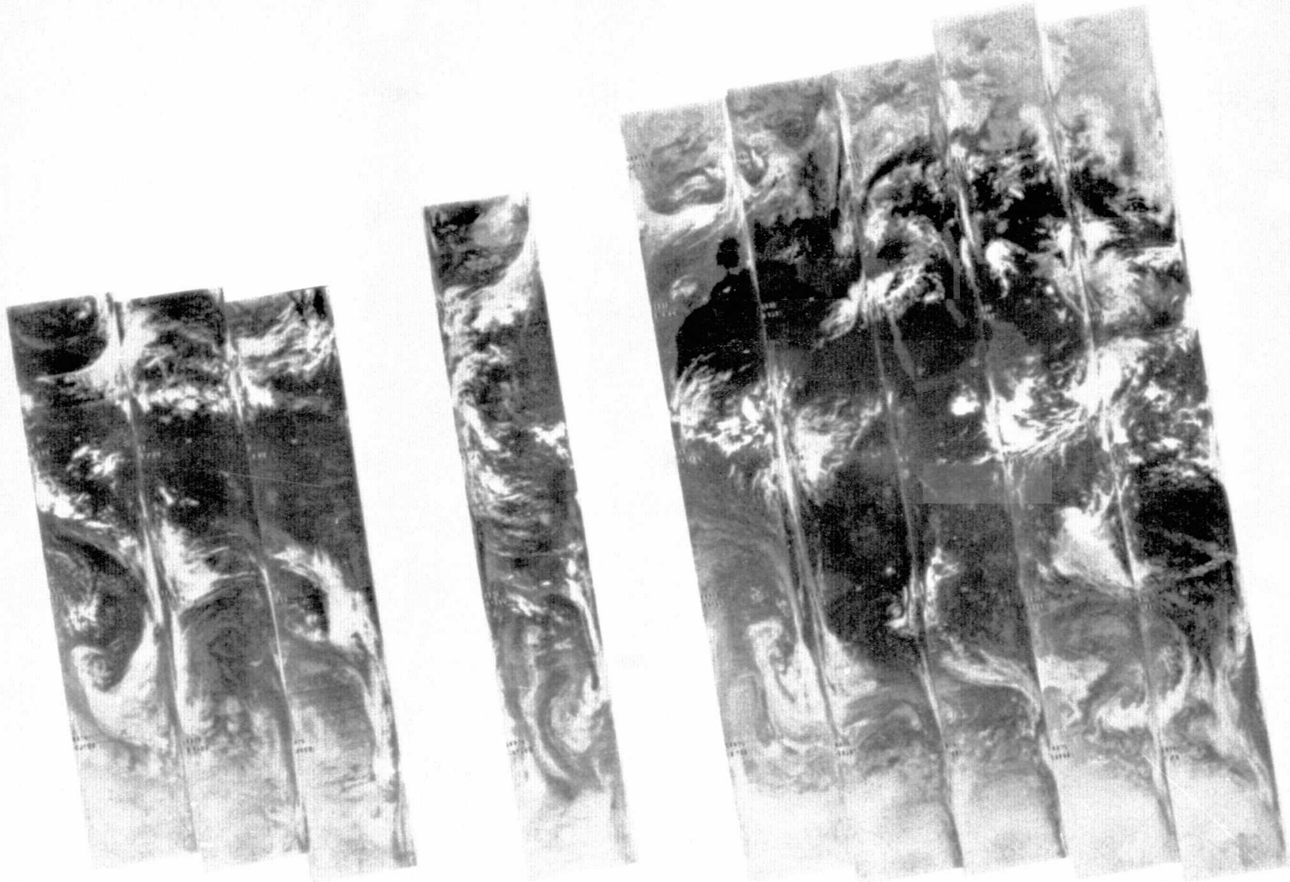
11.5μm



9373 9372 9371 9370 9369 9368 9367 9366 9365 9364 9363 9362 9361

11 MAY 1977

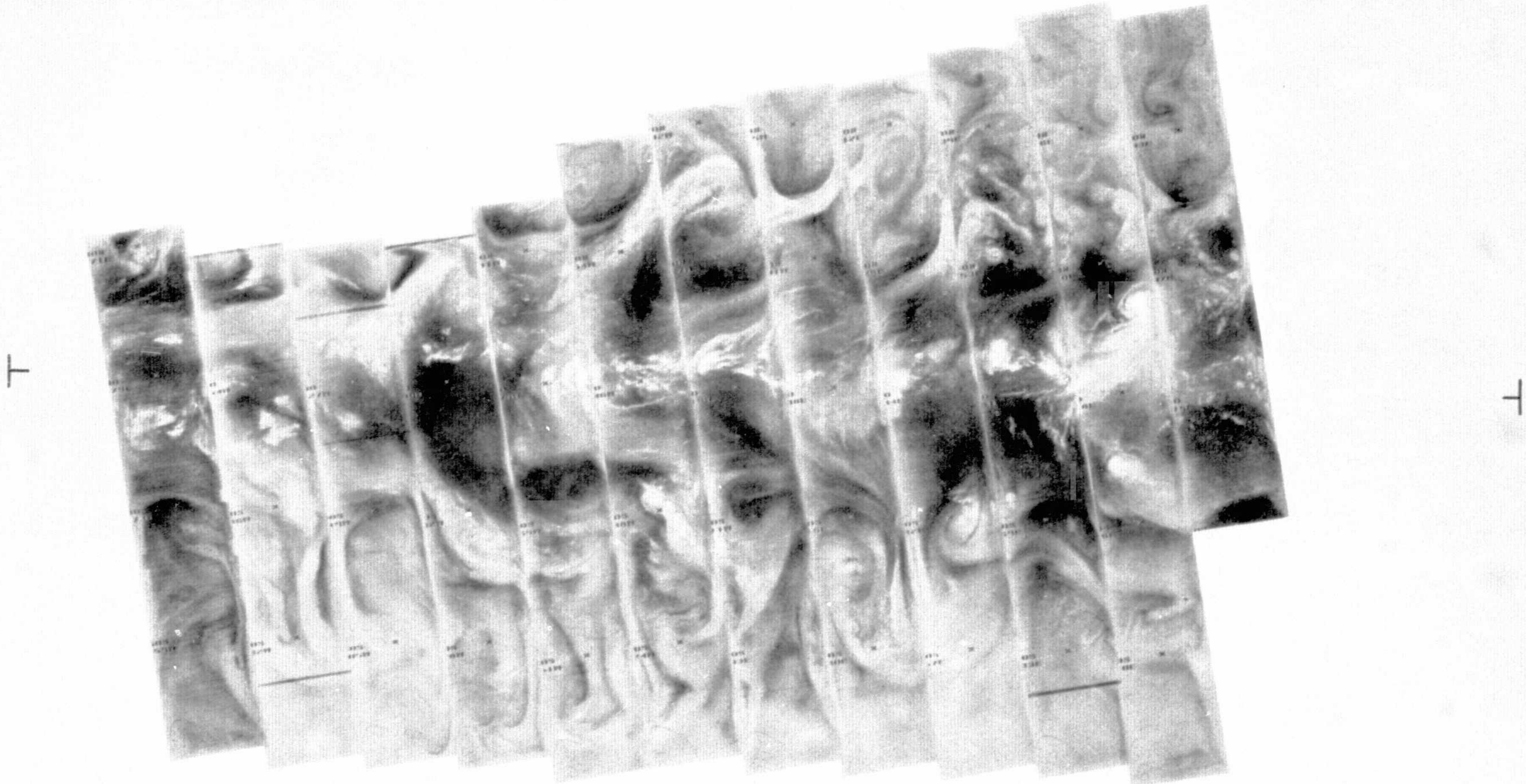
6.7μm



9373 9372 9371 9370 9369 9368 9367 9366 9365 9364 9363 9362 9361

11 MAY 1977

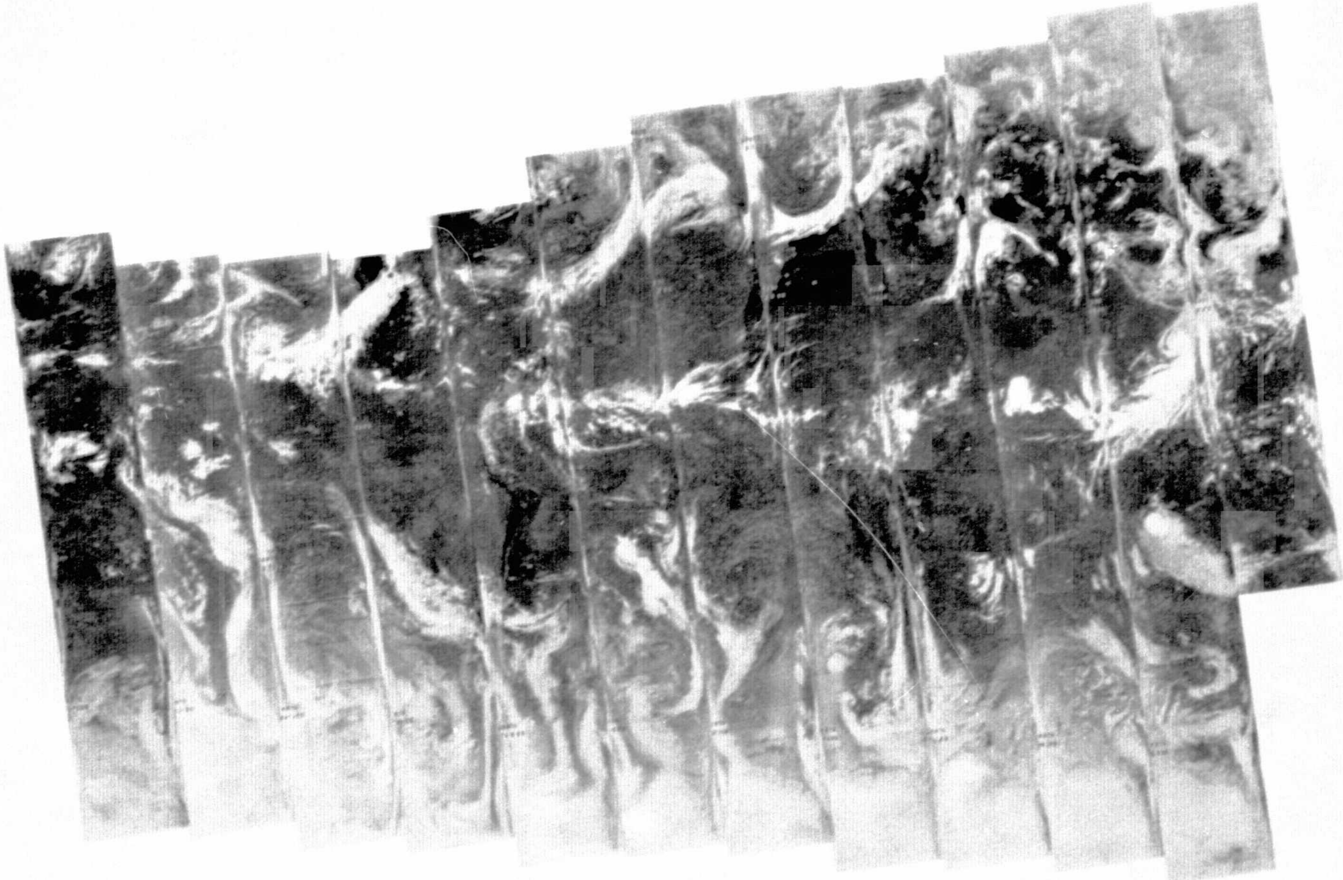
11.5μm



9387 9386 9385 9384 9383 9382 9381 9380 9379 9378 9377 9376 9375 9374

12 MAY 1977

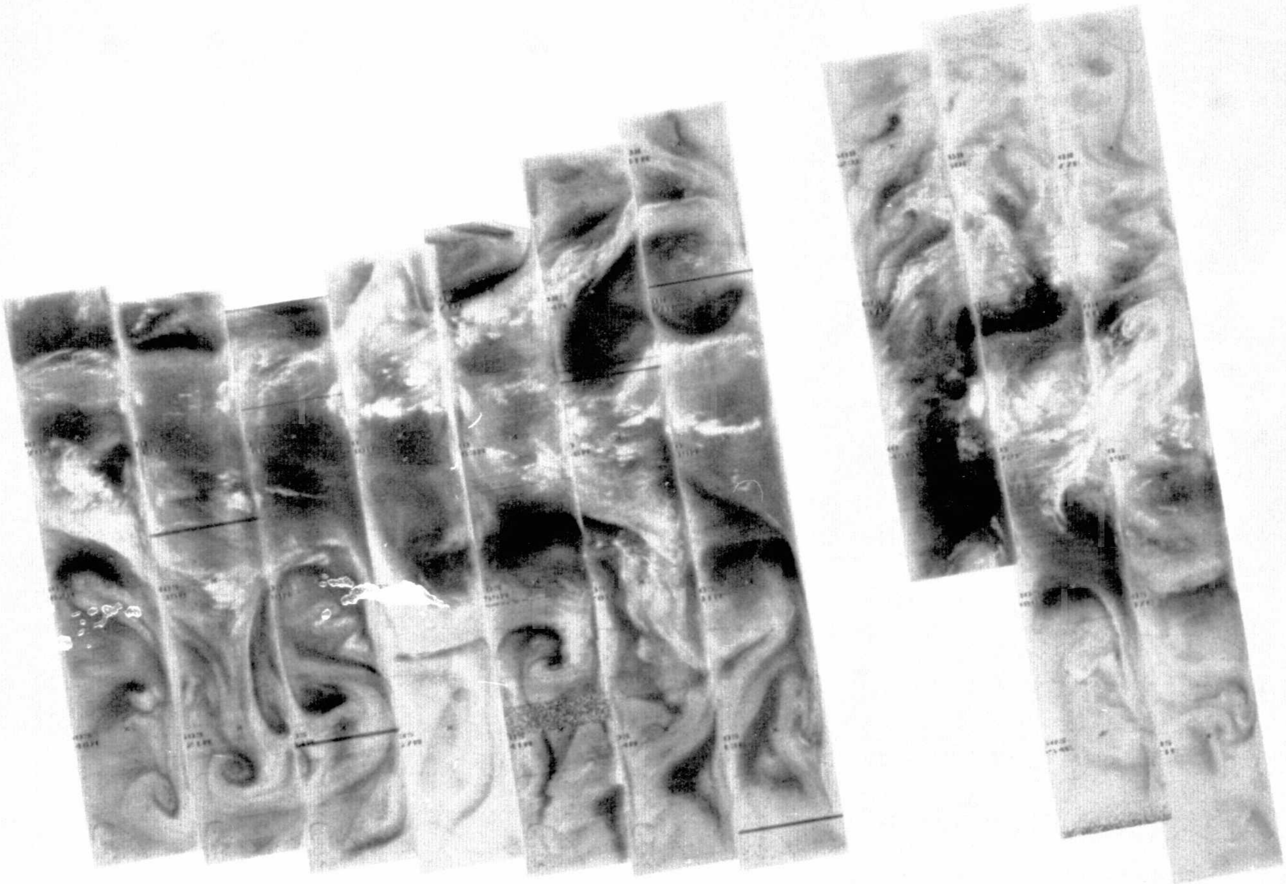
6.7μm



9387 9386 9385 9384 9383 9382 9381 9380 9379 9378 9377 9376 9375 9374

12 MAY 1977

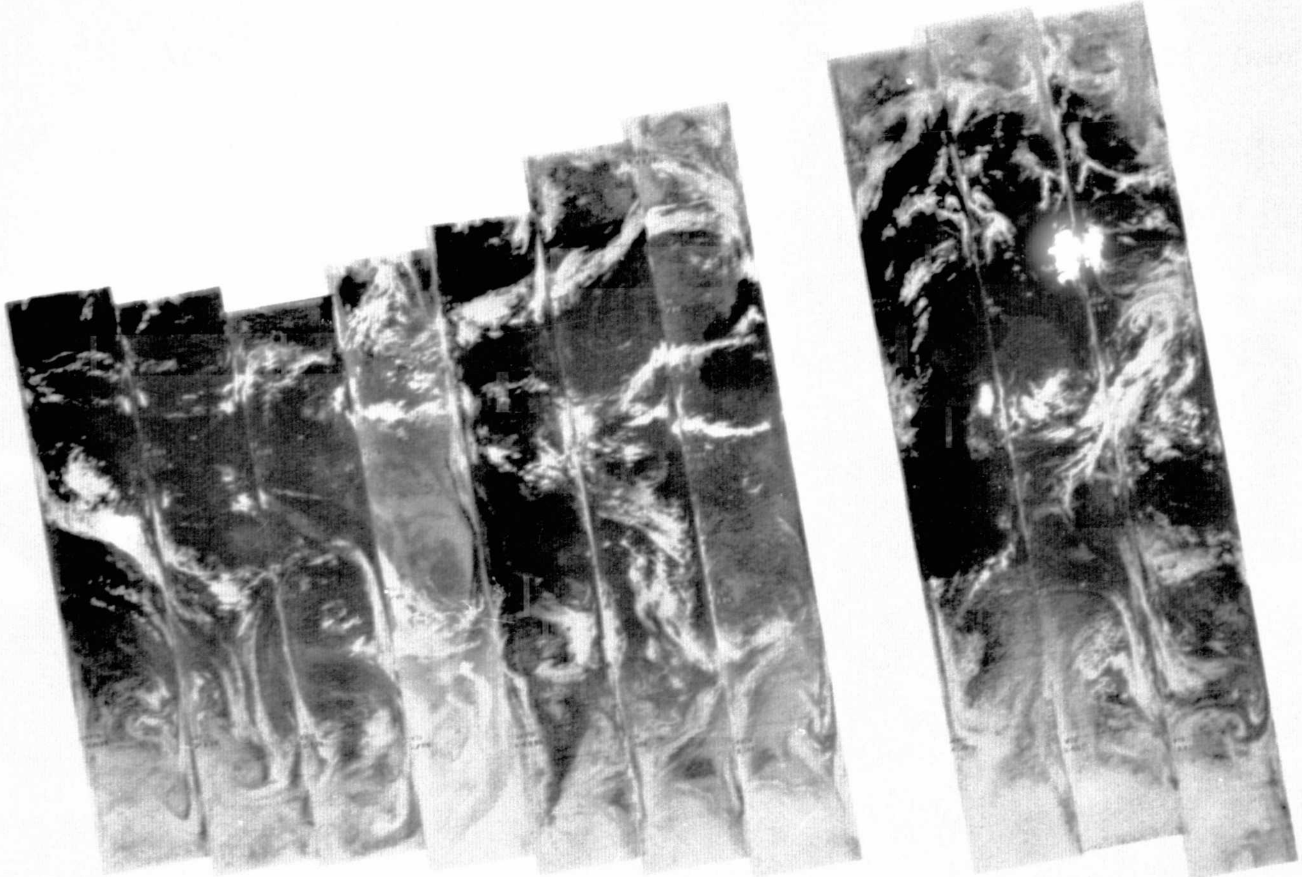
11.5μm



9400 9399 9398 9397 9396 9395 9394 9393 9392 9391 9390 9389 9388

13 MAY 1977

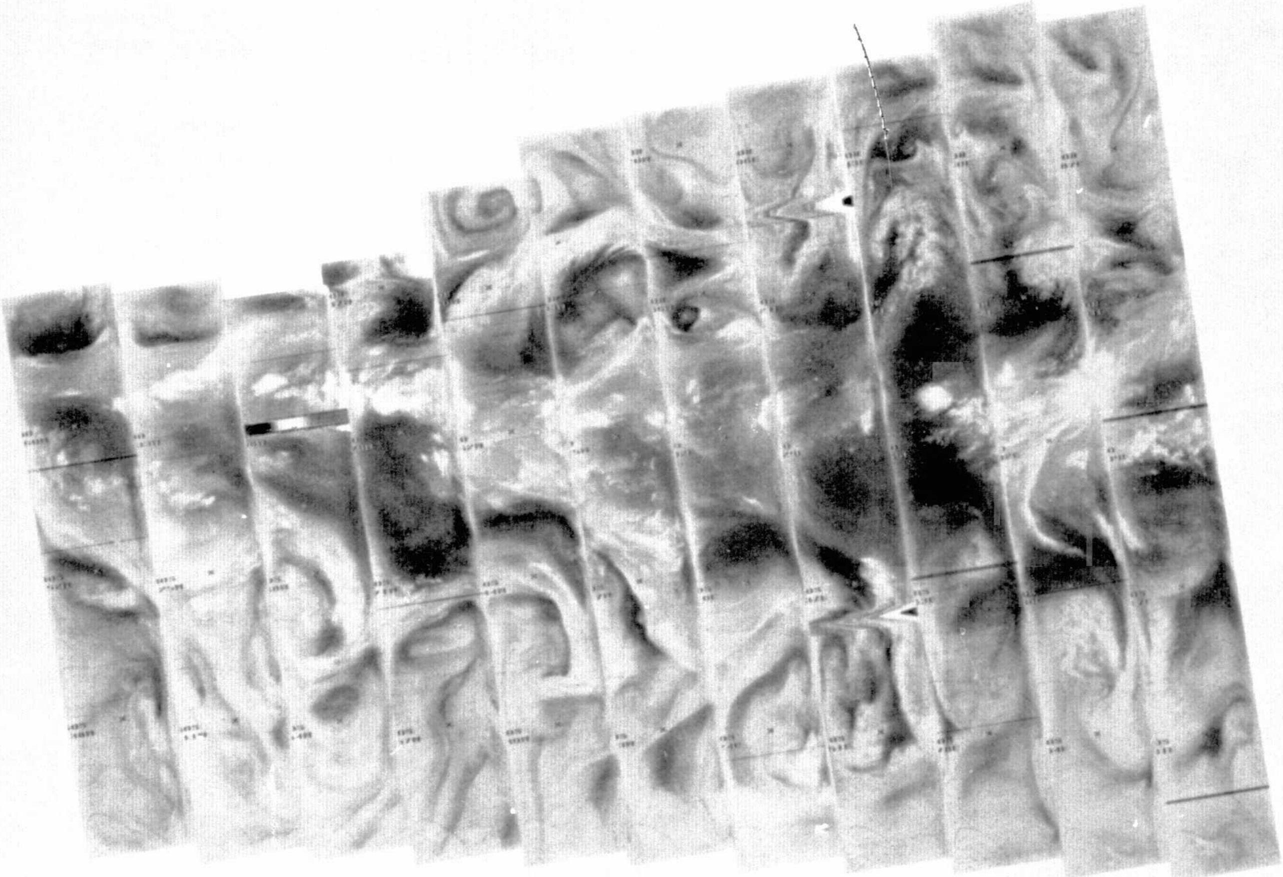
6.7μm



9400 9399 9398 9397 9396 9395 9394 9393 9392 9391 9390 9389 9388

13 MAY 1977

