NOAA Data Report ERL AOML-28

ATMOSPHERIC CHEMISTRY MEASUREMENTS DURING LEG 4, 1993 NORTH ATLANTIC CRUISE, R/V *MALCOLM BALDRIGE*: REYKJAVIK, ICELAND TO MIAMI, FLORIDA 4 SEPTEMBER 1993 THROUGH 22 SEPTEMBER 1993

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CRUISE OVERVIEW

VESSEL: NOAA Research Ship MALCOLM BALDRIGE (formerly RESEARCHER).
PORT CALLS: Reykjavik, Iceland; St. George, Bermuda; Miami, Florida
CHIEF SCIENTIST: Dr. Thomas P. Carsey
DATES: 4-September-1993 through 22-September-1993

The Atmospheric Chemistry effort at the Ocean Chemistry Division of the Atlantic Oceanographic and Meteorological Laboratories (NOAA OCD AOML) has been involved for several years with developing an understanding of the chemical interactions of ozone, hydrocarbons, carbon monoxide, active nitrogen species and other related species in the marine boundary layer (MBL), under the auspices of the Radiatively Important Trace Species program (RITS). Previous field programs have included cruises in the equatorial Pacific (1990), the South Atlantic (1991), and the North Atlantic (1988, 1992). During September, 1993, AOML conducted a multi-leg cruise aboard the MALCOLM BALDRIGE in the North Atlantic, comprising legs devoted to ACCP, OACES, and RITS projects. The itinerary for the four legs is given in Table I, and is plotted in Figure 1.

TABLE I
1993 N. ATLANTIC CRUISE SUMMARY

LEG	EVENT
Leg 1: Miami to Fortaleza	1-Jun (JD 152.65) - 28-Jun (179.81)
Leg 2: Fortaleza to Madeira	4-Jul (JD 185.55) - 24-Jul (JD205.37)
Leg 3: Madeira to Reykjavic	2-Aug (JD 214.36) - 30-Aug (JD242.40)
	Includes Madeira-Madeira JD 214-227
Leg 4: Reykjavik to Miami	4-Sep (JD 247.37) - 22-Sep (265.57)

The Atmospheric Chemistry (RITS) portion of the cruise, Leg 4, is shown in more detail in Figure 2. Scientific personnel associated with the Atmospheric Chemistry effort are listed in Table II.

TABLE II
LEG 4 SCIENTIFIC PERSONNEL

NAME	AFFILIATION	TASK
T. Carsey	AOML	Chief Scientist
M. Farmer	AOML	NO, NO_2, NOy
C. Fischer	AOML	Rn, B.Carbon, MDAS, Rawinsondes
M. Gallagher	AOML	SO_2
Z. Li	RSMAS	DMS
V. Ross	AOML	PAN, back trajectories
M. Springer-Young	AOML	CO, O_3
M. Zetwo	AOML	aerosols

The objective was to evaluate the distribution and transport of tropospheric ozone and ozone precursors in the North Atlantic. The investigation was associated with the North Atlantic Regional Experiment (NARE), a component of the International Global Atmospheric Chemistry (IGAC) Project. Within Leg 4, characterization of the daytime boundary layer was aided by a series of seven daytime stations for intensive atmospheric sampling shown in Figure 2 (see Itinerary below). This portion of the cruise track traversed three diverse wind and chemical regimes: pristine polar westerlies, polluted westerlies and marine southeasterlies. Along this cruise track a large suite of chemical and meteorological data were measured. These included ozone, carbon monoxide in air and surface water, NO, NO_2, NOy, peroxyacetyl nitrate, SO_2 and non-methane hydrocarbons (NMHC). Aerosols were sampled by cascade impactor for

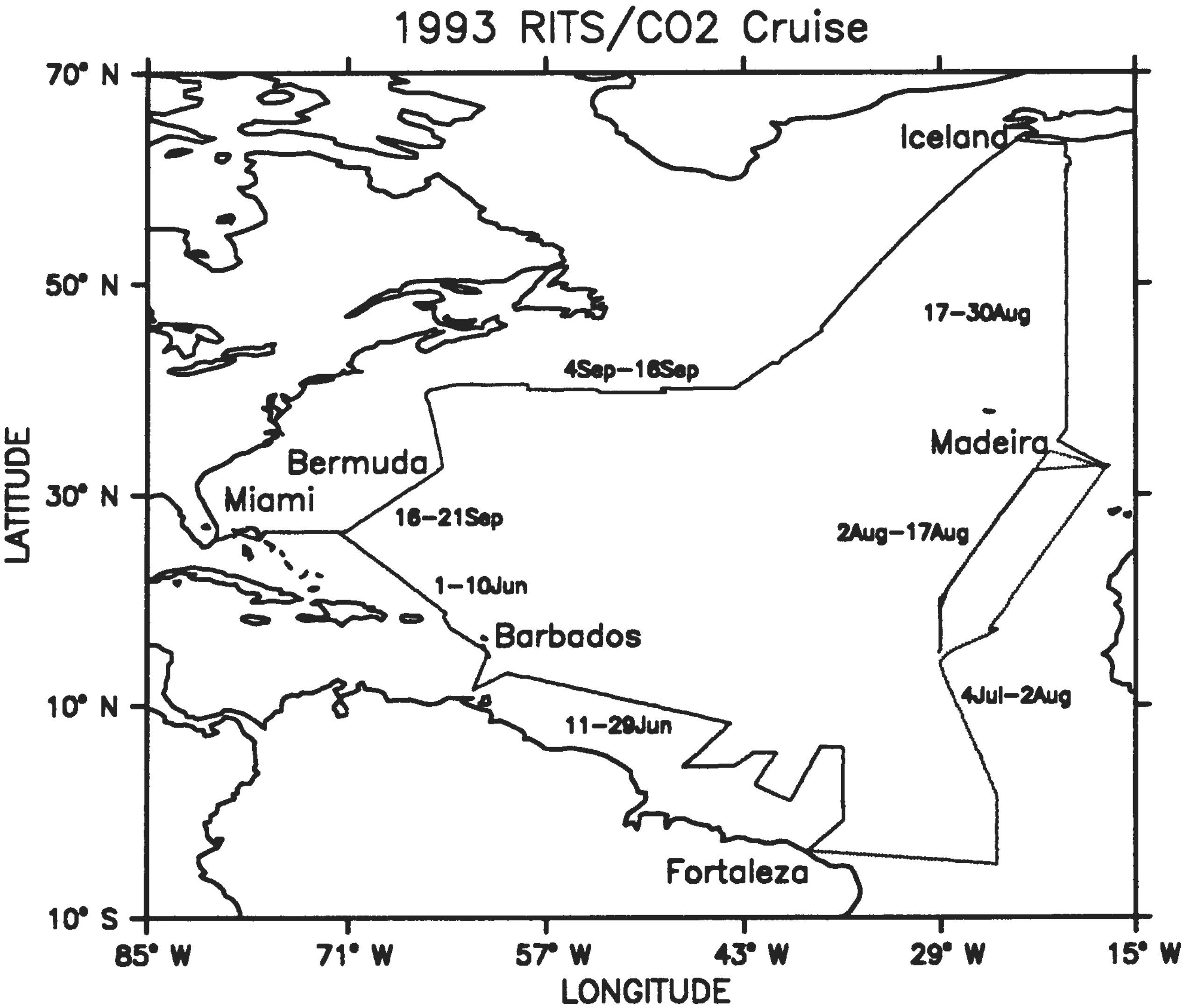

FIGURE 1
CRUISE TRACK OF 1993 N. ATLANTIC CRUISE, ALL LEGS

TABLE III
LEG 4 DAILY CRUISE TRACK AND STATION SUMMARY

JD	DATE			ZHOUR	LATITUDE			LONGITUDE			EVENT
247	04	Sep	93	0840	64	09.10	N	21	56.40	W	Dp Reykjavic,Iceland
248	05	Sep	93	0000	62	27.43	N	24	35.82	W	
249	06	Sep	93	0000	57	42.58	N	28	52.44	W	
250	07	Sep	93	0000	52	46.04	N	32	43.37	W	
251	08	Sep	93	0030	47	52.50	N	36	09.53	W	
251	08	Sep	93	1000	45	48.12	N	37	30.47	W	Intensive 1 Start
251	08	Sep	93	2025	45	05.99	N	37	52.70	W	Intensive 1 end
252	09	Sep	93	0000	44	31.35	N	38	29.41	W	
252	09	Sep	93	0900	43	05.49	N	40	05.94	W	Intensive 2 Start
252	09	Sep	93	2114	42	27.88	N	41	00.78	W	Intensive 2 end
253	10	Sep	93	0000	41	54.83	N	41	35.43	W	
253	10	Sep	93	0800	40	24.43	N	43	14.10	W	Intensive 3 Start
253	10	Sep	93	1300	40	04.26	N	43	33.90	W	Intensive 3 end
254	11	Sep	93	0000	40	00.65	N	46	17.92	W	
254	11	Sep	93	1000	40	00.46	N	48	48.97	W	Intensive 4 Start
254	11	Sep	93	1600	39	40.45	N	48	33.82	W	Intensive 4 end
255	12	Sep	93	0000	39	39.49	N	50	24.68	W	
255	12	Sep	93	1000	39	39.55	N	52	50.25	W	Intensive 5 Start
255	12	Sep	93	1600	39	50.65	N	53	21.03	W	Intensive 5 end
256	13	Sep	93	0000	39	53.42	N	55	28.17	W	
256	13	Sep	93	1100	39	54.74	N	58	19.59	W	Intensive 6 start
256	13	Sep	93	1721	40	23.20	N	58	16.59	W	Intensive 6 end
257	14	Sep	93	0000	40	24.10	N	60	10.07	W	
257	14	Sep	93	1830	39	50.08	N	65	19.97	W	Intensive 7 Start
258	15	Sep	93	0000	39	35.76	N	65	34.62	W	
258	15	Sep	93	0025	39	23.40	N	65	35.35	W	Intensive 7 end
259	16	Sep	93	0000	34	05.76	N	64	32.86	W	
259	16	Sep	93	1234	32	15.00	N	64	07.00	W	Ar St.George, Bermuda
259	16	Sep	93	1740	32	15.00	N	64	07.00	W	Dp St.George, Bermuda
260	17	Sep	93	0000	31	24.40	N	65	36.10	W	
261	18	Sep	93	0000	27	37.36	N	69	53.90	W	
262	19	Sep	93	0000	26	30.32	N	72	28.74	W	
263	20	Sep	93	0000	26	29.96	N	74	53.30	W	
264	21	Sep	93	0059	26	31.03	N	76	30.82	W	
265	22	Sep	93	0000	26	12.29	N	78	47.18	W	
265	22	Sep	93	1344	25	47.00	N	80	11.00	W	Ar Miami, Fl

size-segregated aerosols, and by bulk sampler for total aerosols, for subsequent analysis for ions (ammonium, sodium, potassium, nitrate, chloride, methane sulfonate, and sulfate) by ion chromatography. Black carbon and radon were measured for identification of air mass origin. Rawinsondes were launched twice daily. A number of air samples were obtained for subsequent analysis for non-methane hydrocarbons by Dr. D. Blake. In addition, ozone and carbon monoxide were monitored during the ACCP and OACES legs, increasing the regimes to be investigated to include the southern hemisphere, intertropical convergence zone (ITCZ) and central gyre as well as covering a north-south gradient of over 70 degrees of latitude. The cruise included a preliminary test of a tethered airfoil system designed to measure ozone and a set of meteorological measurements (wet and dry temperature, air pressure) to define the ozone vertical profile within the marine boundary layer. A series of back trajectories was generated at AOML using the Hy-Split program [Draxler 1992] in order to assist in the air mass identification. A sequence of XBTs were deployed in cooperation with T. Rossby of URI to assist in a project in the Labrador Current.

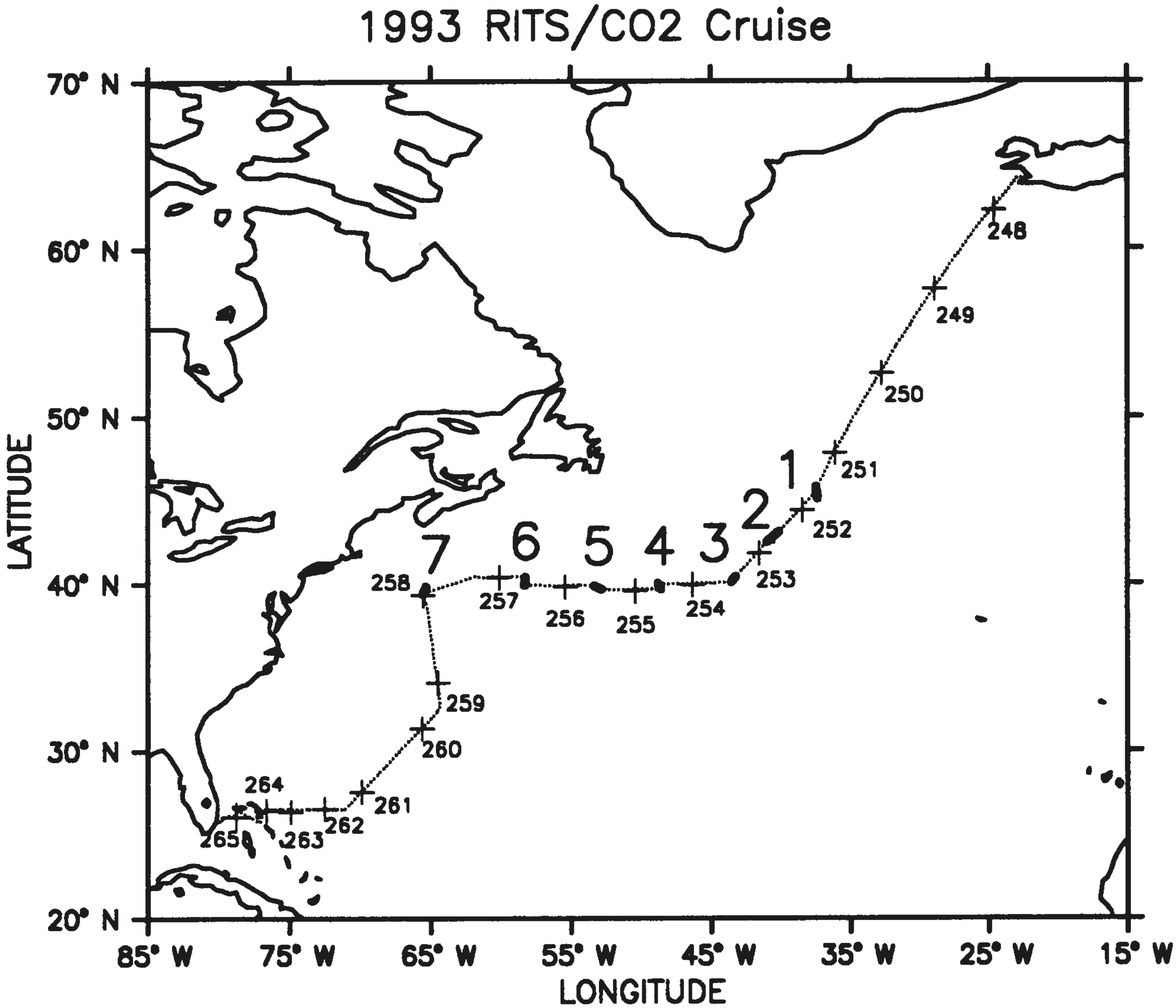

FIGURE 2
CRUISE TRACK OF 1993 N. ATLANTIC CRUISE, LEG 4

INSTRUMENTATION AND RESULTS

Meteorological Data Acquisition System (MDAS)

AOML's Meteorological Data Acquisition System (MDAS) allows for the real time measurement of various meteorological parameters, which are important components used in conjunction with atmospheric samples being collected. The MDAS consists of a computer system and interface, the pump van and the atmospheric sampling bow tower with pertinent atmospheric measurement devices. In addition to the collection of meteorological data, the MDAS allows for the control of various pumps and sensors, and the collection of selected parameters from the Ship's Computer System (SCS). It may also be set up to collect data from various other atmospheric sampling instruments which generate an analog signal. These components will be discussed individually below. A diagram of the M.BALDRIGE showing the position of the bow tower and atmospheric sampling van is shown in Figure 3.

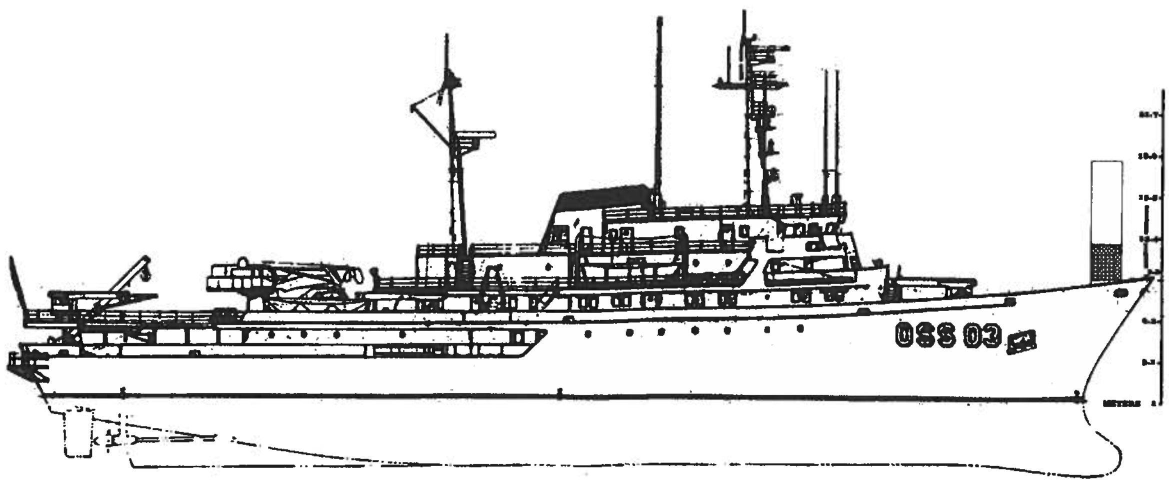

FIGURE 3
R/V MALCOLM BALDRIGE

The computer system and interface, located in OCC behind the ship's bridge, consists of a Northgate 486/25-based computer, an HP System 10 data acquisition system, the data acquisition software (LabTech Notebook®), relays, and translator cards. The HP (Hewlett Packard) System 10 reads the various external electrical and physical measurements, and converts the signals into a form acceptable for computer use. The HP system 10 was also used for external control of various pieces of equipment. Software used to collect data and control various instruments is Labtech Notebook XE, (version 1.1). Data from the different sensors and instruments are sampled every second, and stored in one minute intervals on a hard drive. Since all sensors and instruments outputs are electrical, Notebook does the necessary processing to convert the outputs to their proper units. The screen displayed by Notebook consist of 16 windows, 4 are time versus Y, and the other 11 are digital displays.

To insure uncontaminated ambient atmospheric sampling, the air sampling pumps were computer controlled to turned off if the relative wind direction (relative to the ship's heading) exceeded +90°, or if the wind speed was <1 m s^{-1}). The MDAS is also interfaced with the SCS via a Digital VT-220 to collect various parameters important to the field operation. Typical information is latitude, longitude, ship's speed, and ship's heading. This data was also stored on the MDAS computer hard drive at one minute intervals in a different file.

Translators built by Climatronics, are the IC cards which receives the analog signal from the meteorological sensors. Translators are specific to each sensor and allows one to field check and calibrate each sensor. The translators being used currently are: Wind Translator (model no. 101291 G2 J3), Temperature Translator (model no. 100087 AN G30), Dew Point Translator (100089 AK G3), and a Radiation Translator (100144 AT G17). The translators require a 12 VDC Power Supply (101074 GO) for operation.

Meteorological data was stored on the MDAS's hard drive in one minute intervals. Data was stored daily in two different files, "RITS*.DAT", and "SCS*.DAT". The RITS*.DAT file contains all the meteorological data; SCS*.DAT contains the shipboard data. The "*" indicates a number. The values for RITS*.DAT are in the following order: TM O_3-1 O_3-2 SO_2 WD WS T UV Td RH O_3-3 wherein TM = Time in zulu, O_3-1: Ozone in ppbv (Environics); O_3-2: Ozone in ppbv (Environics) SO_2 = SO_2 instrument from RSMAS; WD = Wind direction, in which the bow of the ship is "0" and starboard values are in positive; WS = Wind speed in knots; T = Temperature in degrees Celsius; UV= Ultraviolet radiation in watts meter^{-2}; Td = Dew point in degrees Celsius; RH = Relative humidity in percent as calculated from T and Td; and O_3-3 = Ozone in ppbv (Electrochemical conductivity cell). The dew point sensor was broken on one of the legs preceding the Leg 4. This resulted in no Td or RH data for Legs 1-3.. The values foe SCS*.DAT are in the following order: DT TM GPTM LT LG HD SD BARO SST SAL; wherein DT = Date; TM = Computer Time in Zulu; GPTM = RGPS time in zulu; LT = Latitude, units of degrees, minutes, and tenths of a minute; LG = Longitude, units of degrees, minutes and tenths of a minute; HD = ships heading in degrees; SD = ships speed in knots; BARO = Barometric pressure in millibars; SST = Sea Surface Temperature in degrees Celsius (TSG); SAL = (uncorrected) salinity in ppt, from teh TSG. A third file "CNC*.DAT" was used to store Condensation Nuclei data every minute.

Wind Speed and Direction

The wind monitor, model 05102, (R. M. Young Company), was developed for ocean buoy use and is well suited for a variety of general wind applications. The wind speed sensor is helicoid shaped propeller molded of polypropylene plastic. The propeller is 4 blade, 18 cm by 30 cm pitch. with a threshold sensitivity of 0.3 m s^{-1}. The vane assembly rotates freely on vertical shaft bearings and has a threshold sensitivity of less than 1.0 m s^{-1}. The wind monitor is mounted on an extended pipe stub located aft on the bow tower. Wind speed range is 0 to 50.0 m s^{-1}. Wind direction range was originally 0 to 540° (for strip chart recorder convenience), but this has been changed to 0 - 360° (for computer operation). Wind speed data is shown in Figure 5; relative wind direction is shown in Figure 6 along with the relative wind direction data from the ship's anemometers located on the bridge tower (port side). A drift in the MDAS wind direction data began in the morning of JD 259 (15-Sep-93). Prior to that occurrence, the two data sets agree reasonably well. Wind speed and direction are also calibrated in house. For direction, the anemometer is rotated full circle and computer read-out is compared against a 360 degree protractor. Wind speed calibration is performed with a RPM Anemometer Driver (R. M. Young); then RPM versus M/S is plotted against each other to determine if there is any drift. Calibration corrections are either done through the translator or software. Wind direction and wind speed were calibrated April 1993 in preparation for the 1993 cruise.

Temperature and Dew Point

The TS-1010WA Motor Aspirated Shield with temperature sensor (P/N 101197) and dew point sensor (P/N 100098) was mounted horizontally with the fan exhaust grate facing downward to prevent water from entering the unit. The assembly was located just below the wind monitor. The Aspirated Shield was designed to reduce errors caused by short and long wave radiation in the measurement of temperature and dew point. The motorized fan provided a high air flow rate passed the sensors, thereby providing a proper mixture of ambient air for measurement. MDAS records a temperature and dew point range from -40 to +60°C. Unfortunately, the dew point instrumentation failed, probably due to excess vibration prior to Leg 4. Results for Leg 4 are shown in Figure 7; relative humidity values are taken from the ship's psychrometer readings. The temperature sensor required no calibration.

Ultraviolet Light
The UV Radiometer was designed and constructed by the Epply Laboratory. The photometer consists of a Weston selenium barrier-layer photoelectric cell with quartz window, a bandpass filter to restrict the wavelength to 295-385 nm and a diffusing disc of opaque quartz. The UV radiometer was located on the bow tower, away from the wind monitor and TS-10WA Shield to prevent any shadows from settling on the instrument. MDAS measured UV radiation intensity from 0-50 W/m^2. The UV radiometer was calibrated by the Epply Laboratory in 1992. No further calibration was performed. Results for Leg 4 are shown in Figure 8. Where UV data was not available, an approximation based on the zenith angle is shown in the Figure.

Condensation Nuclei
A Model 3010 Condensation Particle Counter (CPC) by TSI is used to measure Condensation Nuclei (CN). The CPC is a single-particle counting device that detects particles 0.01 µm in diameter and larger. The instrument is combined with a vacuum pump and was connected directly to the data acquisition system. Particles are detected by condensing alcohol vapor on to the particles, causing them to grow into droplets. These particles, in droplet form, are then easily counted by a optical particle detector. A cabinet purge airflow (1.0 l/m) helps to cool the electronics and create a slight negative pressure within the instrument. Particles that may be generated inside the cabinet are quickly carried out through the vacuum line and do not contaminate the surrounding area. The CPC and vacuum pump along with its sampling lines are housed in a plastic container on the bow tower. The CPC requires no calibration. Values are measured in particles/cm^3, shown for Leg 4 in Figure 9.

Rain
A Rain sensor is also used to control the pumps and has a 5 VDC power supply housed in the pump van. The sensor itself is mounted on the bow tower. When it rains, water on the rain sensor completes a circuit on the sensor's grid, sending a voltage to the MDAS. This allows the MDAS to turn off the pumps via its relay card.

Pump Van
The pump van was of steel construction, 6'6"x6'9"x11'7" (hwl), and located on the F-deck of the NOAA ship MALCOLM BALDRIGE near the bow on the port side. The van contained all the pumps, both hi-vol and lo-vol, necessary for the collection of aerosols and gaseous compounds, and the instrumentation for measuring flow rates. Pumps were plugged into a relay board developed in house to turn the pumps on and off via the MDAS unit. The relay board consisted of 12 relays, with time delayed switches to prevent the pumps from over loading the pump vans circuitry. The relay board may be set to manual, (no MDAS control), or relay, (MDAS control). Power to the pump van is 440 VAC, 3 phase, with a maximum input power requirement of 15 kVA. No A/C is provided. Instrumentation such as ozone monitors were also mounted in the van for sampling from the bow tower.

Calibration of Aerosol Hi-Vol Pumps
Calibration of the hi-vol systems was performed near the end of the Leg 4 while at sea, (19-Sep-93). The ship was stationary, and the weather and seas were both pleasant and calm. The calibration procedure required the GMW-28 variable resistance calibration kit, (General Metal Works). The kit consists of a variable resistance orifice assembly, a NBS calibration curve, a plastic roll-up manometer, 1/4" tubing, and a GMW-35 top loading adapter. The orifice of the calibration assembly allows for the adjustment of air flow from approximately 15 to 60 CFM. This is accomplished by rotating the knob at the top of the assembly to simulate filter resistance, thereby allowing one to calibrate the air flow at various points on the manometer. To calibrate the hi-vol pumps, the calibration assembly must be mounted to the top loading adapter; which in turn is mounted to the stainless steel filter holder connected to the pump via

a 3½" hose. Two individuals were required to calibrate the hi-vol pumps; one on the tower and the other in the pump van. The ship should be stationary or with minimum motion. Prior to calibration, the manometer was filled with water so as to have its level as close as possible to "0" on the flexible plastic scale on the instrument. The Calibration Assembly/Top Load Adapter was installed on one of the hi-vol filter assemblies. Next, the manometer was attached to the Calibration Assembly with the small flexible 1/4" tubing. The appropriate pump was turned on and allowed to run for several seconds. Then the variable orifice on the calibration assembly was adjusted to its most closed position. While the orifice was in this position, the manometer value and the flow rates, (P and vP), were recorded and simultaneously for the pump being calibrated. The step was repeated several more times with the variable orifice adjusted to several different positions. After several calibration points were taken, the hi-vol pump was turned off and the procedure repeated for the other hi-vol pump. The true flow rate were estimated from the NBS Calibration Chart provided by General Metal Works for the calibrator (Figure 10) using the manometer and pump pressure readings taken in the field. Manometer values are listed as Calibrator Static Pressure (csp) located on the y-axis in inches of water. True flow rates (Qc) were determined by intersecting the calibration curve, then dropping a line perpendicular to the x-axis. Values can be read either as cubic feet per minute (cfm) or $m^3\ min^{-1}$; $m^3\ min^{-1}$ was always used in this work. An alternate method involved converting the calibration curve to a straight line by taking the square root of Ps, and using the appropriate curve in Figure 10. This method removed some error due to the pronounce curve formed near the lower limits of the pumps flow. Once the curve has been plotted, true flow values were determined as described herein. After the true flow rate, Qc, for each determination were estimated from the appropriate curve in Figure 10, an X value for each determination was computed according to

$$X = ([PB - V)/PB] * [vP/13.61])^{½} \qquad (1)$$

where V is the line vacuum upstream of the orifice, (located in the flow tube), and vP is the pressure drop across the orifice. From the data set of Qc and X values, a regression analysis of Qc vs X, or

$$Qc = a + bX \qquad (2)$$

gave slope and intercept values a and b. This was done for each of the two hi-vol samplers. Table IV shows the data derived from the hi-vol calibration performed as described above.

V = line vacuum upstream of orifice
vP = pressure drop across orifice
X = calculated from V & vP
csp = Calibrator Static Pressure in inches of water (manometer readings)
Qc = flow rate calculated from the NBS calibration sheet, in M^3/m)

BP (Barometric Pressure) = 1016.0 mb

TABLE IV
HIGH-VOL PUMP CALIBRATION DATA

		HV#1 (port) (A3)	HV#2 (stbd) (Rn)			HV#1 (port) (A3)	HV#2 (stbd) (Rn)
1)	V	1.25	1.2	2)	V	2.6	1.5
	vP	7.9	7.7		vP	3.6	6.62
	csp	8.1	8.41		csp	3.2	7.15
	X	0.761	0.752		X	0.576	0.697
	Qc	1.756	1.784		Qc	1.127	1.657
3)	V	2.2	2.4	4)	V	3.9	3.9
	vP	4.5	3.95		vP	0.99	0.8
	csp	4.2	3.9		csp	0.61	0.51
	X	0.514	0.538		X	0.269	0.24
	Qc	1.280	1.240		Qc	0.425	0.396

Using the values above, a linear regression fit was calculated using equation 2.

high-vol #1: Q = 2.5778X - 0.2087997 (r = 0.99991) (3)

$$\text{high-vol \#2: } Q = 2.6111X - 0.1825515 \quad (r = 0.99999) \tag{4}$$

Both determinations are plotted in Figure 11. For ambient aerosol filter samples, values for X were computed from

$$X = ([PB - V)/PB] * [vP/13.61])^{1/2} \tag{5}$$

using the values for PB, V, and vP recorded each hour. The corrected flow rates Q were computed using either equation 3 or 4. The sample volumes VS were then calculated by multiplying the sample times by the flow rates, viz.,

$$VS = TS*Q \tag{6}$$

where TS = sampling time. Calibration of Aerosol Hi-Vol Pumps For the lo-vol samplers, "Q"s were set with a valve assembly and mass flow meter in 1990. The equipment was on loan from URI and has subsequently been returned. Calibration of the lo-vol samplers requires a valve assembly and mass flow meter not currently owned by AOML. Consequently, the calibration determined for the 1992 ASTEX cruise was used, including a 30% correction determined by comparison to the hi-vol results. Bow Tower The bow tower is a large aluminum walk-up tower approximately 25 feet in height, used to support clean air sampling (Figure 3). All meteorological sensors and various sampling equipment are mounted on the top platform of the tower. The tower is located on the centerline of the vessel, centered approximately 12 inches forward of Frame 1. Cables with guy assemblies extend from the tower to various locations on the ship to secure the tower. For the 1993 cruise, a major modification to the tower was carried out. The bottom section of the tower was replaced with a steel frame within which the air sampling (NOx) van was placed so it could be as close as possible to the bow. The modification, which increased the height of the tower slightly, had a significant increase in vibration which had a negative effect on the instrumentation and sensors on the tower. The top platform of the bow tower supports a variety of equipment as mentioned previously. Shielded signal cables, J-boxes, AC power, and vacuum lines all run from the tower to the pump van and then to the MDAS located in OCC.

Rawinsonde System

The rawinsonde system consists of the sondes (AS1CPTH, 403.5 mHz, from A.I.R., Boulder, CO), balloons (30 g, A.I.R., Boulder, CO), and an Atmospheric Data Acquisition System (ADAS, from A.I.R., Boulder, CO). Rawinsondes were launched twice a day (noon and midnight GMT). From the raw wet and dry bulb temperature and pressure data obtained by the sonde, height, humidity, and potential temperature were computed. These data are shown in Appendix III.

Ozone Profile Airfoil

Airfoil systems have been successfully used on island stations for obtaining vertical profile data of a number of important trace gases and associated meteorological data for altitudes of up to 2.5 km (Balsley *et al.*, 1994). An initial test of this concept took place during six of the daytime intensives listed in Table III. The airfoil system consisted of an airfoil (Stratoscoop 2, from Into the Wind, Boulder, CO) on 200-lb dacron line, an ozone sonde (Mast, Reno, NV), a radiosonde (model RS80, Vaisala, Woburn, MA), received by an Atmospheric Data Acquisition System (A.I.R., Boulder, CO), and winch system. The instrumentation weighed about 1.1 kg.

It was hoped that the kite could be flown from the F-deck fantail. However, successful operation of the airfoil/sonde system was made difficult due to turbulence near the ship. Different ship speed and bearing variations were not availing. Once aloft, the maximum altitude attained by the system during any of the tests was only about 650 m.

The above problems have ready solutions and it is hoped that an airfoil system can be developed for shipboard use, where the sonde could conceivably remain aloft for the lifetime of its batteries. For adequate altitude, a larger kite system and heavier line is required. To minimize problems at launches, the sonde system should not be attached to the line until the airfoil has attained a sufficient distance (e.g., 100 m) from the ship.

Aethalometer
The aethalometer system used by AOML is a semiautomatic instrument allowing real time estimate of atmospheric black carbon. This process involves the measurement of light transmission through a quartz filter, which has had atmospheric particle-laden air deposited on it. As the deposition of black carbon increases, the optical absorption of the material increases, resulting in the attenuation of the light beam (Hansen et al., 1990). Measurement protocol consists of determining the light beam attenuation resulting from the black carbon deposition at 5 minute intervals. Mean aerosol concentration is then equal to the deposition at each interval divided by the total air flow during that time period.

The AOML Shipboard Aethalometer System consist of 4 parts: 1) a $^3/_8$" inch inlet line, 2) the aethalometer, 3) a PC for Aethalometer control, and 4) a relayed controlled vacuum pump. The inlet line, made of a 10-m length of polyethylene tubing, was fitted with a small rain shield made from a 100 ml plastic bottle with the bottom removed. The line was then fed through a moisture trap (a quart size glass mason jar), to the instrument via 91 cm black plastic tubing to prevent light from entering the instrument. The aethalometer was located in the OCC room behind the ship's bridge. The relay controlled vacuum pump and cooling fan are located in a white wooden box (to reflect sunlight), approximately 27" x 16" x 15". The pump box is secured on the weather deck in such a way as to avoid direct rain and bow spray. The System was operated from 1 June to 15 September, 1993. The aethalometer filter was replaced with a new one at least once per day.

The data workup was as follows. The four light attenuation data series were smoothed individually offline using a 9-point moving average, and these smoothed values were then used in the algorithm supplied by the instrument manufacturer (Magee Scientific, Inc.) to calculate black carbon concentrations. A value of 19 m^2/g was used for the specific attenuation of black carbon on the quartz fiber filters used (Pallflex Tissuequartz 2500 QAT-UP). The active collecting area of filter was 0.9 cm^2. The absorption data was converted to black carbon concentration measured in ng m^{-3} averaged over a 6-hour time cycle. The precision, based on variance of the blanks, was 5%; accuracy was estimated at 10% (Hansen *et al.*, 1990). Data for all four legs of the cruise are shown in Figure 13.

Radon
The instrumentation for the detection of ^{222}Rn during the 1992 ASTEX/MAGE cruise was modified to provide more consistent temperature control. ^{222}Rn was estimated indirectly via assay of its short-lived β-particle emitting daughters (^{214}Pb and ^{214}Bi) in aerosols with a system based on the design of Larson and Bressan (1978). Air was drawn through a 10 cm diameter glass fiber filters (Schleicher & Schuell, No. 29) for the first 20 minutes of an 80-minute cycle at a flow rate of 0.7 m^3 min^{-1}. β-particles were then counted during four 10-minute intervals beginning at 1, 11, 40, and 50 minutes after pumping stopped. The detector face was centered approximately 1.5 cm from the filter surface and was shielded from visible light by covering it with Al foil. The filter-detector assembly was housed in a box secured on deck outside the air sampling van. Variations in counting efficiency were checked by counting sources of ^{90}Sr-^{90}Y, ^{210}Pb-^{210}Bi, ^{36}Cl, and ^{99}Tc (Dupont NES-261, -200F, -200D, and 200-B, respectively) centered in fixed geometry in circular plastic frames that were placed individually in the filter holder for 2-3 minutes during the daily filter change interval. Due to an instrumentation operation error, the calibrations were not recorded properly. However, calibration data was available from a cruise in 1992 and were performed subsequent to the 19 93 cruise; calibration parameters to reduce the data from the cruise were interpolated from these other calibrations. Uncertainty in the calibration parameters resulted in uncertainties of approximately ±30 in estimated ^{222}Rn concentrations. Conversion of counting data to ^{222}Rn concentrations was based on Bateman's (1910) method. ^{222}Radon concentrations for Leg 4 are shown in Figure 13.
The detection limit for the system was estimated at 1 pCi m^{-3} (Hansen *et al.*, 1990).

Carbon Monoxide
Carbon monoxide (CO) determinations were made using a Carle model gas chromatograph (GC) equipped with an HgO Reduction Gas detector (Trace Analytical, Inc., Menlo Park, California). Water vapor was removed by a silica gel column followed by an analytical column of Molecular Sieve 5A. Carbon monoxide was determined by measuring the Hg vapor produced by the following reaction:

$$CO + HgO \longrightarrow CO_2 + Hg\ (vapor) \qquad (7)$$

The quantity of Hg vapor is directly proportional to the amount of CO in the sampled air and is quantitatively detected with an UV photometer located downstream of the HgO reaction bed.

Analytical standards were prepared from a commercial, NIST Traceable Standard (Scott-Marrin, Inc., Riverside, California) received just prior to the cruise. Working standards were prepared in a 250 mL gas dilution bulb attached to a manifold from which the system could be evacuated and standard and dilution gases introduced. The partial pressures of standard and dilution gases were measured by a pressure transducer with digital read-out (Cole-Parmer, Chicago, Illinois) and used to calculate the concentration of each standard. Air samples were pumped to the GC from the ship's bow through ~30 m of plastic coated aluminum tubing (Dekoran). A trap of $MgClO_4$ drier was inserted between this line and the GC intake port. A switching valve (Valco Instruments, Houston, Texas) was used to direct gas flow from a gas syringe source, the gas dilution bulb and the bow line to the intake port of the GC. All flows into and from the GC's 2-mL sample loop were monitored with flow meters to insure complete flushing of the sampling system. When the ship's bow was not into the wind, the bow pump was turned off and air samples were collected from the windward side of the ship with 25 mL gas syringes covered with black tape. Instrument variance (pooled) was 2-4 ppb; accuracy was estimated to be within 5%.

The CO_2 equilibrator was used to determine CO in seawater. Seawater was pumped continuously to the equilibrator from an intake located in the bow bubble of the ship from a depth of about 4 m. To measure the concentration of CO in sea water, air from the head space of the equilibrator was sampled with a 25 ml glass syringe. When necessary, dilutions of head space gas were made in the calibrated glass syringe and in the gas dilution bulb. Air samples, almost continuous, were interleaved with equilibrator head space samples which were limited to a half hour period during each hour. Carbon monoxide and ozone mixing ratios measured during Leg 4 of the 1993 cruise are shown in Figure 14.

CO Sea-Air Flux Measurements
An expression for sea-to-air transfer (flux) of a gas is (Wanninkhof 1992)

$$F = kS(pXw - pXa) \qquad (8)$$

where S is the solubility as concentration/pressure, and pXw and pXa are the partial pressures for gas X in water and air respectively, and k is the piston or gas transfer velocity. For carbon monoxide, pCOw was measured in the equilibrator, and a correction was applied for the presence of saturated water vapor (Bates *et al.*, 1993), viz.,

$$F = kS(Pa - Pw) \cdot pXequil \qquad (9)$$

with S as the solubility of CO (Wiesenburg and Guinasso, 1979) expressed as mol/L/atm, Pa and Pw are the pressures of air and water (pXa is taken to be negligible), and the gas transfer velocity k is given by equation 10 (from Liss and Merlivat, 1986)

$$k = 0.041u(Sc/600)^{-0.66} \qquad (10)$$

Here, u is the wind speed (corrected for 10 m above sea level) and Sc, the Schmidt number, is taken to be 580 (Bates et al., 1993). Alternatively, Wanninkhof (1992) gives (11)

$$k = 0.31u^2(Sc/660)^{1/2} \qquad (11)$$

for the gas transfer velocity. Mixing ratio of CO in the surface seawater is shown in Figure 15, along with the estimated flux (sea-to-air) of CO, for Leg 4, using both the Liss and Merlivat (1986) and the Wanninkhof (1992) gas transfer expressions.

Ozone
Ozone measurements were made by continuous operation of two Environics Ozone Analyzers, Models 300 B (Environics, Inc., West Willington, Connecticut). One analyzer ($O_3$1, SN 1257) was located in the pump van and sampled air on the bow tower at a point ~10 meter from the deck. The second analyzer ($O_3$2, SN 1256) was located behind the bridge of the ship, with an air intake on the flying bridge ~20 m ASL. Sample air passed through approximately 30 m of ¼"-OD Teflon® tubing. The 20 m difference in samle line length may have resulted in a loss of ~10% of the ozone (Thompson et al., 1993); however the intake location on the bow tower insured a higher degree of integrity with less influence from stack gases. The mean difference (2.3 ppbv, $O_3$1 - $O_3$2) was small but significant ($Pr(t \geq 5.6) \approx 0.001$), for those time when both instruments were operating. Prior to the cruise both analyzers were calibrated by the Dade County Department of Environmental Resources Management (DERM) in Miami, using EPA protocol; both were accurate to <1%; precision was <0.5% rsd at 100 ppb. The output of the instruments was averaged every minute and recorded on a computerized MET system. The signals were simultaneously sent to a strip chart recorder as back up to the computer system. Results are shown with those of atmospheric CO in Figure 14.

Nitrogen Oxides
Nitrogen oxides were measured by a chemiluminescence instrument built according to established protocols [e.g., Ridley et al. 1988; Carroll et al. 1985]. The NOx and associated PAN components are outlined in Figure 16. Air inlets for NO, NO_2, and NOy, along with the NO_2 permeation device, NOy converter and various Teflon valves (Delta; Gulf Technical Service) were housed in a sampling box suspended on a forward support beam of the bow tower directly above the front of the atmospheric sampling van. About 5 m of ¼"-OD Teflon sampling lines ran from the box to the van. This sampling box was plumbed to allow NO and NO_2 calibration gases to be inserted into the sampling line at a minimum distance downstream of the inlet filters. NO_2 calibrate gas was also directed into the NOy sampling line to provide a check on the conversion efficiency throughout the cruise. To avoid contamination by seasalt aerosols, each sampling line was capped by a 37-mm diameter 1-µm pore size Teflon filter (Gelman). Conversion of NO_2 into NO for chemiluminescence detection was accomplished within a 0.8-L photolysis chamber illuminated by a 300 watt Xenon lamp (ILC Technology). The up-beam end window was a 3"-diameter Pyrex disk (Esco Products); the down-beam end of the chamber was made from a 3"-diameter parabolic mirror (Edmund Scientific) coated for UV reflection (Al-MgF_2 film, Evaporated Metal Films, Ithaca NY). The chamber was designed to have uninterrupted air flow at all times; for all measurements other than the NO_2 ambient read and NO_2 calibrate, a motor-driven shutter system was employed to block the light path. Thus, for the NO_2 blank measurement, the door would be closed; however, a noise spike from an undetermined source voided many NO_2 blank determinations. In those cases the NO ambient read was used for the NO_2 blank rate; in cases where the shutter-closed reading was available, no difference was seen in the ambient NO_2 determination using the two methods. Overall efficiency of the cell was monitored throughout the cruise, average efficiency was 88%. For NOy, a molybdenum converter was used for reduction of NOy species to NO (Joseph and Spicer, 1978; Fehsenfeld et al., 1987). The air stream was passed over 8 g molybdenum wire (0.05 mm D) packed in 6"x $^3/_4$" stainless steel tubing temperature controlled (Thermologic) to 400°C. This unit was placed near the sample box inlet to minimize loss of nitric acid. In order to protect the plumbing and analytical components unit from particles from the convertor or from unconverted marine aerosols, the air passed through a 1-µm pore size Teflon filter downstream from the converter. Thus, aerosol nitrate was reduced by the converter. The convert system was evaluated in the laboratory prior to the cruise, where quantitative conversion of NO_2 was observed. Unfortunately, the NOy converter became contaminated after 8-Sep (JD 251) and could not be rebuilt. Air for all three chemiluminescence analytes (NO, NO_2, NOy) was routed from the box to the van through one sample line; this arrangement has been found to reduce variations in the background count rate. For NO and NOy analysis, the pressure drop in the lines and reaction vessel was controlled by a flow-limiting critical orifice (1.1 L/m) in the sampling box directly downstream of the inlet filter. Thus the line was held at reduced pressure (6.9 torr inside the reaction chamber) and travel time for the gas to the reaction chamber was estimated to be less than one second.

For NO_2 analysis, the orifice was bypassed and the flow and pressure drop was controlled by a mass flow controller downstream of the photolysis chamber; photolysis took place near atmospheric pressure and a flow of 1.24 L/min. Chemiluminescent emission was recorded by a 9658R photomultiplier tube (Thorn EMI) held at 1450 volts and housed in a cooled housing (Products For Research) maintained at -40°C. The housing assembly was mated to an internally gold coated stainless steel reaction vessel (design courtesy of B. Ridley) by an interface of containing a uv filter (Schott RG610). Data acquisition was controlled by a computer employing Labtech Notebook® software and Metrabyte® component boards for control of valves, relays, and motors. A timing sequence was established for the sequential determinations of NO, NO_2, and NOy, with a cycle time (including data recording and setup restarting) of twenty-five minutes. Calibrations for NO were performed on each cycle and for NO_2 and NOy each night. Photon counting intervals of 10 seconds were recorded for the duration of the cycle. The first 3-4 minutes of each measure and calibrate count segments were ignored to allow the system to equilibrate (first 1 minute for NO). Each run was scanned for spikes or other anomalies due to other shipboard instrumentation; questionable 10-second counts were deleted. For each rate, the resulting 10-second count values were averaged and converted to counts per second. Blank (zero) values were determined by reacting the gas stream with excess ozone prior to entering the reaction chamber. Except for part of JD 252-257, when the reaction chamber cooler was off, instrument blank values of ~300 cps produced random errors of ~4% for NO_2 but ~17% for NO (peak, 2σ) (Jenkins 1978); however total error including instrumental drift was estimated to be 50%. The sensitivities (counts per second per parts per trillion, cps/ppt) of the instrument were determined by standard techniques. For NO, a commercial calibration gas mixture (123 ppbv NO in N_2, Scott Specialty Gas) was injected into the inlet stream. For NO_2 and NOy, an 80 cc/min N_2 gas stream which passed over an NO_2 permeation device (VICI Metronics) housed in an insulated chamber held at 30°C (Thermologic) and added to the ambient air stream. The permeation rate of the device was determined from gravimetric analysis of the device over a period of 16 months to be -9.2 ng/min (Figure 17), in approximate agreement with the manufacturers specification of -10 ng/min. Average sensitivities during most of the cruise were 5.38 for NO; 5.47 for for NOy; and 4.46 for NO_2 (in units of cps/ppt). Measured sensitivities varied a few tenths cps/ppt around these means; excursions were generally related to temperature changes inside the equipment or to gas contamination from the ship.

Raw data for NO, NO_2, and NOy were processed into concentrations as follows.

1. An outlier funtion based on K.R. Nair, (Kennedy and Neville, 1976) was used to find the outliers for single values along a running 5-point sequence of data points for the blank and read values,

$$ABS(Xi-M))/\sigma = R \quad (12)$$

where Xi represents a single data point within the 5-point sequence, M is the mean of the 5 point group and σ is the standard deviation of the entire data set. If R > 1 the point was deleted.

2. After outliers were removed as above, noise corrections were made for the blank and read values for the periods when the reaction cooler was off using (3).

$$Xi^*(avg(C_{LN})/avg(C_{HN}) \quad (13)$$

Funtion 2 was again employed to these columns and resulting outliers removed. From a total of 911 data points, 33 blank values were removed representing 3.6%; 50 NO values representing 5.4%; 83 NO_2 values representing 9.1%. Of 236 data points for NOy, 8 were removed representing 3.4%.

3. The resulting corrected columns for the blank and read values were averaged on a 5 point system, then the read minus blank values were calculated. The night-time values for the NO read-blank were averaged to provide the machine NO artifact which turned out to be 4.9 PPT with a standard deviation of 2.08 PPT. This artifact was subtracted to give the night-time zero value.

4. The remaining read-blank values were divided by the average machine sensitivity to give the ambient concentrations. Some night-time values for NO remained which could not be arbitrarily removed.

5. The Average sensitivity was 4.24 cps/ppt with an average background count (blank) of 214 cps yielding a detection limit of 1.26 PPT based on 60 second counts.

6. Any non-zero NO measurements at night were assumed to be due to contamination from the ship and were deleted. A total of 733 NO, NO_2, and NOy, and 675 PAN measurements were generated; these are shown in Figure 18.

Peroxyacetyl Nitrate

Peroxyacetyl Nitrate (PAN) analysis was performed with a Shimadzu Mini-2 gas chromatograph with an electron capture detector equipped with a packed column (10% carbowax 600 on 80/100 Supelcoport). Column and detector temperature were maintained at 30°C. The carrier gas was P-5 (5% methane in argon) at 23 mL/min (scrubbed with an oxygen trap). All plumbing external to the chromatograph used $^1/_8$" or $^1/_{16}$" OD Teflon® tubing. The equipment was mounted on a 6'-high rack adjacent to the chemiluminescence detector (Figure 16). Retention time for PAN was ~100s. Detector output was recorded via a PC using LabTech Notebook® software which also provided full instrument control. A chromatogram was obtained approximately every hour.

To obtain sufficient PAN from remote atmospheric samples for quantitation, a cryogenic trapping procedure was employed (Gallagher *et al.*, 1990). The ambient air line was directed through a $^1/_8$" OD loop of 316 stainless steel immersed in a dewar for a trapping time of 20 minutes, with air flow controlled at 80 cc/m by a mass flow controller, to obtain a sample volume of 1600 ml. A two-stage Neslab immersion cooler maintained an ethanol bath in the dewar at -90±4°C. Following the trapping of ambient air, the trap was flushed by carrier gas for 10 s; this was necessary to flush oxygen from the loop and avoid saturating the ECD. Finally, the loop was warmed in a water bath at room temperature and injection into the chromatograph. Vertical motion of the sample loop (into and out of the dewar or water bath) was controlled by a worm gear and $^1/_{15}$-hp electric motor; angular travel (directing the loop towards the dewer or towards the water bath) was governed by air-driven piston. All operations were controlled by the computer. Ambient sampling lines (¼"-OD Teflon) ran from a sample box on the bow tower down and into the NOx Van, a distance of ~5 m. Previous tests (Carsey et al., 1991) have shown the extent of any PAN losses in the sample line to be minimal. A total of 675 chromatograms were obtained.

A PAN generation system was built according to published design (Warneck & Zerbach, 1992). PAN was generated by photolysis of acetone in the presence of oxygen and NO_2. NO_2 was obtained from a permeation device. PAN generation capacity was controlled by the amount of NO_2 from the permeation device. A calibration factor was required which would convert ambient PAN peak areas into equivalent mass of PAN; this was determined as follows. The flow from the PAN generator was passed through the cryogenic sample loop for a specified amount of time. The loop was then injected into the GC and the peak area determined. The gas stream was directed through a molybdenum catalyst (containing 0.1 mm-diameter molybdenum wire held at 370°C) where PAN was converted to nitric oxide with an efficiency of ~80%. This gas was then introduced into the chemiluminescent nitric oxide detector and analyzed. From the resulting procedure, a calibration constant was determined. This factor was used to convert the ambient sample peak areas into concentrations. The resulting concentrations are shown in Figure 18.

Aerosol Measurements

Aerosol samples were obtained during 36 sampling intervals during the cruise; the approximate sample locations are shown in Figure 4 and listed in Table V. The samples were obtained with a six-stage Sierra high-volume cascade impactor (Series 230) or bulk sampler unit housed in identical anodized aluminum shelter. The equipment was mounted on a 10-m air sampling tower approximately 20 m above the water line. The 50% cut sizes (Dp_{50}) for the cascade impactor as specified by the manufacturer are 3.6, 1.5, 0.75, 0.48, and 0.24 µm radius for impactor stages 1-5; stage 6 collects all aerosols < 0.24 µm. These cut sizes were recomputed (Marple and Liu, 1974) for 25°C, density=1.15 g cm^{-3} (sea salt), and measured average air flow was 1.13 m^3 min^{-1} (40.6 ft^3 min^{-1}); the resulting cut sizes were quite similar (3.4, 1.3, 0.65, 0.39, and 0.21 µm). Some undersampling of large (>10 µm) particles has been indicated for this type of sampler (Pszenny 1992); thus, those results must be viewed with caution. The cascade impactor was loaded with Whatman 41 filters, one slotted filter per stage on stages 1-5 and one 8.5x11-inch filter on stage six. The bulk sampler was loaded with a single 8.5x11 Whatman 41 filter. All filter samples were changed at ~6--hour intervals. The air flow rate was maintained at 1.13 0.04 m^3 min^{-1}; sample volumes averaged 406.7m^3.

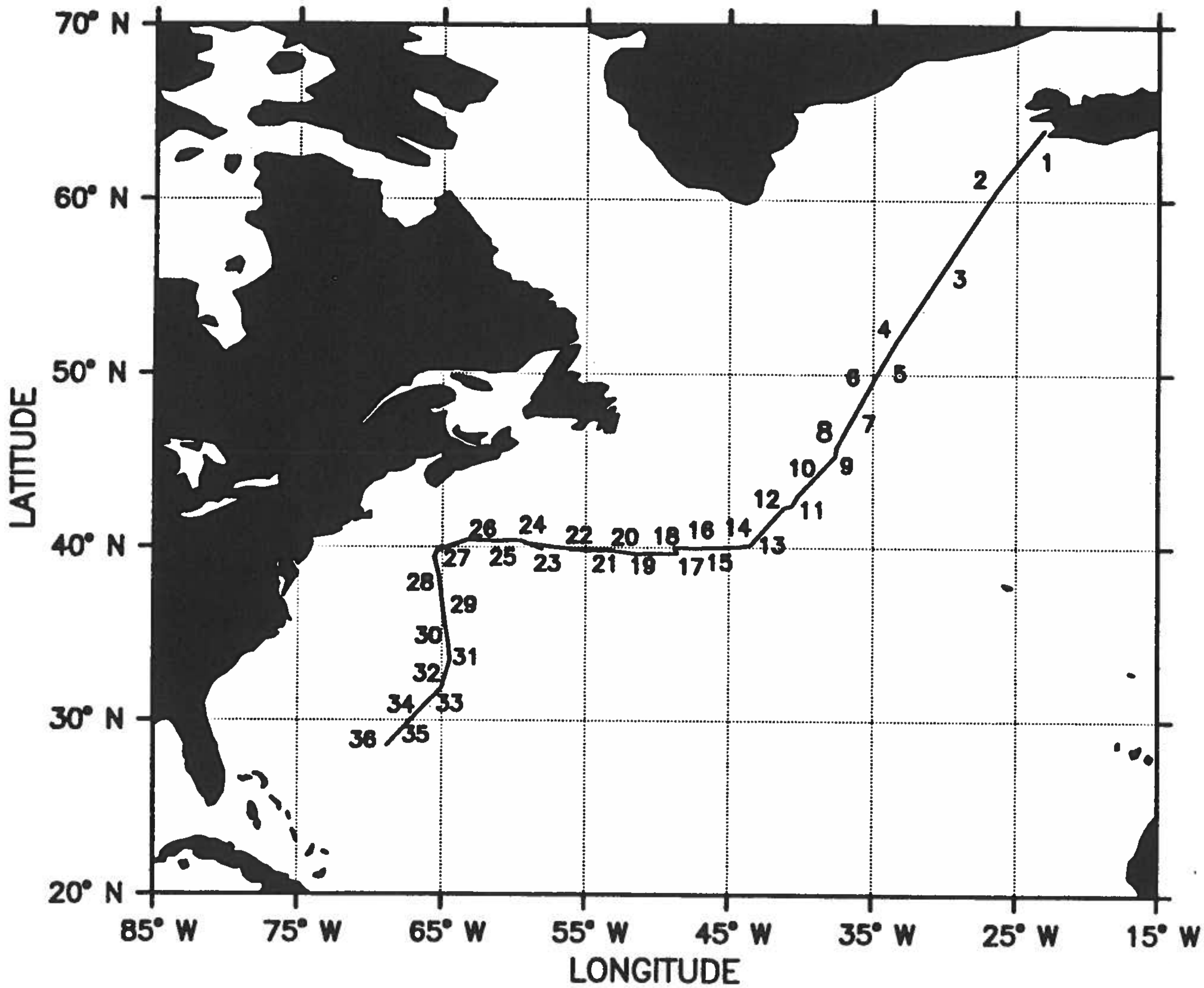

Figure 4
Location of Aerosol Sampling

Table V
Aerosol Sample Times and Locations

Sample	Lat N	Lon W	Start JD	Stop JD	Air Mass	Distance/time to land
1	64.05	23.02	247.69	248.18	Clean marine	
2	61.47	25.60	248.20	248.42	Clean marine	
3	60.48	26.52	249.42	250.17	Europe	2.4 km, 3½ d
4	51.95	33.32	250.18	250.43	Clean marine	
5	50.77	34.17	250.44	250.68	Polar Canadian	
6	49.72	34.90	250.69	251.16	Polar Canadian	
7	47.08	36.65	251.18	251.42	Polar Canadian	
8	45.80	37.50	251.43	251.67	Polar Canadian	
9	45.30	37.62	251.69	251.92	Polar Canadian	
10	44.82	38.15	251.93	252.42	United Staes	3.1 km, 4 d
11	43.00	40.20	252.44	252.67	Clean Marine	
12	42.42	40.63	252.68	252.92	Clean Marine	
13	42.30	41.17	252.93	253.17	Clean Marine	
14	41.13	42.43	253.19	253.42	United States	3.3 km 8½ d
15	40.15	43.48	253.44	253.68	Clean Marine	
16	40.02	44.40	253.69	254.17	Clean Marine	
17	39.98	47.32	254.18	254.41	Clean Marine	
18	40.00	48.80	254.43	254.67	Clean Marine	
19	39.67	48.55	254.68	254.92	Clean Marine	
20	39.65	49.95	254.93	255.17	Clean Marine	
21	39.63	51.47	255.19	255.68	United States	1 km, <2 d
22	39.83	53.35	255.69	256.10	Clean North American	
23	39.87	56.07	256.11	256.41	Clean North American	
24	39.90	58.03	256.43	256.92	Clean North American	
25	40.40	59.53	256.93	257.17	Clean North American	
26	40.37	61.38	257.20	257.42	Clean North American	
27	40.42	63.25	257.45	257.75	Clean North American	
28	39.78	65.35	257.76	258.01	Clean North American	
29	39.42	65.57	258.02	258.19	Clean North American	
30	38.33	65.25	258.20	258.42	Clean North American	
31	37.25	65.07	258.43	258.68	Clean North American	
32	35.87	64.85	258.69	258.91	Clean North American	
33	34.42	64.58	258.93	259.17	Clean North American	
34	31.88	65.02	259.89	260.13	Clean marine	
35	30.90	66.15	260.15	260.38	Clean marine	
36	29.90	67.30	260.40	260.72	Clean marine	

Filter samples were analyzed as follows: two 2-inch strips from each impactor filter were extracted with 10 ml deionized water (DIW) using ultrasonic agitation, and analyzed for anions and cations. All samples were analyzed with a Dionex ion chromatography system, which contained separate anion and cation analytical systems. On the anion system, analysis for Cl^-, NO_3^-, $SO_4^=$, and methane sulfonate (MSA) employed a gradient involving 1 mM NaOH, 200 mM NaOH, 5% methanol and DIW; on the cation system, analysis for Na^+, K^+, and NH_4^+, was isocratic and employed a 40 mM HCl eluant. Standards were made by volumetric dilution of NIST traceable reference materials. In three cases, high Na^+ and Cl^- concentrations in smaller particle sizes were interpreted to be contamination by seasalt aerosol: sample 3 <0.24 µm; sample 24, 0.48 µm; and sample 16, 0.24, 0.48, and <0.24 µm. For those cases, Na^+ and Cl^- concentrations were replaced by averages from adjacent samples of the same particle size. In addition to the above measured analytes, a nonseasalt sulfate ($nssSO_4^=$) concentration was computed as

$$[nssSO_4^=] = [SO_4^=] - 0.0602*[Na^+] \qquad (14)$$

to correct for the seawater derived sulfate (Wilson, 1975). Negative values of $nssSO_4^=$

were set equal to half the detection limit of $SO_4^=$ (Table VI). Similarly, a nonseasalt chloride ($defCl^-$) was computed as

$$[defCl^-] = [Cl^-] - 1.165*[Na^+]. \qquad (15)$$

Assuming there were no nonseasalt sources of Cl^-, a negative value of $defCl^-$ represents a loss of chlorine from the original seasalt concentration. Values of $defCl^-$ were capped at the original Cl^- concentration.

Plots of size-selective ion concentrations are shown in Figures 19-27 and are given in Appendix II.

Table VI
Aerosol Analytical Parameters

Variable	Unit	Detection Limit[1]	Precision (%)[2]
MSA (slot)	nmol m^{-3}	0.221	3.3
MSA (8.5x11)	"	0.046	"
Cl^- (slot)	"	1.54	2.98
Cl^- (8.5x11)	"	4.71	"
NO_3^- (slot)	"	0.14	3.35
NO_3^- (8.5x11)	"	0.549	"
$SO_4^=$ (slot)	"	0.433	3.10
$SO_4^=$ (8.5x11)	"	1.18	"
Na^+ (slot)	"	2.07	3.83
Na^+ (8.5x11)	"	5.48	"
NH_4^+ (slot)	"	2.86	4.09
NH_4^+ (8.5x11)	"	1.75	"
K^+ (slot)	"	1.45	6.06
K^+ (8.5x1155	"	1.03	"

1 The detection limit is the concentration equivalent to an instrument signal significantly different from the blank signal (Miller and Miller, 1988), i.e., $DL = (R_{c=0}+3s_B)*m+b$, where m and b are the relevant calibration slope and intercepts, s_B is the standard deviation of the blank instrument response of the analyte from the 23 blank filters, and $R_{C=0}$ is the instrument response when concentration = 0.
2. Based on analysis of the standards.

Back Trajectories

During Leg 4 of the cruise, rawinsondes were launched every at 0Z and 12Z. This data was forwarded to NOAA/ERL along with other appropriate meteorological data and included as parameterization for the Hybrid Single-Particle Lagrangian Integrated Trajectories (Hy-Split) model (Draxler 1992). The model was then run to generate back trajectories at the location of the ship and at terminal altitudes of 1km and 2km. The terminal heights were chosen as a reasonable estimate for the top of the marine boundary layer, considered the most appropriate terminus for classifying the surface marine air (Draxler, personal comm., 1994). Back trajectories for Leg 4 are shown in Figures 29 through 44 (JD 247-263). The air masses encountered by the ship, as defined by the back trajectories and preceding chemical results, can be delineated into five types as follows.

□ Region 1 JD 247.5-250.2. Air was marine subtropical, in anticyclonic circulation passing over Europe (U.K.) 3-5 days prior to arrival above the ship. Radon measurements, starting on 5-Sep (JD 248) at over 300 ng/m³ were decreasing; black carbon (BC) was steady at ~200 pCi/m³. CO was relatively low at ~110 ppb, ozone at ~80 ppb. A unaccounted dip in ozone was noted prior to and through midnight of 5-Sep (JD 248). Condensation nuclei (CN) counts, quite irregular at the beginning of the data set, resolved to about 1100/cm³ but dropped rapidly from Sep 6 to Sep 7 (JD 249-250). NOy was elevated through 6-Sep (JD 249), up to 1.6 ppb, but dropped rapidly by midnight. While the ship was heading roughly southwest, winds during this period are shifting more to port; near noon of 6-Sep, winds shifted rapidly to starboard and increase in speed, marking a change in sampled air mass.

