NASA Technical Memorandum

NASA TM-82580

ATMOSPHERIC ENVIRONMENT FOR SPACE SHUTTLE (STS-11) LAUNCH

By D. L. Johnson, C. K. Hill, and G. W. Batts
Systems Dynamics Laboratory

May 1984

National Aeronautics and Space Administration

George C. Marshall Space Flight Center

TECHNICAL REPORT STANDARD TITLE PAGE

1. REPORT NO.	2. GOVERNMENT ACCESSION NO.	3. RECIPIENT'S CATALOG NO.
NASA TM- 82580		

4. TITLE AND SUBTITLE	5. REPORT DATE
Atmospheric Environment for Space Shuttle (STS-11) Launch	May 1984
	6. PERFORMING ORGANIZATION CODE

7. AUTHOR(S)	8. PERFORMING ORGANIZATION REPORT #
D. L. Johnson, C. K. Hill, and G. W. Batts*	

9. PERFORMING ORGANIZATION NAME AND ADDRESS	10. WORK UNIT NO.
George C. Marshall Space Flight Center Marshall Space Flight Center, Alabama 35812	11. CONTRACT OR GRANT NO.
	13. TYPE OF REPORT & PERIOD COVERED

12. SPONSORING AGENCY NAME AND ADDRESS	
National Aeronautics and Space Administration Washington, D.C. 20546	Technical Memorandum
	14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES

Prepared by Systems Dynamics Laboratory, Science and Engineering

*Computer Sciences Corporation, Huntsville, Alabama

16. ABSTRACT

This report presents a summary of selected atmospheric conditions observed near Space Shuttle STS-11 launch time on February 3, 1984, at Kennedy Space Center, Florida. Values of ambient pressure, temperature, moisture, ground winds, visual observations (cloud), and winds aloft are included. The sequence of prelaunch Jimsphere measured vertical wind profiles is given in this report. Also presented are wind and thermodynamic parameters representative of surface and aloft conditions in the SRB descent/impact ocean area. Final meteorological tapes, which consist of wind and thermodynamic parameters versus altitude, for STS-11 vehicle ascent and SRB descent/impact have been constructed. The STS-11 ascent meteorological data tape has been constructed by Marshall Space Flight Center in response to Shuttle task agreement No. 561-81-22-368 with Johnson Space Center.

17. KEY WORDS	18. DISTRIBUTION STATEMENT
STS-11 Launch Atmospheric Summary Pressure Temperature Relative Humidity Winds, Winds Aloft, Clouds SRB Descent Atmospheric Summary	Dale L. Johnson Unclassified – Unlimited

19. SECURITY CLASSIF. (of this report)	20. SECURITY CLASSIF. (of this page)	21. NO. OF PAGES	22. PRICE
Unclassified	Unclassified	51	NTIS

MSFC - Form 3292 (May 1969)

For sale by National Technical Information Service, Springfield, Virginia 22151

ACKNOWLEDGMENTS

The authors wish to thank the personnel at NASA Kennedy Space Center, along with those at the Cape Canaveral Air Force Station and their Pan American World Airways contractors, for the acquisition and distribution of all launch related atmospheric data received at MSFC.

Thanks are due to James Arnold and David Keller of the Atmospheric Effects Branch, MSFC, for their help in extracting atmospheric data and satellite cloud photographs that are used in this report. Also, special thanks to Bill Jeffries, Bobby Vayda, and Joe Willett of Computer Sciences Corporation for their assistance in processing all the upper air data used in producing the STS-11 final meteorological data tapes. Finally, appreciation is expressed to Rhonda Gregory and Sherry Anderson of Boeing Computer Support Services for the GRA model and ESDB computer support, respectively.

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

LIST OF TABLES

TECHNICAL MEMORANDUM

ATMOSPHERIC ENVIRONMENT FOR SPACE SHUTTLE (STS-11) LAUNCH

I. INTRODUCTION

This report presents an evaluation of the atmospheric environmental data taken during the launch of the Space Shuttle/STS-11 vehicle. This Space Shuttle vehicle was launched from Pad 39A at Kennedy Space Center (KSC), Florida, on a bearing of 89 deg east of north at 1300 UT (0800 EST) on February 3, 1984.

This report presents a summary of the atmospheric environment at launch time (L+0) of the STS-11, together with the sequence of prelaunch Jimsphere measured winds aloft profiles from L-14 hr through liftoff. The general weather situation for the launch and flight area is described, and surface and upper level wind/thermodynamic observations near launch time are given. Surface and upper level wind/thermodynamic parameter estimates are also presented for the SRB descent/impact analyses.

Previous MSFC-related launch vehicle atmospheric environmental conditions have been published as Appendix A of individual MSFC Saturn Flight Evaluation Working Group reports [1]. Office memorandums have been issued for previous flights giving launch pad wind information. A report has also been published [2] which summarizes most launch atmospheric conditions observed for the past 155 MSFC/ABMA-related vehicle launches through SA-208 (Skylab 4). Reports summarizing ASTP and STS-1 through STS-9 launch conditions are presented in References 3 through 12, respectively.

II. SOURCES OF DATA

Atmospheric observational data used in this report were taken from synoptic maps made by the National Weather Service, plus all available surface observations and measurements from around the launch area. Upper air observations were taken from balloon-released instruments sent aloft from Cape Canaveral Air Force Station (CCAFS). High-altitude winds and thermodynamic data were measured by the Super-Loki rocketsondes launched from the CCAFS. Table 1 presents a listing of systems used to obtain the upper level wind profiles used in compiling the final ascent meteorological data tape. The L-0 rawinsonde and Super-Loki rocket data were used in the upper level atmospheric regions for the construction of the final SRB impact/descent meteorological data tape. Data cutoff altitudes are also given in Table 1.

III. GENERAL SYNOPTIC SITUATION AT LAUNCH TIME

A cold front, extending out of a low pressure area over eastern Lake Superior and passing through central Tennessee, eastern Louisiana and into the Gulf of Mexico, was situated west of KSC prior to STS-11 launch. The influence of high pressure

over eastern Florida was starting to weaken as this front approached. Moderate temperatures and light surface wind conditions prevailed as launchtime grew closer. Figure 1 presents the surface map conditions 1 hr before STS-11 launch. Figure 2 presents the winds aloft conditions at the 500 mb pressure level 1 hr before launch. Moderate westerly winds prevailed aloft over KSC at this pressure level.

From 1735 UT on February 2, 1984, through launch, an area of instability that produced rainshowers extended just off and parallel to the eastern coast line of Florida over the Atlantic Ocean. Between 0049 and 0422 UT on February 3, 1984, rainshower activity occurred at KSC and was reported at Shuttle runway site X68. This left most inland KSC areas slightly cooler and with greater atmospheric moisture than most coastal sites. This was evidenced throughout the later countdown period from observations taken at KSC's AF Wind Tower system sites.

At launch time, the ground fog was starting to clear as visibility improved to 4 miles. The fog was relatively shallow as rooftop visibility was 10 miles. At launch time cloudiness amounting to 3/10 of the total sky cover was mainly located to the east and south of Pad 39A as shown in Figure 3. Figure 3 presents the GOES-5 infrared southeast U.S. cloud picture taken at launch time (1300 UT). The scattered cloud conditions at L-0 consisted of 2/10 cumulus at 2500 ft, 1/10 stratocumulus at 4500 ft, and <1/10 cirrus at 25,000 ft. Figure 4 shows an up-close visible shot of the central Florida peninsula as recorded by GOES-5, taken at 1300 UT.

IV. SURFACE OBSERVATIONS AT LAUNCH TIME

Surface observations at launch time for selected KSC locations are given in Table 2. Included are pad 39A, shuttle runway, and CCAFS balloon release station observations. Neither precipitation nor lightning was observed at launch time.

Table 3 presents PAD 39A wind data along with other standard hourly meteorological measurements and sky observations for the 6-hr period prior to launch of STS-11. Values for wind speed and direction are given for the 18 m (60 ft) pad light pole level. Wind values from the 295 ft level off AF Wind Tower No. 313 were substituted for the Pad 275 ft FSS level winds, due to the FSS wind instrumentation not operating.

V. UPPER AIR MEASUREMENTS DURING LAUNCH

The FPS-16 Jimsphere (1320 UT), MSS Rawinsonde (1305 UT), Super-Loki Rocketsonde (1500 UT), and Super-Loki Robin (1734 UT) systems were used to measure the upper level wind and thermodynamic parameters for STS-11 launch. At altitudes above the rocket-measured data, the Global Reference Atmosphere (GRA) [13] parameters for February KSC conditions were used. A tabulation of the STS-11 final meteorological data for ascent is presented in Table 4 which lists the wind and thermodynamic parameters versus altitude. A brief summary of parameters is given in the following paragraphs.

A. Wind Speed

At launch time, wind speeds were calm (0 ft/sec) at 60 ft and increased to a maximum of 143 ft/sec (85 kn) blowing from 288 deg. This maximum occurred at an altitude of 38,200 ft (11,643 m). The winds decreased above this level as shown in Figure 5. The overall maximum measured speed was 280 ft/sec (166 kn) at 234,000 ft (71,323 m) altitude.

B. Wind Direction

At launch time, the 60-ft wind direction was calm. Light low level winds were from the southeast and shifted through the south to a westerly component above 12,000 ft (3658 m). Winds remained in the winter westerly regime throughout most of the upper troposphere, the stratosphere and lower mesosphere to 250,000 ft (76,200 m). Figure 5 shows the complete wind direction versus altitude profile. As shown in Figure 5, wind direction became quite variable at altitudes with low wind speeds.

C. Prelaunch/Launch Wind Profiles

Prelaunch/launch wind profiles presented in Figures 6 through 9 were measured by the Jimsphere FPS-16 system. Data are shown for the L-13 hr, L-7.25 hr, L-3.5, and L+0 measurement periods.

The wind speed and direction profiles for the 13-hr period prior to and including L+0 are shown in Figures 6 and 7. The in-plane and out-of-plane profiles are given on Figures 8 and 9. Significant differences between the February mean values and the measured values in the 30,000 to 50,000 ft layer were found only in the L-3.5 hr data set. This is seen on Figure 9 at approximately 36,000 ft altitude where the peak left crosswind profile value increased from 25 ft per second at L-7.25 hr to 85 ft per second at L-3.5 hr due to a shift to a more northerly wind direction. However, at L-0 the left crosswind had decreased to approximately 45 ft per second. Although the value of 85 ft per second nearly equaled the February 95 percent value, there were no calculated vehicle load exceedances produced by the wind data presented in Figures 6 through 9. The prelaunch weather conditions are discussed in more detail in Section III.

D. Thermodynamic Data

The thermodynamic data taken at STS-11 launch time, consisting of atmospheric temperature, dew-point temperature, pressure, and density have been compiled as the STS-11 ascent meteorological data and are presented in Table 4. The associated thermodynamic data taken in support of the SRB descent have also been assembled as the STS-11 SRB descent/impact meteorological data and are presented in Table 5. The vertical structure of temperature for the STS-11 ascent and for the SRB descent is shown graphically versus altitude in Figure 10.

The atmospheric thermodynamic parameters of temperature, pressure, and density, measured during STS-11 launch below 130,000 ft (39,624 m) were all within 5 percent of their respective PRA-63 [14] annual values. All these parameters stayed within 18 percent of their respective PRA-63 values, at all levels of measurement.

E. SRB Upper Air and Surface Measurements

As has been mentioned in earlier paragraphs, an SRB descent meteorological data tape has also been constructed which consists of data taken from the Omegasonde-Rawinsonde system (1355 UT) aboard the USNS Redstone, which was stationed off the coast in the Atlantic Ocean. The CCAFS measured Super-Loki rocketsonde data and the GRA model data were used at altitude levels above the measured Omegasonde data. The tabular values for the SRB descent meteorological tape are presented in Table 5, with wind speed and direction profiles presented in Figure 11. Figure 10 gives the vertical temperature profile.

The surface-ship meteorological and oceanographic observations taken close to STS-11 SRB impact are presented in Table 6.

VI. ATMOSPHERIC SUMMARY CONDITIONS FOR STS LAUNCHES

Given in Table 7 are selected atmospheric L+0 launch conditions for all the Space Shuttle launches.

TABLE 1. SYSTEMS USED TO MEASURE UPPER AIR WIND DATA FOR STS-11 ASCENT*

Type of Data	Date: February 3, 1984		Portion of Data Used			
	Release Time		Start		End	
	Time (UT) (hr:min)	Time After L+0 (min)	Altitude m (ft)	Time After L+0 (min)	Altitude m (ft)	Time After L+0 (min)
FPS-16 Jimsphere	13:20	20	6 (21)	20	17,374 (57,000)	79
MSS Rawinsonde	13:05	5	17,678 (58,000)	23	29,870 (98,000)	35
Super-Loki Rocketsonde (Datasonde)	15:00	120	61,265 (201,000)	120	30,175 (99,000)	137
Super-Loki Rocketsonde (Robin)	17:34	274	80,772 (265,000)	274	61,570 (202,000)	275
Omegasonde-Rawinsonde*	13:55	55	9 (28)	55	29,870 (98,000)	85

*The Omegasonde-Rawinsonde was released from the USNS Redstone to measure the upper atmosphere for SRB descent/impact analyses.

TABLE 2. SURFACE OBSERVATIONS AT STS-11 LAUNCH TIME

Location[a]	Time After L+0 (min)	Pressure (MSL) N/cm² (psia)	Temperature °K (°F)	Dew Point °K (°F)	Relative Humidity (%)	Visibility km (miles)	Sky Cover			Wind	
							Cloud** Amount	Cloud Type	Height of Base Meters (ft)	Speed ft/sec (kt)	Direction (deg)
NASA Space Shuttle Runway X68[e] Winds Measured at 10.4 m (34 ft)	-5	10.180 (14.765)	287.0 (57.0)	285.4 (54.0)	90	6 (4)	2 1 0	Cumulus Strato-Cumulus Cirrus	762 (2,500) 1,372 (4,500) 7,620 (25,000)	3.4 (2.0)	010
CCAFS[c] Surface Measurements	0	10.180 (14.765)	284.8 (53.0)	284.3 (52.0)	95	11 (7)	2 1	Strato-Cumulus Cirrus	823 (2,700) 7,620 (25,000)	0.0 (0.0)	0
Pad 39A[d] Lightpole SE 18.3 m (60.0 ft)	0	10.173* (14.755)*	287.6* (58.0)	287.0* (57.0)	97*	-	-	-	-	0.0[b] (0.0)	0[b]
Pad 39A FSS (Top-SE) 83.8 m (275 ft)	0	-	-	-	-	-	-	-	-	N/A N/A	N/A

*Pad 39A Camera Site 3 barometric pressure and humidity instruments appeared to be reading too high. Therefore, the KSC Shuttle runway station pressure value interpolated to 10.173 N/cm² at 21 ft above MSL was used as the L+0 pad atmospheric pressure measurement. Temperature, dewpoint and relative humidity values selected as being representative of L+0 pad (coastal) conditions were 62°F, 54°F, and 75 percent, respectively. Inland conditions around KSC were considered too cool and moist.

**Three-tenths total sky cover at both X68 and CCAFS.

a. Altitudes of measurements are above natural grade, except where noted.

b. Approximately 1 min average prior to L+0.

c. Balloon release site.

d. Pad 39A thermodynamic measurements are taken at camera site No. 3, approximately 6.4 m (21 ft) above MSL.

e. Official STS-11 sky observational site.

N/A - Not Available.

TABLE 3. STS-11 PRE-LAUNCH THROUGH LAUNCH KSC PAD 39A METEOROLOGICAL MEASUREMENTS[a]

Hourly Atmospheric Measurements								Sky Condition[b]			
3 February 1984 Time UT	Temp. (°F)	Dew Point (°F)	RH[c] (%)	275' Level (SE)[d]		50' Level (SE)[e]		Clouds	Total Sky Cover	Vis. (mi)	Other Remarks
				WS Kt	WD°	WS Kt	WD°				
0700	61	58	91	12	102	7	120	Scattered at 7,500 ft	3/10	10	
0800	56	56	93	12	116	8	100	Scattered at 4,500 ft	3/10	10	
0900	58	56	93	8	125	8	100	Clear Skys	0/10	10	Patches of Ground Fog
1000	59	58	95	5	135	4	120	Clear Skys	0/10	7	Patches of Ground Fog
1100	60	59	96	3	120	2	100	Scattered at 9,000 ft	NA	7	Patches of Ground Fog
1200	59	57	93	0	0	0	0	Scattered at 2,500 ft Scattered at 4,500 ft Scattered at 25,000 ft	2/10	2*	Ground Fog. TCU DSNT E
L+0[f] 1300	62	54	75	-	-	0	0	2/10 CU at 2,500 ft 1/10 SC at 4,500 ft 0/10 CI at 25,000 ft	3/10	4*	Ground Fog. TCU DSNT E

a. Hourly observations obtained verbally from CCAFS.

b. Sky observations taken at the Shuttle runway site X68.

c. Note: Relative humidity measurements very erratic and off scale throughout the countdown period. Table values given here through 1200 UT are too high.

d. Pad 39A 275 ft FSS wind instrumentation was taken down prior to L-6 hr, due to a range safety problem. The values presented in these columns are 5-min wind averages obtained from the 295 ft level of the AF Tower No. 313; located inland 3 miles west of Pad 39A.

e. 10 min mean about the hour from pad 39A instrumentation.

f. L+0 PAD Wind and thermodynamic parameters obtained from HOSC strip charts. L+0 thermodynamic parameters have been adjusted slightly here to approximate the correct liftoff atmospheric conditions. SE Anemometers used at 60 ft level for L+0 wind condition (approximately 1 min average prior to L+0). Pad 39A L+0 atmospheric pressure, at 21 ft (MSL), was 10.173 N/cm^2. Sea level pressure was 10.180 N/cm^2.

* Rooftop visibility = 10 miles.