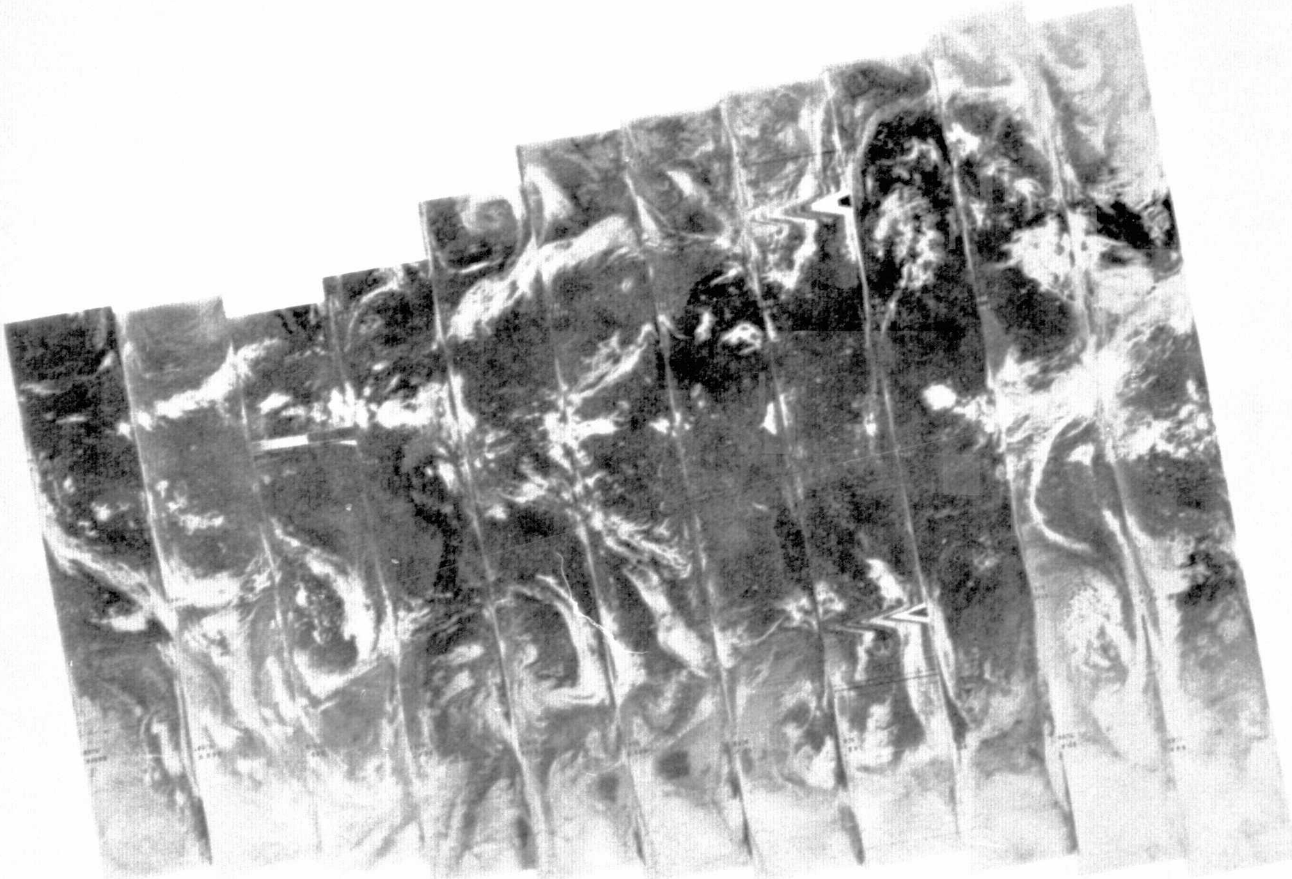
11.5μm



9413 9412 9411 9410 9409 9408 9407 9406 9405 9404 9403 9402 9401

14 MAY 1977

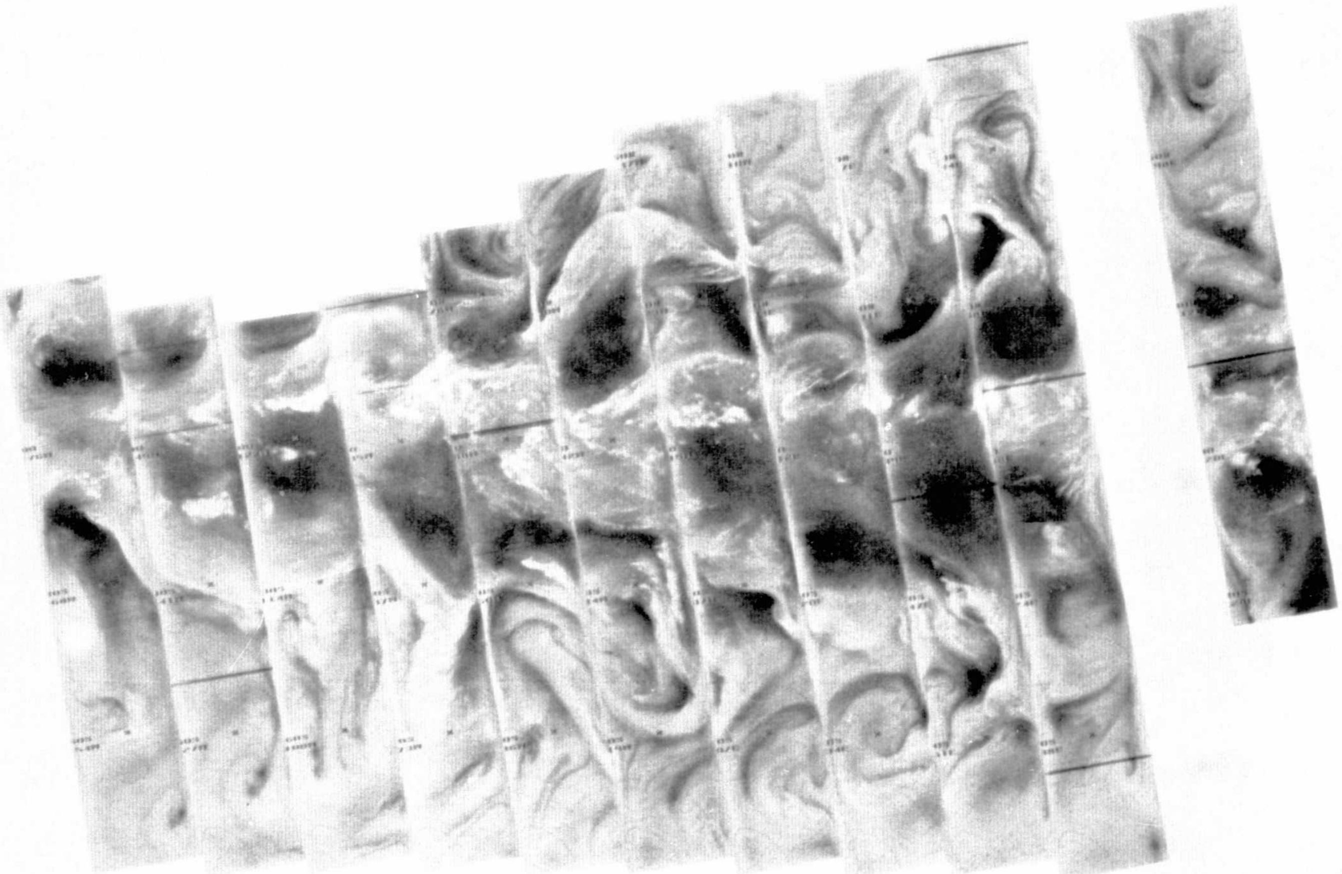
6.7μm



9413 9412 9411 9410 9409 9408 9407 9406 9405 9404 9403 9402 9401

14 MAY 1977

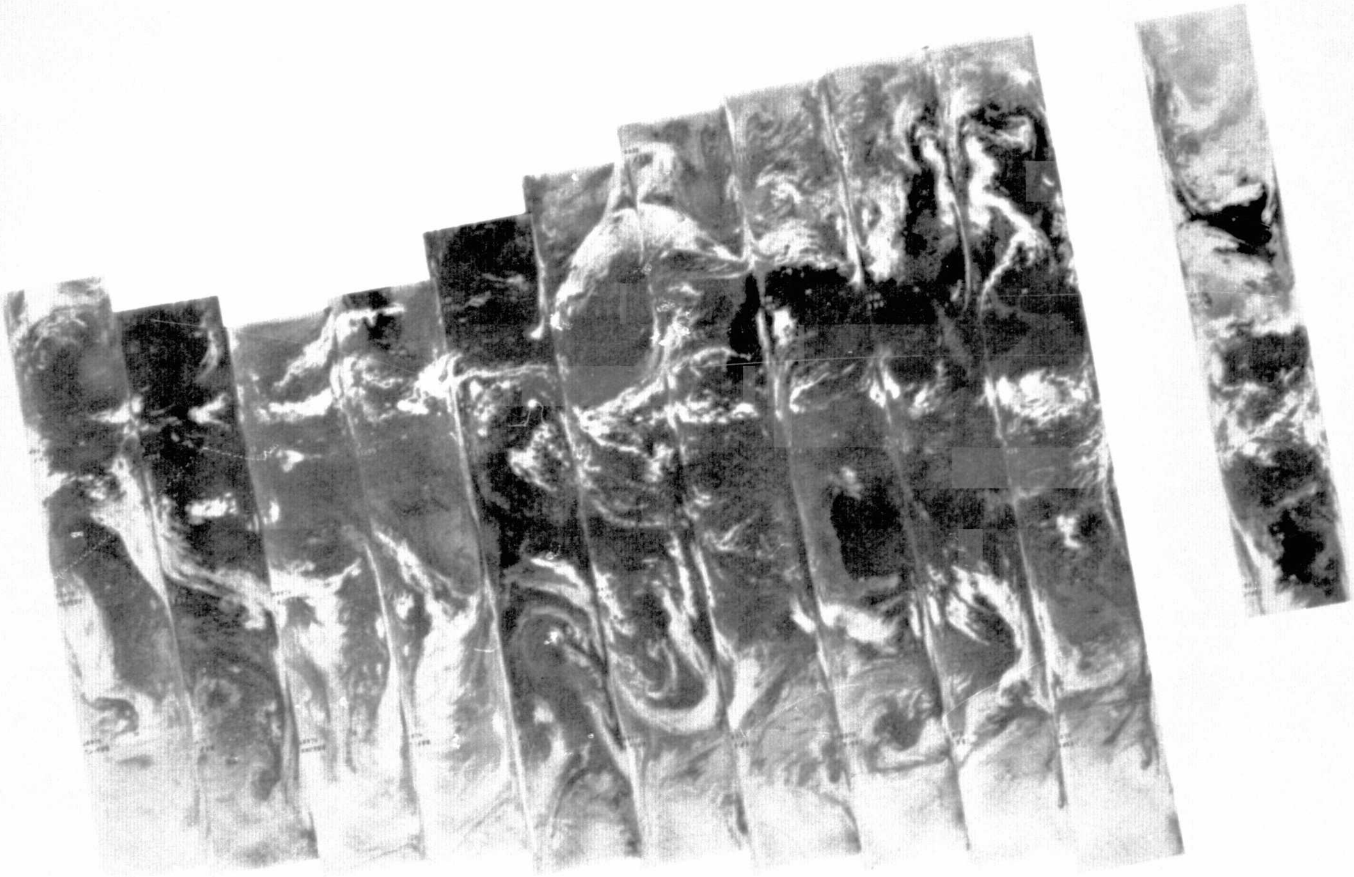
11.5μm



9427 9426 9425 9424 9423 9422 9421 9420 9419 9418 9417 9416 9415 9414

15 MAY 1977

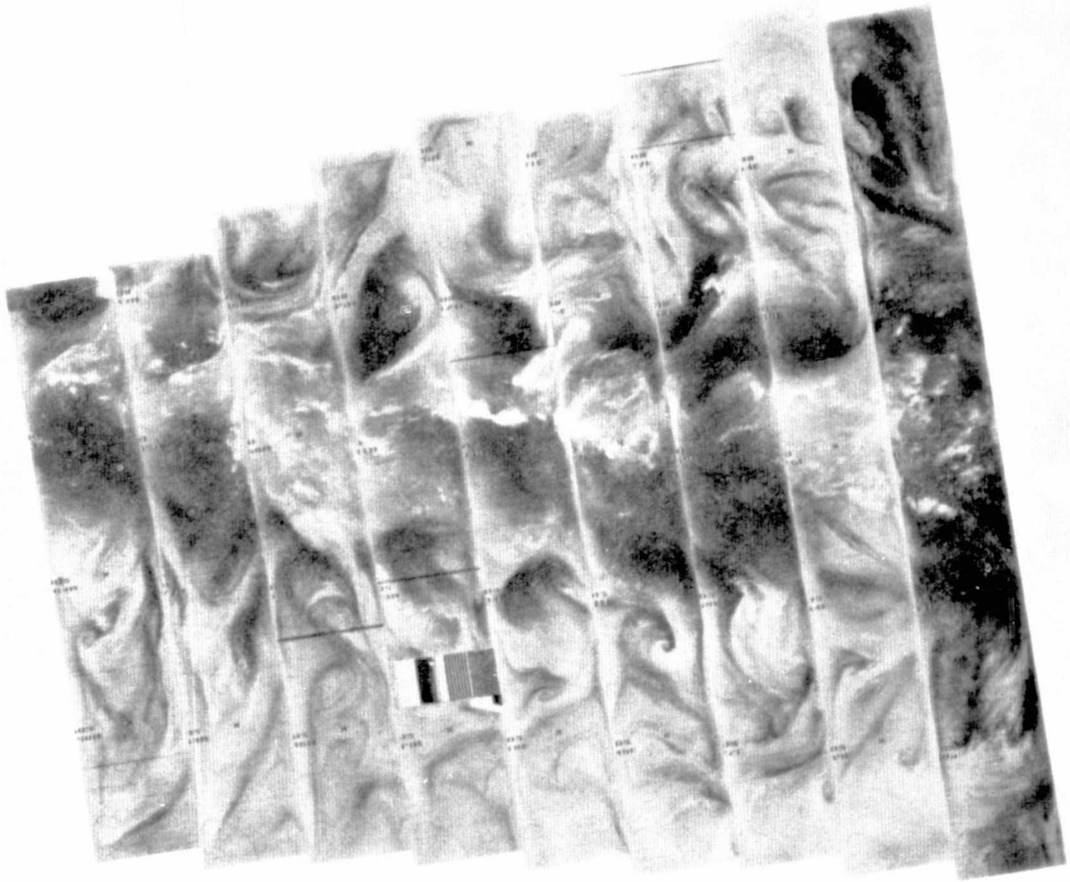
6.7μm



9427 9426 9425 9424 9423 9422 9421 9420 9419 9418 9417 9416 9415 9414

15 MAY 1977

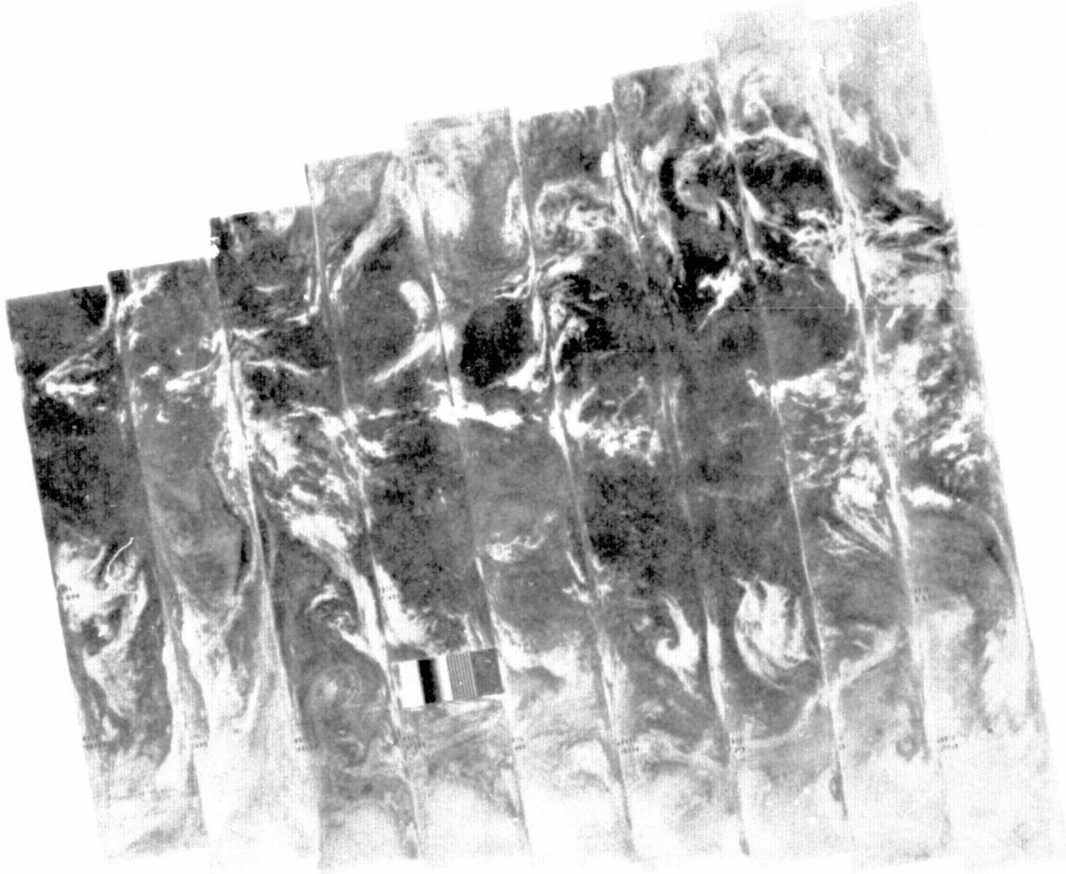
11.5μm



9440 9439 9438 9437 9436 9435 9434 9433 9432 9431 9430 9429 9428

16 MAY 1977

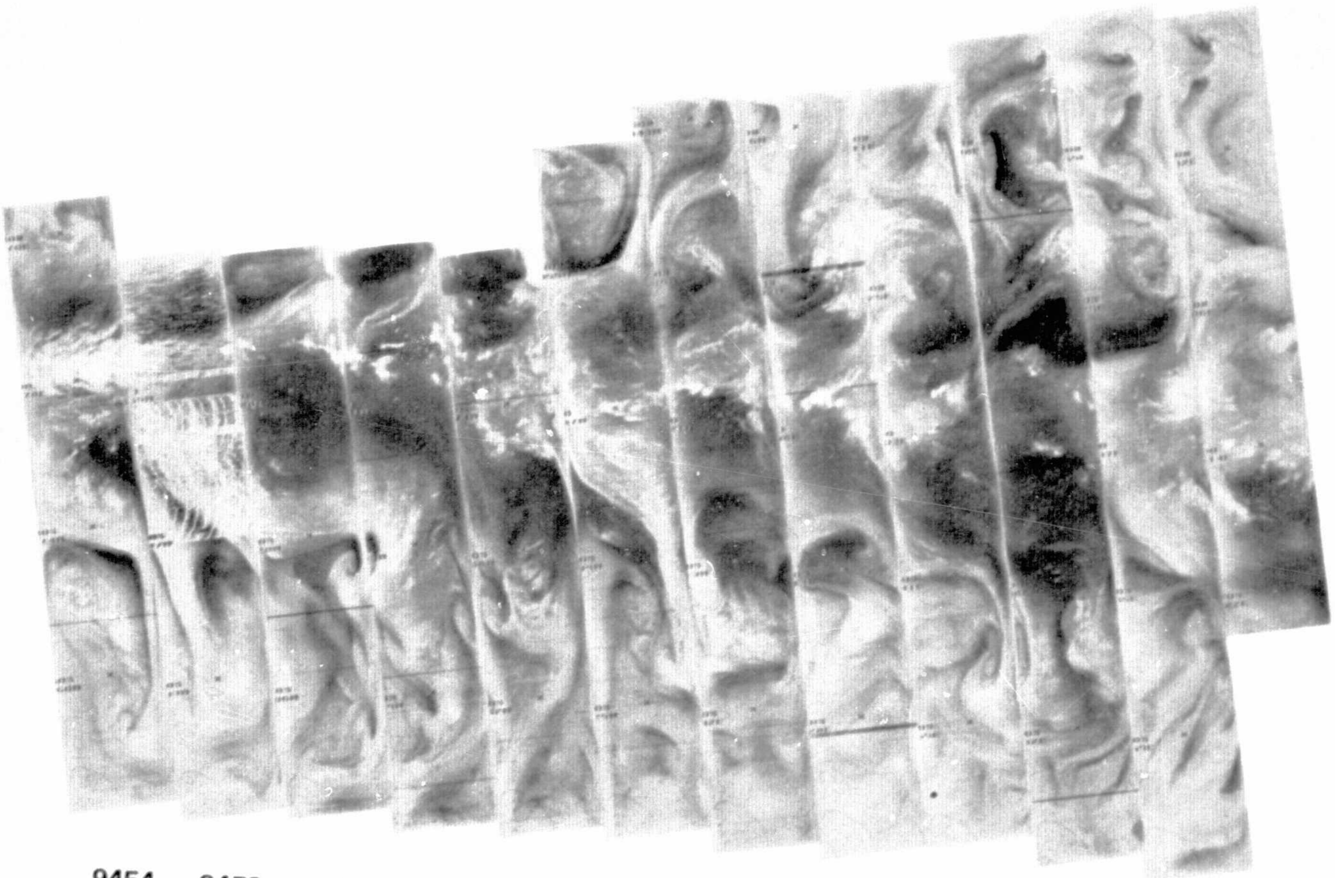
6.7μm



9440 9439 9438 9437 9436 9435 9434 9433 9432 9431 9430 9429 9428

16 MAY 1977