□ Region 2 JD 250.2-252.1. Air was of continental polar origin, passing over central Canada and Labrador, then 2-3 days over the ocean prior to arrival above the ship. During this time Rn was steady at ~150 pCi/m³. BC had an unaccounted maxima around noon of 7-Sep (JD 250) near 500 ng/m³; following that, very low (remote marine) values were noted (~20 ng/m³). Ozone and CO were consistent at about 30 and 60 ppb, resp. Between 0Z and 12Z of 9-Sep (JD 252), a shift was noted to primarily marine subtropical (central gyre) air. A simultaneous drop in CO and O3 was noted. Rn continued to decrease, with a minimum in the afternoon of 9-Sep (JD 252). BC unexpectedly rose, to a peak before noon at 9-Sep (JD 252) of 560 ng/m³. CN counts remained low.

□ Region 3 JD 252.1 - 255.35. Air origin was marine subtropical of central gyre 'Bermuda high') circulation, with minimal influence from the N. America. Ozone and CO mixing ratios were low, at 58 ppb and 70 ppb, respectively. BC and Rn mixing ratios were also low. CN counts rose slightly during 10-Sep (JD 253), then dropped during 11-Sep (JD 254). JD 255 (noon). Chemical measurements and 1 km back trajectories indicated a dramatic shift of air mass origin to northern U.S. and Canada near noon of 12-Sep (JD 255). CN counts showed an impressive spike to ~ 2500 part/cm³; Rn, CO, and ozone also rose. A synoptic weather map indicated the passage of a cold front at approximately the position of the ship at noon on 12-Sep.

□ Region 4 JD 255.35 - 260.5. Air mass was continental polar air which had passed over successively more southern coastal areas during this time (Labrador - Newfoundland - New England), then took a 1-3 day transit to the vicinity of the ship. Ozone mixing ratios were ~30 ppb, CO at ~50; Rn and BC were generally low. BC showed minor increases in the afternoon of 12-Sep (JD 255) and before noon on the next day; both occurrences were barely perceptible in CO and ozone data. A small rise in CO and ozone in the afternoon of 14-Sep (JD 257) was not evident in BC or Rn data.

□ Region 5 JD 260.5 - 263.5. Air mass was subtropical marine of 'Bermuda high' circulation, although 8-10 days previous was over NE United States or SW Canada. BC was generally low with some excursions of >200 ng/m³. CO and ozone remain constant and low, with no sign of anthropogenic influence. Radon instrumentation was taken off-line around noon on 18-Sep (JD 261.48).

CONCLUSIONS

The preceding has been an overview of the sampling and analytical equipment operating during the Atmospheric Chemistry portion, Leg 4, of the 1993 ACCP/OACES/RITS cruise. Specifically, instrumental descriptions of the various analytical components, the aerosols sampling units, and the meteorological data acquisition system (MDAS) are provided. Graphical presentations of representative chemical and meteorological results are presented. Although every effort has been made to obtain the best possible data, some errors may remain; the authors request that they be notified if errors are discovered. It is expected that data described herein will be employed in journal articles or scientific meetings by the authors. However, the data is available to interested individuals; those parties are requested to communicate with the chief scientist.

ACKNOWLEDGEMENTS

The authors would like to thank the officers and crew of the R/V MALCOLM BALDRIGE for providing a pleasant, efficient, and helpful platform for these investigations. We would like to thank Ronald Draxler for his considerable help in setting up his back trajectory program at AOML. Finally, we would like to thank Dr. A. Pszenny for his assistance with the aerosol sampling and ion chromatography efforts.

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FIGURE CAPTIONS

Figure 1. Cruise track of the 1993 North Atlantic Cruise (MB-93-03/04), 1-June-93 through 22-Sep-1993 (page 2).

Figure 2. Cruise track of the Leg 4 of the 1993 North Atlantic Cruise (MB-93-03/04), 4-Sep-93 through 22-Sep-1993. Bold numbers show location of seven daytime sampling stations (page 4).

Figure 3. Diagram of the NOAA R/V MALCOLM BALDRIGE, showing the position of the atmospheric sampling van and the bow tower. The pump van is located F-deck, just aft of the tower (page 5).

Figure 4. Cruise track of Leg 4, showing approximate location of ship at the midpoint of the sampling time associated with each aerosol sample (page 15).

Figure 5. Wind speed measurements for Leg 4. Upper horizontal axis is the calendar Julian day, lower horizontal axis is the Julian day number.

Figure 6. Relative wind direction as measured by the MDAS system (solid line), and as measured by the ship's anemometers located on the bridge tower (port side), denoted by '+'. A drift in the MDAS data is noted for 14-16 Sep (JD 257-259). Both MDAS and the ship's anemometer data is unusable after 16-Sep (JD 259) because the ship was often oriented for CTD work.

Figure 7. Ambient air temperature from the MET sensor (solid line, left axis) and from the psychrometer (dry bulb) reading (dotted line. The relative humidity (psychrometer) is shown by the triangles.

Figure 8. Epply ultraviolet radiation results for Leg 4; units of watts/m^2. Data prior to 8-Sept. is not useable. For comparison purposes, a plot of the calculated solar zenith angle is shown (dotted line), from an algorithm by Dr. H. Gordon, Dept. of Physics, University of Miami (private communication).

Figure 9. Condensation nuclei counts in particles/cm^3.

Figure 10. The NBS calibration chart of pressure versus flow rate for determination of true flow rates for the hi-vol pump calibration. Line with squares represents pressure (P) versus flow rate ($ft^3\ min^{-1}$); line with circles represents pressure (P) versus flow rate ($m^3\ min^{-1}$). Line with triangles represents pressure squared (P^2) versus flow rate ($m^3\ min^{-1}$).

Figure 11. Results of the hi-vol calibrations. Lines represents the correct flow rate versus corrected pressure for hi-vol 1 (solid) and hi-vol 2 (dot), as determined on 19-Sep-93.

Figure 12. Wind direction (upper) and wind speed (lower) calibration plots for April 1993.

Figure 13. Concentrations of black carbon six-hour averaged data (horizontal bar, left axis) and ^{222}Rn (spike, right axis).

Figure 14. Mixing ratios of atmospheric carbon monoxide (+, left axis) and Environics ozone (line, right axis).

Figure 15. Calculated sea-air flux of CO in μM/m²/day for Leg 4 of the 1993 cruise. Δ: Liss and Merlivat calculation; x: Wanninkhof calculation. Line represents the

Figure 16. Diagram of the N-oxides chemiluminescence equipment, PAN gas chromatographic equipment, and sampling box.

Figure 17. Gravimetric determination of the NO_2 permeation rate over a period of 16 months. The rate for the period of operation during the cruise was determined to be -9.2 ng/min.

Figure 18. Mixing rations of NO (spike, left axis), NO_2 (Δ, right axis), and NOy (line, 0-700 pptv). Small boxes below upper axis represent duration of the seven daytime sampling stations.

Figures 19-27. Aerosol data for Leg 4. Each vertical bar represents the sampling time for a high-vol impactor sample. Horizontal lines within a vertical bar represent concentrations of successive size cuts as noted. Sample numbers are shown in the upper region of each frame. Concentration s (units of nmol/m^3) are denoted in the y-axis.

Figure 28. Surface projection weather map for 1200Z, 12-Sep-93 (JD 255). Horizontal and vertical grid lines are at each 10° interval. The ship was located at approximately 39.7° N, 53.17° W, denoted by a small circle.

Appendix I
Back trajectories computed by the Hy-Split program (Draxler, 1992). Each figure show the trajectories terminating at 1 km (solid line) and 2 km altitude (dotted line) above the ship's position at 0000Z and 1200Z of each Julian day of Leg 4 (JD 247-263).

Appendix II
Tables of measurement results.

Appendix III
Rawinsonde plots. X denotes potential temperature, Δ denotes humidity, versus height (pressure) and estimated height (km).

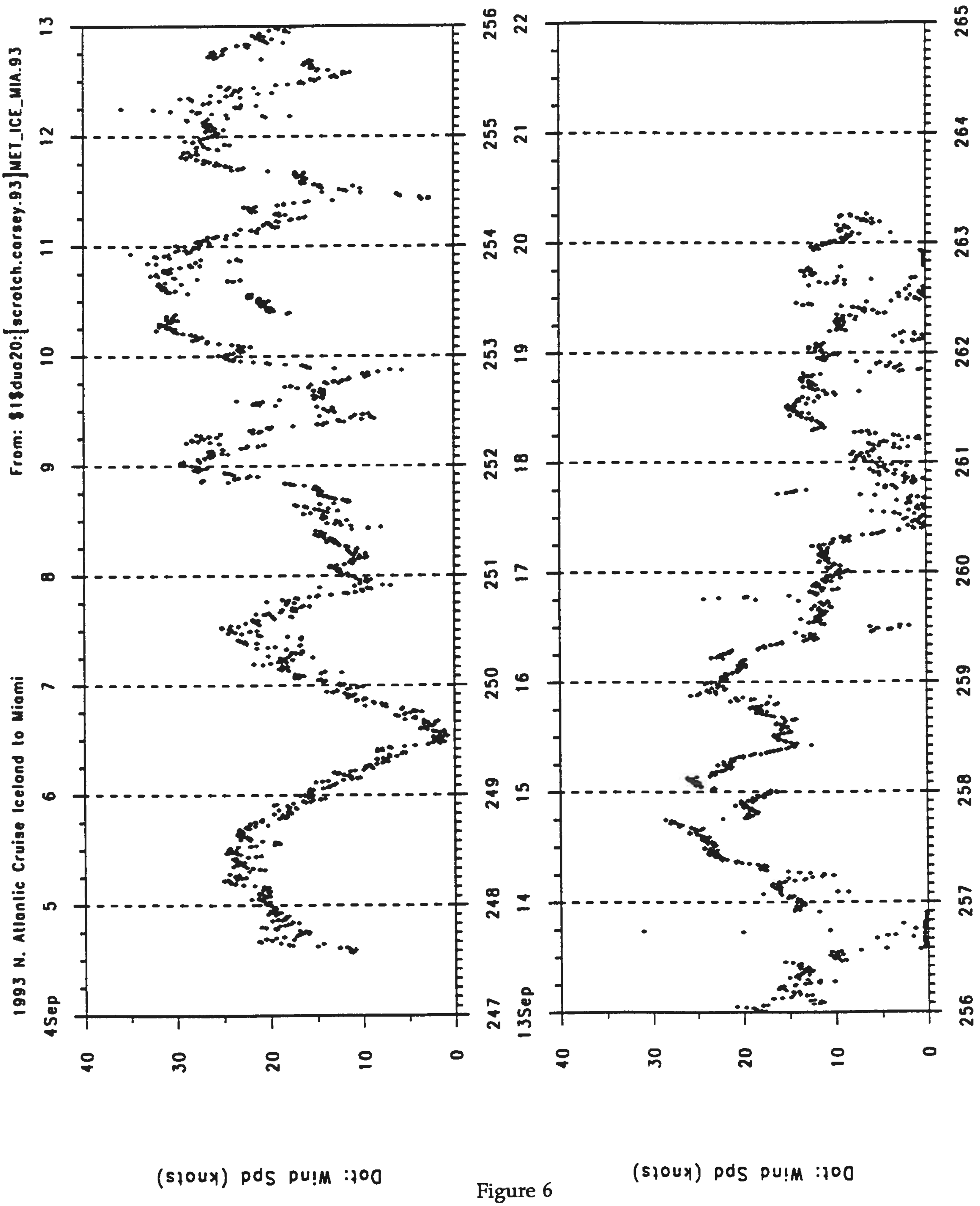
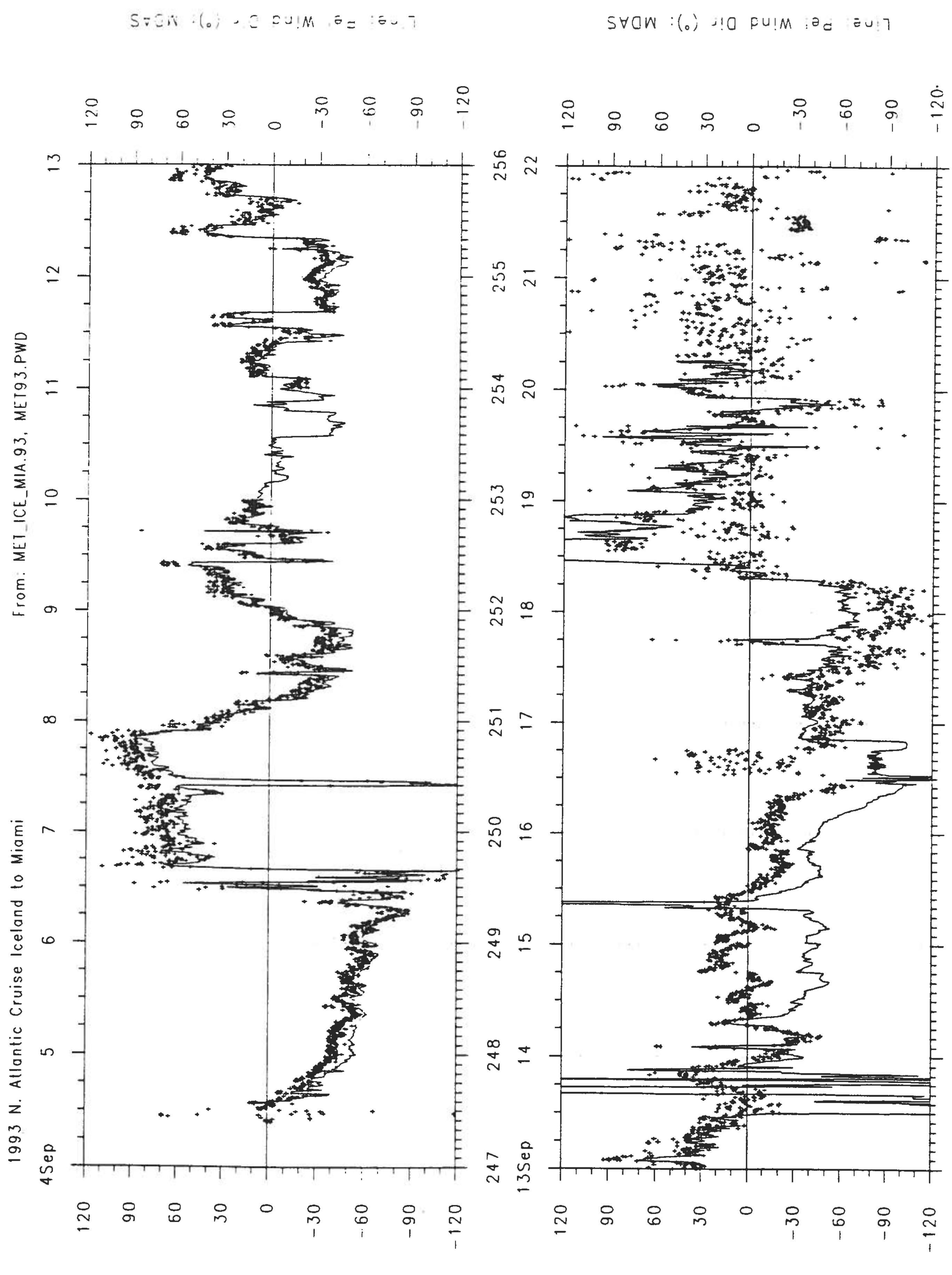

1993 N. Atlantic Cruise Iceland to Miami
From: 1dua20:[scratch.carsey.93]MET_ICE_MIA.93
Dot: Wind Spd (knots)
Dot: Wind Spd (knots)

Figure 6



1993 N. Atlantic Cruise Iceland to Miami
From: MET_ICE_MIA.93, MET93.PWD
Line: Rel Wind Dir (°): MDAS
+: Rel Wind Dir (°): SCS, Port
4Sep
13Sep

Figure 7

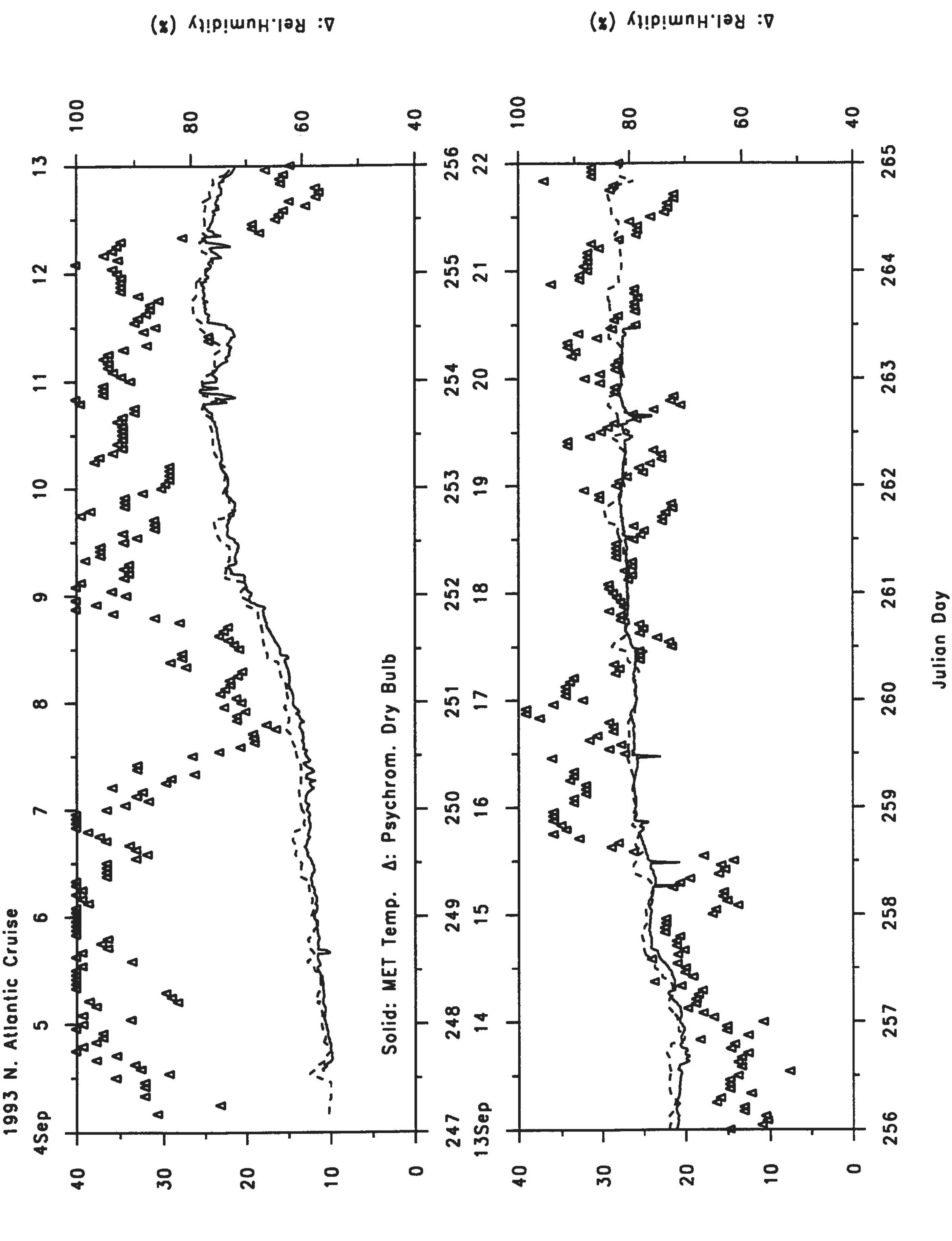

1993 N. Atlantic Cruise
Solid: MET Temp. Δ: Psychrom. Dry Bulb
Line:AirTemp.(°C)
Δ: Rel.Humidity (%)
Air Temp. (°C)
Δ: Rel.Humidity (%)
Julian Day
4Sep
13Sep

Figure 8

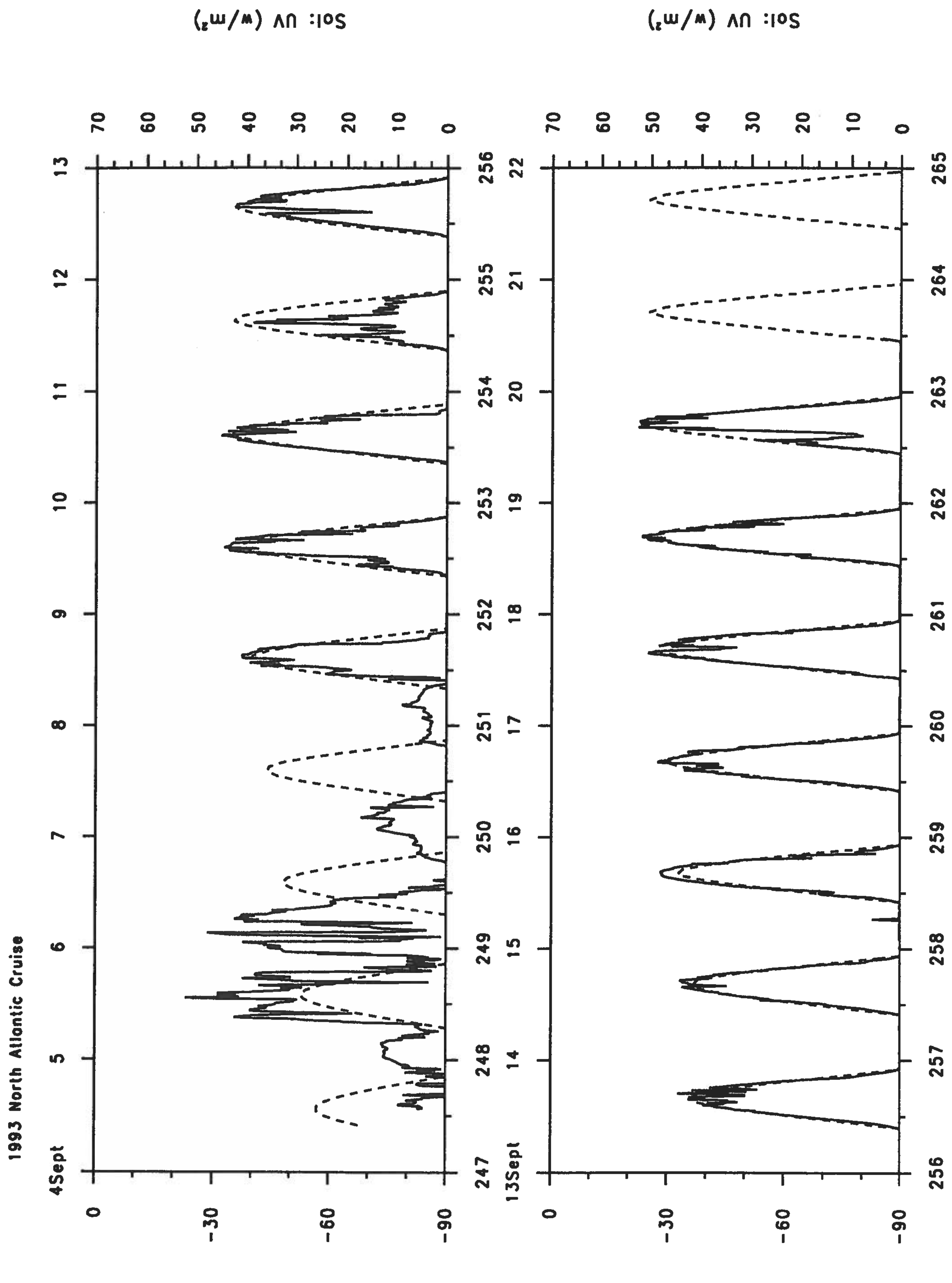

1993 North Atlantic Cruise
Sol: UV (w/m²)
Sol: UV (w/m²)
Dash: Zen Angle (°)
Dash: Zen Angle (°)
4Sept
13Sept

Figure 9

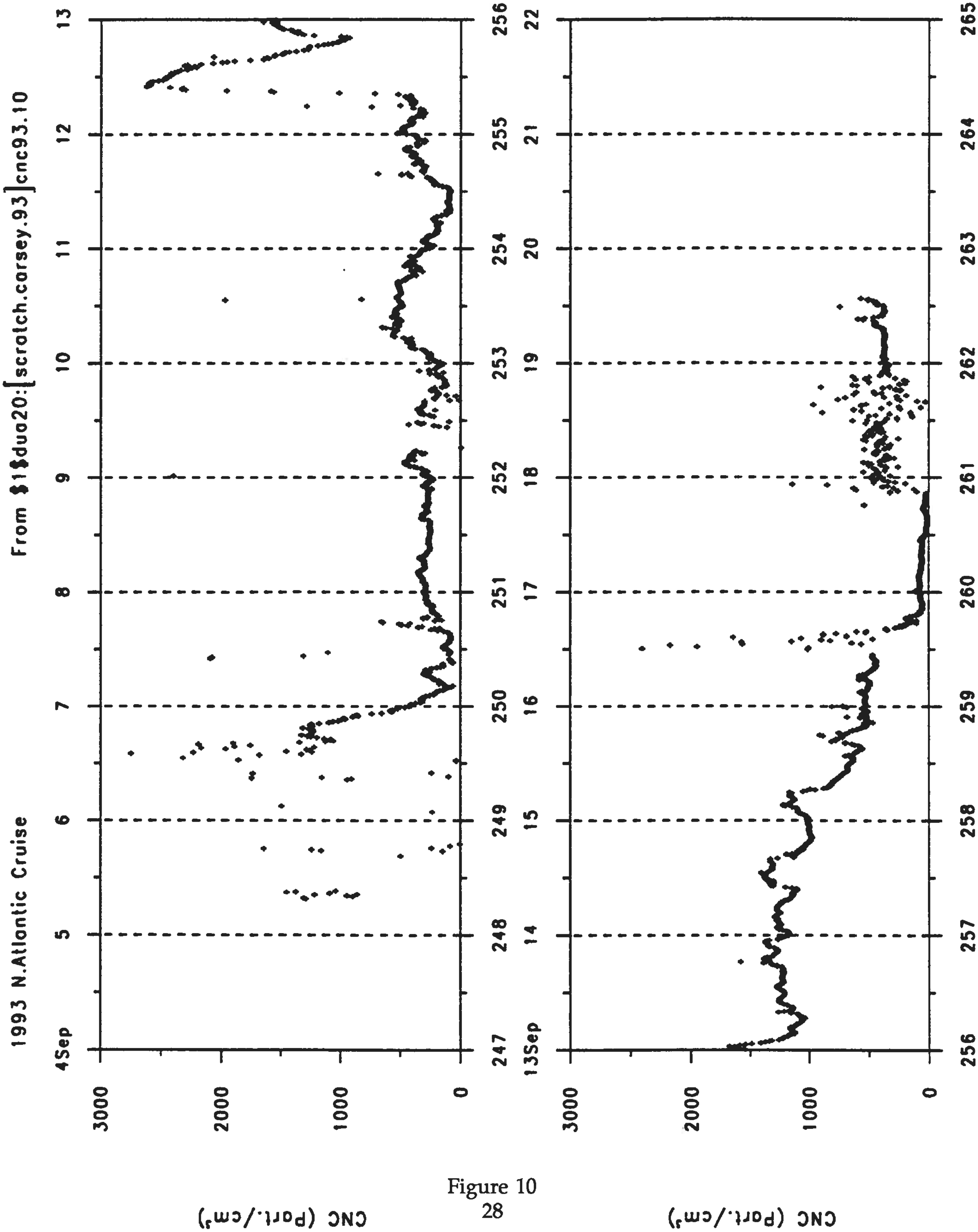

1993 N.Atlantic Cruise
From 1dua20:[scratch.carsey.93]cnc93.10
CNC (Part./cm³)
3000
2000
1000
0
4Sep
5
6
7
8
9
10
11
12
13
247
248
249
250
251
252
253
254
255
256
13Sep
14
15
16
17
18
19
20
21
22
256
257
258
259
260
261
262
263
264
265

Figure 10

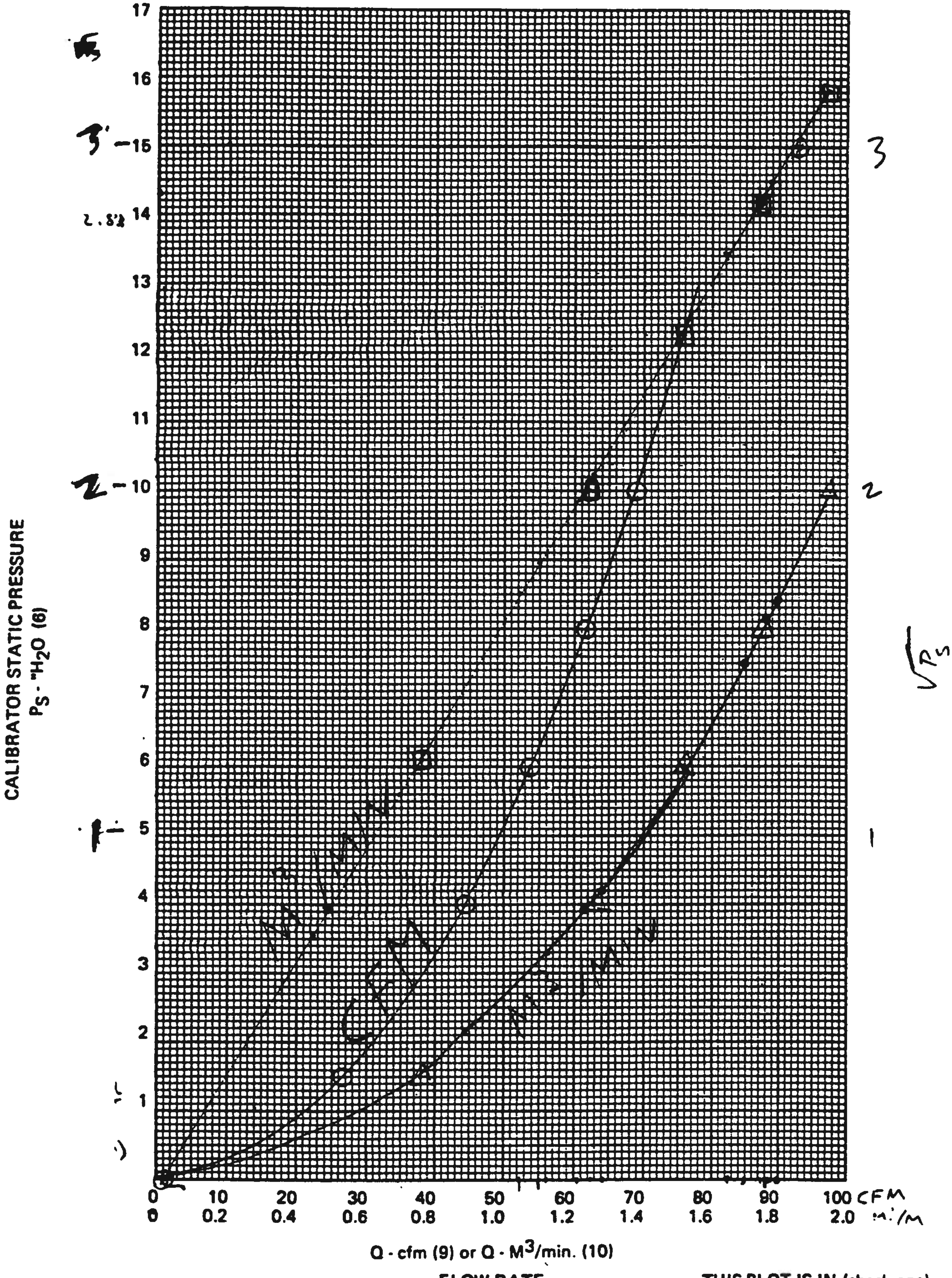


Figure 11

@ 1 atm, 25°C

THIS PLOT IS IN (check one)
cfm ⊙
M^3/min. △
They are NOT EQUIVALENT
m³/min vs. $\sqrt{P_s}$ ☐

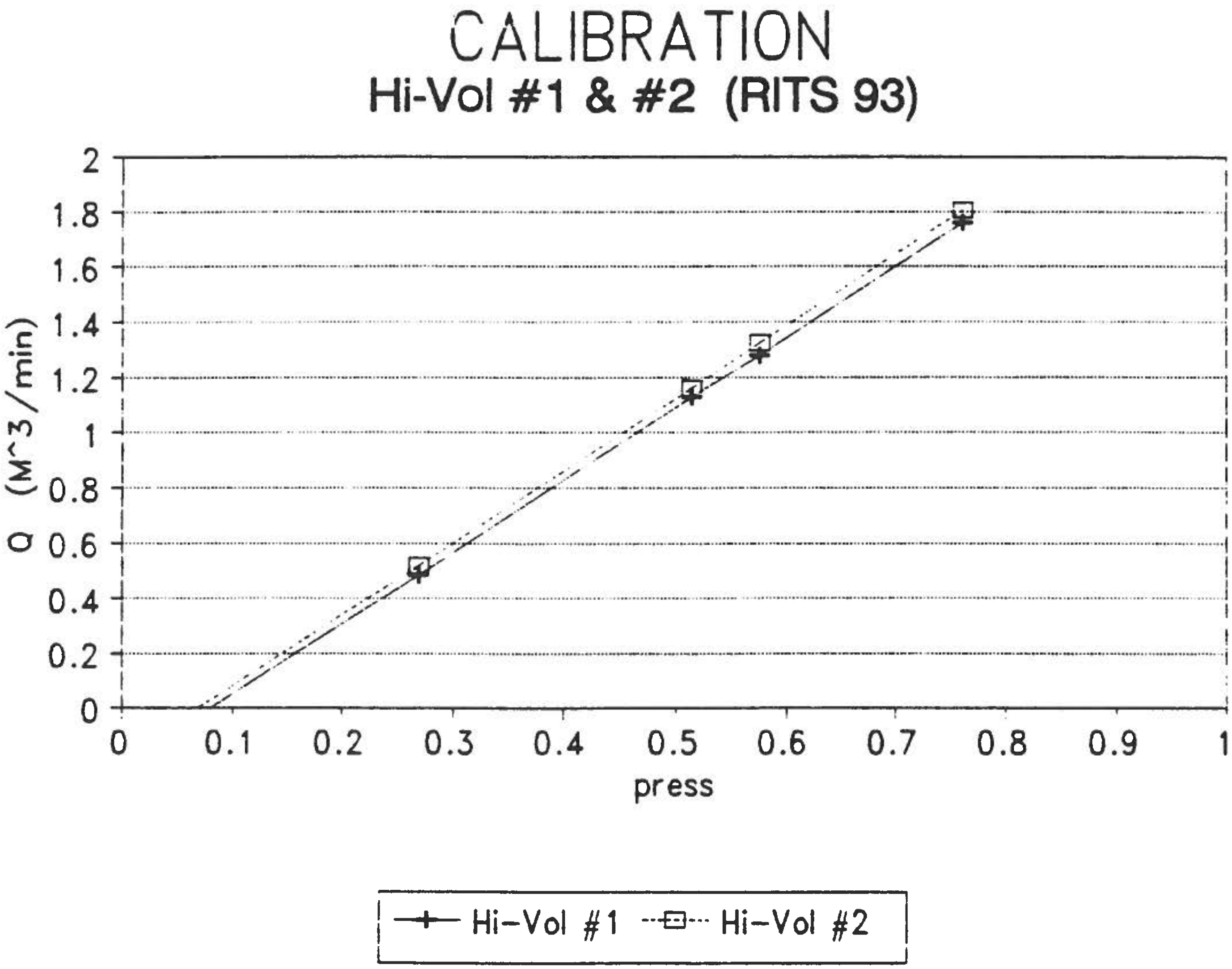
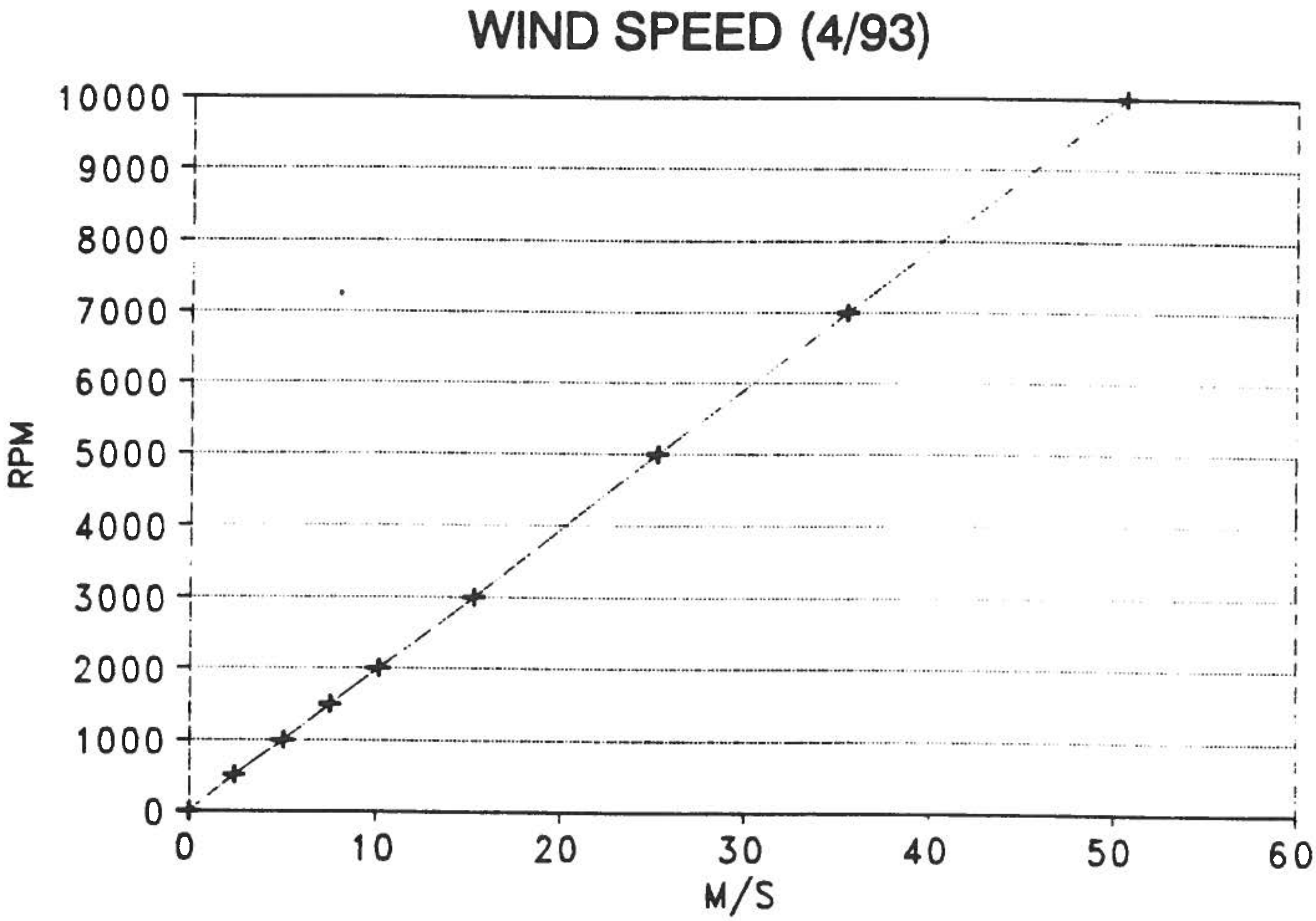

CALIBRATION
Hi-Vol #1 & #2 (RITS 93)
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Q (M^3/min)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
press
Hi-Vol #1
Hi-Vol #2

Figure 12


WIND SPEED (4/93)
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
RPM
0
10
20
30
40
50
60
M/S

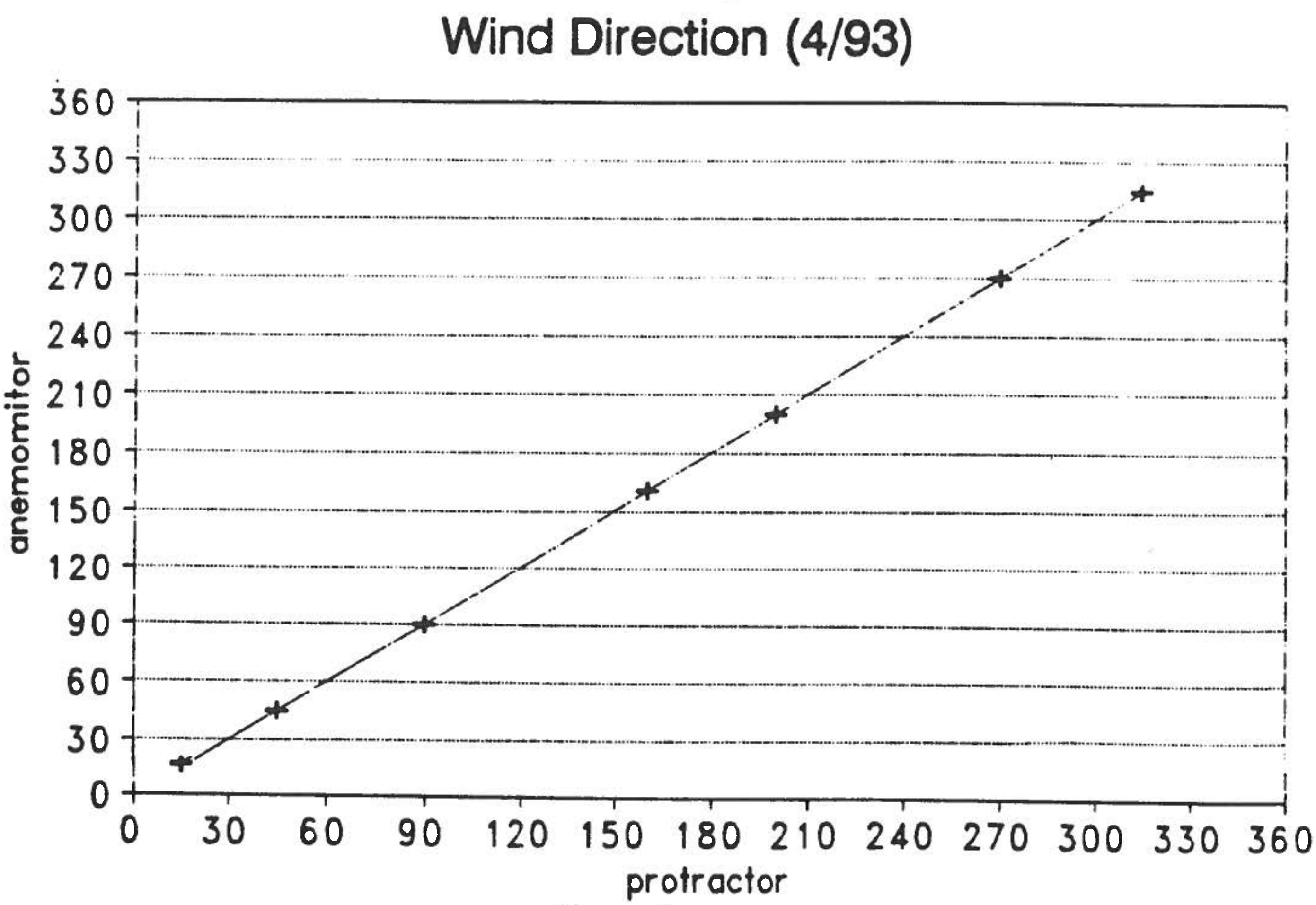

Wind Direction (4/93)
360
330
300
270
240
210
180
150
120
90
60
30
0
anemomitor
0
30
60
90
120
150
180
210
240
270
300
330
360
protractor

Figure 13

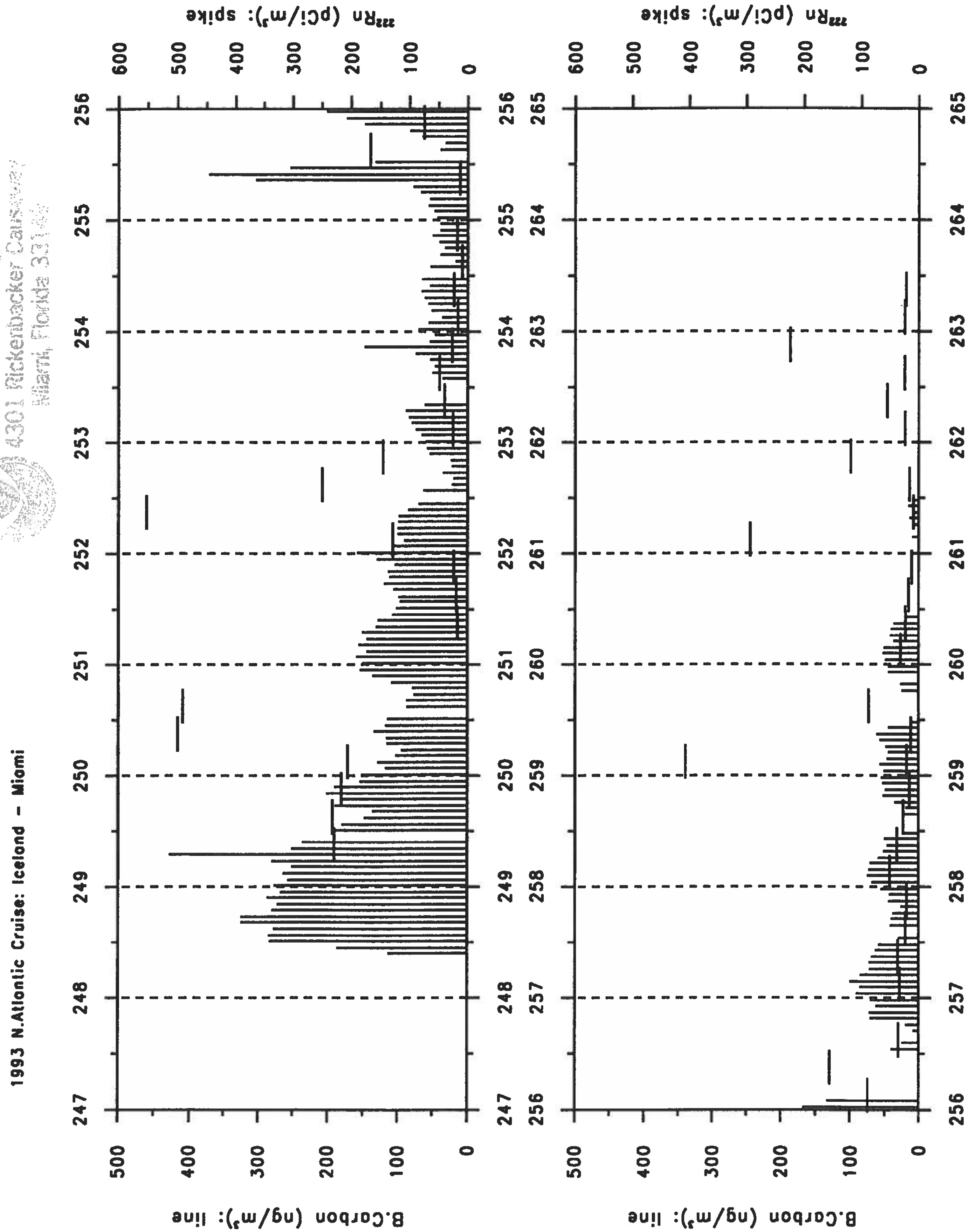

1993 N.Atlantic Cruise: Iceland - Miami
B.Carbon (ng/m³): line
²²²Rn (pCi/m³): spike
0
100
200
300
400
500
600
247
248
249
250
251
252
253
254
255
256
257
258
259
260
261
262
263
264
265

Figure 14

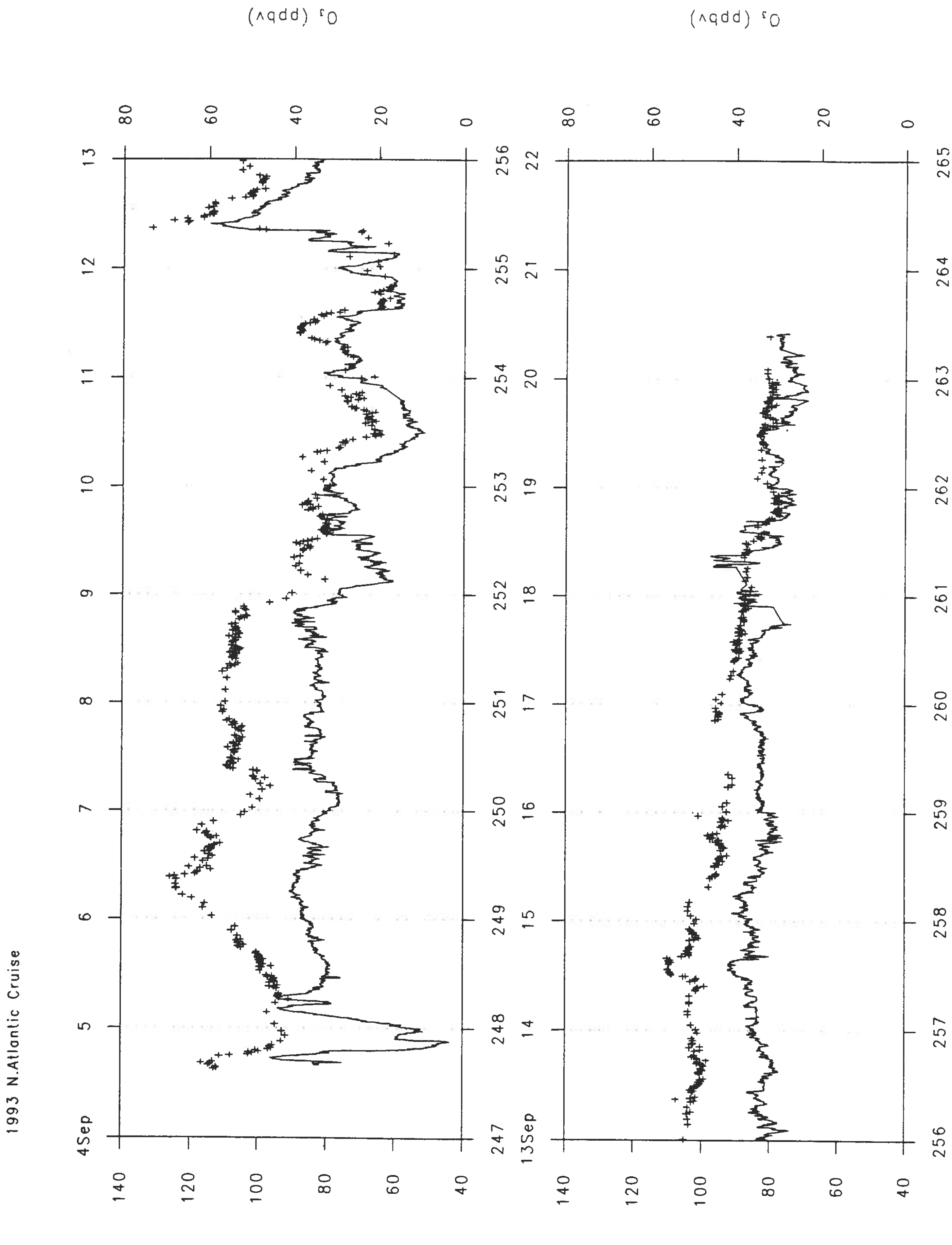


Figure 15

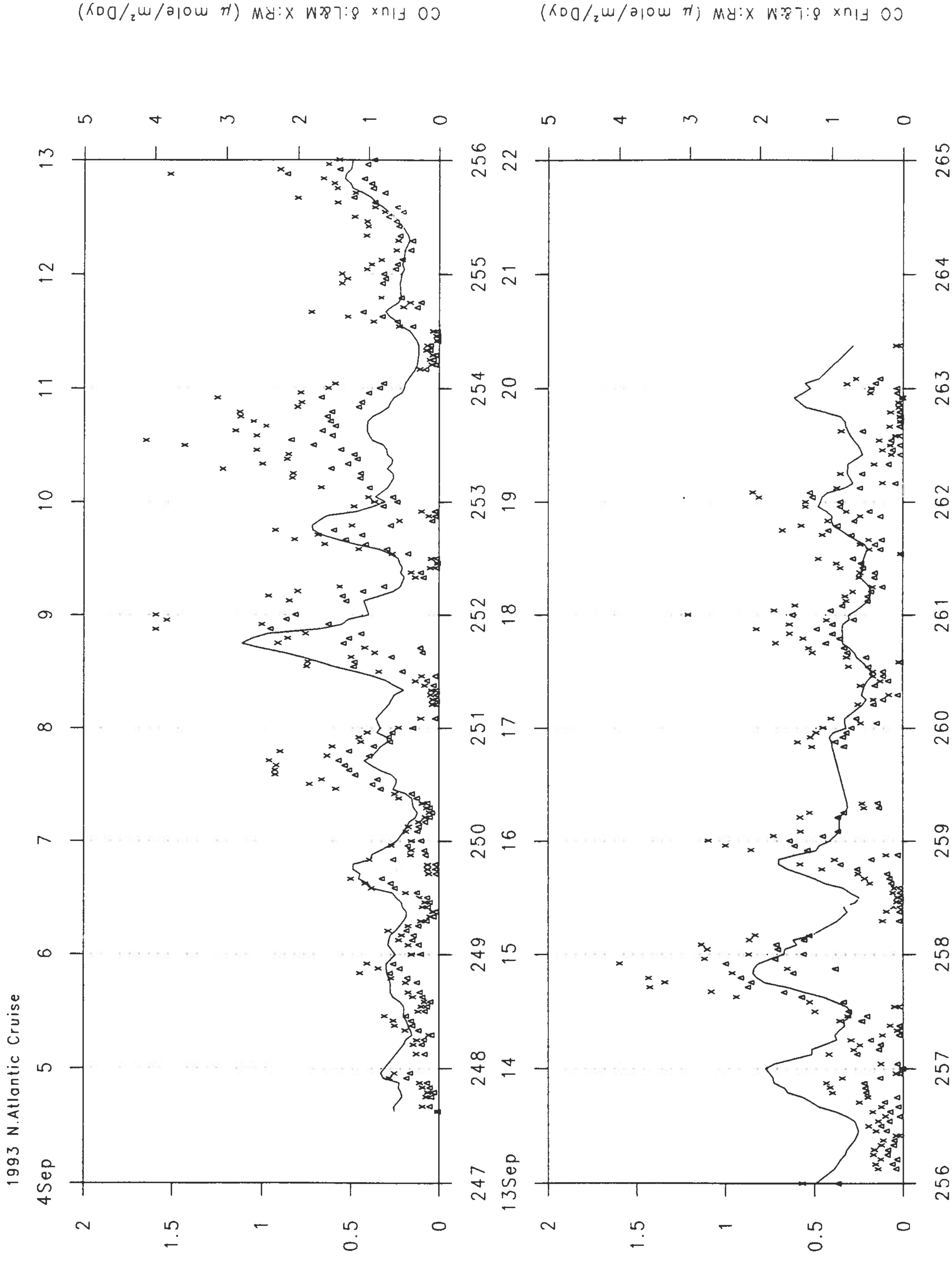

1993 N.Atlantic Cruise
CO Flux δ:L&M x:RW (μ mole/m²/Day)
Line: CO/H₂O nMole/L
4Sep
13Sep

Figure 16

1993 CRUISE

NO_x / PAN INSTRUMENTATION

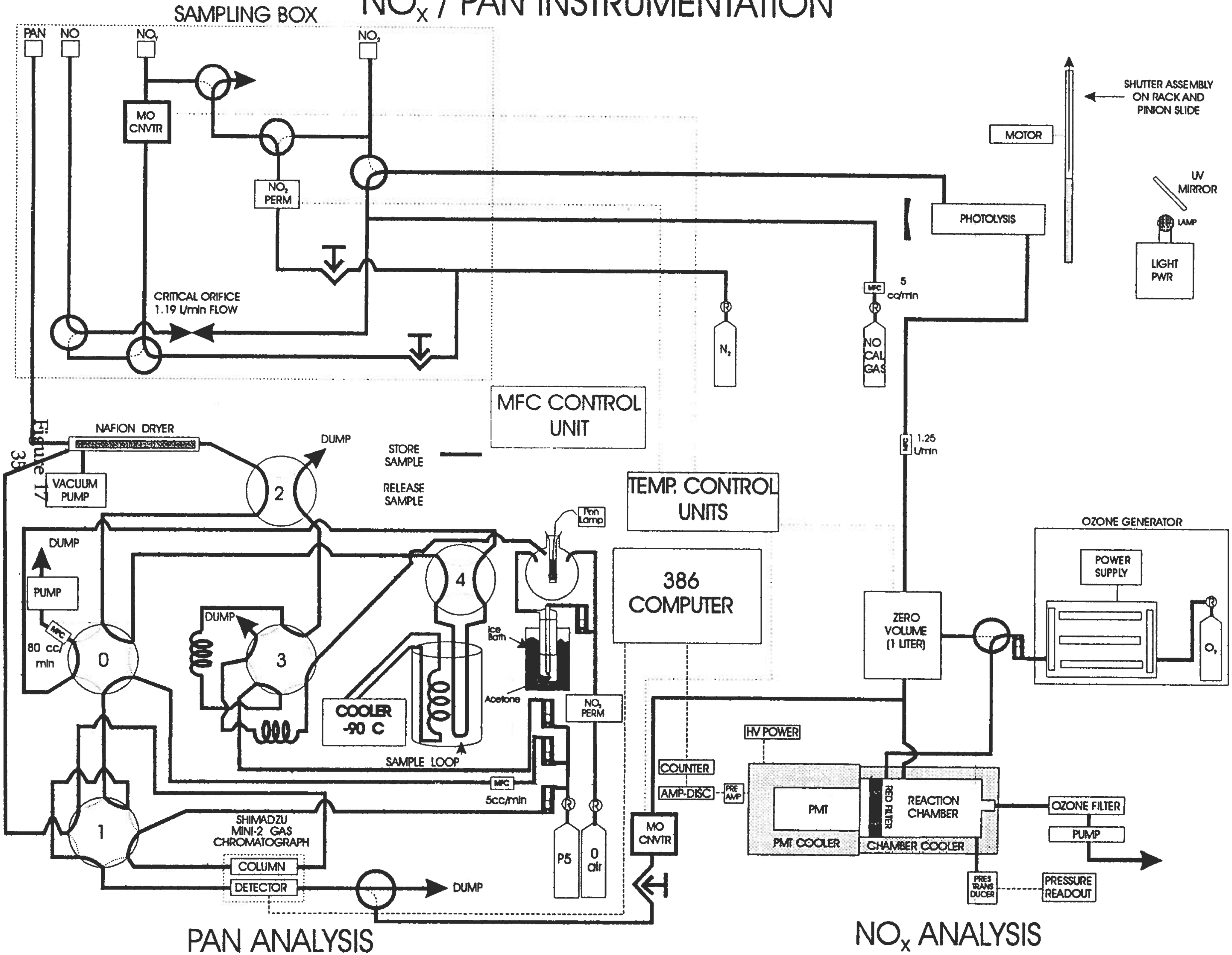


Figure 17

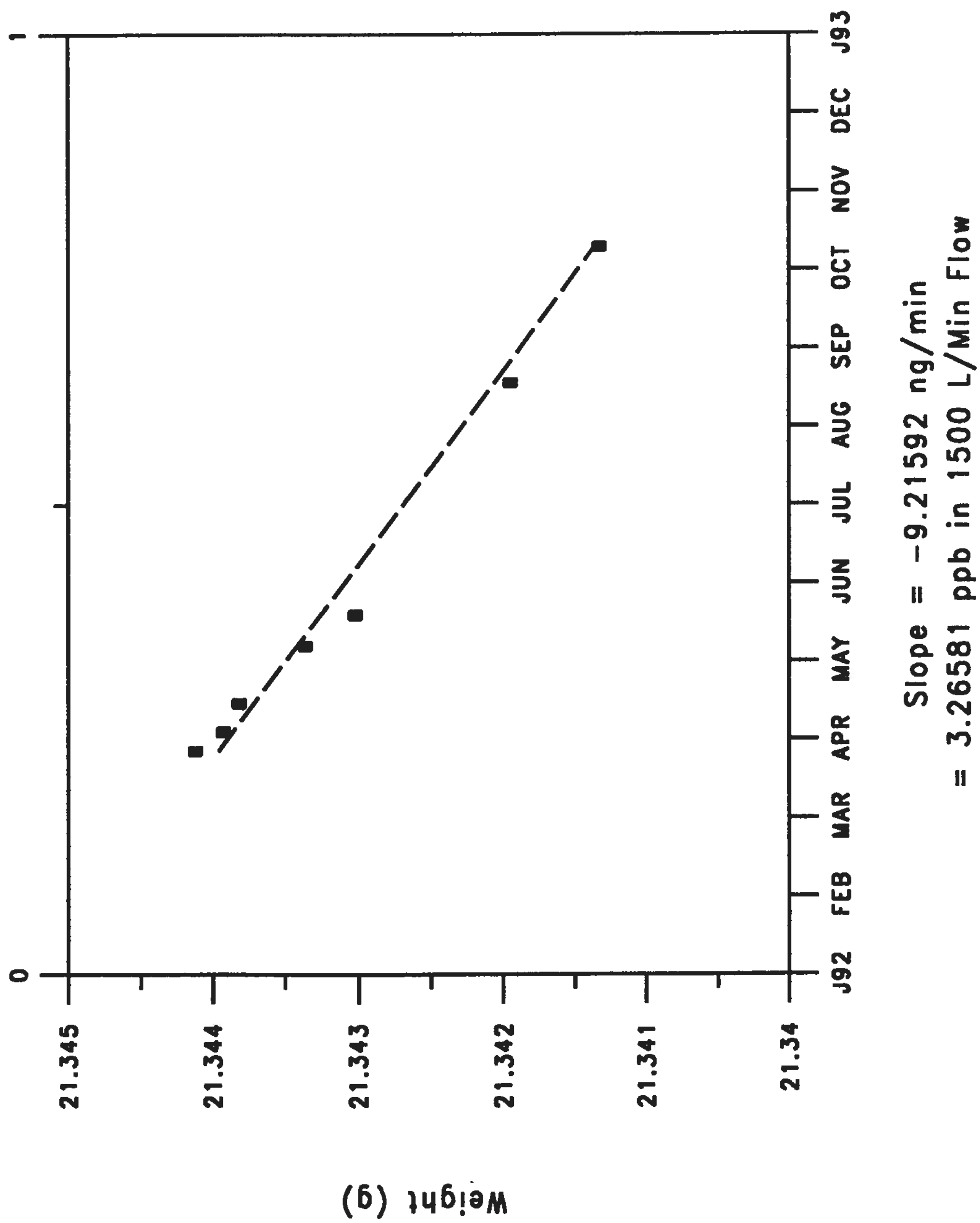

Weight (g)
21.345
21.344
21.343
21.342
21.341
21.34
J92
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
J93
Slope = −9.21592 ng/min
= 3.26581 ppb in 1500 L/Min Flow

Figure 18

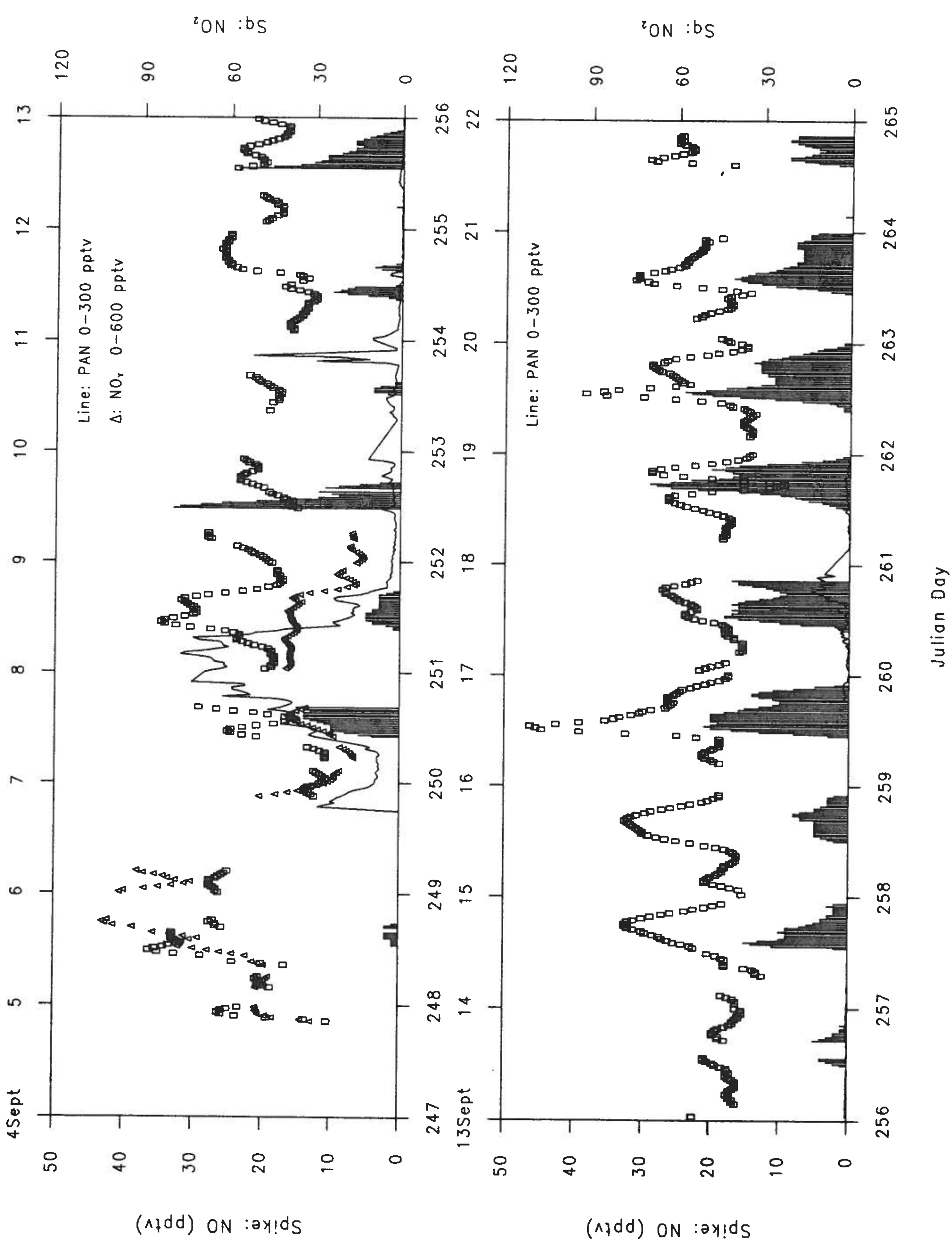

Line: PAN 0-300 pptv
Δ: NO_y 0-600 pptv
Line: PAN 0-300 pptv
Spike: NO (pptv)
Sq: NO_2
Julian Day
4Sept
13Sept