TABLE 4. STS-11 FINAL ASCENT METEOROLOGICAL TAPE LISTING

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
000321	000	007	16.7	.1017+04	.1216+04	12.2
000100	003	144	16.8	.1014+04	.1212+04	12.5
000200	005	154	17.0	.1011+04	.1207+04	13.0
000300	007	150	17.2	.1007+04	.1202+04	13.4
000400	009	160	17.4	.1004+04	.1196+04	13.8
000500	009	163	17.5	.1000+04	.1191+04	14.3
000600	013	145	17.7	.9966+03	.1186+04	14.7
000700	018	156	17.9	.9931+03	.1181+04	15.1
000800	021	162	18.1	.9896+03	.1176+04	15.5
000900	020	158	18.2	.9861+03	.1171+04	16.0
001000	025	159	18.4	.9826+03	.1166+04	16.4
001100	028	161	18.2	.9791+03	.1162+04	16.3
001200	027	160	17.9	.9756+03	.1159+04	16.2
001300	029	158	17.7	.9722+03	.1156+04	16.2
001400	033	162	17.4	.9687+03	.1153+04	16.1
001500	033	165	17.2	.9653+03	.1150+04	16.0
001600	032	159	17.0	.9619+03	.1147+04	15.9
001700	034	156	16.7	.9585+03	.1144+04	15.8
001800	035	163	16.5	.9551+03	.1141+04	15.8
001900	034	163	16.2	.9517+03	.1138+04	15.7
002000	035	155	16.0	.9483+03	.1134+04	15.6
002100	037	159	15.7	.9449+03	.1132+04	15.3
002200	037	161	15.5	.9416+03	.1129+04	15.1
002300	035	160	15.2	.9382+03	.1126+04	14.8
002400	034	158	14.9	.9348+03	.1123+04	14.6
002500	037	157	14.7	.9315+03	.1120+04	14.3
002600	036	161	14.4	.9281+03	.1117+04	14.1
002700	033	163	14.1	.9248+03	.1114+04	13.8
002800	030	157	13.8	.9215+03	.1111+04	13.6
002900	032	162	13.6	.9182+03	.1109+04	13.3
003000	033	169	13.3	.9149+03	.1106+04	13.1
003100	029	168	13.1	.9116+03	.1102+04	12.9
003200	028	167	12.9	.9083+03	.1099+04	12.7
003300	029	164	12.8	.9050+03	.1096+04	12.5
003400	030	168	12.6	.9018+03	.1093+04	12.3
003500	028	174	12.4	.8985+03	.1090+04	12.1
003600	024	169	12.2	.8953+03	.1086+04	12.0
003700	024	161	12.0	.8920+03	.1083+04	11.8
003800	028	165	11.9	.8888+03	.1080+04	11.6
003900	028	172	11.7	.8856+03	.1077+04	11.4
004000	024	171	11.5	.8824+03	.1074+04	11.2
004100	024	165	11.3	.8792+03	.1071+04	11.0
004200	028	168	11.2	.8760+03	.1067+04	10.8
004300	027	173	11.0	.8728+03	.1064+04	10.7
004400	026	181	10.8	.8697+03	.1061+04	10.5
004500	027	177	10.7	.8665+03	.1058+04	10.3
004600	028	183	10.5	.8634+03	.1055+04	10.1
004700	029	193	10.3	.8602+03	.1051+04	9.9
004800	031	187	10.1	.8571+03	.1048+04	9.8
004900	030	184	10.0	.8540+03	.1045+04	9.6

TABLE 4. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
005000	033	189	9.8	.8509+03	.1042+04	9.4
005100	032	193	9.6	.8478+03	.1039+04	9.2
005200	033	190	9.5	.8447+03	.1036+04	9.1
005300	035	191	9.3	.8416+03	.1033+04	8.9
005400	033	188	9.1	.8385+03	.1030+04	8.7
005500	034	193	9.0	.8354+03	.1026+04	8.6
005600	032	189	8.8	.8324+03	.1023+04	8.4
005700	033	186	8.6	.8293+03	.1020+04	8.2
005800	035	187	8.4	.8263+03	.1017+04	8.0
005900	035	188	8.3	.8233+03	.1014+04	7.9
006000	035	195	8.1	.8203+03	.1011+04	7.7
006100	034	199	8.0	.8173+03	.1008+04	6.7
006200	031	198	7.9	.8142+03	.1005+04	5.7
006300	030	192	7.9	.8113+03	.1002+04	4.8
006400	031	197	7.8	.8083+03	.9985+03	3.8
006500	031	205	7.7	.8053+03	.9954+03	2.8
006600	029	197	7.6	.8023+03	.9922+03	1.8
006700	031	194	7.5	.7994+03	.9891+03	.8
006800	032	198	7.5	.7964+03	.9859+03	-.1
006900	027	199	7.4	.7935+03	.9828+03	-1.1
007000	030	195	7.3	.7906+03	.9796+03	-2.1
007100	030	201	7.2	.7877+03	.9767+03	-3.3
007200	030	205	7.0	.7848+03	.9737+03	-4.5
007300	026	205	6.9	.7819+03	.9708+03	-5.6
007400	028	202	6.7	.7790+03	.9678+03	-6.8
007500	025	210	6.6	.7761+03	.9649+03	-8.0
007600	021	219	6.5	.7732+03	.9619+03	-9.2
007700	022	216	6.3	.7704+03	.9590+03	-10.4
007800	023	215	6.2	.7675+03	.9560+03	-11.5
007900	022	229	6.0	.7647+03	.9531+03	-12.7
008000	021	230	5.9	.7618+03	.9501+03	-13.9
008100	017	222	5.7	.7590+03	.9473+03	-13.4
008200	019	224	5.4	.7562+03	.9446+03	-12.9
008300	018	226	5.2	.7534+03	.9418+03	-12.3
008400	017	224	4.9	.7506+03	.9391+03	-11.8
008500	019	215	4.7	.7478+03	.9363+03	-11.3
008600	019	221	4.5	.7450+03	.9336+03	-10.8
008700	016	227	4.2	.7422+03	.9308+03	-10.3
008800	019	219	4.0	.7394+03	.9281+03	-9.7
008900	020	218	3.7	.7367+03	.9254+03	-9.2
009000	018	223	3.5	.7339+03	.9227+03	-8.7
009100	018	212	3.3	.7312+03	.9199+03	-8.6
009200	021	209	3.1	.7284+03	.9172+03	-8.5
009300	020	216	2.8	.7257+03	.9145+03	-8.4
009400	018	214	2.6	.7230+03	.9117+03	-8.3
009500	019	209	2.4	.7203+03	.9090+03	-8.3
009600	020	219	2.2	.7176+03	.9063+03	-8.2
009700	020	225	2.0	.7149+03	.9036+03	-8.1
009800	021	215	1.7	.7122+03	.9009+03	-8.0
009900	024	213	1.5	.7095+03	.8983+03	-7.9

TABLE 4. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
010000	019	222	1.3	.7068+03	.8956+03	-7.8
010100	023	217	1.2	.7042+03	.8927+03	-8.2
010200	021	221	1.0	.7015+03	.8897+03	-8.5
010300	020	232	.9	.6989+03	.8868+03	-8.9
010400	021	224	.8	.6962+03	.8840+03	-9.3
010500	021	227	.7	.6936+03	.8811+03	-9.6
010600	022	234	.5	.6910+03	.8782+03	-10.0
010700	021	232	.4	.6884+03	.8753+03	-10.4
010800	022	238	.3	.6858+03	.8725+03	-10.8
010900	023	246	.1	.6832+03	.8696+03	-11.1
011000	020	236	.0	.6806+03	.8668+03	-11.5
011100	020	233	-.1	.6780+03	.8640+03	-11.8
011200	019	236	-.3	.6754+03	.8611+03	-12.2
011300	019	223	-.4	.6729+03	.8583+03	-12.5
011400	020	209	-.6	.6703+03	.8555+03	-12.8
011500	017	216	-.7	.6676+03	.8528+03	-13.1
011600	019	229	-.8	.6652+03	.8500+03	-13.5
011700	016	234	-1.0	.6627+03	.8472+03	-13.8
011800	021	247	-1.1	.6602+03	.8445+03	-14.1
011900	020	252	-1.3	.6577+03	.8417+03	-14.5
012000	020	248	-1.4	.6552+03	.8390+03	-14.8
012100	025	256	-1.5	.6527+03	.8363+03	-15.1
012200	026	269	-1.7	.6502+03	.8336+03	-16.7
012300	027	267	-1.8	.6477+03	.8309+03	-17.6
012400	027	265	-2.0	.6452+03	.8282+03	-18.5
012500	030	269	-2.1	.6428+03	.8255+03	-19.4
012600	030	276	-2.2	.6403+03	.8228+03	-20.4
012700	031	274	-2.4	.6379+03	.8201+03	-21.3
012800	035	277	-2.5	.6354+03	.8175+03	-22.2
012900	038	281	-2.7	.6330+03	.8148+03	-23.2
013000	036	285	-2.8	.6306+03	.8121+03	-24.1
013100	036	282	-3.0	.6282+03	.8096+03	-24.1
013200	041	285	-3.2	.6258+03	.8070+03	-24.1
013300	043	283	-3.4	.6233+03	.8045+03	-24.1
013400	040	281	-3.6	.6209+03	.8020+03	-24.1
013500	041	280	-3.7	.6186+03	.7994+03	-24.0
013600	043	283	-3.9	.6162+03	.7969+03	-24.0
013700	044	283	-4.1	.6138+03	.7944+03	-24.0
013800	047	281	-4.3	.6115+03	.7919+03	-24.0
013900	049	285	-4.5	.6091+03	.7894+03	-24.0
014000	048	286	-4.7	.6068+03	.7870+03	-24.0
014100	049	281	-4.9	.6044+03	.7844+03	-24.2
014200	050	286	-5.0	.6021+03	.7818+03	-24.3
014300	051	286	-5.2	.5997+03	.7793+03	-24.5
014400	049	285	-5.3	.5974+03	.7767+03	-24.6
014500	052	285	-5.5	.5951+03	.7742+03	-24.8
014600	050	288	-5.7	.5928+03	.7717+03	-25.0
014700	047	284	-5.8	.5905+03	.7691+03	-25.1
014800	048	286	-6.0	.5882+03	.7666+03	-25.3
014900	047	287	-6.1	.5860+03	.7641+03	-25.4

TABLE 4. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
015300	046	283	-6.3	.5837+03	.7616+03	-25.6
015100	046	282	-6.5	.5814+03	.7592+03	-25.7
015200	043	282	-6.7	.5792+03	.7568+03	-25.8
015300	044	279	-6.9	.5769+03	.7545+03	-25.9
015400	045	283	-7.1	.5747+03	.7521+03	-26.0
015500	043	280	-7.3	.5724+03	.7497+03	-26.1
015600	044	282	-7.5	.5702+03	.7474+03	-26.2
015700	043	284	-7.7	.5680+03	.7450+03	-26.3
015800	044	281	-7.9	.5658+03	.7427+03	-26.4
015900	046	282	-8.1	.5636+03	.7404+03	-26.5
016000	046	281	-8.3	.5614+03	.7380+03	-26.6
016100	048	281	-8.5	.5592+03	.7357+03	-26.8
016200	045	282	-8.7	.5570+03	.7333+03	-27.1
016300	046	283	-8.9	.5548+03	.7310+03	-27.3
016400	046	283	-9.1	.5526+03	.7286+03	-27.6
016500	045	283	-9.2	.5504+03	.7263+03	-27.8
016600	046	278	-9.4	.5483+03	.7240+03	-28.1
016700	048	281	-9.6	.5461+03	.7217+03	-28.3
016800	047	283	-9.8	.5440+03	.7194+03	-28.6
016900	052	278	-10.0	.5419+03	.7171+03	-28.8
017000	052	280	-10.2	.5397+03	.7148+03	-29.1
017100	052	275	-10.4	.5376+03	.7125+03	-29.3
017200	056	276	-10.6	.5355+03	.7103+03	-29.5
017300	054	276	-10.8	.5334+03	.7080+03	-29.6
017400	055	274	-11.0	.5312+03	.7058+03	-29.8
017500	056	276	-11.2	.5291+03	.7036+03	-30.0
017600	053	274	-11.5	.5271+03	.7014+03	-30.2
017700	054	274	-11.7	.5250+03	.6992+03	-30.4
017800	053	277	-11.9	.5229+03	.6970+03	-30.5
017900	052	274	-12.1	.5208+03	.6948+03	-30.7
018000	054	273	-12.3	.5188+03	.6926+03	-30.9
018100	051	274	-12.4	.5167+03	.6902+03	-31.1
018200	051	273	-12.6	.5147+03	.6878+03	-31.3
018300	053	275	-12.7	.5126+03	.6855+03	-31.5
018400	052	272	-12.9	.5106+03	.6831+03	-31.7
018500	053	273	-13.0	.5085+03	.6808+03	-31.9
018600	053	274	-13.1	.5065+03	.6784+03	-32.2
018700	052	273	-13.3	.5045+03	.6761+03	-32.4
018800	055	277	-13.4	.5025+03	.6738+03	-32.6
018900	055	280	-13.6	.5005+03	.6715+03	-32.8
019000	053	282	-13.7	.4985+03	.6692+03	-33.0
019100	055	281	-13.9	.4965+03	.6670+03	-33.1
019200	053	283	-14.1	.4945+03	.6649+03	-33.3
019300	052	282	-14.3	.4925+03	.6628+03	-33.4
019400	056	279	-14.5	.4906+03	.6606+03	-33.5
019500	056	281	-14.7	.4886+03	.6585+03	-33.6
019600	055	279	-15.0	.4866+03	.6564+03	-33.8
019700	057	279	-15.2	.4847+03	.6543+03	-33.9
019800	055	282	-15.4	.4828+03	.6523+03	-34.0
019900	053	285	-15.6	.4808+03	.6502+03	-34.2

TABLE 4. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
020000	055	280	-15.8	.4789+03	.6481+03	-34.3
020100	056	286	-16.1	.4770+03	.6461+03	-34.5
020200	055	288	-16.3	.4750+03	.6442+03	-34.7
020300	056	285	-16.6	.4731+03	.6422+03	-34.8
020400	059	288	-16.8	.4712+03	.6403+03	-35.0
020500	059	289	-17.1	.4693+03	.6383+03	-35.2
020600	059	287	-17.4	.4674+03	.6364+03	-35.4
020700	060	288	-17.6	.4655+03	.6345+03	-35.6
020800	060	291	-17.9	.4636+03	.6326+03	-35.7
020900	059	289	-18.1	.4618+03	.6307+03	-35.9
021000	060	287	-18.4	.4599+03	.6288+03	-36.1
021100	059	291	-18.6	.4580+03	.6267+03	-35.9
021200	057	290	-18.8	.4561+03	.6247+03	-35.8
021300	058	29[illegible]	-19.0	.4543+03	.6226+03	-35.6
021400	058	288	-19.2	.4524+03	.6206+03	-35.5
021500	058	287	-19.4	.4506+03	.6186+03	-35.3
021600	057	285	-19.7	.4488+03	.6166+03	-35.1
021700	059	284	-19.9	.4469+03	.6146+03	-35.0
021800	060	283	-20.1	.4451+03	.6125+03	-34.8
021900	061	282	-20.3	.4433+03	.6106+03	-34.7
022000	063	283	-20.5	.4415+03	.6086+03	-34.5
022100	063	288	-20.7	.4397+03	.6066+03	-33.8
022200	064	284	-21.0	.4379+03	.6047+03	-33.2
022300	065	287	-21.2	.4361+03	.6028+03	-32.5
022400	062	287	-21.5	.4343+03	.6008+03	-31.9
022500	063	285	-21.7	.4325+03	.5989+03	-31.2
022600	064	284	-21.9	.4307+03	.5970+03	-30.5
022700	062	288	-22.2	.4289+03	.5951+03	-29.9
022800	063	284	-22.4	.4271+03	.5932+03	-29.2
022900	064	285	-22.7	.4254+03	.5913+03	-28.6
023000	063	285	-22.9	.4236+03	.5894+03	-27.9
023100	064	282	-23.1	.4219+03	.5874+03	-28.9
023200	065	283	-23.3	.4201+03	.5855+03	-29.9
023300	065	284	-23.5	.4184+03	.5835+03	-30.9
023400	067	282	-23.7	.4167+03	.5816+03	-31.9
023500	068	285	-23.8	.4149+03	.5796+03	-32.9
023600	070	286	-24.0	.4132+03	.5777+03	-34.0
023700	072	285	-24.2	.4115+03	.5757+03	-35.0
023800	071	287	-24.4	.4098+03	.5738+03	-36.0
023900	073	283	-24.6	.4081+03	.5719+03	-37.0
024000	073	285	-24.8	.4064+03	.5699+03	-38.0
024100	073	287	-25.0	.4047+03	.5680+03	-38.5
024200	072	285	-25.2	.4030+03	.5661+03	-39.1
024300	074	287	-25.4	.4013+03	.5643+03	-39.6
024400	072	287	-25.6	.3996+03	.5624+03	-40.2
024500	073	286	-25.8	.3980+03	.5605+03	-40.8
024600	073	286	-26.1	.3963+03	.5586+03	-41.3
024700	072	283	-26.3	.3946+03	.5568+03	-41.8
024800	076	283	-26.5	.3930+03	.5549+03	-42.4
024900	074	285	-26.7	.3913+03	.5531+03	-42.9