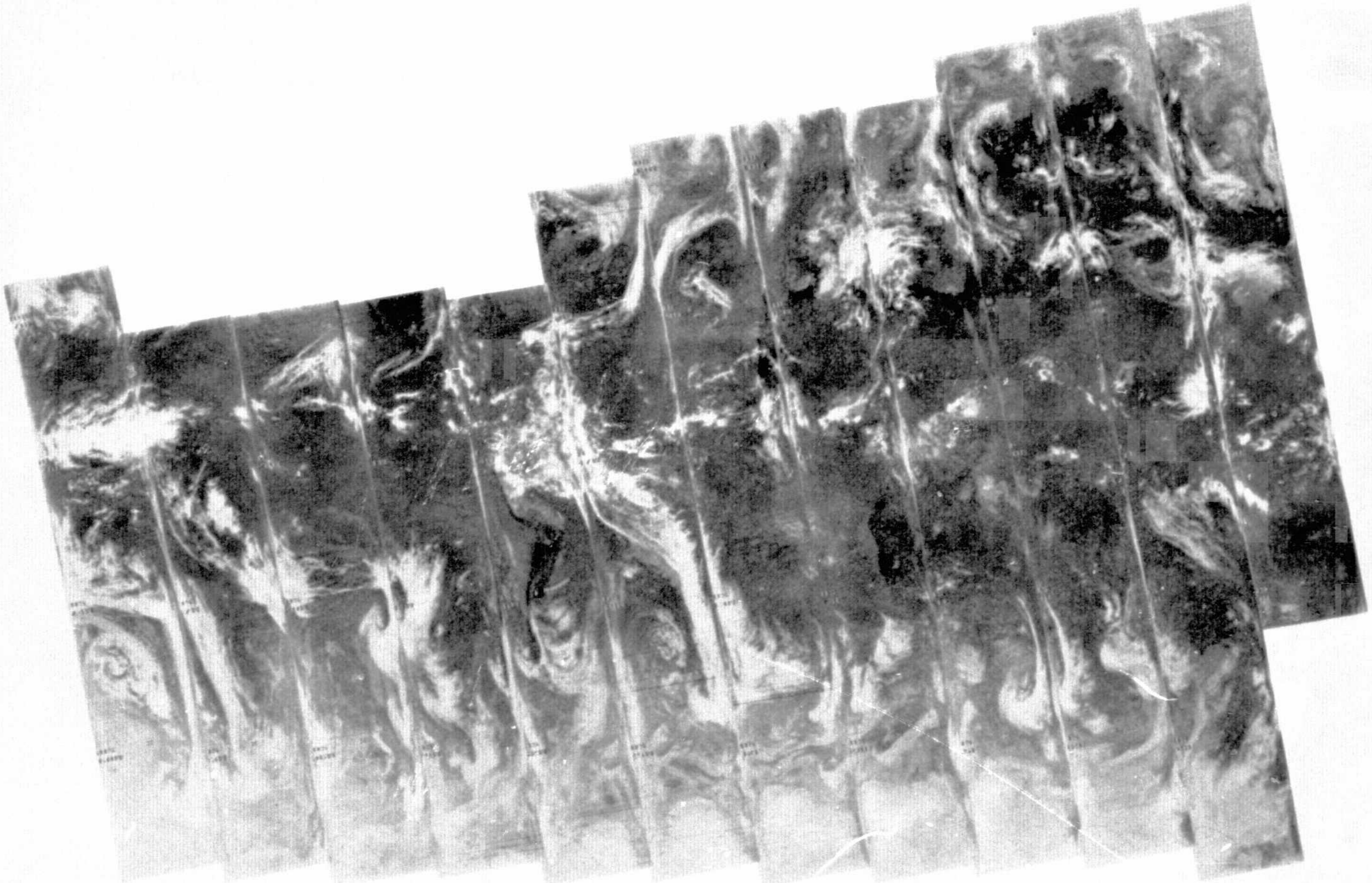
11.5μm



9454 9453 9452 9451 9450 9449 9448 9447 9446 9445 9444 9443 9442 9441

17 MAY 1977

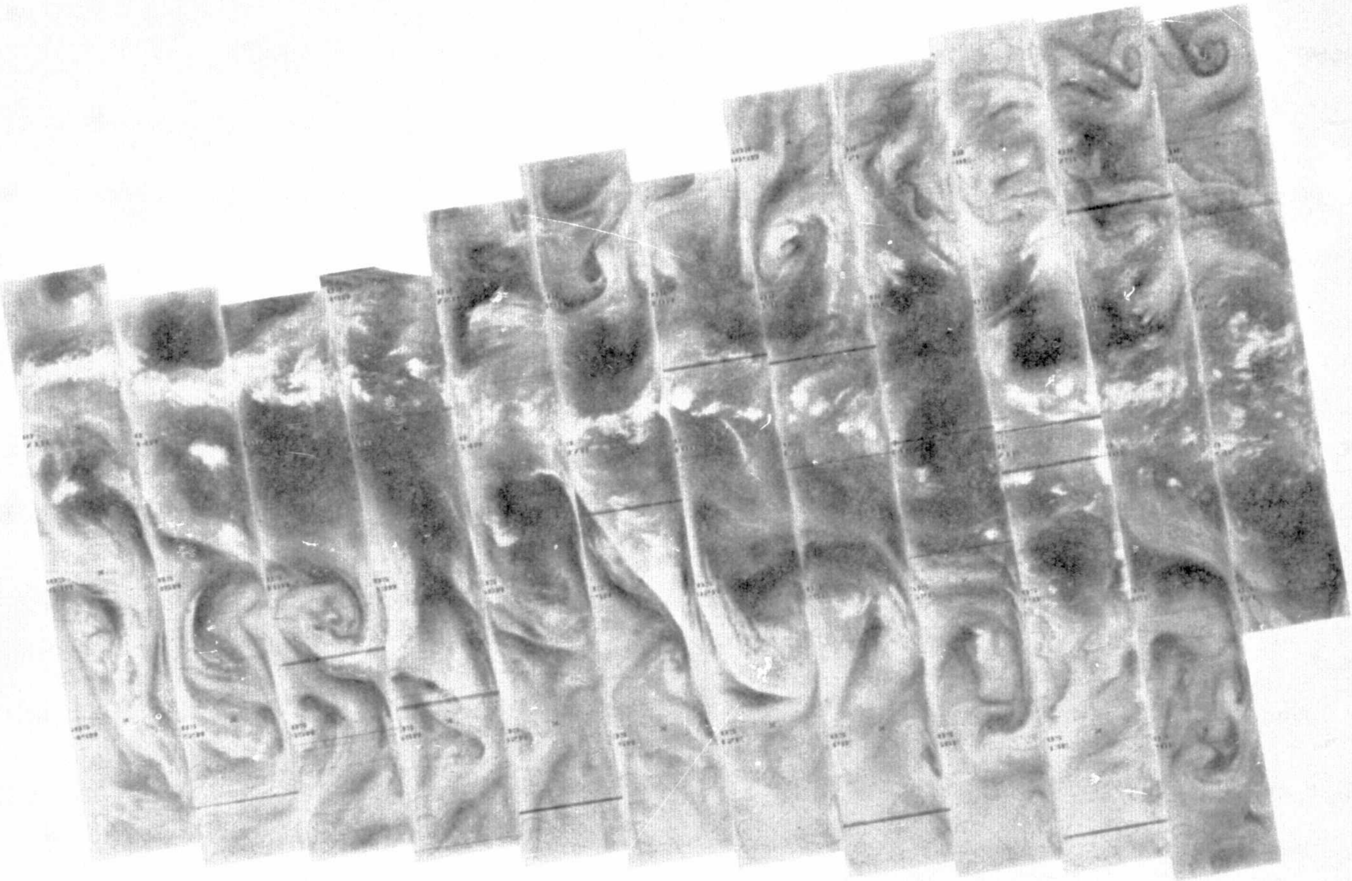
6.7μm



9454 9453 9452 9451 9450 9449 9448 9447 9446 9445 9444 9443 9442 9441

17 MAY 1977

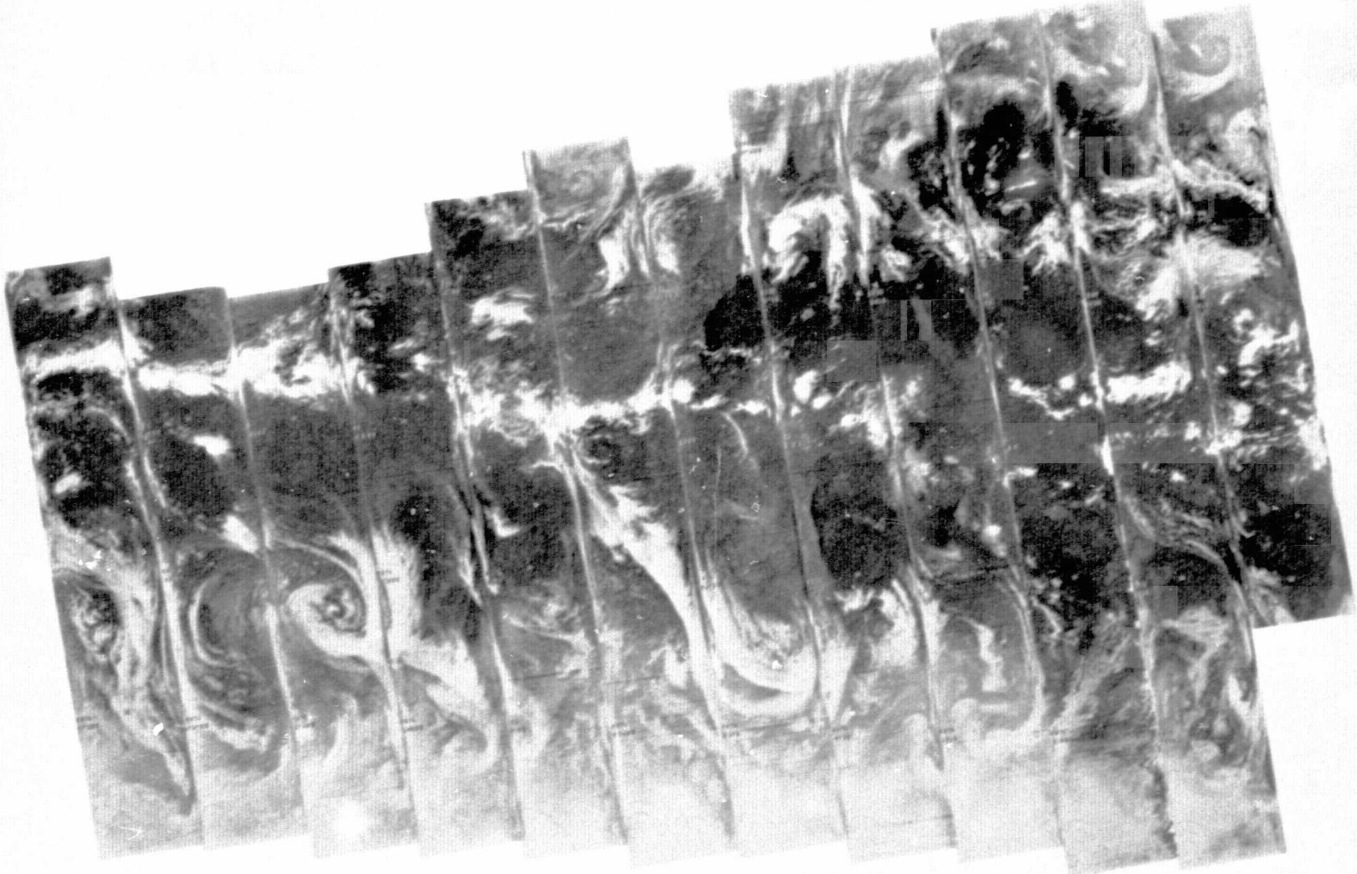
11.5μm



9467 9466 9465 9464 9463 9462 9461 9460 9459 9458 9457 9456 9455

18 MAY 1977

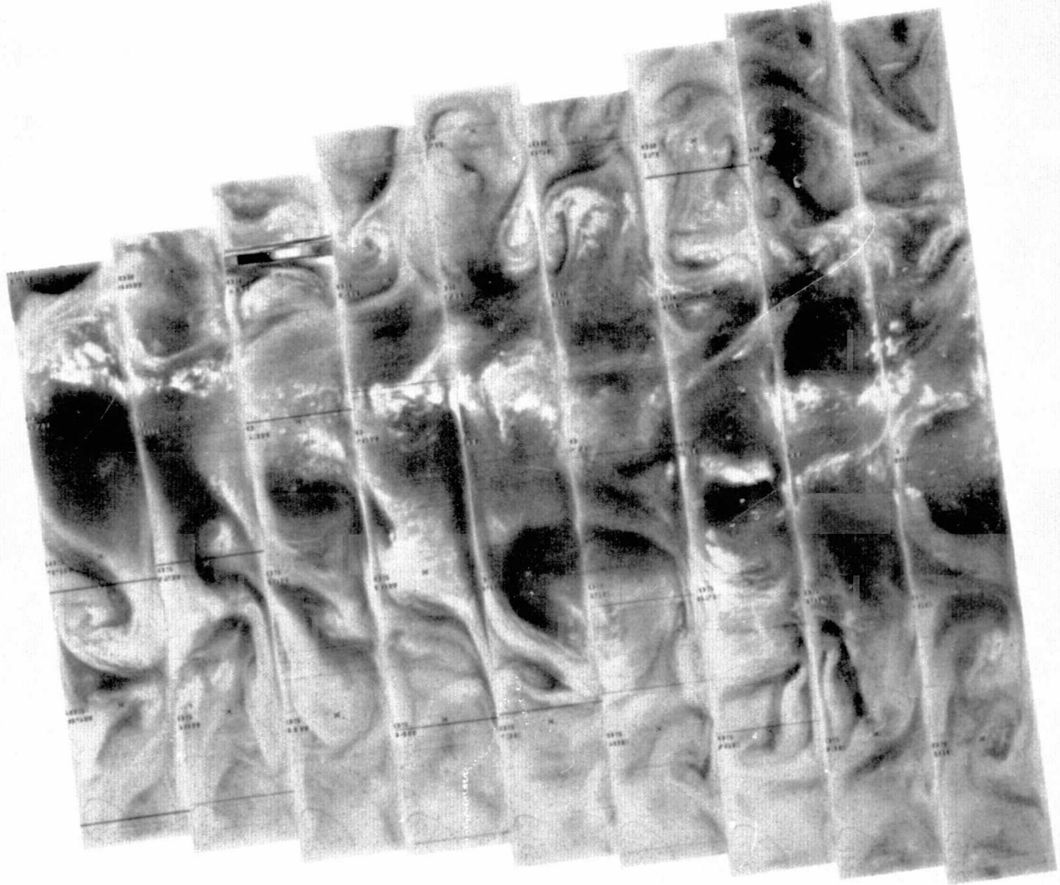
6.7μm



9467 9466 9465 9464 9463 9462 9461 9460 9459 9458 9457 9456 9455

18 MAY 1977

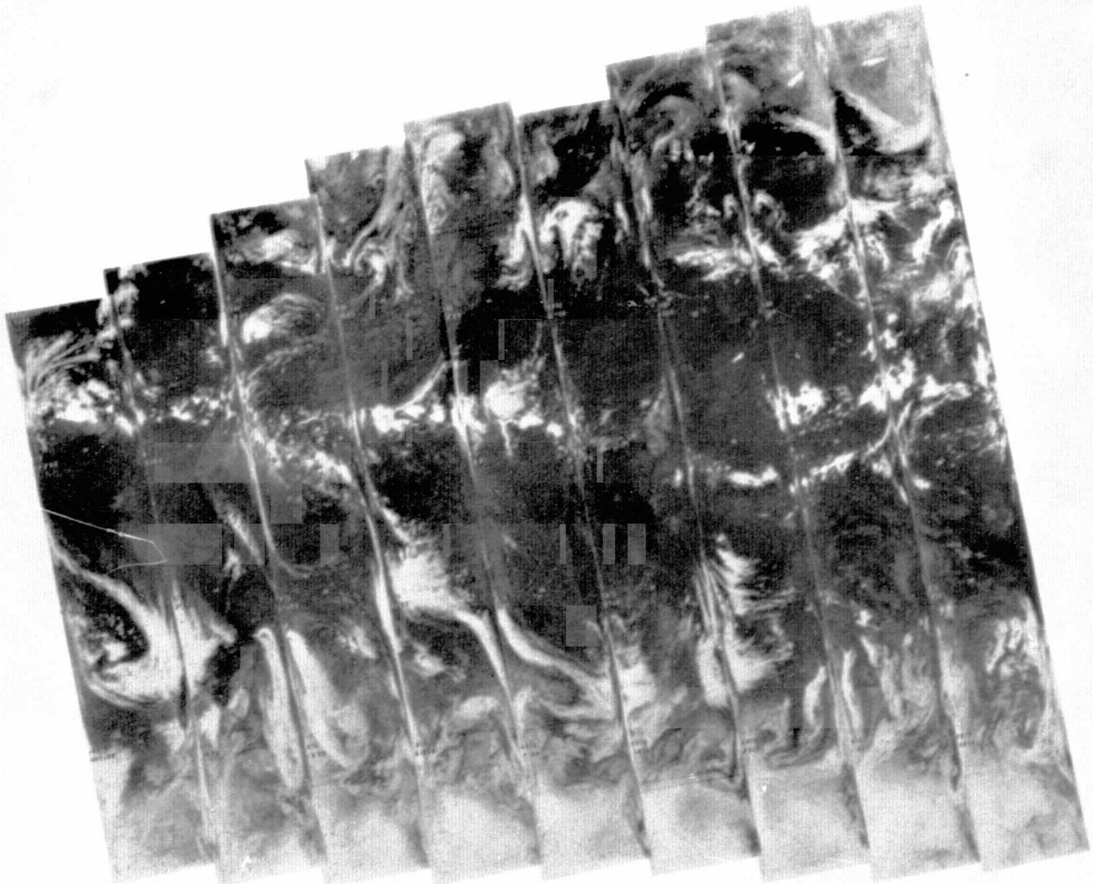
11.5μm



9480 9479 9478 9477 9476 9475 9474 9473 9472 9471 9470 9469 9468

19 MAY 1977

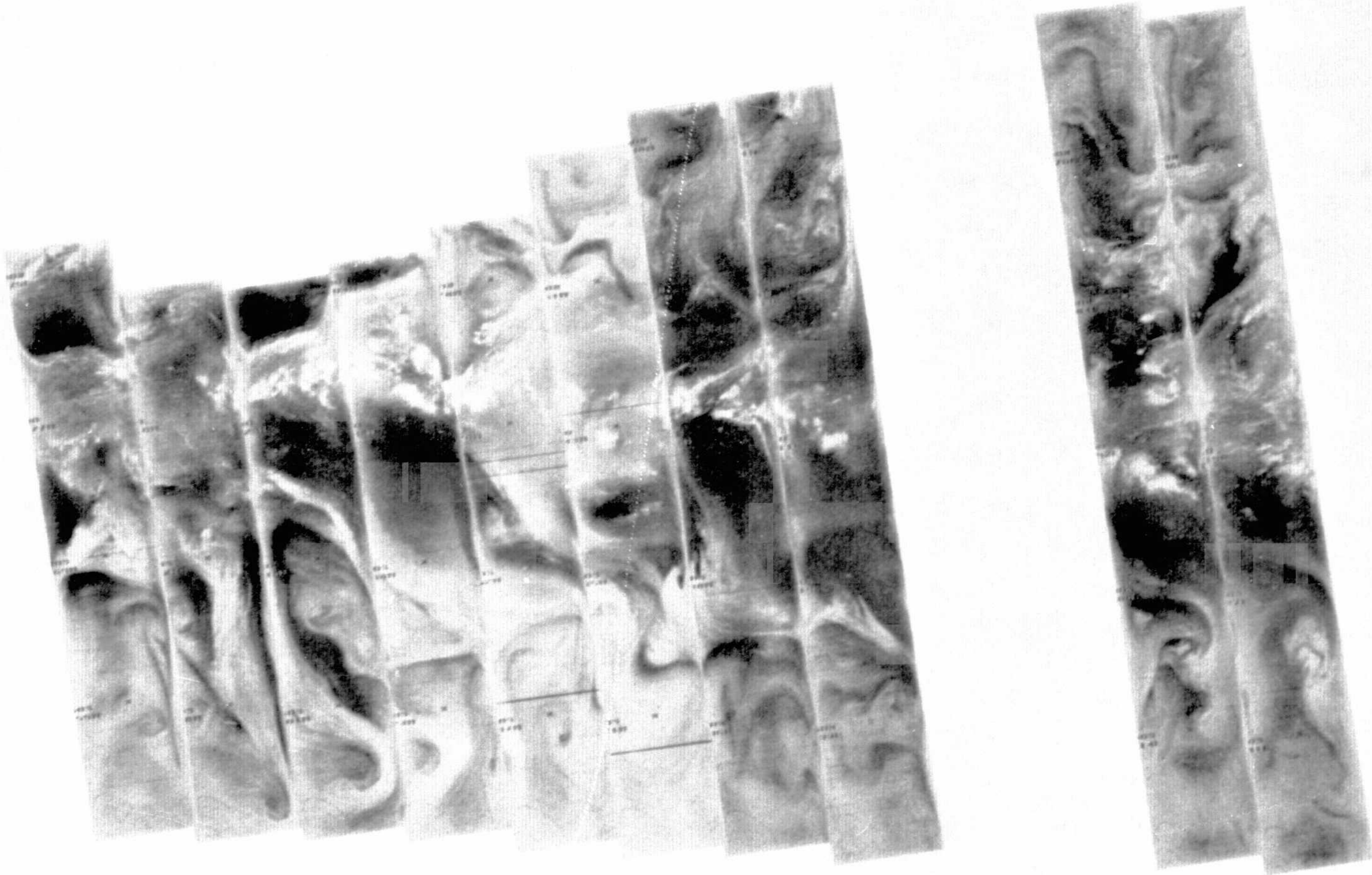
6.7μm



9480 9479 9478 9477 9476 9475 9474 9473 9472 9471 9470 9469 9468

19 MAY 1977

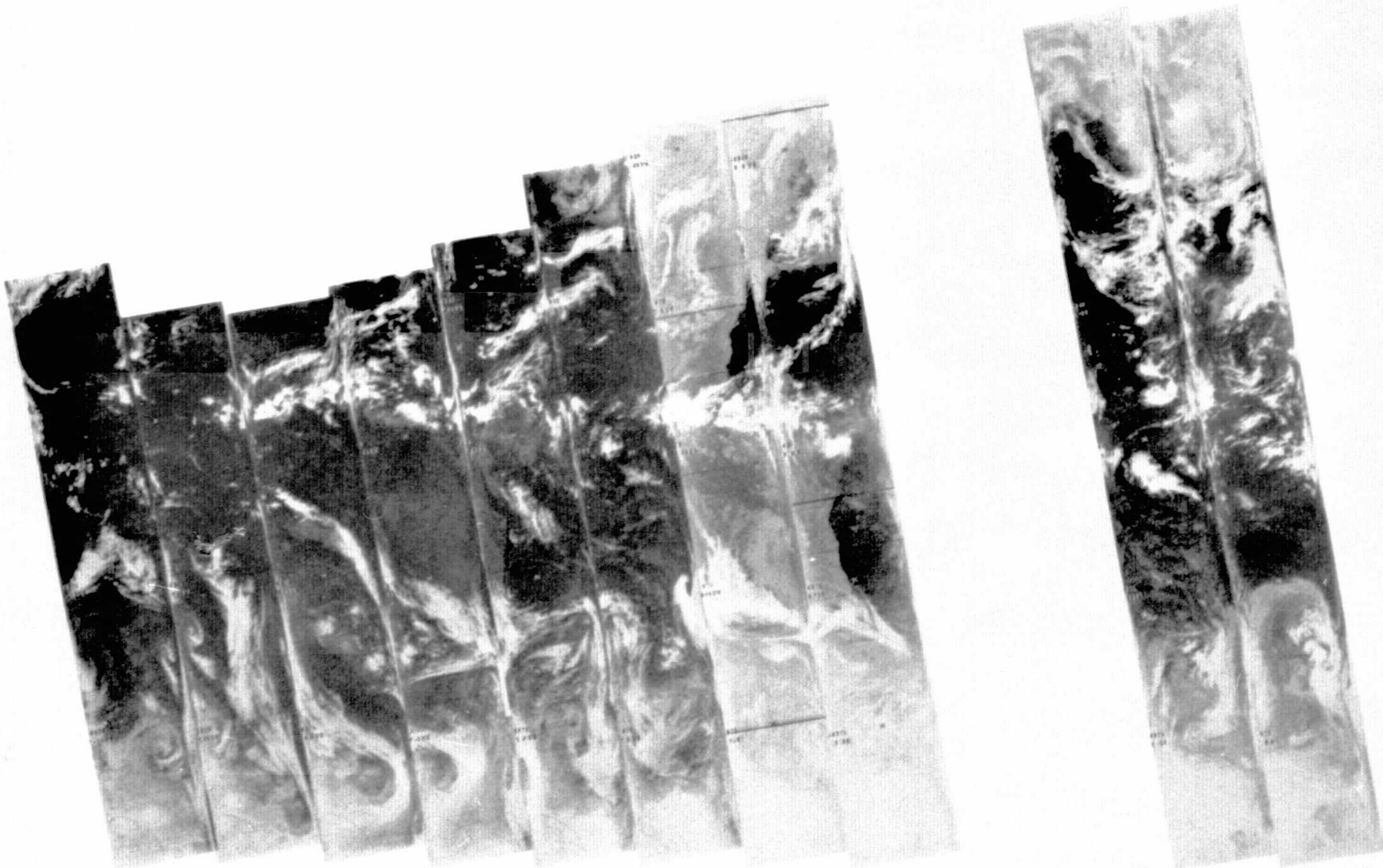