Figure 19

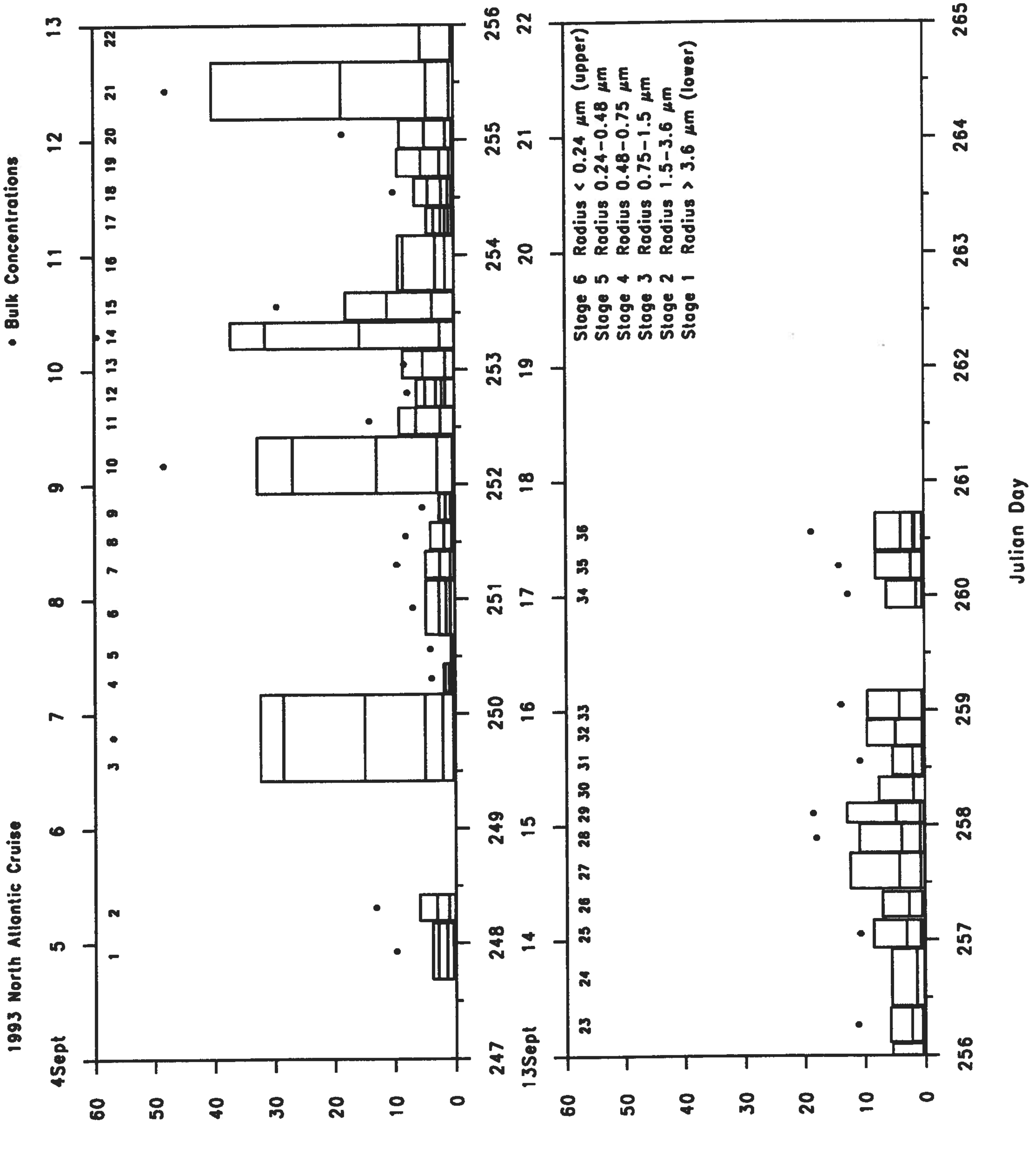

1993 North Atlantic Cruise
• Bulk Concentrations
Stage 6 Radius < 0.24 µm (upper)
Stage 5 Radius 0.24–0.48 µm
Stage 4 Radius 0.48–0.75 µm
Stage 3 Radius 0.75–1.5 µm
Stage 2 Radius 1.5–3.6 µm
Stage 1 Radius > 3.6 µm (lower)
Julian Day
4Sept
13Sept
nssSO4= (nmol/m3)

Figure 20

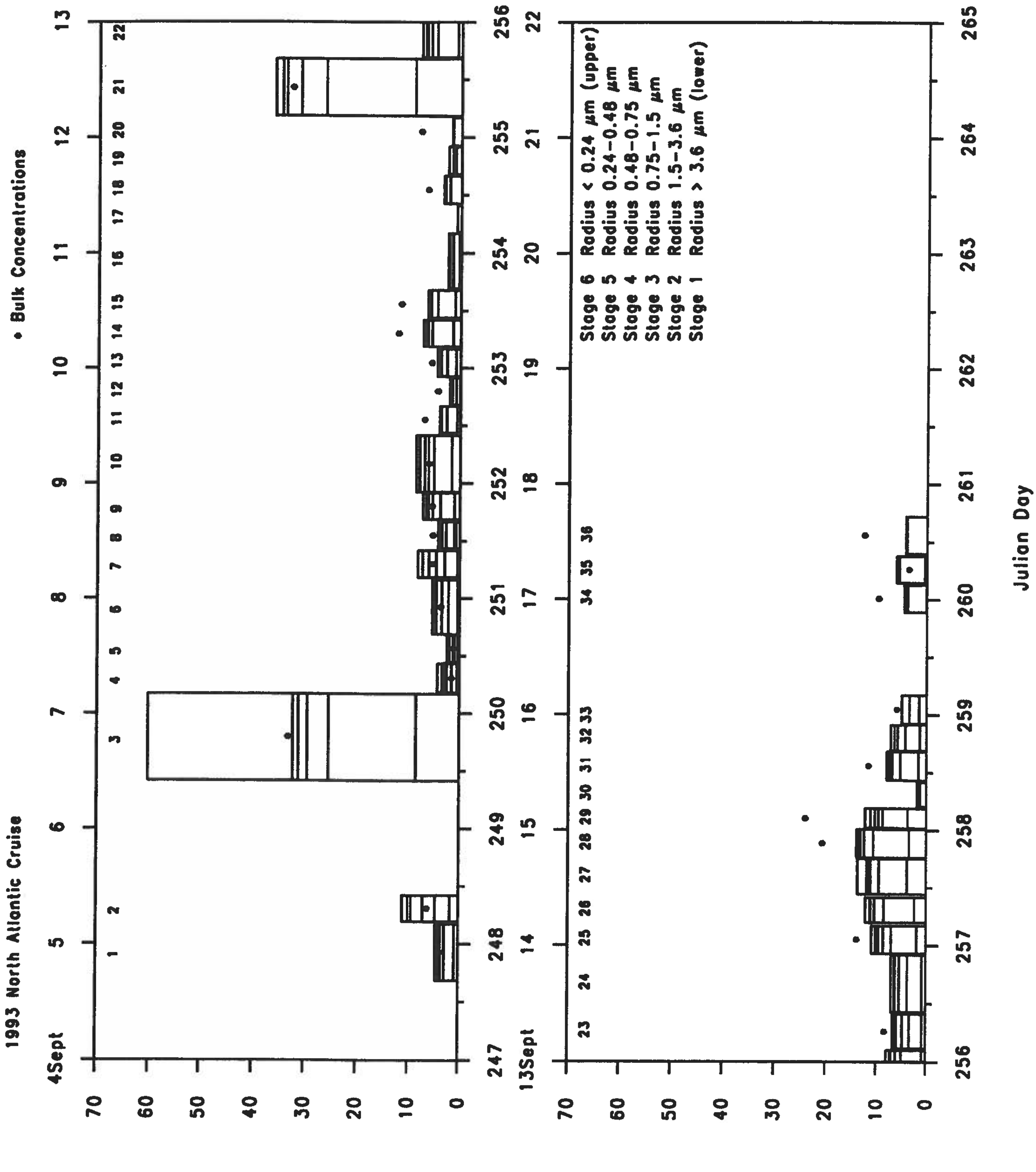

1993 North Atlantic Cruise
• Bulk Concentrations
Stage 6 Radius < 0.24 μm (upper)
Stage 5 Radius 0.24–0.48 μm
Stage 4 Radius 0.48–0.75 μm
Stage 3 Radius 0.75–1.5 μm
Stage 2 Radius 1.5–3.6 μm
Stage 1 Radius > 3.6 μm (lower)
Julian Day
4Sept
13Sept
NO3- (nmol/m3)
NO3- (nmol/m3)

Figure 21

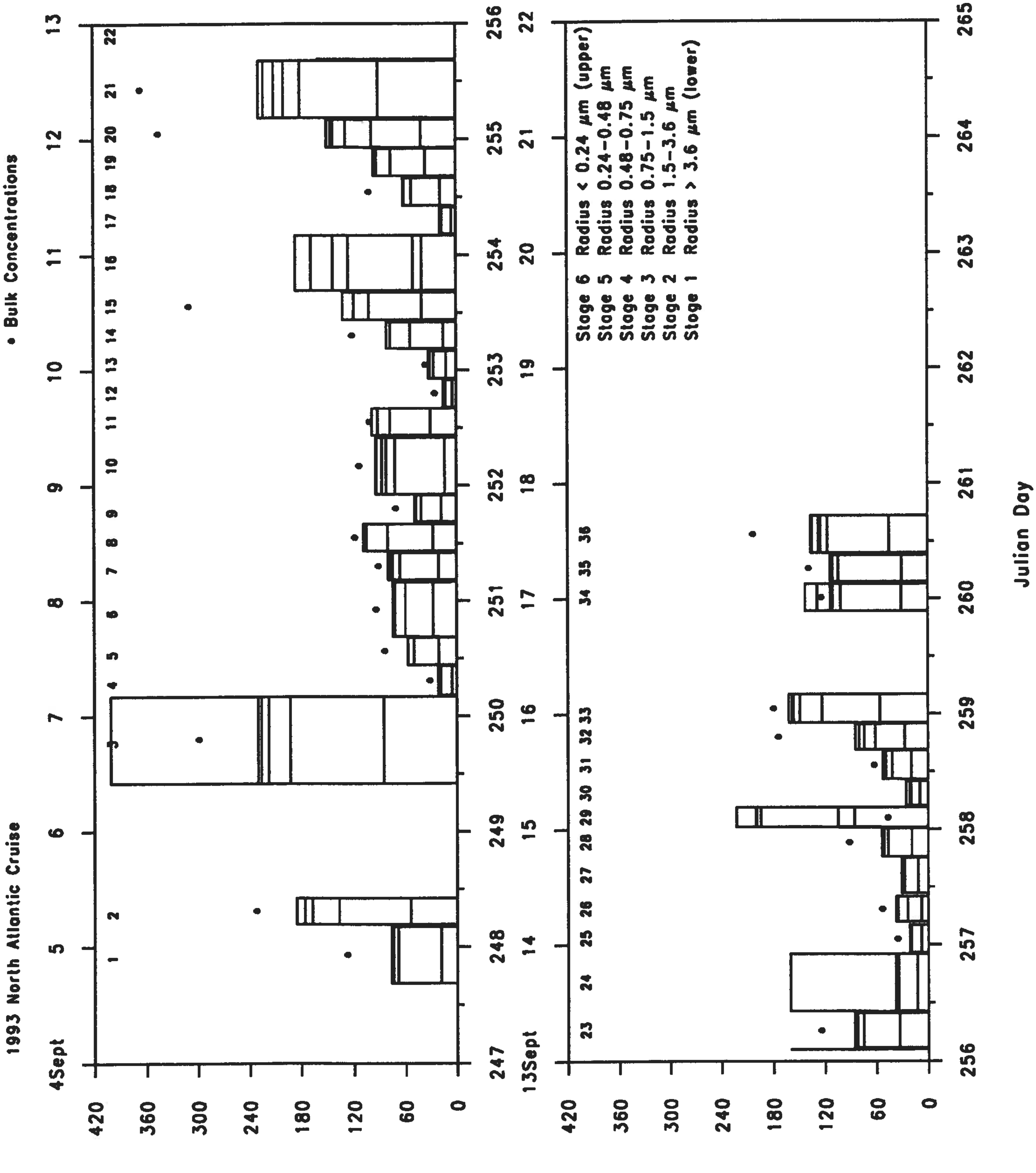
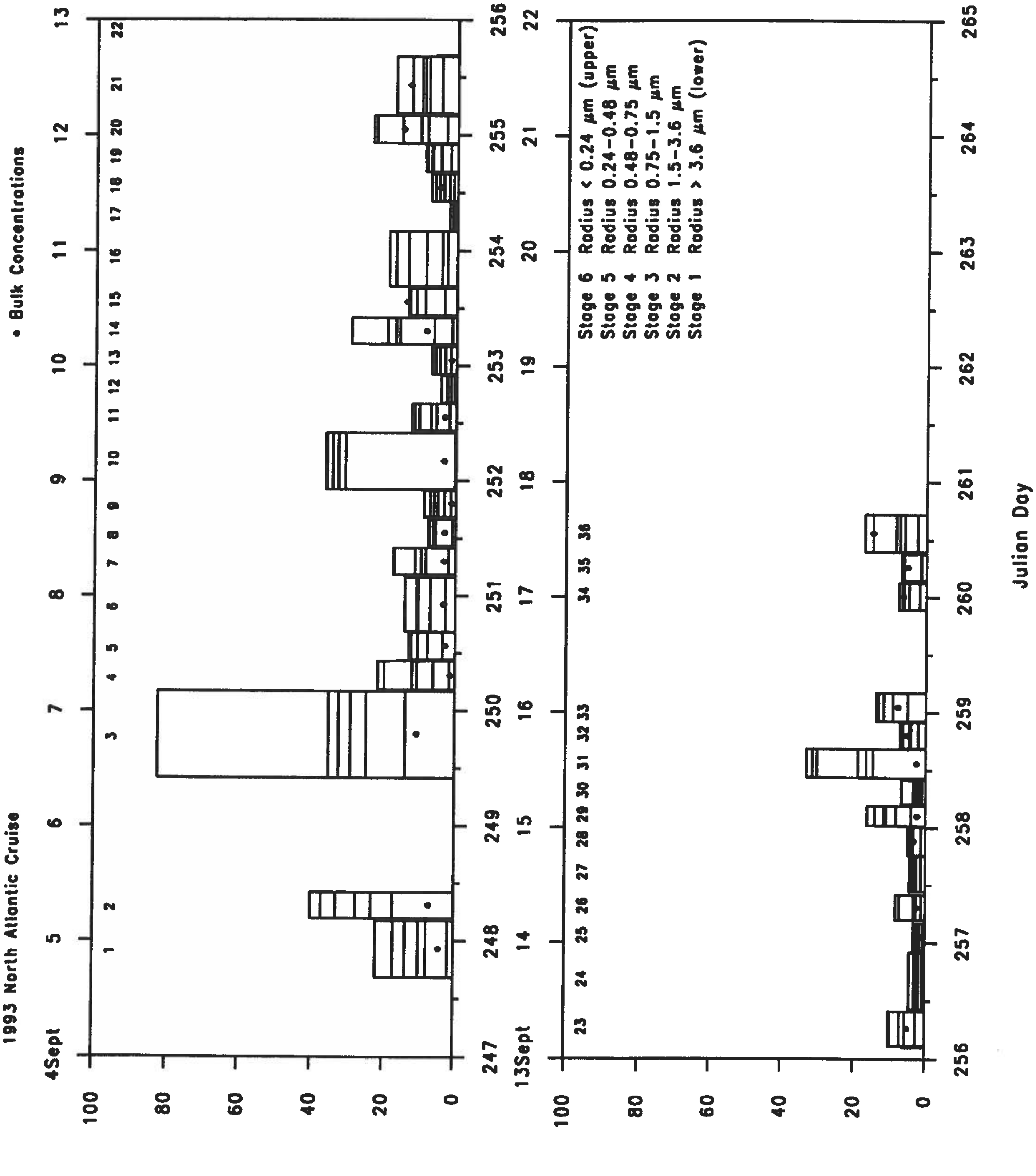
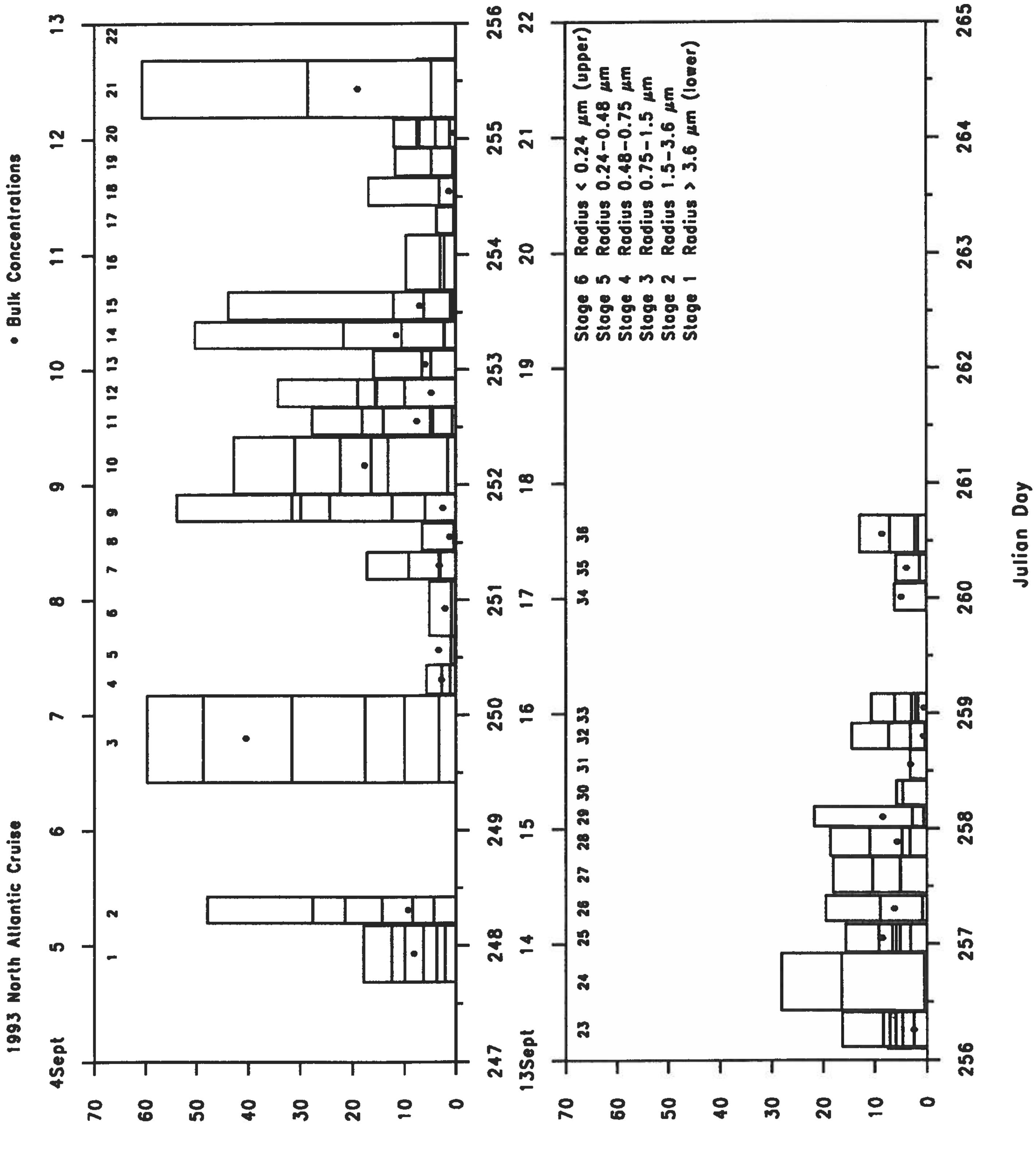

1993 North Atlantic Cruise
• Bulk Concentrations
Stage 6 Radius < 0.24 µm (upper)
Stage 5 Radius 0.24–0.48 µm
Stage 4 Radius 0.48–0.75 µm
Stage 3 Radius 0.75–1.5 µm
Stage 2 Radius 1.5–3.6 µm
Stage 1 Radius > 3.6 µm (lower)
Julian Day
No3 (nmol/m3)
4Sept
13Sept

Figure 22



1993 North Atlantic Cruise
• Bulk Concentrations
Stage 6 Radius < 0.24 μm (upper)
Stage 5 Radius 0.24–0.48 μm
Stage 4 Radius 0.48–0.75 μm
Stage 3 Radius 0.75–1.5 μm
Stage 2 Radius 1.5–3.6 μm
Stage 1 Radius > 3.6 μm (lower)
Julian Day
4Sept
13Sept
K+ (nmol/m3)
K+ (nmol/m3)

Figure 23



1993 North Atlantic Cruise
• Bulk Concentrations
4Sept
5
6
7
8
9
10
11
12
13
247
248
249
250
251
252
253
254
255
256
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
13Sept
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
Stage 6 Radius < 0.24 µm (upper)
Stage 5 Radius 0.24–0.48 µm
Stage 4 Radius 0.48–0.75 µm
Stage 3 Radius 0.75–1.5 µm
Stage 2 Radius 1.5–3.6 µm
Stage 1 Radius > 3.6 µm (lower)
256
257
258
259
260
261
262
263
264
265
Julian Day
70
60
50
40
30
20
10
0
NH4+ (nmol/m3)

Figure 24

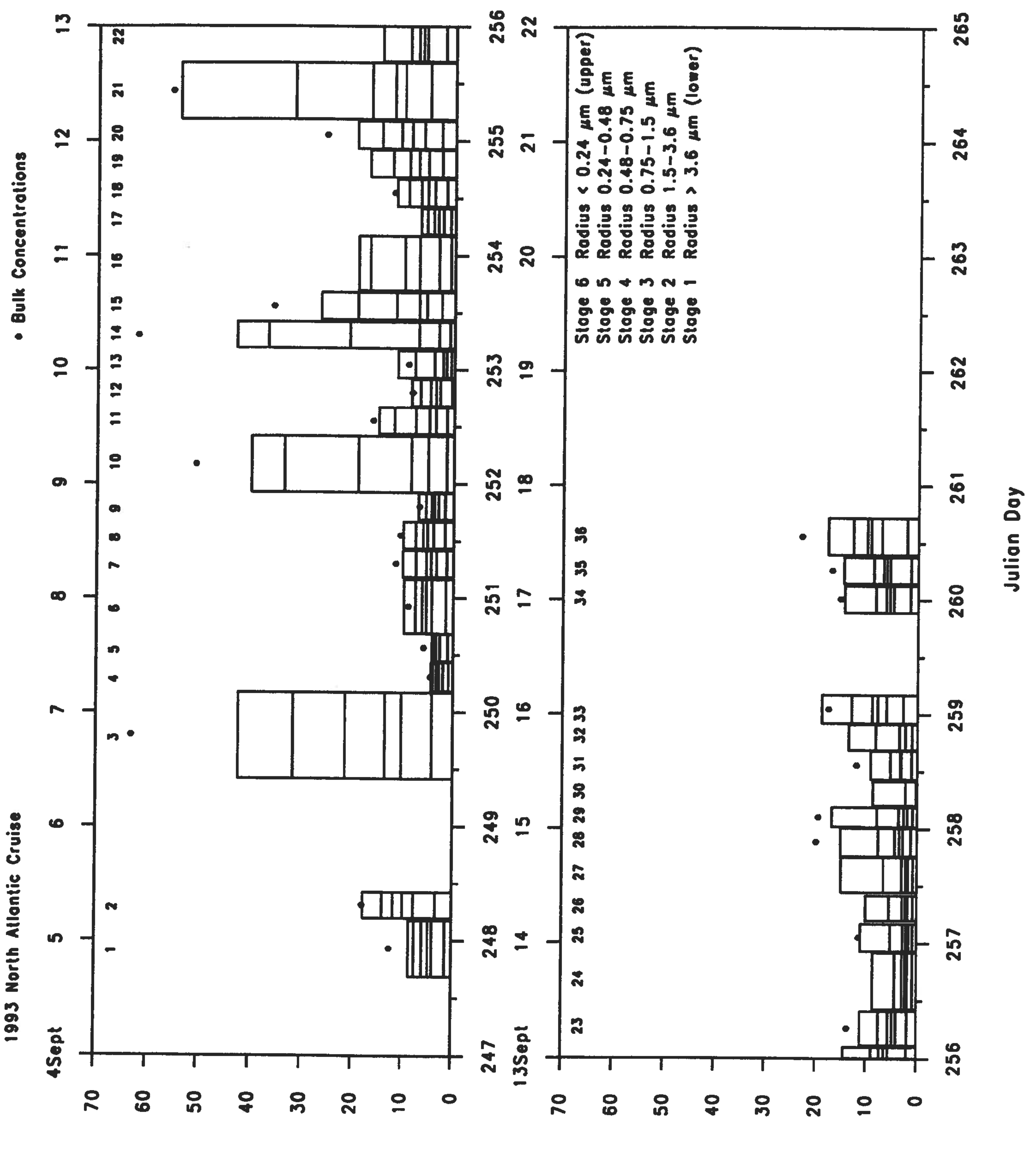

1993 North Atlantic Cruise
• Bulk Concentrations
Stage 6 Radius < 0.24 μm (upper)
Stage 5 Radius 0.24–0.48 μm
Stage 4 Radius 0.48–0.75 μm
Stage 3 Radius 0.75–1.5 μm
Stage 2 Radius 1.5–3.6 μm
Stage 1 Radius > 3.6 μm (lower)
Julian Day
SO4= (nmol/m3)
4Sept
13Sept

Figure 25

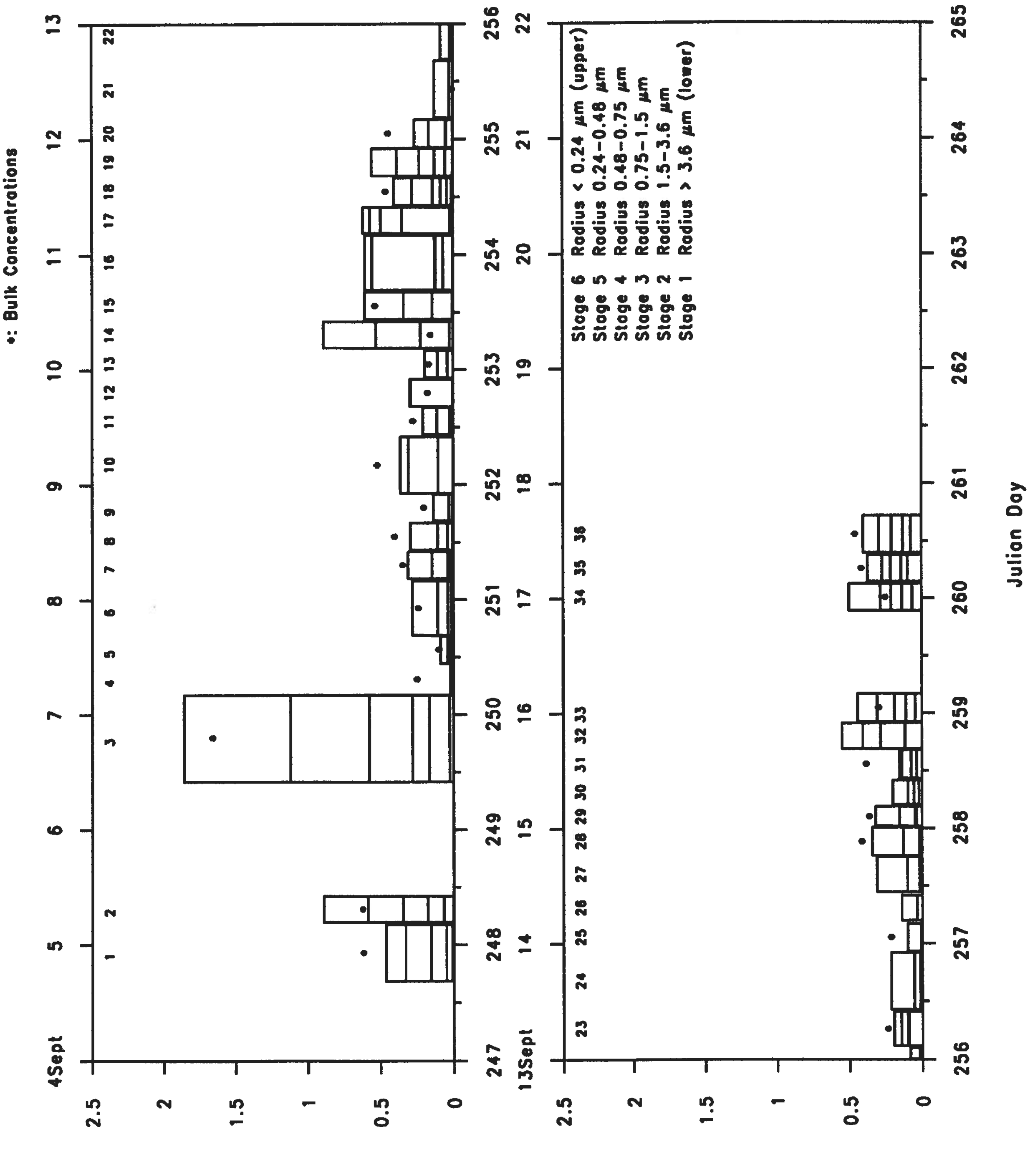
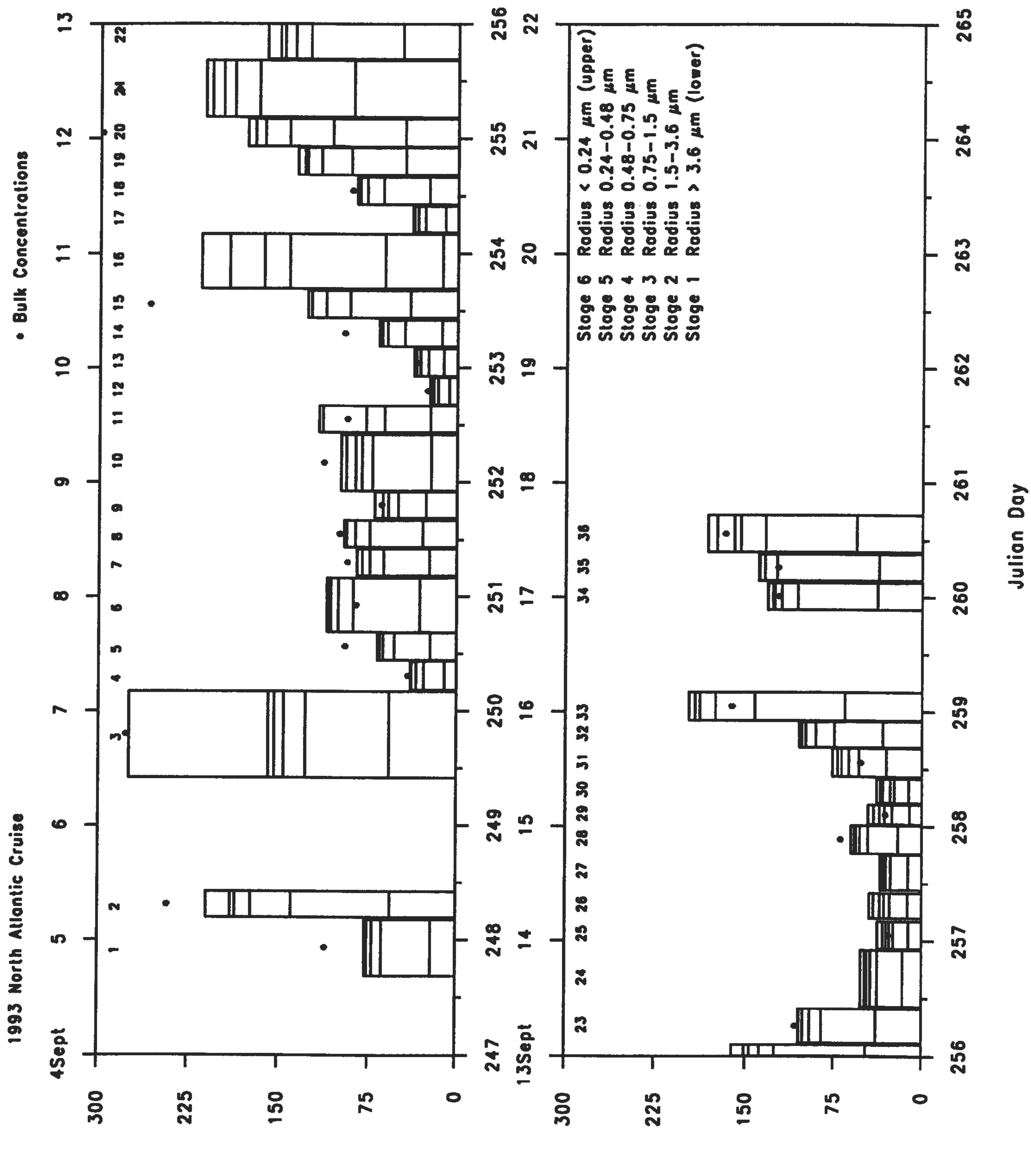

•: Bulk Concentrations
MSA (nmol/m³)
Julian Day
4Sept
13Sept
Stage 6 Radius < 0.24 µm (upper)
Stage 5 Radius 0.24–0.48 µm
Stage 4 Radius 0.48–0.75 µm
Stage 3 Radius 0.75–1.5 µm
Stage 2 Radius 1.5–3.6 µm
Stage 1 Radius > 3.6 µm (lower)

Figure 26



1993 North Atlantic Cruise
• Bulk Concentrations
Cl⁻ (nmol/m³)
300
225
150
75
0
4Sept
5
6
7
8
9
10
11
12
13
247
248
249
250
251
252
253
254
255
256
13Sept
14
15
16
17
18
19
20
21
22
256
257
258
259
260
261
262
263
264
265
Julian Day
Stage 6 Radius < 0.24 μm (upper)
Stage 5 Radius 0.24–0.48 μm
Stage 4 Radius 0.48–0.75 μm
Stage 3 Radius 0.75–1.5 μm
Stage 2 Radius 1.5–3.6 μm
Stage 1 Radius > 3.6 μm (lower)

Figure 27

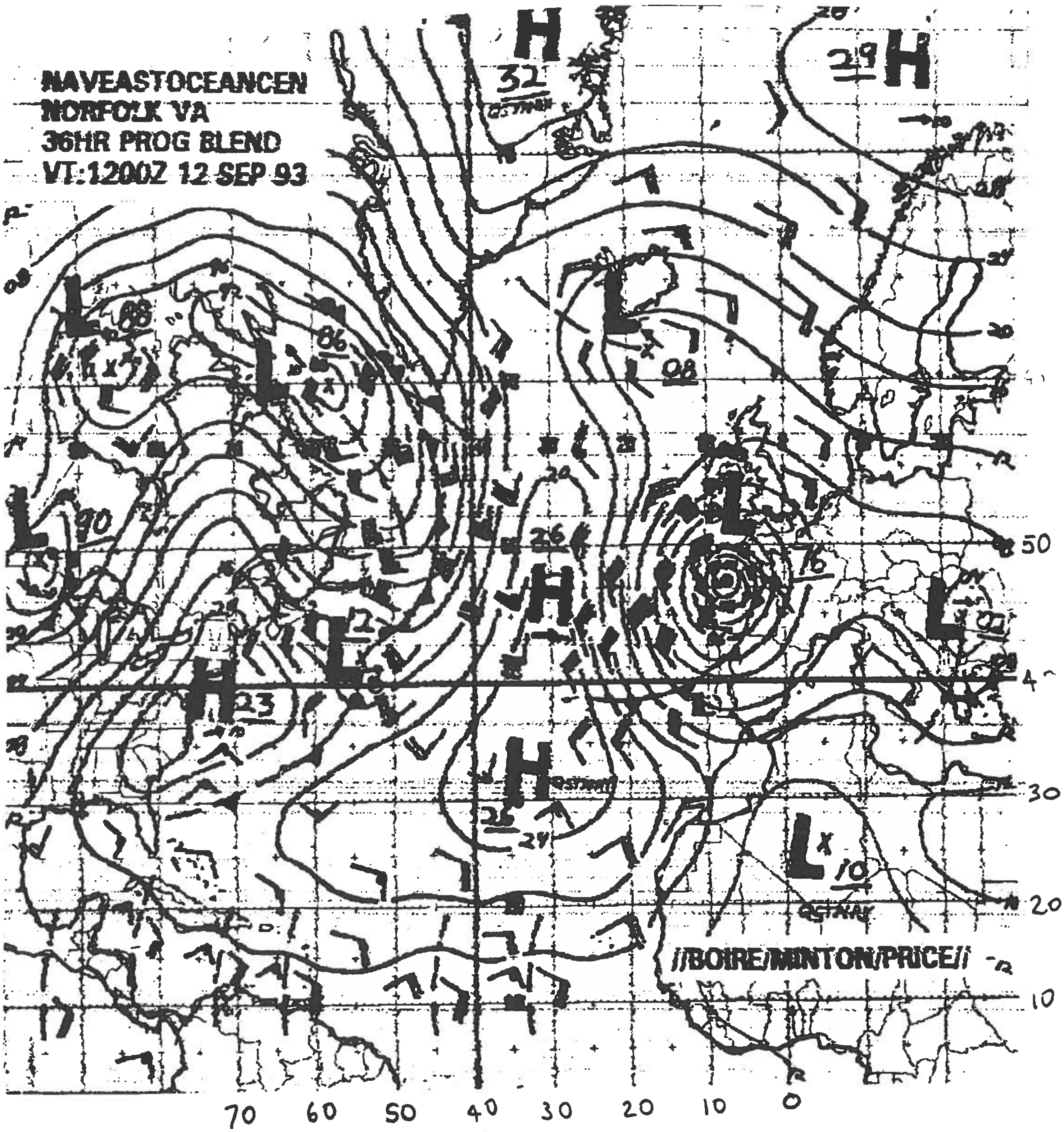

NAVEASTOCEANCEN
NORFOLK VA
36HR PROG BLEND
VT:1200Z 12 SEP 93
//BOIRE/MINTON/PRICE//
50
40
30
20
10
70
60
50
40
30
20
10
0

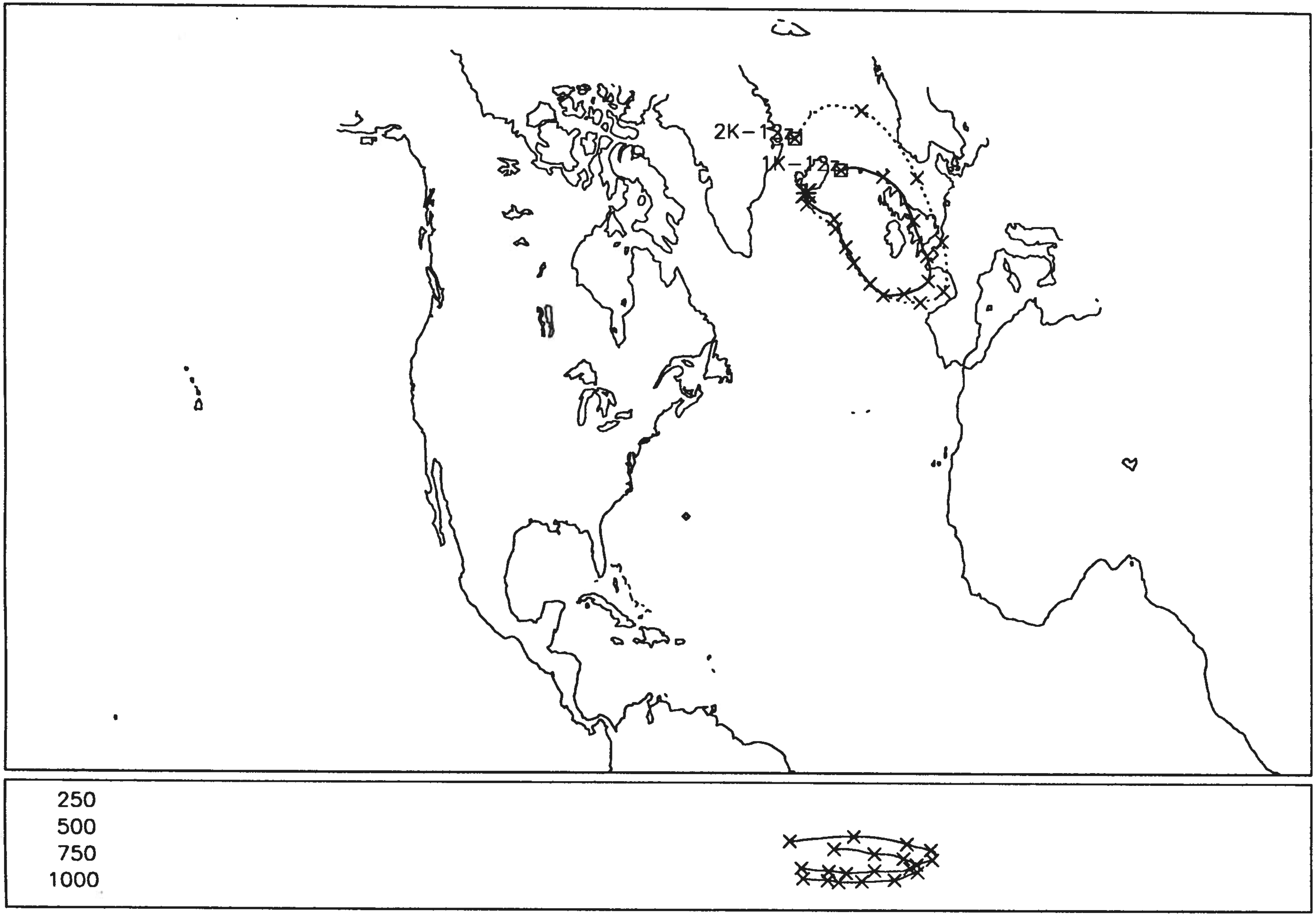
Figure 28

APPENDIX I

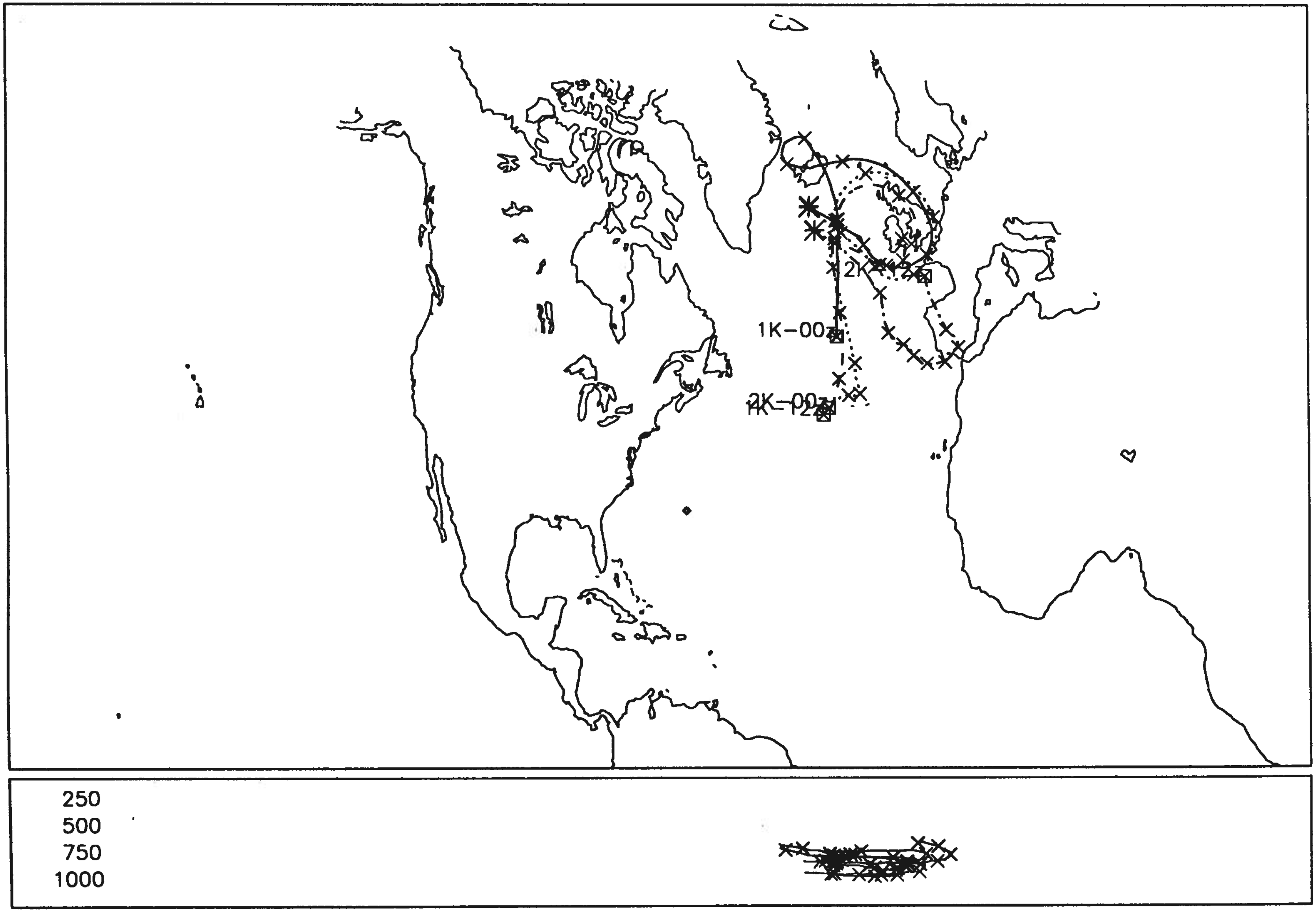
BACK TRAJECTORY PLOTS

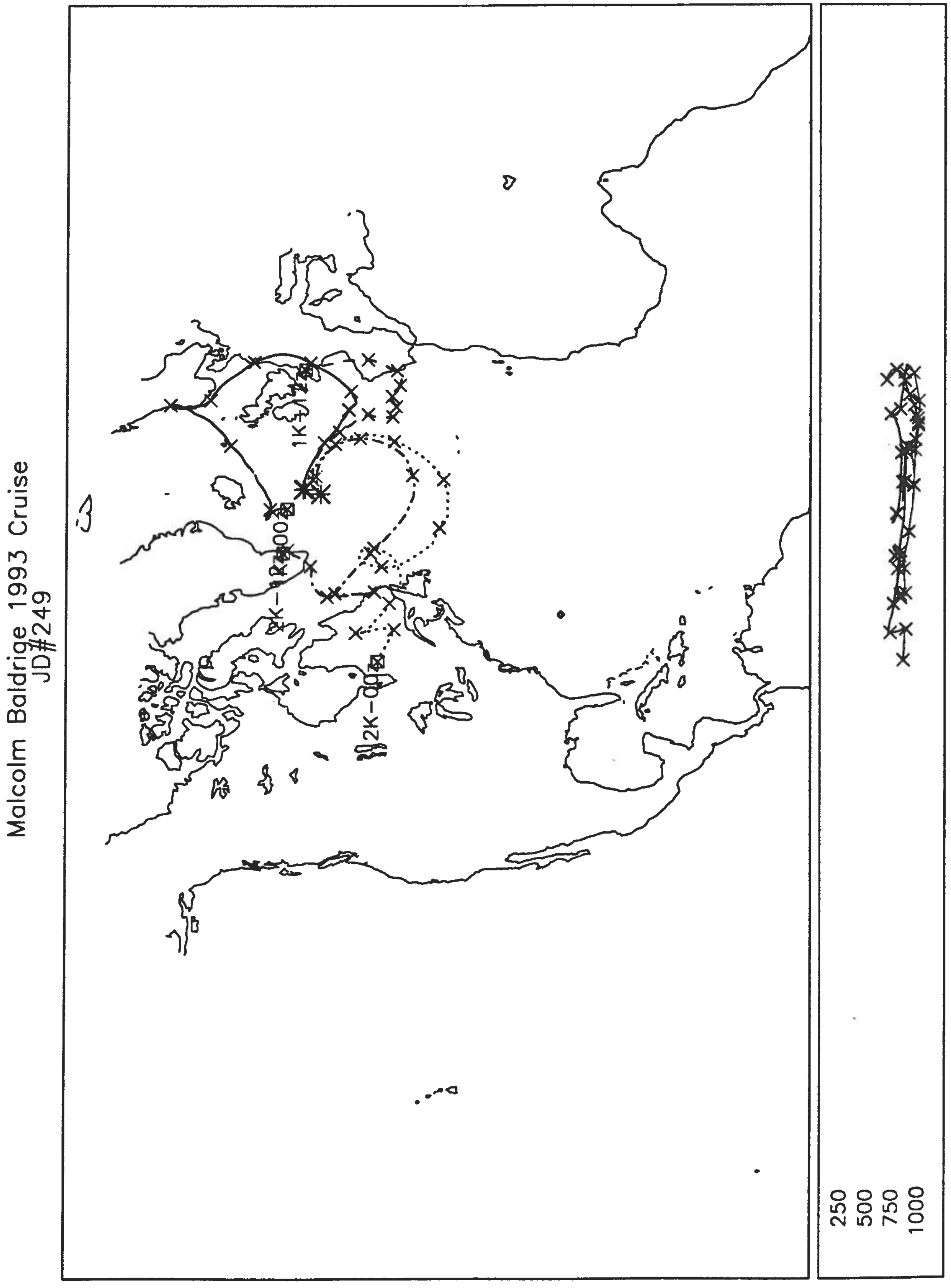
Julian Day	**Calendar Day**	**Page**
jd 247	4-Sept-93	49
jd 248	5-Sept-93	50
jd 249	6-Sept-93	51
jd 250	7-Sept-93	52
jd 251	8-Sept-93	53
jd 252	9-Sept-93	54
jd 253	10-Sept-93	55
jd 254	11-Sept-93	56
jd 255	12-Sept-93	57
jd 256	13-Sept-93	58
jd 257	14-Sept-93	59
jd 258	15-Sept-93	60
jd 259	16-Sept-93	61
jd 260	17-Sept-93	62
jd 261	18-Sept-93	63
jd 262	19-Sept-93	64
jd 263	20-Sept-93	65

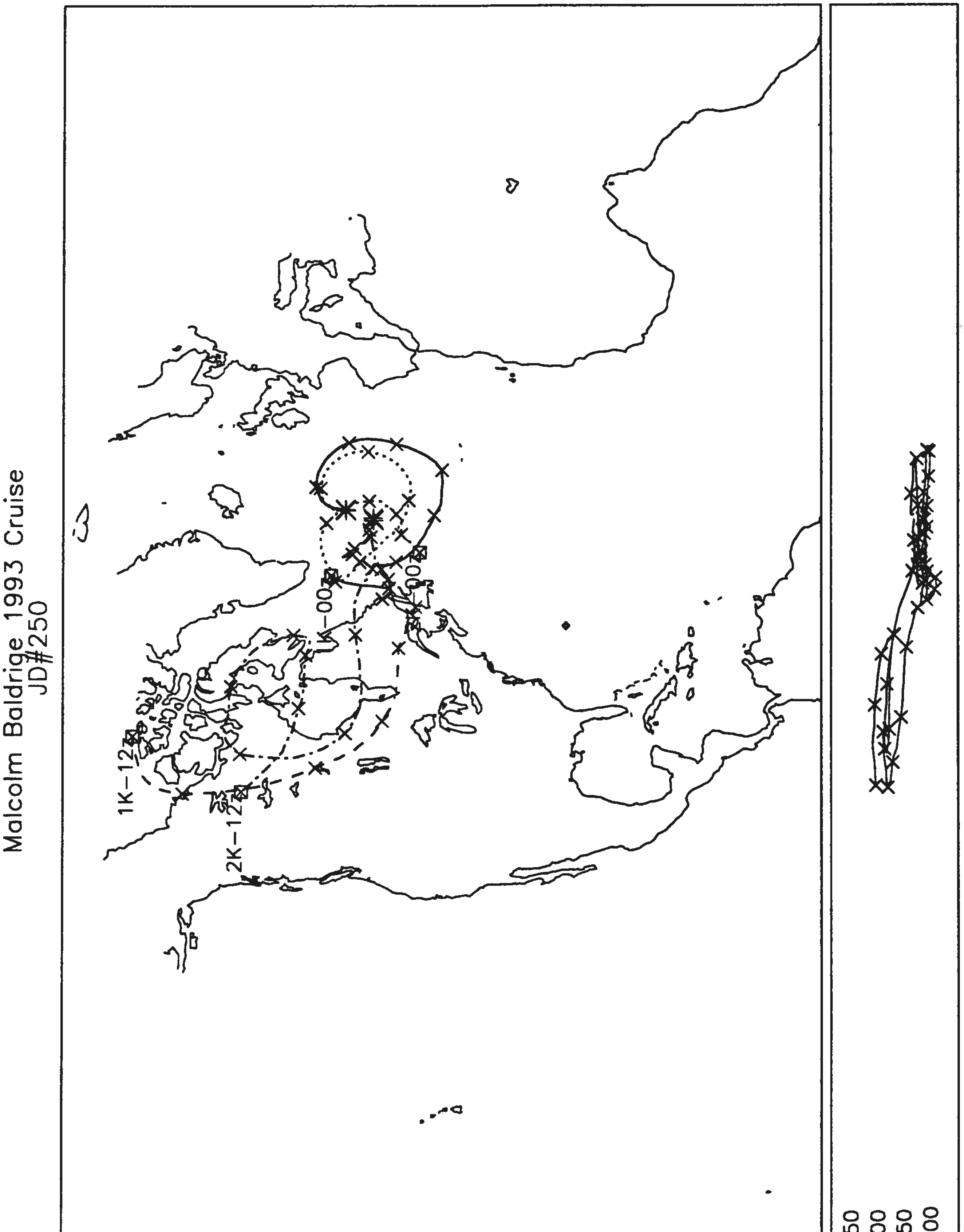
Malcolm Baldrige 1993 Cruise
JD#247



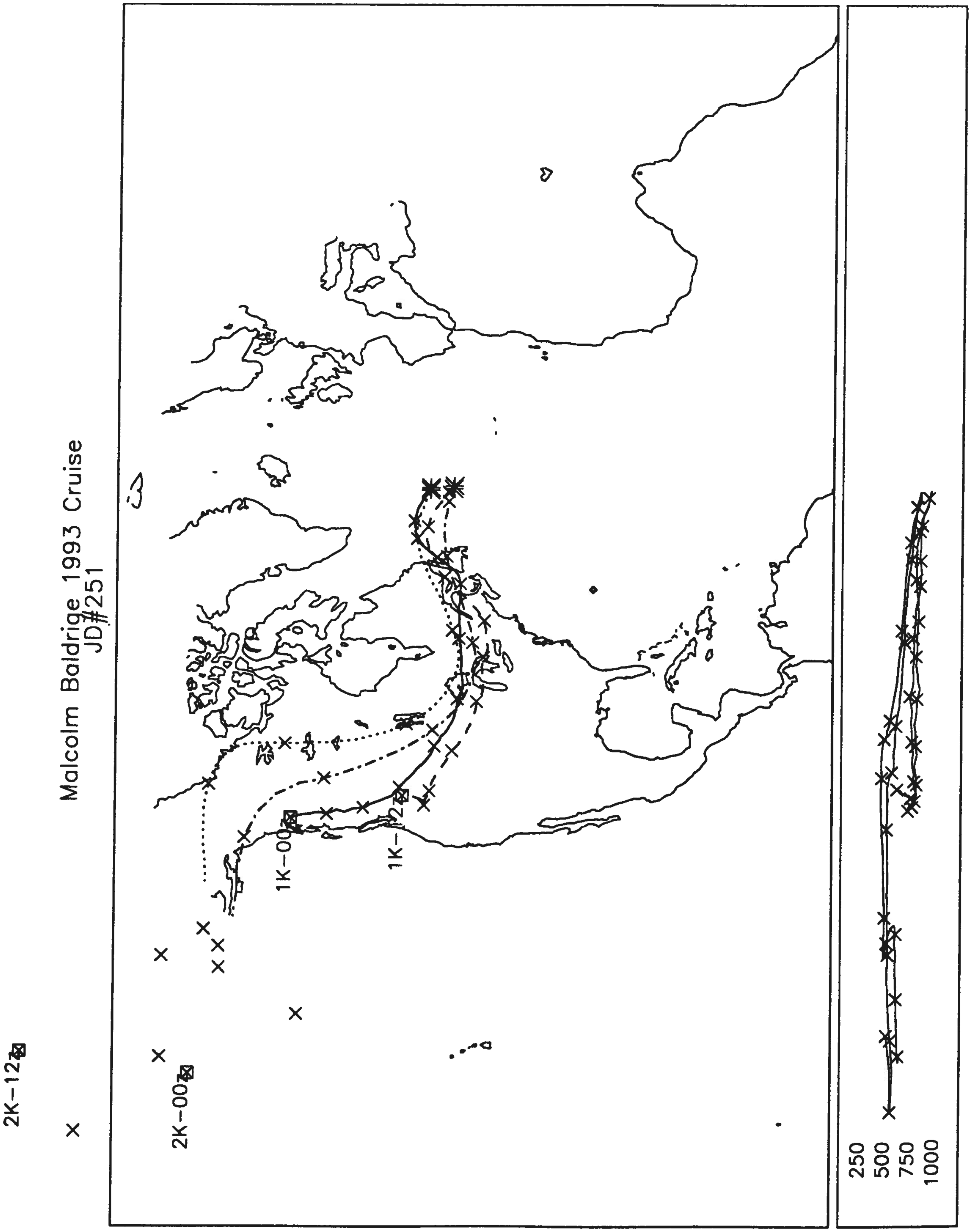
Malcolm Baldrige 1993 Cruise
JD#248



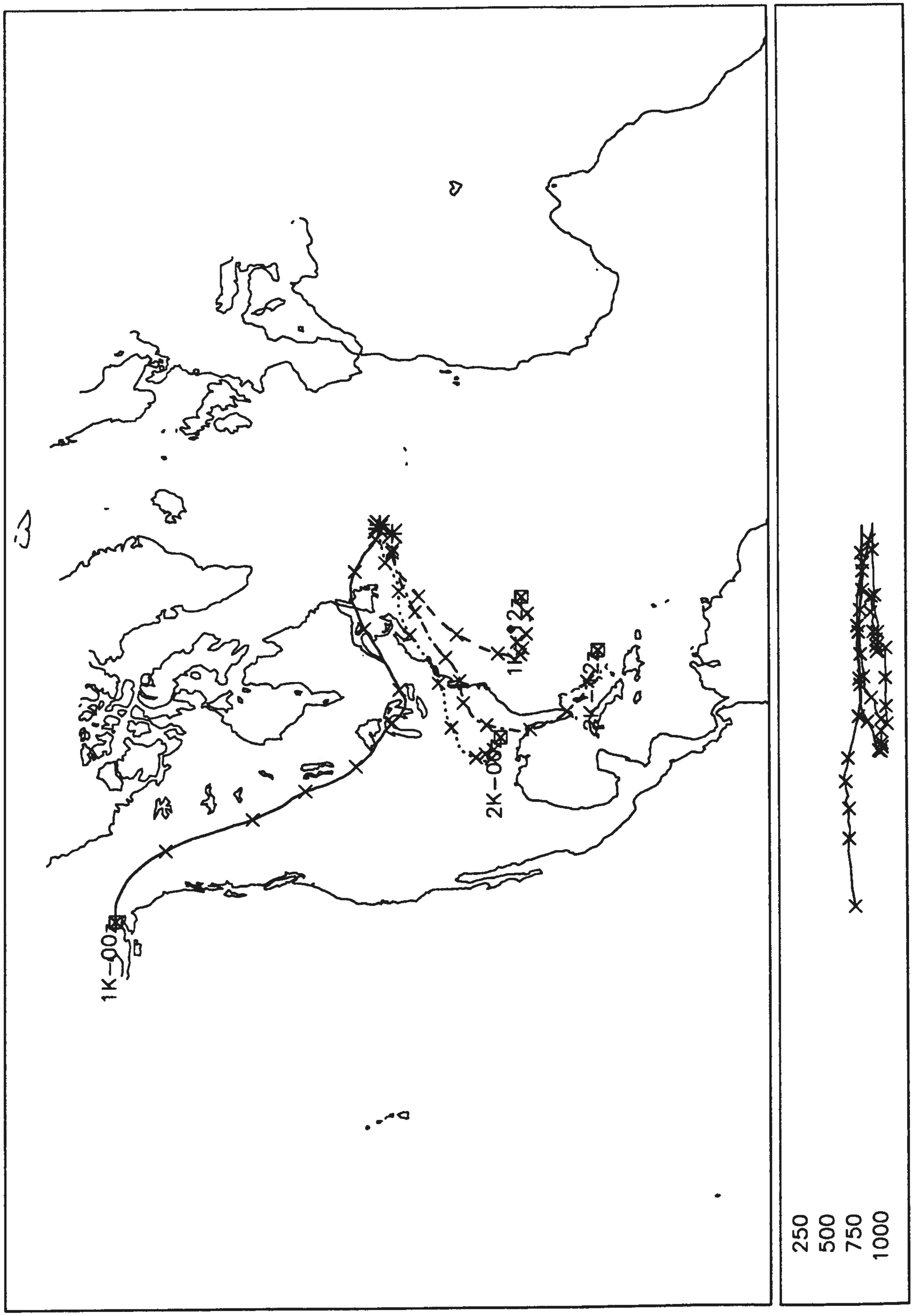

Malcolm Baldrige 1993 Cruise
JD#249
250
500
750
1000



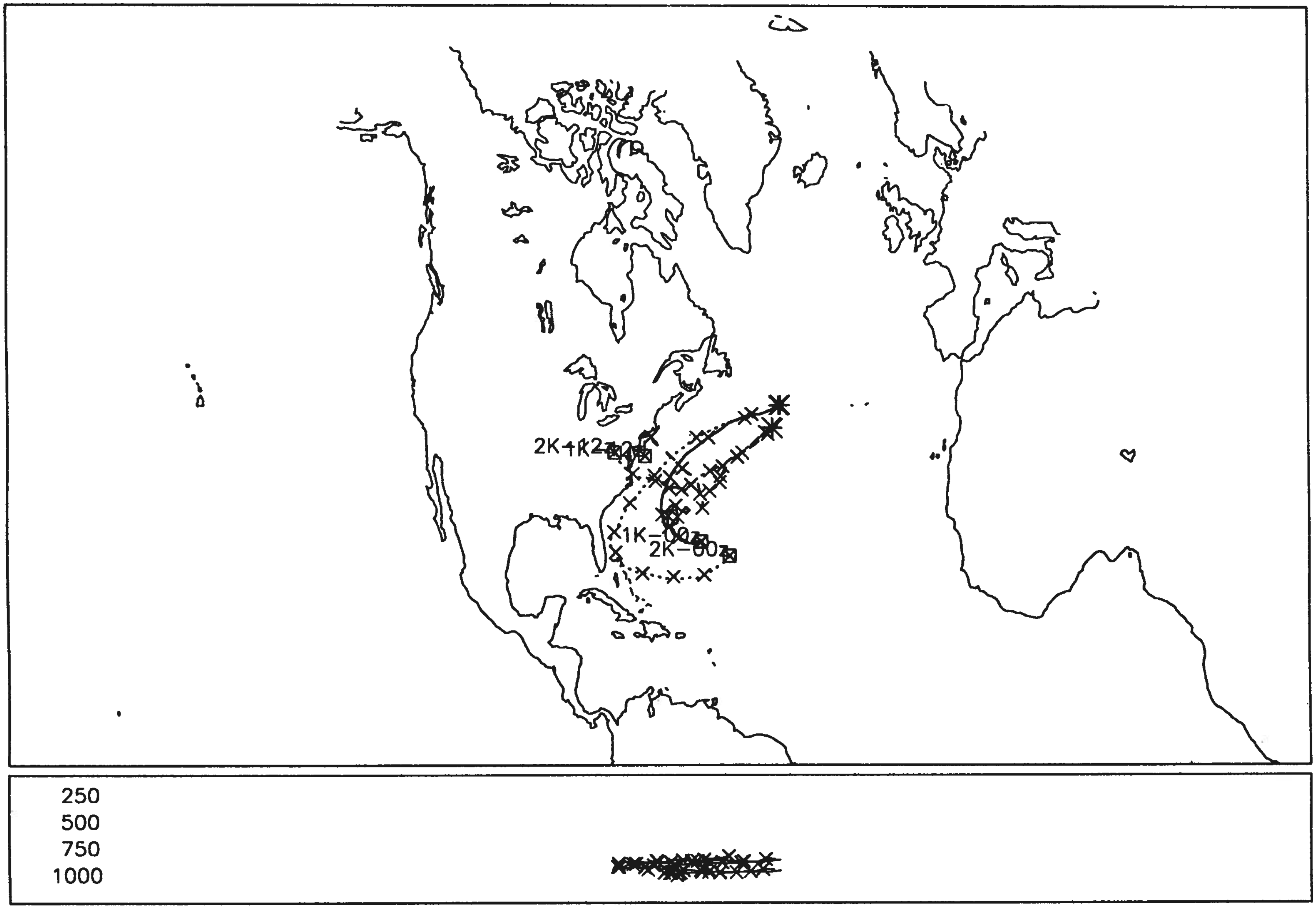
Malcolm Baldrige 1993 Cruise
JD#250
1K-12
2K-12
1K-00
2K-00
250
500
750
1000