TABLE 4. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
025000	073	282	-26.9	.3897+03	.5513+03	-43.5
025100	074	284	-27.1	.3881+03	.5494+03	-43.6
025200	075	285	-27.3	.3864+03	.5476+03	-43.8
025300	075	284	-27.6	.3848+03	.5458+03	-43.9
025400	078	284	-27.8	.3832+03	.5440+03	-44.0
025500	075	284	-28.0	.3816+03	.5421+03	-44.1
025600	076	284	-28.2	.3800+03	.5403+03	-44.3
025700	077	284	-28.4	.3783+03	.5386+03	-44.4
025800	074	285	-28.7	.3768+03	.5368+03	-44.5
025900	074	292	-28.9	.3752+03	.5350+03	-44.7
026000	080	282	-29.1	.3736+03	.5332+03	-44.8
026100	080	284	-29.3	.3720+03	.5315+03	-45.0
026200	083	280	-29.6	.3704+03	.5298+03	-45.2
026300	082	280	-29.8	.3688+03	.5281+03	-45.4
026400	082	287	-30.1	.3673+03	.5263+03	-45.6
026500	087	279	-30.3	.3657+03	.5246+03	-45.8
026600	086	279	-30.6	.3641+03	.5230+03	-46.1
026700	086	280	-30.8	.3626+03	.5213+03	-46.3
026800	087	278	-31.1	.3610+03	.5196+03	-46.5
026900	085	279	-31.3	.3595+03	.5179+03	-46.7
027000	087	278	-31.6	.3580+03	.5162+03	-46.9
027100	086	279	-31.8	.3564+03	.5145+03	-47.1
027200	085	279	-32.1	.3549+03	.5128+03	-47.3
027300	087	278	-32.3	.3534+03	.5111+03	-47.5
027400	088	276	-32.6	.3519+03	.5094+03	-47.7
027500	087	278	-32.8	.3503+03	.5078+03	-47.9
027600	085	278	-33.0	.3488+03	.5061+03	-48.1
027700	083	278	-33.3	.3473+03	.5044+03	-48.3
027800	084	278	-33.5	.3458+03	.5027+03	-48.5
027900	084	276	-33.8	.3444+03	.5011+03	-48.7
028000	084	278	-34.0	.3429+03	.4994+03	-48.9
028100	084	279	-34.2	.3414+03	.4976+03	-49.1
028200	084	278	-34.4	.3399+03	.4958+03	-49.3
028300	084	280	-34.5	.3384+03	.4941+03	-49.4
028400	086	281	-34.7	.3370+03	.4923+03	-49.6
028500	087	281	-34.9	.3355+03	.4905+03	-49.8
028600	089	283	-35.1	.3340+03	.4888+03	-50.0
028700	094	286	-35.3	.3326+03	.4870+03	-50.2
028800	095	288	-35.4	.3311+03	.4853+03	-50.3
028900	096	285	-35.6	.3297+03	.4835+03	-50.5
029000	099	288	-35.8	.3283+03	.4818+03	-50.7
029100	099	286	-36.0	.3268+03	.4802+03	-50.8
029200	100	287	-36.3	.3254+03	.4786+03	-50.8
029300	102	288	-36.5	.3240+03	.4770+03	-50.9
029400	101	288	-36.8	.3226+03	.4754+03	-50.9
029500	104	289	-37.0	.3212+03	.4738+03	-51.0
029600	101	288	-37.3	.3198+03	.4723+03	-51.1
029700	104	289	-37.5	.3184+03	.4707+03	-51.1
029800	104	288	-37.8	.3170+03	.4691+03	-51.2
029900	103	290	-38.0	.3156+03	.4676+03	-51.2

TABLE 4. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
030100	104	290	-38.3	.3142+03	.4660+03	-51.3
030100	103	289	-38.6	.3128+03	.4645+03	-51.1
030200	106	291	-38.8	.3114+03	.4629+03	-50.9
030300	107	291	-39.1	.3100+03	.4614+03	-50.6
030400	108	289	-39.3	.3087+03	.4599+03	-50.4
030500	109	289	-39.6	.3073+03	.4583+03	-50.2
030600	107	289	-39.9	.3059+03	.4568+03	-50.0
030700	107	290	-40.1	.3046+03	.4553+03	-49.8
030800	109	288	-40.4	.3032+03	.4538+03	-49.5
030900	107	290	-40.6	.3019+03	.4523+03	-49.3
031000	110	288	-40.9	.3006+03	.4508+03	-49.1
031100	112	287	-41.2	.2992+03	.4493+03	-49.2
031200	110	287	-41.5	.2979+03	.4479+03	-49.2
031300	111	289	-41.8	.2965+03	.4464+03	-49.3
031400	111	286	-42.1	.2952+03	.4450+03	-49.4
031500	112	287	-42.3	.2939+03	.4435+03	-49.4
031600	111	287	-42.6	.2926+03	.4421+03	-49.5
031700	111	286	-42.9	.2912+03	.4407+03	-49.6
031800	116	286	-43.2	.2899+03	.4393+03	-49.7
031900	115	286	-43.5	.2886+03	.4378+03	-49.7
032000	114	285	-43.8	.2873+03	.4364+03	-49.8
032100	116	283	-44.1	.2860+03	.4350+03	-50.1
032200	117	285	-44.3	.2848+03	.4335+03	-50.4
032300	115	284	-44.6	.2835+03	.4321+03	-50.6
032400	115	284	-44.9	.2822+03	.4306+03	-50.9
032500	115	284	-45.1	.2809+03	.4292+03	-51.2
032600	117	284	-45.4	.2796+03	.4277+03	-51.5
032700	118	283	-45.7	.2784+03	.4263+03	-51.8
032800	120	285	-46.0	.2771+03	.4249+03	-52.0
032900	119	285	-46.2	.2758+03	.4234+03	-52.3
033000	124	282	-46.5	.2746+03	.4220+03	-52.6
033100	127	282	-46.7	.2733+03	.4205+03	-52.8
033200	127	283	-46.9	.2721+03	.4190+03	-53.0
033300	123	282	-47.2	.2708+03	.4175+03	-53.2
033400	124	282	-47.4	.2696+03	.4160+03	-53.4
033500	121	283	-47.6	.2684+03	.4145+03	-53.6
033600	122	283	-47.8	.2671+03	.4130+03	-53.9
033700	123	283	-48.0	.2659+03	.4115+03	-54.1
033800	123	286	-48.3	.2647+03	.4100+03	-54.3
033900	121	284	-48.5	.2635+03	.4085+03	-54.5
034000	123	286	-48.7	.2623+03	.4070+03	-54.7
034100	120	287	-48.9	.2610+03	.4055+03	-54.9
034200	121	287	-49.1	.2598+03	.4040+03	-55.1
034300	125	284	-49.3	.2586+03	.4025+03	-55.3
034400	122	285	-49.5	.2574+03	.4011+03	-55.5
034500	122	284	-49.7	.2563+03	.3996+03	-55.7
034600	124	283	-50.0	.2551+03	.3981+03	-56.0
034700	124	283	-50.2	.2539+03	.3966+03	-56.2
034800	122	284	-50.4	.2527+03	.3952+03	-56.4
034900	120	283	-50.6	.2515+03	.3937+03	-56.6

TABLE 4. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
035200	124	282	-50.8	.2509+03	.3923+03	-56.8
035100	121	284	-51.0	.2492+03	.3908+03	-57.0
035200	123	283	-51.3	.2480+03	.3894+03	-57.2
035300	122	282	-51.5	.2469+03	.3880+03	-57.4
035400	125	286	-51.7	.2457+03	.3866+03	-57.6
035500	123	284	-51.9	.2446+03	.3852+03	-57.8
035600	124	288	-52.2	.2434+03	.3838+03	-58.0
035700	123	287	-52.4	.2423+03	.3824+03	-58.2
035800	126	282	-52.6	.2412+03	.3810+03	-58.4
035900	126	283	-52.9	.2401+03	.3796+03	-58.6
036000	126	285	-53.1	.2389+03	.3782+03	-58.8
036100	127	283	-53.3	.2378+03	.3768+03	-59.0
036200	127	285	-53.5	.2367+03	.3753+03	-59.2
036300	125	284	-53.7	.2356+03	.3739+03	-59.4
036400	124	284	-53.9	.2345+03	.3724+03	-59.6
036500	127	287	-54.0	.2333+03	.3710+03	-59.8
036600	125	287	-54.2	.2322+03	.3696+03	-60.0
036700	126	287	-54.4	.2312+03	.3682+03	-60.2
036800	125	287	-54.6	.2301+03	.3667+03	-60.4
036900	127	287	-54.9	.2290+03	.3653+03	-60.6
037000	129	288	-55.0	.2279+03	.3639+03	-60.8
037100	128	286	-55.2	.2268+03	.3625+03	-61.0
037200	132	288	-55.4	.2257+03	.3611+03	-61.1
037300	136	287	-55.6	.2247+03	.3597+03	-61.3
037400	138	287	-55.8	.2236+03	.3583+03	-61.5
037500	141	289	-55.9	.2225+03	.3569+03	-61.6
037600	138	287	-56.1	.2215+03	.3555+03	-61.8
037700	140	287	-56.3	.2204+03	.3541+03	-62.0
037800	139	285	-56.5	.2194+03	.3528+03	-62.2
037900	140	286	-56.7	.2183+03	.3514+03	-62.3
038000	141	288	-56.9	.2173+03	.3500+03	-62.5
038100	141	287	-57.1	.2162+03	.3487+03	-9999.
038200	143	288	-57.3	.2152+03	.3473+03	-9999.
038300	139	288	-57.4	.2142+03	.3459+03	-9999.
038400	139	288	-57.6	.2132+03	.3445+03	-9999.
038500	137	287	-57.8	.2121+03	.3432+03	-9999.
038600	137	288	-58.0	.2111+03	.3418+03	-9999.
038700	135	288	-58.2	.2101+03	.3405+03	-9999.
038800	133	287	-58.3	.2091+03	.3391+03	-9999.
038900	134	288	-58.5	.2081+03	.3378+03	-9999.
039000	131	289	-58.7	.2071+03	.3364+03	-9999.
039100	126	286	-59.0	.2061+03	.3352+03	-9999.
039200	126	286	-59.2	.2051+03	.3340+03	-9999.
039300	120	290	-59.5	.2041+03	.3328+03	-9999.
039400	116	289	-59.8	.2031+03	.3316+03	-9999.
039500	118	288	-60.0	.2021+03	.3304+03	-9999.
039600	117	288	-60.3	.2012+03	.3293+03	-9999.
039700	115	288	-60.6	.2002+03	.3281+03	-9999.
039800	114	287	-60.9	.1992+03	.3269+03	-9999.
039900	112	287	-61.1	.1982+03	.3257+03	-9999.

TABLE 4. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
040000	111	287	-61.4	.1973+03	.3246+03	-9999.
040100	110	286	-61.4	.1963+03	.3230+03	-9999.
040200	110	286	-61.5	.1954+03	.3215+03	-9999.
040300	107	286	-61.5	.1944+03	.3200+03	-9999.
040400	107	285	-61.5	.1935+03	.3184+03	-9999.
040500	106	282	-61.5	.1925+03	.3169+03	-9999.
040600	104	283	-61.6	.1916+03	.3154+03	-9999.
040700	103	280	-61.6	.1906+03	.3139+03	-9999.
040800	102	278	-61.6	.1897+03	.3124+03	-9999.
040900	099	274	-61.7	.1888+03	.3110+03	-9999.
041000	094	273	-61.7	.1878+03	.3095+03	-9999.
041100	094	270	-61.6	.1869+03	.3078+03	-9999.
041200	095	271	-61.5	.1860+03	.3061+03	-9999.
041300	096	271	-61.3	.1851+03	.3045+03	-9999.
041400	097	270	-61.2	.1842+03	.3028+03	-9999.
041500	096	275	-61.1	.1833+03	.3012+03	-9999.
041600	096	273	-61.0	.1824+03	.2995+03	-9999.
041700	097	274	-60.9	.1815+03	.2979+03	-9999.
041800	098	275	-60.7	.1807+03	.2963+03	-9999.
041900	101	270	-60.6	.1798+03	.2947+03	-9999.
042000	101	270	-60.5	.1789+03	.2931+03	-9999.
042100	102	267	-60.4	.1780+03	.2915+03	-9999.
042200	100	269	-60.3	.1772+03	.2900+03	-9999.
042300	101	273	-60.3	.1763+03	.2885+03	-9999.
042400	100	271	-60.2	.1755+03	.2870+03	-9999.
042500	099	272	-60.1	.1746+03	.2855+03	-9999.
042600	099	274	-60.0	.1738+03	.2840+03	-9999.
042700	099	274	-59.9	.1729+03	.2825+03	-9999.
042800	099	275	-59.9	.1721+03	.2811+03	-9999.
042900	097	274	-59.8	.1712+03	.2796+03	-9999.
043000	101	273	-59.7	.1704+03	.2781+03	-9999.
043100	101	273	-59.7	.1696+03	.2767+03	-9999.
043200	102	275	-59.6	.1688+03	.2754+03	-9999.
043300	105	270	-59.6	.1680+03	.2740+03	-9999.
043400	105	268	-59.5	.1671+03	.2726+03	-9999.
043500	109	269	-59.5	.1663+03	.2712+03	-9999.
043600	109	270	-59.5	.1655+03	.2699+03	-9999.
043700	113	267	-59.4	.1647+03	.2685+03	-9999.
043800	113	268	-59.4	.1639+03	.2672+03	-9999.
043900	113	271	-59.3	.1631+03	.2658+03	-9999.
044000	113	274	-59.3	.1624+03	.2645+03	-9999.
044100	111	275	-59.4	.1616+03	.2633+03	-9999.
044200	109	277	-59.4	.1608+03	.2621+03	-9999.
044300	109	277	-59.5	.1600+03	.2609+03	-9999.
044400	107	276	-59.6	.1592+03	.2598+03	-9999.
044500	105	278	-59.6	.1585+03	.2586+03	-9999.
044600	105	278	-59.7	.1577+03	.2574+03	-9999.
044700	101	278	-59.8	.1569+03	.2563+03	-9999.
044800	099	277	-59.9	.1562+03	.2551+03	-9999.
044900	092	277	-59.9	.1554+03	.2540+03	-9999.

TABLE 4. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
045100	090	275	-60.0	.1547+03	.2528+03	-9999.
045100	089	274	-60.0	.1539+03	.2516+03	-9999.
045200	088	275	-60.1	.1532+03	.2505+03	-9999.
045300	088	273	-60.1	.1524+03	.2493+03	-9999.
045400	085	274	-60.2	.1517+03	.2481+03	-9999.
045500	081	275	-60.2	.1510+03	.2470+03	-9999.
045600	079	273	-60.2	.1502+03	.2458+03	-9999.
045700	080	270	-60.3	.1495+03	.2447+03	-9999.
045800	085	269	-60.3	.1488+03	.2435+03	-9999.
045900	082	269	-60.4	.1481+03	.2424+03	-9999.
046000	083	269	-60.4	.1473+03	.2413+03	-9999.
046100	084	270	-60.5	.1466+03	.2402+03	-9999.
046200	082	272	-60.6	.1459+03	.2391+03	-9999.
046300	081	271	-60.6	.1452+03	.2380+03	-9999.
046400	081	272	-60.7	.1445+03	.2370+03	-9999.
046500	081	271	-60.8	.1438+03	.2359+03	-9999.
046600	079	271	-60.9	.1431+03	.2348+03	-9999.
046700	077	270	-61.0	.1424+03	.2338+03	-9999.
046800	076	268	-61.0	.1417+03	.2327+03	-9999.
046900	074	268	-61.1	.1410+03	.2317+03	-9999.
047000	073	268	-61.2	.1403+03	.2307+03	-9999.
047100	075	267	-61.4	.1397+03	.2297+03	-9999.
047200	077	267	-61.5	.1390+03	.2288+03	-9999.
047300	077	264	-61.7	.1383+03	.2278+03	-9999.
047400	077	263	-61.8	.1376+03	.2269+03	-9999.
047500	077	263	-62.0	.1369+03	.2259+03	-9999.
047600	078	262	-62.2	.1363+03	.2250+03	-9999.
047700	079	263	-62.3	.1356+03	.2241+03	-9999.
047800	080	262	-62.5	.1349+03	.2231+03	-9999.
047900	082	261	-62.6	.1343+03	.2222+03	-9999.
048000	081	262	-62.8	.1336+03	.2213+03	-9999.
048100	082	262	-62.9	.1330+03	.2204+03	-9999.
048200	084	259	-63.1	.1323+03	.2194+03	-9999.
048300	084	260	-63.2	.1317+03	.2185+03	-9999.
048400	082	262	-63.4	.131 +03	.2176+03	-9999.
048500	083	262	-63.5	.13 +03	.2166+03	-9999.
048600	082	265	-63.6	.1297+03	.2157+03	-9999.
048700	082	261	-63.8	.1291+03	.2148+03	-9999.
048800	081	264	-63.9	.1285+03	.2139+03	-9999.
048900	078	264	-64.1	.1278+03	.2130+03	-9999.
049000	080	264	-64.2	.1272+03	.2121+03	-9999.
049100	080	264	-64.3	.1266+03	.2111+03	-9999.
049200	079	264	-64.5	.1259+03	.2102+03	-9999.
049300	078	267	-64.6	.1253+03	.2093+03	-9999.
049400	078	268	-64.7	.1247+03	.2084+03	-9999.
049500	078	270	-64.8	.1241+03	.2075+03	-9999.
049600	077	272	-65.0	.1235+03	.2066+03	-9999.
049700	075	275	-65.1	.1228+03	.2057+03	-9999.
049800	073	273	-65.2	.1222+03	.2048+03	-9999.
049900	073	272	-65.4	.1216+03	.2039+03	-9999.

TABLE 4. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
050100	072	270	-65.5	.1210+03	.2030+03	-9999.
050200	071	268	-65.6	.1204+03	.2022+03	-9999.
050230	070	268	-65.7	.1198+03	.2013+03	-9999.
050300	071	267	-65.9	.1192+03	.2004+03	-9999.
050400	070	266	-66.0	.1186+03	.1995+03	-9999.
050500	071	265	-66.1	.1180+03	.1986+03	-9999.
050600	072	265	-66.2	.1175+03	.1977+03	-9999.
050700	072	264	-66.3	.1169+03	.1969+03	-9999.
050800	073	264	-66.5	.1163+03	.1960+03	-9999.
050900	076	263	-66.6	.1157+03	.1951+03	-9999.
051000	078	263	-66.7	.1151+03	.1943+03	-9999.
051100	081	264	-66.8	.1146+03	.1934+03	-9999.
051200	081	264	-66.9	.1140+03	.1926+03	-9999.
051300	081	264	-67.1	.1134+03	.1917+03	-9999.
051400	084	262	-67.2	.1128+03	.1909+03	-9999.
051500	085	264	-67.3	.1123+03	.1900+03	-9999.
051600	086	264	-67.4	.1117+03	.1892+03	-9999.
051700	086	264	-67.5	.1112+03	.1883+03	-9999.
051800	088	262	-67.7	.1106+03	.1875+03	-9999.
051900	089	263	-67.8	.1101+03	.1867+03	-9999.
052000	087	265	-67.9	.1095+03	.1859+03	-9999.
052100	085	264	-68.0	.1089+03	.1850+03	-9999.
052200	084	265	-68.1	.1084+03	.1842+03	-9999.
052300	083	266	-68.3	.1079+03	.1834+03	-9999.
052400	083	265	-68.4	.1073+03	.1826+03	-9999.
052500	083	265	-68.5	.1068+03	.1817+03	-9999.
052600	085	265	-68.6	.1062+03	.1809+03	-9999.
052700	085	265	-68.7	.1057+03	.1801+03	-9999.
052800	086	264	-68.9	.1052+03	.1793+03	-9999.
052900	086	264	-69.0	.1046+03	.1785+03	-9999.
053000	085	266	-69.1	.1041+03	.1777+03	-9999.
053100	084	267	-69.2	.1036+03	.1769+03	-9999.
053200	085	266	-69.3	.1030+03	.1761+03	-9999.
053300	085	265	-69.3	.1025+03	.1752+03	-9999.
053400	086	262	-69.4	.1020+03	.1744+03	-9999.
053500	085	260	-69.5	.1015+03	.1736+03	-9999.
053600	085	260	-69.6	.1010+03	.1728+03	-9999.
053700	086	261	-69.7	.1005+03	.1720+03	-9999.
053800	084	263	-69.7	.9996+02	.1712+03	-9999.
053900	084	264	-69.8	.9945+02	.1704+03	-9999.
054000	085	266	-69.9	.9895+02	.1696+03	-9999.
054100	088	267	-69.9	.9845+02	.1687+03	-9999.
054200	090	268	-69.9	.9795+02	.1679+03	-9999.
054300	090	271	-69.8	.9745+02	.1670+03	-9999.
054400	091	269	-69.8	.9696+02	.1661+03	-9999.
054500	088	268	-69.8	.9647+02	.1653+03	-9999.
054600	084	269	-69.8	.9598+02	.1644+03	-9999.
054700	083	267	-69.8	.9549+02	.1636+03	-9999.
054800	082	268	-69.7	.9501+02	.1627+03	-9999.
054900	081	272	-69.7	.9453+02	.1619+03	-9999.