11.5μm



9494 9493 9492 9491 9490 9489 9488 9487 9486 9485 9484 9483 9482 9481

20 MAY 1977

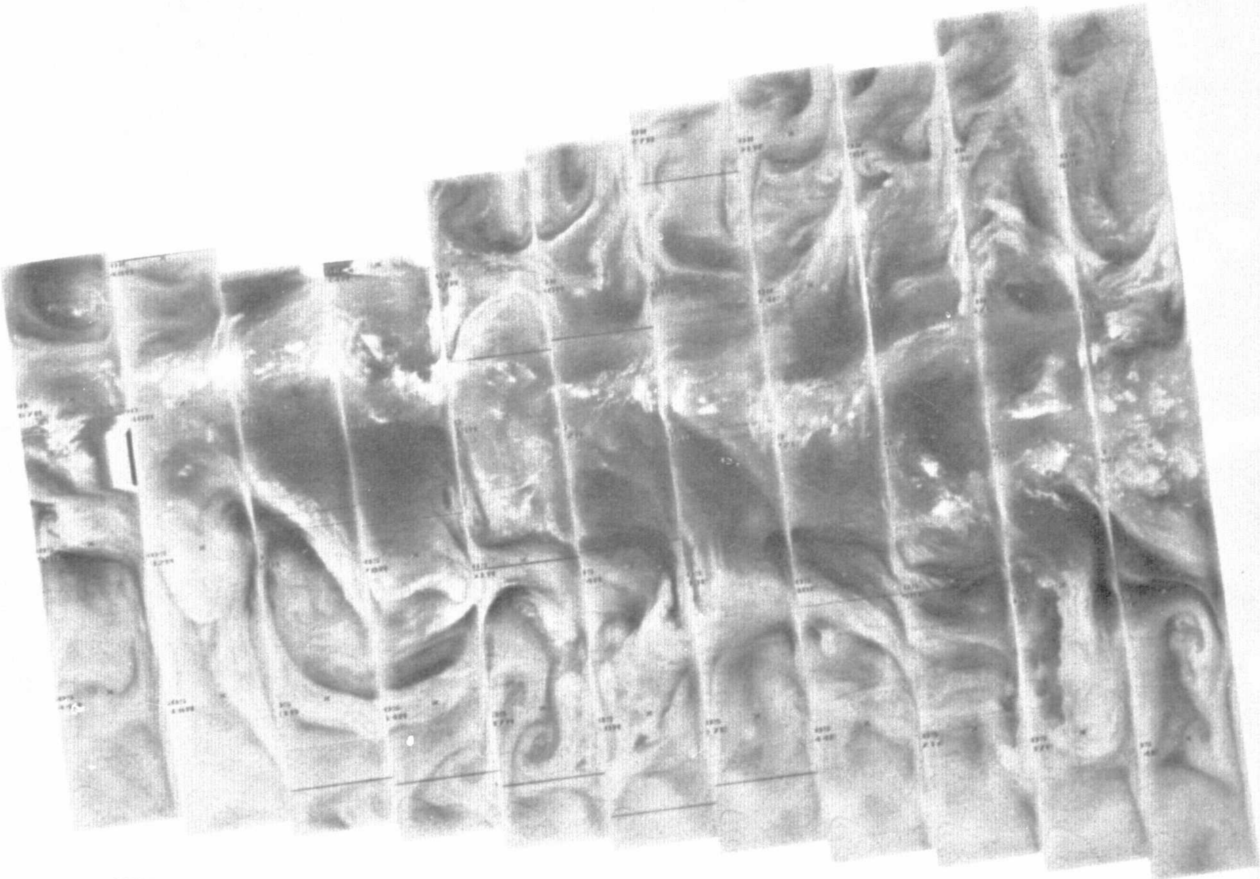
$6.7\mu m$



9494 9493 9492 9491 9490 9489 9488 9487 9486 9485 9484 9483 9482 9481

20 MAY 1977

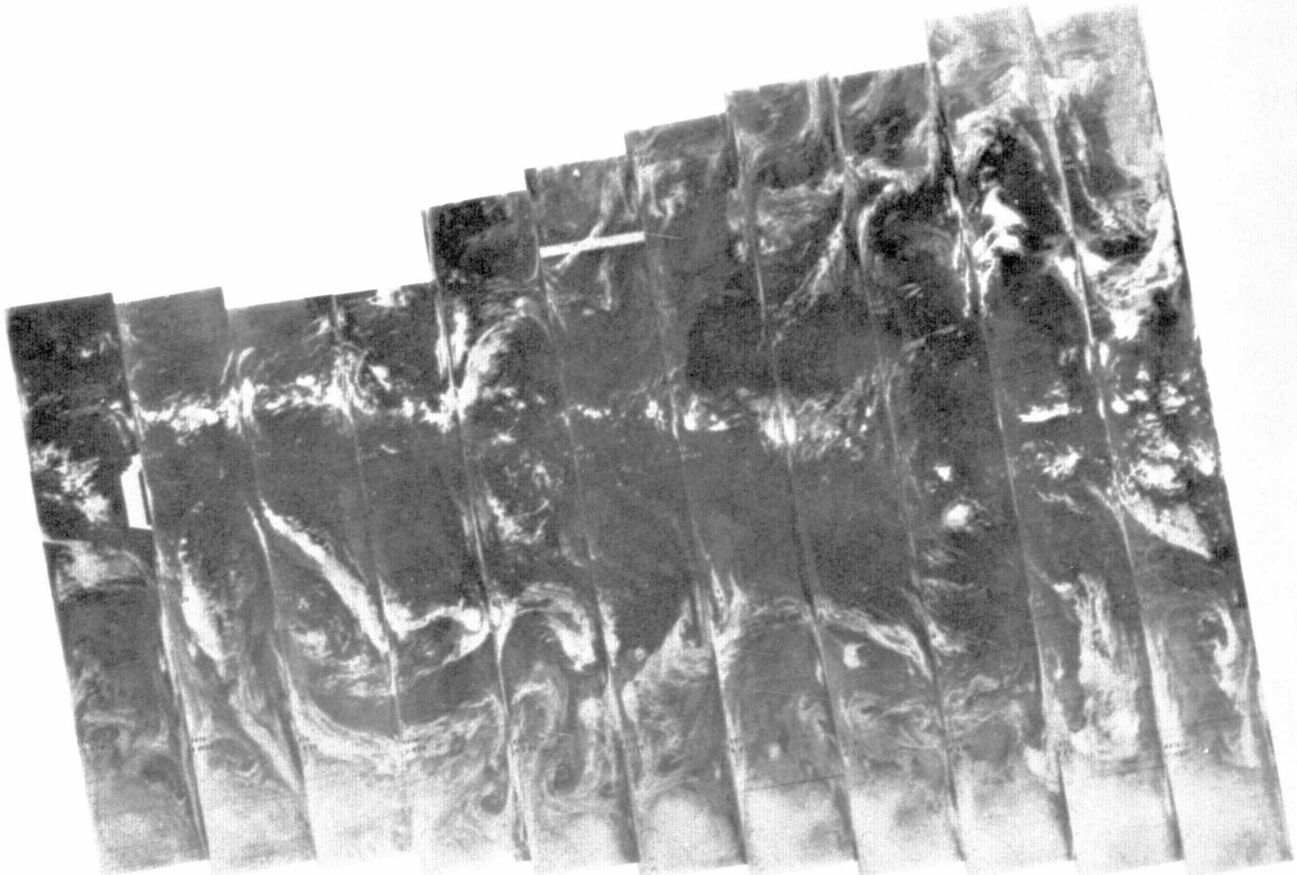
11.5μm



9507 9506 9505 9504 9503 9502 9501 9500 9499 9498 9497 9496 9495

21 MAY 1977

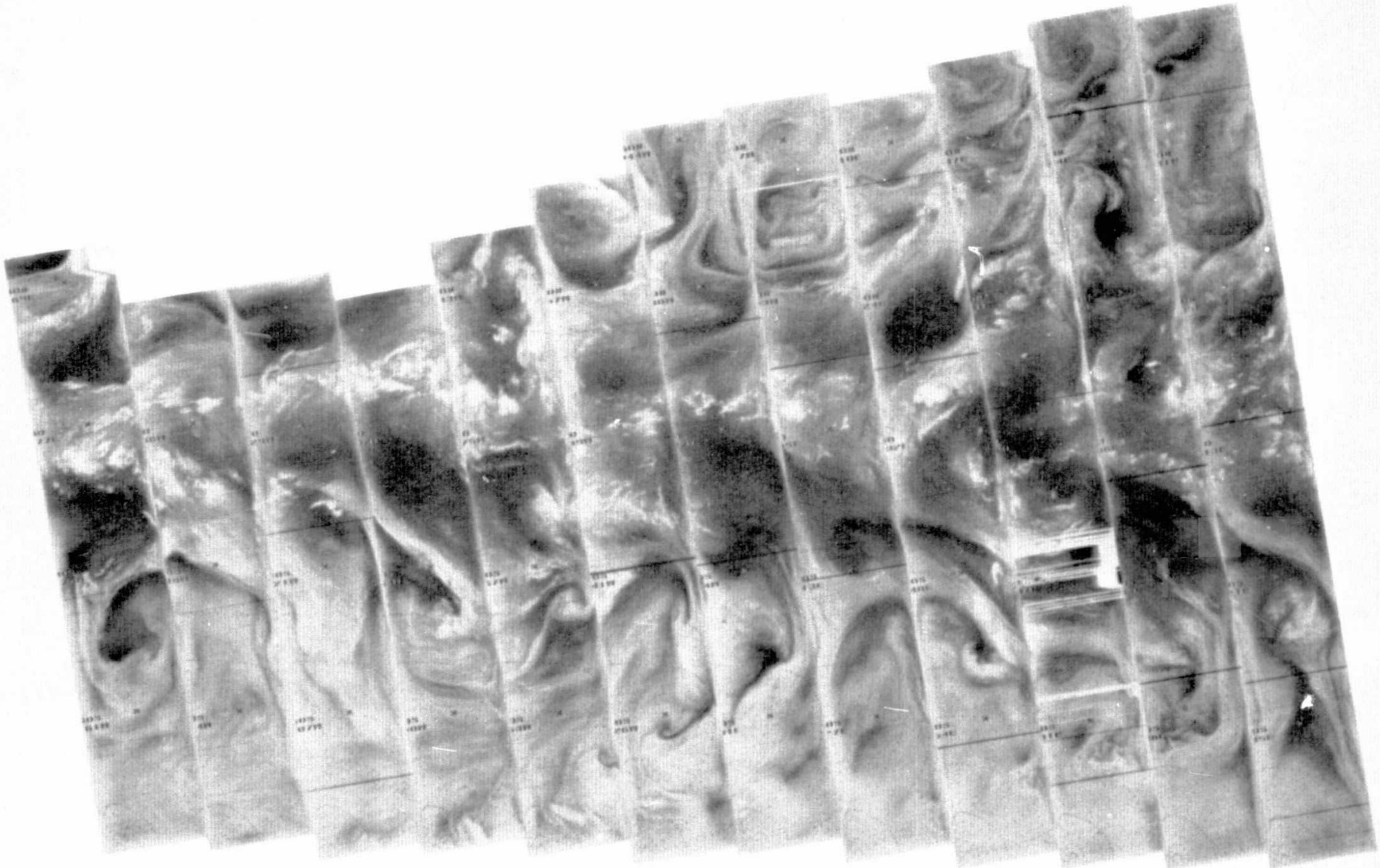
6.7μm



9507 9506 9505 9504 9503 9502 9501 9500 9499 9498 9497 9496 9495

21 MAY 1977

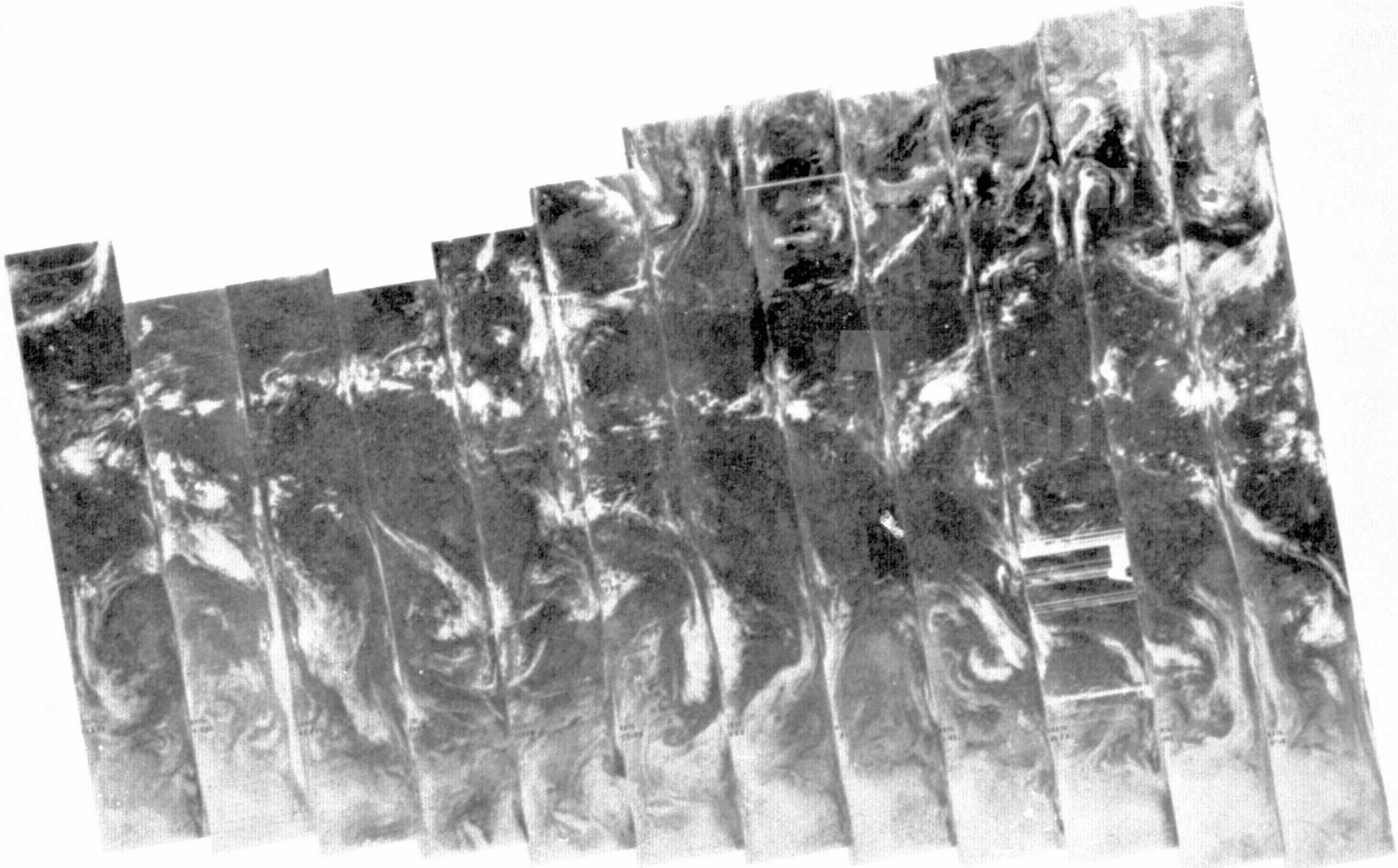
11.5μm



9521 9520 9519 9518 9517 9516 9515 9514 9513 9512 9511 9510 9509 9508

22 MAY 1977

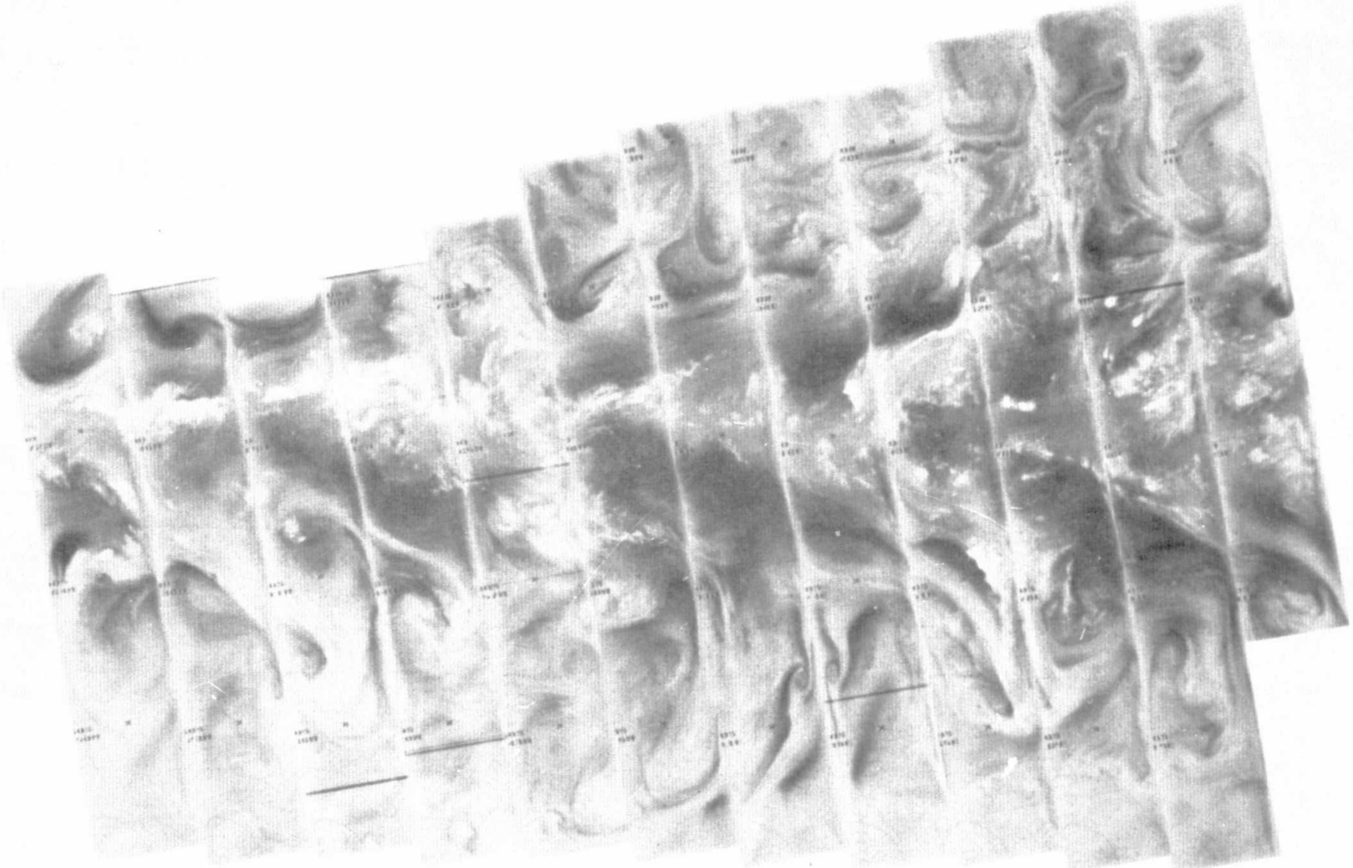
6.7μm



9521 9520 9519 9518 9517 9516 9515 9514 9513 9512 9511 9510 9509 9508

22 MAY 1977