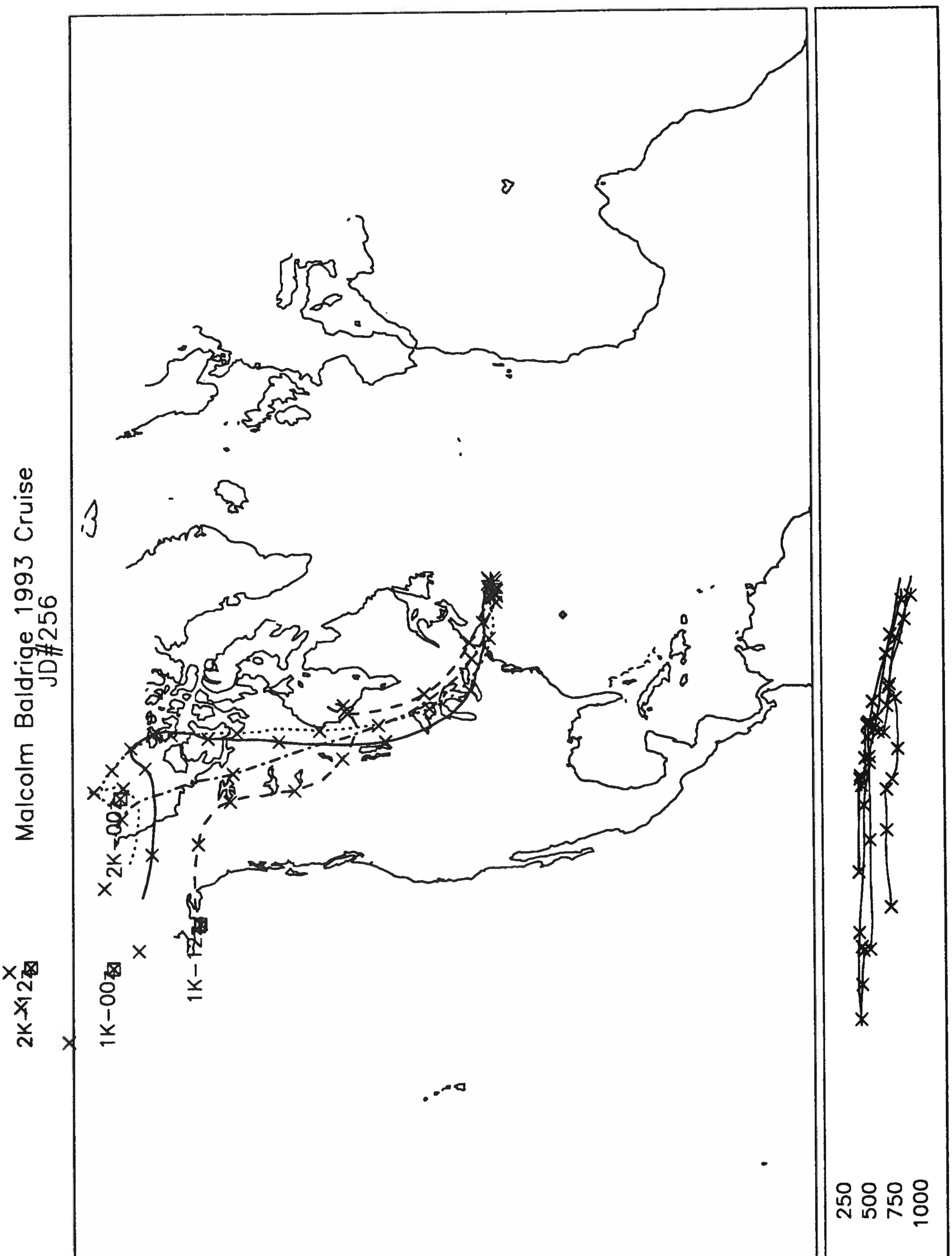

Malcolm Baldrige 1993 Cruise
JD#251
1K-00
1K-12
2K-00
2K-12
250
500
750
1000

Malcolm Baldrige 1993 Cruise
JD#252

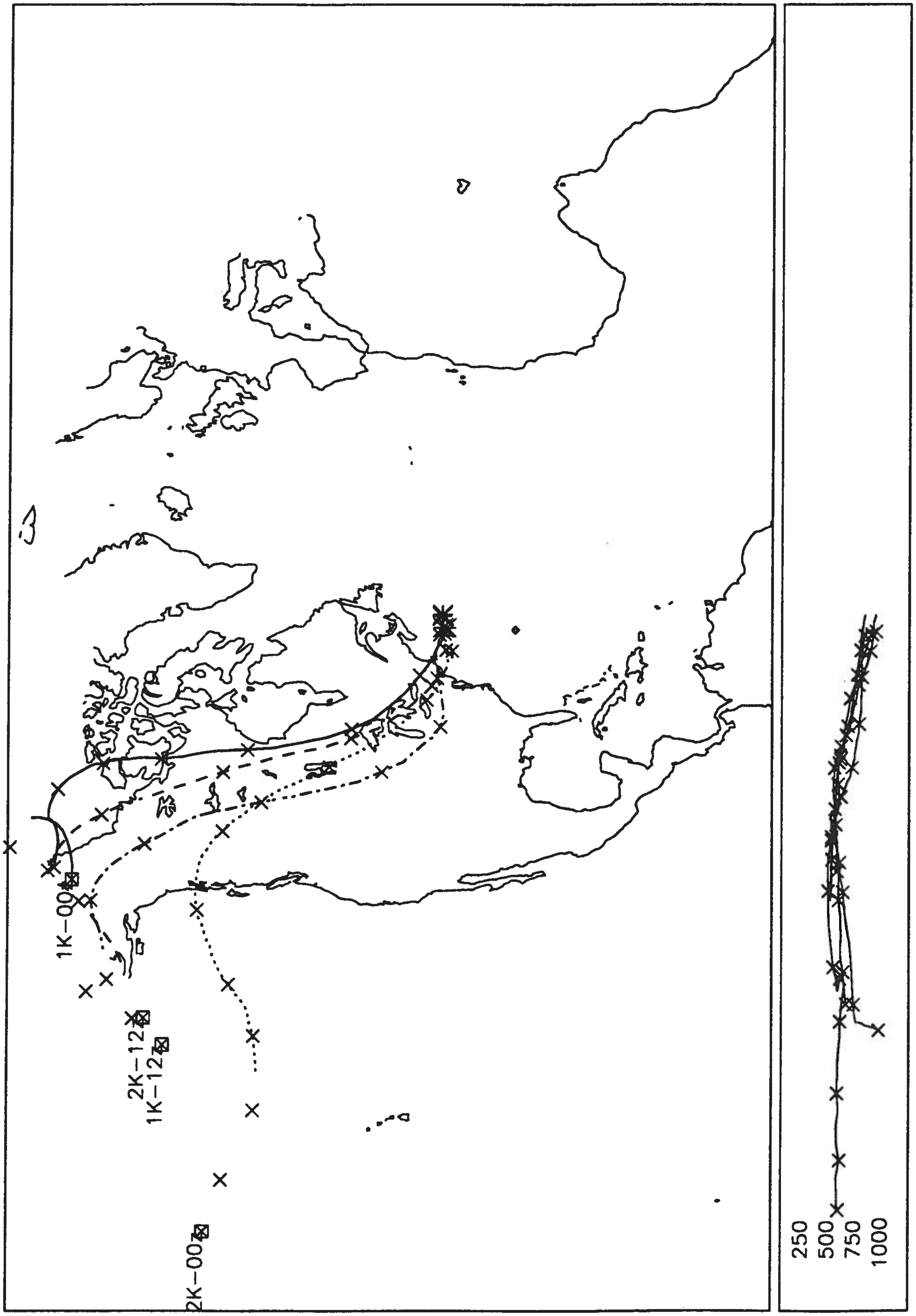


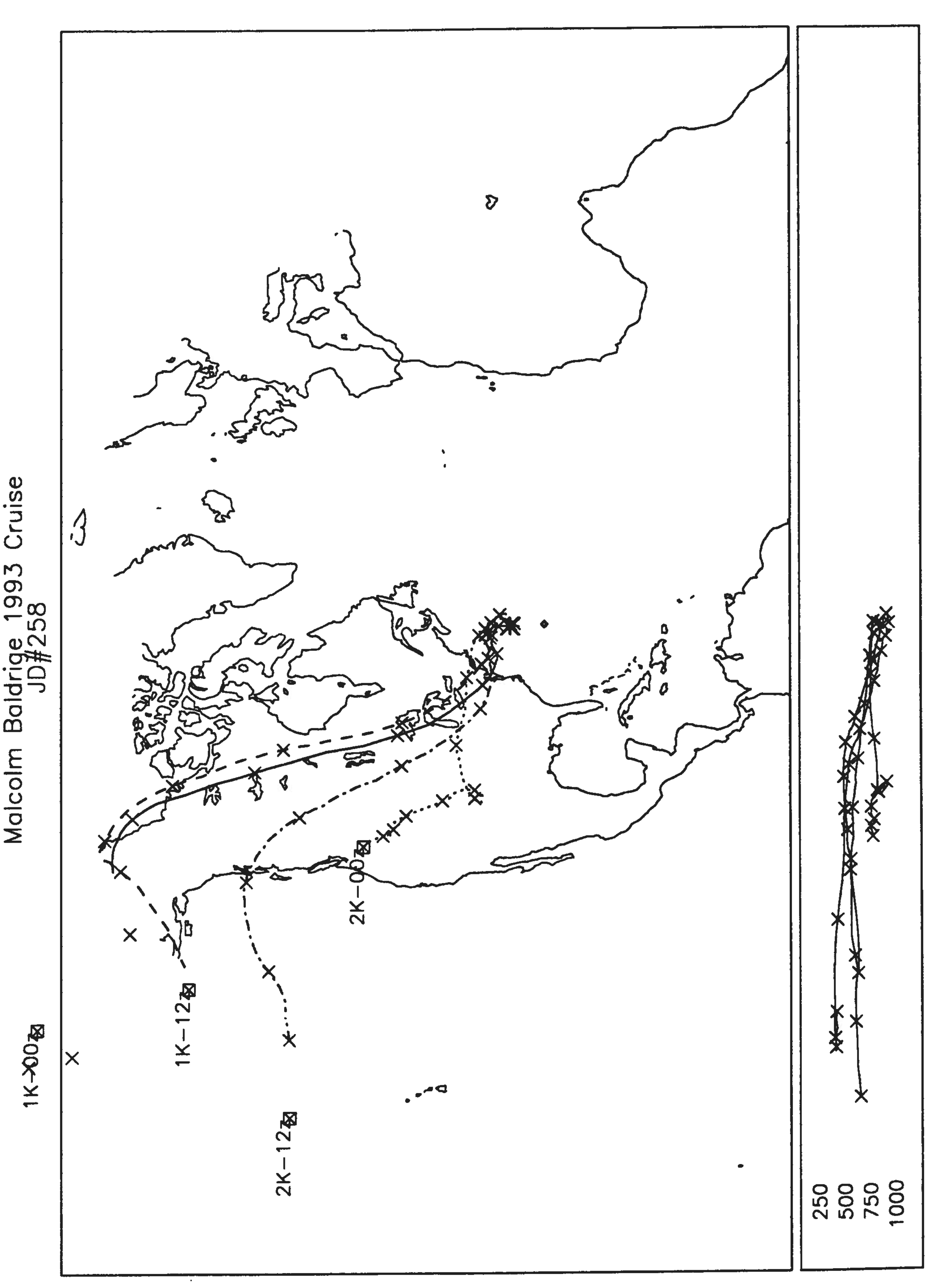
Malcolm Baldrige 1993 Cruise
JD#253



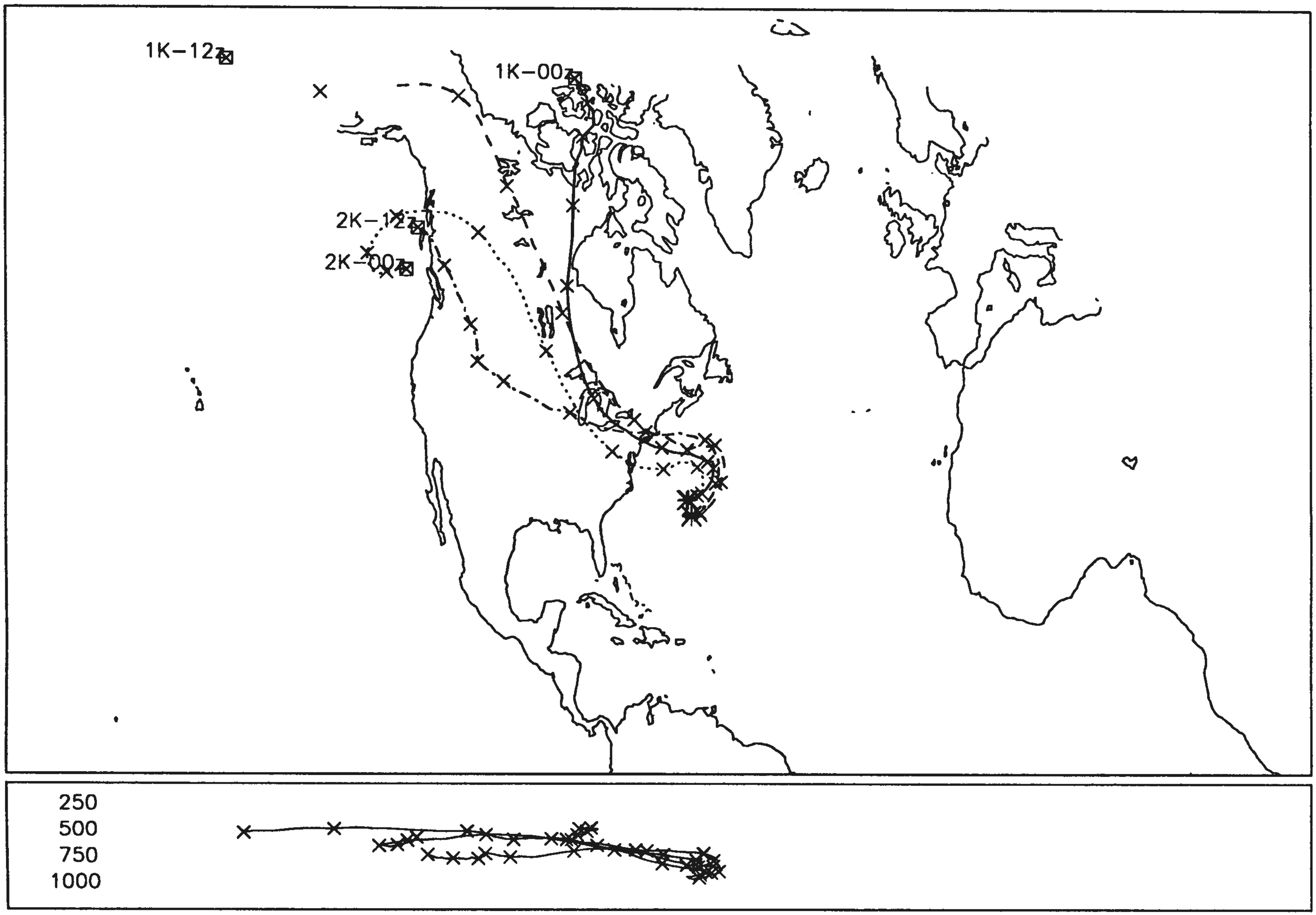

Malcolm Baldrige 1993 Cruise
JD#256
2K-12Z
1K-00Z
1K-12Z
2K-00Z
250
500
750
1000

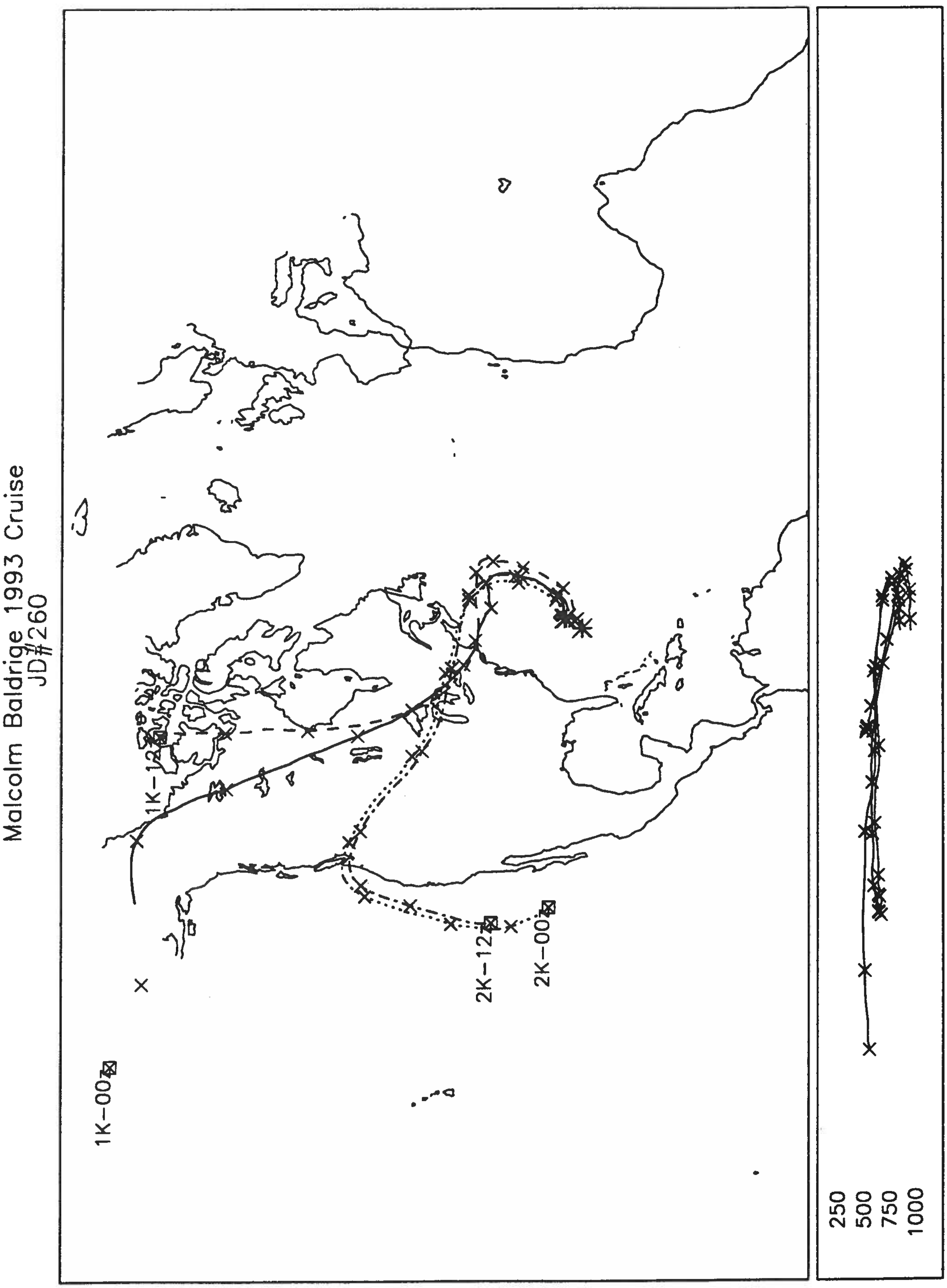
Malcolm Baldrige 1993 Cruise
JD#257

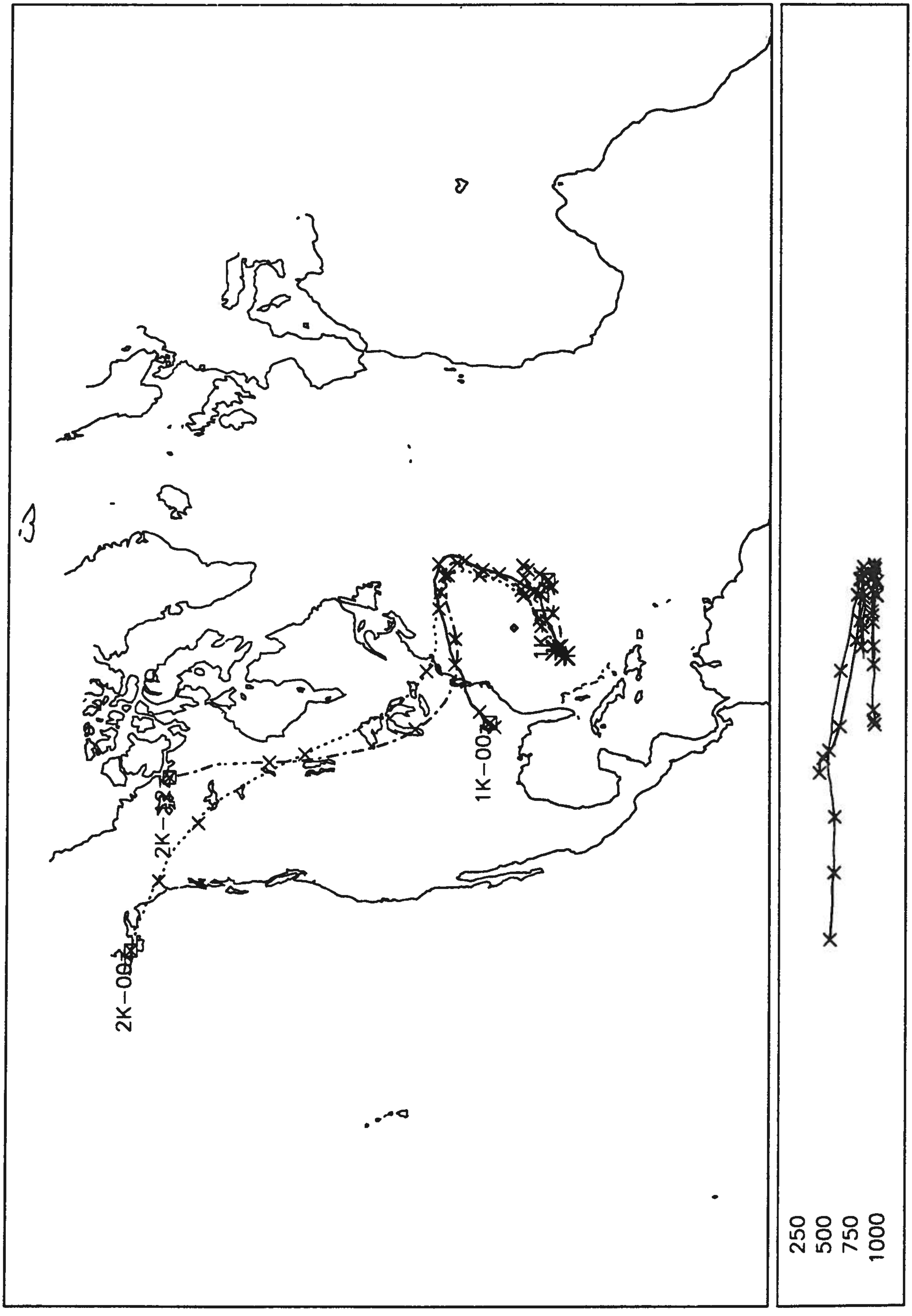


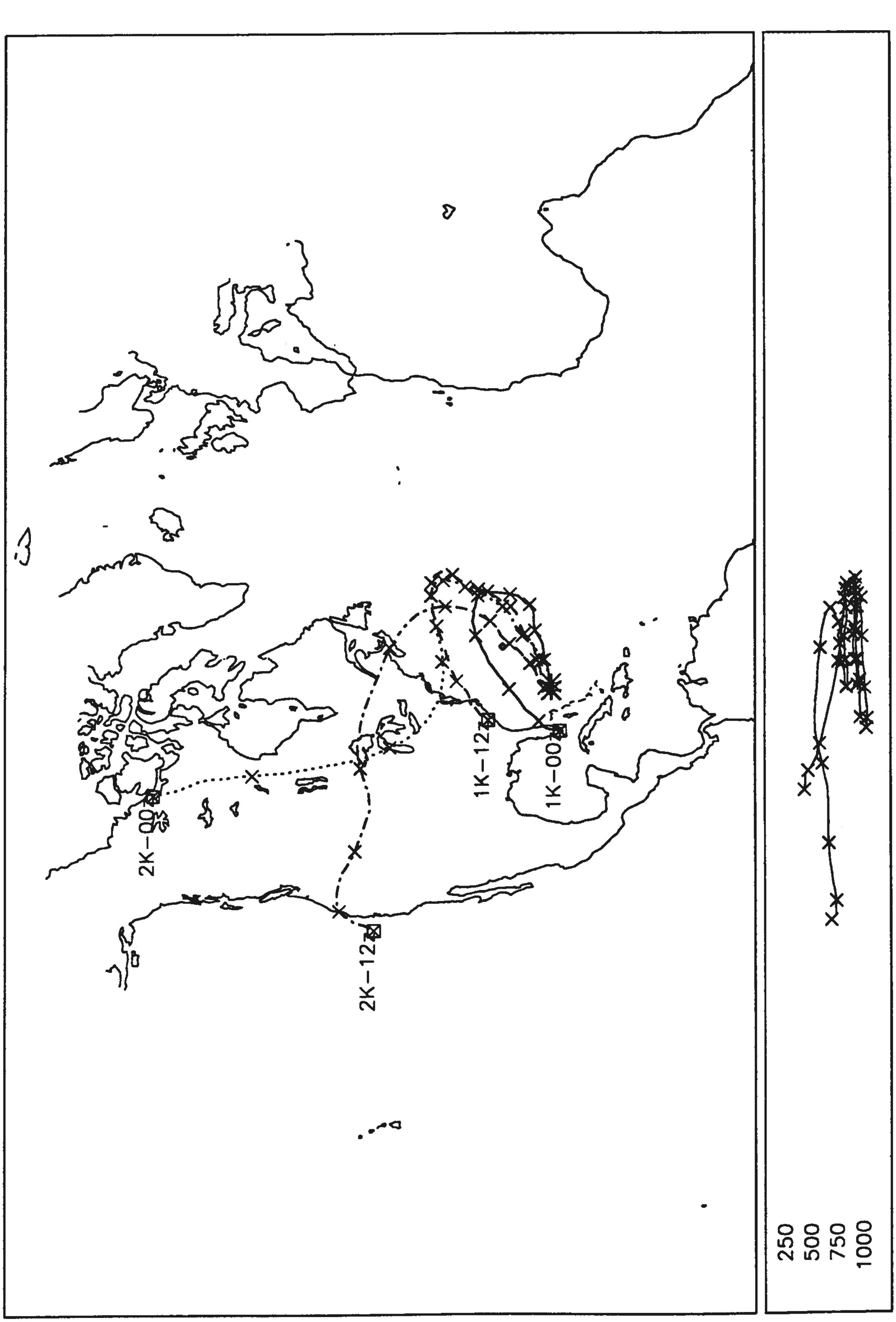

Malcolm Baldrige 1993 Cruise
JD#258
1K-00
1K-12
2K-00
2K-12
250
500
750
1000

Malcolm Baldrige 1993 Cruise
JD#259

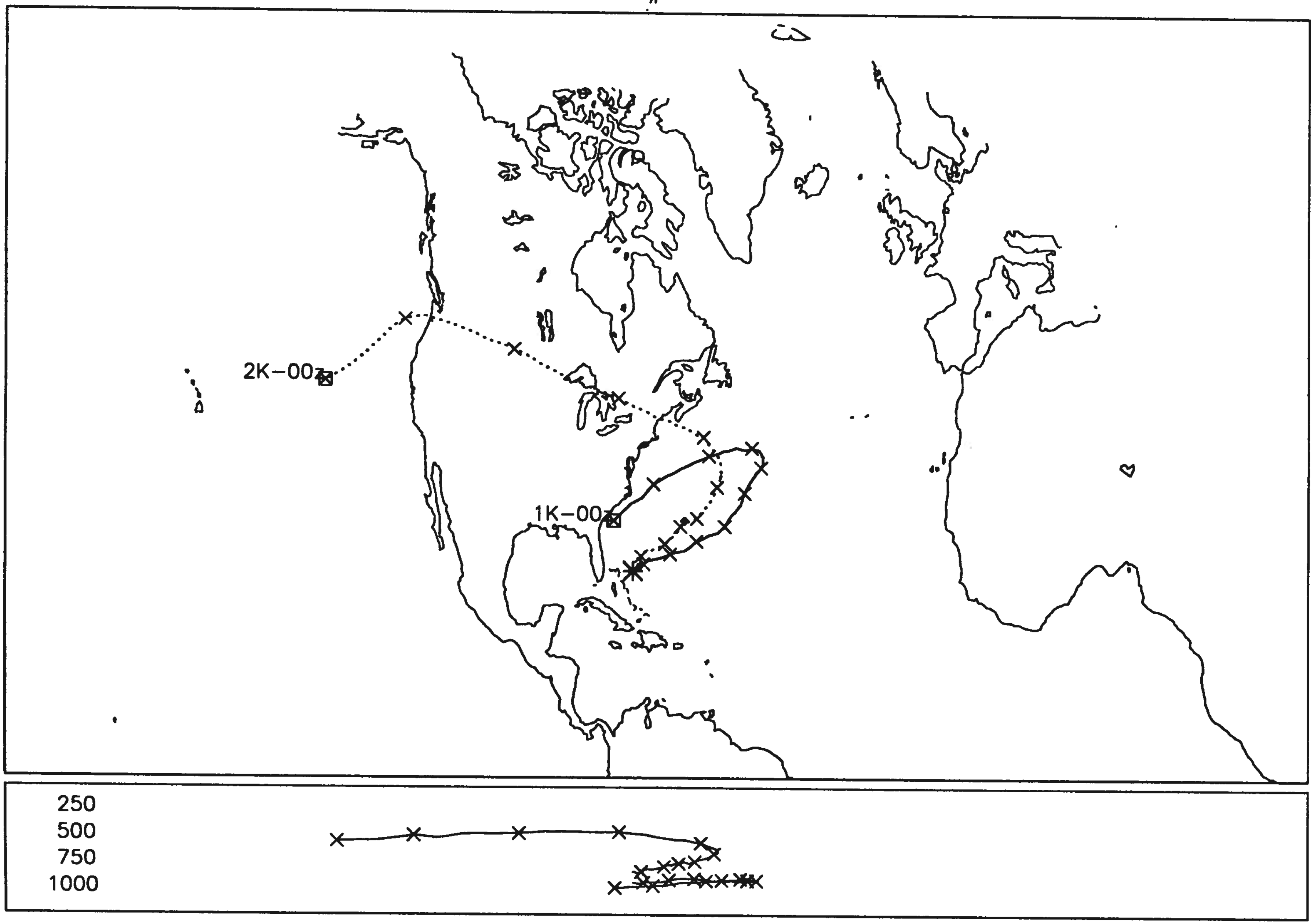



Malcolm Baldrige 1993 Cruise
JD#260
1K-00Z
1K-12Z
2K-12Z
2K-00Z
250
500
750
1000


Malcolm Baldrige 1993 Cruise
JD#261
250
500
750
1000


Malcolm Baldrige 1993 Cruise
JD#262
2K-00
2K-12
1K-12
1K-00
250
500
750
1000

Malcolm Baldrige 1993 Cruise
JD#263



APPENDIX II

MEASUREMENT RESULTS

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Table 1
Aerosol Black Carbon (ng/m^3)

T(jd)	BC	T(jd)	BC	T(jd)	BC	T(jd)	BC
249.250	190.14	252.500	207.84	256.000	73.85	259.500	71.97
249.500	192.48	252.750	121.62	256.250	129.96	259.000	339.55
249.750	180.46	253.000	20.94	256.500	29.56	260.000	26.00
250.000	171.54	253.250	33.37	257.000	27.47	260.250	19.15
250.250	416.04	253.500	40.18	257.250	30.23	260.500	14.43
250.500	408.79	253.750	22.56	257.500	19.35	260.750	9.77
250.750	2512.39	254.000	14.37	257.750	17.22	261.000	244.90
251.000		254.250	20.05	258.000	41.28	261.250	7.16
251.250	14.89	254.500	7.67	258.250	31.53	261.500	13.13
251.500	16.24	254.750	15.08	258.500	21.95	261.750	98.82
251.750	19.51	255.250	11.51	258.750	13.10	262.000	19.91
252.000	106.75	255.500	139.49	259.000	17.36	262.250	46.11
252.250	460.39	255.750	62.68	259.250	11.29	262.500	20.33

Table 2
Condensation Nuclei (particles/cm^3)

T(jd)	CN	T(jd)	CN	T(jd)	CN	T(jd)	CN	T(jd)	CN	T(jd)	CN
248.324	1168	251.642	319	254.182	192	256.476	1213	258.782	650	261.078	424
248.350	1011	251.663	314	254.203	197	256.497	1209	258.802	588	261.099	378
248.371	1308	251.684	306	254.224	175	256.518	1225	258.823	535	261.120	469
248.602	564	251.705	275	254.245	218	256.539	1261	258.844	541	261.141	445
248.746	1352	251.726	286	254.266	220	256.560	1262	258.865	492	261.162	341
248.778	114	251.747	292	254.288	164	256.582	1221	258.886	523	261.182	355
249.186	894	251.767	270	254.310	107	256.603	1222	258.907	596	261.203	424
249.371	1273	251.788	270	254.331	112	256.624	1229	258.927	546	261.224	437
249.405	695	251.809	275	254.351	94	256.644	1223	258.948	518	261.245	452
249.530	1713	251.830	274	254.372	99	256.665	1219	258.969	527	261.266	369
249.551	3434	251.851	275	254.393	105	256.686	1218	258.990	688	261.287	367
249.572	2150	251.872	269	254.414	111	256.708	1221	259.011	594	261.308	412
249.593	2076	251.892	250	254.435	100	256.731	1259	259.032	535	261.328	486
249.614	1337	251.913	278	254.456	100	256.751	1340	259.052	538	261.349	385
249.635	1787	251.934	290	254.476	99	256.772	1428	259.073	532	261.370	495
249.655	2252	251.955	275	254.497	89	256.793	1374	259.094	535	261.391	427
249.676	1816	251.976	236	254.518	96	256.814	1326	259.115	559	261.412	473
249.697	1094	251.997	242	254.539	128	256.835	1290	259.136	536	261.433	440
249.718	1140	252.017	993	254.560	211	256.857	1265	259.156	512	261.453	435
249.739	1288	252.038	305	254.581	224	256.883	1282	259.177	504	261.474	463
249.760	1244	252.059	288	254.601	245	256.906	1345	259.198	501	261.495	514
249.780	1230	252.080	336	254.622	319	256.927	1358	259.219	506	261.516	297
249.801	1274	252.101	415	254.643	537	256.948	1357	259.240	572	261.537	365
249.822	1243	252.122	461	254.664	353	256.969	1253	259.261	557	261.558	457
249.843	1228	252.142	433	254.685	315	256.990	1198	259.281	537	261.581	452
249.864	1063	252.163	409	254.706	299	257.011	1172	259.302	498	261.606	238
249.885	976	252.184	407	254.726	310	257.031	1179	259.323	468	261.627	597
249.905	908	252.205	347	254.747	367	257.052	1248	259.344	448	261.650	299
249.926	824	252.226	363	254.768	340	257.073	1264	259.365	449	261.676	369
249.947	600	252.383	100	254.789	365	257.094	1241	259.386	444	261.696	450
249.968	560	252.462	329	254.810	400	257.115	1256	259.406	452	261.717	365
249.989	472	252.484	256	254.831	381	257.136	1269	259.427	472	261.738	487
250.010	416	252.540	246	254.851	433	257.156	1286	259.448	1323	261.759	315
250.030	344	252.561	328	254.872	461	257.177	1269	259.469	7568	261.780	527
250.051	324	252.582	289	254.893	383	257.198	1247	259.490	5642	261.801	527
250.072	315	252.603	344	254.914	362	257.219	1267	259.511	1790	261.821	320
250.093	258	252.624	314	254.935	307	257.240	1269	259.531	2440	261.842	301
250.114	213	252.645	305	254.956	338	257.261	1257	259.552	931	261.863	479
250.135	173	252.665	232	254.976	366	257.281	1237	259.573	960	261.884	518
250.155	119	252.686	151	254.997	459	257.302	1197	259.594	1065	261.905	340
250.176	92	252.707	155	255.018	477	257.323	1155	259.615	753	261.926	381
250.197	157	252.728	165	255.039	492	257.344	1140	259.636	732	261.947	358
250.218	168	252.749	196	255.060	469	257.365	1138	259.656	494	261.968	361
250.239	224	252.770	240	255.081	417	257.386	1117	259.677	335	261.989	346
250.260	251	252.790	169	255.101	400	257.407	1118	259.698	225	262.009	375
250.280	299	252.811	121	255.122	420	257.427	1276	259.719	169	262.030	369
250.301	270	252.832	130	255.143	370	257.448	1304	259.740	125	262.051	382
250.322	265	252.858	137	255.164	337	257.469	1323	259.761	175	262.072	379

250.343	169	252.884	173	255.185	306	257.490	1360	259.781	165	262.093	378
250.364	148	252.905	221	255.206	325	257.511	1375	259.802	97	262.114	375
250.385	71	252.930	254	255.226	494	257.532	1370	259.823	73	262.134	373
250.405	85	252.953	208	255.247	736	257.552	1364	259.844	63	262.155	375
250.426	3078	252.974	185	255.268	387	257.573	1316	259.866	57	262.176	380
250.447	1820	252.995	154	255.289	403	257.594	1312	259.887	57	262.197	379
250.468	427	253.016	196	255.310	422	257.615	1307	259.908	60	262.218	373
250.489	101	253.037	244	255.331	439	257.636	1320	259.928	69	262.239	373
250.510	137	253.057	260	255.351	752	257.657	1329	259.949	74	262.259	376
250.530	134	253.078	253	255.372	1707	257.677	1177	259.970	75	262.280	382
250.551	103	253.099	289	255.393	2320	257.698	1158	259.991	78	262.301	389
250.572	96	253.120	336	255.414	2555	257.719	1109	260.012	102	262.322	433
250.593	84	253.141	413	255.435	2594	257.740	1074	260.033	78	262.343	454
250.614	87	253.162	401	255.456	2568	257.761	1056	260.053	76	262.364	458
250.635	92	253.182	422	255.476	2477	257.782	1035	260.074	78	262.384	565
250.655	149	253.203	429	255.497	2447	257.802	1014	260.095	80	262.405	428
250.676	214	253.224	480	255.518	2424	257.823	993	260.116	82	262.426	388
250.697	371	253.245	565	255.539	2378	257.844	983	260.137	84	262.447	377
250.718	475	253.266	555	255.560	2305	257.865	985	260.158	78	262.468	379
250.739	509	253.287	534	255.581	2233	257.886	996	260.178	75	262.489	502
250.760	218	253.307	616	255.601	2259	257.907	1001	260.199	68	262.509	422
250.780	248	253.328	520	255.622	2013	257.927	1002	260.220	67	262.530	449
250.801	197	253.349	539	255.643	1771	257.948	1001	260.241	65	262.551	499
250.822	224	253.370	497	255.664	1768	257.969	1010	260.262	60	262.572	2947
250.843	240	253.391	527	255.685	1537	257.990	1013	260.283	61	262.593	515
250.864	236	253.412	562	255.706	1464	258.011	1013	260.303	64	262.614	517
250.885	245	253.432	534	255.726	1324	258.032	1020	260.324	65	262.634	353
250.905	277	253.453	544	255.747	1273	258.052	1049	260.345	62	262.655	415
250.926	282	253.474	536	255.768	1205	258.073	1090	260.370	62	262.676	742
250.947	290	253.495	492	255.789	1076	258.094	1099	260.391	63	262.697	1907
250.968	289	253.516	493	255.810	999	258.115	1120	260.412	61	262.718	411
250.989	301	253.537	506	255.831	952	258.136	1202	260.432	60	262.739	388
251.010	301	253.557	1111	255.851	1064	258.157	1155	260.453	70	262.759	402
251.030	294	253.578	533	255.872	1341	258.177	1126	260.474	54	262.780	385
251.051	292	253.599	507	255.893	1373	258.198	1137	260.495	36	262.801	381
251.072	297	253.620	502	255.914	1471	258.219	1159	260.516	26	262.822	650
251.093	314	253.641	505	255.935	1524	258.240	1157	260.537	23	262.843	541
251.114	317	253.662	514	255.956	1541	258.261	1009	260.557	23	262.864	420
251.135	332	253.682	521	255.976	1590	258.282	909	260.578	16	262.884	361
251.155	345	253.703	525	255.997	1547	258.302	827	260.599	17	262.905	364
251.176	344	253.724	471	256.018	1601	258.323	813	260.620	15	262.926	467
251.197	312	253.745	446	256.039	1607	258.344	796	260.641	15	262.947	352
251.218	298	253.766	389	256.060	1426	258.365	768	260.662	16	262.968	360
251.239	301	253.787	394	256.081	1304	258.386	743	260.682	22	262.989	413
251.260	302	253.807	372	256.101	1221	258.407	722	260.703	32	263.009	422
251.280	318	253.828	349	256.122	1179	258.427	692	260.724	48	263.030	511
251.301	333	253.849	424	256.143	1131	258.448	679	260.745	44	263.051	516
251.322	293	253.870	407	256.164	1138	258.469	685	260.766	203	263.072	439
251.343	281	253.891	402	256.185	1157	258.490	673	260.787	28	263.093	470
251.364	262	253.912	399	256.206	1130	258.511	646	260.807	29	263.114	394
251.385	257	253.932	398	256.226	1099	258.532	634	260.828	26	263.134	401
251.408	261	253.953	346	256.247	1069	258.552	642	260.849	27	263.155	397
251.433	268	253.974	333	256.268	1053	258.573	669	260.870	153	263.176	439
251.455	269	253.995	292	256.289	1061	258.594	617	260.891	334	263.197	406

251.476	262	254.016	265	256.310	1097	258.615	580	260.912	441	263.218	461
251.497	260	254.037	256	256.330	1210	258.636	564	260.932	782	263.239	399
251.517	253	254.057	298	256.351	1145	258.657	597	260.953	316	263.259	703
251.538	252	254.078	293	256.372	1138	258.677	684	260.974	391	263.280	419
251.559	259	254.099	273	256.393	1185	258.698	793	260.995	427	263.301	424
251.580	260	254.120	237	256.414	1245	258.719	753	261.016	414	263.322	392
251.601	255	254.141	203	256.435	1255	258.740	842	261.037	440	263.343	397
251.622	262	254.162	194	256.455	1236	258.761	734	261.057	432	263.364	421

Table 3
CO in Air (ppbv)

T(jd)	CO	T(jd)	CO	T(jd)	CO	T(jd)	CO	T(jd)	CO	T(jd)	CO
187.584	70.5	201.807	93.6	217.517	69.3	232.052	112.4	248.621	99.2	254.706	64.1
187.651	69.7	201.846	91.9	217.547	68.9	232.166	123.7	248.650	100.0	254.759	64.4
187.741	72.6	201.881	91.5	217.579	68.5	232.311	153.3	248.683	100.4	254.799	63.7
187.806	73.5	202.178	99.0	217.609	69.0	232.370	161.9	248.745	105.2	254.832	61.9
187.874	76.9	202.344	101.1	217.641	68.4	232.409	158.8	248.774	105.6	254.918	64.5
188.261	79.5	202.402	99.2	217.691	68.9	232.441	152.3	248.817	106.1	255.062	68.2
188.464	81.1	202.453	93.9	217.736	70.7	232.467	149.2	248.947	109.6	255.216	64.1
188.510	78.9	202.489	91.7	217.821	69.2	232.541	136.4	249.144	117.4	255.341	79.7
188.634	78.0	202.532	94.0	218.996	70.8	232.570	126.0	249.260	123.6	255.380	117.9
188.698	78.4	202.582	88.8	221.162	75.9	232.603	121.7	249.347	124.2	255.437	122.8
188.801	78.5	202.643	88.3	221.250	76.3	232.650	119.7	249.392	124.1	255.471	116.4
188.878	79.9	202.694	88.4	221.322	76.8	232.684	112.8	249.425	118.3	255.499	114.1
189.379	111.3	202.725	89.7	221.352	75.0	232.714	105.3	249.464	117.3	255.543	114.5
189.414	111.0	202.780	90.9	221.407	75.0	232.748	107.5	249.520	115.6	255.606	112.0
189.485	108.6	202.806	94.0	221.453	76.3	232.779	104.6	249.576	115.7	255.654	103.2
189.528	111.3	202.850	92.9	221.492	76.0	232.851	99.1	249.630	114.7	255.684	102.7
189.568	111.1	203.285	97.8	221.530	76.2	232.972	94.9	249.661	114.2	255.713	100.9
189.635	103.2	203.334	94.9	221.572	76.6	233.047	101.0	249.704	112.8	255.787	99.7
189.678	103.0	203.390	94.0	221.609	75.7	233.103	104.8	249.756	113.9	255.822	98.9
189.744	105.6	203.433	93.1	221.663	75.6	233.172	110.2	249.790	115.5	255.891	103.2
189.775	106.9	203.499	94.0	221.721	75.8	233.316	111.8	249.856	116.1	256.044	104.9
189.844	109.0	203.545	94.5	221.747	75.3	233.392	100.4	249.987	103.9	256.231	103.9
189.882	105.2	203.586	91.6	221.778	76.2	233.416	99.5	250.144	100.5	256.335	103.2
190.379	110.1	203.644	91.8	221.793	76.8	233.444	100.1	250.251	99.1	256.383	104.2
190.437	106.1	203.705	90.6	221.825	77.8	233.474	102.2	250.307	100.5	256.449	102.9
190.474	106.7	203.763	88.6	221.924	78.9	233.528	101.5	250.366	100.9	256.482	102.2
190.554	103.3	203.793	88.8	222.046	76.0	233.561	100.0	250.391	108.5	256.507	100.8
190.601	105.1	203.816	89.9	222.187	76.5	233.591	98.9	250.425	108.3	256.539	100.5
190.707	108.5	203.854	88.1	222.278	78.0	233.631	97.6	250.455	107.6	256.592	100.4
190.750	107.2	204.282	95.5	222.315	78.2	233.657	96.6	250.496	107.9	256.632	100.2
190.825	107.6	204.347	93.7	222.341	79.0	233.688	97.8	250.547	107.4	256.671	99.8
190.916	104.9	204.396	92.7	222.365	78.6	233.725	97.6	250.579	107.5	256.705	101.1
191.383	104.8	204.499	89.1	222.390	79.0	233.756	95.5	250.611	107.1	256.737	100.4
191.454	104.8	204.555	87.2	222.416	78.6	233.791	95.4	250.645	105.8	256.780	102.3
191.543	101.1	204.590	86.7	222.441	78.6	233.856	111.8	250.682	106.2	256.838	101.5
191.557	100.8	204.667	86.5	222.464	77.9	233.974	131.4	250.735	105.6	256.888	102.6
191.567	100.6	204.708	88.2	222.487	77.4	234.059	129.1	250.766	105.7	256.969	101.9
191.656	98.4	204.745	89.5	222.516	76.8	234.213	105.3	250.798	107.6	257.121	103.8
191.739	97.7	204.779	90.3	222.548	75.9	234.319	96.5	250.831	108.6	257.271	103.6
191.750	96.0	204.833	91.5	222.595	75.7	234.362	96.2	250.935	110.8	257.371	101.6
191.760	95.2	203.807	96.5	222.675	73.8	234.391	97.3	251.114	109.9	257.413	101.3
191.785	96.6	203.306	96.1	222.706	73.5	234.417	96.6	251.308	109.6	257.464	101.8
191.833	96.9	203.381	93.6	222.750	73.2	234.444	95.1	251.351	107.4	257.497	106.4
191.847	96.7	203.418	93.5	222.915	75.2	234.468	94.2	251.408	107.6	257.526	109.4
191.862	96.1	203.472	94.1	222.989	74.7	234.538	93.3	251.433	107.2	257.571	109.9
191.925	95.4	203.530	93.9	223.131	77.3	234.609	90.9	251.454	107.4	257.624	109.5
191.937	95.2	203.575	93.4	223.238	77.3	234.652	89.2	251.475	106.9	257.658	108.5
192.376	95.0	203.623	91.3	223.321	77.9	234.680	87.2	251.494	106.4	257.695	104.1

192.404	94.7	203.682	91.6	223.382	76.3	234.707	89.4	251.516	107.3	257.727	103.9
192.445	91.5	203.748	88.2	223.414	76.1	234.745	89.0	251.567	107.5	257.757	103.6
192.467	92.8	203.783	89.3	223.445	75.9	234.790	91.0	251.603	107.5	257.831	102.3
192.478	93.3	203.810	89.4	223.472	77.6	236.013	98.0	251.632	106.3	257.868	102.0
192.490	93.1	203.843	88.4	223.499	77.1	236.059	97.7	251.664	107.1	257.910	103.1
192.505	92.3	204.138	93.1	223.538	80.8	236.116	95.6	251.700	107.2	258.013	102.4
192.516	93.0	204.321	94.7	223.572	80.8	236.267	96.8	251.758	105.9	258.132	104.0
192.527	93.5	204.379	92.5	223.614	80.5	236.325	97.4	251.797	104.4	258.369	97.6
192.539	91.1	204.463	91.0	223.642	82.8	236.370	96.9	251.840	106.0	258.423	95.9
192.554	90.9	204.541	88.1	223.697	84.2	236.398	96.9	251.891	102.0	258.507	95.9
192.581	91.9	204.574	86.7	223.727	85.3	236.416	96.3	252.039	87.8	258.547	94.9
192.618	89.5	204.643	86.3	223.756	86.3	236.441	96.4	252.221	87.7	258.580	94.8
192.690	88.5	204.693	87.2	223.837	89.5	236.480	97.4	252.327	88.9	258.639	93.8
192.723	88.6	204.740	89.6	223.920	89.0	236.543	96.9	252.416	86.6	258.686	94.0
192.748	88.7	204.766	89.5	224.010	88.2	236.597	96.3	252.454	86.4	258.715	95.1
192.765	89.2	204.813	91.3	224.137	89.7	236.631	95.9	252.487	87.5	258.746	96.0
192.791	86.1	208.103	88.9	224.249	89.0	236.662	95.7	252.528	82.8	258.777	97.6
192.841	86.6	214.631	80.5	224.327	90.9	236.687	96.6	252.589	81.4	258.823	95.7
192.861	86.5	214.682	77.4	224.357	91.9	236.716	95.1	252.620	80.5	258.889	93.9
192.886	88.3	214.722	76.6	224.390	92.1	236.754	94.4	252.651	80.4	258.935	93.4
192.905	88.3	214.753	76.7	224.415	92.7	236.828	93.2	252.713	81.4	259.008	96.0
193.071	90.3	214.782	75.2	224.441	95.1	236.977	95.7	252.769	84.0	259.192	92.1
193.415	90.9	214.841	75.2	224.462	94.8	237.051	95.3	252.812	85.0	259.507	93.3
193.467	88.6	214.867	74.0	224.487	102.8	237.157	93.9	252.842	85.8	259.880	95.4
193.548	89.3	215.013	69.1	224.516	96.1	237.330	94.2	252.892	84.3	259.914	95.1
193.647	89.3	215.268	68.3	224.547	97.0	237.393	93.4	252.379	83.7	259.969	95.5
193.689	88.5	215.307	66.9	224.570	97.4	237.422	92.9	252.221	87.7	260.125	94.0
193.723	91.4	215.341	66.8	224.590	97.6	237.456	93.6	252.327	88.9	260.323	91.1
193.760	92.5	215.380	67.0	224.649	92.7	237.526	94.7	252.416	86.6	260.420	90.1
193.833	95.7	215.417	66.5	224.706	89.8	237.575	93.8	252.454	86.4	260.488	89.3
193.859	95.5	215.456	66.4	224.741	89.4	237.631	95.1	252.487	87.5	260.523	90.0
193.880	96.2	215.532	67.0	224.801	90.2	237.671	94.2	252.528	82.8	260.569	90.0
193.908	95.1	215.580	68.7	224.897	90.1	237.697	94.2	252.589	81.4	260.608	89.4
195.137	91.2	215.606	67.9	226.729	92.2	237.727	94.6	252.620	80.5	260.655	88.5
195.754	90.6	215.639	68.2	230.286	103.4	237.762	93.6	252.651	80.4	260.684	88.8
195.766	88.5	215.678	67.7	230.337	107.6	237.800	93.4	252.713	81.4	260.734	88.7
196.176	86.1	215.708	69.0	230.390	110.0	237.881	94.3	252.769	84.0	260.789	88.2
196.396	82.8	215.737	68.0	230.422	111.8	237.982	93.8	252.812	85.0	260.845	88.2
196.453	86.8	215.762	68.7	230.455	115.4	238.162	94.9	252.842	85.8	260.895	87.2
196.529	83.8	215.807	67.5	230.516	114.6	238.326	92.7	252.892	84.3	260.944	87.4
196.843	87.3	215.833	68.3	230.576	111.6	238.374	94.2	253.016	80.3	261.047	86.3
197.409	98.9	216.007	71.5	230.619	110.9	238.440	98.9	253.211	84.6	261.183	87.1
197.549	92.7	216.212	74.6	230.655	114.5	238.468	98.8	253.320	82.1	261.343	87.1
197.620	93.1	216.255	74.2	230.681	118.7	238.525	102.1	253.371	76.1	261.447	86.7
197.662	90.0	216.306	74.2	230.705	115.2	238.566	99.8	253.419	74.4	261.511	85.1
197.698	89.2	216.380	72.7	230.732	117.8	238.599	100.2	253.466	66.4	261.549	83.2
197.822	85.1	216.424	72.9	230.755	121.4	238.616	100.0	253.499	65.4	261.588	82.0
197.901	83.8	216.448	73.8	230.787	126.0	238.641	99.0	253.556	67.5	261.660	83.0
198.228	86.4	216.478	73.2	230.825	131.9	238.685	99.4	253.602	66.7	261.695	80.4
198.426	82.9	216.506	71.5	230.945	133.5	238.767	98.6	253.633	68.0	261.728	79.2
198.449	83.8	216.542	71.1	231.043	134.1	238.848	99.2	253.675	67.3	261.770	78.2
198.466	85.0	216.572	70.4	231.203	119.2	244.743	107.2	253.707	70.1	261.819	78.0
198.504	85.9	216.601	69.6	231.289	113.6	247.660	113.8	253.745	73.1	261.874	78.0
198.595	88.8	216.631	70.6	231.332	115.8	247.706	113.9	253.799	71.8	261.903	78.3

198.636	92.1	216.686	69.7	231.396	122.5	247.760	104.3	253.830	73.2	261.941	78.3
198.651	91.8	216.740	70.9	231.433	130.3	247.787	101.1	253.866	72.7	262.049	81.7
198.691	95.1	216.776	70.2	231.465	126.9	247.818	96.6	253.975	72.2	262.199	82.6
198.730	95.5	216.808	72.3	231.536	126.2	247.887	93.8	254.156	74.1	262.391	82.5
198.752	97.1	216.839	71.4	231.563	123.8	248.050	95.2	254.308	78.6	262.443	82.7
198.773	101.4	216.898	70.3	231.590	125.9	248.256	93.3	254.350	84.0	262.506	82.7
198.811	103.4	217.019	69.0	231.631	126.0	248.298	94.1	254.414	88.1	262.546	82.0
198.846	100.5	217.133	69.3	231.672	118.3	248.347	94.4	254.445	88.2	262.581	80.6
198.900	101.4	217.215	68.9	231.699	115.8	248.382	95.5	254.477	87.7	262.626	78.9
200.726	97.4	217.255	69.0	231.729	110.1	248.422	95.7	254.507	84.4	262.663	81.1
201.648	96.6	217.314	68.5	231.770	110.4	248.454	96.0	254.554	82.7	262.704	81.8
201.682	93.4	217.417	68.8	231.813	108.8	248.494	97.7	254.590	79.0	262.736	81.0
201.713	90.8	217.454	69.1	231.894	98.8	248.559	98.3	254.633	68.0	262.769	79.9
201.754	92.1	217.485	69.0	231.992	108.0	248.589	99.1	254.672	64.6	262.797	80.8

Table 4
CO in Seawater, nMole/liter)

T(jd)	CO	T(jd)	CO	T(jd)	CO	T(jd)	CO	T(jd)	CO	T(jd)	CO
230.250	0.17	234.542	0.71	239.375	0.36	249.625	0.40	253.875	0.28	258.167	0.52
230.292	0.17	234.583	0.84	239.417	0.49	249.667	0.46	253.917	0.26	258.292	0.37
230.333	0.17	234.625	0.86	239.458	0.60	249.708	0.45	253.958	0.21	258.375	0.32
230.375	0.17	234.667	0.72	239.500	0.56	249.750	0.48	254.000	0.20	258.417	0.34
230.417	0.19	234.708	0.63	239.542	0.55	249.792	0.49	254.042	0.19	258.458	0.27
230.458	0.21	234.750	0.55	239.583	0.56	249.833	0.39	254.167	0.14	258.500	0.25
230.500	0.25	234.792	0.61	239.625	0.54	249.875	0.38	254.208	0.12	258.542	0.30
230.542	0.26	235.000	0.59	239.667	0.54	249.917	0.33	254.250	0.12	258.583	0.34
230.583	0.31	235.042	0.54	239.708	0.66	249.958	0.28	254.292	0.12	258.625	0.44
230.625	0.34	235.083	0.50	239.750	0.73	250.000	0.24	254.333	0.12	258.667	0.50
230.667	0.30	235.125	0.47	239.792	0.68	250.083	0.20	254.375	0.12	258.708	0.57
230.708	0.32	235.250	0.38	239.833	0.67	250.125	0.18	254.417	0.13	258.750	0.65
230.750	0.32	235.292	0.33	239.875	0.67	250.167	0.17	254.458	0.15	258.792	0.70
230.792	0.31	235.333	0.30	239.917	0.54	250.208	0.13	254.500	0.17	258.833	0.70
230.833	0.31	235.375	0.27	239.958	0.52	250.250	0.12	254.542	0.21	258.875	0.59
230.875	0.31	235.417	0.27	240.000	0.64	250.292	0.14	254.583	0.24	258.917	0.49
230.917	0.34	235.458	0.30	240.042	0.67	250.333	0.15	254.625	0.28	258.958	0.47
230.958	0.34	235.500	0.33	240.083	0.54	250.375	0.15	254.667	0.31	259.000	0.41
231.000	0.33	235.542	0.35	240.125	0.42	250.417	0.19	254.708	0.28	259.042	0.39
231.042	0.31	235.583	0.41	240.250	0.37	250.458	0.26	254.750	0.23	259.083	0.36
231.083	0.25	235.625	0.42	240.292	0.34	250.500	0.25	254.792	0.22	259.208	0.36
231.250	0.18	235.667	0.44	240.333	0.33	250.542	0.24	254.917	0.22	259.250	0.33
231.292	0.20	235.708	0.62	240.375	0.33	250.583	0.27	254.958	0.22	259.292	0.31
231.333	0.20	235.750	0.66	240.542	0.68	250.625	0.33	255.000	0.21	259.333	0.32
231.375	0.20	235.792	0.64	240.625	0.65	250.667	0.38	255.042	0.20	259.833	0.40
231.417	0.20	235.958	0.45	240.667	0.60	250.708	0.42	255.083	0.21	259.875	0.40
231.458	0.19	236.000	0.39	240.708	0.57	250.750	0.38	255.125	0.20	259.917	0.42
231.500	0.20	236.042	0.30	240.750	0.54	250.792	0.35	255.208	0.19	259.958	0.40
231.542	0.21	236.083	0.31	240.792	0.50	250.833	0.33	255.292	0.17	260.000	0.32
231.583	0.25	236.125	0.31	240.833	0.42	250.875	0.29	255.333	0.17	260.042	0.33
231.625	0.27	236.250	0.26	240.875	0.36	250.917	0.29	255.417	0.21	260.083	0.33
231.667	0.27	236.292	0.25	240.917	0.35	250.958	0.35	255.458	0.23	260.208	0.23
231.708	0.31	236.333	0.25	240.958	0.38	251.000	0.34	255.500	0.25	260.250	0.21
231.750	0.31	236.375	0.29	241.000	0.38	251.083	0.36	255.542	0.29	260.292	0.23
231.792	0.31	236.417	0.33	241.042	0.39	251.208	0.28	255.583	0.32	260.375	0.22
231.833	0.29	236.625	1.31	241.083	0.33	251.250	0.27	255.625	0.36	260.417	0.20
231.875	0.25	236.667	1.52	241.125	0.25	251.292	0.25	255.667	0.39	260.458	0.17
231.917	0.25	236.708	1.93	241.167	0.22	251.333	0.20	255.708	0.43	260.500	0.18
231.958	0.24	236.750	2.37	241.208	0.20	251.375	0.25	255.750	0.49	260.542	0.20
232.000	0.11	236.792	2.75	241.250	0.19	251.417	0.30	255.792	0.50	260.583	0.23
232.042	0.27	236.833	3.07	241.292	0.18	251.458	0.38	255.833	0.54	260.625	0.26
232.083	0.29	236.875	2.57	241.333	0.20	251.500	0.47	255.875	0.53	260.667	0.28
232.125	0.30	236.958	2.36	241.375	0.21	251.542	0.59	255.917	0.50	260.708	0.30
232.250	0.28	237.000	1.86	241.417	0.20	251.583	0.68	255.958	0.50	260.750	0.34
232.292	0.29	237.042	1.65	241.458	0.25	251.625	0.77	256.000	0.49	260.792	0.34
232.333	0.26	237.083	1.81	241.500	0.28	251.667	0.89	256.125	0.39	260.833	0.34
232.375	0.25	237.125	1.95	241.542	0.31	251.708	1.01	256.167	0.37	260.875	0.34
232.417	0.25	237.250	1.62	241.583	0.29	251.750	1.11	256.208	0.36	260.917	0.34