TABLE 4. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
055000	079	273	-69.7	.9405+02	.1610+03	-9999.
055100	076	274	-69.7	.9357+02	.1602+03	-9999.
055200	074	274	-69.6	.9310+02	.1594+03	-9999.
055300	071	271	-69.6	.9263+02	.1585+03	-9999.
055400	071	269	-69.5	.9216+02	.1577+03	-9999.
055500	072	267	-69.5	.9169+02	.1568+03	-9999.
055600	073	265	-69.5	.9123+02	.1560+03	-9999.
055700	074	263	-69.4	.9076+02	.1552+03	-9999.
055800	075	263	-69.4	.9030+02	.1544+03	-9999.
055900	078	261	-69.3	.8985+02	.1536+03	-9999.
056000	079	262	-69.3	.8939+02	.1528+03	-9999.
056100	079	265	-69.3	.8894+02	.1520+03	-9999.
056200	081	264	-69.3	.8849+02	.1512+03	-9999.
056300	083	265	-69.3	.8804+02	.1505+03	-9999.
056400	081	267	-69.3	.8760+02	.1497+03	-9999.
056500	076	268	-69.3	.8715+02	.1490+03	-9999.
056600	072	269	-69.4	.8671+02	.1482+03	-9999.
056700	067	270	-69.4	.8627+02	.1475+03	-9999.
056800	065	271	-69.4	.8584+02	.1467+03	-9999.
056900	062	273	-69.4	.8540+02	.1460+03	-9999.
057000	058	271	-69.4	.8497+02	.1453+03	-9999.
058000	055	274	-68.3	.8078+02	.1374+03	-9999.
059000	046	272	-66.9	.7682+02	.1298+03	-9999.
060000	034	268	-64.0	.7309+02	.1217+03	-9999.
061000	023	264	-61.7	.6958+02	.1146+03	-9999.
062000	019	252	-62.7	.6626+02	.1097+03	-9999.
063000	017	234	-62.8	.6308+02	.1045+03	-9999.
064000	016	218	-61.9	.6007+02	.9906+02	-9999.
065000	015	220	-62.4	.5720+02	.9455+02	-9999.
066000	013	235	-62.0	.5446+02	.8985+02	-9999.
067000	010	261	-61.3	.5187+02	.8530+02	-9999.
068000	007	310	-60.5	.4941+02	.8093+02	-9999.
069000	010	037	-59.1	.4707+02	.7661+02	-9999.
070000	017	059	-58.6	.4486+02	.7284+02	-9999.
071000	018	066	-59.1	.4275+02	.6958+02	-9999.
072000	015	075	-58.4	.4074+02	.6609+02	-9999.
073000	014	080	-58.8	.3883+02	.6311+02	-9999.
074000	012	075	-58.6	.3700+02	.6008+02	-9999.
075000	011	062	-57.2	.3527+02	.5690+02	-9999.
076000	010	053	-55.9	.3363+02	.5393+02	-9999.
077000	008	051	-55.4	.3207+02	.5131+02	-9999.
078000	004	050	-54.7	.3059+02	.4878+02	-9999.
079000	002	323	-53.6	.2918+02	.4630+02	-9999.
080000	005	336	-53.1	.2785+02	.4409+02	-9999.
081000	006	317	-53.0	.2657+02	.4204+02	-9999.
082000	005	321	-53.0	.2536+02	.4013+02	-9999.
083000	006	334	-53.7	.2419+02	.3840+02	-9999.
084000	006	332	-54.0	.2308+02	.3669+02	-9999.
085000	007	322	-54.3	.2202+02	.3505+02	-9999.
086000	009	306	-55.0	.2101+02	.3351+02	-9999.

TABLE 4. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
097000	012	294	-55.1	.2004+02	.3202+02	-9999.
098000	015	286	-54.6	.1911+02	.3046+02	-9999.
099000	018	282	-53.5	.1824+02	.2893+02	-9999.
100000	021	278	-52.2	.1740+02	.2743+02	-9999.
101000	023	274	-50.9	.1661+02	.2604+02	-9999.
102000	025	273	-49.9	.1586+02	.2475+02	-9999.
103000	026	268	-49.4	.1515+02	.2359+02	-9999.
104000	025	261	-49.1	.1447+02	.2250+02	-9999.
105000	024	251	-48.7	.1382+02	.2145+02	-9999.
106000	029	238	-47.3	.1323+02	.2041+02	-9999.
107000	037	233	-46.0	.1267+02	.1943+02	-9999.
108000	050	227	-45.0	.1213+02	.1852+02	-9999.
109000	065	226	-44.6	.1161+02	.1770+02	-9999.
110000	067	231	-44.2	.1112+02	.1692+02	-9999.
111000	065	238	-43.8	.1064+02	.1617+02	-9999.
112000	060	246	-44.4	.1019+02	.1552+02	-9999.
113000	060	255	-45.5	.9740+01	.1491+02	-9999.
114000	067	261	-45.8	.9309+01	.1425+02	-9999.
115000	070	265	-44.9	.8899+01	.1358+02	-9999.
116000	072	270	-43.7	.8508+01	.1291+02	-9999.
117000	072	277	-43.7	.8136+01	.1224+02	-9999.
118000	072	285	-39.5	.7784+01	.1160+02	-9999.
119000	070	293	-37.6	.7451+01	.1102+02	-9999.
120000	065	301	-36.0	.7133+01	.1048+02	-9999.
121000	059	304	-34.6	.6831+01	.9977+01	-9999.
122000	052	302	-34.3	.6543+01	.9542+01	-9999.
123000	045	298	-34.8	.6267+01	.9162+01	-9999.
124000	042	283	-35.5	.6002+01	.8800+01	-9999.
125000	040	274	-36.2	.5748+01	.8452+01	-9999.
126000	042	268	-36.8	.5504+01	.8113+01	-9999.
127000	038	268	-36.9	.5269+01	.7771+01	-9999.
128000	033	271	-36.9	.5045+01	.7438+01	-9999.
129000	028	263	-36.9	.4830+01	.7121+01	-9999.
130000	027	246	-35.7	.4625+01	.6785+01	-9999.
131000	035	233	-31.9	.4431+01	.6399+01	-9999.
132000	043	233	-28.1	.4248+01	.6040+01	-9999.
133000	048	233	-25.5	.4074+01	.5732+01	-9999.
134000	050	232	-23.8	.3909+01	.5461+01	-9999.
135000	052	232	-22.5	.3752+01	.5214+01	-9999.
136000	055	241	-22.4	.3602+01	.5003+01	-9999.
137000	064	257	-21.3	.3457+01	.4783+01	-9999.
138000	076	257	-19.0	.3320+01	.4551+01	-9999.
139000	084	260	-16.8	.3189+01	.4334+01	-9999.
140000	087	260	-14.6	.3064+01	.4129+01	-9999.
141000	089	257	-12.6	.2945+01	.3938+01	-9999.
142000	089	252	-10.6	.2832+01	.3758+01	-9999.
143000	092	248	-9.7	.2724+01	.3589+01	-9999.
144000	097	246	-7.7	.2620+01	.3439+01	-9999.
145000	101	248	-7.8	.2521+01	.3309+01	-9999.
146000	106	252	-8.1	.2[illegible]	.[illegible]+01	-9999.

TABLE 4. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
137000	109	253	-8.6	.2333+01	.3072+01	-9999.
138000	111	256	-9.0	.2245+01	.2960+01	-9999.
139000	114	259	-9.5	.2159+01	.2852+01	-9999.
140000	119	261	-8.8	.2077+01	.2737+01	-9999.
141000	124	261	-5.7	.1998+01	.2603+01	-9999.
142000	126	258	-.4	.1924+01	.2457+01	-9999.
143000	131	258	3.2	.1853+01	.2336+01	-9999.
144000	135	258	5.7	.1786+01	.2231+01	-9999.
145000	136	260	7.4	.1722+01	.2138+01	-9999.
146000	138	260	8.6	.1660+01	.2053+01	-9999.
147000	138	259	8.6	.1601+01	.1979+01	-9999.
148000	136	257	8.0	.1544+01	.1913+01	-9999.
149000	136	255	6.8	.1488+01	.1852+01	-9999.
150000	136	251	5.7	.1435+01	.1792+01	-9999.
151000	136	247	4.5	.1383+01	.1735+01	-9999.
152000	141	239	3.3	.1333+01	.1679+01	-9999.
153000	148	232	2.2	.1284+01	.1625+01	-9999.
154000	155	227	1.0	.1237+01	.1572+01	-9999.
155000	160	226	-.1	.1192+01	.1520+01	-9999.
156000	162	227	-1.2	.1148+01	.1470+01	-9999.
157000	162	229	-2.3	.1105+01	.1421+01	-9999.
158000	160	232	-3.3	.1064+01	.1374+01	-9999.
159000	158	236	-4.4	.1025+01	.1328+01	-9999.
160000	155	240	-5.5	.9862+00	.1283+01	-9999.
161000	153	244	-6.5	.9491+00	.1240+01	-9999.
162000	150	250	-7.5	.9133+00	.1198+01	-9999.
163000	145	255	-8.6	.8788+00	.1157+01	-9999.
164000	150	250	-8.3	.8454+00	.1112+01	-9999.
165000	158	250	-6.4	.8135+00	.1062+01	-9999.
166000	167	253	-6.5	.7829+00	.1023+01	-9999.
167000	170	259	-7.0	.7534+00	.9862+00	-9999.
168000	168	266	-7.6	.7250+00	.9513+00	-9999.
169000	170	274	-8.1	.6976+00	.9168+00	-9999.
170000	173	274	-8.7	.6712+00	.8841+00	-9999.
171000	177	266	-9.3	.6457+00	.8524+00	-9999.
172000	187	261	-9.1	.6212+00	.8166+00	-9999.
173000	200	258	-6.2	.5978+00	.7802+00	-9999.
174000	209	255	-4.4	.5754+00	.7459+00	-9999.
175000	211	252	-2.7	.5540+00	.7135+00	-9999.
176000	207	254	-1.7	.5335+00	.6847+00	-9999.
177000	200	256	-1.4	.5138+00	.6585+00	-9999.
178000	190	260	-1.2	.4948+00	.6339+00	-9999.
179000	180	263	-.9	.4766+00	.6099+00	-9999.
180000	172	265	-.5	.4591+00	.5866+00	-9999.
181000	167	267	-1.5	.4422+00	.5670+00	-9999.
182000	163	270	-3.1	.4258+00	.5493+00	-9999.
183000	162	272	-4.8	.4099+00	.5321+00	-9999.
184000	163	272	-6.5	.3946+00	.5156+00	-9999.
185000	163	268	-8.2	.3797+00	.4993+00	-9999.
186000	163	263	-9.8	.3653+00	.4832+00	-9999.

TABLE 4. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
187000	158	257	-11.5	.3514+00	.4678+00	-9999.
188000	155	252	-13.1	.3379+00	.4527+00	-9999.
189000	157	249	-14.7	.3249+00	.4380+00	-9999.
190000	158	248	-16.3	.3122+00	.4234+00	-9999.
191000	160	248	-18.0	.3000+00	.4095+00	-9999.
192000	163	251	-19.4	.2882+00	.3957+00	-9999.
193000	167	253	-21.1	.2768+00	.3825+00	-9999.
194000	168	253	-22.7	.2658+00	.3697+00	-9999.
195000	172	252	-24.4	.2552+00	.3574+00	-9999.
196000	172	250	-26.1	.2449+00	.3453+00	-9999.
197000	172	246	-26.8	.2350+00	.3324+00	-9999.
198000	179	241	-26.6	.2254+00	.3143+00	-9999.
199000	190	237	-26.2	.2105+00	.2969+00	-9999.
200000	206	236	-26.1	.1992+00	.2809+00	-9999.
201000	229	234	-26.8	.1886+00	.2667+00	-9999.
202000	260	234	-31.3	.1785+00	.2571+00	-9999.
203000	263	236	-30.8	.1689+00	.2428+00	-9999.
204000	266	239	-31.1	.1599+00	.2301+00	-9999.
205000	268	243	-31.2	.1513+00	.2179+00	-9999.
206000	270	246	-34.1	.1432+00	.2086+00	-9999.
207000	271	250	-36.9	.1372+00	.2023+00	-9999.
208000	273	254	-39.1	.1314+00	.1956+00	-9999.
209000	275	257	-40.7	.1258+00	.1885+00	-9999.
210000	276	260	-41.2	.1204+00	.1808+00	-9999.
211000	276	263	-41.4	.1152+00	.1732+00	-9999.
212000	276	266	-42.2	.1103+00	.1664+00	-9999.
213000	275	268	-43.8	.1055+00	.1602+00	-9999.
214000	273	270	-45.3	.1009+00	.1543+00	-9999.
215000	271	272	-46.5	.9650-01	.1483+00	-9999.
216000	268	272	-48.3	.9220-01	.1429+00	-9999.
217000	263	272	-49.2	.8810-01	.1370+00	-9999.
218000	260	272	-50.2	.8420-01	.1315+00	-9999.
219000	256	271	-51.9	.8040-01	.1266+00	-9999.
220000	255	271	-54.7	.7680-01	.1225+00	-9999.
221000	255	270	-58.5	.7330-01	.1189+00	-9999.
222000	255	269	-62.1	.7000-01	.1156+00	-9999.
223000	256	269	-65.9	.6650-01	.1118+00	-9999.
224000	260	269	-69.9	.6310-01	.1082+00	-9999.
225000	261	269	-73.0	.5980-01	.1041+00	-9999.
226000	265	270	-74.6	.5680-01	.9964-01	-9999.
227000	268	271	-74.2	.5410-01	.9473-01	-9999.
228000	270	272	-72.7	.5160-01	.8967-01	-9999.
229000	271	272	-72.2	.4910-01	.8510-01	-9999.
230000	275	273	-70.1	.4670-01	.8013-01	-9999.
231000	275	274	-68.1	.4440-01	.7542-01	-9999.
232000	276	275	-65.6	.4230-01	.7099-01	-9999.
233000	278	275	-63.0	.4030-01	.6680-01	-9999.
234000	280	276	-60.2	.3840-01	.6282-01	-9999.
235000	280	276	-59.2	.3670-01	.5974-01	-9999.
236000	280	276	-58.2	.3500-01	.5671-01	-9999.

TABLE 4. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
237000	280	276	-57.2	.3340-01	.5387-01	-9999.
238000	278	276	-57.2	.3190-01	.5145-01	-9999.
239000	276	275	-57.2	.3040-01	.4903-01	-9999.
240000	275	275	-57.9	.2900-01	.4694-01	-9999.
241000	271	274	-58.4	.2770-01	.4494-01	-9999.
242000	270	273	-60.0	.2640-01	.4314-01	-9999.
243000	266	271	-60.5	.2510-01	.4112-01	-9999.
244000	263	270	-61.2	.2400-01	.3944-01	-9999.
245000	260	268	-62.5	.2280-01	.3771-01	-9999.
246000	256	267	-63.2	.2180-01	.3616-01	-9999.
247000	251	265	-64.2	.2070-01	.3450-01	-9999.
248000	248	263	-65.1	.1980-01	.3315-01	-9999.
249000	244	261	-65.6	.1880-01	.3156-01	-9999.
250000	241	258	-66.2	.1790-01	.3012-01	-9999.
251000	236	256	-67.2	.1710-01	.2892-01	-9999.
252000	233	254	-67.2	.1620-01	.2740-01	-9999.
253000	229	251	-68.2	.1550-01	.2634-01	-9999.
254000	228	249	-68.1	.1470-01	.2497-01	-9999.
255000	224	247	-67.2	.1400-01	.2368-01	-9999.
256000	221	244	-67.2	.1330-01	.2249-01	-9999.
257000	219	242	-67.2	.1270-01	.2148-01	-9999.
258000	216	240	-67.2	.1210-01	.2046-01	-9999.
259000	214	238	-67.9	.1150-01	.1952-01	-9999.
260000	212	236	-68.4	.1090-01	.1854-01	-9999.
261000	211	235	-69.9	.1040-01	.1783-01	-9999.
262000	209	233	-70.4	.9900-02	.1701-01	-9999.
263000	206	232	-71.7	.9400-02	.1625-01	-9999.
264000	204	231	-72.5	.8900-02	.1545-01	-9999.
265000	200	230	-73.2	.8500-02	.1481-01	-9999.
266000	197	229	-73.5	.8136-02	.1417-01	-9999.
267000	175	228	-73.9	.7788-02	.1357-01	-9999.
268000	162	227	-74.2	.7455-02	.1298-01	-9999.
269000	150	226	-74.6	.7135-02	.1243-01	-9999.
270000	137	225	-74.9	.6830-02	.1190-01	-9999.
271000	125	223	-75.3	.6538-02	.1139-01	-9999.
272000	113	222	-75.6	.6258-02	.1090-01	-9999.
273000	101	219	-76.0	.5990-02	.1043-01	-9999.
274000	089	216	-76.3	.5734-02	.9987-02	-9999.
275000	077	213	-76.7	.5488-02	.9560-02	-9999.
276000	066	208	-77.0	.5253-02	.9150-02	-9999.
277000	055	201	-77.4	.5028-02	.8759-02	-9999.
278000	046	191	-77.7	.4813-02	.8384-02	-9999.
279000	039	177	-78.1	.4607-02	.8025-02	-9999.
280000	035	158	-78.4	.4410-02	.7682-02	-9999.
283000	025	135	-79.4	.3770-02	.6780-02	-9999.
285000	023	099	-80.3	.3220-02	.5820-02	-9999.
289000	030	069	-81.2	.2750-02	.5000-02	-9999.
292000	042	053	-82.1	.2350-02	.4300-02	-9999.
295000	056	049	-83.0	.2010-02	.3690-02	-9999.
298000	046	041	-82.2	.1620-02	.2950-02	-9999.