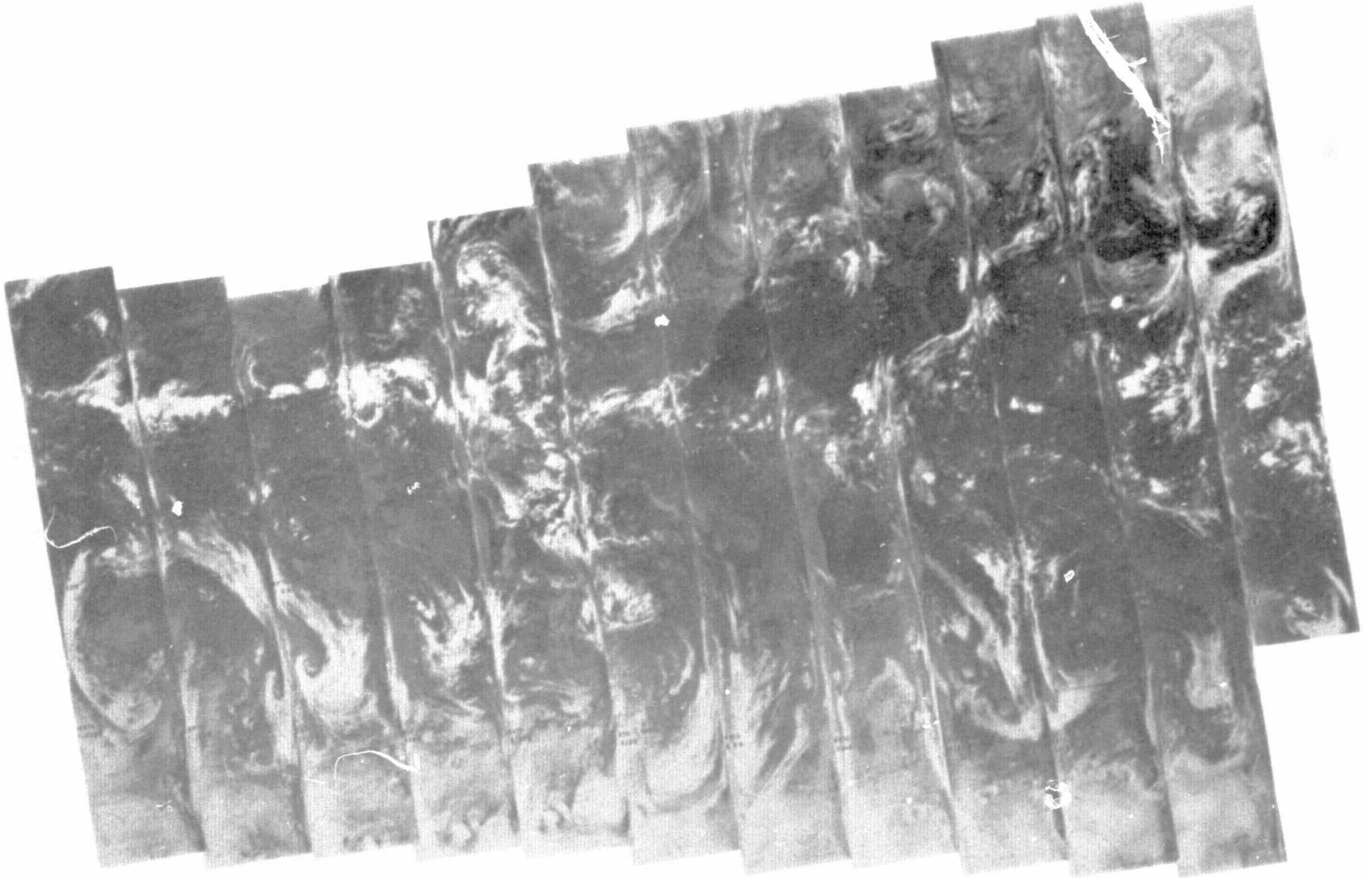
11.5μm



9534 9533 9532 9531 9530 9529 9528 9527 9526 9525 9524 9523 9522

23 MAY 1977

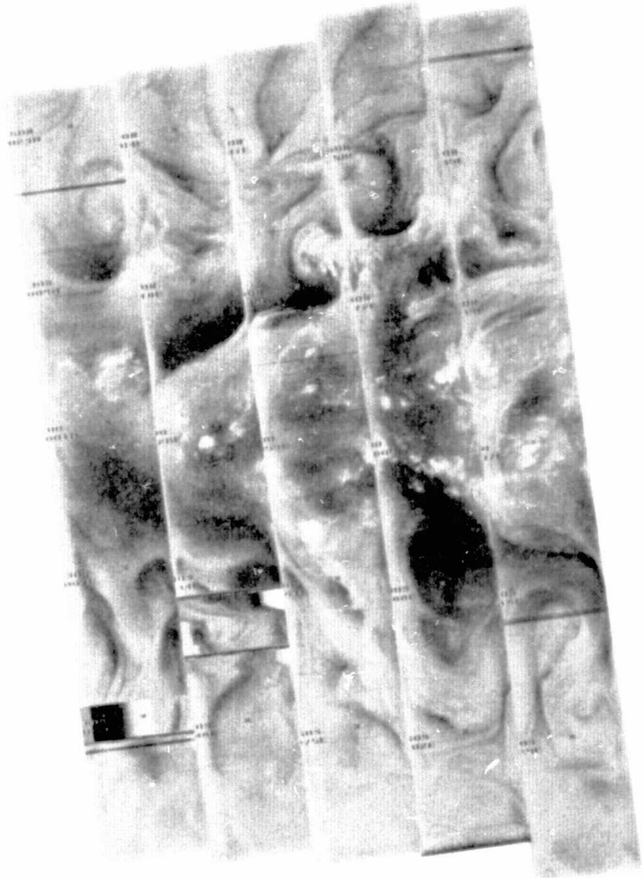
6.7μm



9534 9533 9532 9531 9530 9529 9528 9527 9526 9525 9524 9523 9522

23 MAY 1977

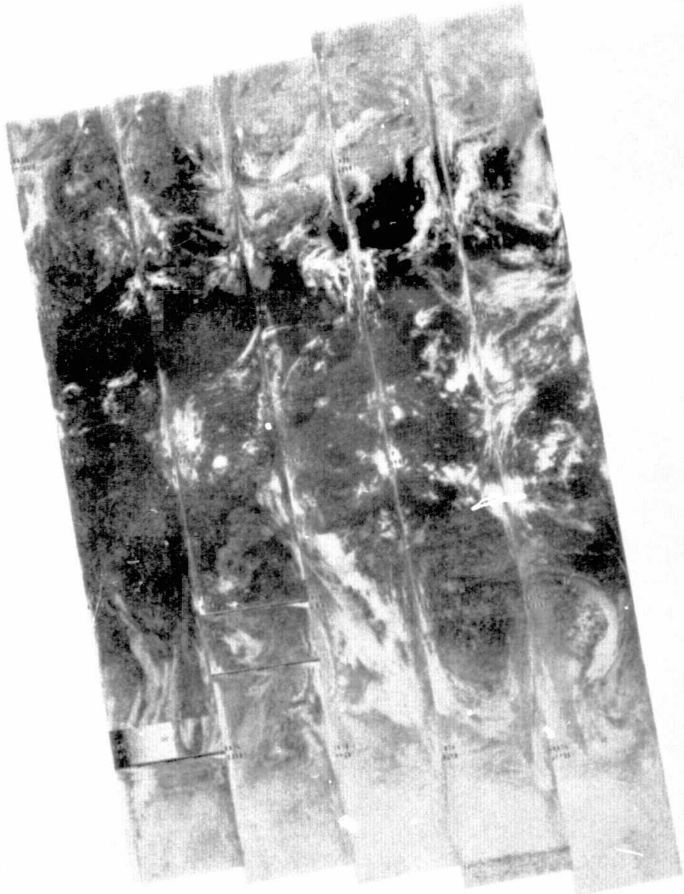
11.5μm



9547 9546 9545 9544 9543 9542 9541 9540 9539 9538 9537 9536 9535

24 MAY 1977

6.7μm



9547 9546 9545 9544 9543 9542 9541 9540 9539 9538 9537 9536 9535

24 MAY 1977

11.5μm

SECTION 5

CORRECTIONS TO THE NIMBUS 6 USER'S GUIDE

This section presents all corrections or additions to The Nimbus 6 User's Guide, which now are known to be necessary. If additional corrections are required, they will appear in a subsequent catalog. All corrections will be carried forward cumulatively into each new catalog.