232.458	0.30	237.292	1.49	241.625	0.30	251.792	1.05	256.250	0.33	260.958	0.30
232.500	0.34	237.333	2.86	241.667	0.34	251.833	0.97	256.292	0.32	261.000	0.31
232.542	0.42	237.375	2.33	241.708	0.38	251.875	0.67	256.333	0.30	261.042	0.26
232.583	0.48	237.417	1.50	241.750	0.37	251.917	0.55	256.375	0.28	261.083	0.23
232.625	0.49	237.458	1.41	241.792	0.37	251.958	0.51	256.417	0.26	261.125	0.20
232.667	0.42	237.500	1.38	247.625	0.25	252.000	0.40	256.458	0.25	261.167	0.19
232.708	0.41	237.542	1.37	247.667	0.25	252.125	0.43	256.500	0.26	261.208	0.19
232.750	0.39	237.583	2.10	247.750	0.21	252.167	0.34	256.542	0.28	261.250	0.19
232.792	0.35	237.625	3.13	247.792	0.21	252.208	0.26	256.583	0.32	261.333	0.24
232.833	0.33	237.667	2.91	247.833	0.23	252.250	0.22	256.625	0.38	261.375	0.24
232.875	0.33	237.708	3.46	247.875	0.22	252.333	0.20	256.667	0.47	261.417	0.23
232.917	0.32	237.750	3.41	247.917	0.32	252.375	0.22	256.708	0.52	261.458	0.23
232.958	0.31	237.792	3.26	247.958	0.33	252.417	0.21	256.750	0.56	261.500	0.22
233.000	0.27	237.875	3.56	248.125	0.25	252.458	0.22	256.792	0.65	261.542	0.21
233.042	0.23	237.917	3.86	248.208	0.20	252.500	0.23	256.833	0.67	261.583	0.20
233.083	0.20	237.958	3.14	248.250	0.19	252.542	0.28	256.875	0.73	261.625	0.22
233.125	0.19	238.000	3.30	248.292	0.15	252.583	0.34	256.917	0.73	261.667	0.26
233.250	0.21	238.042	3.65	248.333	0.16	252.625	0.47	256.958	0.75	261.708	0.31
233.292	0.21	238.083	3.73	248.375	0.17	252.667	0.57	257.000	0.77	261.750	0.35
233.333	0.20	238.125	3.60	248.417	0.18	252.708	0.66	257.042	0.72	261.792	0.39
233.375	0.19	238.250	1.96	248.458	0.20	252.750	0.71	257.125	0.52	261.833	0.40
233.417	0.20	238.292	1.22	248.500	0.20	252.792	0.71	257.167	0.51	261.875	0.40
233.458	0.22	238.333	1.05	248.542	0.20	252.833	0.68	257.208	0.44	261.917	0.43
233.500	0.25	238.375	0.33	248.583	0.22	252.875	0.63	257.250	0.38	261.958	0.48
233.542	0.34	238.417	0.47	248.625	0.26	252.917	0.46	257.292	0.39	262.000	0.47
233.583	0.46	238.458	0.68	248.667	0.28	252.958	0.37	257.333	0.36	262.042	0.45
233.625	0.57	238.500	1.55	248.750	0.28	253.000	0.30	257.375	0.33	262.083	0.43
233.667	0.56	238.542	1.56	248.792	0.28	253.042	0.36	257.417	0.34	262.125	0.33
233.708	0.62	238.583	1.41	248.833	0.29	253.125	0.29	257.458	0.30	262.167	0.28
233.750	0.64	238.625	1.35	248.875	0.30	253.208	0.26	257.500	0.30	262.250	0.31
233.792	0.60	238.667	1.26	248.917	0.30	253.250	0.26	257.542	0.32	262.333	0.31
233.833	0.47	238.708	1.43	249.000	0.25	253.292	0.30	257.583	0.38	262.417	0.23
233.875	0.39	238.750	1.13	249.083	0.29	253.333	0.27	257.625	0.45	262.458	0.24
233.917	0.41	238.792	0.92	249.125	0.28	253.375	0.26	257.667	0.55	262.500	0.25
233.958	0.41	238.875	0.62	249.167	0.28	253.417	0.29	257.708	0.65	262.542	0.28
234.000	0.39	238.917	0.57	249.208	0.25	253.458	0.30	257.750	0.77	262.583	0.30
234.042	0.38	238.958	0.55	249.250	0.22	253.500	0.32	257.792	0.82	262.625	0.31
234.125	0.35	239.000	0.48	249.292	0.20	253.542	0.38	257.833	0.84	262.667	0.32
234.250	0.24	239.042	0.45	249.333	0.19	253.583	0.40	257.875	0.84	262.708	0.33
234.292	0.26	239.083	0.35	249.375	0.18	253.625	0.41	257.917	0.81	262.750	0.35
234.333	0.27	239.125	0.41	249.417	0.21	253.667	0.41	257.958	0.74	262.792	0.44
234.375	0.27	239.208	0.41	249.458	0.21	253.708	0.41	258.000	0.67	262.833	0.55
234.417	0.37	239.250	0.38	249.500	0.24	253.750	0.38	258.042	0.66	262.875	0.58
234.458	0.48	239.292	0.36	249.542	0.26	253.792	0.33	258.083	0.60	262.917	0.61
234.500	0.63	239.333	0.35	249.583	0.38	253.833	0.29	258.125	0.62	262.958	0.56

Table 5
CO Flux (sea-to-air, µMole/m²/day)

T(jd)	CO	T(jd)	CO	T(jd)	CO	T(jd)	CO	T(jd)	CO	T(jd)	CO
230.250	0.44	234.542	2.33	239.375	1.06	249.625	0.67	253.875	1.09	258.167	1.31
230.292	0.44	234.583	3.32	239.417	1.65	249.667	0.80	253.917	1.66	258.292	0.04
230.333	0.42	234.625	3.94	239.458	2.28	249.708	0.03	253.958	0.99	258.375	0.04
230.375	0.38	234.667	4.44	239.500	1.85	249.750	0.04	254.000	0.84	258.417	0.03
230.417	0.42	234.708	4.21	239.542	1.93	249.792	0.04	254.042	0.78	258.458	0.02
230.458	0.59	234.750	3.56	239.583	1.61	249.833	0.63	254.167	0.17	258.500	0.02
230.500	0.69	234.792	2.31	239.625	1.56	249.875	0.17	254.208	0.05	258.542	0.03
230.542	0.80	235.000	3.82	239.667	1.12	249.917	0.19	254.250	0.07	258.583	0.03
230.583	1.02	235.042	2.12	239.708	1.81	249.958	0.43	254.292	0.04	258.625	0.16
230.625	1.16	235.083	1.73	239.750	2.03	250.000	0.24	254.333	0.12	258.667	0.18
230.667	1.10	235.125	1.45	239.792	2.39	250.083	0.29	254.375	0.11	258.708	0.21
230.708	1.14	235.250	1.18	239.833	1.79	250.125	0.27	254.417	0.01	258.750	0.64
230.750	1.10	235.292	1.09	239.875	2.24	250.167	0.18	254.458	0.01	258.792	0.87
230.792	0.98	235.333	0.86	239.917	2.09	250.208	0.12	254.500	0.01	258.833	0.44
230.833	0.95	235.375	0.82	239.958	2.07	250.250	0.08	254.542	0.36	258.875	0.05
230.875	0.88	235.417	0.92	240.000	2.99	250.292	0.11	254.583	0.59	258.917	1.34
230.917	0.92	235.458	0.91	240.042	3.61	250.333	0.15	254.625	0.80	258.958	1.51
230.958	0.86	235.500	0.95	240.083	2.95	250.375	0.30	254.667	1.07	259.000	1.58
231.000	0.74	235.542	0.93	240.125	1.84	250.417	0.37	254.708	0.30	259.042	1.12
231.042	0.66	235.583	1.10	240.250	1.88	250.458	0.81	254.750	0.24	259.083	0.91
231.083	0.60	235.625	1.19	240.292	1.95	250.500	0.93	254.792	0.52	259.208	0.91
231.250	0.40	235.667	1.13	240.333	1.84	250.542	0.86	254.917	0.79	259.250	0.83
231.292	0.42	235.708	1.49	240.375	1.74	250.583	1.18	254.958	0.75	259.292	0.33
231.333	0.41	235.750	1.58	240.542	2.13	250.625	1.26	255.000	0.78	259.333	0.35
231.375	0.37	235.792	1.16	240.625	2.80	250.667	1.32	255.042	0.61	259.833	0.82
231.417	0.34	235.958	1.16	240.667	2.44	250.708	1.41	255.083	0.58	259.875	0.94
231.458	0.35	236.000	0.80	240.708	2.06	250.750	0.98	255.125	0.51	259.917	0.84
231.500	0.39	236.042	0.45	240.750	1.84	250.792	1.26	255.208	0.39	259.958	0.78
231.542	0.48	236.083	0.53	240.792	0.77	250.833	0.91	255.292	0.36	260.000	0.71
231.583	0.60	236.125	0.43	240.833	0.78	250.875	0.68	255.333	0.55	260.042	0.36
231.625	0.72	236.250	0.31	240.875	0.61	250.917	0.70	255.417	0.56	260.083	0.65
231.667	0.61	236.292	0.30	240.917	0.66	250.958	0.65	255.458	0.60	260.208	0.41
231.708	0.68	236.333	0.21	240.958	0.92	251.000	0.35	255.500	0.71	260.250	0.26
231.750	0.75	236.375	0.45	241.000	1.68	251.083	0.04	255.542	0.50	260.292	0.06
231.792	0.83	236.417	0.49	241.042	1.30	251.208	0.02	255.583	0.58	260.375	0.39
231.833	0.80	236.625	0.18	241.083	0.99	251.250	0.02	255.625	0.90	260.417	0.19
231.875	0.84	236.667	0.54	241.125	0.29	251.292	0.02	255.667	1.21	260.458	0.27
231.917	0.97	236.708	0.96	241.167	0.31	251.333	0.02	255.708	0.76	260.500	0.27
231.958	0.86	236.750	0.26	241.208	0.32	251.375	0.07	255.750	0.93	260.542	0.47
232.000	0.11	236.792	0.17	241.250	0.26	251.417	0.16	255.792	0.95	260.583	0.01
232.042	0.94	236.833	0.17	241.292	0.26	251.458	0.04	255.833	1.05	260.625	0.51
232.083	0.91	236.875	0.13	241.333	0.22	251.500	0.50	255.875	2.14	260.667	0.78
232.125	0.85	236.958	0.14	241.375	0.06	251.542	1.20	255.917	1.40	260.708	0.82
232.250	0.62	237.000	0.11	241.417	0.01	251.583	1.18	255.958	1.01	260.750	1.07
232.292	0.67	237.042	0.13	241.458	0.01	251.625	0.66	256.000	0.91	260.792	0.88
232.333	0.55	237.083	0.13	241.500	0.02	251.667	0.22	256.125	0.09	260.833	0.98
232.375	0.47	237.125	0.04	241.542	0.14	251.708	0.26	256.167	0.14	260.875	1.20
232.417	0.49	237.250	0.11	241.583	0.40	251.750	1.34	256.208	0.08	260.917	0.98

232.458	0.55	237.292	0.16	241.625	0.54	251.792	1.27	256.250	0.21	260.958	0.68
232.500	0.63	237.333	0.35	241.667	0.49	251.833	1.09	256.292	0.20	261.000	1.54
232.542	0.97	237.375	0.31	241.708	0.65	251.875	2.37	256.333	0.12	261.042	1.01
232.583	1.14	237.417	0.14	241.750	0.57	251.917	1.55	256.375	0.11	261.083	0.85
232.625	1.26	237.458	0.04	241.792	0.48	251.958	2.14	256.417	0.02	261.125	0.49
232.667	0.98	237.500	0.05	247.625	0.01	252.000	2.02	256.458	0.22	261.167	0.49
232.708	1.04	237.542	0.08	247.667	0.12	252.125	1.30	256.500	0.30	261.208	0.44
232.750	1.19	237.583	2.22	247.750	0.09	252.167	1.35	256.542	0.18	261.250	0.28
232.792	1.19	237.625	5.47	247.792	0.06	252.208	1.07	256.583	0.04	261.333	0.39
232.833	1.22	237.667	5.38	247.833	0.12	252.250	0.77	256.625	0.17	261.375	0.39
232.875	1.13	237.708	7.07	247.875	0.16	252.333	0.21	256.667	0.05	261.417	0.55
232.917	0.96	237.750	3.06	247.917	0.45	252.375	0.25	256.708	0.25	261.458	0.58
232.958	0.97	237.792	0.39	247.958	0.39	252.417	0.02	256.750	0.07	261.500	0.70
233.000	0.86	237.875	8.43	248.125	0.19	252.458	0.01	256.792	0.51	261.542	0.01
233.042	0.76	237.917	9.57	248.208	0.23	252.500	0.02	256.833	0.53	261.583	0.30
233.083	0.56	237.958	8.16	248.250	0.20	252.542	0.42	256.875	0.54	261.625	0.39
233.125	0.51	238.000	7.35	248.292	0.09	252.583	0.73	256.917	0.31	261.667	0.29
233.250	0.46	238.042	0.58	248.333	0.28	252.625	1.03	256.958	0.04	261.708	0.72
233.292	0.41	238.083	0.51	248.375	0.36	252.667	1.31	257.000	0.00	261.750	1.04
233.333	0.42	238.125	3.52	248.417	0.38	252.708	1.08	257.042	0.07	261.792	0.91
233.375	0.35	238.250	5.16	248.458	0.45	252.750	1.48	257.125	0.64	261.833	0.67
233.417	0.30	238.292	2.79	248.500	0.19	252.792	0.67	257.167	0.33	261.875	0.31
233.458	0.32	238.333	1.13	248.542	0.16	252.833	0.09	257.208	0.30	261.917	0.46
233.500	0.40	238.375	0.41	248.583	0.11	252.875	0.04	257.250	0.45	261.958	0.88
233.542	0.56	238.417	1.25	248.625	0.22	252.917	0.05	257.292	0.04	262.000	0.88
233.583	0.77	238.458	2.08	248.667	0.26	252.958	0.77	257.333	0.02	262.042	1.26
233.625	1.07	238.500	5.75	248.750	0.30	253.000	0.59	257.375	0.03	262.083	1.29
233.667	0.91	238.542	5.95	248.792	0.43	253.042	0.64	257.417	0.57	262.125	0.60
233.708	0.86	238.583	4.99	248.833	0.69	253.125	0.98	257.458	0.50	262.167	0.09
233.750	1.03	238.625	3.67	248.875	0.55	253.208	1.10	257.500	0.76	262.250	0.57
233.792	1.10	238.667	3.51	248.917	0.64	253.250	1.10	257.542	0.02	262.333	0.19
233.833	1.05	238.708	6.13	249.000	0.25	253.292	1.52	257.583	0.84	262.417	0.02
233.875	0.63	238.750	6.78	249.083	0.27	253.333	1.28	257.625	1.41	262.458	0.14
233.917	0.44	238.792	6.12	249.125	0.36	253.375	1.15	257.667	1.66	262.500	0.03
233.958	0.17	238.875	4.17	249.167	0.34	253.417	1.19	257.708	2.16	262.542	0.15
234.000	0.08	238.917	2.98	249.208	0.44	253.458	1.37	257.750	2.12	262.583	0.02
234.042	0.27	238.958	1.70	249.250	0.28	253.500	1.77	257.792	2.26	262.625	0.56
234.125	0.59	239.000	1.07	249.292	0.16	253.542	2.08	257.833	1.53	262.667	0.03
234.250	0.47	239.042	1.11	249.333	0.07	253.583	1.50	257.875	0.94	262.708	0.01
234.292	0.85	239.083	0.81	249.375	0.03	253.625	1.64	257.917	2.48	262.750	0.02
234.333	0.95	239.125	0.94	249.417	0.15	253.667	1.45	257.958	1.78	262.792	0.04
234.375	0.83	239.208	0.88	249.458	0.11	253.708	1.53	258.000	1.39	262.833	0.03
234.417	1.27	239.250	0.85	249.500	0.16	253.750	1.57	258.042	1.74	262.875	0.03
234.458	1.75	239.292	0.73	249.542	0.30	253.792	1.51	258.083	1.76	262.917	0.00
234.500	2.00	239.333	0.80	249.583	0.61	253.833	1.13	258.125	1.38	262.958	0.07

Table 6
Psychrometer Measurements

Time	JD	Hour	BPres (mb)	Tdry (°C)	Twet (°C)	RHum (%)	Tdp (°C)	Time	JD	Hour	BPres (mb)	Tdry (°C)	Twet (°C)	RHum (%)	Tdp (°C)
247.167	247	4	1026.4	10.2	9.0	85.9	7.9	256.000	255	24	1028.5	22.0	17.2	62.0	14.4
247.250	247	6	1024.2	10.2	8.0	74.5	5.9	256.042	256	1	1028.8	21.9	16.3	56.2	12.8
247.333	247	8	1024.5	10.0	9.0	88.1	8.1	256.083	256	2	1029.0	21.7	16.0	55.3	12.4
247.417	247	10	1024.2	10.0	9.0	88.1	8.1	256.125	256	3	1029.3	22.0	16.3	55.6	12.8
247.458	247	11	1024.2	10.0	9.0	88.1	8.1	256.167	256	4	1029.0	21.5	16.4	59.4	13.3
247.500	247	12	1024.4	11.3	10.7	93.1	10.2	256.208	256	5	1029.0	21.5	16.4	59.4	13.3
247.542	247	13	1024.5	12.5	11.0	83.7	9.8	256.250	256	6	1029.6	21.2	16.8	64.3	14.2
247.583	247	14	1024.3	11.8	10.8	88.8	10.0	256.292	256	7	1030.0	21.3	16.8	63.6	14.1
247.625	247	15	1024.1	11.4	10.5	89.8	9.8	256.333	256	8	1030.2	21.8	16.5	58.2	13.3
247.667	247	16	1024.0	10.5	10.2	96.5	10.0	256.375	256	9	1030.9	22.0	17.2	62.0	14.4
247.708	247	17	1023.5	10.5	9.9	93.0	9.4	256.417	256	10	1031.0	22.0	17.2	62.0	14.4
247.750	247	18	1023.5	10.0	10.0	100.0	10.0	256.458	256	11	1031.5	22.0	17.2	62.0	14.4
247.792	247	19	1022.9	10.1	10.0	98.8	9.9	256.500	256	12	1031.9	21.9	16.9	60.5	13.9
247.833	247	20	1022.6	10.8	10.5	96.5	10.3	256.542	256	13	1031.7	21.8	15.5	51.2	11.3
247.875	247	21	1022.0	10.6	10.2	95.3	9.9	256.583	256	14	1031.3	22.0	16.9	59.9	13.9
247.917	247	22	1022.0	10.6	10.2	95.3	9.9	256.625	256	15	1030.9	21.9	16.9	60.5	13.9
247.958	247	23	1021.0	11.0	11.0	100.0	11.0	256.667	256	16	1031.0	22.0	16.9	59.9	13.9
248.000	247	24	1020.9	11.0	10.9	98.8	10.8	256.708	256	17	1030.9	22.3	17.0	58.7	13.9
248.042	248	1	1020.2	10.9	10.1	90.5	9.4	256.750	256	18	1030.5	21.8	17.0	61.8	14.2
248.083	248	2	1019.7	11.0	10.9	98.8	10.8	256.792	256	19	1030.5	21.8	16.9	61.1	14.0
248.215	248	3	1019.4	11.1	10.9	97.7	10.7	256.833	256	20	1030.9	20.2	16.3	67.2	14.0
248.167	248	4	1018.5	11.1	10.8	96.5	10.6	256.875	256	21	1031.0	20.1	15.1	58.7	11.8
248.208	248	5	1018.0	11.6	10.0	82.2	8.7	256.917	256	22	1031.5	20.9	16.3	62.5	13.5
248.250	248	6	1017.3	11.6	10.1	83.3	8.9	256.958	256	23	1031.5	20.9	16.3	62.5	13.5
248.292	248	7	1017.3	11.5	10.1	84.3	8.9	257.000	256	24	1031.2	21.0	15.5	56.0	11.9
248.333	248	8	1016.8	11.0	11.0	100.0	11.0	257.042	257	1	1030.9	21.0	16.7	64.8	14.2
248.375	248	9	1016.0	11.2	11.2	100.0	11.2	257.083	257	2	1030.7	21.5	17.4	66.7	15.1
248.417	248	10	1015.0	11.2	11.2	100.0	11.2	257.125	257	3	1030.9	22.0	18.2	69.4	16.2
248.458	248	11	1014.8	11.2	11.2	100.0	11.2	257.167	257	4	1030.9	22.1	18.1	68.0	15.9
248.500	248	12	1014.8	11.9	11.9	100.0	11.9	257.208	257	5	1029.6	22.0	18.0	67.9	15.8
248.542	248	13	1014.3	12.0	11.9	98.9	11.8	257.250	257	6	1029.0	21.5	17.5	67.5	15.3
248.583	248	14	1014.1	12.8	11.9	90.3	11.2	257.292	257	7	1029.6	21.6	17.5	66.8	15.2
248.625	248	15	1013.2	12.0	12.0	100.0	12.0	257.333	257	8	1029.2	21.6	18.0	70.6	16.1
248.667	248	16	1011.4	12.0	11.9	98.9	11.8	257.375	257	9	1029.5	21.8	18.8	75.4	17.3
248.708	248	17	1012.0	12.5	12.0	94.5	11.6	257.417	257	10	1030.0	22.8	18.8	68.5	16.7
248.750	248	18	1011.6	12.5	12.1	95.6	11.8	257.458	257	11	1030.0	22.8	19.0	69.9	17.1
248.792	248	19	1011.6	12.7	12.2	94.5	11.8	257.500	257	12	1029.9	23.7	19.8	69.8	17.9
248.833	248	20	1011.2	12.0	12.0	100.0	12.0	257.542	257	13	1029.9	23.8	20.1	71.3	18.3
248.875	248	21	1011.0	12.0	12.0	100.0	12.0	257.583	257	14	1029.1	24.1	21.0	75.9	19.6
248.917	248	22	1011.0	11.5	11.5	100.0	11.5	257.625	257	15	1028.9	24.8	21.0	71.2	19.3
248.958	248	23	1010.0	11.5	11.5	100.0	11.5	257.667	257	16	1029.0	25.0	21.0	70.0	19.2
249.000	248	24	1010.0	12.3	12.3	100.0	12.3	257.708	257	17	1029.0	25.1	21.3	71.4	19.6
249.042	249	1	1009.8	12.1	12.1	100.0	12.1	257.750	257	18	1029.0	25.1	21.3	71.4	19.6
249.083	249	2	1009.3	11.9	11.9	100.0	11.9	257.792	257	19	1029.0	25.3	21.4	70.8	19.7
249.125	249	3	1009.2	12.2	12.0	97.8	11.9	257.833	257	20	1027.8	25.0	21.5	73.5	20.0
249.167	249	4	1009.0	12.1	12.0	98.9	11.9	257.875	257	21	1028.0	25.0	21.5	73.5	20.0
249.208	249	5	1008.8	12.5	12.5	100.0	12.5	257.917	257	22	1028.0	24.7	21.2	73.3	19.6

249.250	249	6	1008.6	12.5	12.4	98.9	12.3
249.292	249	7	1008.6	12.6	12.6	100.0	12.6
249.333	249	8	1009.0	12.5	12.5	100.0	12.5
249.375	249	9	1009.0	13.5	13.0	94.7	12.7
249.417	249	10	1009.2	13.5	13.0	94.7	12.7
249.458	249	11	1009.8	13.5	13.0	94.7	12.7
249.500	249	12	1010.1	13.4	12.9	94.7	12.6
249.542	249	13	1010.1	13.9	12.9	89.6	12.2
249.583	249	14	1010.3	14.2	13.0	87.6	12.2
249.625	249	15	1010.3	14.0	13.0	89.6	12.3
249.667	249	16	1010.5	14.1	13.2	90.7	12.6
249.708	249	17	1011.0	14.5	14.0	94.8	13.7
249.750	249	18	1011.2	14.5	14.1	95.9	13.8
249.792	249	19	1012.0	14.4	14.2	97.9	14.1
249.833	249	20	1012.2	13.0	13.0	100.0	13.0
249.875	249	21	1013.0	13.2	13.2	100.0	13.2
249.917	249	22	1013.0	13.0	13.0	100.0	13.0
249.958	249	23	1013.6	13.0	13.0	100.0	13.0
250.000	249	24	1014.4	13.4	12.9	94.7	12.6
250.042	250	1	1013.9	13.5	12.7	91.5	12.1
250.083	250	2	1014.2	13.6	12.4	87.4	11.5
250.125	250	3	1014.1	13.7	12.7	89.5	12.0
250.167	250	4	1014.0	13.7	12.6	88.5	11.8
250.208	250	5	1014.5	13.8	13.2	93.7	12.8
250.250	250	6	1014.9	13.5	12.0	84.3	10.9
250.292	250	7	1015.1	13.5	11.9	83.3	10.7
250.333	250	8	1016.0	13.5	11.5	79.2	10.0
250.375	250	9	1016.0	13.5	12.5	89.4	11.8
250.417	250	10	1017.0	13.5	12.5	89.4	11.8
250.500	250	12	1017.3	14.0	12.0	79.5	10.5
250.542	250	13	1017.8	14.1	11.6	74.7	9.7
250.583	250	14	1018.8	14.2	11.3	70.9	9.0
250.625	250	15	1019.4	14.5	11.3	68.3	8.7
250.667	250	16	1020.0	14.6	11.4	68.4	8.8
250.708	250	17	1021.0	14.8	11.6	68.6	9.1
250.750	250	18	1021.2	15.3	11.6	64.5	8.6
250.792	250	19	1021.9	15.2	11.7	66.2	8.9
250.833	250	20	1021.5	14.9	12.0	71.5	9.8
250.875	250	21	1023.0	15.0	12.1	71.5	9.9
250.917	250	22	1023.0	15.2	12.1	69.9	9.7
250.958	250	23	1024.0	15.5	12.8	73.8	10.8
251.000	250	24	1024.3	15.1	12.1	70.7	9.8
251.042	251	1	1024.4	15.1	12.2	71.6	10.0
251.083	251	2	1024.3	15.2	12.6	74.5	10.7
251.125	251	3	1024.1	15.2	12.5	73.6	10.5
251.167	251	4	1024.0	15.3	12.5	72.7	10.4
251.208	251	5	1024.0	15.4	12.6	72.8	10.5
251.250	251	6	1024.1	15.9	12.9	71.3	10.7
251.292	251	7	1024.1	16.0	12.9	70.5	10.6
251.333	251	8	1024.2	16.2	14.2	80.7	12.9
251.375	251	9	1024.5	16.2	14.5	83.5	13.4
251.417	251	10	1024.2	17.5	15.5	81.4	14.3
251.458	251	11	1024.2	17.5	15.5	81.4	14.3
251.500	251	12	1024.6	17.8	14.6	71.1	12.5

257.958	257	23	1028.0	24.7	21.2	73.3	19.6
258.000	257	24	1027.8	24.7	20.0	65.0	17.7
258.042	258	1	1027.9	24.8	20.0	64.4	17.7
258.083	258	2	1027.2	24.2	18.9	60.5	16.1
258.125	258	3	1026.8	24.0	19.0	62.4	16.4
258.167	258	4	1026.4	24.0	19.1	63.1	16.6
258.208	258	5	1026.1	23.9	19.0	63.0	16.5
258.250	258	6	1026.0	23.8	20.2	72.1	18.5
258.292	258	7	1026.0	24.1	20.3	70.8	18.5
258.333	258	8	1027.0	24.6	20.5	69.0	18.6
258.375	258	9	1026.8	26.0	21.0	63.9	18.7
258.417	258	10	1026.5	26.2	21.0	62.8	18.6
258.458	258	11	1027.0	26.3	21.2	63.5	18.9
258.500	258	12	1026.2	25.9	20.5	61.3	17.9
258.542	258	13	1025.4	26.0	21.4	66.6	19.3
258.583	258	14	1025.1	25.0	22.3	79.2	21.2
258.625	258	15	1024.7	25.9	23.7	83.2	22.9
258.667	258	16	1024.0	26.1	23.7	81.9	22.8
258.708	258	17	1023.6	25.8	24.4	89.1	23.9
258.750	258	18	1023.8	25.6	24.8	93.7	24.5
258.792	258	19	1023.0	25.6	24.5	91.4	24.1
258.833	258	20	1023.0	26.5	25.5	92.3	25.2
258.875	258	21	1023.0	26.0	25.2	93.7	24.9
258.917	258	22	1024.0	26.0	25.2	93.7	24.9
258.958	258	23	1024.0	26.0	25.2	93.7	24.9
259.042	259	1	1023.6	26.1	24.8	90.0	24.3
259.083	259	2	1023.8	26.3	25.0	90.0	24.5
259.125	259	3	1023.2	26.3	24.7	87.8	24.1
259.167	259	4	1023.0	26.4	24.8	87.8	24.2
259.208	259	5	1023.0	26.3	24.7	87.8	24.1
259.250	259	6	1023.0	26.1	24.9	90.7	24.5
259.292	259	7	1023.0	26.3	25.0	90.0	24.5
259.333	259	8	1023.5	26.5	25.2	90.0	24.7
259.458	259	11	1024.2	27.0	26.2	93.9	25.9
259.500	259	12	1024.3	26.8	24.2	80.7	23.2
259.542	259	13	1023.9	26.9	24.7	83.6	23.9
259.583	259	14	1023.8	26.9	24.4	81.4	23.5
259.625	259	15	1022.1	26.7	25.0	87.1	24.4
259.667	259	16	1022.5	26.8	24.9	85.7	24.2
259.708	259	17	1022.9	26.8	24.5	82.8	23.7
259.750	259	18	1022.9	26.8	24.5	82.8	23.7
259.792	259	19	1022.1	26.9	24.7	83.6	23.9
259.833	259	20	1022.2	26.6	26.1	96.1	25.9
259.875	259	21	1022.5	26.1	25.9	98.4	25.8
259.917	259	22	1023.0	26.1	25.9	98.4	25.8
259.958	259	23	1023.0	26.0	25.2	93.7	24.9
260.000	259	24	1022.7	26.0	24.5	88.4	24.0
260.042	260	1	1022.2	26.0	24.9	91.5	24.5
260.083	260	2	1021.7	26.1	25.0	91.5	24.6
260.125	260	3	1021.0	26.2	25.1	91.5	24.7
260.167	260	4	1020.7	26.2	25.0	90.7	24.6
260.208	260	5	1020.7	26.3	25.0	90.0	24.5
260.250	260	6	1020.3	25.5	23.2	82.4	22.3
260.292	260	7	1020.1	25.7	23.3	81.7	22.4

251.542	251	13	1024.0	17.9	14.8	72.0	12.8		260.333	260	8	1021.0	26.5	24.2	82.7	23.4
251.583	251	14	1023.3	18.0	15.0	73.0	13.1		260.375	260	9	1021.2	27.0	24.0	78.0	22.9
251.625	251	15	1023.1	18.0	15.2	74.7	13.4		260.417	260	10	1021.2	27.0	24.0	78.0	22.9
251.667	251	16	1022.0	18.1	15.2	73.9	13.4		260.458	260	11	1021.5	27.2	24.2	78.1	23.1
251.708	251	17	1022.0	18.2	15.2	73.1	13.3		260.500	260	12	1021.7	28.9	24.9	72.2	23.5
251.750	251	18	1022.0	18.3	16.3	81.8	15.1		260.542	260	13	1021.3	28.5	24.6	72.7	23.2
251.792	251	19	1021.0	18.5	17.0	86.3	16.2		260.583	260	14	1020.6	27.5	24.0	74.8	22.7
251.833	251	20	1020.9	18.5	17.8	93.5	17.4		260.625	260	15	1019.8	27.0	24.0	78.0	22.9
251.875	251	21	1021.0	19.0	19.0	100.0	19.0		260.667	260	16	1019.0	27.3	24.2	77.4	23.0
251.917	251	22	1020.0	20.2	19.8	96.4	19.6		260.708	260	17	1019.0	27.2	24.2	78.1	23.1
251.958	251	23	1020.0	19.8	19.8	100.0	19.8		260.750	260	18	1019.0	27.0	24.5	81.5	23.6
252.000	251	24	1019.3	20.8	19.8	91.3	19.3		260.792	260	19	1018.5	27.0	24.5	81.5	23.6
252.042	252	1	1019.3	20.6	19.9	93.8	19.6		260.833	260	20	1018.0	27.0	24.8	83.6	24.0
252.083	252	2	1019.4	20.1	20.1	100.0	20.1		260.875	260	21	1018.0	27.2	24.6	80.9	23.7
252.125	252	3	1019.0	20.2	20.1	99.1	20.1		260.917	260	22	1018.0	27.0	24.5	81.5	23.6
252.167	252	4	1019.0	22.5	21.5	91.6	21.1		260.958	260	23	1018.5	27.0	24.6	82.2	23.7
252.208	252	5	1019.0	22.5	21.4	90.8	20.9		261.000	260	24	1018.2	27.0	24.7	82.9	23.9
252.250	252	6	1019.7	22.4	21.4	91.6	21.0		261.042	261	1	1017.7	27.0	24.8	83.6	24.0
252.292	252	7	1020.4	22.6	21.5	90.8	21.0		261.083	261	2	1017.3	27.1	24.9	83.7	24.1
252.333	252	8	1021.0	22.0	21.8	98.3	21.7		261.125	261	3	1017.0	27.0	24.3	80.1	23.3
252.375	252	9	1020.9	22.0	21.5	95.7	21.3		261.167	261	4	1017.0	27.0	24.2	79.4	23.2
252.417	252	10	1021.0	22.0	21.5	95.7	21.3		261.208	261	5	1016.0	26.8	24.2	80.7	23.2
252.458	252	11	1021.0	22.0	21.5	95.7	21.3		261.250	261	6	1016.0	27.0	24.2	79.4	23.2
252.500	252	12	1021.1	23.0	22.0	91.7	21.6		261.292	261	7	1015.9	27.1	24.3	79.4	23.3
252.542	252	13	1020.7	23.3	22.0	89.4	21.5		261.333	261	8	1016.2	27.4	25.0	82.3	24.2
252.583	252	14	1020.4	23.6	22.6	91.8	22.2		261.375	261	9	1016.8	27.4	25.0	82.3	24.2
252.625	252	15	1020.4	23.7	22.0	86.3	21.3		261.417	261	10	1016.8	27.4	25.0	82.3	24.2
252.667	252	16	1020.5	23.8	22.1	86.3	21.4		261.458	261	11	1017.0	27.4	25.0	82.3	24.2
252.708	252	17	1020.4	23.9	22.2	86.4	21.5		261.500	261	12	1017.0	27.9	25.0	79.1	24.0
252.750	252	18	1021.0	21.5	21.4	99.1	21.4		261.542	261	13	1016.9	28.1	25.0	77.8	23.9
252.792	252	19	1021.0	21.6	21.3	97.4	21.2		261.583	261	14	1016.2	28.2	25.0	77.2	23.9
252.833	252	20	1021.0	22.0	21.0	91.5	20.6		261.625	261	15	1015.8	28.0	25.1	79.1	24.1
252.875	252	21	1021.5	22.0	21.0	91.5	20.6		261.667	261	16	1015.2	29.5	25.7	73.9	24.4
252.917	252	22	1021.2	22.0	21.0	91.5	20.6		261.708	261	17	1014.8	29.6	25.8	73.9	24.5
252.958	252	23	1021.5	22.8	21.4	88.4	20.8		261.750	261	18	1014.5	29.7	25.8	73.3	24.5
253.000	252	24	1021.3	22.5	20.7	85.1	19.9		261.792	261	19	1014.7	29.7	25.6	72.1	24.2
253.042	253	1	1021.0	22.5	20.6	84.4	19.7		261.833	261	20	1014.8	29.0	25.0	72.3	23.6
253.083	253	2	1020.0	22.6	20.6	83.6	19.7		261.875	261	21	1015.0	28.0	26.0	85.3	25.3
253.125	253	3	1020.1	22.5	20.5	83.6	19.6		261.917	261	22	1015.2	28.0	26.0	85.3	25.3
253.167	253	4	1019.8	22.5	20.5	83.6	19.6		261.958	261	23	1016.0	27.6	26.0	88.1	25.5
253.208	253	5	1019.6	22.6	20.6	83.6	19.7		262.000	261	24	1016.0	27.3	24.9	82.3	24.1
253.250	253	6	1019.1	23.4	23.0	96.7	22.8		262.042	262	1	1015.3	27.5	25.0	81.7	24.1
253.292	253	7	1020.0	23.5	23.0	95.9	22.8		262.083	262	2	1015.0	27.6	24.9	80.3	23.9
253.333	253	8	1020.0	23.8	23.0	93.5	22.7		262.125	262	3	1014.6	27.1	24.0	77.4	22.8
253.375	253	9	1020.0	24.0	23.0	91.9	22.6		262.167	262	4	1014.0	27.2	24.2	78.1	23.1
253.417	253	10	1020.0	24.0	23.1	92.7	22.8		262.208	262	5	1014.0	27.2	23.9	76.1	22.7
253.458	253	11	1020.0	24.0	23.0	91.9	22.6		262.250	262	6	1014.0	27.2	23.6	74.0	22.2
253.500	253	12	1020.3	24.1	23.1	91.9	22.7		262.292	262	7	1015.0	27.3	23.7	74.1	22.3
253.542	253	13	1019.7	24.1	23.1	91.9	22.7		262.333	262	8	1016.8	27.4	24.0	75.5	22.7
253.583	253	14	1018.9	24.3	23.3	91.9	22.9		262.375	262	9	1016.0	28.2	27.0	91.1	26.6
253.625	253	15	1018.0	24.2	23.3	92.7	23.0		262.417	262	10	1016.5	28.2	27.0	91.1	26.6
253.667	253	16	1018.0	24.3	23.3	91.9	22.9		262.458	262	11	1016.5	29.0	27.2	87.0	26.6
253.708	253	17	1017.5	25.2	23.9	89.8	23.4		262.500	262	12	1016.7	26.7	24.7	85.0	24.0
253.750	253	18	1017.2	25.3	24.0	89.8	23.5		262.542	262	13	1016.6	27.4	25.2	83.8	24.4

253.792	253	19	1017.5	25.1	25.0	99.2	25.0
253.833	253	20	1017.2	23.0	23.0	100.0	23.0
253.875	253	21	1017.0	25.2	24.6	95.2	24.4
253.917	253	22	1017.2	25.2	24.6	95.2	24.4
253.958	253	23	1017.0	25.2	24.6	95.2	24.4
254.000	253	24	1017.0	25.3	24.1	90.6	23.7
254.042	254	1	1017.0	25.1	24.1	92.1	23.7
254.083	254	2	1017.1	24.0	23.2	93.5	22.9
254.125	254	3	1017.0	23.7	23.0	94.3	22.7
254.167	254	4	1017.1	23.8	23.1	94.3	22.8
254.208	254	5	1017.0	23.8	23.2	95.1	23.0
254.250	254	6	1017.0	23.9	23.2	94.3	22.9
254.292	254	7	1017.8	23.1	22.1	91.7	21.7
254.333	254	8	1017.0	23.0	21.5	87.7	20.9
254.375	254	9	1018.0	24.0	21.0	76.6	19.7
254.417	254	10	1018.0	24.0	21.0	76.6	19.7
254.458	254	11	1017.5	25.0	23.5	88.2	22.9
254.500	254	12	1017.7	25.7	23.9	86.1	23.2
254.542	254	13	1017.6	25.3	24.0	89.8	23.5
254.583	254	14	1017.7	26.0	24.6	89.2	24.1
254.625	254	15	1017.3	26.3	24.7	87.8	24.1
254.667	254	16	1017.0	26.4	24.7	87.1	24.1
254.708	254	17	1017.0	26.4	24.7	87.1	24.1
254.750	254	18	1016.0	26.5	24.6	85.6	23.9
254.792	254	19	1016.0	26.0	24.6	89.2	24.1
254.833	254	20	1016.0	26.0	25.0	92.2	24.7
254.875	254	21	1016.0	26.0	25.0	92.2	24.7
254.917	254	22	1016.0	26.0	25.0	92.2	24.7
254.958	254	23	1016.5	25.5	24.5	92.1	24.1
255.000	254	24	1016.4	24.9	24.0	92.8	23.7
255.042	255	1	1016.1	24.9	24.1	93.6	23.8
255.083	255	2	1015.9	24.0	24.0	100.0	24.0
255.125	255	3	1015.9	24.0	23.1	92.7	22.8
255.167	255	4	1015.0	24.2	23.6	95.1	23.4
255.208	255	5	1014.9	25.3	24.5	93.7	24.2
255.250	255	6	1014.8	25.4	24.5	92.9	24.2
255.292	255	7	1016.0	25.6	24.6	92.2	24.2
255.333	255	8	1017.0	24.5	22.1	81.3	21.1
255.375	255	9	1018.0	25.2	20.8	67.4	18.8
255.417	255	10	1019.0	25.0	20.8	68.7	18.9
255.458	255	11	1020.5	25.0	20.8	68.7	18.9
255.500	255	12	1021.3	25.0	20.2	64.6	17.9
255.542	255	13	1022.0	25.2	20.3	64.0	18.0
255.583	255	14	1022.2	25.0	20.0	63.2	17.6
255.625	255	15	1022.3	24.9	19.3	59.2	16.4
255.667	255	16	1022.6	25.2	20.0	62.1	17.5
255.708	255	17	1022.8	24.3	18.5	57.3	15.4
255.667	255	16	1022.6	25.2	20.0	62.1	17.5
255.708	255	17	1022.8	24.3	18.5	57.3	15.4
255.750	255	18	1022.8	24.4	18.5	56.8	15.3
255.792	255	19	1024.8	24.4	18.6	57.4	15.5
255.833	255	20	1025.0	23.9	19.1	63.7	16.6
255.875	255	21	1026.0	24.0	19.2	63.8	16.8
255.917	255	22	1027.0	22.5	17.8	63.2	15.2
262.583	262	14	1016.0	28.1	25.7	82.6	24.9
262.625	262	15	1015.8	28.1	25.1	78.5	24.0
262.667	262	16	1015.0	28.2	25.3	79.2	24.3
262.708	262	17	1014.8	28.7	25.2	75.4	24.0
262.750	262	18	1015.0	29.3	25.0	70.6	23.5
262.792	262	19	1014.9	29.1	25.1	72.4	23.7
262.833	262	20	1014.5	29.1	25.0	71.8	23.5
262.875	262	21	1015.0	27.9	25.5	82.5	24.7
262.917	262	22	1015.5	27.9	25.5	82.5	24.7
262.958	262	23	1016.0	27.5	25.5	85.2	24.8
263.000	262	24	1016.7	27.3	25.7	88.0	25.2
263.042	263	1	1016.2	27.5	25.5	85.2	24.8
263.083	263	2	1016.0	27.6	25.2	82.4	24.4
263.125	263	3	1015.9	27.7	25.3	82.4	24.5
263.167	263	4	1015.7	27.7	25.2	81.8	24.3
263.208	263	5	1015.7	27.8	26.5	90.3	26.1
263.250	263	6	1016.0	27.8	26.4	89.6	25.9
263.292	263	7	1016.0	27.7	26.5	91.0	26.1
263.333	263	8	1017.0	28.2	27.0	91.1	26.6
263.375	263	9	1016.5	29.2	27.2	85.7	26.6
263.417	263	10	1017.8	29.2	27.7	89.1	27.2
263.458	263	11	1018.0	29.6	27.2	83.0	26.5
263.500	263	12	1018.2	28.8	25.8	78.7	24.8
263.542	263	13	1018.3	28.1	25.7	82.6	24.9
263.583	263	14	1018.1	28.3	25.8	81.9	25.0
263.625	263	15	1017.7	29.0	26.0	78.8	25.0
263.667	263	16	1017.0	29.1	26.1	78.9	25.1
263.708	263	17	1017.0	29.1	26.1	78.9	25.1
263.750	263	18	1017.0	29.3	26.2	78.3	25.2
263.792	263	19	1017.0	29.2	26.2	78.9	25.2
263.833	263	20	1017.2	29.2	26.2	78.9	25.2
263.875	263	21	1017.8	28.0	27.2	94.0	27.0
263.917	263	22	1019.0	28.0	26.5	88.9	26.0
263.958	263	23	1019.0	28.0	26.5	88.9	26.0
264.000	263	24	1019.2	27.7	26.0	87.4	25.4
264.042	264	1	1019.0	27.6	26.0	88.1	25.5
264.083	264	2	1018.7	27.6	25.9	87.4	25.3
264.125	264	3	1018.3	27.7	26.0	87.4	25.4
264.167	264	4	1018.0	27.8	26.1	87.4	25.5
264.208	264	5	1018.0	27.8	25.8	85.3	25.1
264.250	264	6	1018.0	27.9	26.1	86.7	25.5
264.292	264	7	1019.0	27.5	25.0	81.7	24.1
264.333	264	8	1019.0	28.5	25.5	78.6	24.5
264.375	264	9	1019.5	28.0	25.0	78.4	23.9
264.417	264	10	1019.8	28.0	25.0	78.4	23.9
264.458	264	11	1020.0	28.0	25.2	79.8	24.2
264.500	264	12	1019.7	28.7	25.3	76.0	24.1
264.542	264	13	1019.7	28.9	25.1	73.5	23.7
264.583	264	14	1019.4	28.9	25.0	72.9	23.6
264.625	264	15	1018.8	29.0	25.1	72.9	23.7
264.667	264	16	1018.5	29.2	25.1	71.8	23.6
264.708	264	17	1018.1	29.3	25.2	71.8	23.7
264.750	264	18	1018.1	28.4	26.1	83.4	25.3
264.792	264	19	1018.1	28.4	26.0	82.7	25.2

255.958	255	23	1028.0	22.0	17.8	66.4	15.5	264.833	264	20	1019.0	26.2	25.6	95.3	25.4
								264.875	264	21	1019.5	27.8	26.0	86.7	25.4
								264.917	264	22	1020.0	27.8	26.0	86.7	25.4
								264.958	264	23	1020.2	27.8	26.0	86.7	25.4
								265.000	264	24	1020.0	27.8	25.3	81.8	24.4

Table 7
Nitric Oxide (pptv)

T(jd)	NO	T(jd)	NO	T(jd)	NO	T(jd)	NO	T(jd)	NO
248.537	1	253.609	1	257.820	3	260.509	16	262.695	11
248.553	1	253.627	1	257.837	3	260.526	18	262.711	12
248.569	1	254.367	1	257.853	2	260.542	18	262.728	12
248.585	1	254.384	2	257.870	2	260.559	17	262.744	13
248.601	2	254.400	5	257.887	2	260.575	16	262.761	13
248.617	2	254.416	8	257.903	2	260.592	17	262.778	13
248.632	2	254.433	10	257.920	3	260.609	16	262.794	13
248.648	2	254.449	9	257.936	2	260.625	16	262.811	13
248.697	2	254.465	8	258.500	2	260.642	17	262.827	14
248.713	2	254.482	7	258.517	3	260.659	16	262.844	13
248.729	1	254.498	1	258.533	4	260.675	15	262.860	12
250.418	4	254.622	1	258.550	5	260.692	13	262.877	10
250.434	6	254.639	3	258.566	5	260.709	11	262.893	9
250.451	8	254.655	4	258.583	5	260.725	10	262.910	7
250.467	10	254.672	3	258.600	5	260.742	9	262.926	6
250.483	10	254.688	1	258.616	5	260.758	10	262.943	5
250.500	10	255.201	1	258.633	5	260.775	11	262.959	4
250.516	10	255.545	24	258.649	5	260.792	12	262.976	2
250.532	11	255.561	19	258.666	5	260.808	14	262.993	1
250.549	12	255.577	15	258.683	5	260.825	16	263.009	1
250.565	13	255.594	13	258.699	7	260.842	16	263.451	1
250.582	14	255.610	12	258.716	7	260.858	17	263.467	3
250.598	14	255.626	11	258.732	8	261.511	1	263.484	5
250.614	14	255.643	11	258.749	8	261.528	2	263.500	8
250.631	14	255.659	11	258.766	7	261.545	3	263.516	11
250.647	13	255.676	9	258.782	5	261.562	4	263.533	13
250.663	14	255.692	8	258.799	5	261.579	6	263.549	15
250.680	15	255.708	7	258.815	4	261.596	7	263.565	16
251.391	1	255.725	7	258.832	3	261.612	8	263.582	17
251.407	1	255.741	6	258.849	3	261.629	10	263.598	16
251.424	2	255.757	7	258.865	3	261.646	13	263.614	15
251.440	4	255.774	7	258.882	3	261.663	16	263.631	14
251.456	4	255.790	7	258.898	3	261.680	22	263.647	12
251.473	5	255.807	6	258.915	2	261.697	26	263.663	11
251.489	5	255.823	5	259.451	3	261.714	28	263.680	10
251.506	5	255.839	4	259.467	8	261.731	29	263.696	9
251.522	5	255.856	3	259.484	13	261.748	26	263.712	8
251.538	5	255.872	2	259.500	17	261.765	23	263.729	8
251.555	4	255.888	1	259.517	20	261.781	19	263.745	7
251.571	4	256.492	1	259.534	21	261.798	17	263.761	7
251.587	3	256.508	2	259.550	20	261.815	16	263.778	7
251.604	3	256.525	3	259.567	19	261.832	17	263.794	7
251.620	3	256.541	4	259.583	20	261.849	18	263.810	7
251.637	3	256.557	4	259.600	20	261.866	20	263.827	7
251.653	3	256.715	5	259.617	20	261.883	18	263.843	7
251.669	3	256.731	4	259.633	20	261.900	16	263.859	8

251.686	3	256.747	3	259.650	20	261.917	12	263.876	8
251.702	3	256.764	2	259.666	18	261.934	7	263.892	8
251.718	2	256.780	2	259.683	16	261.951	4	263.908	8
251.735	1	256.801	1	259.700	15	261.967	2	263.925	7
252.485	33	256.818	1	259.716	13	261.984	1	263.941	6
252.502	32	256.851	1	259.733	11	262.397	1	263.957	6
252.518	29	257.540	2	259.749	10	262.414	1	263.974	6
252.534	26	257.556	11	259.766	10	262.430	1	263.990	5
252.551	21	257.573	14	259.783	11	262.447	2	264.142	1
252.567	16	257.589	15	259.799	13	262.463	3	264.602	2
252.583	12	257.606	13	259.816	14	262.480	7	264.618	5
252.600	9	257.622	10	259.832	14	262.496	11	264.634	7
252.616	10	257.639	9	259.849	13	262.513	16	264.650	9
252.632	12	257.655	9	259.865	11	262.529	20	264.666	9
252.671	11	257.672	9	259.882	8	262.546	23	264.682	7
252.687	9	257.688	10	259.899	5	262.562	24	264.699	6
252.704	6	257.705	9	259.915	2	262.579	21	264.715	5
252.720	3	257.721	9	260.409	1	262.596	18	264.731	4
253.518	2	257.738	7	260.426	1	262.612	15	264.747	5
253.536	4	257.754	6	260.442	2	262.629	13	264.763	6
253.554	4	257.771	5	260.459	7	262.645	11	264.779	7
253.573	4	257.787	4	260.476	10	262.662	11	264.795	8
253.591	3	257.804	4	260.492	13	262.678	11	264.812	9

Table 8
Nitrogen Dioxide (pptv)

T(jd)	NO_2	T(jd)	NO_2	T(jd)	NO_2	T(jd)	NO_2	T(jd)	NO_2	T(jd)	NO_2
247.858	25	250.778	67	253.914	72	256.492	46	259.384	45	262.132	38
247.873	33	250.794	58	253.930	71	256.508	47	259.401	45	262.149	37
247.889	46	250.811	53	254.007	38	256.525	49	259.417	45	262.165	35
247.905	57	250.827	49	254.023	38	256.541	50	259.434	53	262.182	34
247.921	62	250.844	46	254.040	37	256.557	50	259.451	60	262.199	34
247.937	63	250.860	46	254.056	37	256.715	43	259.467	78	262.215	34
247.953	62	250.876	48	254.072	38	256.731	45	259.484	94	262.232	35
247.968	60	250.893	49	254.089	38	256.747	45	259.500	107	262.248	36
247.984	56	250.909	50	254.105	38	256.764	47	259.517	109	262.265	37
248.016	52	250.998	48	254.122	39	256.780	47	259.534	111	262.281	37
248.032	47	251.014	47	254.138	39	256.801	46	259.550	102	262.298	37
248.048	40	251.031	47	254.154	39	256.818	45	259.567	94	262.314	36
248.063	35	251.047	45	254.171	38	256.834	43	259.583	85	262.331	35
248.079	32	251.063	45	254.187	37	256.851	41	259.600	82	262.347	34
248.095	32	251.080	44	254.203	36	256.867	40	259.617	80	262.364	33
248.111	34	251.096	44	254.220	35	256.883	40	259.633	76	262.381	35
248.127	38	251.113	44	254.236	35	256.900	39	259.650	73	262.397	36
248.143	42	251.129	44	254.253	34	256.916	38	259.666	72	262.414	37
248.158	45	251.145	44	254.269	34	256.933	38	259.683	69	262.430	41
248.174	47	251.162	45	254.285	33	256.949	37	259.700	64	262.447	42
248.190	48	251.178	45	254.302	33	256.966	37	259.716	63	262.463	45
248.206	49	251.194	45	254.318	33	256.982	37	259.733	62	262.480	52
248.222	49	251.211	46	254.334	33	256.998	39	259.749	61	262.496	61
248.238	50	251.227	48	254.351	31	257.048	39	259.766	63	262.513	72
248.253	49	251.244	51	254.367	30	257.064	39	259.783	63	262.529	85
248.269	45	251.260	53	254.384	30	257.081	40	259.799	63	262.546	92
248.285	40	251.276	55	254.400	30	257.097	42	259.816	61	262.562	86
248.301	36	251.293	57	254.416	31	257.114	44	259.832	60	262.579	81
248.317	33	251.309	57	254.433	33	257.294	30	259.849	59	262.596	70
248.342	35	251.325	56	254.449	36	257.311	32	259.865	58	262.612	61
248.358	40	251.342	56	254.465	39	257.327	32	259.882	55	262.629	56
248.373	48	251.358	58	254.482	41	257.344	33	259.899	53	262.645	58
248.389	58	251.375	61	254.498	39	257.360	36	259.915	50	262.662	59
248.442	69	251.391	66	254.540	35	257.377	43	259.932	48	262.678	60
248.458	78	251.407	73	254.557	33	257.393	43	259.948	45	262.695	61
248.474	84	251.424	78	254.573	35	257.433	43	259.965	43	262.711	62
248.490	87	251.440	82	254.590	36	257.450	44	259.982	42	262.728	63
248.506	85	251.456	83	254.606	43	257.472	46	259.998	42	262.744	66
248.522	82	251.473	82	254.622	51	257.489	49	260.043	52	262.761	67
248.537	80	251.489	79	254.639	56	257.540	54	260.060	50	262.778	68
248.553	77	251.506	75	254.655	58	257.556	55	260.076	48	262.794	69
248.569	77	251.522	72	254.672	60	257.573	58	260.093	45	262.811	69
248.585	78	251.538	71	254.688	60	257.589	61	260.110	43	262.827	65
248.601	79	251.555	71	254.704	61	257.606	63	260.126	41	262.844	64
248.617	79	251.571	71	254.721	61	257.622	65	260.143	40	262.860	61
248.632	79	251.587	72	254.737	62	257.639	66	260.160	39	262.877	56

248.648	79	251.604	73	254.754	62	257.655	68	260.176	38	262.893	50
248.697	62	251.620	74	254.770	62	257.672	71	260.193	38	262.910	46
248.713	64	251.637	75	254.787	62	257.688	72	260.209	38	262.926	41
248.729	64	251.653	76	254.803	62	257.705	75	260.226	37	262.943	38
248.745	66	251.669	75	254.819	63	257.721	77	260.243	37	262.959	36
248.761	65	251.686	71	254.836	62	257.738	78	260.259	37	262.976	36
248.776	64	251.702	67	254.852	62	257.754	78	260.276	37	262.993	38
248.792	61	251.718	61	254.869	62	257.771	77	260.293	37	263.009	42
248.808	59	251.735	55	254.885	61	257.787	75	260.309	38	263.026	43
248.824	57	251.751	50	254.901	61	257.804	72	260.326	40	263.042	45
249.010	63	251.774	46	254.918	60	257.820	69	260.343	40	263.222	54
249.026	64	251.790	43	254.934	60	257.837	65	260.359	42	263.239	52
249.042	64	251.807	42	254.951	60	257.853	62	260.376	43	263.255	51
249.057	65	251.824	41	255.062	48	257.870	57	260.392	43	263.271	49
249.073	66	251.841	41	255.078	47	257.887	54	260.409	42	263.288	46
249.089	66	251.857	42	255.094	46	257.903	50	260.426	42	263.304	43
249.105	66	251.874	42	255.119	44	257.920	47	260.442	43	263.320	42
249.121	66	251.891	43	255.135	42	257.936	44	260.459	44	263.337	41
249.137	64	251.908	43	255.152	42	257.953	42	260.476	47	263.353	41
249.153	63	251.924	43	255.168	42	257.969	40	260.492	51	263.369	42
249.169	62	251.941	43	255.184	42	257.986	38	260.509	54	263.386	42
249.185	61	251.958	43	255.201	42	258.002	37	260.526	56	263.402	43
249.201	60	251.975	44	255.217	44	258.019	37	260.542	57	263.418	42
249.217	60	251.991	45	255.233	44	258.063	38	260.559	57	263.435	38
249.233	62	252.008	46	255.250	45	258.079	41	260.575	55	263.451	35
249.248	64	252.025	47	255.266	47	258.096	44	260.592	53	263.467	40
249.264	66	252.042	48	255.283	48	258.112	47	260.609	53	263.484	45
249.280	69	252.058	49	255.299	49	258.129	50	260.625	54	263.500	52
249.296	72	252.075	51	255.315	51	258.145	50	260.642	55	263.516	61
249.312	74	252.092	52	255.332	55	258.162	49	260.659	57	263.533	69
249.328	74	252.109	53	255.348	57	258.178	48	260.675	59	263.549	71
249.344	76	252.125	55	255.364	61	258.195	46	260.692	60	263.565	75
249.631	85	252.142	57	255.381	67	258.211	45	260.709	61	263.582	74
249.649	80	252.159	59	255.397	72	258.228	44	260.725	62	263.598	74
249.666	73	252.176	62	255.414	78	258.244	44	260.742	64	263.614	74
249.684	67	252.192	64	255.430	82	258.261	43	260.758	64	263.631	69
249.701	60	252.209	66	255.446	84	258.277	43	260.775	65	263.647	65
249.718	52	252.226	67	255.463	83	258.294	41	260.792	64	263.663	63
249.736	45	252.243	67	255.479	82	258.310	40	260.808	61	263.680	60
249.753	44	252.259	67	255.495	77	258.327	39	260.825	57	263.696	58
249.783	44	252.276	66	255.512	69	258.343	39	260.842	55	263.712	58
249.800	42	252.293	66	255.528	63	258.360	39	260.858	53	263.729	57
249.816	39	252.309	65	255.545	58	258.376	39	261.122	61	263.745	57
249.832	35	252.485	36	255.561	53	258.393	40	261.139	62	263.761	56
249.849	31	252.502	38	255.577	49	258.409	41	261.156	62	263.778	55
249.865	29	252.518	39	255.594	48	258.426	43	261.173	58	263.794	54
249.881	30	252.534	39	255.610	49	258.442	46	261.190	56	263.810	53
249.898	31	252.551	38	255.626	49	258.459	50	261.207	52	263.827	52
249.914	32	252.567	40	255.643	50	258.483	55	261.224	49	263.843	52
249.930	33	252.583	41	255.659	52	258.500	60	261.241	44	263.859	51
249.947	33	252.600	43	255.676	55	258.517	64	261.257	44	263.876	51
249.963	32	252.616	45	255.692	55	258.533	67	261.274	43	263.892	51

249.979	30	252.632	46	255.708	56	258.550	70	261.291	43	263.908	50
249.996	28	252.671	48	255.725	56	258.566	72	261.308	43	263.925	51
250.012	27	252.687	50	255.741	54	258.583	72	261.325	43	263.941	45
250.028	26	252.704	52	255.757	51	258.600	73	261.342	43	264.602	41
250.045	26	252.720	54	255.774	48	258.616	74	261.359	42	264.618	56
250.061	27	252.736	56	255.790	46	258.633	75	261.376	41	264.634	68
250.077	28	252.753	56	255.807	44	258.649	76	261.393	41	264.650	70
250.094	29	252.769	56	255.823	42	258.666	77	261.410	41	264.666	66
250.110	30	252.785	55	255.839	41	258.683	78	261.426	42	264.682	62
250.126	30	252.802	54	255.856	41	258.699	77	261.443	44	264.699	59
250.143	28	252.818	52	255.872	40	258.716	76	261.460	46	264.715	56
250.159	27	252.834	50	255.888	40	258.732	74	261.477	49	264.731	55
250.175	26	252.851	50	255.905	40	258.749	71	261.494	51	264.747	55
250.192	26	252.867	50	255.921	40	258.766	69	261.511	54	264.763	56
250.208	26	252.883	51	255.938	43	258.782	65	261.528	57	264.779	58
250.224	26	252.900	53	255.954	46	258.799	62	261.545	59	264.795	60
250.241	26	252.916	54	255.970	49	258.815	58	261.562	61	264.812	59
250.257	26	252.932	55	255.987	51	258.832	55	261.579	63	264.828	60
250.273	26	253.290	36	256.033	54	258.849	51	261.596	63	264.844	60
250.290	28	253.306	38	256.050	52	258.865	49	261.612	63	264.860	59
250.306	30	253.322	39	256.066	48	258.882	47	261.629	61	264.876	58
250.322	32	253.339	42	256.082	45	258.898	45	261.646	55	264.892	57
250.339	38	253.355	44	256.099	42	258.915	45	261.663	48	264.909	53
250.401	44	253.372	46	256.115	40	258.932	46	261.680	37	264.941	94
250.418	50	253.445	45	256.132	39	258.948	47	261.697	28	264.957	96
250.434	55	253.463	43	256.148	39	258.965	50	261.714	24	264.973	104
250.451	59	253.482	43	256.164	40	258.981	54	261.731	23	264.989	109
250.467	60	253.500	43	256.181	40	258.998	55	261.748	28	265.006	114
250.483	59	253.518	42	256.197	41	259.015	57	261.765	37	265.022	119
250.500	55	253.536	42	256.213	41	259.102	52	261.781	48	265.118	122
250.516	50	253.554	43	256.230	42	259.119	51	261.798	58	265.134	129
250.532	44	253.573	45	256.246	41	259.135	50	261.815	65	265.149	125
250.549	40	253.591	46	256.263	41	259.152	47	261.832	69	265.165	111
250.565	36	253.609	47	256.279	40	259.168	46	261.849	69	265.180	104
250.582	38	253.627	49	256.295	39	259.185	45	261.866	66	265.196	95
250.598	40	253.645	50	256.312	39	259.202	45	261.883	61	265.212	83
250.614	46	253.664	51	256.328	39	259.218	47	261.900	54	265.227	59
250.631	51	253.682	53	256.344	39	259.235	48	261.917	48	265.258	110
250.647	58	253.783	82	256.361	40	259.251	50	261.934	43	265.274	113
250.663	64	253.800	81	256.377	41	259.268	51	261.951	39	265.290	116
250.680	70	253.816	81	256.394	42	259.285	51	261.967	36	265.305	117
250.696	75	253.832	79	256.410	41	259.301	50	261.984	35	265.321	116
250.713	80	253.849	78	256.426	41	259.318	48	262.001	34	265.336	109
250.729	81	253.865	76	256.443	42	259.334	47	262.018	42	265.352	101
250.745	79	253.881	74	256.459	42	259.351	45	262.099	41	265.368	94
250.762	73	253.898	72	256.475	44	259.368	45	262.116	40	265.383	95

Table 9
NOy (pptv)

T(jd)	NOy	T(jd)	NOy	T(jd)	NOy	T(jd)	NOy	T(jd)	NOy
247.858	153	248.648	426	249.881	243	250.680	164	251.506	189
247.873	170	248.697	462	249.898	215	250.696	158	251.522	190
247.889	220	248.713	495	249.914	194	250.713	169	251.538	192
247.905	232	248.729	509	249.930	176	250.729	180	251.555	194
247.921	244	248.745	514	249.947	163	250.745	191	251.571	189
247.937	245	248.761	505	249.963	153	250.762	198	251.587	184
247.95	248	248.776	494	249.979	142	250.778	206	251.604	179
247.968	247	248.792	490	249.996	130	250.794	203	251.620	175
247.984	249	248.808	481	250.012	123	250.811	202	251.637	171
248.016	249	248.824	480	250.028	118	250.827	201	251.653	181
248.032	251	249.010	484	250.045	114	250.844	204	251.669	186
248.048	252	249.026	477	250.061	113	250.860	207	251.686	183
248.063	254	249.042	442	250.077	112	250.876	210	251.702	173
248.079	252	249.057	417	250.094	108	250.893	212	251.718	157
248.095	251	249.073	394	250.110	104	250.909	211	251.735	131
248.111	251	249.089	372	250.126	99	250.998	208	251.751	108
248.127	248	249.105	361	250.143	93	251.014	202	251.774	91
248.143	248	249.121	388	250.159	88	251.031	197	251.790	79
248.158	247	249.137	401	250.175	84	251.047	193	251.807	76
248.174	246	249.153	409	250.192	81	251.063	190	251.824	81
248.190	242	249.169	424	250.208	79	251.080	188	251.841	87
248.206	239	249.185	443	250.224	79	251.096	189	251.857	93
248.222	234	249.201	454	250.241	80	251.113	190	251.874	105
248.238	230	249.217	482	250.257	83	251.129	190	251.891	109
248.253	226	249.233	522	250.273	86	251.145	191	251.908	104
248.269	223	249.248	560	250.290	91	251.162	191	251.924	99
248.285	220	249.264	588	250.306	96	251.178	190	251.941	95
248.301	220	249.280	606	250.322	103	251.194	189	251.958	85
248.317	223	249.296	603	250.339	105	251.211	188	251.975	78
248.342	227	249.312	586	250.401	110	251.227	189	251.991	75
248.358	234	249.328	536	250.418	114	251.244	192	252.008	71
248.373	244	249.344	470	250.434	119	251.260	195	252.025	66
248.389	254	249.631	387	250.451	119	251.276	198	252.042	64
248.442	267	249.649	317	250.467	131	251.293	200	252.058	67
248.458	289	249.666	246	250.483	141	251.309	199	252.075	71
248.474	310	249.684	220	250.500	150	251.325	194	252.092	76
248.490	332	249.701	232	250.516	160	251.342	188	252.109	83
248.506	357	249.718	264	250.532	171	251.358	183	252.125	86
248.522	382	249.736	294	250.549	177	251.375	179	252.142	86
248.537	380	249.753	327	250.565	183	251.391	177	252.159	84
248.553	378	249.783	340	250.582	188	251.407	178	252.176	81
248.569	375	249.800	325	250.598	192	251.424	181	252.192	79
248.585	363	249.816	319	250.614	194	251.440	184	252.209	80
248.601	349	249.832	304	250.631	187	251.456	186	252.226	81
248.617	373	249.849	286	250.647	179	251.473	187	252.243	82
248.632	396	249.865	263	250.663	171	251.489	189	252.259	83