TABLE 4. (Concluded)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
301100	033	036	-81.1	.1380-02	.2490-02	-9999.
304000	021	022	-79.9	.1180-02	.2110-02	-9999.
307000	012	335	-78.7	.1010-02	.1780-02	-9999.
310000	021	281	-77.5	.8570-03	.1510-02	-9999.
313000	030	269	-76.1	.7350-03	.1280-02	-9999.
316000	028	269	-74.3	.6330-03	.1090-02	-9999.
319000	025	268	-72.4	.5450-03	.9280-03	-9999.
322000	020	267	-70.6	.4700-03	.7890-03	-9999.
325000	013	263	-68.8	.4050-03	.6720-03	-9999.
328000	003	233	-66.9	.3480-03	.5720-03	-9999.
331000	002	234	-64.0	.3010-03	.4860-03	-9999.
334000	003	220	-61.1	.2610-03	.4140-03	-9999.
337000	004	206	-58.1	.2260-03	.3520-03	-9999.
340000	005	194	-55.2	.1950-03	.3000-03	-9999.
343000	007	185	-52.2	.1690-03	.2550-03	-9999.
346000	004	166	-48.2	.1470-03	.2180-03	-9999.
349000	008	146	-43.2	.1290-03	.1860-03	-9999.
352000	012	135	-38.1	.1130-03	.1600-03	-9999.
355000	019	129	-33.1	.9900-04	.1370-03	-9999.
358000	027	126	-28.0	.8680-04	.1170-03	-9999.
361000	033	117	-22.9	.7600-04	.1000-03	-9999.
364000	036	112	-15.7	.6820-04	.8700-04	-9999.
367000	040	116	-8.5	.6110-04	.7570-04	-9999.
370000	045	122	-1.2	.5470-04	.6580-04	-9999.
373000	050	127	6.0	.4900-04	.5720-04	-9999.
376000	057	133	13.3	.4380-04	.4970-04	-9999.
379000	047	118	21.3	.3950-04	.4350-04	-9999.
382000	046	122	30.3	.3600-04	.3830-04	-9999.
385000	046	126	39.7	.3290-04	.3390-04	-9999.
388000	047	130	49.2	.3010-04	.3000-04	-9999.
391000	047	134	59.1	.2770-04	.2670-04	-9999.
394000	049	138	69.1	.2550-04	.2380-04	-9999.
397000	050	142	79.4	.2360-04	.2130-04	-9999.
400000	052	146	89.8	.2190-04	.1910-04	-9999.

TABLE 5. STS-11 FINAL SRB DESCENT METEOROLOGICAL DATA TAPE

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
000028	045	161	21.1	.1017+04	.1197+04	14.4
001000	030	021	18.9	.9843+03	.1166+04	16.2
002000	023	065	15.6	.9499+03	.1138+04	15.3
003000	039	120	13.1	.9164+03	.1110+04	9.3
004000	042	133	12.1	.8838+03	.1075+04	5.8
005000	036	147	11.5	.8523+03	.1039+04	6.3
006000	015	174	8.6	.8217+03	.1011+04	6.9
007000	016	203	5.7	.7920+03	.9851+03	5.7
008000	017	246	4.6	.7631+03	.9537+03	2.4
009000	025	287	2.7	.7351+03	.9254+03	.3
010000	029	292	1.4	.7079+03	.8965+03	-6.4
011000	021	284	-.3	.6816+03	.8688+03	-9.2
012000	014	281	-2.0	.6562+03	.8414+03	-8.1
013000	016	278	-3.6	.6315+03	.8150+03	-12.9
014000	027	280	-5.1	.6076+03	.7887+03	-14.5
015000	038	287	-6.3	.5845+03	.7622+03	-15.8
016000	044	292	-7.0	.5622+03	.7354+03	-21.8
017000	046	293	-8.7	.5407+03	.7119+03	-27.1
018000	051	290	-11.3	.5198+03	.6912+03	-29.2
019000	056	290	-13.2	.4995+03	.6692+03	-30.5
020000	058	288	-15.2	.4799+03	.6479+03	-32.3
021000	059	284	-17.7	.4609+03	.6284+03	-33.9
022000	058	281	-20.3	.4425+03	.6095+03	-36.0
023000	055	277	-21.1	.4247+03	.5869+03	-37.6
024000	052	262	-23.8	.4075+03	.5692+03	-39.6
025000	058	275	-27.3	.3908+03	.5537+03	-41.7
026000	068	279	-29.4	.3746+03	.5353+03	-41.7
027000	076	283	-31.5	.3589+03	.5173+03	-39.3
028000	084	289	-33.2	.3438+03	.4990+03	-39.5
029000	090	292	-35.3	.3292+03	.4821+03	-44.5
030000	097	295	-38.2	.3151+03	.4671+03	-48.6
031000	099	296	-39.3	.3014+03	.4490+03	-49.4
032000	100	295	-41.1	.2883+03	.4329+03	-50.3
033000	104	297	-43.5	.2757+03	.4182+03	-51.9
034000	125	303	-47.1	.2635+03	.4060+03	-54.9
035000	150	307	-47.5	.2516+03	.3885+03	-55.2
036000	166	306	-51.3	.2403+03	.3773+03	-58.5
037000	146	304	-53.4	.2293+03	.3634+03	-60.3
038000	115	298	-55.4	.2187+03	.3497+03	-62.0
039000	103	292	-57.7	.2085+03	.3371+03	-64.1
040000	107	297	-60.3	.1996+03	.3251+03	-9999.
041000	106	297	-62.1	.1891+03	.3122+03	-9999.
042000	099	299	-60.1	.1801+03	.2946+03	-9999.
043000	091	294	-58.1	.1716+03	.2781+03	-9999.
044000	085	286	-57.8	.1636+03	.2646+03	-9999.
045000	080	277	-59.0	.1559+03	.2536+03	-9999.
046000	080	271	-60.2	.1485+03	.2410+03	-9999.
047000	087	269	-60.3	.1415+03	.2315+03	-9999.
048000	096	275	-61.5	.1347+03	.2218+03	-9999.
049000	094	280	-62.4	.1283+03	.2121+03	-9999.

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
050000	087	231	-63.4	.1221+03	.2029+03	-9999.
051000	081	279	-64.2	.1162+03	.1933+03	-9999.
052000	081	271	-65.0	.1106+03	.1852+03	-9999.
053000	095	269	-65.9	.1053+03	.1769+03	-9999.
054000	092	269	-65.9	.1001+03	.1683+03	-9999.
055000	072	266	-65.0	.9527+02	.1594+03	-9999.
056000	066	273	-65.9	.9064+02	.1524+03	-9999.
057000	057	269	-66.9	.8622+02	.1456+03	-9999.
058000	046	269	-66.6	.8201+02	.1383+03	-9999.
059000	039	259	-63.5	.7804+02	.1297+03	-9999.
060000	035	268	-62.2	.7430+02	.1227+03	-9999.
061000	030	275	-61.8	.7075+02	.1166+03	-9999.
062000	024	272	-60.8	.6738+02	.1105+03	-9999.
063000	017	253	-59.6	.6419+02	.1047+03	-9999.
064000	012	237	-60.2	.6115+02	.1000+03	-9999.
065000	008	289	-59.8	.5826+02	.9513+02	-9999.
066000	013	326	-58.0	.5552+02	.8990+02	-9999.
067000	010	335	-57.4	.5292+02	.8545+02	-9999.
068000	006	009	-58.7	.5044+02	.8194+02	-9999.
069000	011	028	-58.1	.4807+02	.7787+02	-9999.
070000	013	045	-56.4	.4583+02	.7366+02	-9999.
071000	011	083	-54.8	.4371+02	.6974+02	-9999.
072000	011	093	-54.8	.4169+02	.6651+02	-9999.
073000	011	068	-54.2	.3977+02	.6328+02	-9999.
074000	012	038	-53.4	.3794+02	.6015+02	-9999.
075000	012	029	-52.9	.3620+02	.5726+02	-9999.
076000	010	049	-52.5	.3455+02	.5455+02	-9999.
077000	010	022	-52.3	.3297+02	.5201+02	-9999.
078000	009	012	-52.3	.3146+02	.4962+02	-9999.
079000	008	355	-52.1	.3003+02	.4733+02	-9999.
080000	012	340	-51.7	.2866+02	.4509+02	-9999.
081000	021	335	-51.7	.2736+02	.4304+02	-9999.
082000	023	330	-52.4	.2611+02	.4120+02	-9999.
083000	017	326	-52.0	.2492+02	.3926+02	-9999.
084000	012	323	-51.3	.2379+02	.3736+02	-9999.
085000	009	344	-50.6	.2271+02	.3555+02	-9999.
086000	009	019	-49.9	.2168+02	.3383+02	-9999.
087000	012	038	-49.3	.2071+02	.3223+02	-9999.
088000	014	029	-48.7	.1978+02	.3070+02	-9999.
089000	020	012	-48.7	.1889+02	.2932+02	-9999.
090000	024	359	-48.0	.1804+02	.2791+02	-9999.
091000	025	341	-47.2	.1724+02	.2658+02	-9999.
092000	024	311	-47.4	.1647+02	.2542+02	-9999.
093000	027	297	-47.0	.1574+02	.2425+02	-9999.
094000	033	289	-46.6	.1503+02	.2311+02	-9999.
095000	047	281	-45.8	.1437+02	.2202+02	-9999.
096000	056	251	-45.9	.1368+02	.2097+02	-9999.
097000	063	245	-45.6	.1303+02	.1995+02	-9999.
098000	067	241	-45.1	.1240+02	.1894+02	-9999.
099000	065	226	-44.6	.1181+02	.1800+02	-9999.

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
100900	067	231	-44.2	.1124+02	.1711+02	-9999.
101900	065	238	-43.8	.1070+02	.1626+02	-9999.
102000	060	246	-44.4	.1019+02	.1552+02	-9999.
103000	060	255	-45.5	.9740+01	.1491+02	-9999.
104000	067	261	-45.6	.9309+01	.1425+02	-9999.
105000	070	265	-44.9	.8899+01	.1358+02	-9999.
106000	072	270	-43.7	.8508+01	.1291+02	-9999.
107000	072	277	-41.7	.8136+01	.1224+02	-9999.
108000	072	285	-39.5	.7784+01	.1160+02	-9999.
109000	070	293	-37.6	.7451+01	.1102+02	-9999.
110000	065	301	-36.0	.7133+01	.1048+02	-9999.
111000	059	306	-34.6	.6831+01	.9977+01	-9999.
112000	052	302	-34.3	.6543+01	.9542+01	-9999.
113000	045	294	-34.8	.6267+01	.9162+01	-9999.
114000	042	283	-35.5	.6002+01	.8800+01	-9999.
115000	040	274	-36.2	.5748+01	.8452+01	-9999.
116000	042	268	-36.8	.5504+01	.8113+01	-9999.
117000	038	268	-36.9	.5269+01	.7771+01	-9999.
118000	033	271	-36.9	.5045+01	.7438+01	-9999.
119000	028	263	-36.9	.4830+01	.7121+01	-9999.
120000	027	246	-35.7	.4625+01	.6785+01	-9999.
121000	035	233	-31.9	.4431+01	.6399+01	-9999.
122000	043	233	-28.1	.4248+01	.6040+01	-9999.
123000	048	233	-25.5	.4074+01	.5732+01	-9999.
124000	050	232	-23.8	.3909+01	.5461+01	-9999.
125000	052	232	-22.5	.3752+01	.5214+01	-9999.
126000	055	241	-22.4	.3602+01	.5003+01	-9999.
127000	064	252	-21.3	.3457+01	.4783+01	-9999.
128000	076	257	-19.0	.3320+01	.4551+01	-9999.
129000	084	260	-16.8	.3189+01	.4334+01	-9999.
130000	087	260	-14.6	.3064+01	.4129+01	-9999.
131000	089	257	-12.6	.2945+01	.3938+01	-9999.
132000	089	252	-10.6	.2832+01	.3758+01	-9999.
133000	092	248	-8.7	.2724+01	.3589+01	-9999.
134000	097	246	-7.1	.2620+01	.3439+01	-9999.
135000	101	248	-7.8	.2521+01	.3309+01	-9999.
136000	106	252	-8.1	.2426+01	.3188+01	-9999.
137000	109	253	-8.6	.2333+01	.3072+01	-9999.
138000	111	256	-9.0	.2245+01	.2960+01	-9999.
139000	114	259	-9.5	.2159+01	.2852+01	-9999.
140000	119	261	-8.8	.2077+01	.2737+01	-9999.
141000	124	261	-5.7	.1998+01	.2603+01	-9999.
142000	128	258	-.4	.1924+01	.2457+01	-9999.
143000	131	258	3.2	.1853+01	.2336+01	-9999.
144000	135	258	5.7	.1786+01	.2231+01	-9999.
145000	136	260	7.4	.1722+01	.2138+01	-9999.
146000	138	260	8.6	.1660+01	.2053+01	-9999.
147000	138	259	8.6	.1601+01	.1979+01	-9999.
148000	136	257	8.0	.1544+01	.1913+01	-9999.
149000	136	255	6.8	.1488+01	.1852+01	-9999.

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
150000	136	251	5.7	.1435+01	.1792+01	-9999.
151000	136	247	4.5	.1383+01	.1735+01	-9999.
152000	141	239	3.3	.1333+01	.1679+01	-9999.
153000	148	232	2.2	.1284+01	.1625+01	-9999.
154000	155	227	1.0	.1237+01	.1572+01	-9999.
155000	160	226	-.1	.1192+01	.1520+01	-9999.
156000	162	227	-1.2	.1148+01	.1470+01	-9999.
157000	162	229	-2.3	.1105+01	.1421+01	-9999.
158000	160	232	-3.3	.1064+01	.1374+01	-9999.
159000	158	236	-4.4	.1025+01	.1328+01	-9999.
160000	155	240	-5.5	.9862+00	.1283+01	-9999.
161000	153	244	-6.5	.9491+00	.1240+01	-9999.
162000	150	250	-7.5	.9133+00	.1198+01	-9999.
163000	145	255	-8.6	.8788+00	.1157+01	-9999.
164000	150	250	-8.3	.8454+00	.1112+01	-9999.
165000	158	250	-6.4	.8135+00	.1062+01	-9999.
166000	167	253	-6.5	.7829+00	.1023+01	-9999.
167000	170	259	-7.0	.7534+00	.9862+00	-9999.
168000	168	266	-7.6	.7250+00	.9513+00	-9999.
169000	170	274	-8.1	.6976+00	.9168+00	-9999.
170000	173	278	-8.7	.6712+00	.8841+00	-9999.
171000	177	266	-9.3	.6457+00	.8524+00	-9999.
172000	187	261	-8.1	.6212+00	.8166+00	-9999.
173000	200	258	-6.2	.5978+00	.7802+00	-9999.
174000	209	255	-4.4	.5754+00	.7459+00	-9999.
175000	211	252	-2.7	.5540+00	.7135+00	-9999.
176000	207	254	-1.7	.5335+00	.6847+00	-9999.
177000	200	256	-1.4	.5138+00	.6585+00	-9999.
178000	196	260	-1.2	.4948+00	.6339+00	-9999.
179000	190	263	-.9	.4766+00	.6099+00	-9999.
180000	172	265	-.5	.4591+00	.5866+00	-9999.
181000	167	267	-1.5	.4422+00	.5670+00	-9999.
182000	163	270	-3.1	.4258+00	.5493+00	-9999.
183000	162	272	-4.8	.4099+00	.5321+00	-9999.
184000	163	272	-6.5	.3946+00	.5156+00	-9999.
185000	163	268	-8.2	.3797+00	.4993+00	-9999.
186000	163	263	-9.8	.3653+00	.4832+00	-9999.
187000	158	257	-11.5	.3514+00	.4678+00	-9999.
188000	155	252	-13.1	.3379+00	.4527+00	-9999.
189000	157	249	-14.7	.3249+00	.4380+00	-9999.
190000	158	248	-16.3	.3122+00	.4234+00	-9999.
191000	160	249	-18.0	.3000+00	.4095+00	-9999.
192000	163	251	-19.4	.2882+00	.3957+00	-9999.
193000	167	253	-21.1	.2768+00	.3825+00	-9999.
194000	168	253	-22.7	.2658+00	.3697+00	-9999.
195000	172	252	-24.4	.2552+00	.3574+00	-9999.
196000	172	250	-26.1	.2449+00	.3453+00	-9999.
197000	172	246	-26.8	.2350+00	.3324+00	-9999.
198000	179	241	-26.6	.2224+00	.3143+00	-9999.
199000	190	237	-26.2	.2105+00	.2969+00	-9999.