5.1 THIR Corrections to the User's Guide

The THIR mirror on Nimbus 6 rotates counterclockwise. Therefore, replace lines one through four on page 14 with the following:

> ". . . rotation is such that, when combined with the velocity vector of the satellite, a left-hand spiral results. Therefore, the mirror scans across the earth from west to east in the daytime when traveling northward, and from east to west at night when traveling southward."

The information in Figure 2-4 on page 17 is correct. However, the direction of scan is counterclockwise, and not clockwise as shown.

5.2 HIRS Corrections to the User's Guide

On page 40, Table 3-2, under "Detector Summary" change LnSe to LnSb.

The CHANNEL (and) RANGE information in the swath displays for HIRS has been changed since launch, making Table 3-5 on pages 54 and 55 in the User's Guide incorrect. The table below labeled Table 5-1 provides the correct information.

5.3 SCAMS Corrections to the User's Guide

The information contents of the image in the swath displays for SCAMS has been changed since launch, making Tables 4-5, 4-6, and 4-7 in the User's Guide incorrect. Thus, the table below labeled Table 5-2 replaces Tables 4-5 and 4-6 in the User's Guide, and the table labeled 5-3 replaces Table 4-7 in the User's Guide. All the images display the same parameters. Therefore, these new tables do not list all the possible displays, as were listed in the old Tables 4-5, 4-6, and 4-7.

On page 44, Figure 3-3, the SCAMS elements are shown with a right-to-left (clockwise) stepping pattern when looking in the direction of satellite motion. The SCAMS elements should be corrected to show a left-to-right (counterclockwise) stepping pattern.

Table 5-1

This table replaces Table 3-5 on pages 54 and 55 in The Nimbus 6 User's Guide

Table 3-5

Temperature Range of Gray Scale, and Channel of HIRS Data for each Swath on each HIRS Image Display Between Orbit 426 and 4697 (14 July 1975 through 27 May 1976)

		SWATH NUMBER									
		1	2	3	4	5	6	7	8	9	10
Coverage Period 14 July-20 July Orbits 426-513	HIRS Channel Display (channel-range)*	08-08	09-09	10-10	16-16	17-17	18-18	12-12	14-14	03-03	15-15
	Temperature Range (°K) (black to white)	300-200	290-210	260-210	310-270	100-900	0-30	290-210	260-210	240-210	280-210
Coverage Period 22 July-31 July Orbits 538-545 548-549 600-613 615-647 651-657 659	HIRS Channel Display (channel-range)*	08-08	09-09	10-10	16-16	17-17	17-17	12-12	14-14	03-03	15-15
	Temperature Range (°K) (black-white)	300-200	290-210	260-230	310-270	100-900	100-900	280-200	280-200	280-200	280-200
Coverage Period 23 July-6 Aug. Orbits 546-547 553-599 614 648-650 658 660-747	HIRS Channel Display (channel-range)*	08-08	16-16	16-21	18-18	17-17	10-10	12-12	14-14	03-03	15-15
	Temperature Range (°K) (black-white)	300-200	310-270	300-200	0-30	100-900	260-230	280-200	280-200	280-200	280-200

Table 3-5 (Continued)

		SWATH NUMBER									
		1	2	3	4	5	6	7	8	9	10
Coverage Period 7 Aug. - 27 May Orbits 748-4697	HIRS Channel Display (channel-range)*	08-08	16-16	16-21	18-18	17-17	10-10	12-12	14-14	03-03	15-15
	Temperature Range (°K) (black-white)	310-230	310-230	310-270	0-50	100-900	280-210	300-210	300-210 **	240-185	300-185 ***

*The HIRS channel number is number before the hyphen. The number after the hyphen is the computer program table used to display the data from each channel as temperatures (°K). The range of temperatures displayed in each swath is given beneath each "HIRS Channel Display." The 18 steps of the scale are used to represent the division of each temperature range into 18 approximately equal temperature intervals. The central wavelength (in μm) of each channel on these displays is: channel 3 = 14.4, 8 = 11.0, 9 = 8.2, 10 = 6.7, 12 = 4.52, 14 = 4.40, 15 = 4.24, 16 = 3.71, 17 = 0.61, and 18 is the temperature difference between channel 16 and channel 8. The values of channel 17-17 are albedo, represented as "counts" between 100 (blackest) and 900 (whitest). The values for 16-21 represent a second temperature range for channel 16 data. Table 3-1 on page 39 of the User's Guide provides detailed spectral information and the purpose of each of the HIRS channels.

**14-14 temperature range changed to 270-210 on orbit 3166A (26 January 1976)

***15-15 temperature range changed to 275-210 on orbit 3166A (26 January 1976)

Table 5-2

This table replaces Tables 4-5 and 4-6 (on pages 79 through 81) in the Nimbus 6 User's Guide and Table 5-2 in the Nimbus 6 Data Catalog Volume 4

Table 4-5 and 6

Parameter Limits of the Gray Scale for Parameters 1, 2, 3, 5, 11, 12, and 16 on the SCAMS Image Displays between Orbits 426 and 4751 (14 July 1975 and 31 May 1976)

	Swath		1	2	3	4	5
Orbits 426 thru 1425 14 July 75 thru 26 Sept. 75	Parameter		3	2	16	11	12
	Gray Scale Value	black	280	320	10	60	1.5
			°K	°K	°K	g/mm^2	g/mm^2
		white	210	100	-22	0.0	-0.1*
Orbits 1426 thru 3675 26 Sept. 75 thru 12 Mar. 76	Parameter		3	2	16	11	12
	Gray Scale Value	black	280	320	10	60	2.0
			°K	°K	°K	g/mm^2	g/mm^2
		white	210	100	-22	0.0	0.0
Orbits 3676 thru 3899 12 Mar. 76 thru 29 Mar. 76	Parameter		5	2	16	11	12
	Gray Scale Value	black	240	320	10	70	2.0
			°K	°K	°K	g/mm^2	g/mm^2
		white	200	100	-22	0.0	0.0
Orbits 3900 thru 3929 29 Mar. 76 thru 31 Mar. 76	Parameter		1	1	1	5	5
	Gray Scale Value	black	220	265	300	240	280
			°K	°K	°K	°K	°K
		white	130	210	260	200	220
Orbits 3930 thru 4584 31 Mar. 76 thru 19 May 76	Parameter		1	1	1	2	3
	Gray Scale Value	black	220	265	300	320	280
			°K	°K	°K	°K	°K
		white	130	210	260	100	220
Orbits 4585 thru 4751 19 May 76 thru 31 May 76	Parameter		1	1	1	5	3
	Gray Scale Value	black	220	260	290	240	280
			°K	°K	°K	°K	°K
		white	130	200	245	180	220

*1.6 to 0.0 between orbit 426 and 477

Parameters 1, 2, 3, 5, and 16 represent uninverted antenna temperatures for channels 1 (22.24 GHz), 2 (31.65 GHz), 3 (52.85 GHz), and 5 (55.45 GHz). Parameter 16 is the temperature difference between channels 2 and 3. Parameters 11 and 12 represent inverted antenna temperatures of integrated atmospheric water vapor (channel 11) and integrated liquid water from clouds or precipitation.

Table 5-3

This table replaces Table 4-7 (on pages 82 and 83) in The Nimbus 6 User's Guide

Table 4-7

Contour Program Options used for Parameters 13, 14, and 15 on the SCAMS Image Display

Contour options	Parameters			Valid for orbits
	13 Mean temperature between 1000 mb and 500 mb	14 Mean temperature between 500 mb and 250 mb	15 Mean temperature between 250 mb and 100 mb	
Contour interval	4°K	4°K	4°K	426-851 (14 July-14 Aug. 1975)
Contour thickness	1°K	1°K	1°K	
Contour interval	4°K	4°K	4°K	852-4751 (14Aug.-1975-31 May 1976)
Contour thickness	2°K	2°K	2°K	

Section 4.5.3 "Tape Format" on page 83 of the User's Guide states that each tape will have "five files, i.e., a short header file. . . and four data files, . . ." There will not be a header file on the archival tape. The sentence should be changed to read: "The tapes will be standard 9-track 1600 BPI tapes, each containing four data files, one for each of four days."

In Table 4-8 on page 80 the "Pitch error" and "Roll error" "Dimensional Units" should be changed to counts (from Deg) and the "Multiplier Used" should be changed to 1 (from 32). In the same table the "Playback orbit" should be followed by one "I*2 Spare", and then by the "Reference orbit", which should be changed to I*4 (rather than I*2). (Reference orbit = year * 100,00 + day * 100 + finish hour.) The "Dimensional Units" for the "Geopotential thicknesses" on page 85 of the same table should be changed to "°K" (from DM).

The following SCAMS information has been edited by the experimenter and briefly outlines the current status of data availability, retrieval methods, and a current table of theoretical brightness temperature values.

The SCAMS instrument operated from June 15, 1975 to May 31, 1976. The data from this experiment has been processed and can be obtained from the National Space Science Data Center at GSFC. The digital data, including instrument output, calibrated antenna temperatures, deconvolved brightness temperatures, and retrieved atmospheric parameters, are recorded on a set of 87 9-track tapes. With three exceptions, each tape contains four contiguous days of data. Channel 1 and 2 brightness temperatures and five atmospheric parameters from these tapes have been dumped in a condensed format on microfiche. A typical fiche contains somewhat less than two days of data. Photographic images for individual orbits are also available.

At this time, the archived data represent the "first cut" at retrievals, and can be improved with respect to calibration of the oxygen band channels and inversion of the H_2O channels. Data prior to January 2, 1976 was calibrated by assuming the radiometric temperatures of the calibration targets to be equal to their physical temperatures. Comparisons with radiosondes indicated that a more accurate calibration would be obtained with an offset of -1.2°K on the oxygen band target. The archived data starting with January 2, 1976 incorporates this correction. Strictly speaking, the previous data should be recalibrated and reinverted, but for most purposes an adequate approximation can be obtained by simply subtracting 1° from the oxygen band antenna and brightness temperatures and the retrieved temperature profile. No corrections was made to the H_2O targets, for lack of evidence that any was necessary.

All of the archived water vapor and liquid water retrievals were obtained by a linear algorithm. Improved retrievals, particularly in humid regions, can be obtained by use of the following nonlinear equations:

$$\text{vapor} \quad (\text{mm}) = 72 + 12\alpha$$

$$\text{liquid} \quad (\text{mm}) = 0.4\beta$$

where

$$\alpha = \left[7.34 \ln\left(\frac{280 - T_{01}}{280 - T_{B1}}\right) - 3.75 \ln\left(\frac{280 - T_{02}}{280 - T_{B2}}\right)\right] \cos\theta$$

$$\beta = \left[-3.34 \ln\left(\frac{280 - T_{01}}{280 - T_{B1}}\right) + 9.71 \ln\left(\frac{280 - T_{02}}{280 - T_{B2}}\right)\right] \cos\theta$$

T_{B1} and T_{B2} are the measured brightness temperatures at 22.23 and 31.65 GHz, and T_{01} and T_{02} are brightness temperatures computed for a tropical model atmosphere containing 72 mm precipitable water vapor; the latter are listed in table 5-4 as a function of view angle θ.

The following information, describing how the antenna temperatures are computed from the SCAMS instrument digital data, should be added after SCAMS Section 4.5 of the User's Guide.

Table 5-4

Theoretical brightness temperatures for a saturated tropical troposphere with no clouds and a smooth ocean surface. (Valid for period 2 January 1976 - 31 May 1976)

θ view angle	T_{01}	T_{02}
0	225.6	178.2
8°	225.9	177.9
17°	226.9	177.3
26°	229.2	177.5
34°	233.9	180.1
44°	242.0	187.4
53°	254.5	203.0

4.6 Post-launch Calibration

Antenna temperatures are computed from the SCAMS Instrument digital data for each of the five channels by the equation:

$$T_A = T_{AS} + \frac{T_{AC} - T_{AS}}{d_{T_c} - d_s} (d - d_s)$$

where T_A is antenna temperature for the earth (positions 0-12), T_{AS} is the space antenna temperature (position 13), T_{AC} is the calibration target antenna temperature (position 14), d is earth data in counts, d_s is space data in counts, and d_c is calibration target data in counts. The digital data matrix is described in Table 4-2 of the Nimbus 6 User's Guide. The space calibration antenna temperature is assumed constant at 3°K for all five channels. The target antenna temperature is computed by

$$T_{AC} = T_C + T_{CO}$$

The constant offset T_{CO} is currently zero for channels 1 and 2. The target temperatures (T_C) are given by

Table 5-5

This table accompanies Section 4.6 "Post-launch Calibration",
and should be added to the end of the SCAMS section of the User's Guide

Table 4-9

Thermistor Calibration Constants
used to Calculate the SCAMS Target Temperatures

constant \ channel	1	2	3,4,5
a_0	298.16		
a_1	.46485	.46535	.46814
a_2	$3.0 \cdot 10^{-5}$	$2.9 \cdot 10^{-5}$	$3.0 \cdot 10^{-5}$
R_{25}	603.75	602.98	599.71
R_1	495.6		
R_2	603.4		
d_R (word no.)	1	11	2
d_{R1}(word no.)	61		62
d_{R2}(word no.)	71		72

Table 5-6

This table replaces Table 4-9 in Section 4.6 "Post-launch Calibration" and should be added to the end of the SCAMS section of the User's Guide.

Table 4-9a

Thermistor Calibration Constants
used to Calculate the SCAMS Target Temperatures

constant \ channel	1	2	3,4,5
a_0	298.16		
a_1	.46485	.46535	.46814
a_2	$3.0 \cdot 10^{-5}$	$2.9 \cdot 10^{-5}$	$3.0 \cdot 10^{-5}$
R_{25}	603.75	602.98	599.71
R_1	495.6		
R_2	603.4		
d_R (word no.)	1	11	2
d_{R1} (word no.)	61		62
d_{R2} (word no.)	71		72
T_{CO}	0		-1.2°K

$$T_C = a_0 + a_1 (R - R_{25}) + a_2 (R - R_{25})^2$$

where the thermistor resistances (R) are computed by

$$R = R_1 + \frac{R_2 - R_1}{d_{R2} - d_{R1}} (d_R - d_{R1})$$

and values of the other constants are listed in Table 4-9a. Note that channels 3, 4, and 5 share the same calibration target. Also listed in Table 4-9a are word numbers in the digital data matrix containing data values d_R, d_{R1}, d_{R2}, and the recent addition of the T_{CO} value for channels 3, 4, and 5.

Figure 5-1 below replaces Figure 4-2 (page 64) in <u>The Nimbus 6 User's Guide.</u>

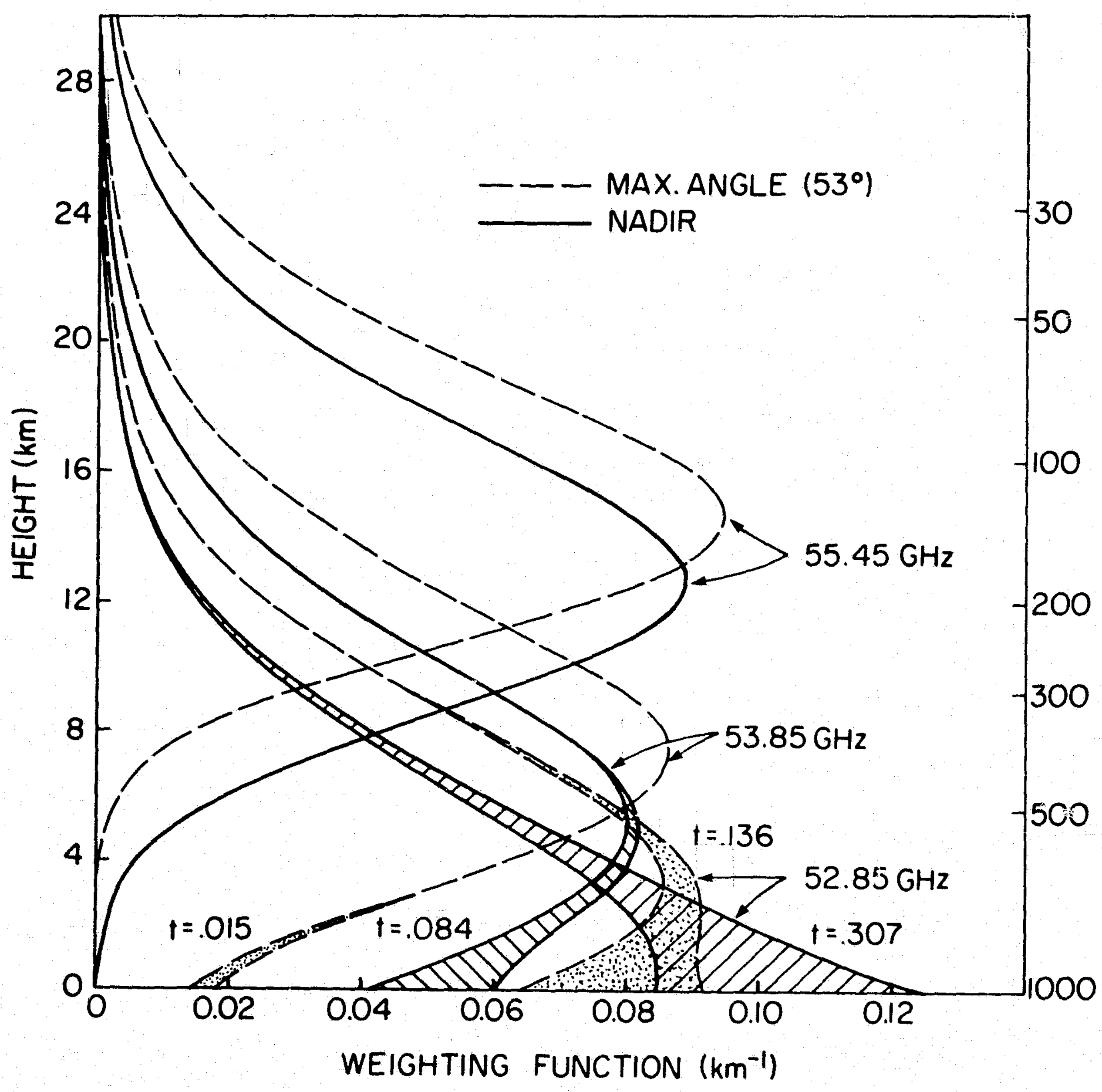


Figure 5-1. Weighting functions for the SCAMS oxygen-band channels, at two view angles. The shaded area within each weighting function represents the reflected contribution when the surface is smooth seawater ($t = e^{-\tau_\nu}$, transmittance of the atmosphere). The calculations used the 1962 U.S. Standard Atmosphere temperature profile with 2 g/cm^2 water vapor. The oxygen absorption coefficient was computed as in References 1 and 2.