Table 10
O_3 in air (ppbv, average of 5 values)

T(jd)	O_3	T(jd)	O_3	T(jd)	O_3	T(jd)	O_3	T(jd)	O_3	T(jd)	O_3	T(jd)	O_3
247.666	34.1	249.773	35.5	251.866	37.9	254.137	24.9	256.240	33.8	258.331	36.4	260.463	35.8
247.683	33.0	249.792	35.4	251.880	34.8	254.151	24.8	256.254	35.7	258.344	37.5	260.481	35.8
247.702	39.8	249.806	34.5	251.893	33.3	254.165	24.6	256.268	35.0	258.358	36.8	260.495	35.8
247.716	43.6	249.820	33.5	251.907	31.0	254.178	24.4	256.281	35.1	258.372	35.2	260.509	36.3
247.729	43.5	249.834	34.9	251.921	30.2	254.192	25.3	256.295	35.2	258.386	35.0	260.523	36.6
247.743	40.5	249.848	35.1	251.935	30.4	254.206	26.3	256.309	34.9	258.400	36.3	260.537	36.0
247.757	35.7	249.862	35.5	251.949	30.8	254.220	27.9	256.323	33.8	258.414	34.9	260.551	36.2
247.771	32.3	249.876	35.2	251.963	30.2	254.234	28.0	256.337	32.7	258.428	34.0	260.565	36.1
247.785	31.9	249.890	35.5	251.977	27.7	254.248	27.9	256.351	33.0	258.442	33.3	260.579	35.3
247.799	19.3	249.904	34.1	251.991	28.8	254.262	28.6	256.365	34.1	258.456	33.8	260.592	35.3
247.813	12.0	249.917	34.2	252.005	29.1	254.276	27.8	256.379	34.5	258.470	34.3	260.606	36.0
247.827	8.7	249.931	34.3	252.020	29.0	254.292	28.4	256.393	35.1	258.488	33.3	260.620	34.2
247.841	6.8	249.945	33.7	252.034	29.0	254.306	28.4	256.406	34.8	258.503	34.5	260.634	34.0
247.854	6.4	249.959	33.0	252.048	29.0	254.320	29.8	256.420	34.9	258.517	35.1	260.648	33.7
247.868	5.3	249.973	32.0	252.062	27.0	254.334	29.9	256.434	36.4	258.531	34.5	260.662	33.3
247.883	3.8	249.987	32.3	252.076	25.4	254.347	30.0	256.448	35.5	258.544	34.1	260.676	33.3
247.897	11.7	250.001	31.2	252.090	22.6	254.361	29.6	256.462	33.0	258.558	34.5	260.690	32.9
247.911	15.1	250.015	31.3	252.104	20.3	254.375	28.6	256.476	33.0	258.572	35.5	260.704	31.6
247.925	15.5	250.029	30.5	252.118	17.5	254.389	28.8	256.490	33.3	258.586	35.4	260.717	30.5
247.939	14.9	250.042	29.5	252.132	17.0	254.403	29.0	256.504	33.0	258.600	34.4	260.731	30.8
247.952	13.8	250.056	29.3	252.146	18.5	254.417	27.4	256.518	33.0	258.614	33.5	260.745	28.2
247.966	11.6	250.070	29.0	252.159	18.8	254.431	26.4	256.531	33.6	258.628	32.0	260.855	31.9
247.980	10.3	250.084	29.0	252.173	19.0	254.445	27.3	256.545	33.3	258.642	32.5	260.926	38.4
247.994	10.3	250.098	29.0	252.187	19.1	254.459	26.9	256.559	33.5	258.656	32.7	260.943	37.2
248.008	12.6	250.112	29.3	252.201	19.9	254.472	26.3	256.574	32.5	258.669	33.8	260.959	36.0
248.022	15.1	250.126	29.3	252.215	18.6	254.486	26.2	256.588	32.9	258.683	32.5	260.973	37.4
248.036	15.8	250.140	29.5	252.229	18.6	254.500	24.7	256.602	31.6	258.697	33.7	260.987	38.8
248.050	18.2	250.154	28.5	252.243	20.5	254.514	25.8	256.616	31.8	258.711	33.9	261.002	37.2
248.064	22.3	250.168	31.6	252.257	22.5	254.528	27.1	256.630	30.3	258.725	30.7	261.018	36.5
248.077	24.1	250.182	30.4	252.271	21.2	254.542	28.4	256.644	31.0	258.739	31.6	261.032	39.5
248.091	26.6	250.196	29.9	252.284	20.3	254.556	28.9	256.658	30.9	258.753	32.2	261.052	37.0
248.105	30.1	250.210	29.6	252.298	19.9	254.570	26.1	256.672	31.5	258.767	31.1	261.196	40.2
248.119	33.3	250.224	30.0	252.312	20.9	254.584	25.0	256.686	31.3	258.781	31.5	261.280	44.2
248.133	35.8	250.238	30.5	252.326	23.4	254.597	24.5	256.700	31.4	258.794	30.5	261.297	39.3
248.147	38.8	250.251	30.3	252.340	23.1	254.611	23.3	256.715	31.1	258.808	32.2	261.314	35.7
248.161	41.8	250.265	33.3	252.354	22.5	254.625	18.9	256.732	31.3	258.822	31.6	261.329	42.8
248.175	42.8	250.279	34.8	252.368	21.0	254.639	15.1	256.747	32.3	258.836	31.0	261.343	42.6
248.189	40.7	250.293	33.1	252.382	20.2	254.653	15.6	256.761	33.2	258.850	30.6	261.357	42.8
248.202	39.0	250.307	32.3	252.396	20.9	254.667	14.8	256.775	32.3	258.864	30.6	261.371	44.8
248.216	33.0	250.321	32.9	252.409	23.3	254.681	14.7	256.789	33.3	258.878	31.2	261.385	37.8
248.230	31.5	250.335	34.5	252.423	24.8	254.695	15.4	256.803	33.1	258.892	31.9	261.399	38.1
248.244	35.0	250.349	35.8	252.437	24.3	254.709	15.6	256.818	34.1	258.906	32.1	261.413	37.4
248.258	41.7	250.363	35.0	252.451	24.8	254.722	14.8	256.831	34.2	258.919	31.0	261.427	35.5
248.272	43.3	250.376	37.8	252.465	23.4	254.737	15.0	256.845	34.3	258.933	32.4	261.440	33.2
248.293	40.8	250.390	35.5	252.479	22.7	254.755	15.9	256.861	33.3	258.948	32.7	261.454	32.5
248.322	36.0	250.404	36.0	252.495	25.5	254.769	14.8	256.879	33.3	258.967	30.5	261.468	31.1
248.336	35.5	250.418	38.0	252.509	24.0	254.783	16.1	256.894	34.0	258.981	32.1	261.482	30.0
248.350	34.2	250.434	37.7	252.523	22.5	254.797	17.7	256.909	34.5	258.995	31.6	261.496	29.9
248.364	34.4	250.450	39.0	252.537	21.2	254.811	17.5	256.926	34.8	259.009	34.0	261.514	30.0
248.378	32.8	250.465	38.9	252.551	27.3	254.825	17.0	256.944	36.1	259.023	34.3	261.530	30.0
248.392	33.2	250.479	36.8	252.564	31.5	254.838	16.5	256.958	35.9	259.037	34.0	261.544	31.0
248.406	33.0	250.492	35.9	252.578	31.9	254.852	16.3	256.972	35.7	259.051	33.9	261.564	30.9
248.420	32.7	250.506	35.5	252.592	30.4	254.870	16.1	256.986	35.5	259.065	33.5	261.578	32.5
248.434	32.5	250.520	35.3	252.606	29.9	254.888	16.1	257.000	36.0	259.078	33.8	261.592	36.5
248.447	32.8	250.534	35.5	252.620	28.9	254.902	16.5	257.014	35.9	259.092	33.5	261.638	37.0
248.461	29.4	250.548	34.8	252.634	29.6	254.915	17.0	257.028	36.7	259.106	33.8	261.696	33.6
248.475	32.5	250.562	35.5	252.648	28.5	254.929	19.5	257.041	36.8	259.120	34.5	261.711	29.6

248.489	31.9	250.576	35.5	252.662	28.8	254.943	23.1	257.055	35.7	259.134	34.3	261.725	28.9
248.503	31.6	250.590	35.3	252.676	28.6	254.957	26.0	257.069	34.8	259.148	34.7	261.738	28.3
248.517	31.8	250.604	35.4	252.689	31.0	254.971	26.8	257.083	34.9	259.162	34.8	261.752	28.2
248.531	31.8	250.618	34.6	252.703	31.5	254.985	27.8	257.097	35.0	259.176	34.8	261.766	27.5
248.545	31.6	250.632	35.2	252.722	29.3	254.999	29.1	257.111	35.9	259.189	34.8	261.784	30.5
248.559	31.6	250.648	34.6	252.737	31.5	255.013	27.9	257.125	34.8	259.203	35.0	261.797	29.5
248.572	31.2	250.662	33.6	252.751	27.5	255.027	24.8	257.139	35.0	259.217	34.7	261.811	30.1
248.586	31.5	250.676	33.2	252.764	26.8	255.040	23.5	257.153	35.0	259.231	34.5	261.830	28.4
248.600	31.7	250.690	35.9	252.778	25.8	255.054	21.9	257.166	35.0	259.245	34.3	261.859	27.1
248.614	32.0	250.704	33.3	252.792	25.0	255.068	20.3	257.180	35.0	259.259	33.8	261.874	28.3
248.628	32.6	250.719	33.6	252.806	25.3	255.082	18.3	257.194	35.0	259.273	34.2	261.888	26.9
248.642	33.0	250.733	33.5	252.820	25.5	255.096	17.0	257.208	35.0	259.287	34.8	261.902	27.3
248.656	32.8	250.747	33.7	252.834	25.5	255.110	16.3	257.222	37.7	259.301	34.2	261.916	27.9
248.670	33.3	250.761	35.1	252.850	26.6	255.124	15.9	257.236	37.2	259.314	34.0	261.930	28.5
248.685	34.3	250.775	37.0	252.871	27.6	255.138	16.0	257.250	36.8	259.328	33.8	261.955	28.0
248.699	34.2	250.789	36.1	252.892	28.4	255.152	31.3	257.264	35.8	259.342	33.8	261.976	27.6
248.718	34.5	250.803	35.8	252.907	30.1	255.165	31.0	257.278	35.0	259.356	33.8	262.006	31.5
248.733	34.5	250.818	35.5	252.921	31.1	255.179	27.6	257.291	35.0	259.370	33.8	262.020	32.2
248.747	35.1	250.838	36.3	252.935	28.8	255.193	23.3	257.305	35.2	259.384	33.7	262.033	31.4
248.761	35.2	250.851	36.5	252.949	31.4	255.207	25.7	257.319	36.8	259.398	34.0	262.047	30.5
248.774	35.2	250.865	37.2	252.962	32.2	255.221	27.0	257.333	37.4	259.412	34.2	262.061	30.4
248.788	35.7	250.879	37.2	252.976	32.2	255.235	26.8	257.347	37.3	259.426	34.2	262.075	30.0
248.802	33.3	250.893	35.8	252.990	31.8	255.249	34.3	257.361	36.0	259.439	34.4	262.089	30.3
248.816	34.3	250.907	34.5	253.004	31.8	255.263	36.1	257.375	36.4	259.454	34.2	262.104	31.0
248.830	35.0	250.921	33.1	253.018	30.3	255.277	33.5	257.389	37.2	259.494	33.6	262.118	32.0
248.844	35.8	250.935	33.2	253.032	30.7	255.290	31.6	257.403	37.4	259.521	33.9	262.132	32.1
248.858	36.3	250.949	33.4	253.046	31.1	255.304	32.3	257.417	37.0	259.539	33.7	262.146	31.9
248.872	35.8	250.963	33.8	253.061	31.0	255.318	31.6	257.430	36.7	259.553	34.2	262.160	31.2
248.886	36.0	250.976	33.5	253.091	30.6	255.332	33.7	257.444	36.3	259.567	34.2	262.174	31.0
248.899	35.7	250.990	33.7	253.129	30.8	255.346	42.0	257.458	36.7	259.581	33.8	262.188	31.1
248.913	35.5	251.004	34.3	253.164	29.3	255.360	52.7	257.472	37.2	259.595	33.7	262.212	30.5
248.927	35.0	251.018	34.0	253.178	27.9	255.374	55.5	257.486	38.4	259.609	34.2	262.242	30.3
248.941	35.5	251.032	32.8	253.192	25.5	255.388	56.7	257.500	39.8	259.623	33.8	262.256	29.4
248.955	35.6	251.046	32.8	253.206	24.3	255.403	58.0	257.514	40.2	259.637	33.9	262.270	29.1
248.969	36.0	251.060	32.8	253.219	21.3	255.418	54.5	257.528	40.3	259.651	33.6	262.284	30.0
248.983	36.8	251.074	32.9	253.233	19.8	255.432	53.2	257.542	40.5	259.664	33.5	262.298	30.6
248.997	37.4	251.088	33.0	253.247	20.3	255.445	52.5	257.557	41.4	259.678	33.5	262.312	31.3
249.011	37.7	251.101	33.0	253.261	19.4	255.459	50.7	257.571	40.8	259.692	33.2	262.326	32.7
249.024	37.5	251.115	34.4	253.275	19.5	255.473	49.8	257.585	41.3	259.706	33.5	262.340	33.0
249.038	37.5	251.129	34.4	253.289	18.6	255.487	48.7	257.599	40.6	259.720	33.8	262.353	32.3
249.052	37.8	251.143	35.0	253.303	17.3	255.501	49.1	257.612	41.3	259.734	33.8	262.367	32.9
249.066	37.8	251.157	35.3	253.317	16.1	255.515	49.5	257.626	40.8	259.748	34.0	262.381	33.0
249.080	37.5	251.171	34.9	253.331	15.9	255.529	48.5	257.640	39.8	259.763	35.2	262.395	33.0
249.094	37.3	251.185	32.5	253.344	15.1	255.543	48.0	257.654	35.7	259.777	35.3	262.409	33.0
249.108	36.8	251.199	33.7	253.358	14.1	255.557	47.5	257.668	36.3	259.791	34.6	262.488	33.8
249.122	37.8	251.213	34.8	253.372	14.1	255.570	47.0	257.682	33.5	259.805	34.8	262.543	31.2
249.136	38.0	251.227	34.8	253.386	14.6	255.584	46.5	257.696	37.3	259.819	35.5	262.557	30.7
249.149	37.9	251.240	34.0	253.400	14.0	255.598	46.8	257.710	36.5	259.832	35.7	262.575	29.7
249.163	37.8	251.254	34.0	253.414	14.0	255.612	45.3	257.724	36.1	259.847	35.5	262.596	28.5
249.177	38.3	251.268	34.7	253.428	12.9	255.626	43.5	257.737	38.1	259.861	36.8	262.610	28.1
249.191	38.8	251.282	34.3	253.442	12.1	255.640	43.3	257.751	37.0	259.875	37.5	262.628	29.0
249.205	39.2	251.296	34.0	253.456	11.8	255.654	42.0	257.765	35.7	259.889	37.4	262.650	28.9
249.219	38.8	251.310	33.5	253.469	11.1	255.668	42.5	257.779	36.5	259.903	38.1	262.667	28.0
249.233	39.5	251.324	33.8	253.483	11.4	255.682	41.8	257.793	36.5	259.918	37.8	262.686	26.9
249.247	40.2	251.338	34.0	253.497	10.1	255.695	42.0	257.807	35.7	259.936	34.5	262.710	27.1
249.261	39.9	251.352	34.0	253.511	10.1	255.709	42.3	257.821	34.5	259.950	34.0	262.724	26.3
249.274	39.7	251.365	34.0	253.525	10.6	255.723	41.0	257.835	35.8	259.964	34.0	262.738	26.0
249.288	39.7	251.379	34.0	253.539	11.4	255.737	40.3	257.849	35.5	259.978	34.4	262.752	27.0
249.302	39.7	251.393	34.3	253.553	12.9	255.751	39.4	257.862	34.5	259.992	36.0	262.766	26.4
249.316	39.7	251.410	33.7	253.567	13.4	255.765	39.2	257.876	36.0	260.006	37.3	262.780	25.0
249.330	39.0	251.426	33.2	253.581	13.0	255.779	37.2	257.890	36.0	260.020	38.3	262.798	23.7
249.344	38.8	251.443	33.2	253.594	11.9	255.793	36.5	257.904	36.3	260.033	38.5	262.821	27.2

249.358	38.8	251.457	34.1	253.608	12.8	255.807	36.5	257.923	34.9	260.047	38.7	262.836	29.8
249.372	38.3	251.470	33.2	253.623	12.3	255.820	35.8	257.938	35.9	260.061	37.8	262.855	27.4
249.386	38.5	251.484	33.0	253.637	13.6	255.834	37.1	257.952	36.5	260.075	37.3	262.878	25.0
249.399	39.3	251.498	33.7	253.651	13.9	255.848	36.7	257.966	37.3	260.089	36.7	262.893	23.3
249.413	39.2	251.512	36.3	253.665	13.8	255.864	36.5	257.980	37.5	260.103	36.7	262.907	23.9
249.427	38.5	251.526	36.6	253.678	13.3	255.884	34.3	257.994	36.9	260.117	36.8	262.921	24.2
249.441	38.6	251.540	35.8	253.692	12.9	255.897	34.5	258.008	37.0	260.131	37.1	262.936	24.0
249.455	37.0	251.554	35.3	253.706	13.6	255.911	34.8	258.021	36.7	260.145	37.7	262.950	24.0
249.469	35.4	251.568	35.2	253.720	14.3	255.925	35.3	258.035	38.2	260.158	37.9	262.964	25.4
249.483	34.8	251.582	37.5	253.734	14.3	255.939	35.0	258.049	38.5	260.172	36.9	262.978	26.5
249.497	33.6	251.595	35.5	253.748	14.3	255.953	34.6	258.063	39.3	260.186	37.1	262.992	27.6
249.511	36.0	251.609	34.0	253.762	14.6	255.967	34.6	258.077	39.5	260.200	37.0	263.006	27.1
249.524	35.5	251.623	34.5	253.776	14.7	255.981	33.9	258.091	38.3	260.214	37.1	263.019	27.1
249.538	35.0	251.637	35.1	253.790	14.6	255.995	33.0	258.105	37.3	260.228	37.6	263.039	26.0
249.552	34.1	251.651	35.8	253.900	18.5	256.009	32.8	258.119	37.3	260.242	38.0	263.054	25.2
249.566	35.5	251.665	36.4	253.914	19.3	256.023	34.1	258.133	38.1	260.256	38.7	263.068	26.2
249.580	35.7	251.679	34.8	253.932	20.2	256.036	33.0	258.146	37.3	260.270	39.3	263.082	26.6
249.594	33.8	251.693	35.2	253.963	24.1	256.050	32.1	258.160	37.8	260.284	39.1	263.096	26.4
249.608	35.8	251.707	38.7	253.977	23.2	256.069	31.0	258.174	37.7	260.298	38.5	263.119	27.7
249.622	34.5	251.720	38.0	253.994	25.5	256.101	30.1	258.188	38.2	260.311	38.7	263.133	28.1
249.636	34.5	251.734	38.7	254.012	29.0	256.115	31.5	258.202	39.2	260.325	38.2	263.147	27.3
249.649	36.1	251.748	37.0	254.026	31.8	256.129	34.0	258.216	38.8	260.339	38.2	263.161	28.9
249.663	32.7	251.762	39.0	254.040	32.2	256.143	32.3	258.230	39.5	260.355	36.9	263.184	28.4
249.677	33.8	251.780	36.7	254.053	30.6	256.157	30.7	258.244	39.0	260.371	36.7	263.200	28.9
249.691	34.8	251.796	38.2	254.067	28.6	256.170	30.7	258.258	37.7	260.385	36.5	263.215	26.4
249.705	36.2	251.810	38.5	254.081	26.4	256.184	31.6	258.275	36.7	260.399	36.8	263.256	27.8
249.723	37.8	251.824	39.5	254.095	26.7	256.198	34.0	258.289	36.0	260.413	37.2	263.285	29.7
249.740	37.8	251.838	39.3	254.109	25.8	256.212	32.6	258.303	35.8	260.426	36.5	263.299	29.6
249.757	36.5	251.852	38.2	254.123	26.7	256.226	34.0	258.317	35.8	260.441	35.7	263.313	29.3

Table 11
^{222}Rn in air (pCi/m^3)

T(jd)	Rn	T(jd)	Rn	T(jd)	Rn	T(jd)	Rn
248.400	135.71	251.230	173.19	254.190	61.88	257.480	69.48
248.450	223.72	251.290	180.71	254.250	66.94	257.540	35.09
248.510	339.84	251.340	157.29	254.300	73.46	257.650	49.52
248.560	341.41	251.400	154.54	254.360	78.45	257.710	48.16
248.620	333.24	251.450	129.40	254.410	64.58	257.760	44.58
248.680	390.28	251.510	121.58	254.470	78.34	257.820	30.72
248.730	390.51	251.570	115.72	254.580	63.93	257.870	52.26
248.790	335.78	251.610	117.62	254.630	20.25	257.930	50.71
248.840	326.14	251.680	126.66	254.690	47.42	257.980	65.34
248.900	343.54	251.730	143.41	254.750	38.99	258.040	81.51
248.950	321.11	251.790	133.76	254.800	48.20	258.100	88.80
249.010	331.85	251.840	135.49	254.860	60.27	258.150	87.29
249.060	308.38	251.900	124.12	254.910	46.99	258.210	84.37
249.120	316.32	251.950	155.52	254.970	47.08	258.260	70.82
249.180	301.76	252.010	189.50	255.020	52.64	258.320	60.84
249.230	335.86	252.070	128.30	255.080	57.42	258.370	54.48
249.290	513.89	252.120	108.78	255.130	67.20	258.430	59.94
249.340	301.81	252.180	119.72	255.190	65.48	258.480	27.77
249.400	282.85	252.230	119.49	255.250	80.60	258.650	25.99
249.510	227.87	252.290	119.17	255.300	93.62	258.710	22.10
249.560	215.07	252.340	117.79	255.360	364.71	258.760	41.88
249.620	176.54	252.400	101.34	255.410	446.12	258.820	61.40
249.680	162.35	252.450	83.77	255.470	304.73	258.870	57.71
249.730	226.59	252.570	75.68	255.520	158.37	258.930	62.68
249.790	213.03	252.620	27.19	255.630	47.00	258.980	65.24
249.840	240.90	252.680	23.33	255.690	38.67	259.040	60.54
249.900	226.96	252.730	42.70	255.750	78.21	259.100	67.13
249.950	184.39	252.790	27.00	255.800	99.58	259.150	54.48
250.010	181.12	252.840	28.67	255.860	176.74	259.210	52.25
250.070	140.86	252.900	64.71	255.910	207.71	259.260	56.81
250.120	154.34	252.950	70.14	255.970	241.59	259.320	67.00
250.180	123.03	253.010	71.33	256.020	201.93	259.370	72.53
250.230	112.83	253.070	79.21	256.080	159.55	259.430	52.11
250.290	138.93	253.120	89.28	256.540	48.28	259.480	13.98
250.340	139.37	253.180	95.98	256.600	29.70	259.760	28.65
250.400	160.03	253.230	100.70	256.710	9.78	259.820	31.04
250.450	140.73	253.290	105.89	256.760	22.55	259.930	53.01
250.510	137.69	253.340	73.76	256.820	84.70	259.980	52.74
250.620	104.50	253.580	43.10	256.870	85.80	260.040	57.90
250.680	104.81	253.630	60.14	256.930	74.05	260.100	62.13
250.730	91.86	253.690	56.40	256.980	83.63	260.150	60.24
250.790	95.17	253.750	64.40	257.040	108.45	260.210	43.66
250.840	130.75	253.800	89.26	257.100	102.72	260.260	48.96
250.900	162.35	253.860	176.36	257.150	119.71	260.320	48.07
250.950	184.90	253.910	64.88	257.210	101.60	260.370	43.32
251.010	180.14	253.970	56.44	257.260	85.35	260.430	22.42
251.070	191.34	254.020	84.63	257.320	85.67	261.150	10.40
251.120	173.21	254.080	67.61	257.370	82.15	261.260	10.38
251.180	187.08	254.130	43.61	257.430	75.68	261.320	15.09

Table 12
Ultra-Violet Light Intensity (watts/m²)

T(jd)	UV	T(jd)	UV	T(jd)	UV	T(jd)	UV
251.431	9.00	252.748	21.30	254.070	0.00	255.385	0.53
251.477	22.23	252.792	13.33	254.114	-0.07	255.429	5.63
251.521	26.53	252.836	6.10	254.158	0.00	255.473	15.10
251.564	34.87	252.889	-0.07	254.201	0.00	255.516	24.33
251.608	38.60	252.933	-0.17	254.245	0.00	255.560	32.20
251.652	38.57	252.977	-0.40	254.291	-0.07	255.604	24.73
251.696	34.10	253.020	-0.07	254.335	-0.03	255.648	39.67
251.739	17.13	253.064	-0.20	254.379	0.97	255.691	36.70
251.783	4.83	253.108	-0.50	254.423	7.50	255.735	35.37
251.827	2.10	253.151	-0.63	254.466	11.43	255.779	29.37
251.871	-0.40	253.195	-0.40	254.510	16.30	255.823	16.67
251.914	0.10	253.239	-1.10	254.554	14.03	255.866	5.07
251.958	0.10	253.283	-0.93	254.598	23.30	255.910	0.43
252.002	0.03	253.326	-0.97	254.641	26.17	255.954	-0.17
252.046	0.00	253.370	0.83	254.685	15.70	255.998	-0.23
252.089	0.00	253.414	9.47	254.729	13.37	256.041	-0.53
252.133	0.00	253.458	20.20	254.773	11.10	256.085	-0.37
252.177	0.00	253.501	30.77	254.816	10.70	256.129	-0.40
252.221	0.00	253.545	39.17	254.860	4.20	256.173	-0.23
252.264	-0.37	253.589	43.00	254.904	0.10	256.216	-0.17
252.308	-0.37	253.633	35.63	254.948	0.00	256.260	-0.27
252.352	0.37	253.677	39.27	254.991	-0.17	256.304	-0.43
252.396	5.40	253.720	26.40	255.035	-0.03	256.348	-0.13
252.439	14.27	253.764	21.90	255.079	0.00	256.391	0.23
252.484	13.27	253.808	3.97	255.123	0.00	256.435	4.57
252.529	27.60	253.852	0.30	255.166	0.00	256.479	14.43
252.573	41.30	253.895	0.10	255.210	0.00	256.522	24.57
252.617	43.57	253.939	0.07	255.254	0.00	256.567	33.30
252.660	37.20	253.983	0.10	255.298	0.00	256.611	36.33
252.704	32.60	254.026	-0.10	255.341	-0.03	256.655	38.40

Table 13
Bulk Aerosol Chemical Composition (nMole m^{-3})

Nr	Tmid	Tbeg	Tend	Na^+	NH_4^+	K^+	MSA	Cl^-	$defCl^-$	NO_3^-	$SO_4^=$	$nssSO_4^=$
1	247.932	247.688	248.176	128.47	8.28	4.51	0.62	111.90	-37.77	3.83	12.54	9.89
2	248.310	248.198	248.422	233.46	9.44	7.29	0.63	242.63	-29.35	6.44	18.09	13.28
3	249.797	249.917	250.167	299.67	40.65	11.00	1.67	277.41	-71.71	33.42	63.27	57.10
4	250.307	250.181	250.434	32.39	2.96	1.57	0.26	42.21	4.48	1.75	4.61	3.94
5	250.563	250.443	250.683	85.02	3.51	3.08	0.11	95.51	-3.54	1.33	5.96	4.21
6	250.926	250.688	251.163	95.06	2.30	3.55	0.25	86.66	-24.08	3.91	9.03	7.08
7	251.300	251.184	251.417	92.53	3.37	3.50	0.35	93.98	-13.82	5.57	11.61	9.70
8	251.549	251.432	251.667	119.44	1.33	3.44	0.41	100.52	-38.63	5.53	10.67	8.21
9	251.802	251.688	251.917	71.69	2.73	1.44	0.21	65.09	-18.43	5.64	6.91	5.44
10	252.172	251.927	252.417	114.20	17.83	3.60	0.53	113.78	-19.26	6.32	50.79	48.44
11	252.554	252.438	252.669	102.52	7.73	3.45	0.28	94.20	-25.24	7.23	16.29	14.18
12	252.800	252.682	252.917	26.40	4.94	2.31	0.18	25.68	-5.08	4.64	8.40	7.86
13	253.048	252.928	253.168	36.91	6.10	1.76	0.17	33.81	-9.19	5.85	9.14	8.38
14	253.303	253.189	253.418	122.29	11.75	8.78	0.16	96.77	-45.70	12.41	62.22	59.71
15	253.556	253.437	253.675	310.98	7.20	14.32	0.54	258.56	-103.73	11.85	35.98	29.57
16	253.931	253.693	254.168	-	-	-	-	-	-	-	-	-
17	254.297	254.183	254.410	-	-	-	-	-	-	-	-	-
18	254.546	254.426	254.665	102.62	1.48	5.17	0.47	90.54	-29.01	6.72	12.23	10.11
19	254.801	254.683	254.919	-	-	-	-	-	-	-	-	-
20	255.050	254.929	255.170	346.07	0.56	15.50	0.45	299.12	-104.05	8.11	25.71	18.59
21	255.432	255.185	255.678	366.90	19.09	13.58	0.01	285.70	-141.74	32.94	55.59	48.03
22	255.894	255.689	256.099	-	-	-	-	-	-	-	-	-
23	256.261	256.113	256.410	125.25	2.65	5.23	0.24	108.50	-37.42	8.44	13.87	11.29
24	256.676	256.428	256.923	-	-	-	-	-	-	-	-	-
25	257.053	256.933	257.173	36.50	8.74	1.53	0.22	28.87	-13.65	14.07	11.66	10.91
26	257.308	257.200	257.417	54.38	6.36	2.55	-	-	-63.35	-	-	-
27	257.600	257.447	257.753	-	-	-	-	-	-	-	-	-
28	257.885	257.764	258.006	92.73	5.81	3.50	0.42	70.02	-38.01	20.80	20.11	18.20
29	258.101	258.017	258.186	47.65	8.61	2.62	0.37	31.55	-23.96	24.12	19.67	18.69
30	258.310	258.204	258.415	-	-	-	-	-	-	-	-	-
31	258.556	258.433	258.680	63.60	3.26	2.80	0.39	52.59	-21.50	11.81	12.20	10.89
32	258.801	258.690	258.913	174.71	0.77	5.52	-	-	-203.54	-	-	-
33	259.047	258.925	259.168	180.35	0.67	8.11	0.31	162.39	-47.72	6.06	17.69	13.98
34	260.009	259.891	260.126	124.88	4.98	6.63	0.26	123.00	-22.49	9.81	15.45	12.88
35	260.261	260.147	260.376	138.89	3.99	5.44	0.42	123.56	-38.25	3.77	17.15	14.29
36	260.556	260.396	260.717	203.76	8.69	15.23	0.47	167.84	-69.54	12.69	23.09	18.89

Table 14
Impactor Aerosol Chemistry (nMole m^{-3})

Nr	Stg	Tjd	MSA	Cl^-	$defCl^-$	NO_3^+	$SO_4^=$	$nssSO_4^=$	Na^+	NH_4^+	K^+
1	1	247.932	0.111	21.29	0.00	0.84	1.28	0.04	18.67	2.10	1.75
1	2	247.932	0.111	41.98	-16.40	2.02	2.53	0.22	50.10	1.68	6.03
1	3	247.932	0.111	8.27	0.00	0.68	0.82	0.37	5.41	2.56	2.17
1	4	247.932	0.111	4.11	0.00	0.43	1.26	1.01	1.99	3.60	3.77
1	5	247.932	0.168	1.59	0.00	0.29	1.56	1.40	1.04	2.56	3.41
1	6	247.932	0.137	0.77	0.00	0.29	1.07	0.90	1.04	5.40	4.94
2	1	248.310	0.111	56.14	-6.90	1.80	3.22	0.22	54.10	4.33	17.17
2	2	248.310	0.111	83.11	-13.70	2.91	4.40	0.22	83.10	4.03	6.18
2	3	248.310	0.113	33.09	-1.80	2.47	2.20	0.10	29.96	5.99	4.37
2	4	248.310	0.165	13.04	0.00	2.28	1.88	1.05	8.93	7.08	5.37
2	5	248.310	0.242	3.99	0.00	0.57	2.19	1.92	1.04	6.24	4.02
2	6	248.310	0.304	19.90	0.00	1.15	3.83	2.81	9.41	20.27	3.01
3	1	248.792	0.111	57.43	-41.90	8.55	4.11	0.35	85.30	3.38	14.00
3	2	248.792	0.139	70.26	-54.60	16.85	6.10	1.69	107.20	6.63	10.91
3	3	248.792	0.115	17.85	-11.20	4.13	3.29	2.90	24.97	7.61	4.45
3	4	248.792	0.295	7.92	-3.00	1.75	7.95	10.05	9.34	14.07	3.20
3	5	248.792	0.544	4.98	0.00	1.08	10.29	13.52	3.61	17.05	2.68
3	6	248.792	0.736	116.20	-82.40	27.79	10.57	3.85	170.50	10.90	47.17
4	1	250.307	0.111	10.28	0.00	0.51	0.87	0.26	5.78	1.43	1.64
4	2	250.307	0.111	17.37	0.00	1.04	1.08	0.22	13.14	1.43	4.47
4	3	250.307	0.111	6.91	0.00	0.95	0.77	0.35	2.33	1.43	4.54
4	4	250.307	0.111	3.89	0.00	0.60	0.63	0.42	1.04	1.66	1.49
4	5	250.307	0.111	0.87	0.00	0.40	0.60	0.53	1.04	1.43	7.84
4	6	250.307	0.111	0.77	0.00	0.86	0.38	0.26	1.04	2.99	1.78
5	1	250.563	0.111	22.62	0.00	0.27	1.07	0.22	20.89	1.43	3.58
5	2	250.563	0.111	30.67	-3.00	0.66	1.53	0.22	28.94	1.43	4.22
5	3	250.563	0.111	9.59	0.00	0.40	0.66	0.10	6.89	1.43	2.77
5	4	250.563	0.111	3.00	0.00	0.72	0.32	0.16	1.04	1.43	1.84
5	5	250.563	0.111	1.60	0.00	0.25	0.25	0.16	1.04	1.43	0.73
5	6	250.563	0.111	0.77	0.00	0.22	0.35	0.26	1.04	1.43	0.73
6	1	250.926	0.111	31.45	0.00	0.45	1.45	0.22	27.59	1.43	2.84
6	2	250.926	0.111	56.67	0.00	1.79	2.81	0.71	32.38	1.43	4.26
6	3	250.926	0.111	12.78	0.00	1.38	1.04	0.15	12.39	1.43	3.30
6	4	250.926	0.111	6.14	0.00	1.03	0.80	0.53	2.01	1.43	0.73
6	5	250.926	0.111	1.99	0.00	0.42	1.36	1.22	1.04	1.43	3.34
6	6	250.926	0.175	0.98	0.00	0.40	2.32	2.15	1.04	4.29	0.73
7	1	251.300	0.111	23.09	0.00	0.48	1.29	0.22	20.95	1.43	2.04
7	2	251.300	0.111	39.55	-12.90	2.54	2.09	0.22	45.05	3.04	6.36
7	3	251.300	0.111	11.71	0.00	1.67	1.00	0.21	8.98	1.43	1.21
7	4	251.300	0.111	6.30	0.00	1.45	0.94	0.51	3.06	1.43	1.85
7	5	251.300	0.112	4.46	0.00	1.27	2.09	1.74	1.90	5.78	5.77
7	6	251.300	0.159	0.77	0.00	0.87	2.69	2.31	1.04	8.12	0.73
8	1	251.549	0.111	28.83	-3.00	0.78	1.62	0.22	27.31	1.43	1.01
8	2	251.549	0.111	45.42	-16.30	0.33	2.37	0.22	52.95	1.43	4.75
8	3	251.549	0.111	12.66	0.00	1.61	1.09	0.22	25.03	1.43	0.73
8	4	251.549	0.111	7.21	0.00	0.85	0.91	0.46	3.37	1.43	0.93
8	5	251.549	0.111	1.83	0.00	0.32	1.50	1.31	1.04	1.43	0.73
8	6	251.549	0.185	0.77	0.00	0.40	2.44	2.22	1.04	6.17	0.73
9	1	251.802	0.111	26.17	0.00	1.10	1.62	0.30	17.45	6.02	1.44
9	2	251.802	0.111	24.02	-3.50	2.84	1.34	0.22	23.65	6.36	1.90
9	3	251.802	0.111	8.36	0.00	1.49	0.77	0.10	6.13	11.97	1.84
9	4	251.802	0.111	4.84	0.00	0.86	0.60	0.27	1.04	5.55	0.93
9	5	251.802	0.111	7.11	0.00	0.41	1.12	0.88	1.04	1.76	1.07
9	6	251.802	0.111	0.77	0.00	0.61	1.51	0.99	1.04	22.22	1.74
10	1	252.172	0.111	21.84	0.00	1.69	1.41	0.37	13.40	1.60	0.73
10	2	252.172	0.111	50.33	-17.90	3.56	3.65	0.22	58.59	11.62	30.63

10	3	252.172	0.111	9.12	-2.40	1.02	3.33	2.48	9.93	3.23	1.99
10	4	252.172	0.111	5.41	0.00	0.83	10.65	10.09	5.00	5.88	1.46
10	5	252.172	0.201	7.86	0.00	0.95	14.58	13.92	6.81	8.71	1.54
10	6	252.172	0.111	4.14	0.00	0.61	6.36	5.95	1.04	11.81	0.73
11	1	252.554	0.111	22.86	-12.50	0.68	1.36	0.22	30.33	1.43	2.01
11	2	252.554	0.111	39.19	-15.90	2.08	2.16	0.22	47.29	3.85	3.69
11	3	252.554	0.111	15.67	0.00	1.13	1.30	0.14	14.45	1.43	1.53
11	4	252.554	0.111	36.55	0.00	0.28	2.81	2.15	6.17	9.10	3.13
11	5	252.554	0.111	2.79	0.00	0.07	4.21	3.97	1.04	4.04	1.40
11	6	252.554	0.111	0.77	0.00	0.07	3.13	2.82	1.04	9.60	0.75
12	1	252.800	0.111	7.03	0.00	0.14	0.49	0.22	4.78	9.91	0.73
12	2	252.800	0.111	9.49	0.00	0.71	2.28	1.54	8.05	1.43	0.91
12	3	252.800	0.111	3.78	0.00	0.74	0.86	0.50	1.79	5.45	0.89
12	4	252.800	0.111	1.83	0.00	0.26	1.10	0.93	1.04	1.43	0.73
12	5	252.800	0.290	1.20	0.00	0.20	1.94	1.81	1.04	3.44	0.73
12	6	252.800	0.111	0.77	0.00	0.07	1.71	1.40	1.04	15.33	1.43
13	1	253.048	0.111	11.61	-2.20	0.94	0.68	0.22	11.86	1.43	1.73
13	2	253.048	0.111	13.11	-3.50	1.89	0.91	0.22	14.24	1.43	1.61
13	3	253.048	0.111	7.05	0.00	1.11	0.57	0.05	4.72	1.43	1.52
13	4	253.048	0.111	3.27	0.00	0.53	1.83	1.49	1.81	4.78	1.09
13	5	253.048	0.111	1.60	0.00	0.12	3.75	3.60	1.04	1.76	0.73
13	6	253.048	0.111	0.77	0.00	0.07	3.51	3.31	1.04	9.38	0.73
14	1	253.303	0.111	13.57	-3.50	1.61	0.95	0.22	14.65	1.43	1.41
14	2	253.303	0.111	31.30	-14.20	4.03	2.03	0.22	39.07	2.18	5.02
14	3	253.303	0.111	14.90	-12.10	0.81	4.01	2.35	23.19	1.43	9.60
14	4	253.303	0.203	4.70	0.00	0.56	13.88	13.33	4.76	8.20	1.07
14	5	253.303	0.301	2.40	0.00	0.07	16.02	15.77	1.04	11.14	2.44
14	6	253.303	0.365	0.77	0.00	0.44	6.05	5.77	1.04	28.63	9.97
15	1	253.556	0.111	40.10	-6.40	1.19	2.54	0.22	39.88	1.43	3.58
15	2	253.556	0.111	51.71	-20.80	3.46	2.99	0.22	62.25	1.43	5.35
15	3	253.556	0.111	20.15	0.00	1.29	1.53	0.16	17.41	1.43	2.54
15	4	253.556	0.137	11.92	-2.70	0.29	4.55	3.47	12.57	5.18	1.79
15	5	253.556	0.194	3.07	0.00	0.09	7.70	7.43	1.04	5.92	0.73
15	6	253.556	0.269	0.77	0.00	0.18	7.24	6.95	1.04	31.74	0.73
16	1	253.931	0.111	13.24	0.00	0.07	0.82	0.22	39.98	1.43	2.85
16	2	253.931	0.111	48.71	0.00	0.36	2.31	1.48	10.05	1.43	1.57
16	3	253.931	0.111	80.01	-8.50	1.21	3.89	0.22	75.98	1.43	4.37
16	4	253.931	0.111	21.47	0.00	0.60	2.89	1.65	16.92	2.14	4.91
16	5	253.931	0.426	28.10	0.00	0.39	7.01	5.27	25.18	1.43	3.45
16	6	253.931	0.111	23.50	0.00	0.07	2.30	0.88	17.90	6.58	2.13
17	1	254.297	0.111	10.84	0.00	0.07	0.94	0.38	5.61	1.43	0.73
17	2	254.297	0.111	16.89	0.00	0.85	1.40	0.49	10.90	1.43	0.73
17	3	254.297	0.331	6.44	0.00	0.07	0.92	0.52	2.50	1.43	0.73
17	4	254.297	0.145	3.02	0.00	0.08	0.97	0.80	1.04	1.43	0.73
17	5	254.297	0.111	1.38	0.00	0.07	1.30	1.17	1.04	1.43	0.73
17	6	254.297	0.111	0.77	0.00	0.07	1.29	1.14	1.04	3.40	0.95
18	1	254.546	0.111	24.30	0.00	0.07	1.63	0.29	18.43	1.43	1.18
18	2	254.546	0.111	39.64	0.00	2.30	2.42	0.12	33.89	1.43	1.26
18	3	254.546	0.111	13.69	0.00	0.91	1.32	0.53	8.64	1.43	1.51
18	4	254.546	0.111	5.97	0.00	0.30	1.42	1.09	1.09	1.43	1.14
18	5	254.546	0.141	2.31	0.00	0.07	2.47	2.22	1.04	2.92	1.15
18	6	254.546	0.122	0.77	0.00	0.07	2.40	2.19	1.04	13.72	1.05
19	1	254.801	0.111	44.51	0.00	0.07	2.58	0.17	35.73	1.43	2.06
19	2	254.801	0.111	46.68	0.00	1.22	2.71	0.22	40.05	1.43	2.70
19	3	254.801	0.111	24.78	0.00	0.43	1.90	0.56	17.42	1.43	2.25
19	4	254.801	0.111	11.83	0.00	0.07	1.85	1.58	1.04	4.22	0.73
19	5	254.801	0.150	1.76	0.00	0.07	3.39	3.06	1.04	1.43	1.11
19	6	254.801	0.171	5.94	0.00	0.95	4.55	3.95	2.57	7.00	0.73
20	1	255.050	0.111	44.91	-2.70	0.07	2.66	0.22	40.86	1.43	3.20
20	2	255.050	0.111	61.73	-5.70	1.81	3.50	0.22	57.89	2.73	5.28
20	3	255.050	0.111	36.09	0.00	0.07	2.42	0.35	29.54	1.43	1.98
20	4	255.050	0.111	20.09	0.00	0.07	2.18	0.99	14.91	3.11	5.15

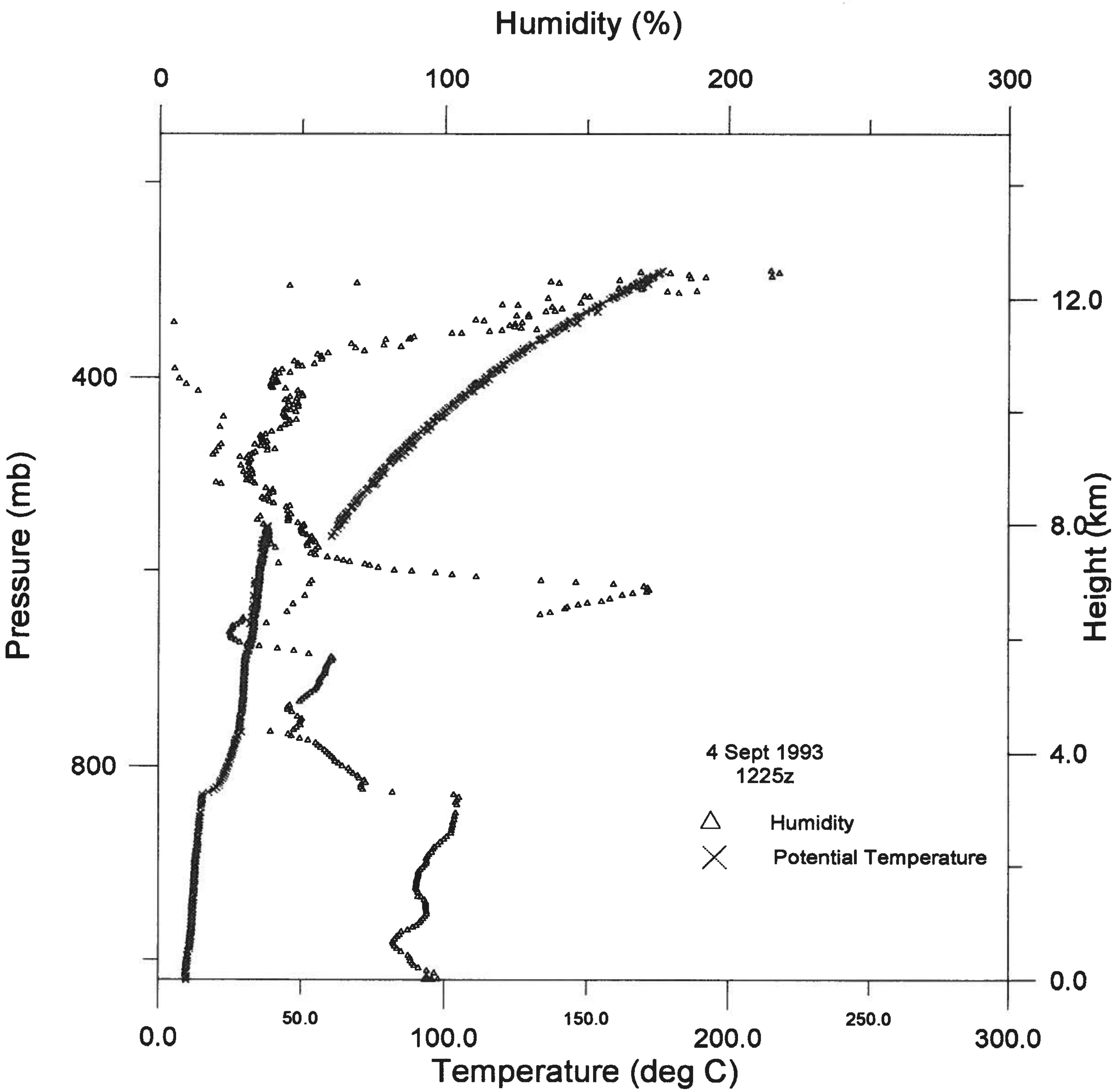
20	5	255.050	0.118	7.75	0.00	0.07	3.88	3.44	2.25	1.43	7.21
20	6	255.050	0.111	6.36	0.00	0.07	4.86	4.14	4.47	4.55	0.91
21	1	255.432	0.111	89.05	-16.90	9.16	5.00	0.22	90.95	1.43	4.61
21	2	255.432	0.111	78.32	-25.90	17.14	5.01	0.22	89.49	1.43	3.57
21	3	255.432	0.111	20.47	0.00	4.91	2.04	0.70	19.06	1.43	1.01
21	4	255.432	0.111	9.51	-3.70	2.84	4.65	3.78	11.33	4.74	0.83
21	5	255.432	0.111	9.44	-5.30	0.76	15.08	14.13	12.63	23.77	2.90
21	6	255.432	0.111	5.26	0.00	1.39	22.18	21.54	5.69	32.16	4.41
22	1	255.894	0.111	47.27	0.00	0.80	1.94	0.22	41.78	1.43	1.79
22	2	255.894	0.111	78.05	-13.20	4.08	3.70	0.22	78.32	1.43	2.73
22	3	255.894	0.111	12.56	0.00	1.14	0.79	0.06	8.71	1.43	0.73
22	4	255.894	0.111	8.81	0.00	0.86	0.88	0.36	5.07	1.43	0.73
22	5	255.894	0.111	3.88	0.00	0.30	1.64	0.03	23.34	1.43	0.73
22	6	255.894	0.111	10.69	0.00	0.74	5.50	4.98	3.29	6.43	0.96
23	1	256.261	0.111	38.62	0.00	0.70	1.80	0.22	33.56	2.51	2.67
23	2	256.261	0.111	46.61	-2.60	2.58	2.27	0.22	42.23	2.15	3.03
23	3	256.261	0.111	10.07	0.00	1.41	0.73	0.04	7.43	1.43	1.43
23	4	256.261	0.111	5.80	0.00	1.20	0.82	0.46	2.95	1.43	2.83
23	5	256.261	0.111	2.96	0.00	0.27	1.89	1.73	1.04	1.43	0.73
23	6	256.261	0.111	1.14	0.00	0.41	3.69	3.58	1.04	7.90	0.73
24	1	256.676	0.111	15.97	0.00	0.71	0.77	0.22	13.04	1.43	0.73
24	2	256.676	0.111	21.72	-3.10	2.98	1.10	0.22	21.31	1.43	1.08
24	3	256.676	0.111	5.64	0.00	1.56	0.49	0.14	3.31	1.43	0.73
24	4	256.676	0.111	3.14	0.00	0.90	0.54	0.22	122.50	1.43	0.73
24	5	256.676	0.111	1.69	0.00	0.15	1.44	1.31	1.04	15.96	0.73
24	6	256.676	0.160	3.53	0.00	0.68	4.31	4.14	1.04	11.67	1.34
25	1	257.053	0.111	10.87	0.00	1.84	0.70	0.01	7.96	3.08	0.73
25	2	257.053	0.111	12.93	0.00	5.11	0.93	0.22	11.93	2.03	1.03
25	3	257.053	0.111	3.65	0.00	1.65	0.49	0.25	1.04	1.43	0.73
25	4	257.053	0.111	2.79	0.00	1.03	0.65	0.49	1.04	1.43	0.73
25	5	257.053	0.111	2.59	0.00	0.51	2.44	2.31	1.04	2.67	0.73
25	6	257.053	0.111	4.61	0.00	0.84	5.89	5.45	1.42	6.34	0.73
26	1	257.308	0.111	11.92	0.00	2.34	0.77	0.05	8.16	1.43	0.98
26	2	257.308	0.111	14.89	-3.20	6.11	1.05	0.22	15.56	1.43	1.68
26	3	257.308	0.111	5.09	0.00	1.95	0.44	0.22	11.23	1.43	0.73
26	4	257.308	0.111	3.90	0.00	0.71	0.65	0.46	1.04	1.43	0.73
26	5	257.308	0.111	5.01	0.00	0.22	2.58	2.17	2.57	8.11	4.12
26	6	257.308	0.111	3.94	0.00	0.87	4.67	4.40	1.04	10.49	1.00
27	1	257.600	0.111	11.62	-2.00	3.84	0.75	0.22	11.69	4.99	1.23
27	2	257.600	0.111	14.47	-3.80	5.63	0.96	0.22	15.72	1.43	1.22
27	3	257.600	0.111	4.35	0.00	1.80	0.47	0.12	2.77	1.43	0.73
27	4	257.600	0.111	2.10	0.00	0.34	0.82	0.61	1.04	1.43	0.79
27	5	257.600	0.111	2.12	0.00	0.35	3.64	3.49	1.04	5.29	0.73
27	6	257.600	0.210	0.77	0.00	1.82	8.38	8.21	1.04	7.64	0.73
28	1	257.885	0.111	19.95	-2.00	3.44	1.22	0.22	18.86	3.26	1.22
28	2	257.885	0.111	25.77	-6.50	7.19	1.63	0.22	27.74	1.43	2.26
28	3	257.885	0.111	6.96	0.00	1.85	0.64	0.12	4.98	1.44	0.73
28	4	257.885	0.111	3.02	0.00	0.71	0.90	0.66	1.04	1.43	0.73
28	5	257.885	0.112	1.91	0.00	0.35	3.26	3.01	1.04	6.24	0.73
28	6	257.885	0.215	2.61	0.00	0.41	7.44	7.05	1.04	7.66	0.73
29	1	258.100	0.111	10.32	0.00	3.68	0.88	0.22	18.86	1.43	4.00
29	2	258.101	0.111	14.48	-3.20	5.05	1.04	0.22	15.19	1.43	4.38
29	3	258.101	0.111	6.93	0.00	0.88	0.77	0.16	4.89	1.43	2.64
29	4	258.101	0.111	4.29	0.00	0.70	0.96	0.63	1.04	1.43	0.82
29	5	258.101	0.111	5.06	0.00	0.96	4.28	4.00	1.04	2.21	2.50
29	6	258.101	0.169	4.69	0.00	1.03	8.92	8.17	4.23	18.92	2.14
30	1	258.310	0.111	10.82	0.00	0.07	0.22	0.22	9.26	1.43	0.91
30	2	258.310	0.111	12.21	0.00	1.33	0.22	0.22	10.64	1.43	0.78
30	3	258.310	0.111	3.61	0.00	0.07	0.22	0.22	1.26	1.43	0.73
30	4	258.310	0.111	6.48	0.00	0.07	0.22	0.22	1.04	1.43	0.73
30	5	258.310	0.111	1.96	0.00	0.12	2.10	1.88	1.04	4.61	0.78
30	6	258.310	0.111	3.24	-1.90	0.34	6.40	5.72	4.39	1.43	3.44

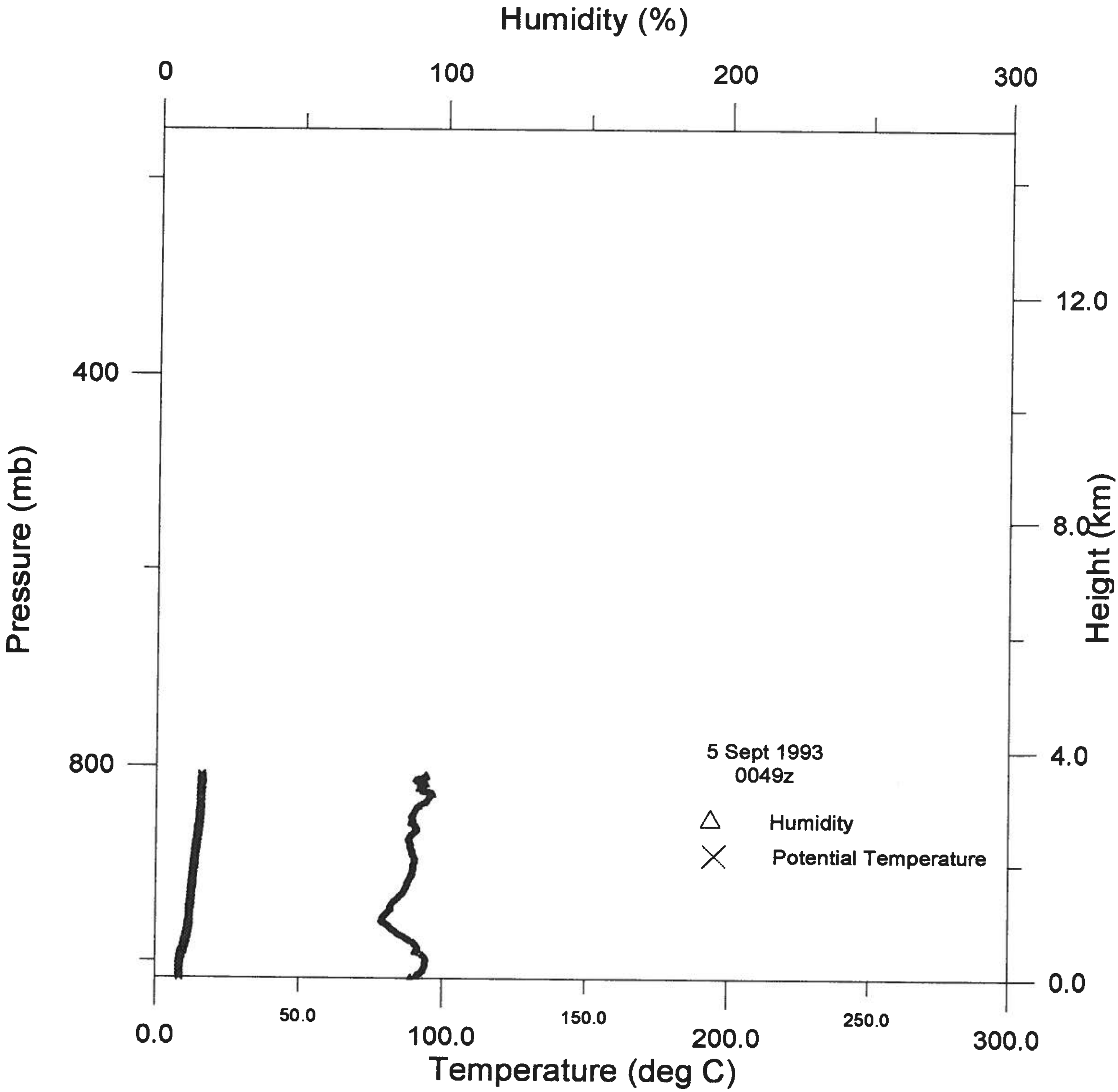
31	1	258.556	0.111	30.20	0.00	1.62	1.14	0.22	19.45	1.43	14.81
31	2	258.556	0.111	23.42	-2.60	3.55	2.05	0.43	22.36	1.43	1.89
31	3	258.556	0.111	8.67	0.00	1.64	0.22	0.22	7.36	1.43	2.33
31	4	258.556	0.111	6.39	0.00	0.51	0.26	0.22	1.04	1.43	11.20
31	5	258.556	0.111	3.12	0.00	0.07	1.83	1.59	1.04	1.43	1.24
31	6	258.556	0.111	4.21	0.00	0.54	3.94	3.32	3.26	3.15	1.70
32	1	258.801	0.111	33.33	0.00	1.26	1.05	0.22	26.82	1.43	2.07
32	2	258.801	0.111	41.24	0.00	2.99	1.37	0.22	34.46	1.43	2.02
32	3	258.801	0.117	16.20	0.00	1.51	0.22	0.22	12.95	1.43	0.73
32	4	258.801	0.171	8.41	0.00	0.57	1.13	0.45	6.17	2.77	1.82
32	5	258.801	0.121	3.05	0.00	0.07	4.65	4.43	1.04	4.23	0.73
32	6	258.801	0.142	2.30	0.00	0.80	5.41	4.68	4.14	7.12	0.73
33	1	259.047	0.111	65.52	0.00	1.50	2.84	0.22	55.78	1.70	5.08
33	2	259.047	0.111	76.83	0.00	1.94	3.33	0.22	67.14	1.43	4.23
33	3	259.047	0.111	32.78	0.00	1.52	1.68	0.22	25.57	1.43	2.58
33	4	259.047	0.111	12.60	0.00	0.07	1.06	0.36	7.90	1.43	1.32
33	5	259.047	0.121	3.97	0.00	0.07	4.12	3.80	1.56	3.16	0.73
33	6	259.047	0.132	5.14	0.00	0.07	5.84	5.28	3.56	4.52	0.73
34	1	260.009	0.111	38.02	0.00	0.07	1.47	0.22	30.84	1.43	1.79
34	2	260.009	0.111	68.15	-14.20	3.82	3.23	0.22	70.71	1.43	2.98
34	3	260.009	0.111	13.48	0.00	0.56	0.80	0.22	9.38	1.43	1.48
34	4	260.009	0.111	6.49	0.00	0.07	0.70	0.31	2.65	1.43	0.73
34	5	260.009	0.111	1.34	0.00	0.07	2.10	0.98	14.80	1.43	0.73
34	6	260.009	0.215	4.11	0.00	0.07	6.21	4.99	14.24	6.09	0.93
35	1	260.261	0.111	36.97	0.00	0.40	1.38	0.22	30.00	1.43	1.56
35	2	260.261	0.111	87.13	0.00	5.06	4.06	0.22	74.48	1.43	4.74
35	3	260.261	0.111	10.14	0.00	0.55	0.62	0.22	6.62	1.43	0.73
35	4	260.261	0.111	4.10	0.00	0.07	0.71	0.34	1.83	1.43	0.73
35	5	260.261	0.111	1.23	0.00	0.07	1.96	1.82	1.04	1.43	0.73
35	6	260.261	0.111	0.77	0.00	0.07	5.98	5.90	1.04	4.56	0.73
36	1	260.556	0.111	55.78	0.00	0.07	2.20	0.22	45.16	1.70	2.45
36	2	260.556	0.111	78.06	-4.80	3.99	4.99	0.34	71.09	1.43	3.70
36	3	260.556	0.111	20.78	0.00	0.07	2.15	1.25	8.55	1.43	1.29
36	4	260.556	0.111	5.54	0.00	0.27	0.68	0.18	2.07	1.43	1.08
36	5	260.556	0.111	14.09	0.00	0.07	2.87	2.03	7.66	4.81	6.45
36	6	260.556	0.111	7.20	0.00	0.07	4.90	4.26	1.04	5.83	2.33