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
200000	206	236	-26.1	.1992+00	.2809+00	-9999.
201000	229	234	-25.8	.1886+00	.2667+00	-9999.
202000	260	234	-31.3	.1785+00	.2571+00	-9999.
203000	263	236	-30.8	.1689+00	.2428+00	-9999.
204000	266	239	-31.1	.1599+00	.2301+00	-9999.
205000	268	243	-31.2	.1513+00	.2179+00	-9999.
206000	270	246	-34.1	.1432+00	.2086+00	-9999.
207000	271	250	-36.9	.1372+00	.2023+00	-9999.
208000	273	254	-39.1	.1314+00	.1956+00	-9999.
209000	275	257	-40.7	.1258+00	.1885+00	-9999.
210000	276	260	-41.2	.1204+00	.1808+00	-9999.
211000	276	263	-41.4	.1152+00	.1732+00	-9999.
212000	276	266	-42.2	.1103+00	.1664+00	-9999.
213000	275	268	-43.8	.1055+00	.1602+00	-9999.
214000	273	270	-45.3	.1009+00	.1543+00	-9999.
215000	271	272	-46.5	.9650-01	.1483+00	-9999.
216000	268	272	-48.3	.9220-01	.1429+00	-9999.
217000	263	272	-49.2	.8810-01	.1370+00	-9999.
218000	260	272	-50.2	.8420-01	.1315+00	-9999.
219000	256	271	-51.9	.8040-01	.1266+00	-9999.
220000	255	271	-54.7	.7680-01	.1225+00	-9999.
221000	255	270	-58.5	.7330-01	.1189+00	-9999.
222000	255	269	-62.1	.7000-01	.1156+00	-9999.
223000	256	269	-65.9	.6650-01	.1118+00	-9999.
224000	260	269	-69.9	.6310-01	.1082+00	-9999.
225000	261	269	-73.0	.5980-01	.1041+00	-9999.
226000	265	270	-74.6	.5680-01	.9964-01	-9999.
227000	268	271	-74.2	.5410-01	.9473-01	-9999.
228000	270	272	-72.7	.5160-01	.8967-01	-9999.
229000	271	272	-72.2	.4910-01	.8510-01	-9999.
230000	275	273	-70.1	.4670-01	.8013-01	-9999.
231000	275	274	-68.1	.4440-01	.7542-01	-9999.
232000	276	275	-65.6	.4230-01	.7099-01	-9999.
233000	278	275	-63.0	.4030-01	.6660-01	-9999.
234000	280	276	-60.2	.3840-01	.6282-01	-9999.
235000	280	276	-59.2	.3670-01	.5974-01	-9999.
236000	280	276	-58.2	.3500-01	.5671-01	-9999.
237000	280	276	-57.2	.3340-01	.5387-01	-9999.
238000	278	276	-57.2	.3190-01	.5145-01	-9999.
239000	276	275	-57.2	.3040-01	.4903-01	-9999.
240000	275	275	-57.9	.2900-01	.4694-01	-9999.
241000	271	274	-58.4	.2770-01	.4494-01	-9999.
242000	270	273	-60.0	.2640-01	.4314-01	-9999.
243000	266	271	-60.5	.2510-01	.4112-01	-9999.
244000	263	270	-61.2	.2400-01	.3944-01	-9999.
245000	260	269	-62.5	.2280-01	.3771-01	-9999.
246000	256	267	-63.2	.2180-01	.3616-01	-9999.
247000	251	265	-64.2	.2070-01	.3450-01	-9999.
248000	248	263	-65.1	.1980-01	.3315-01	-9999.
249000	244	261	-65.6	.1880-01	.3156-01	-9999.

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
250000	241	258	-66.2	.1790-01	.3012-01	-9999.
251000	236	256	-67.2	.1710-01	.2892-01	-9999.
252000	233	254	-67.2	.1620-01	.2740-01	-9999.
253000	229	251	-63.2	.1550-01	.2634-01	-9999.
254000	228	249	-68.1	.1470-01	.2497-01	-9999.
255000	224	247	-67.2	.1400-01	.2368-01	-9999.
256000	221	244	-67.2	.1330-01	.2249-01	-9999.
257000	219	242	-67.2	.1270-01	.2148-01	-9999.
258000	216	240	-67.2	.1210-01	.2046-01	-9999.
259000	214	238	-67.9	.1150-01	.1952-01	-9999.
260000	212	236	-68.4	.1090-01	.1854-01	-9999.
261000	211	235	-69.9	.1040-01	.1783-01	-9999.
262000	209	233	-70.4	.9900-02	.1701-01	-9999.
263000	206	232	-71.7	.9400-02	.1625-01	-9999.
264000	204	231	-72.5	.8900-02	.1545-01	-9999.
265000	200	230	-73.2	.8500-02	.1481-01	-9999.
266000	197	229	-73.5	.8136-02	.1417-01	-9999.
267000	195	228	-73.9	.7788-02	.1357-01	-9999.
268000	192	227	-74.2	.7455-02	.1298-01	-9999.
269000	190	226	-74.6	.7135-02	.1243-01	-9999.
270000	187	225	-74.9	.6830-02	.1190-01	-9999.
271000	185	223	-75.3	.6538-02	.1139-01	-9999.
272000	183	222	-75.6	.6258-02	.1090-01	-9999.
273000	181	219	-76.0	.5990-02	.1043-01	-9999.
274000	089	216	-76.3	.5734-02	.9987-02	-9999.
275000	077	213	-76.7	.5488-02	.9560-02	-9999.
276000	066	208	-77.0	.5253-02	.9150-02	-9999.
277000	055	201	-77.4	.5028-02	.8759-02	-9999.
278000	046	191	-77.7	.4813-02	.8384-02	-9999.
279000	039	177	-78.1	.4607-02	.8025-02	-9999.
280000	035	158	-78.4	.4410-02	.7682-02	-9999.
283000	025	135	-79.4	.3770-02	.6780-02	-9999.
286000	023	099	-80.3	.3220-02	.5820-02	-9999.
289000	030	069	-81.2	.2750-02	.5000-02	-9999.
292000	042	053	-82.1	.2350-02	.4300-02	-9999.
295000	056	044	-83.0	.2010-02	.3690-02	-9999.
298000	046	041	-82.2	.1620-02	.2950-02	-9999.
301000	033	036	-81.1	.1380-02	.2490-02	-9999.
304000	071	022	-79.9	.1160-02	.2110-02	-9999.
307000	012	335	-78.7	.1010-02	.1780-02	-9999.
310000	021	281	-77.5	.8570-03	.1510-02	-9999.
313000	030	269	-76.1	.7350-03	.1280-02	-9999.
316000	028	269	-74.3	.6330-03	.1090-02	-9999.
319000	025	269	-72.4	.5450-03	.9280-03	-9999.
322000	020	267	-70.6	.4700-03	.7890-03	-9999.
325000	013	263	-68.6	.4050-03	.6720-03	-9999.
328000	003	233	-66.9	.3480-03	.5720-03	-9999.
331000	002	234	-64.0	.3010-03	.4860-03	-9999.
334000	003	240	-61.1	.2610-03	.4140-03	-9999.
337000	004	246	-58.1	.2260-03	.3520-03	-9999.

TABLE 5. (Concluded)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
340000	005	194	-55.2	.1950-03	.3000-03	-9999.
343000	007	195	-52.2	.1690-03	.2550-03	-9999.
346000	004	166	-48.2	.1470-03	.2180-03	-9999.
349000	008	145	-43.2	.1290-03	.1860-03	-9999.
352000	012	135	-38.1	.1130-03	.1600-03	-9999.
355000	019	129	-33.1	.9900-04	.1370-03	-9999.
358000	027	126	-28.0	.8680-04	.1170-03	-9999.
361000	033	107	-22.9	.7600-04	.1000-03	-9999.
364000	036	112	-15.7	.6820-04	.8700-04	-9999.
367000	040	116	-8.5	.6110-04	.7570-04	-9999.
370000	045	122	-1.2	.5470-04	.6580-04	-9999.
373000	050	127	6.0	.4900-04	.5720-04	-9999.
376000	057	133	13.3	.4360-04	.4970-04	-9999.
379000	047	118	21.3	.3950-04	.4350-04	-9999.
382000	046	122	30.3	.3600-04	.3830-04	-9999.
385000	046	126	39.7	.3290-04	.3390-04	-9999.
388000	047	130	49.2	.3010-04	.3000-04	-9999.
391000	047	134	59.1	.2770-04	.2670-04	-9999.
394000	049	138	69.1	.2550-04	.2380-04	-9999.
397000	050	142	79.4	.2360-04	.2130-04	-9999.
400000	052	146	89.8	.2190-04	.1910-04	-9999.

TABLE 6. STS-11 SRB DESCENT-IMPACT SURFACE SHIP OBSERVATIONS

Site: U.S.N. Ship Redstone

Location: 29° Latitude
78° Longitude

Date: February 3, 1984

Time: 1306 UT

Surface Observation:

Air Temp °F	Wet-Bulb °F	Dew Point °F	Pressure (MSL) mb	Wind Direction	Wind Speed Kt.
70.2	62.5	58.0	1018.0	100°	27

Sky Observation:

Clouds	Total Sky Cover	Total Opaque Sky	Visibility (miles)
1/10 Cumulus at 2000 ft. 4/10 Stratocumulus at 4000 ft. 1/10 Altocirrus at 10000 ft.	6/10	6/10	8

Sea Observation:

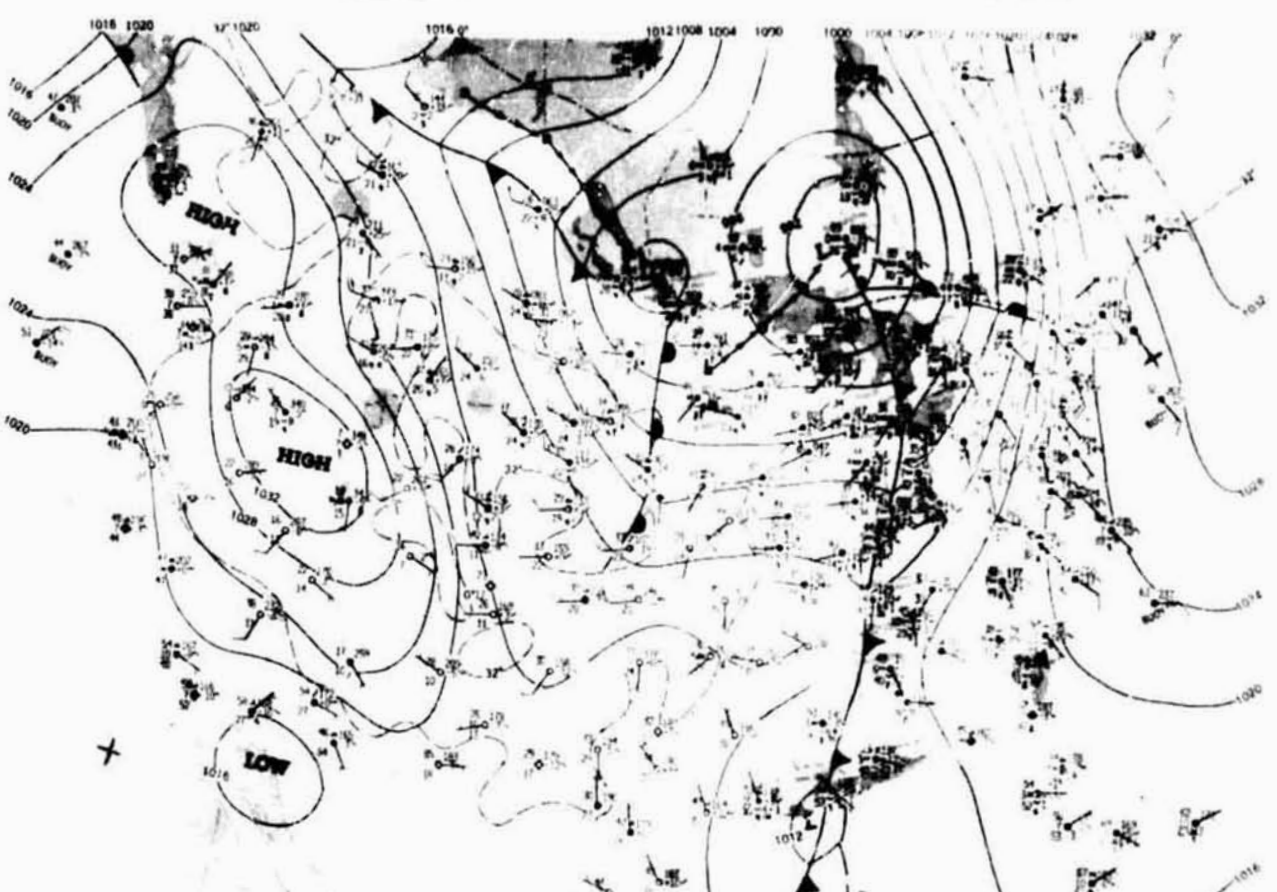
Sea Condition:	Wind Waves: Freq. Sec.	Wind Waves: Ht. m.	Swell Conditions: Dir. from Which Swell is coming	Swell Conditions: Freq. Sec.	Swell Conditions: Ht. m.
Sea Moderate - Code 4 1/10 Breaking Waves 1/10 Foam	4	2	40°	4	2

Surface Sea Water Temp. = 22.2°C (72°F)

TABLE 7. SELECTED ATMOSPHERIC OBSERVATIONS FOR THE FLIGHT TESTS OF THE SPACE SHUTTLE VEHICLES

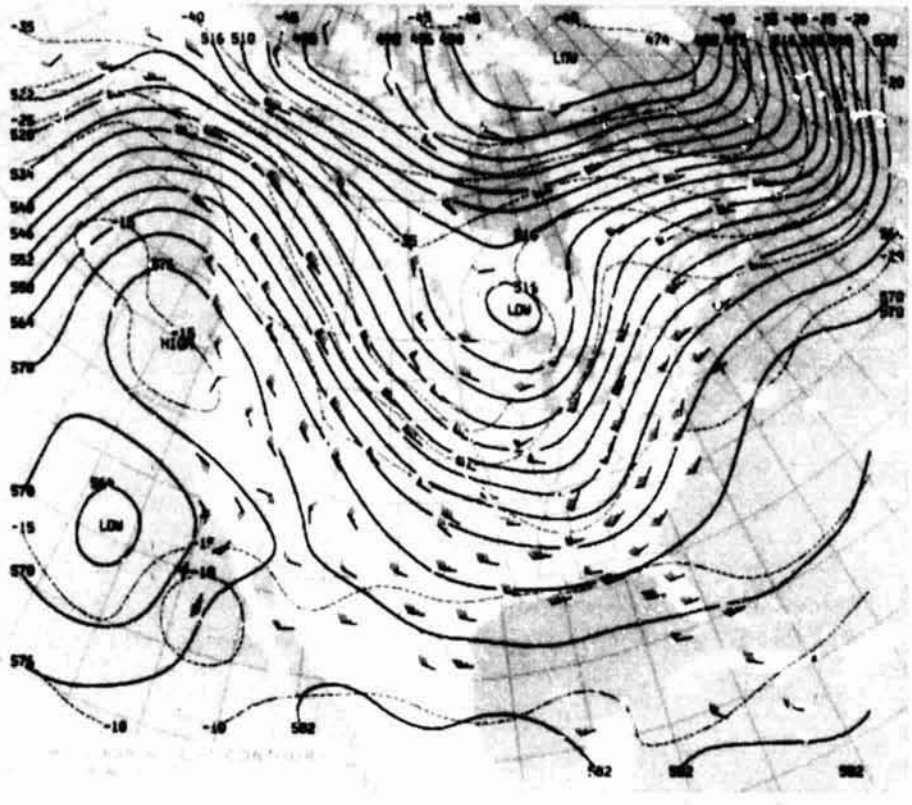
Vehicle Data					Surface Observations					Inflight Conditions Max. Wind Below 60,000 ft			Count Down and Launch Comments of Meteorological Significance
					Thermodynamic[a]			Wind[b]					
Seq. No.	Vehicle No.	Launch Date	Time (EST) Nearest Minute	Launch Pad	Press.[c] N/cm^2	Temp. (°C)	Rel. Hum. (%)	Speed (ft/sec)	Dir. (deg)	Alt. (ft)	Speed (ft/sec)	Dir. (deg)	
1	STS-1 Columbia	4/12/81	0700	39A	10.234[d]	21	82	11.8 15.2	125 120	44,300	98	250	
2	STS-2 Columbia	11/12/81	1010	39A	10.166	23	61	27.0 27.0	345 355	36,300	158	286	
3	STS-3 Columbia	3/22/82	1100	39A	10.160	24	71	7.0[e] 8.0[e]	50[e] 145[e]	45,000	119	250	Wind directional change observed at Pad just prior to L+0. Onset of sea breeze.
4	STS-4 Columbia	6/27/82	1100[f]	39A	10.200	29	70	5.8[g] 4.9[g]	133[g] 141[g]	47,900	37	329	
5	STS-5 Columbia	11/11/82	0719	39A	10.227	22	68	22.3 35.0	90 90	40,600	146	336	
6	STS-6 Challenger	4/4/83	1330	39A	10.183	23	55	12.7 16.4	63 55	46,100	155	277	
7	STS-7 Challenger	6/18/83	0733[f]	39A	10.146	25	80	5.9[e] 10.3[e]	10[e] 350[e]	45,900	76	278	
8	STS-8 Challenger	8/30/83	0232[f]	39A	10.111	24	97	8.8 14.0	269 268	45,100	30	349	17 min countdown delay due to adverse weather conditions.
9	STS-9 (SL-1) Columbia	11/28/83	1100	39A	10.153	24	83	19.1 32.0	183 190	47,100	117	252	
10	STS-11 (41-B) Challenger	2/3/84	0800	39A	10.173	17	75	0.0 NA	0 NA	38,200	143	288	

a. Pad 39A thermodynamic measurements taken at approximately 1.2 m (4 ft) above natural grade at camera site No. 3.
b. 1 min average prior to L+0 of 60 ft PLP (listed first) and 275 ft FSS winds measured above natural grade.
c. Pressure measurement applicable to 21 ft above MSL unless otherwise indicated.
d. Pressure measurement applicable to 14 ft above MSL.
e. 10 sec average prior to L+0.
f. Eastern Daylight Time.
g. 30 sec average prior to L+0.



Surface Synoptic Map at 1200 UT February 3, 1984 – Isobaric, Frontal, and Precipitation Patterns are Shown in Standard Symbolic Form.

Figure 1. Surface synoptic chart 1 hr before launch of STS-11.



500 Millibar Height
Contours at 1200 UT
February 3, 1984
Continuous Lines Indicate Height Contours In Feet Above Sea Level. Dashed Lines are Isotherms In Degrees Centigrade. Arrows Show Wind Direction and Speed at the 500 MB Level.

Figure 2. 500 mb map 1 hr prior to launch of STS-11.