REFERENCES

1. Rosenkranz, P. W.: Shape of the 5 mm Oxygen Band in the Atmosphere. IEEE Trans. Antenn. Propag., vol. AP-23, No. 4, 1975, pp. 498-506.

2. Liebe, H. J., Gimmestad, G. G., and Hopponen, J. D.: Atmospheric Oxygen Microwave Spectrum — Experiment versus Theory. IEEE Trans. Antenn. Propag., vol. AP-25, no. 3, 1977, pp. 327-335.

5.4 ESMR Corrections to the User's Guide

The following are corrected equations for the ESMR Section of the User's Guide:

page 90

$$X\ (\text{km}) = (636 + 10.8P = 0.32P^2)\ R_j$$

page 96

$$T_B = T_A - (T_A - T_C)\ \frac{(C - C_A)}{(C_C - C_A)}$$

page 101

$$T_{\substack{\text{Horizontal}\\ \text{True}}} = 1 + a\ T_{\substack{\text{Horizontal}\\ \text{Nominal}}} - T_{\substack{\text{Vertical}\\ \text{Nominal}}}$$

$$T_{\substack{\text{Vertical}\\ \text{True}}} = 1 + b\ T_{\substack{\text{Vertical}\\ \text{Nominal}}} - b\ T_{\substack{\text{Horizontal}\\ \text{Nominal}}}$$

page 106

$$N_j = 256\ (T_{Hi} - 100) + T_{Vi} - 100$$

The following information supplements Section 5.3.2 in the User's Guide.

The display format and temperature ranges of the images in the swath displays for ESMR has been changed twice since launch. The first revision occurred after orbit 3932 in which each ESMR scan line is displayed once prior to orbit 3932 and twice after orbit 3933. Similarly, each of the 71 scan-spot elements is displayed once through orbit 3932 and twice after orbit 3933.

Through orbit 3932 (31 March) the ESMR displays contained 20 swaths of data, as shown in the ESMR image displays up to orbit 3932 in Section 3.3. The swaths are numbered (numbers not shown) from 1 on the left to 20 on the right. Each of the ten swaths on the left has the same geographic coverage. However, each swath displays either horizontally or vertically polarized data at a temperature range as listed in Table 5-5a. The right set of ten swaths has a similar format, and displays the earliest recorded data. If the right swaths were cut and placed above the group on the left, the new display would show the continuous coverage recorded for that orbit. Swaths 1 and 11 have the same polarization and temperature range. Similarly, swaths 2 and 12, 3 and 13, etc., are the same. The tables here labeled 5-8 and 5-9 replace Table 5-5 on page 105 of the User's Guide.

As stated above, the ESMR display format was modified at orbit 3933 (31 March 1976) and again at orbit 6185 (15 September 1976). From orbit 3933 through orbit 6184, the following format was used:

The new displays contain ten swaths of data plus a geographic grid overlay for each swath, as shown in the ESMR image displays after orbit 3933 in Section 3.3, of the Nimbus 6, Data Catalog, Volume 5.

The swaths are numbered (numbers not displayed) from 1 on the left to 10 on the right. Each of the five swaths on the left has the same geographic coverage. However, each swath displays either horizontally or vertically polarized data at a temperature range as listed in Table 5-5b. The right set of five swaths has a similar format, and displays the latest recorded data. If the right swaths were cut and placed below the group on the left, the new display would show the continuous coverage of that display.

Swaths 1 and 6 display the same parameter. That is, the temperature range and polarization for swaths 1 and 6 are the same. Similarly, swaths 2 and 7, 3 and 8, 4 and 9, and 5 and 10 display the same parameters. Table 5-5b is set up to show this duplication of parameter information.

Data time (GMT) references for the left set of five swaths are shown adjacent to the vertical line at the left. Time tick marks are every five minutes with hour and minute annotation every fifteen minutes. Data time references for the right set of five swaths are shown in a similar manner adjacent to the vertical line at the right.

The center portion of the display contains two swaths of grid overlay information: the left grid for overlay on each of the five swaths on the left, and the right grid for overlay on each of the five swaths on the right. The grid longitudes are generated at ten degree intervals between 55 degrees south and 55 degrees north, and at 20 degree intervals from 55 degrees to the Poles. Latitude grids are generated every five degrees. All grid lines consist of a series of dots at one degree intervals. Latitudes are labeled at 60°S, 30°S, EQ, 30°N, and 60°N. Longitude labels are normally placed next to each latitude label.

Table 5-7

This table replaces Table 5-5 on page 105 in the User's Guide

Table 5-5

Brightness Temperature Value for each Step of the Gray Scale on ESMR Image Displays for Orbits 426 through 827 (14 July through 12 August 1975)

Gray Scale Number	Swath Number and ESMR Display Parameter									
	1 and 11 (T_H)	2 and 12 (T_V)	3 and 13 $\frac{T_H+T_V}{2}$	4 and 14 (T_H)	5 and 15 (T_V)	6 and 16 $\frac{T_H+T_V}{2}$	7 and 17 (T_H)	8 and 18 (T_V)	9 and 19 $\frac{T_H+T_V}{2}$	10 and 20 (T_V-T_H)
(black) 1	> 200			> 250			> 300			> 50
2	196-200	same	same	246-250	same	same	296-300	same	same	46-50
3	193-196	as	as	243-246	as	as	293-296	as	as	43-46
4	190-193	1 and 11	1 and 11	240-243	4 and 14	4 and 14	290-293	7 and 17	7 and 17	40-43
5	187-190			237-240			287-290			37-40
6	184-187			234-237			284-287			34-37
7	181-184			231-234			281-284			31-34
8	178-181			228-231			278-281			28-31
9	175-178			225-228			275-278			25-28
10	171-175			221-225			271-275			21-25
11	168-171			218-221			268-271			18-21
12	165-168			215-218			265-268			15-18
13	162-165			212-215			262-265			12-15
14	159-162			209-212			259-262			09-12
15	156-159			206-209			256-259			06-09
16	153-156			203-206			253-256			03-06
17	150-153			200-203			250-253			00-03
(white) 18	< 150			< 200			< 250			< 00

T_H = Brightness temperature derived from the ESMR horizontal polarization channel data

T_V = Brightness temperature derived from the ESMR vertical polarization channel data

Table 5-8

This table follows the new Table 5-6 (above), which replaced Table 5-5 on page 105 in the User's Guide

Table 5-5a

Brightness Temperature Value for each Step of the Gray Scale on ESMR Image Displays for Orbits 828 through 3932 (13 August 1975 through 31 March 1976) (Brightness Temperatures are in °K)

Gray Scale Number	Swath Number and ESMR Display Parameter									
	1 and 11 (T_H)	2 and 12 (T_V)	3 and 13 $\frac{T_H+T_V}{2}$	4 an[illegible] (T_H)	5 and 15 (T_V)	6 and 16 $\frac{T_H+T_V}{2}$	7 and 17 (T_H)	8 and 18 (T_V)	9 and 19 $\frac{T_H+T_V}{2}$	10 and 20 (T_V-0.6T_H)
(black) 1	> 200	> 230	> 210	> 250	> 270	> 250	> 290	> 300	> 280	> 140
2	196-200	226-230	206-210	246-250	267-270	247-250	287-290	298-300	278-280	136-140
3	191-196	223-226	203-206	243-246	264-267	244-247	284-287	295-298	275-278	133-136
4	187-191	219-223	199-203	239-243	261-264	241-244	281-284	293-295	273-275	129-133
5	183-187	215-219	195-199	235-239	258-261	238-241	278-281	290-293	270-273	125-129
6	178-183	211-215	191-195	231-235	254-258	234-238	274-278	288-290	268-270	121-125
7	174-178	208-211	188-191	228-231	251-254	231-234	271-274	285-288	265-268	118-121
8	169-174	204-208	184-188	224-228	248-251	228-231	268-271	283-285	263-265	114-118
9	165-169	200-204	180-184	220-224	245-248	225-228	265-268	280-283	260-263	110-114
10	161-165	196-200	176-180	216-220	242-245	222-225	262-265	278-280	258-260	106-110
11	156-161	193-196	173-176	213-216	239-242	219-222	259-262	275-278	255-258	103-106
12	152-156	189-193	169-173	209-213	236-239	216-219	256-259	273-275	253-255	99-103
13	148-152	185-189	165-169	205-209	233-236	213-216	253-256	270-273	250-253	95-99
14	143-148	181-185	161-165	201-205	229-233	209-213	249-253	268-270	248-250	91-95
15	139-143	178-181	158-161	198-201	226-229	206-209	246-249	265-268	245-248	88-91
16	134-139	174-175	154-158	194-198	223-226	203-206	243-246	263-265	243-245	84-88
17	130-134	170-174	150-154	190-194	220-223	200-203	240-243	260-263	240-243	80-84
(white) 18	< 130	< 170	< 150	< 190	< 220	< 200	< 240	< 260	< 260	< 80

T_H = Brightness temperature derived from the ESMR horizontal polarization data

T_V = Brightness temperature derived from the ESMR vertical polarization data

Table 5-9

This table follows the new Table 5-5a (above), which replaced Table 5-5 on page 105 in the User's Guide

Table 5-5b

Brightness Temperature Value for each Step of the Gray Scale on ESMR Image Displays for Orbits 3933 through 6184 (31 March through 30 June 1976)

(Brightness Temperatures are in °K)

Gray Scale Number	Swath Number and ESMR Display Parameter				
	1 and 6 (T_H)	2 and 7 (T_H)	3 and 8 (T_H)	4 and 9 (T_V)	5 and 10 $\left(\frac{T_H+T_V}{2}\right)$
(black) 1	>200	>230	>210	>250	>270
2	196-200	296-230	206-210	246-250	267-270
3	191-196	223-226	203-206	243-246	264-267
4	187-191	219-223	199-203	239-243	261-264
5	183-187	215-219	195-199	235-239	258-261
6	178-183	211-215	191-195	231-235	254-258
7	174-178	208-211	188-191	228-231	251-254
8	169-174	204-208	184-188	224-228	248-251
9	165-169	200-204	180-184	220-224	245-248
10	161-165	196-200	176-180	216-220	242-245
11	156-161	193-196	173-176	213-216	239-242
12	152-156	189-193	169-173	209-213	236-239
13	148-152	185-189	165-169	205-209	233-236
14	143-148	181-185	161-165	201-205	229-233
15	139-143	178-181	158-161	198-201	226-229
16	134-139	174-178	154-158	194-198	223-226
17	130-134	170-174	150-154	190-194	220-223
(white) 18	<130	<170	<150	<190	<220

T_H = Brightness temperature derived from the ESMR horizontal polarization data

T_V = Brightness temperature derived from the ESMR vertical polarization data

Table 5-10

Brightness Temperature Value for each Step of the Gray Scale on ESMR Image Displays for Orbits 6185 (15 September 1976) through the present Catalog period

(Brightness Temperatures are in °K)

	Swath Number and ESMR Display Parameter				
Gray Scale Number	1 and 6 (T_V)	2 and 7 (T_V)	3 and 8 (T_V)	4 and 9 (T_V)	5 and 10 (T_V)
(black) 1	>240	>254	>270	>280	>300
2	236-240	251-254	266-270	277-280	296-300
3	233-236	248-251	263-266	274-277	293-296
4	230-233	245-248	260-263	271-274	290-293
5	227-230	242-245	257-260	268-271	287-290
6	224-227	239-242	254-257	265-268	284-287
7	221-224	236-239	251-254	262-265	281-284
8	218-221	233-236	248-251	259-262	278-281
9	215-218	230-233	245-248	256-259	275-278
10	212-215	227-230	242-245	253-256	272-275
11	209-212	224-227	239-242	250-253	269-272
12	206-209	221-224	236-239	247-250	266-269
13	203-206	218-221	233-236	244-247	263-266
14	200-203	215-218	230-233	241-244	260-263
15	197-200	212-215	227-230	239-241	257-260
16	193-197	208-212	223-227	237-239	253-257
17	190-193	205-208	220-223	235-237	250-253
(white) 18	<190	<205	<220	<235	<250

T_V = Brightness temperature derived from the ESMR vertical polarization data

From orbit 6185 (15 September 1976) through the current data catalog period, the new ESMR image display has the following format:

Since an anomaly renders the Horizontal channel unuseable, the new ESMR format was devised to display the Vertical channel with five different temperature ranges and polarization for each individual swath. That is, the temperature range and polarization for swaths 1 and 6 are the same. Swaths 2 and 7, 3 and 8, 4 and 9, and 5 and 10 display the same parameters. Thus, four additional swaths of data are dedicated to the Vertical channel display for a total of 5 swaths as described above.

Data time (GMT) references and grid overlay information remain unchanged. Please refer to Table 5-10 for new parameter information.

5.5 ERB Corrections to the User's Guide

Post-launch calibration procedures are described below. While the numbers are not for the period of this catalog, the calibration procedure is valid for all data. This information can be added as section 6.5a to the User's Guide and would fit on page 134.

6.5a Post-launch Calibration

The observations from the wide angle channels (11 and 12), which measure the total energy (< 0.2 μm to > 50 μm) emitted and reflected by the earth, depend on the prelaunch calibration and pertinent instrument temperatures. Assuming unit emissivity for the target scene, the irradiance from the scene is given by,

$$H_T = [\Delta W - \epsilon_s F_s \sigma T_s^4 + \epsilon_d F_d \sigma (T_d + Kv)^4]$$

where

ΔW = effective thermopile irradiance (w m^{-2})

σ = 5.6697×10^{-8} w m^{-2} (deg. K)$^{-4}$

ϵ_s = emissivity of FOV stop = 0.965

F_s = view factor of the FOV stop = 0.18892

T_s = temperature (°K) of the FOV stop

ϵ_d = emissivity of the thermopile = 0.977

F_d = view factor of the thermopile = 0.80461

T_d = temperature (°K) of the thermopile base

K = factor relating thermopile base temperature to thermopile surface temperature = 0.0031°K per count

v = thermopile output in digital counts

The effective thermopile irradiance (ΔW) is obtained from the thermopile output (v) as follows:

$$\Delta W = a_0 \ (T_m) + a_1 \ (T_m) \cdot v$$

where

$$a_0 = C_0 + C_1 T_m ,$$

and

$$a_1 = d_0 + d_1 T_m$$

are derived from prelaunch calibrations and depend on the module temperature (T_m, °C). The coefficients C_0, C_1, d_0, d_1 are given below. In calibrating channel 11 and channel 12 (W) with the FOV stop out, the quantity F_s in the equation for H_T is set to zero.

	Ch. 11	Ch. 12 (W)	Ch. 12 (N)
C_0:	9.86	10.4	8.38
C_1:	0.18358	0.23235	0.18483
d_0:	0.6042	0.6035	0.6014
d_1:	-8.254×10^{-4}	-6.109×10^{-4}	-5.879×10^{-4}

The observations from the other two wide-angle channels (13 and 14), which measure the shortwave radiation (0.2 μm to 4.0 μm), and (0.7 μm to 3.0 μm), are transformed to irradiance (H) by,

$$H = \frac{(V - V_0)}{S_T}$$

where V is the digital counts, V_0 is the offset (in counts) observed from dark FOV's, and S_T is the sensitivity (w m^{-2} $count^{-1}$) obtained from the equation: $S_T + S_0 (1+(0.01) \cdot (T-25) \cdot STC)$, where S_0 is the sensitivity at 25°C, T is the detector temperature (°C), and STC is the sensitivity temperature coefficient (percent per degree C). These constants are given below:

Ch	V_0	S	STC
13	-41	2.004	0.04
14	-44	3.989	0.03

The interpretation of digital counts (V) from the shortwave scanning channels (15-18) gives the radiance (w m^{-2} sr^{-1}) of the scene (N_s) by,

$$N = \frac{(V - V_o)}{S_T}$$

where V_o is the offset (counts) obtained during views of the internal blackbody or space. The sensitivity S_T at temperature T(°C) is obtained using the equation for S_T described above, and the constants given below.

Ch	V_o	S	STC
15	-3	3.155	0.0
16	0	3.275	0.03
17	-1	3.116	-0.01
18	15	2.963	-0.05

A series of checks on the sensitivity of these channels, using the on-board diffuse target, indicated no noticeable degradation over the July-August 1975 period of operation.

The longwave scanning channels (19-22) have had numerous inflight calibrations which have remained essentially unchanged since 3 July. The calibration coefficients, a_0 and a_1 relate digital counts (V) to the scene radiance N ($w\ m^{-2}\ sr^{-1}$) as follows:

$$N_s = N_m + a_0 + a_1 \cdot V$$

where N_m is the radiance of the detector module. The radiance N_s is the actual radiance measured within the spectral limits of the filter (4.5 μm to 50 μm). The calibration coefficients, obtained from inflight calibrations on 3 July 1975, are as follows:

Ch	a_0	a_1
19	-0.82	0.09583
20	-0.60	0.10535
21	-1.26	0.10168
22	-0.29	0.10338

The deviations of these calibration coefficients as derived from inflight calibrations from 29 July to 20 August are shown in Table 6-6a. The only change which indicates a need for updating the calibration coefficients is the change in the intercept of channel 20.

Periodic checks of the electronic gains of channels 1 through 14 have shown that the electronic gains have remained within 0.5 percent of the prelaunch values, with few exceptions. Table 6-6a shows the percentage of maximum deviation in the gain ratios (current/prelaunch) for the three steps in the calibration staircase voltage. The 6.5 percent change in the high-level gain of channel 2 and the gain changes in channels 6, 7, and 8 are believed to be caused by radio-frequency interference with the electronic calibration circuit and is neither a real change in the electronic gain nor nonlinearities of the channels.