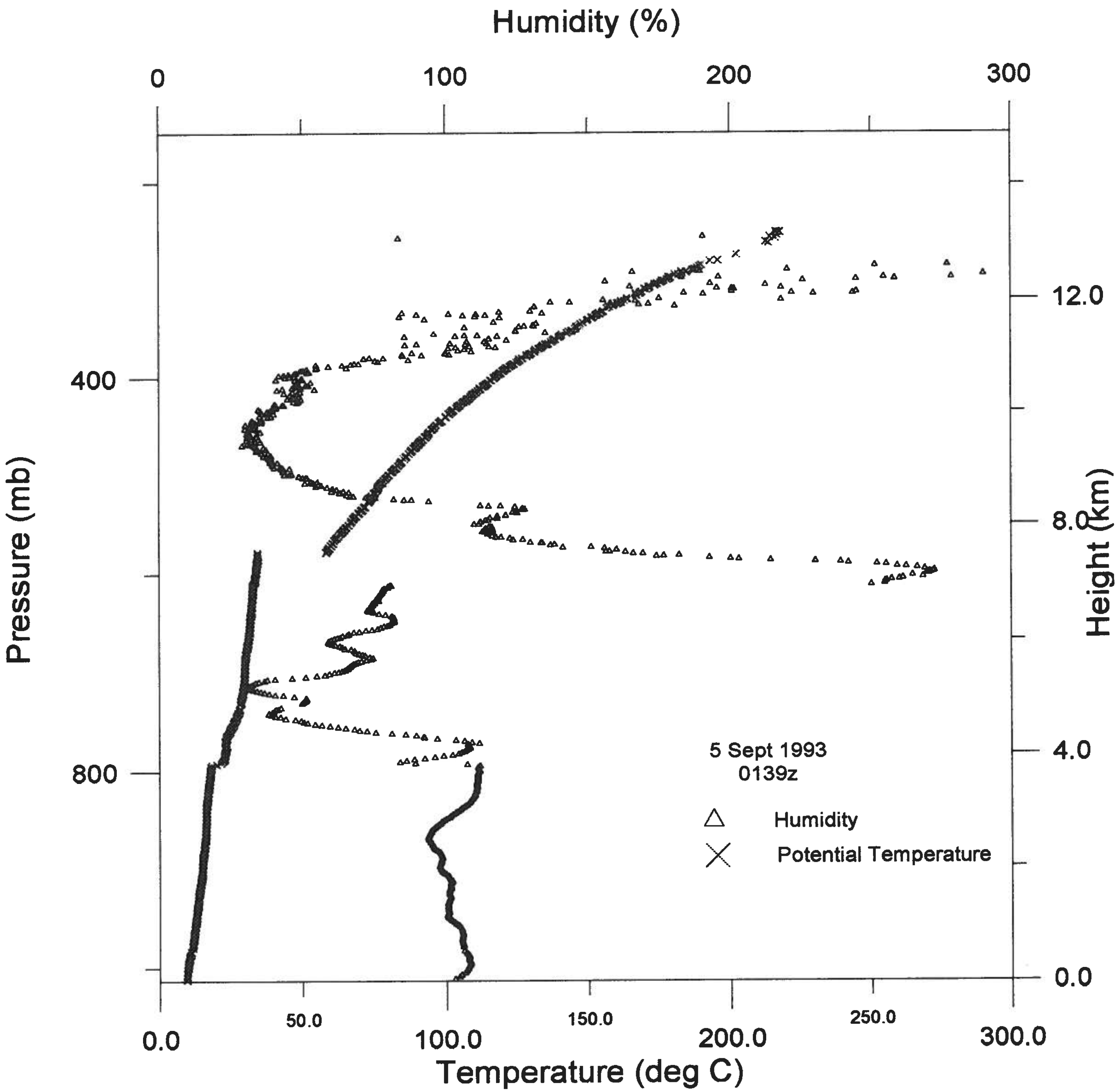
APPENDIX III

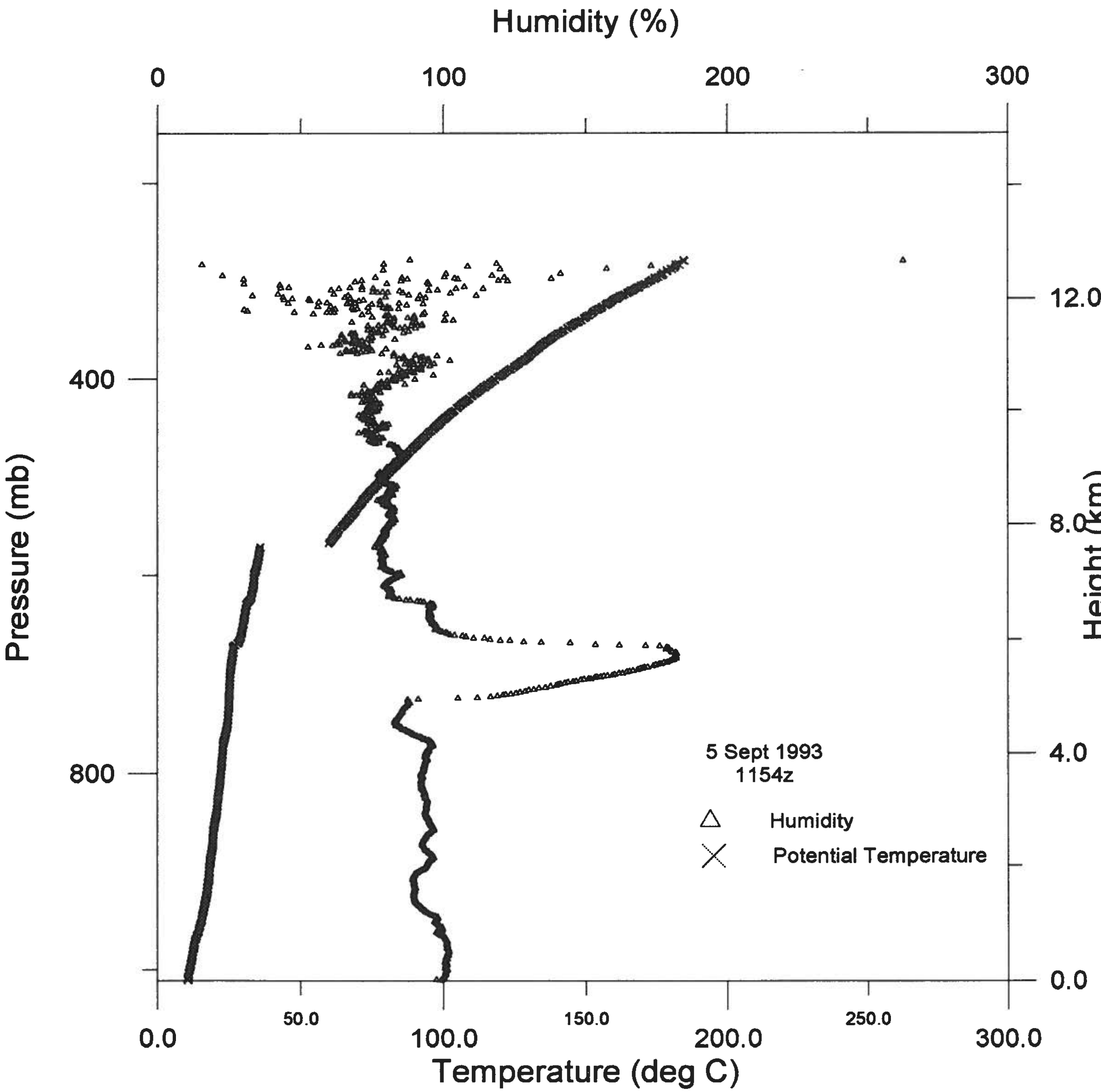
RAWINSONDE RESULTS

JD 247	4-Sept-1993	1225z	p 100
JD 248	5-Sept-1993	0049z	p 101
JD 248	5-Sept-1993	0139z	p 102
JD 248	5-Sept-1993	1154z	p 103
JD 249	6-Sept-1993	0038z	p 104
JD 249	6-Sept-1993	1156z	p 105
JD 250	7-Sept-1993	0019z	p 106
JD 250	7-Sept-1993	1150z	p 107
JD 250	7-Sept-1993	2350z	p 108
JD 251	8-Sept-1993	1610z	p 109
JD 251	8-Sept-1993	2349z	p 110
JD 252	9-Sept-1993	1153z	p 111
JD 252	9-Sept-1993	2350z	p 112
JD 253	10-Sept-1993	1158z	p 113
JD 253	10-Sept-1993	2354z	p 114
JD 254	11-Sept-1993	1156z	p 115
JD 254	11-Sept-1993	2346z	p 116
JD 255	12-Sept-1993	1203z	p 117
JD 255	12-Sept-1993	2347z	p 118
JD 256	13-Sept-1993	1152z	p 119
JD 256	13-Sept-1993	2349z	p 120
JD 257	14-Sept-1993	1152z	p 121
JD 257	14-Sept-1993	2356z	p 122
JD 258	15-Sept-1993	1318z	p 123
JD 258	15-Sept-1993	2350z	p 124
JD 259	16-Sept-1993	0001z	p 125
JD 259	16-Sept-1993	2351z	p 126
JD 260	17-Sept-1993	1146z	p 127
JD 260	17-Sept-1993	2353z	p 128
JD 261	18-Sept-1993	1155z	p 129
JD 261	18-Sept-1993	1309z	p 130
JD 262	19-Sept-1993	0000z	p 131
JD 262	19-Sept-1993	1204z	p 132
JD 262	19-Sept-1993	2354z	p 133

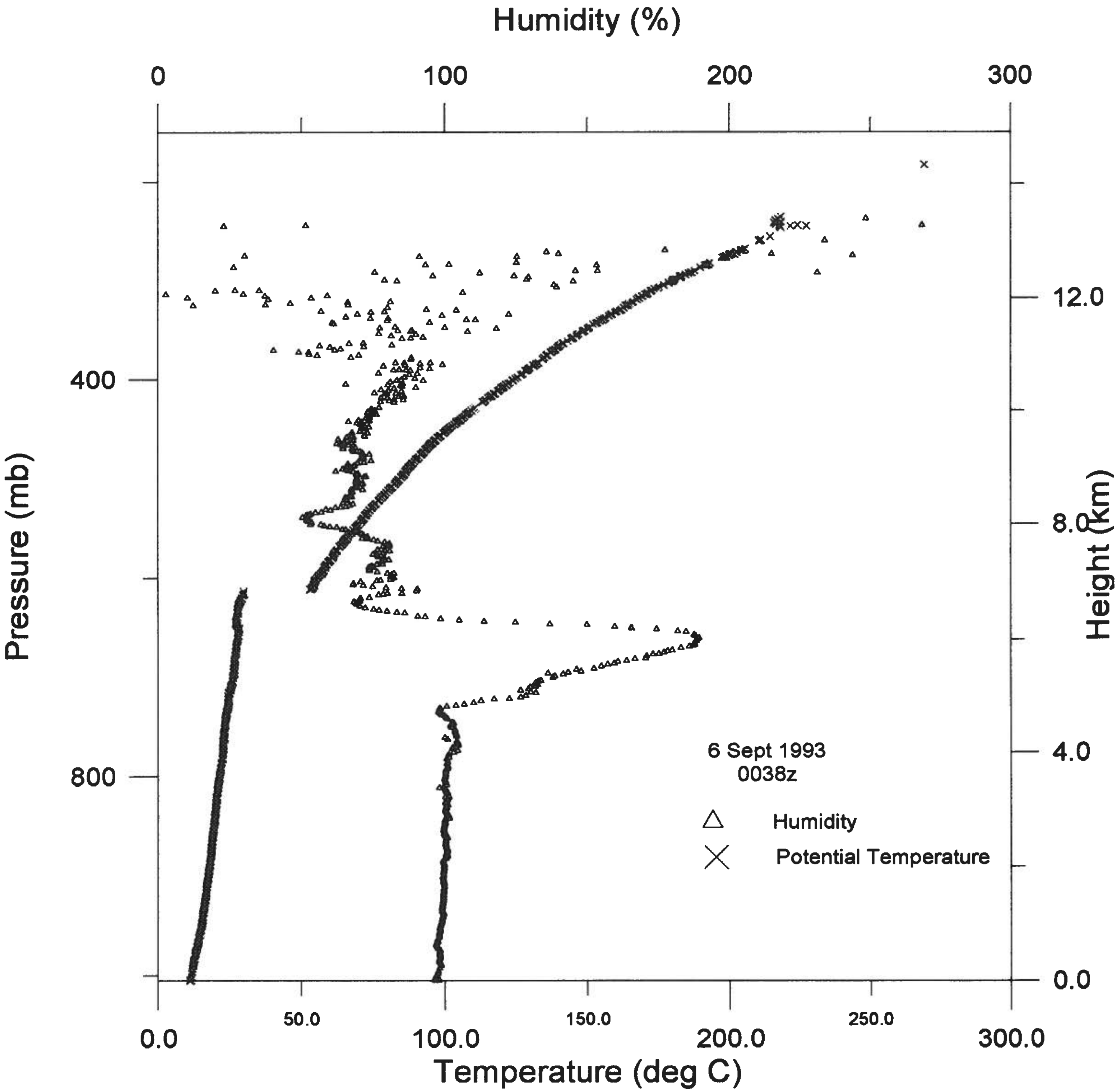

Humidity (%)
0
100
200
300
Pressure (mb)
400
800
Height (km)
12.0
8.0
4.0
0.0
4 Sept 1993
1225z
Humidity
Potential Temperature
0.0
50.0
100.0
150.0
200.0
250.0
300.0
Temperature (deg C)

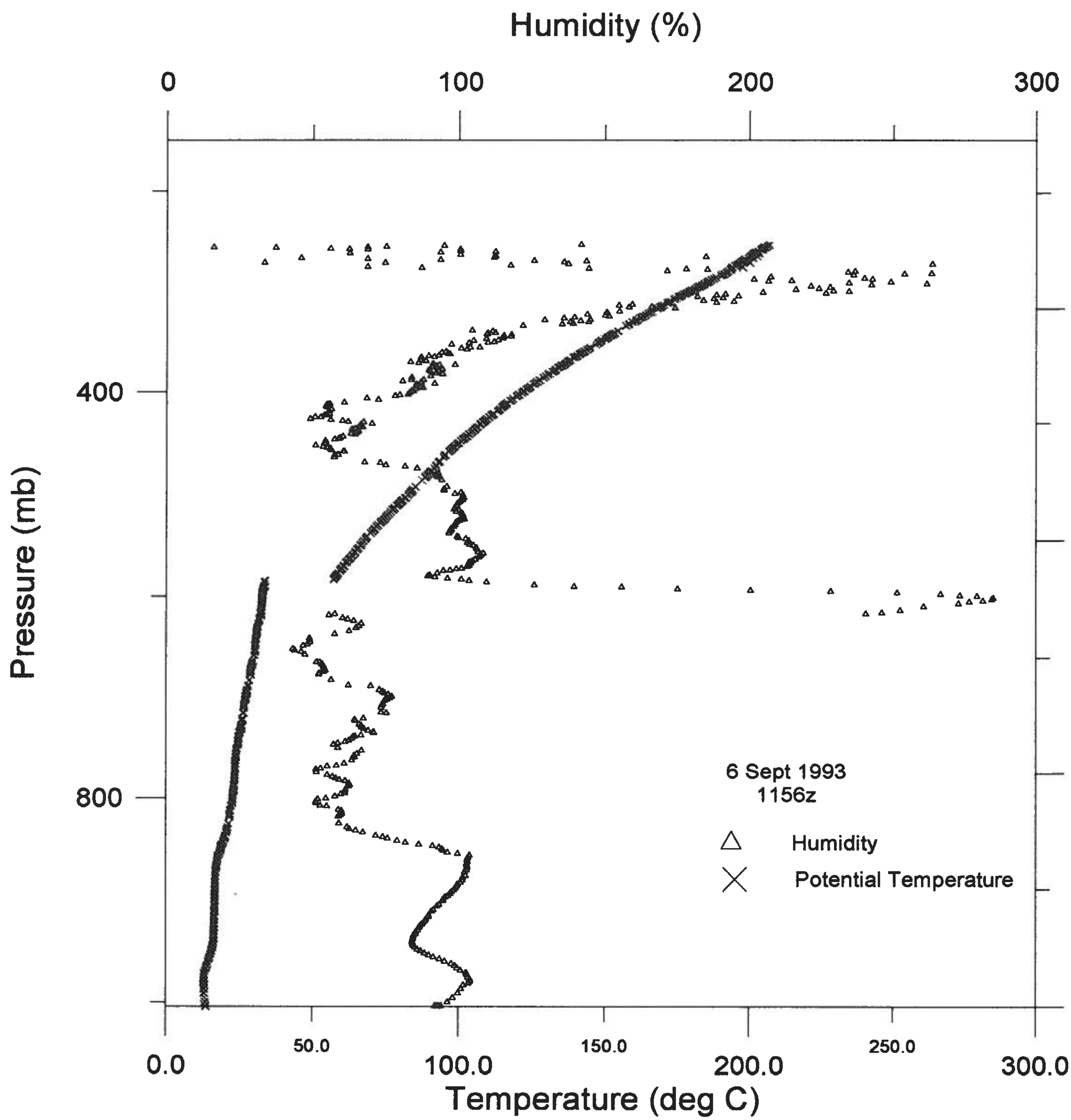

Humidity (%)
0
100
200
300
400
800
Pressure (mb)
12.0
8.0
4.0
0.0
Height (km)
5 Sept 1993
0049z
Humidity
Potential Temperature
0.0
50.0
100.0
150.0
200.0
250.0
300.0
Temperature (deg C)

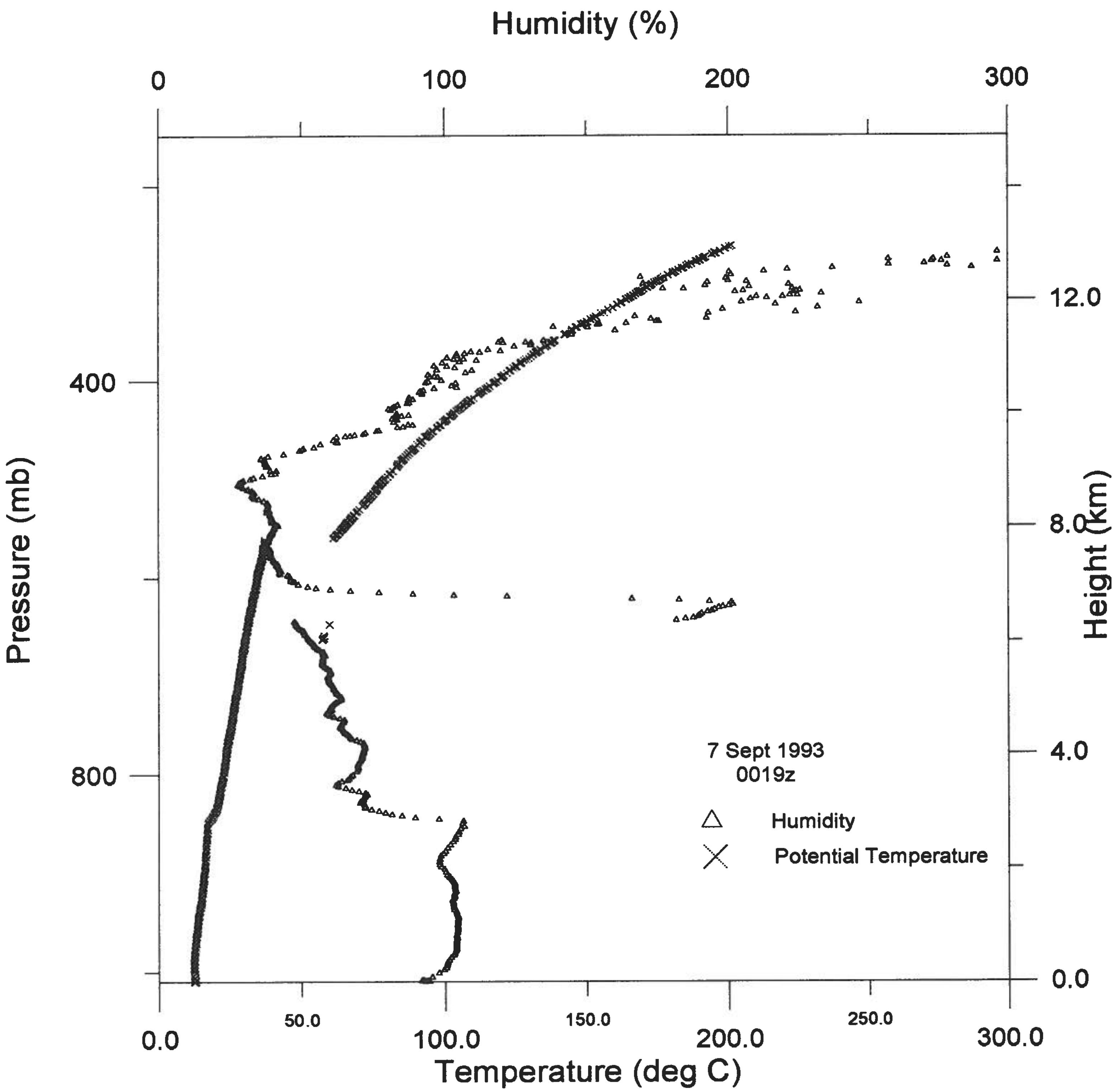

Humidity (%)
0
100
200
300
Pressure (mb)
400
800
Height (km)
12.0
8.0
4.0
0.0
5 Sept 1993
0139z
Humidity
Potential Temperature
0.0
50.0
100.0
150.0
200.0
250.0
300.0
Temperature (deg C)

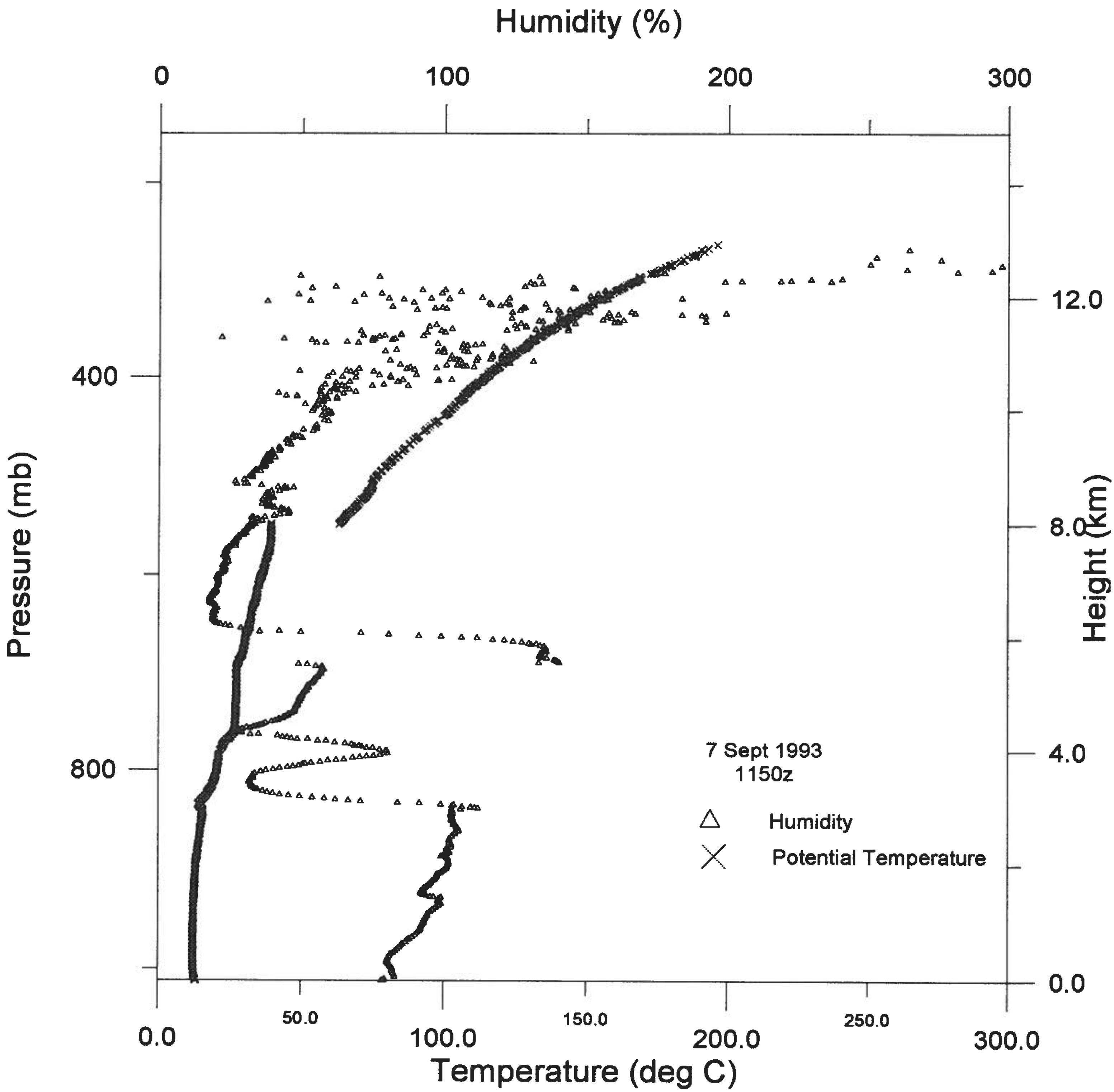


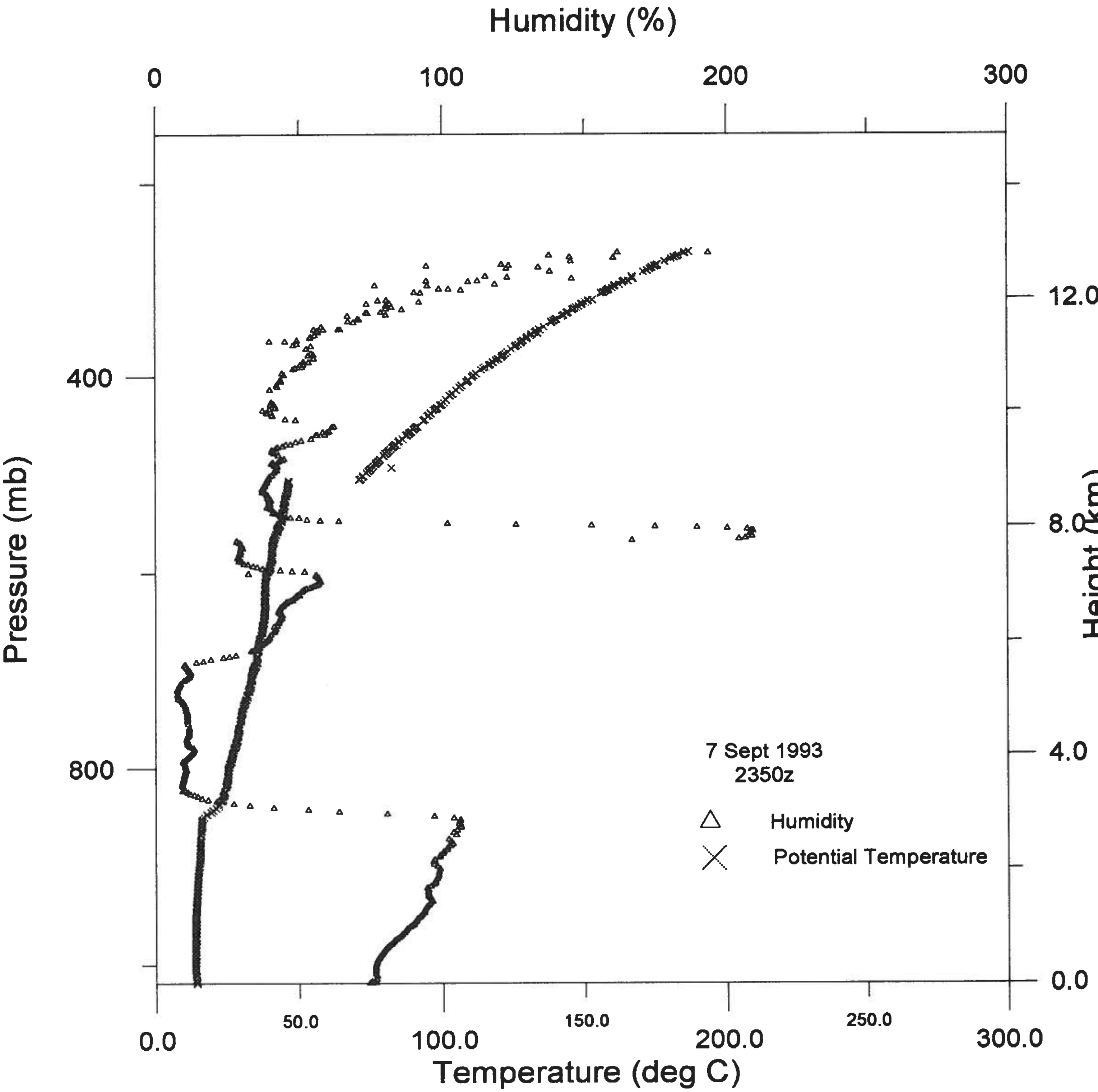
Humidity (%)
0
100
200
300
Pressure (mb)
400
800
Height (km)
12.0
8.0
4.0
0.0
5 Sept 1993
1154z
Humidity
Potential Temperature
0.0
50.0
100.0
150.0
200.0
250.0
300.0
Temperature (deg C)

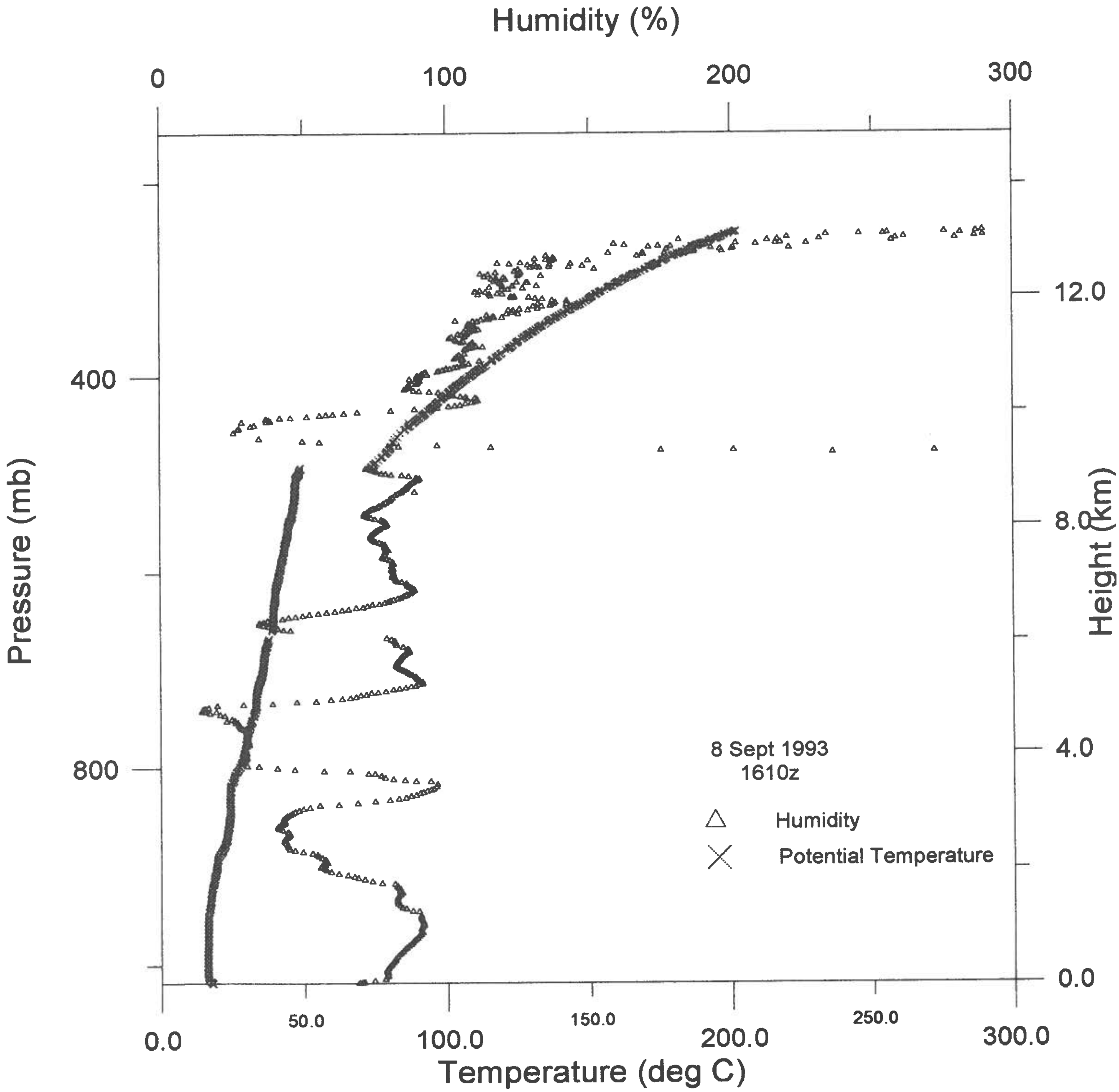

Humidity (%)
0
100
200
300
400
800
Pressure (mb)
12.0
8.0
4.0
0.0
Height (km)
6 Sept 1993
0038z
Humidity
Potential Temperature
0.0
50.0
100.0
150.0
200.0
250.0
300.0
Temperature (deg C)

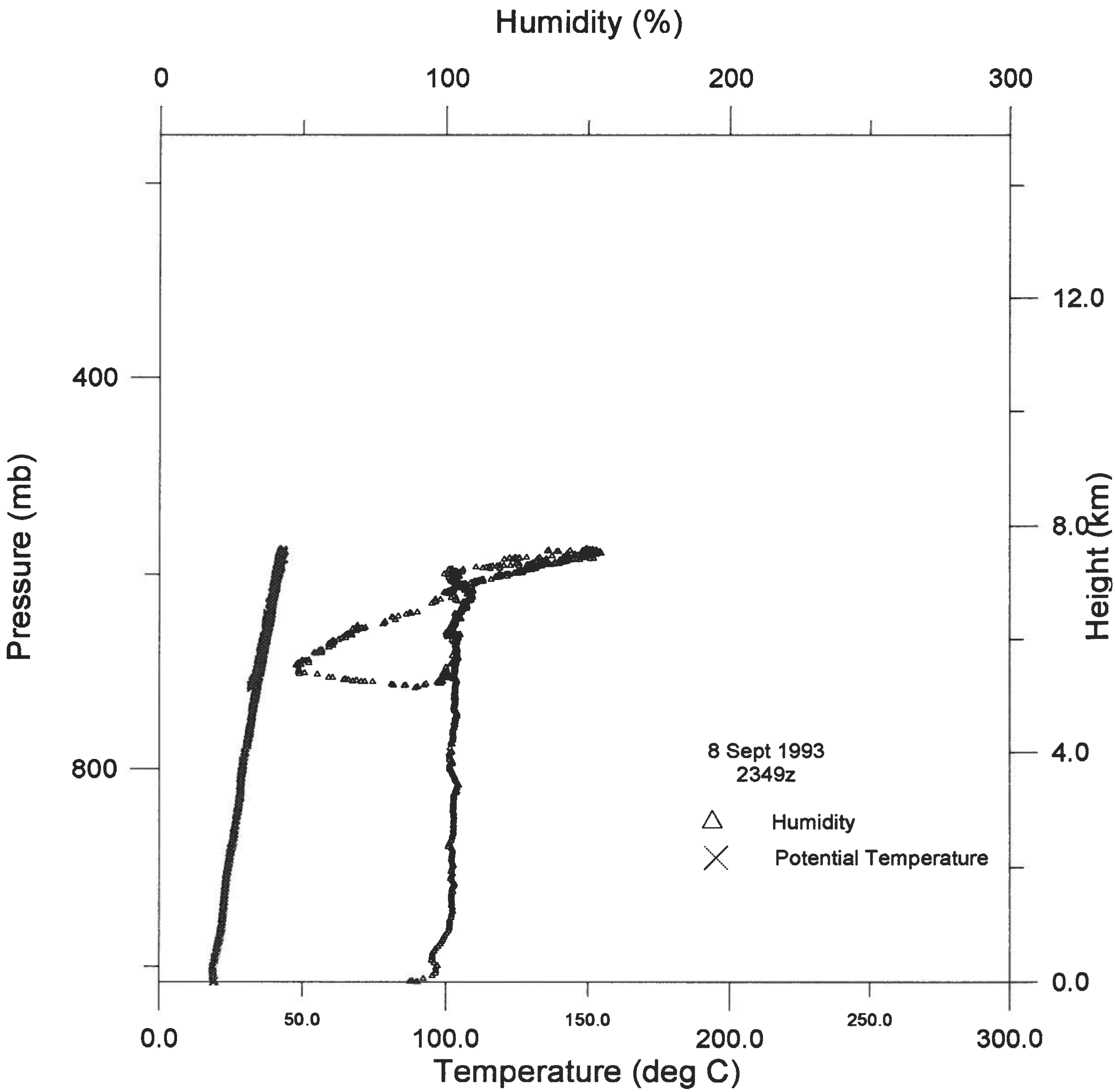

Humidity (%)
0
100
200
300
Pressure (mb)
400
800
Height (km)
12.0
8.0
4.0
0.0
6 Sept 1993
1156z
Humidity
Potential Temperature
0.0
50.0
100.0
150.0
200.0
250.0
300.0
Temperature (deg C)

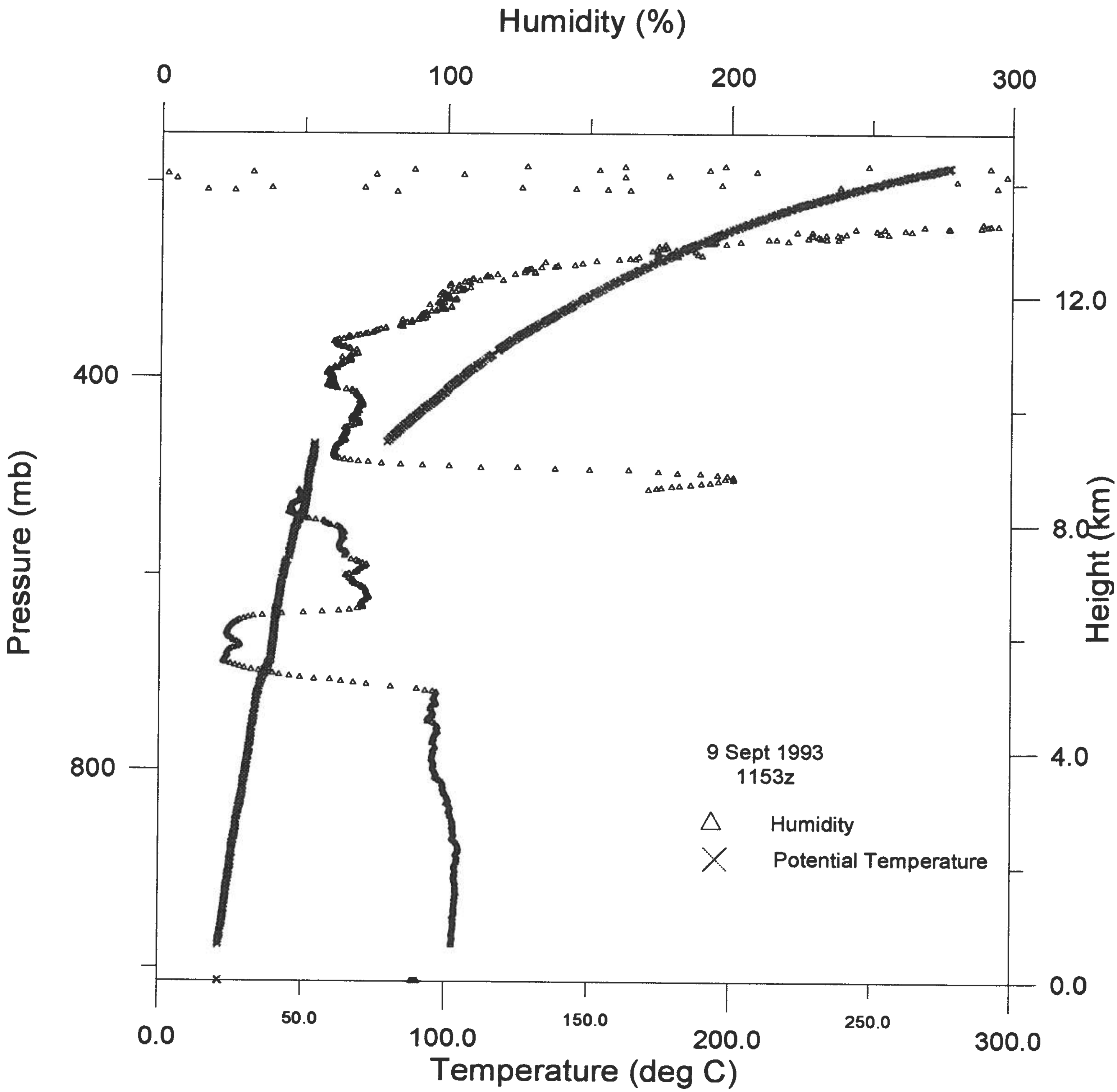

Humidity (%)
0
100
200
300
Pressure (mb)
400
800
Height (km)
12.0
8.0
4.0
0.0
0.0
50.0
100.0
150.0
200.0
250.0
300.0
Temperature (deg C)
7 Sept 1993
0019z
Humidity
Potential Temperature


Humidity (%)
0
100
200
300
Pressure (mb)
400
800
Height (km)
12.0
8.0
4.0
0.0
7 Sept 1993
1150z
Humidity
Potential Temperature
0.0
50.0
100.0
150.0
200.0
250.0
300.0
Temperature (deg C)

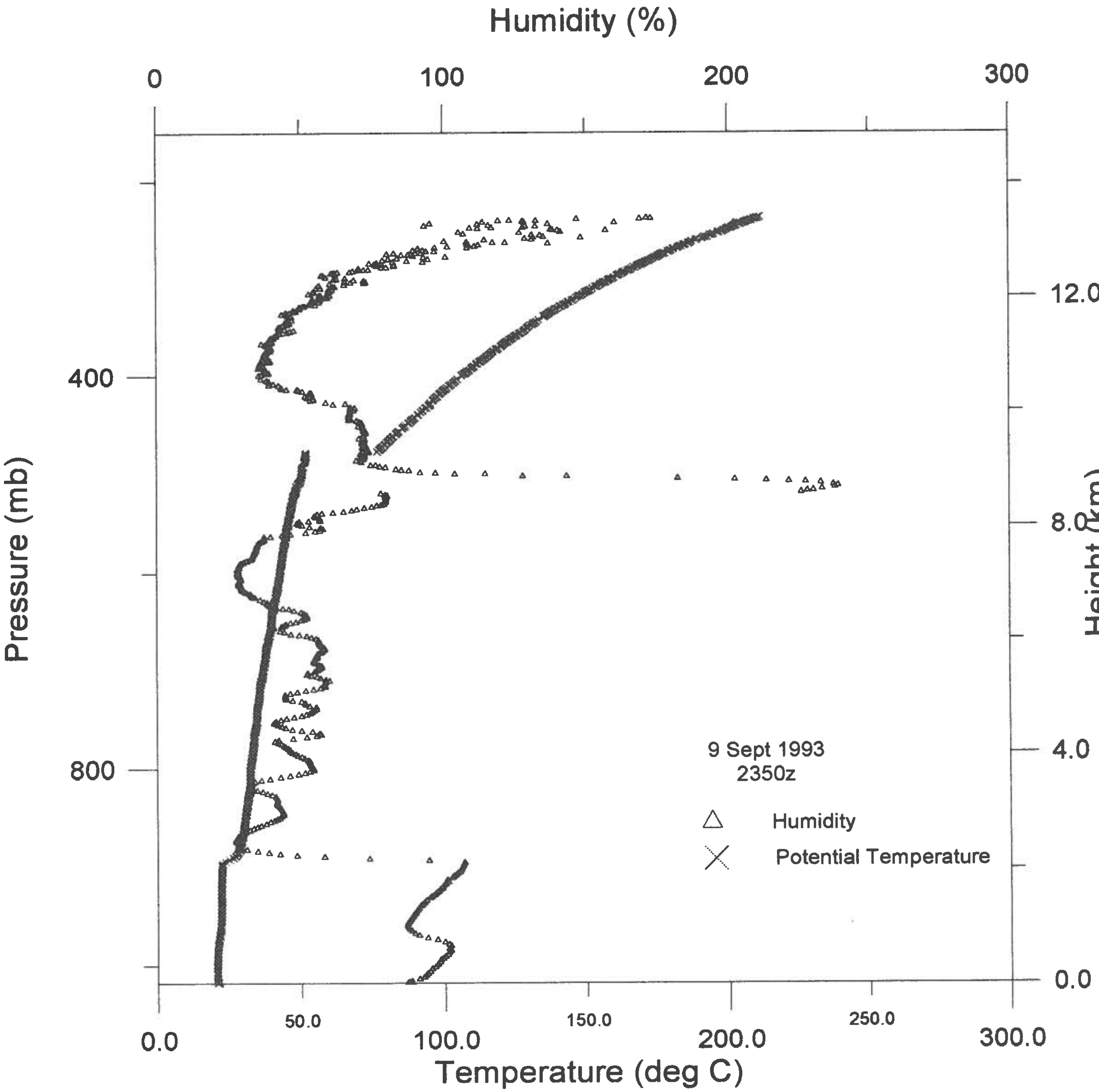

Humidity (%)
0
100
200
300
400
800
Pressure (mb)
12.0
8.0
4.0
0.0
Height (km)
7 Sept 1993
2350z
Humidity
Potential Temperature
0.0
50.0
100.0
150.0
200.0
250.0
300.0
Temperature (deg C)

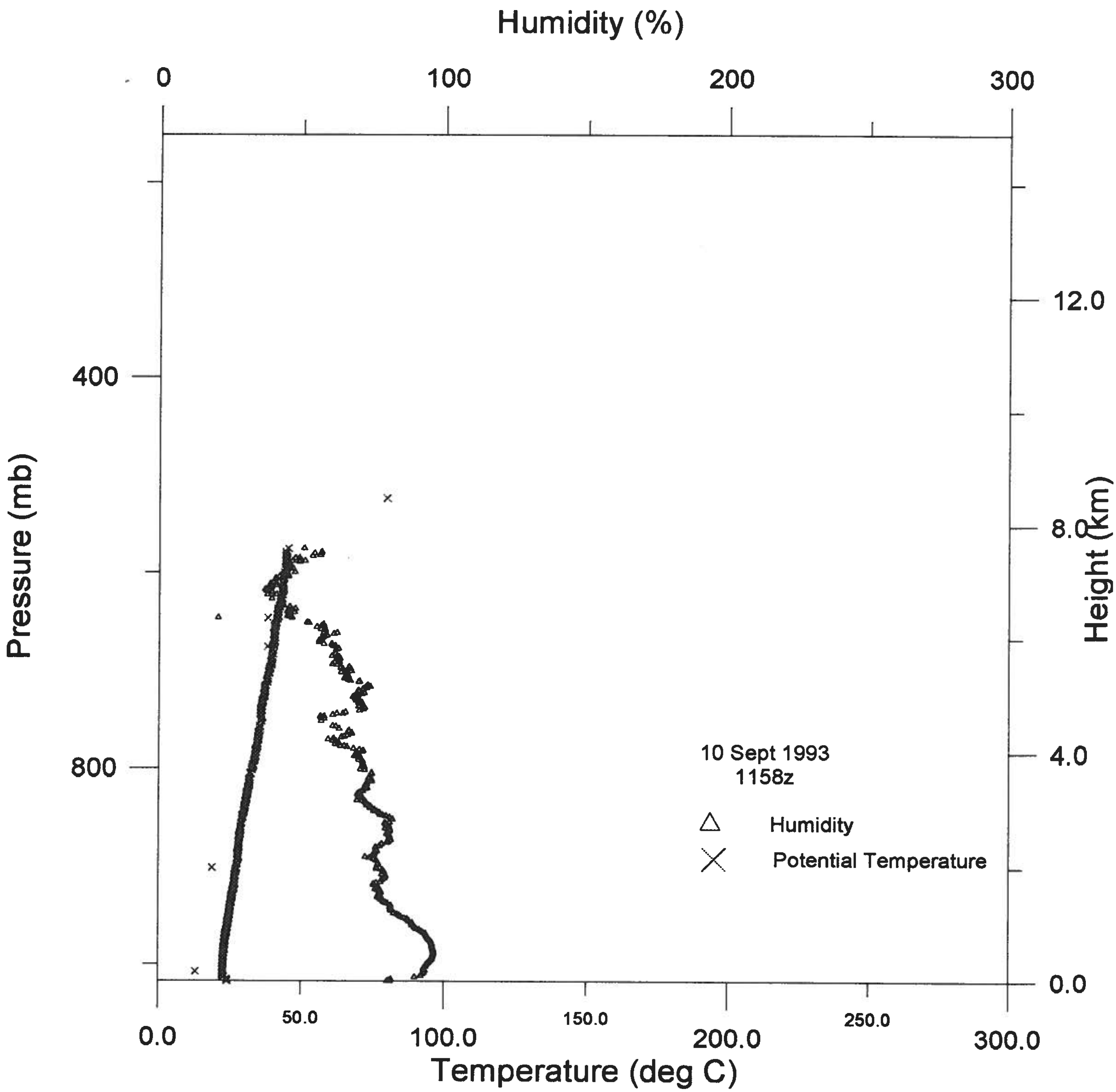

Humidity (%)
0
100
200
300
Pressure (mb)
400
800
Height (km)
12.0
8.0
4.0
0.0
8 Sept 1993
1610z
Humidity
Potential Temperature
0.0
50.0
100.0
150.0
200.0
250.0
300.0
Temperature (deg C)


Humidity (%)
0
100
200
300
400
800
Pressure (mb)
12.0
8.0
4.0
0.0
Height (km)
8 Sept 1993
2349z
Humidity
Potential Temperature
0.0
50.0
100.0
150.0
200.0
250.0
300.0
Temperature (deg C)

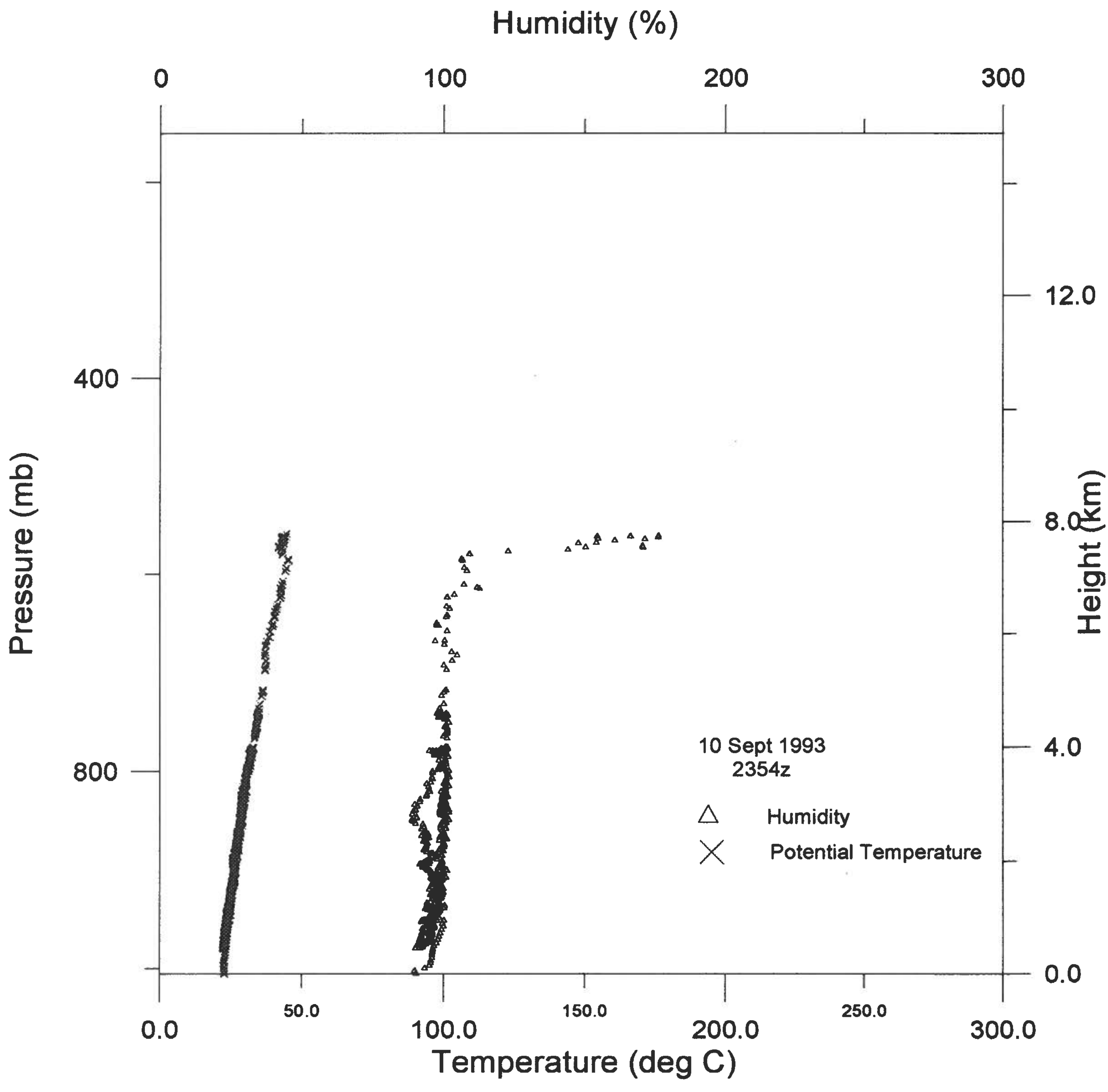


Humidity (%)
0
100
200
300
Pressure (mb)
400
800
Height (km)
12.0
8.0
4.0
0.0
9 Sept 1993
1153z
Humidity
Potential Temperature
0.0
50.0
100.0
150.0
200.0
250.0
300.0
Temperature (deg C)

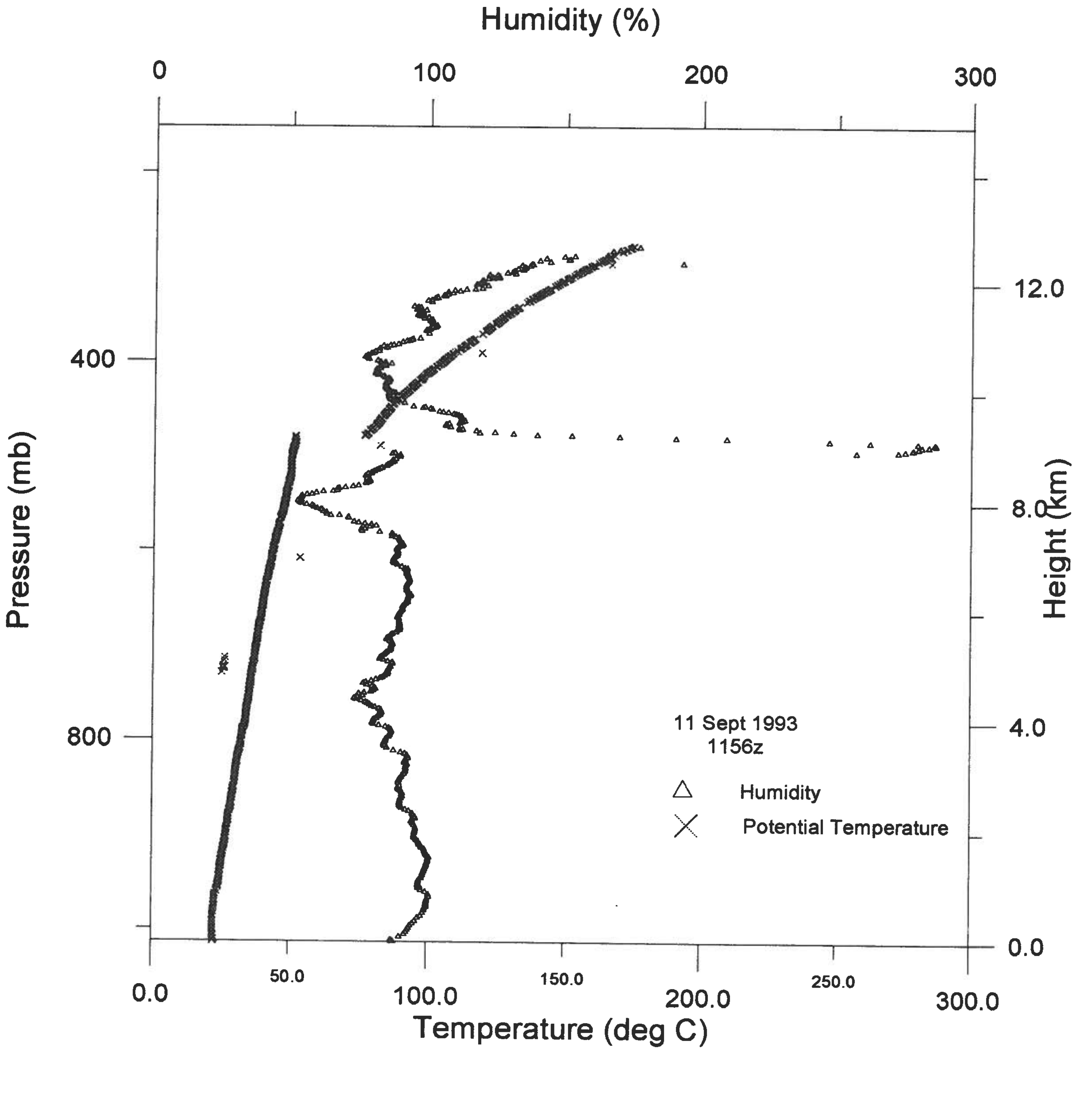

Humidity (%)
0
100
200
300
400
800
Pressure (mb)
12.0
8.0
4.0
0.0
Height (km)
9 Sept 1993
2350z
Humidity
Potential Temperature
0.0
50.0
100.0
150.0
200.0
250.0
300.0
Temperature (deg C)

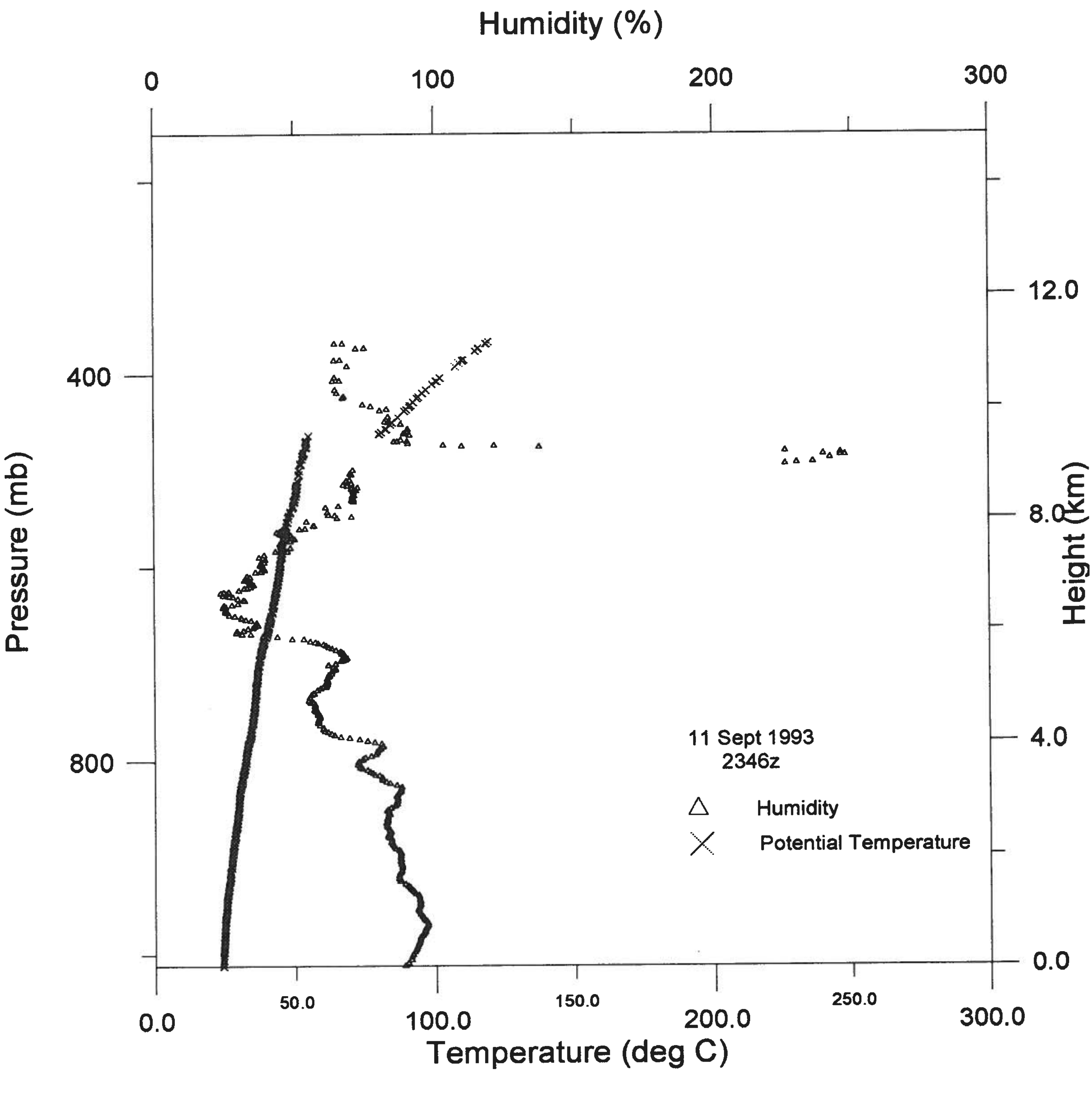


Humidity (%)
0
100
200
300
400
800
Pressure (mb)
12.0
8.0
4.0
0.0
Height (km)
10 Sept 1993
1158z
Humidity
Potential Temperature
0.0
50.0
100.0
150.0
200.0
250.0
300.0
Temperature (deg C)

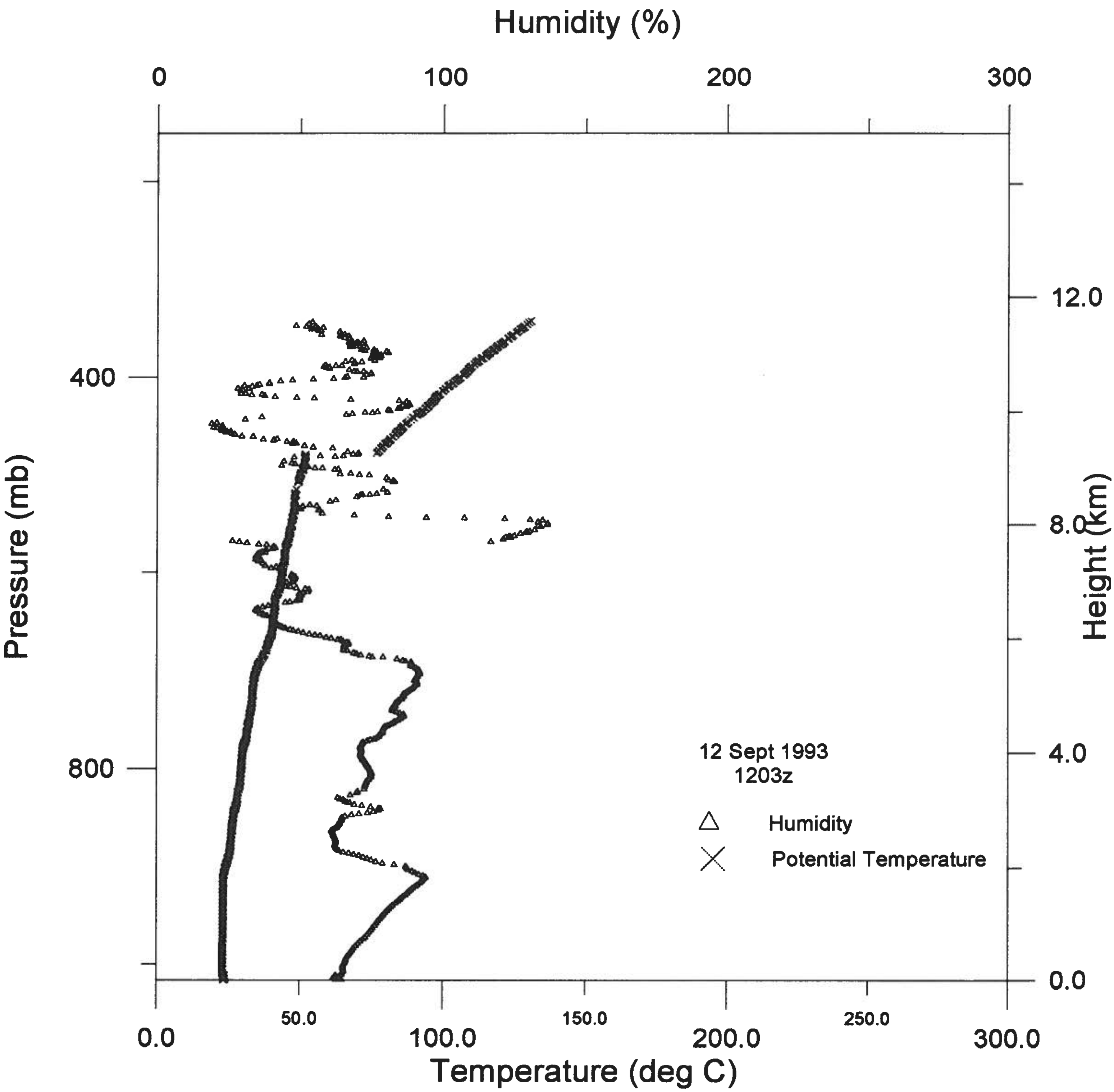


Humidity (%)
0
100
200
300
400
800
Pressure (mb)
12.0
8.0
4.0
0.0
Height (km)
10 Sept 1993
2354z
Humidity
Potential Temperature
0.0
50.0
100.0
150.0
200.0
250.0
300.0
Temperature (deg C)