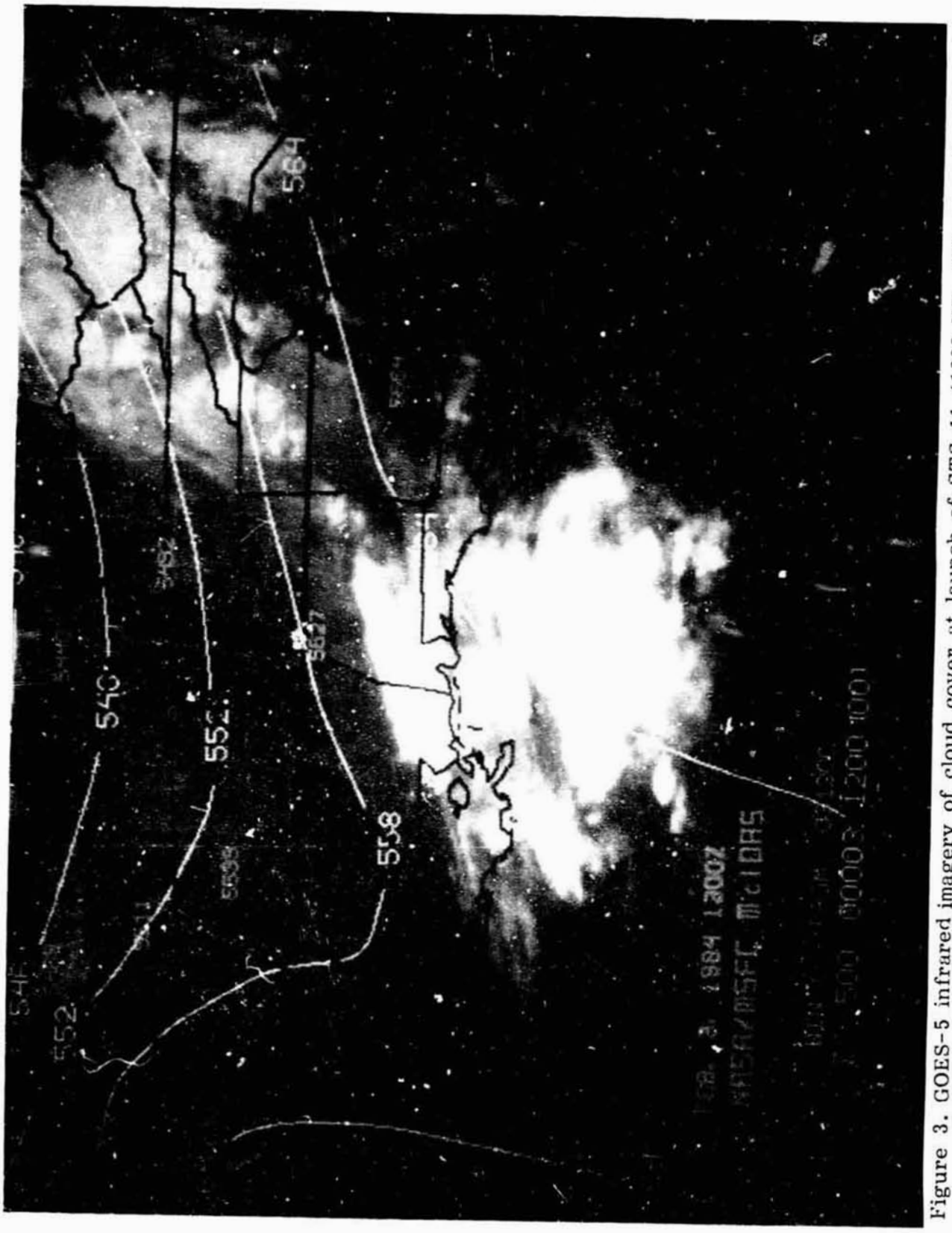


Figure 3. GOES-5 infrared imagery of cloud cover at launch of STS-11 (1300 UT, February 3, 1984). 500-mb contours and wind barbs are also included for 1200 UT.

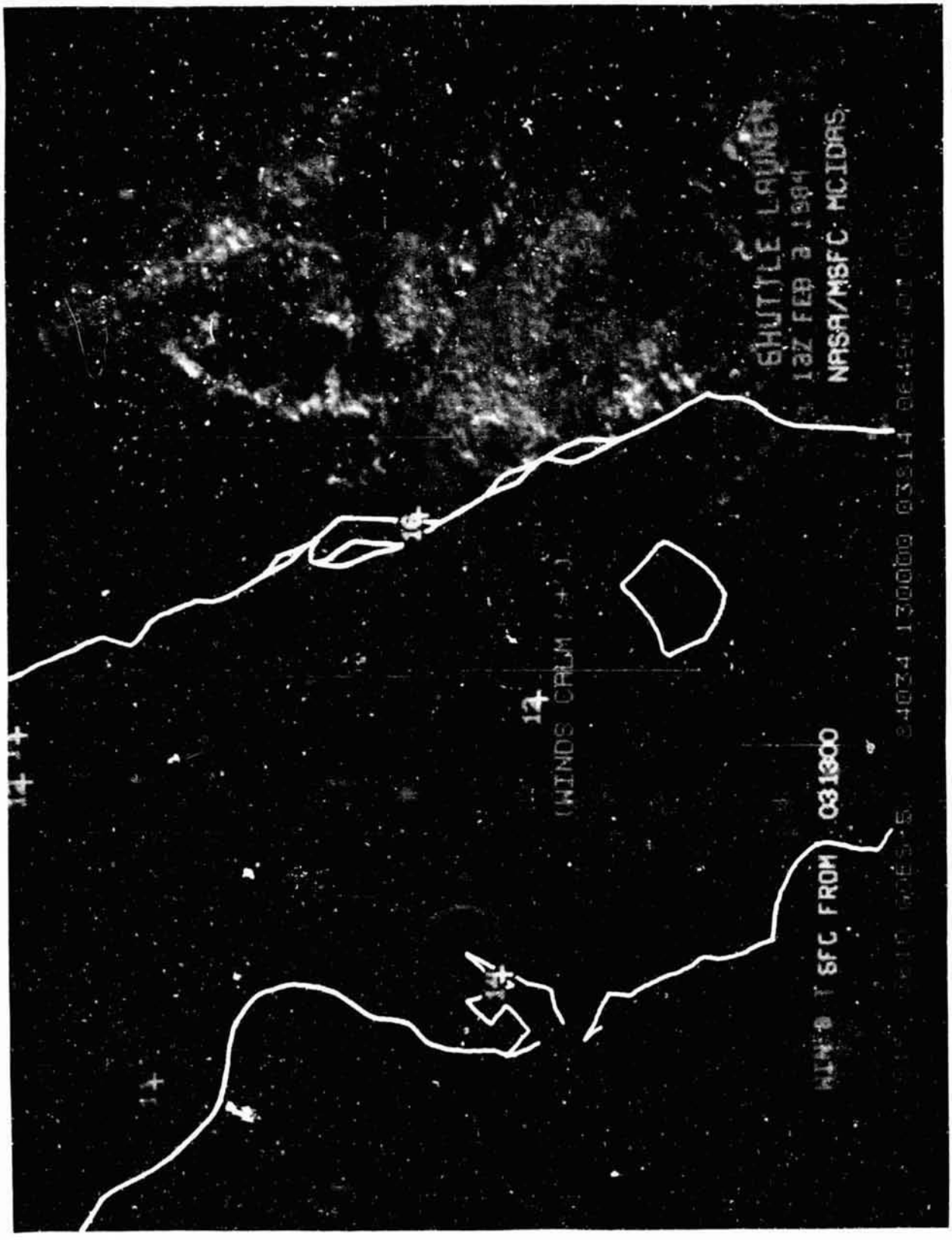


Figure 4. Enlarged view of GOES-5 visible imagery of cloud cover at launch of STS-11 (1300 UT, February 3, 1984). Surface temperatures and wind barbs for 1300 UT are also included.

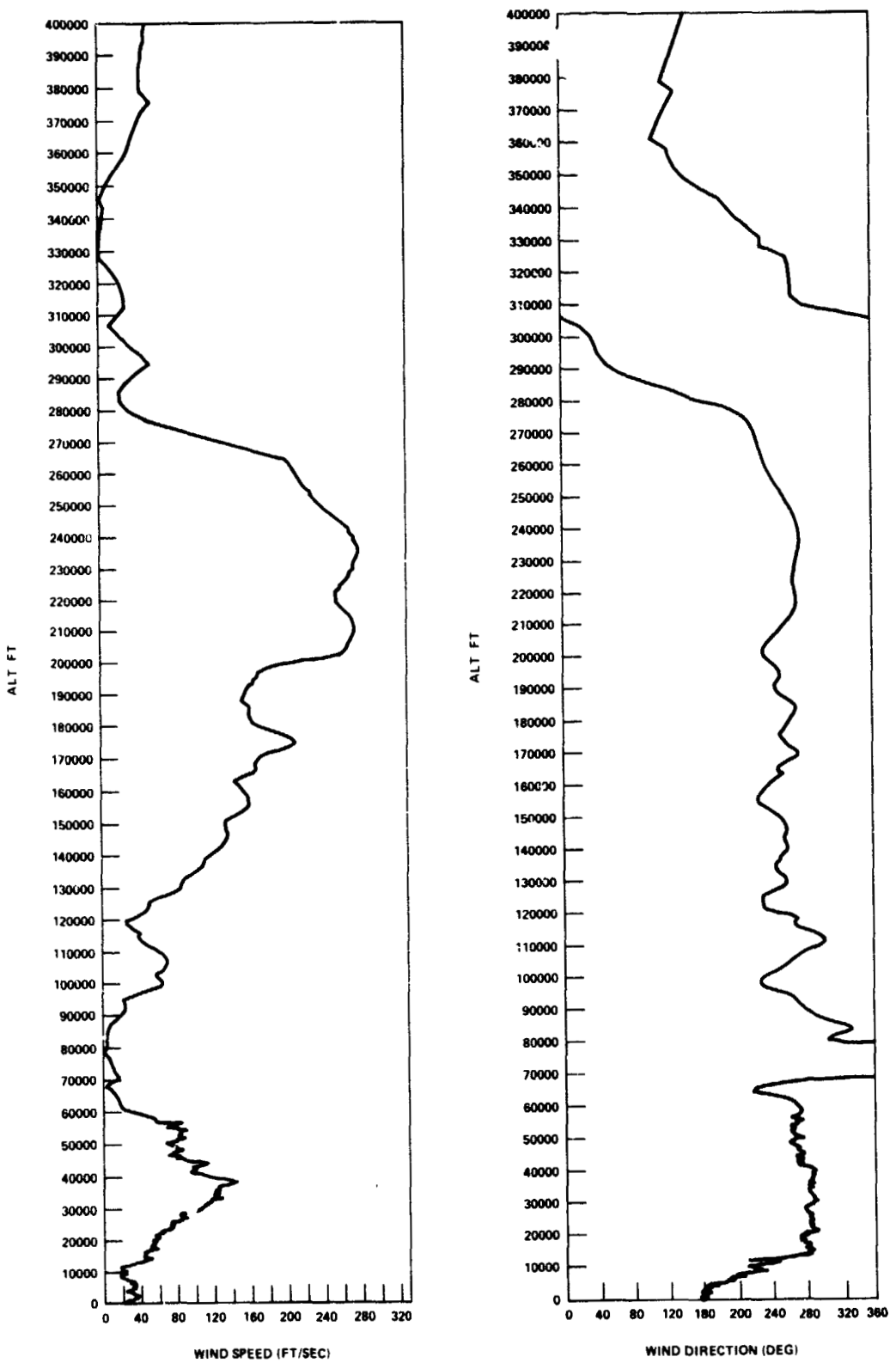


Figure 5. Scalar wind speed and direction at launch time of STS-11.

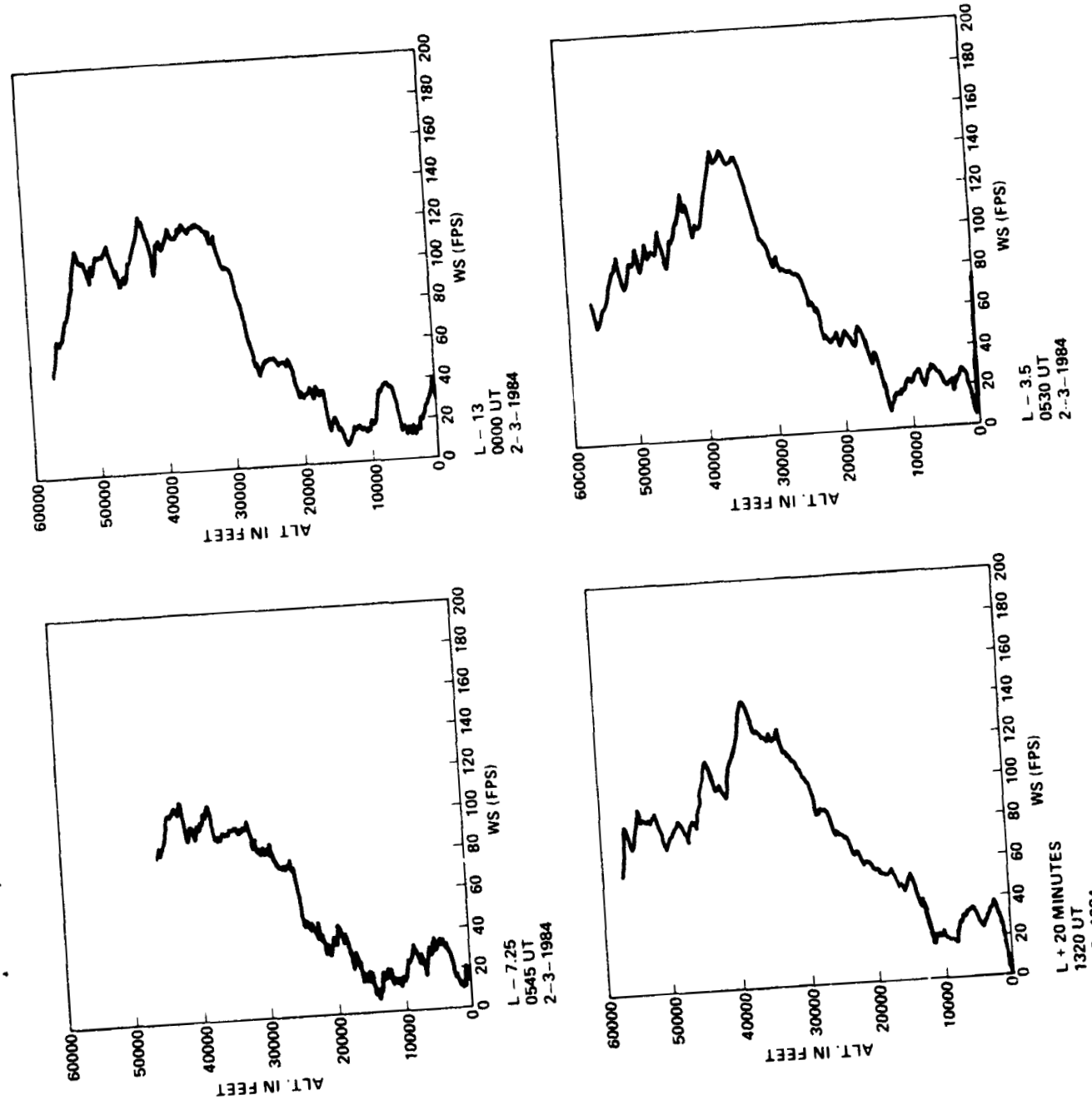


Figure 6. STS-11 prelaunch/launch Jimsphere-measured wind speeds (FPS).

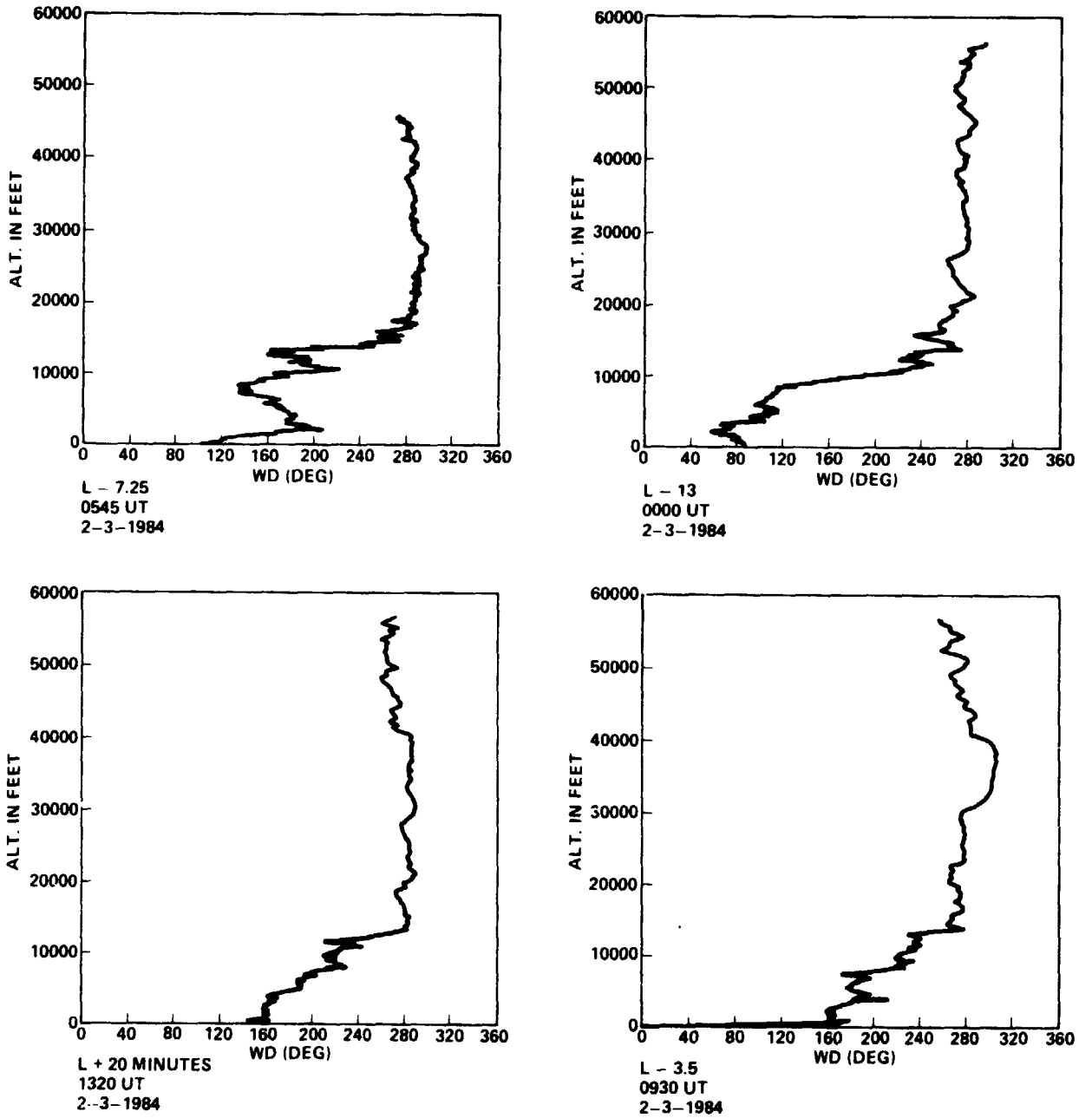


Figure 7. STS-11 prelaunch/launch Jimsphere-measured wind directions (degrees).