Table 5-11

This table is part of the new Section 6.5a "Post-launch Calibration" to be added to the ERB section of the User's Guide

Table 6-6a

Stability of Calibration of the ERB Longwave Scanning Channels (between 29 July and 20 August 1975)

	Channel 19		Channel 20		Channel 21		Channel 22	
Date	Δa_0	Δa_1	Δa_0	Δa_1	Δa_0	Δa_1	Δa_0	Δa_1
7/29	-0.07	-0.4	1.12	0.5	-0.07	-0.4	0.36	-0.3
8/5	0.50	-0.3	1.22	0.1	0.08	-0.3	0.11	-0.2
8/8	0.68	-0.4	1.33	0.1	0.04	-0.2	-0.003	-0.1
8/12	-0.06	-0.2	0.74	-0.4	-0.09	-0.3	0.17	-0.2
8/17	0.69	-0.3	1.49	0.2	0.20	-0.3	0.16	-0.2
8/20	-0.22	-0.3	1.53	0.2	0.04	-0.2	0.13	-0.4

Δa_0 = change in intercept ($w\ m^{-2}\ sr^{-1}$)

$$= (a_0)_{current} - (a_0)_{7/3/75}$$

Δa_1 = change in slope (% $w\ m^{-2}\ sr^{-1}\ ct^{-1}$)

$$= \frac{[(a_1)_{current} - (a_1)_{7/3/75}]}{(a_1)_{7/3/75}} \times 100$$

Table 5-12

This table is part of the new Section 6.5a "Post-launch Calibration" to be added to the ERB section of the User's Guide

Table 6-6b

Percentage Change of the Maximum Deviation in the Gain Ratio between Post-launch and Prelaunch Gain Values for ERB channels 1 through 14 (20 June and 17 August 1975)

Ch	G_{0-39}	G_{30-60}	G_{60-90}
1	-0.2	0.2	-0.1
2	0.1	-0.3	-6.5
3	±0.1	-0.1	-0.2
4	±0.1	-0.2	-0.1
5	±0.1	-0.2	0.2
6	2.6	1.8	-2.1
7	1.3	2.1	-0.6
8	1.6	1.3	-0.9
9	0.4	-0.6	±0.1
10	0.7	-0.5	±0.2
11	-0.4	0.3	0.4
12	0.2	-0.2	0.4
13	-0.3	0.2	0.3
14	+0.2	-0.1	0.3

Table 6-7, the ERB Compacted Archival Tape Format, on pages 136 through 139 of the User's Guide, should be changed as follows:

Directory Record (Page 136)

Delete last line of section A which reads:

"135-340	Zero fill	1"

and add the following:

135-149	Orbital Elements	
135	Day of Epoch	1
136	Year of Epoch	1
137	Hours	1
138	Minutes (including fraction)	100
139	Eccentricity	10^5
140	Argument of Perigee (integer part)	1
141	Argument of Perigee (fraction part)	10^3
142	Right Ascension (integer part)	1
143	Right Ascension (fraction part)	10^3
144	Inclination (integer part)	1
145	Inclination (fraction part)	10^3
146	Semimajor Axis (km, integer part)	1
147	Semimajor Axis (km, fraction part)	10^3
148	Mean Anomaly (integer part)	1
149	Mean Anomaly (fraction part)	10^3
150	Sun-Earth Distance (A. U.)	10^4
151-340	Zero fill	1

Orbital Summary Record (Page 139)

Delete last line of table, which reads:

17-340	Zero fill	1"

and add the following:

17-26	Solar Irradiances (Chs. 1-10) Normalized to mean sun-earth distance	Chs. 1-5:10 Chs. 6-10:100
27	Solar Channels Assembly Gamma Angle (positive to right of track)	1
28-340	Zero fill	1

5.6 LRIR Corrections to the User's Guide

Table 5-13

Post-launch analysis of relative spectral response data and orbital data leads to the following corrected values for Table 7-2, on page 154 of the User's Guide

Table 7-2

Optical Characteristics of LRIR Channels

Channel		Band Pass (50% Peak Response)	Field-of-view (km)		Random noise in orbit* $\pm 1\sigma$ (watts/m^2-sr)
No.	Abbrev.		Vertical	Horizontal	
1	NCO_2	649-672 cm^{-1} (14.9-15.4 μm)	2.0	20	0.0023
2	BCO_2	592-700 cm^{-1} (14.3-16.9 μm)	2.0	20	0.0040
3	O_3	984-1169 cm^{-1} (8.6-10.2 μm)	2.0	20	0.011
4	H_2O	412-446 cm^{-1} (22.4-24.3 μm)	2.5	25	0.008

*Noise will gradually increase as the detector temperature increases during the useful life of the experiment.

5.7 PMR Corrections to the User's Guide

There are no PMR corrections to the User's Guide.

5.8 TWERLE Corrections to the User's Guide

Table 5-14

The following are address changes to Table 9-2
on page 186 in the User's Guide

Table 9-2

Nimbus RAMS Experiments - Address Changes

Address Changes

OLD	NEW
Mr. G. R. Cresswell Division of Fisheries & Oceanography Commonwealth Scientific & Industrial Research Organization Melbourne, Australia	Mr. G. R. Cresswell Division of Fisheries & Oceanography CSIRO P. O. Box 21 Cronulla, N. S. W. 2230 Australia
A. J. Dyer CSIRO P. O. Box 77 Mordialloc, Vic 3195 Australia	Dr. A. J. Dyer Division of Atmospheric Physics CSIRO Station Street ASPENDALE 3195 Victoria, Australia
Professor Fierre Lacombe, Director Laboratory d'Oceanographic Museau Historie Naturelle de Paris 43 Rue Cuvier Paris, France	Professor Pierre Lacombe, Director Laboratoire d'Oceanographie Physique Museum National d'Histoire Naturelle 43-45 Rue Cuvier 75005 Paris, France
Professor P. Tchernia Museum d'Historie Naturelle de Paris 43 Rue Cuvier Paris, France	Professor P. Tchernia Laboratoire d'Oceanographie Physique Museum National d'Histoire Naturelle 43-45 Rue Cuvier 75005 Paris, France

Table 9-2 (Continued)

Dr. Norbert Untersteiner, Program Director Project AIDJEX 4059 Roosevelt Wave, N. E. Seattle, WA 98105	Dr. Norbert Untersteiner AIDJEX Coordinator University of Washington 4059 Roosevelt Way, N. E. Seattle, Washington 98105
Dr. Donald V. Hansen, Director Physical Oceanography AOWL NOAA U. S. Department of Commerce Miami, Florida	Dr. Donald V. Hansen, Director Physical Oceanography Laboratory AOML/NOAA 15 Rickenbacker Causeway Virginia Key Miami, Florida 33149
Vincent E. Lally National Center for Atmospheric Research P. O. Box 1470 Boulder, Colordao 80302	Mr. Vincent E. Lally National Center for Atmospheric Research P. O. Box 3000 Boulder, Colorado 80302
J. Lentfer Wildlife Research U. S. Department of Interior 813 D. Street Anchorage, Alaska	Mr. Jack W. Lentfer Fish and Wildlife Service Department of Interior 4454 Business Park Blvd. Anchorage, Alaska 99503
H. Brann Bureau of Meteorology Melbourne, Victoria Australia	Mr. H. N. Brann Bureau of Meteorology P. O. Box 1289K Melbourne, Victoria 3001 Australia
Robert Kee Development Engineering Division Code 6201 U. S. Naval Oceanographic Office Washington, D. C. 20390	Mr. Robert Kee Code 6220 U. S. Naval Oceanographic Office Washington, D. C. 20373

Table 9-2 (Concluded)

F. Anderson South African Council for Scientific & Industrial Research Congella, Natal, South Africa	Mr. Frank P. Anderson CSIR, Institute for Technology P. O. Box 17001 Congella 4013 South Africa
H. Stommel Professor of Oceanography MIT Cambridge, Massachusetts	Professor Henry Stommel Department of Meteorology Room 54-1416 Massachusetts Institute of Technology Cambridge, Massachusetts 02139
B. Buck Polar Research Lab. Santa Barbara California 93101	Mr. B. M. Buck, President Polar Research Laboratory, Inc. 123 Santa Barbara Street Santa Barbara, California 93101
John A. Knauss Graduate School of Oceanography University of Rhode Island Kingston, Rhode Island 02881	Dr. P. L. Richardson Woods Hole Ocean Institute Woods Hole, Massachusetts 02543

5.9 T&DRE Corrections to the User's Guide

There are no T&DRE corrections to the User's Guide.

Table 5-15

The following are new TWERLE users, added since launch. This information should be added to Table 9-2 (Nimbus RAMS Experiments) on page 186 in the User's Guide.

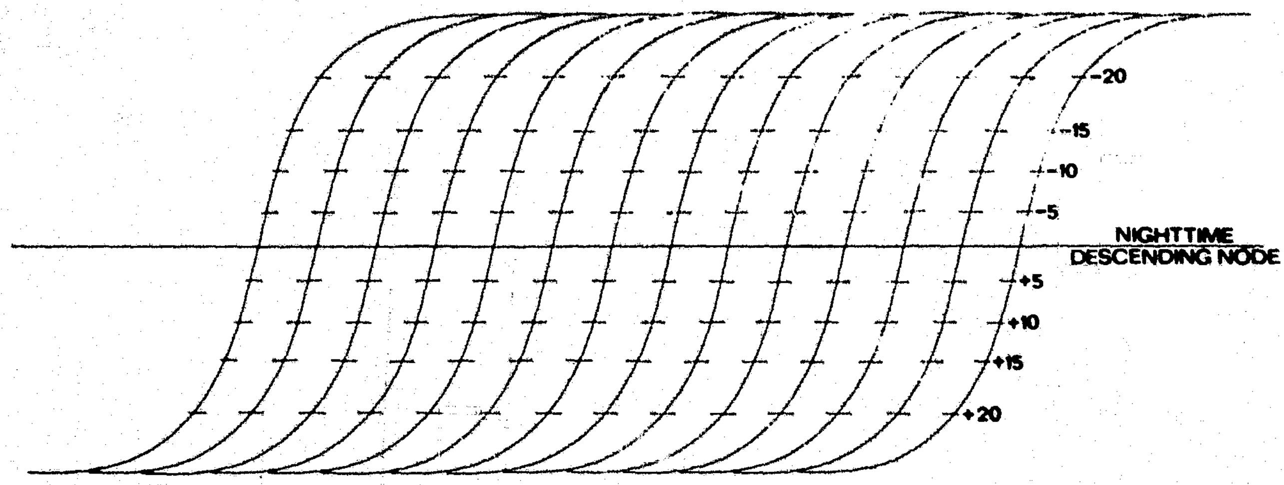
Principal Investigator	Experiment Title	Platforms		
		Number	Type	Deployment Area
Mr. Kalinowski Centre National Pour L Exploitation Des Oceans COB 29 N-Plouzane B-T 337 29273 Brest CEDEX, France	Drifting Buoys in Bay of Biscay, France	10	Drifting Buoys	Bay of Biscay, France
Mr. James L. Baker 4 Beach Road Sherwood Forest, Maryland 21405	Distress Communication and Location System for Small Craft	2	Ships	Chesapeake Bay and Gulfstream between Florida and Cape Hatteras
Mr. Michael Metge Imperial Oil LTD. 339 50th Ave., S.E. Calgary, Alberta Canada T2G 2B3	Surface Drifter Buoys, Davis Strait	24	Drifting Buoys	Davis Strait
Mr. Ronald J. Lynn NOAA/NMFS Southwest Fisheries Center P.O. Box 271 La Jolla, California 92038	Albacore Oceanography Drifter Study	9	Drifting Buoys	Eastern Pacific Ocean
Dr. Julian Pike NCAR, P.O. Box 3000 Boulder, Colorado 80307	Mountain Wind Project	4	Meteorological Platforms	Rocky Mountains
Mr. Jorgen Taagholt Ionosphere Laboratory University of Denmark Building 349 Dk. 2800 Lyngby, Denmark	Greenland Meteorological Experiment	3	Meteorological Platforms	Northeast Greenland
Dr. A. D. Kirwan, Jr. Department of Oceanography College of Geosciences Texas A&M University College Station, Texas 77843	Anomaly Dynamics Study (ADS)	32	Drifting Buoys	North Pacific
Mr. Jan Dietrich Danish Hydraulic Institute Agern Alle 5 DK 2970 Horsholm, Denmark	Iceberg Tracking in Davis Strait	4	Buoy Transmitter	Davis Strait

Table 5-15 (Continued)

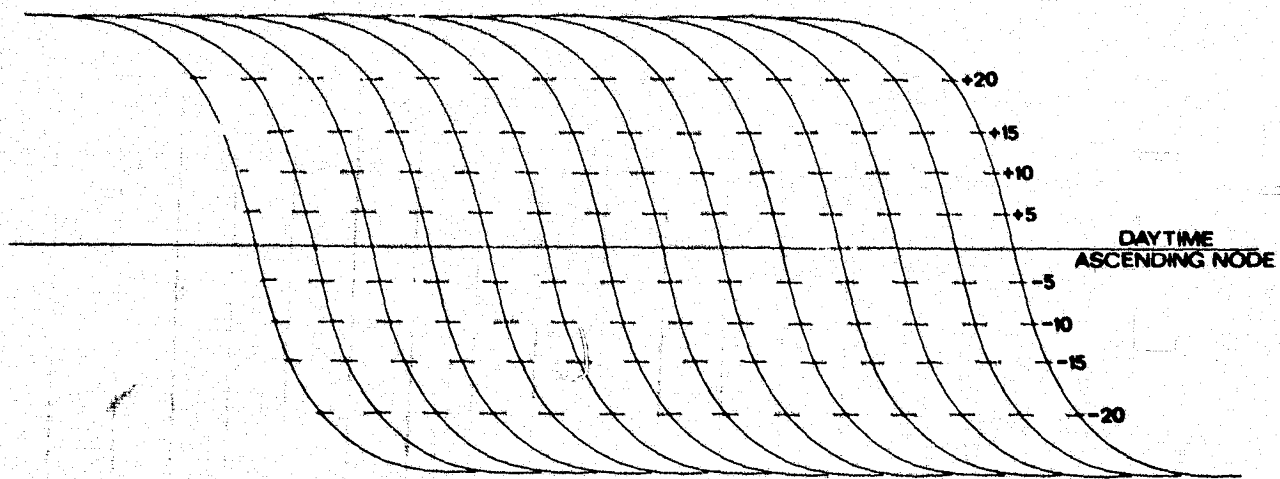
Mr. Gale Woods NOAA National Marine Fisheries Service NSTL Bay St. Louis, Mississippi 39520	Porpoise Tracking System Project	5	Antenna and Transmitter	San Diego, California
Mr. David F. Thomas, Jr. SATD-MEB-SDS, Mail Stop 322 NASA Langley Research Center Hampton, Virginia 23665	Air-droppable In Situ Platforms for Long Duration Measurements near Hurricanes	10	Ocean Platforms	Western Atlantic near North America
Dr. P. Roger Williamson Department of Applied Physics & Information Science University of California – San Diego La Jolla, California 92037	Stratospheric Monitoring with Long-term Balloon Flights	3	Super-pressure Balloons	Southern Hemisphere
Mr. J. C. O'Rourke Canadian Marine Drilling, Ltd. P.O. Box 200 Calgary, Canada T2P 2H8	Arctic Ice Dynamics	2-4	Sea Ice Platforms	Beaufort Sea
Dr. J. Michael Hall NOAA Data Buoy Office National Space Tech Office Bay St. Louis, Mississippi 39520	East Coast Drifting Experiment	24	Drifting Buoys	Atlantic Ocean
	High Impact Detection and Determination on Large Buoys	10	Buoy	Atlantic Ocean, Gulf of Mexico, & North Pacific Ocean
	Reliability Enhancement Experiment	3	Buoy	Santa Barbara, California & Arctic Ocean
Mr. Robert Oehlkers University of Wisconsin Space Science and Engineering Center 1225 W. Dayton St. Madison, Wisconsin 53706	Buoy Experiments in Lake Michigan	10	Buoy	Lake Michigan
Capt. E. A. Delaney USCG Oceanographic Unit Bldg. 159E Navy Yard Navy Yard Annex Washington, D.C. 20590	North Atlantic and Labrador Current Studies	1	Drifting Buoys	North Atlantic, Labrador Coast
Dr. R. H. Goodman Innovative Ventures, Ltd. 4632 11th St. Calgary Alberta, Canada T2E2W7	Ice Monitoring in the Canadian Arctic and Labrador Region	2	Drifting Buoys	Canadian Arctic, Labrador

Table 5-15 (Continued)

Mr. L. Brooks Chevron Oil Field Research Co. P.O. Box 446 La Habra, California 90631	Current Flow and Iceberg Drift in Davis Strait	4	Buoys	Davis Strait
Dr. John D. Cochrane Department of Oceanography Texas A&M University College Station, Texas 77843	North Equatorial Counter-current Experiment	3	Buoys	Pacific Ocean
Dr. F. M. Vukovich P.O. Box 12194 Research Triangle Institute Research Triangle Park North Carolina, 27709	Gulf Stream Eddies	4	Drifting Buoys	Gulf Stream
Dr. Donald R. Sheldon Drug Enforcement Administration DEA 1405 I St. N.W. Washington, D.C. 20537	Tracking Concealed RAMS Transmitters	10	Beacon	Washington, D.C.
Dr. D. Halpern NOAA Pacific Marine Env. Labs Univ. Washington WB10 Seattle, Washington 98195	Ocean Circulation Studies and Pacific Equatorial Waters	3	Drifting Buoys, Moored Buoys	Mid-Pacific Equatorial
M. Petit, Project Marisonde Ceram, Magny Les Hameaux 78470 Saint Remy, France	Project Marisonde	7	Meteorological Buoys	10°W-15°W 44°N-46°N
Dr. John J. Kelly Naval Arctic Research Lab. Barrow, Alaska 99723	NARL Buoy Program	10	Buoys	Arctic Ocean



NIMBUS SUBSATELLITE TRACKS OVERLAY



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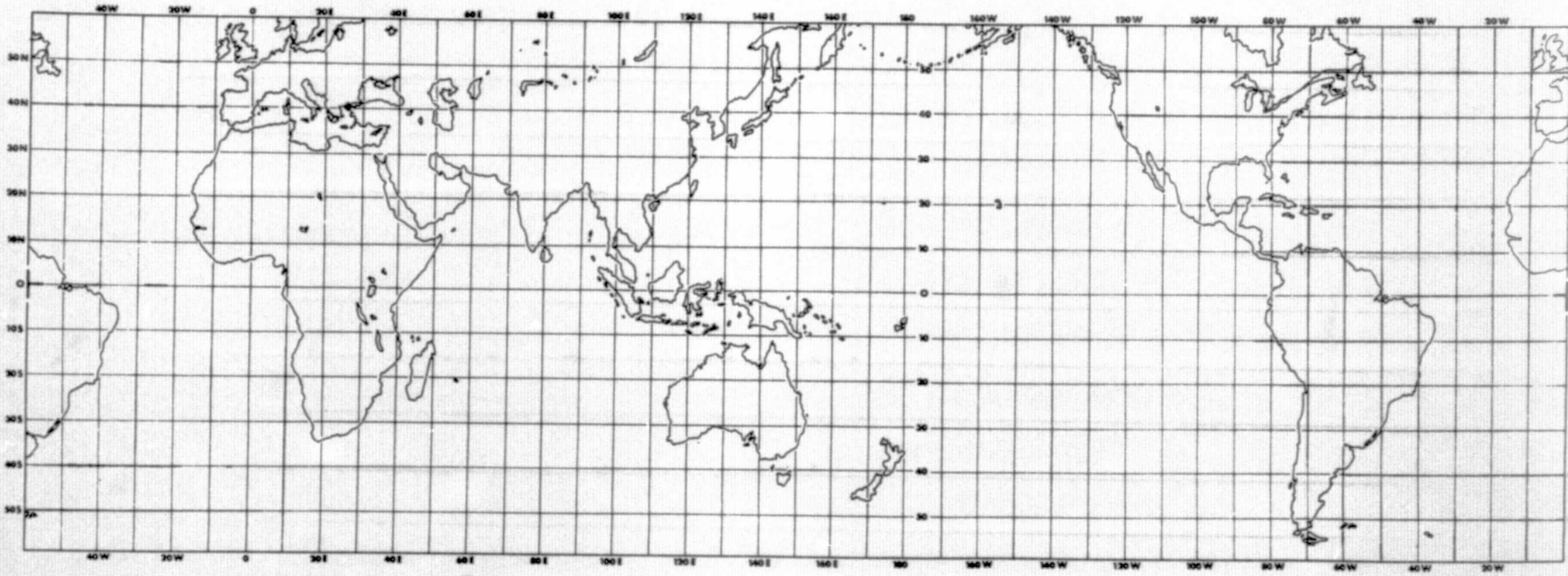

LOCATION GUIDE
AVERAGE SCALE FOR NIMBUS
THIR NIGHTTIME MONTAGES