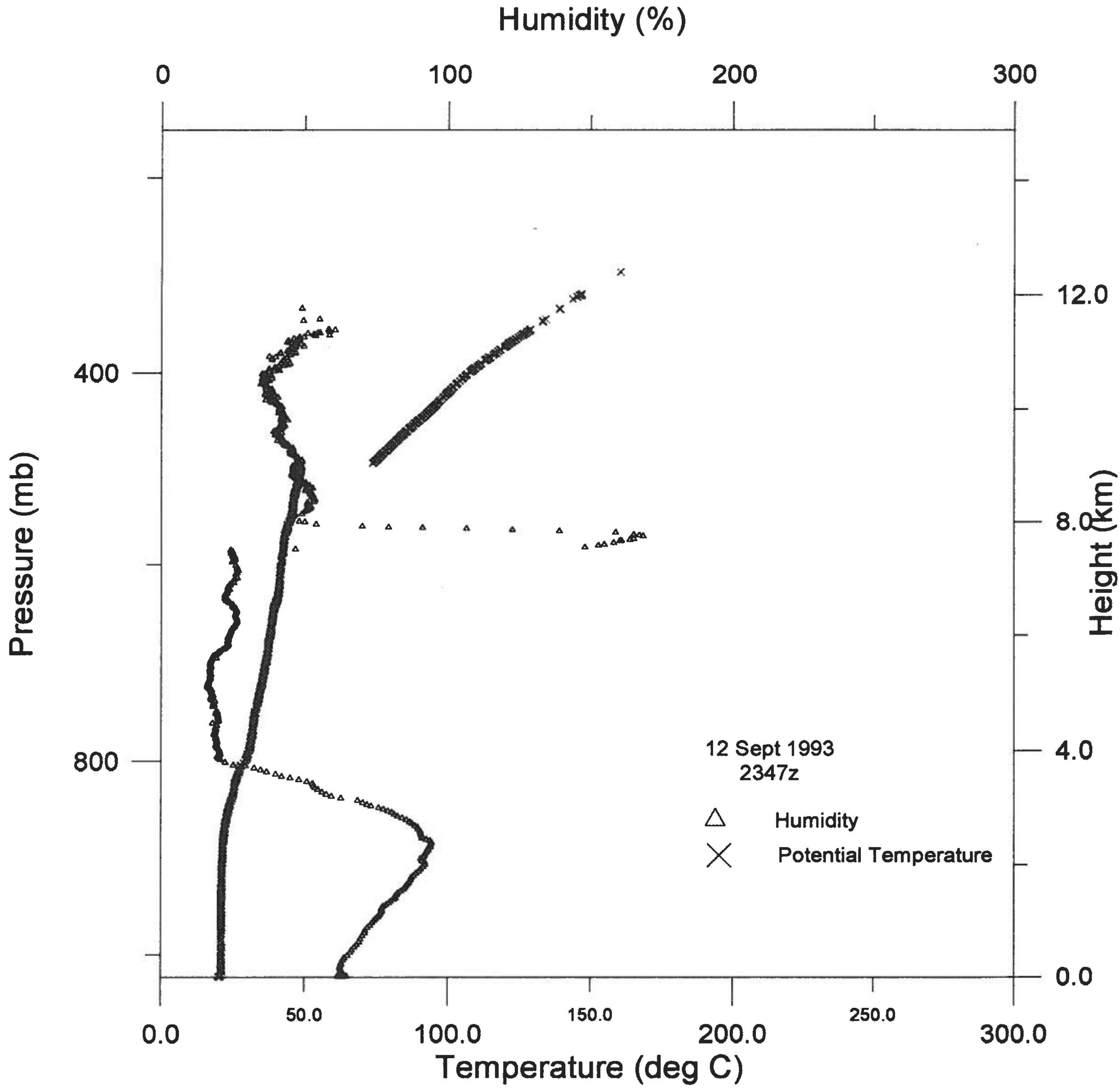

Humidity (%)
0
100
200
300
400
800
Pressure (mb)
12.0
8.0
4.0
0.0
Height (km)
11 Sept 1993
1156z
Humidity
Potential Temperature
0.0
50.0
100.0
150.0
200.0
250.0
300.0
Temperature (deg C)

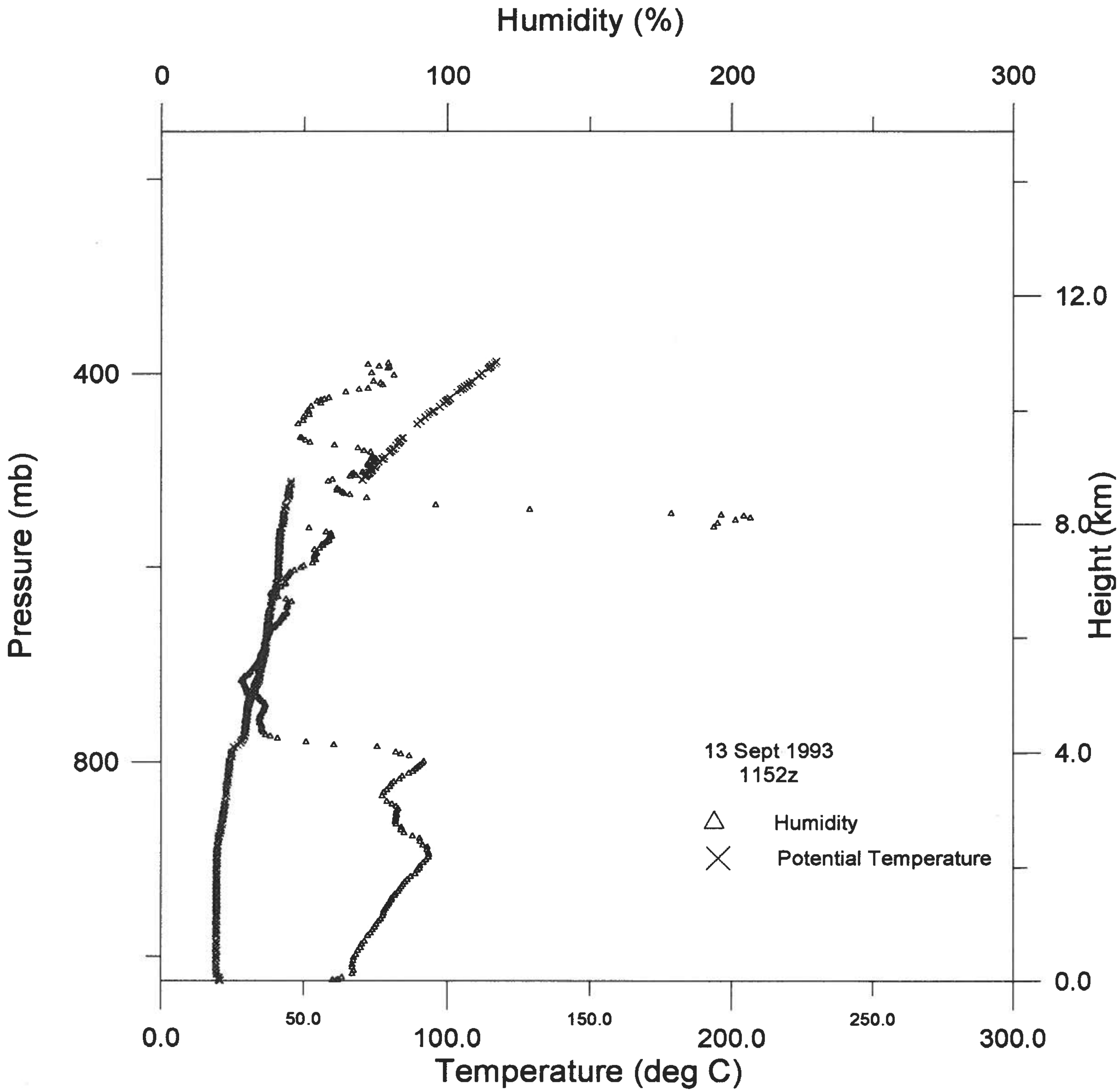


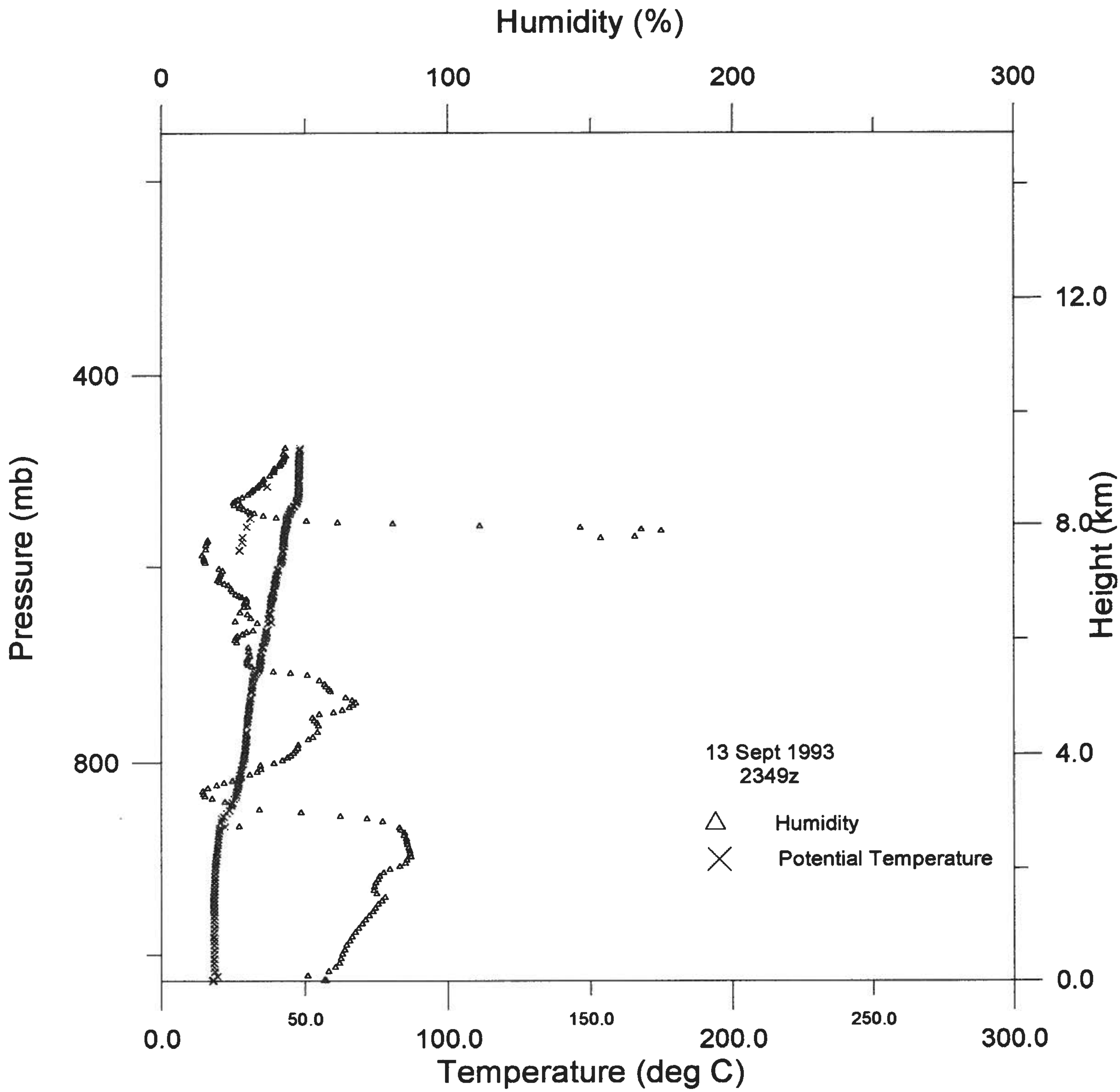
Humidity (%)
0
100
200
300
Pressure (mb)
400
800
Height (km)
12.0
8.0
4.0
0.0
11 Sept 1993
2346z
Humidity
Potential Temperature
0.0
50.0
100.0
150.0
200.0
250.0
300.0
Temperature (deg C)



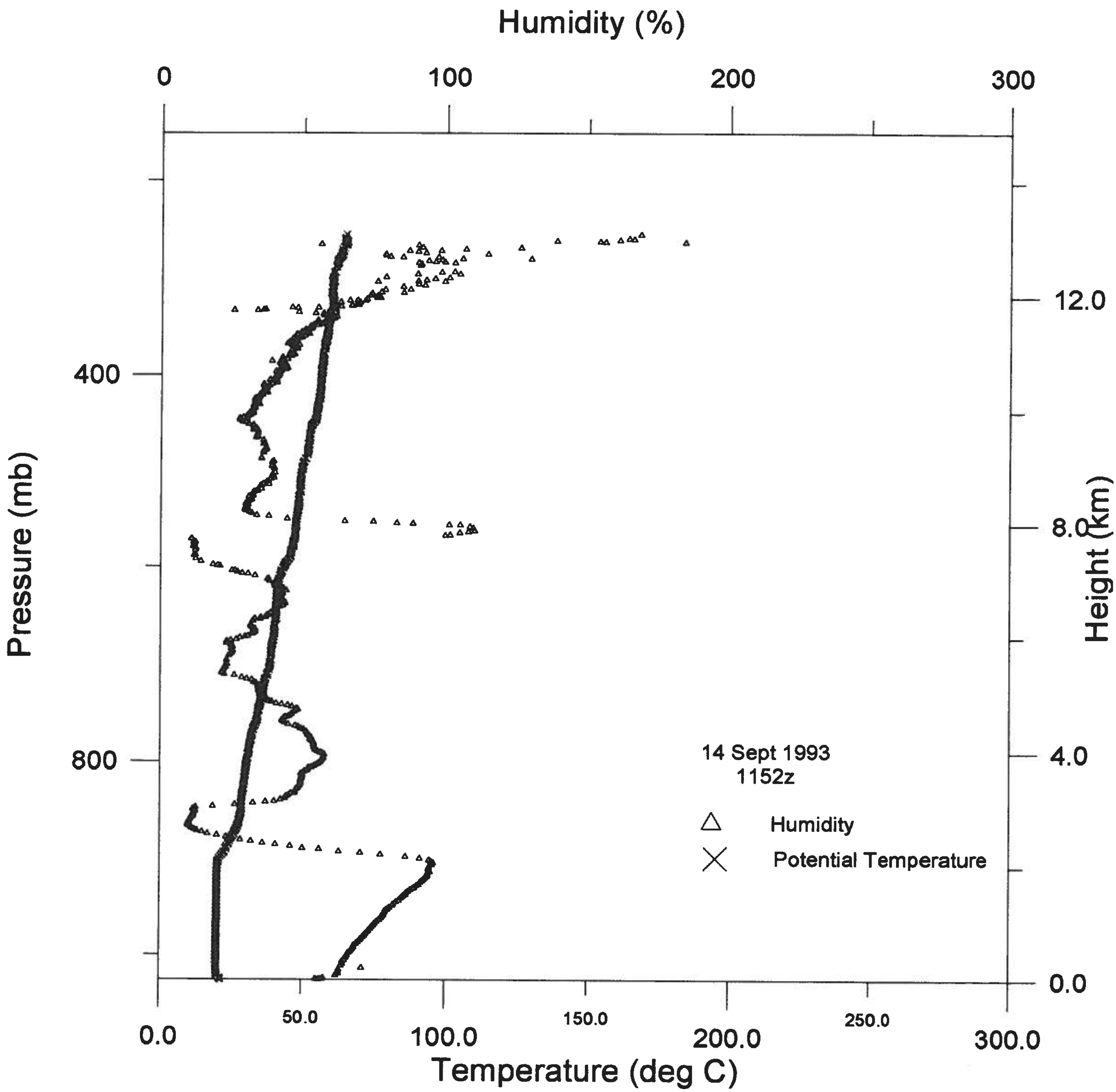
Humidity (%)
0
100
200
300
Pressure (mb)
400
800
Height (km)
12.0
8.0
4.0
0.0
12 Sept 1993
1203z
Humidity
Potential Temperature
0.0
50.0
100.0
150.0
200.0
250.0
300.0
Temperature (deg C)

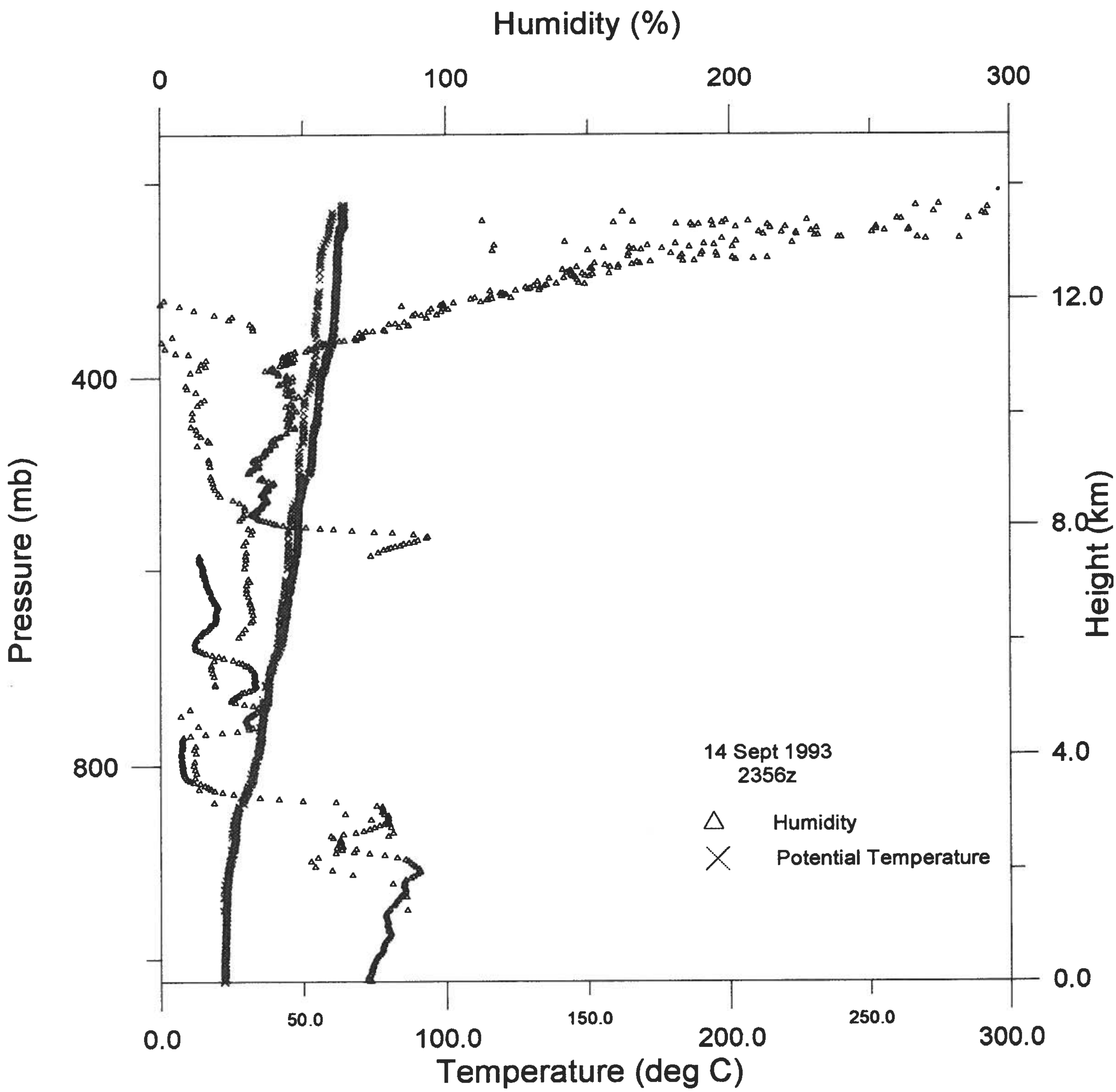

Humidity (%)
0
100
200
300
Pressure (mb)
400
800
Height (km)
12.0
8.0
4.0
0.0
12 Sept 1993
2347z
Humidity
Potential Temperature
0.0
50.0
100.0
150.0
200.0
250.0
300.0
Temperature (deg C)


Humidity (%)
0
100
200
300
Pressure (mb)
400
800
Height (km)
12.0
8.0
4.0
0.0
13 Sept 1993
1152z
Humidity
Potential Temperature
0.0
50.0
100.0
150.0
200.0
250.0
300.0
Temperature (deg C)

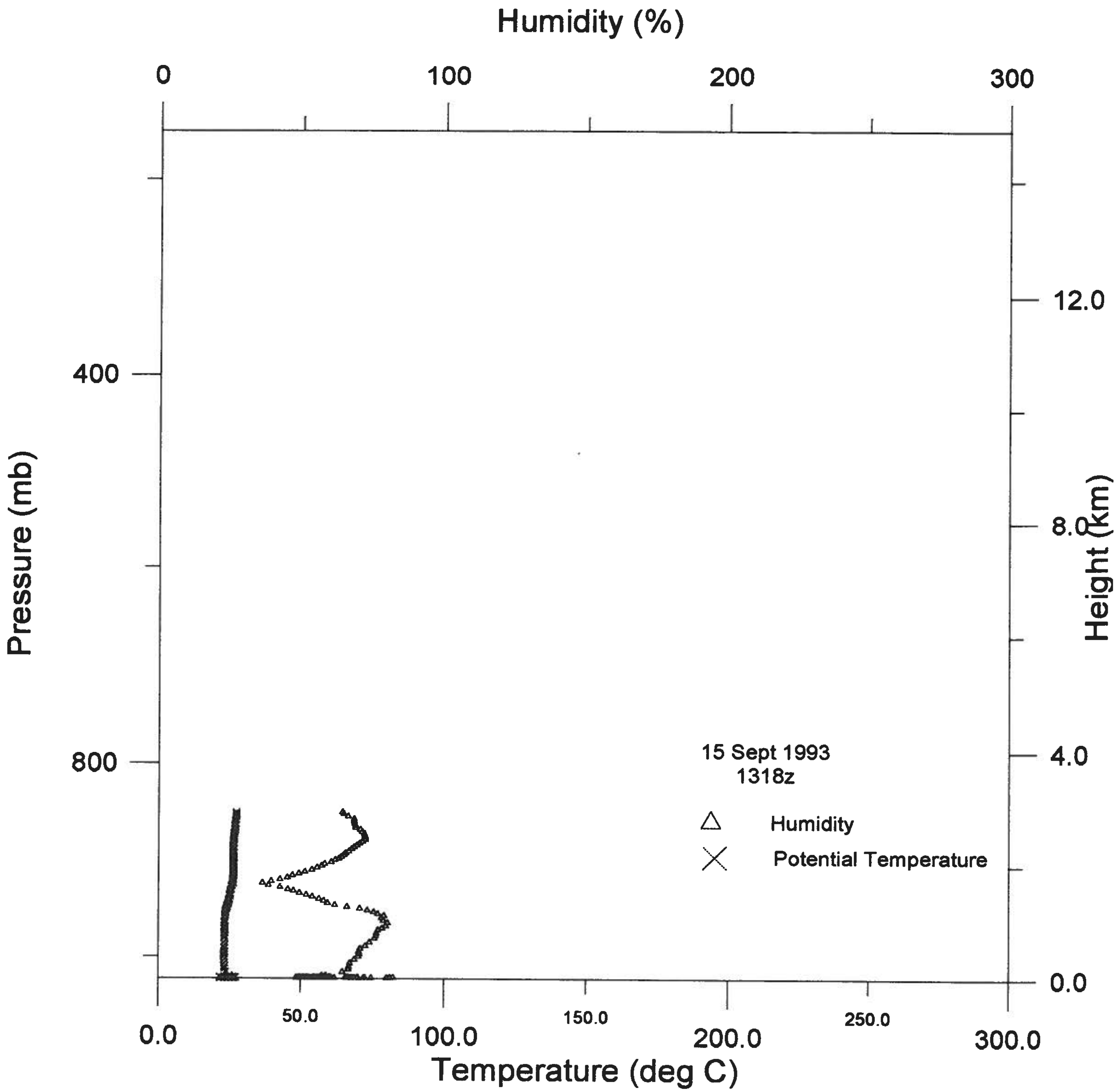


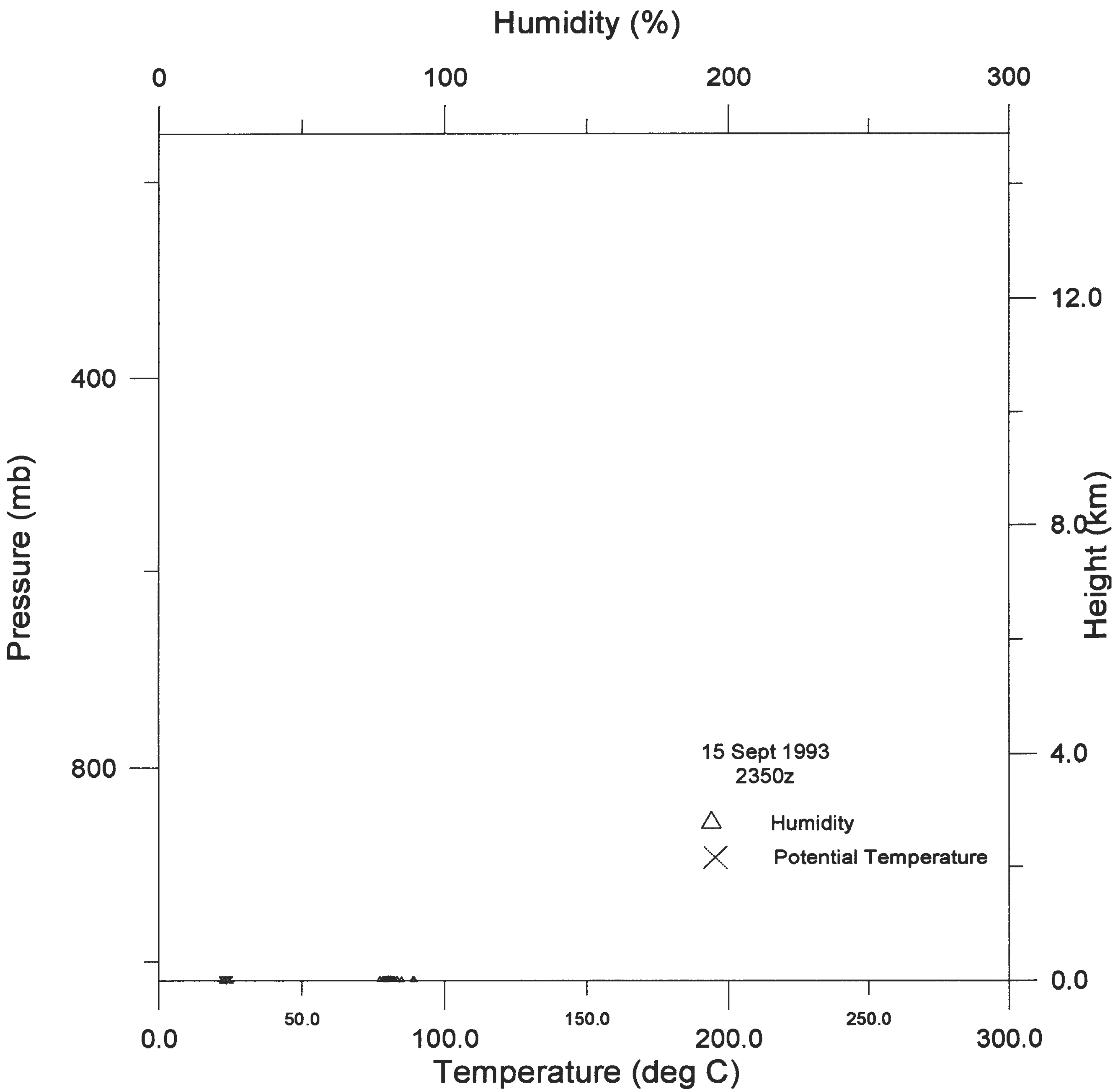
Humidity (%)
0
100
200
300
Pressure (mb)
400
800
Height (km)
12.0
8.0
4.0
0.0
13 Sept 1993
2349z
Humidity
Potential Temperature
0.0
50.0
100.0
150.0
200.0
250.0
300.0
Temperature (deg C)

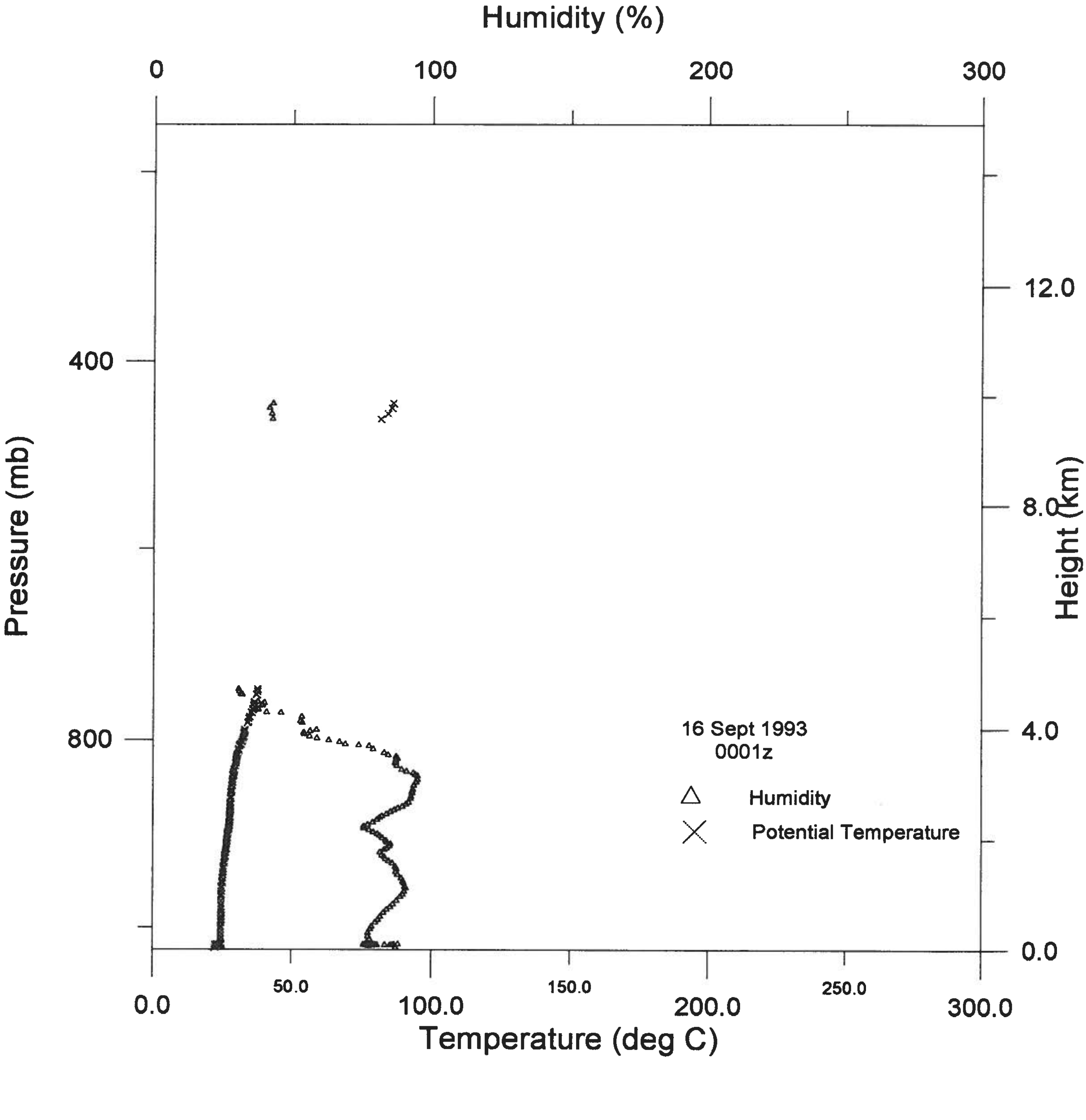

Humidity (%)
0
100
200
300
400
800
Pressure (mb)
12.0
8.0
4.0
0.0
Height (km)
14 Sept 1993
1152z
Humidity
Potential Temperature
0.0
50.0
100.0
150.0
200.0
250.0
300.0
Temperature (deg C)

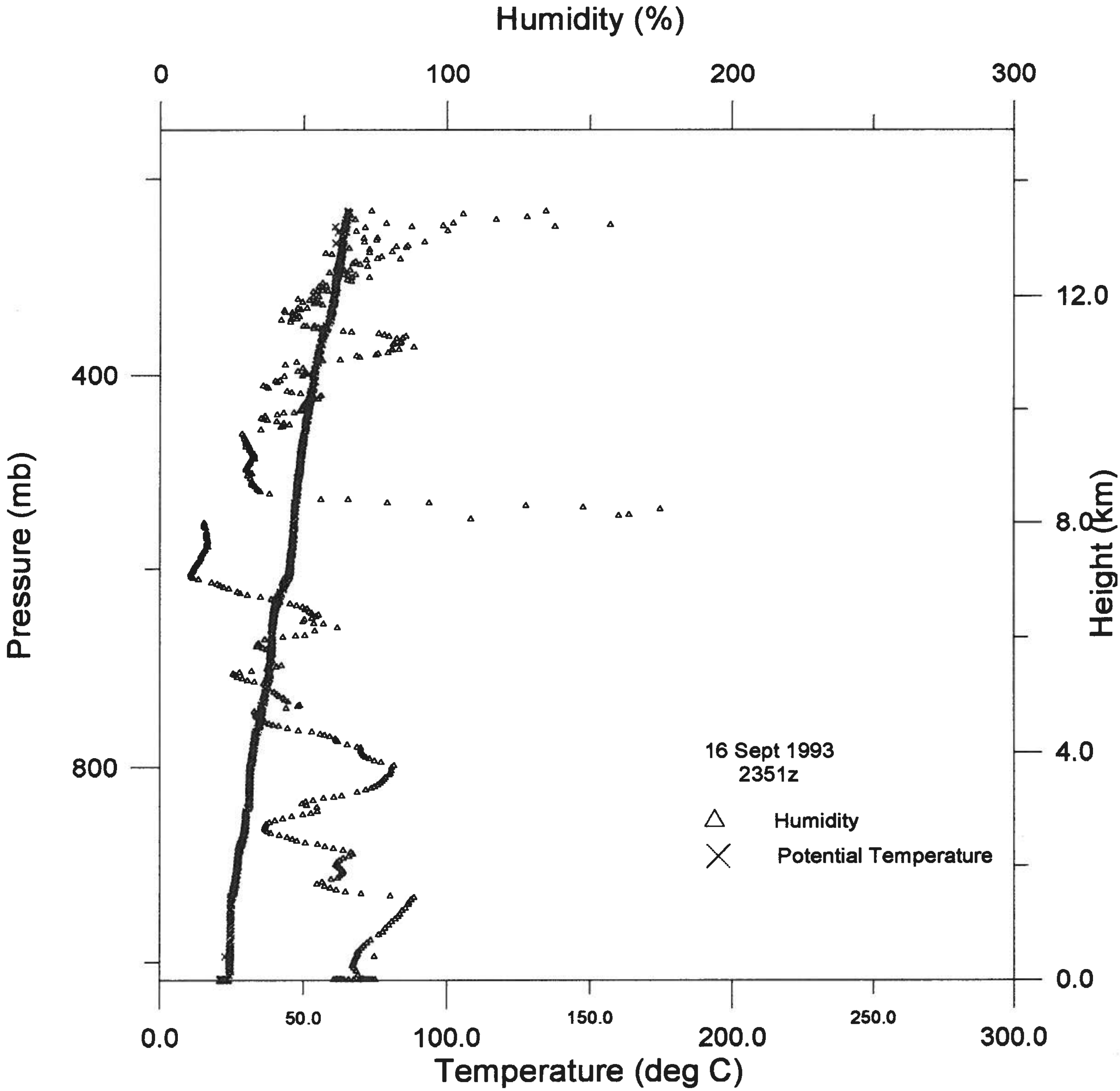


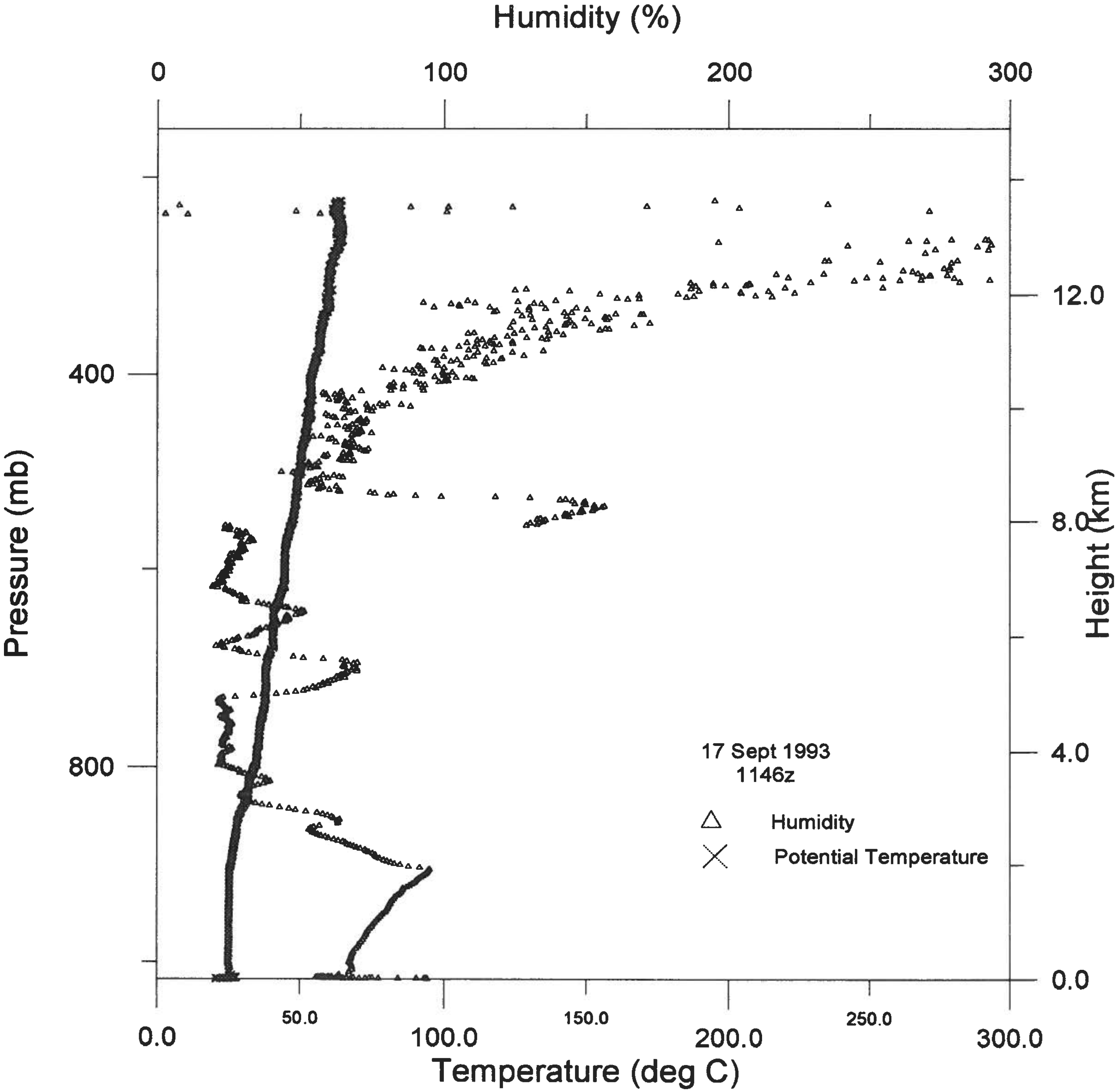
Humidity (%)
0
100
200
300
Pressure (mb)
400
800
Height (km)
12.0
8.0
4.0
0.0
14 Sept 1993
2356z
Humidity
Potential Temperature
0.0
50.0
100.0
150.0
200.0
250.0
300.0
Temperature (deg C)


Humidity (%)
0
100
200
300
Pressure (mb)
400
800
Height (km)
12.0
8.0
4.0
0.0
15 Sept 1993
1318z
Humidity
Potential Temperature
0.0
50.0
100.0
150.0
200.0
250.0
300.0
Temperature (deg C)

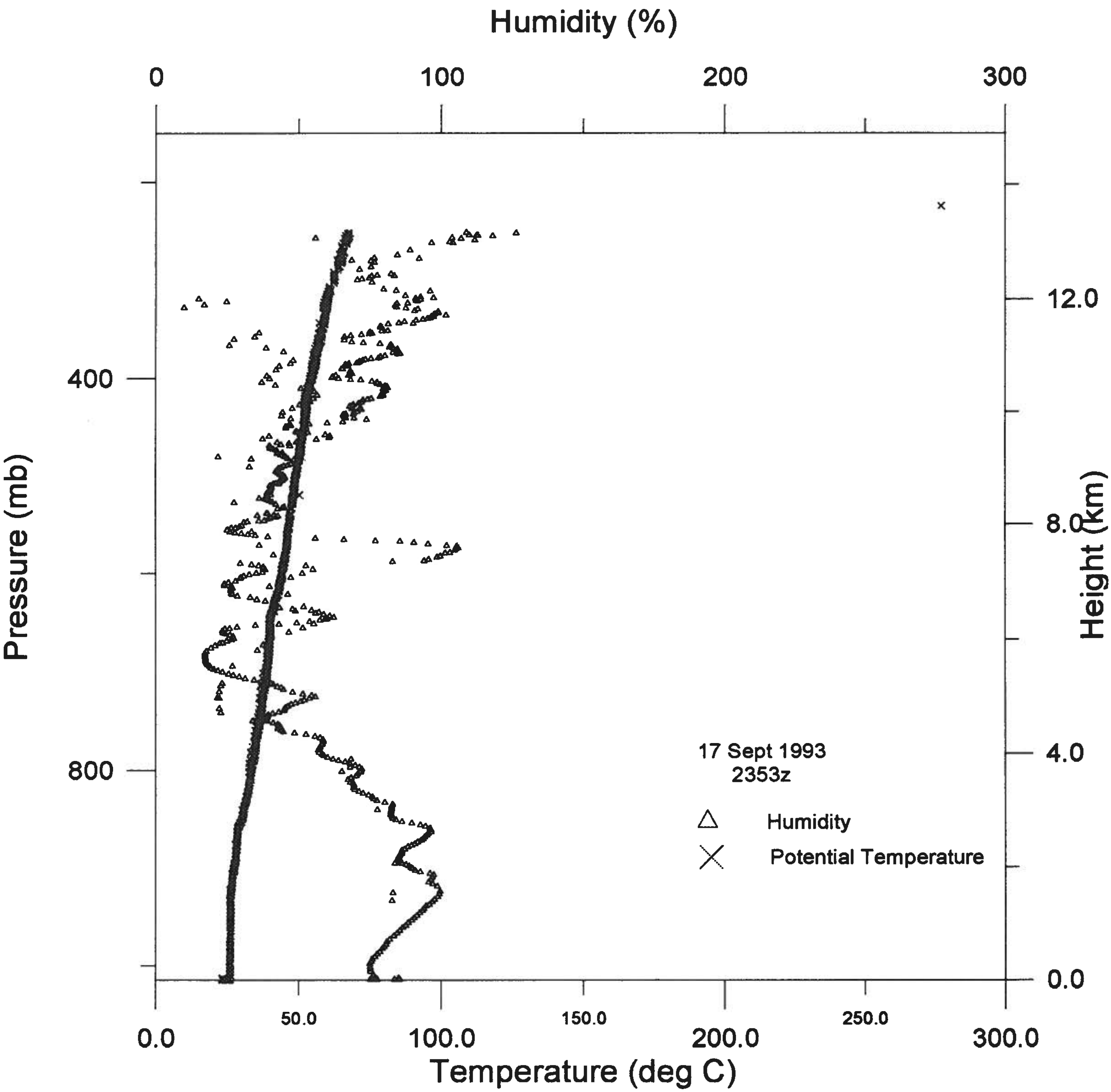

Humidity (%)
0
100
200
300
Pressure (mb)
400
800
Height (km)
12.0
8.0
4.0
0.0
15 Sept 1993
2350z
Humidity
Potential Temperature
0.0
50.0
100.0
150.0
200.0
250.0
300.0
Temperature (deg C)


Humidity (%)
0
100
200
300
400
800
Pressure (mb)
12.0
8.0
4.0
0.0
Height (km)
16 Sept 1993
0001z
Humidity
Potential Temperature
0.0
50.0
100.0
150.0
200.0
250.0
300.0
Temperature (deg C)

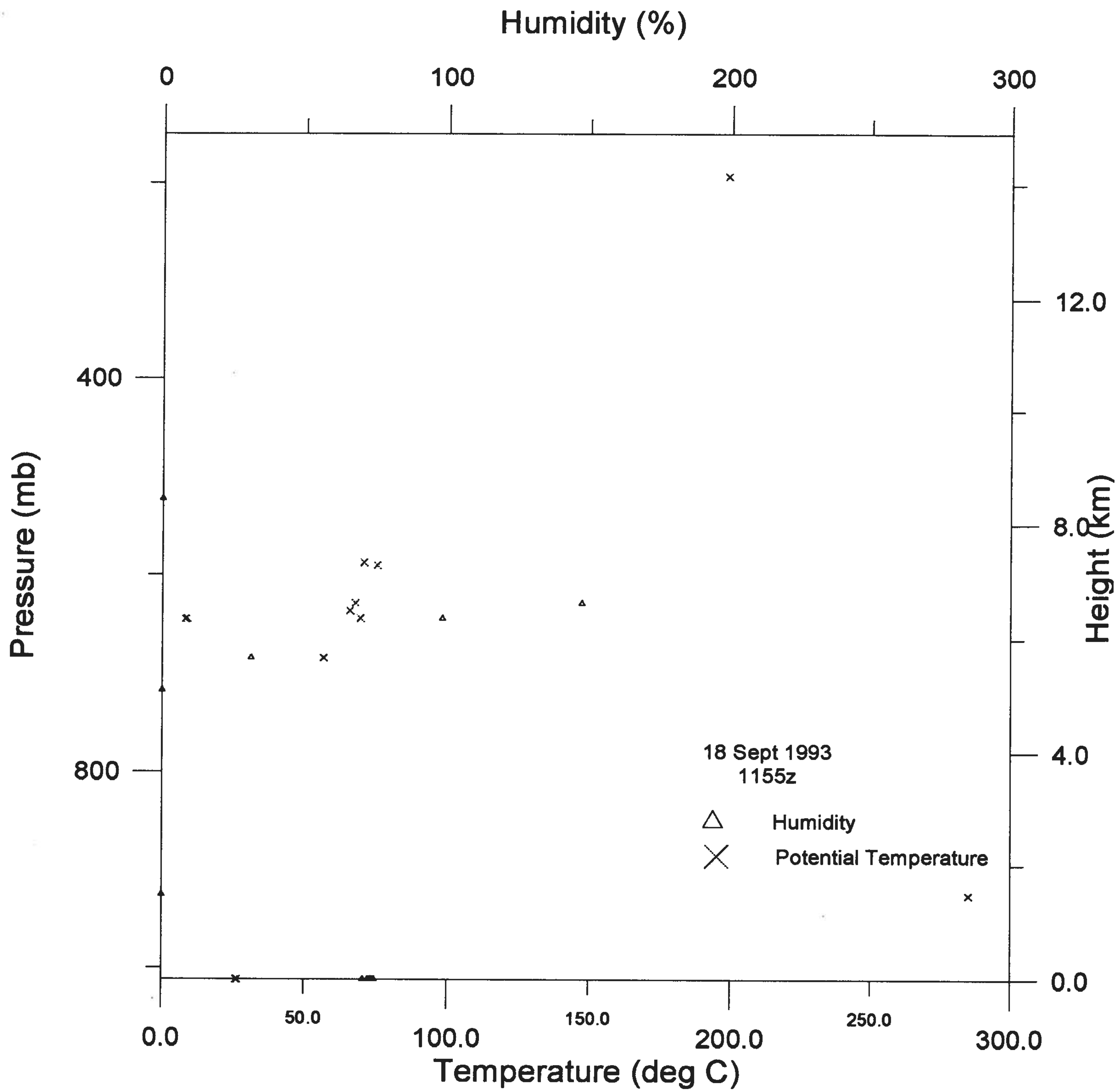

Humidity (%)
0
100
200
300
400
800
Pressure (mb)
12.0
8.0
4.0
0.0
Height (km)
16 Sept 1993
2351z
Humidity
Potential Temperature
0.0
50.0
100.0
150.0
200.0
250.0
300.0
Temperature (deg C)

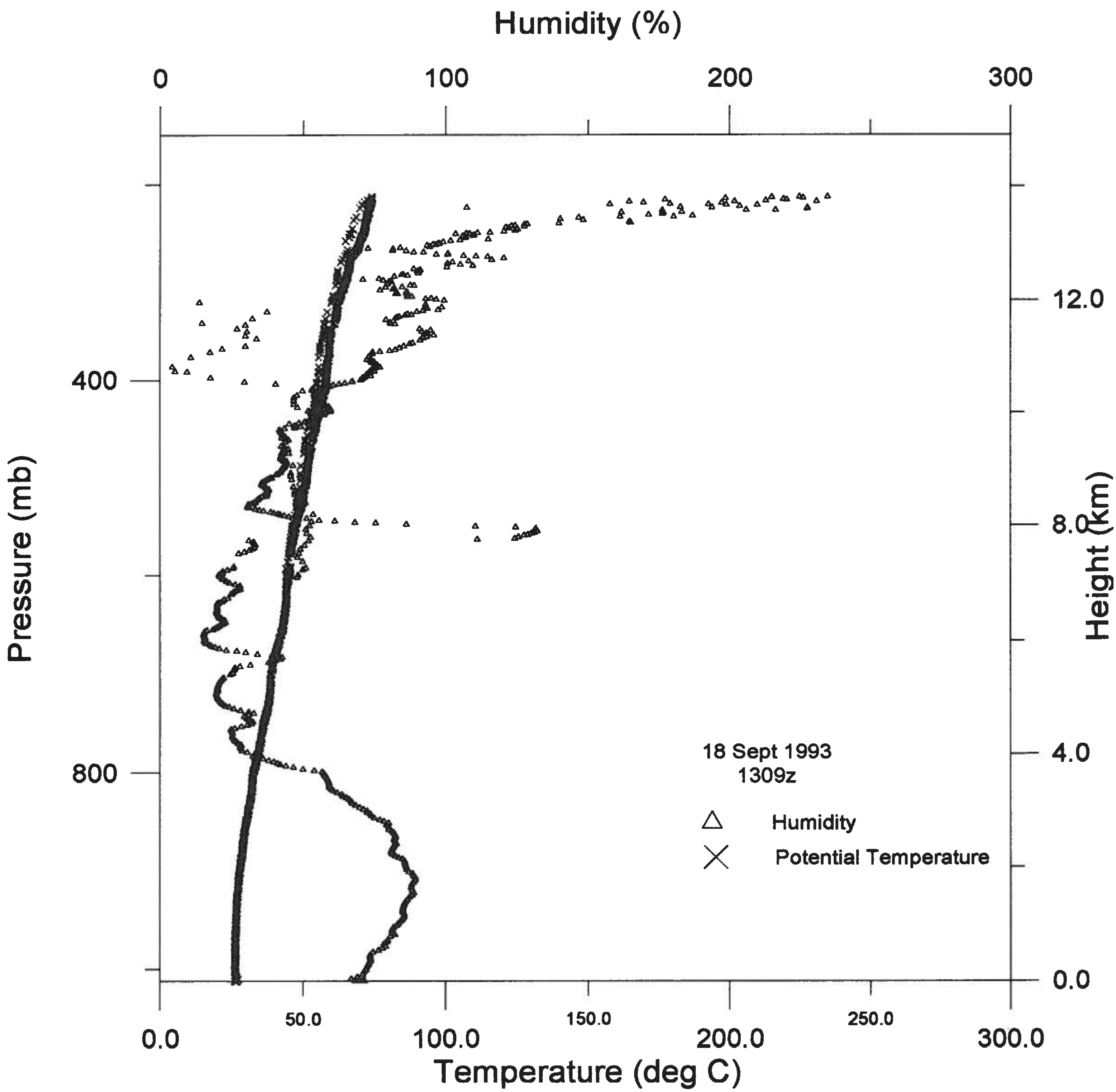


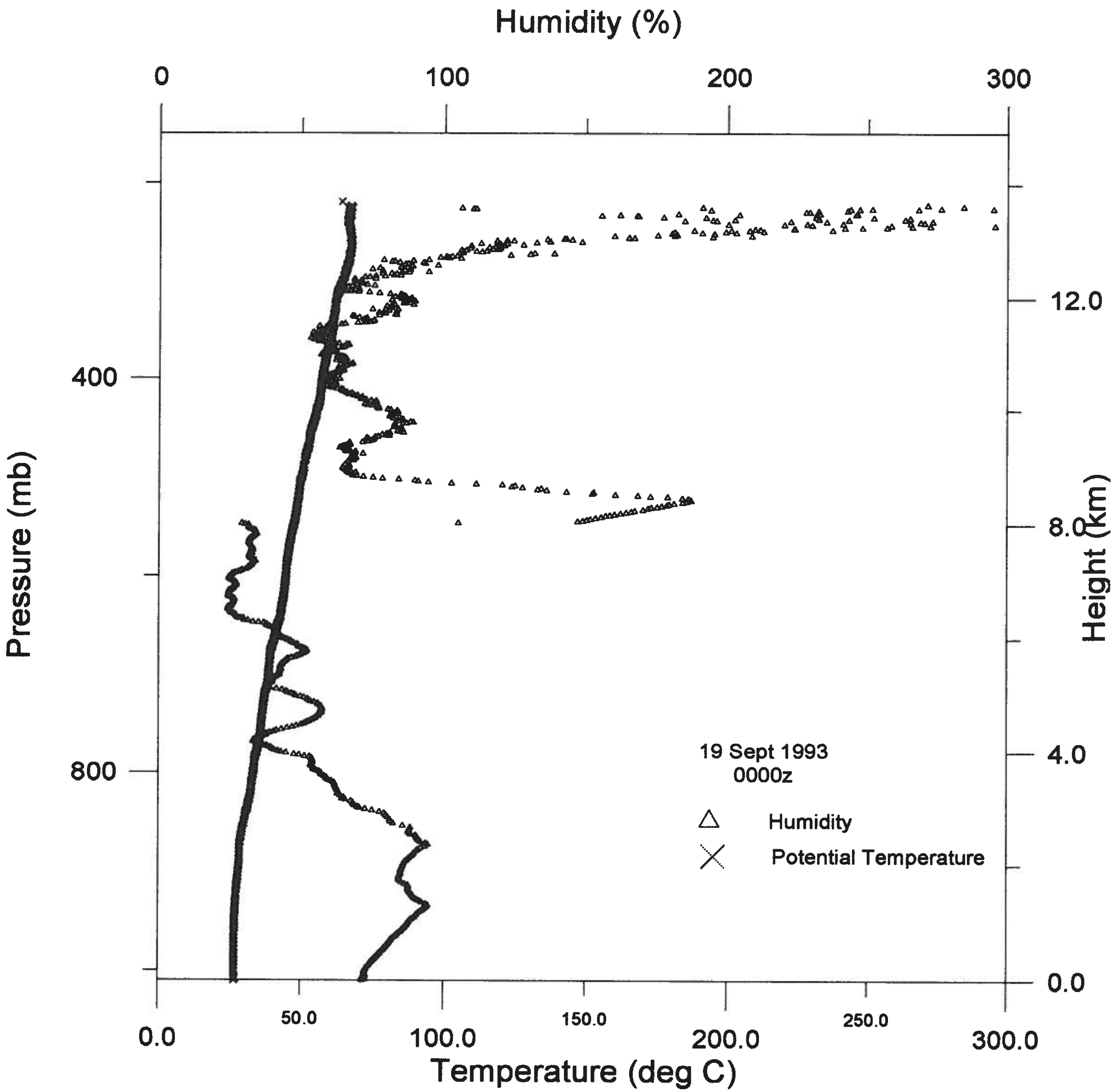
Humidity (%)
0
100
200
300
400
800
Pressure (mb)
12.0
8.0
4.0
0.0
Height (km)
17 Sept 1993
1146z
Humidity
Potential Temperature
0.0
50.0
100.0
150.0
200.0
250.0
300.0
Temperature (deg C)

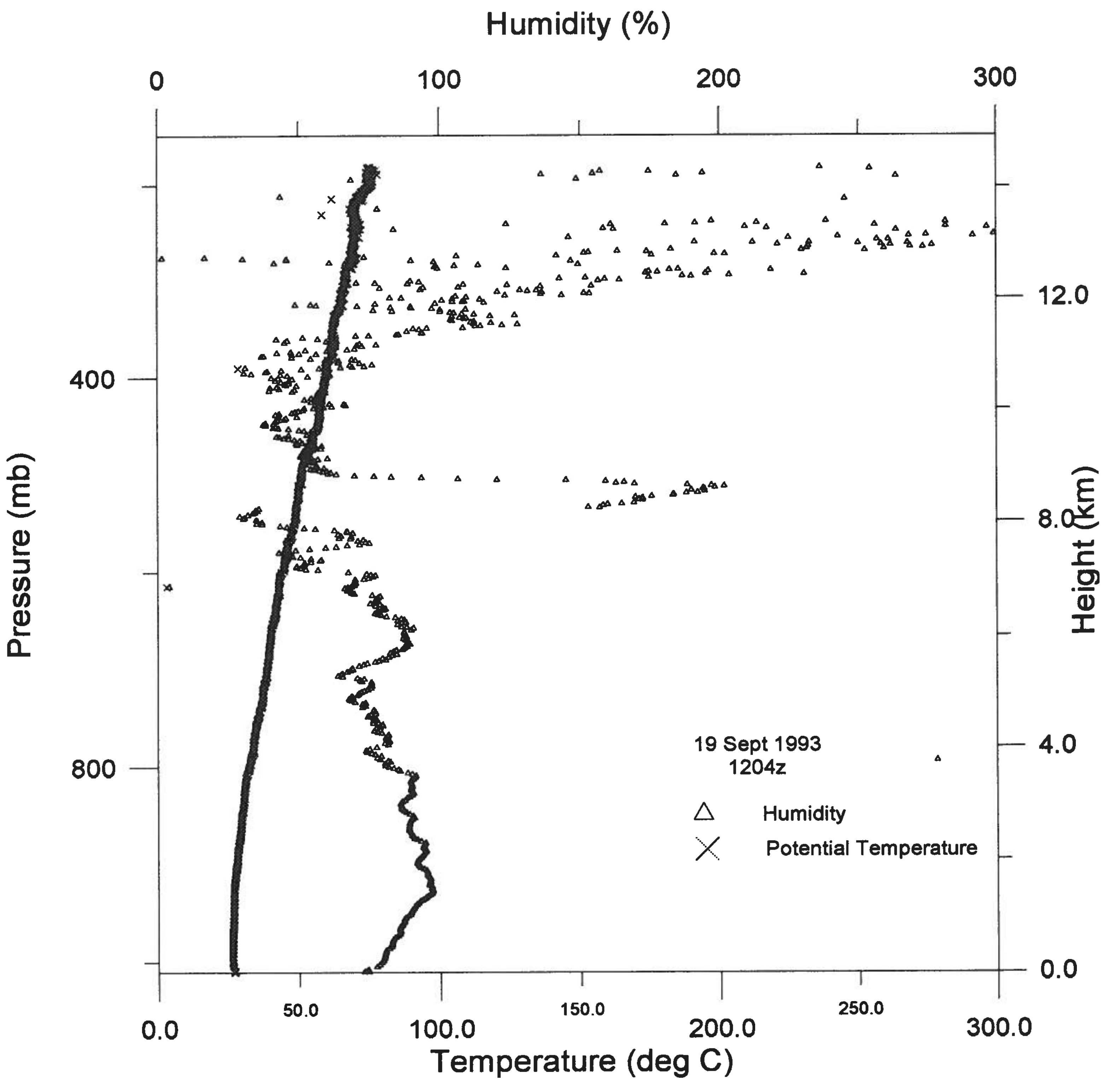


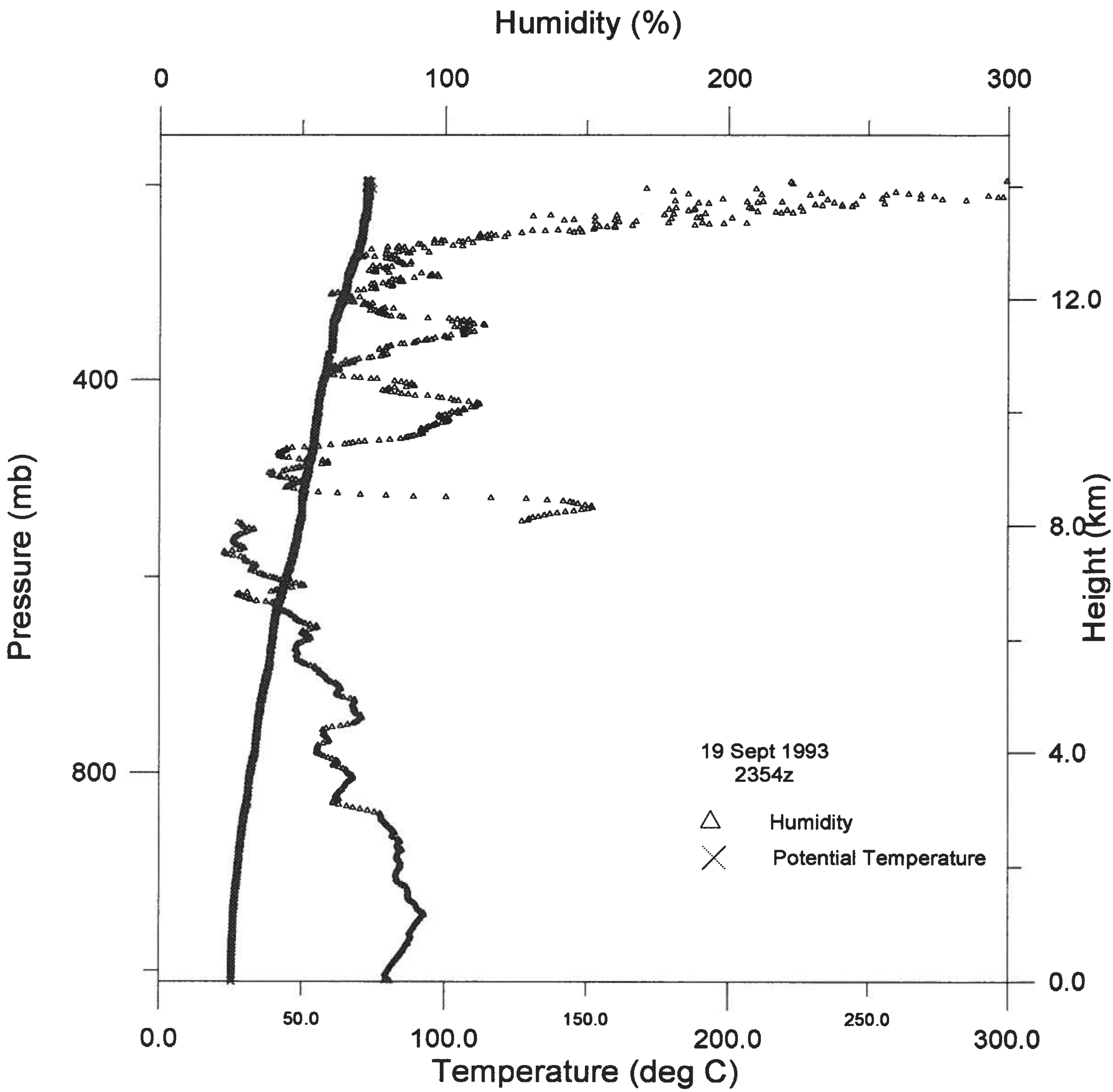
Humidity (%)
0
100
200
300
Pressure (mb)
400
800
Height (km)
12.0
8.0
4.0
0.0
0.0
50.0
100.0
150.0
200.0
250.0
300.0
Temperature (deg C)
17 Sept 1993
2353z
Humidity
Potential Temperature


Humidity (%)
0
100
200
300
400
800
Pressure (mb)
12.0
8.0
4.0
0.0
Height (km)
18 Sept 1993
1155z
Humidity
Potential Temperature
0.0
50.0
100.0
150.0
200.0
250.0
300.0
Temperature (deg C)


Humidity (%)
0
100
200
300
Pressure (mb)
400
800
Height (km)
12.0
8.0
4.0
0.0
18 Sept 1993
1309z
Humidity
Potential Temperature
0.0
50.0
100.0
150.0
200.0
250.0
300.0
Temperature (deg C)


Humidity (%)
0
100
200
300
Pressure (mb)
400
800
Height (km)
12.0
8.0
4.0
0.0
19 Sept 1993
0000z
Humidity
Potential Temperature
0.0
50.0
100.0
150.0
200.0
250.0
300.0
Temperature (deg C)


Humidity (%)
0
100
200
300
Pressure (mb)
400
800
Height (km)
12.0
8.0
4.0
0.0
19 Sept 1993
1204z
Humidity
Potential Temperature
0.0
50.0
100.0
150.0
200.0
250.0
300.0
Temperature (deg C)



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