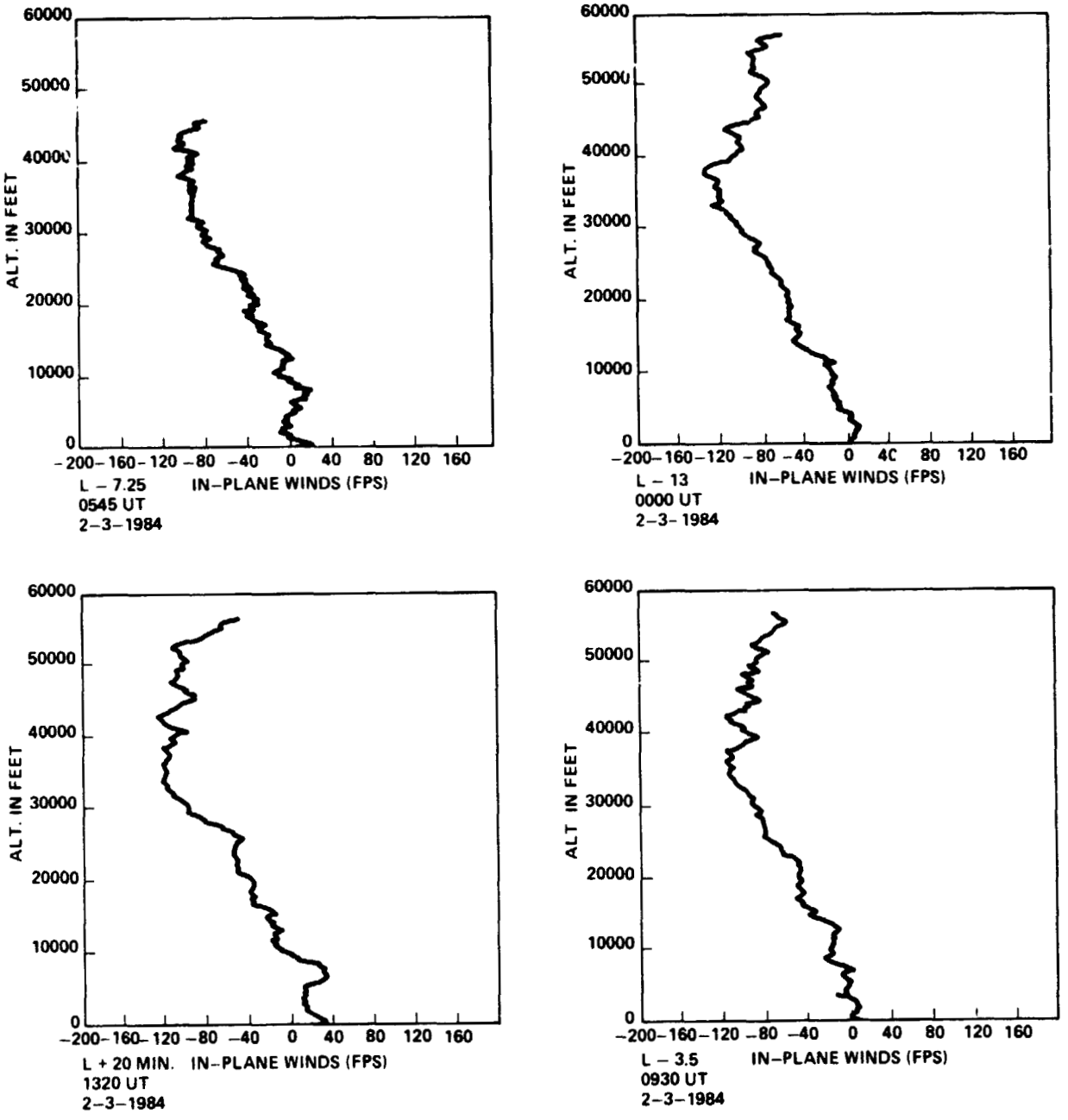


Figure 8. STS-11 prelaunch/launch Jimsphere-measured in-plane component winds (FPS). Flight azimuth = 89 degrees.

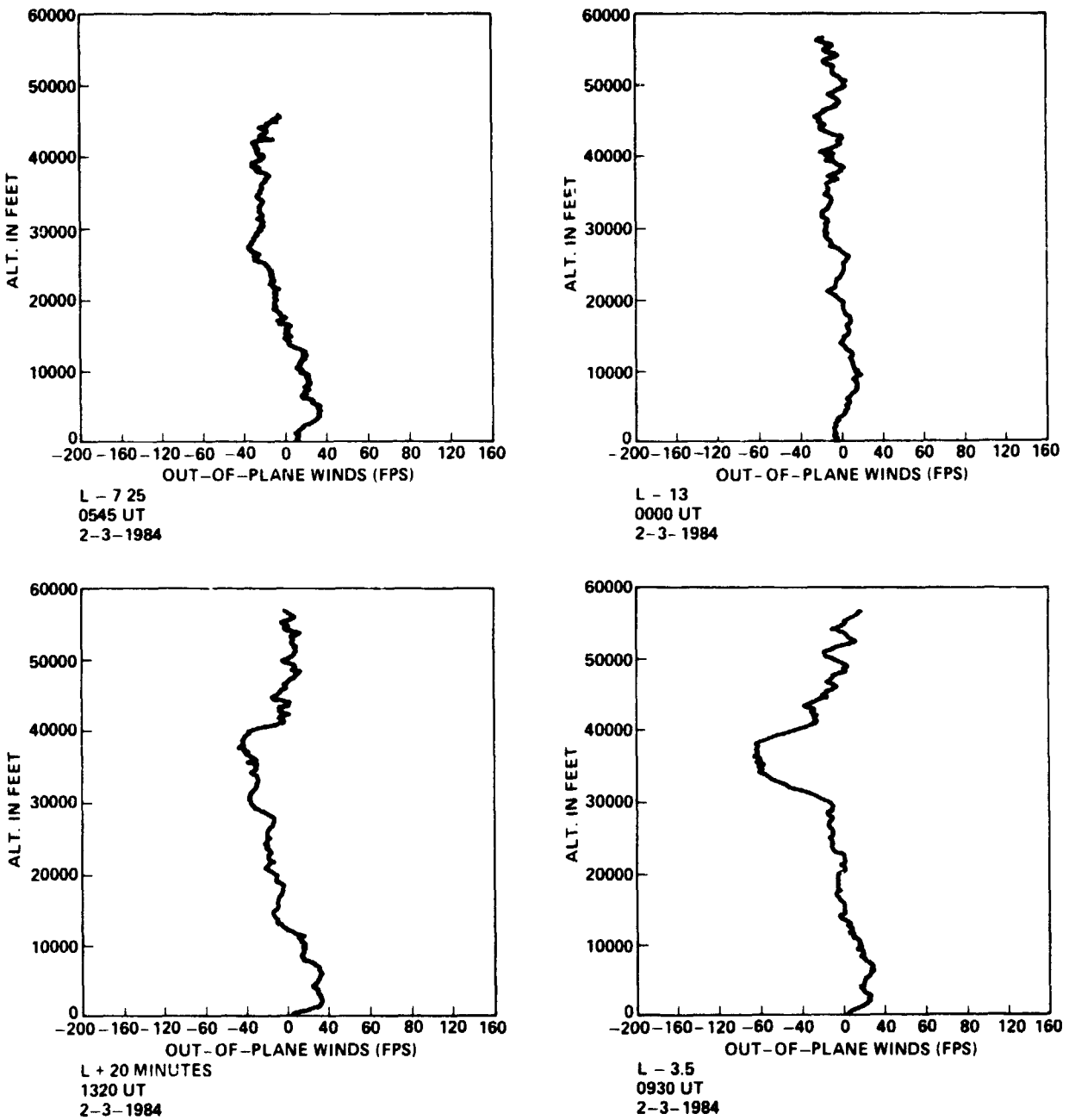


Figure 9. STS-11 prelaunch/launch Jimsphere-measured out-of-plane component winds (FPS). Flight azimuth = 89 degrees.

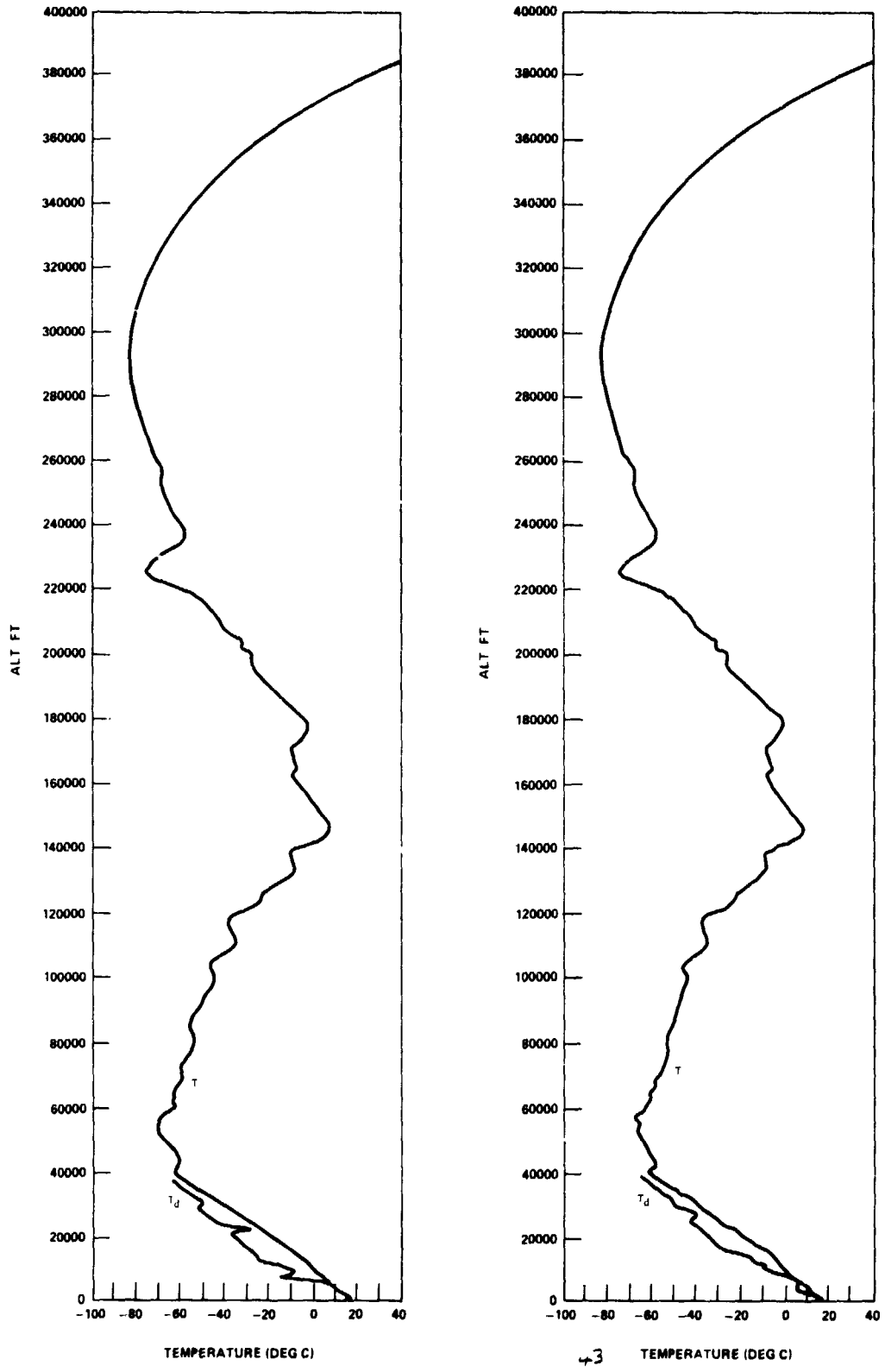


Figure 10. STS-11 temperature profiles versus altitude for launch (left) and SRB descent (right).

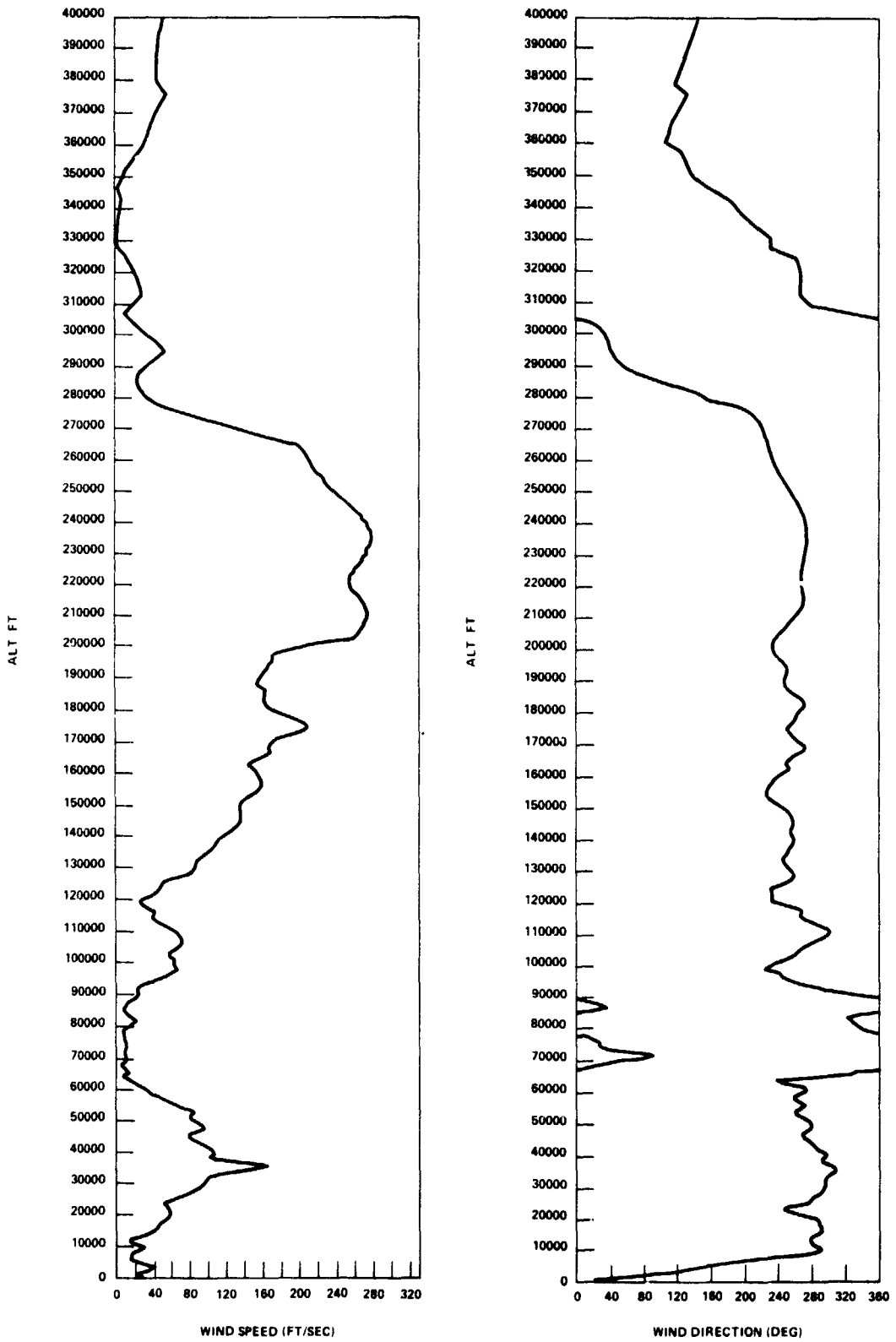


Figure 11. STS-11 scalar wind speed and direction for SRB descent.

REFERENCES

1. Saturn Flight Evaluation Working Group: Saturn Launch Vehicle Flight Evaluation Report — Appendix A — Atmosphere (A separate report is prepared for each Saturn vehicle launch operation). George C. Marshall Space Flight Center, Alabama.

2. Johnson, D. L.: Summary of Atmospheric Data Observations for 155 Flights of MSFC/ABMA Related Aerospace Vehicles. NASA TM X-64796, December 5, 1973.

3. Johnson, D. L.: Atmospheric Environment for ASTP (SA-210) Launch. NASA TM X-64990. February 1976.

4. Johnson, D. L., Jasper, G., and Brown, S. C.: Atmospheric Environment for Space Shuttle (STS-1) Launch. NASA TM 82436, July 1981.

5. Johnson, D. L. and Brown, S. C.: Atmospheric Environment for Space Shuttle (STS-2) Launch. NASA TM 82463, December 1981.

6. Johnson, D. L., Brown, S. C., and Batts, G. W.: Atmospheric Environment for Space Shuttle (STS-3) Launch. NASA TM 82480, April 1982.

7. Johnson, D. L., Hill, C. K., and Batts, G. W.: Atmospheric Environment for Space Shuttle (STS-4) Launch. NASA TM 82498, July 1982.

8. Johnson, D. L., Hill, C. K., and Batts, G. W.: Atmospheric Environment for Space Shuttle (STS-5) Launch. NASA TM 82515, March 1983.

9. Johnson, D. L., Hill, C. K., and Batts, G. W.: Atmospheric Environment for Space Shuttle (STS-6) Launch. NASA TM 82529, May 1983.

10. Johnson, D. L., Hill, C. K., and Batts, G. W.: Atmospheric Environment for Space Shuttle (STS-7) Launch. NASA TM 82542, July 1983.

11. Johnson, D. L., Hill, C. K., Turner, R. E., and Batts, G. W.: Atmospheric Environment for Space Shuttle (STS-8) Launch. NASA TM 82560, October 1983.

12. Johnson, D. L., Hill, C. K., and Batts, G. W.: Atmospheric Environment for Space Shuttle (STS-9) Launch. NASA TM 82572, January 1984.

13. Justus, C. G., et al.: The NASA/MSFC Global Reference Atmosphere Model — Mod 3 (with Spherical Harmonic Wind Model). NASA CR-3256, March 1980.

14. Smith, O. E. and Weidner, D. K.: A Reference Atmosphere for Patrick AFB, Florida, Annual (1963 Revision). NASA TM X-53139, September 23, 1964.