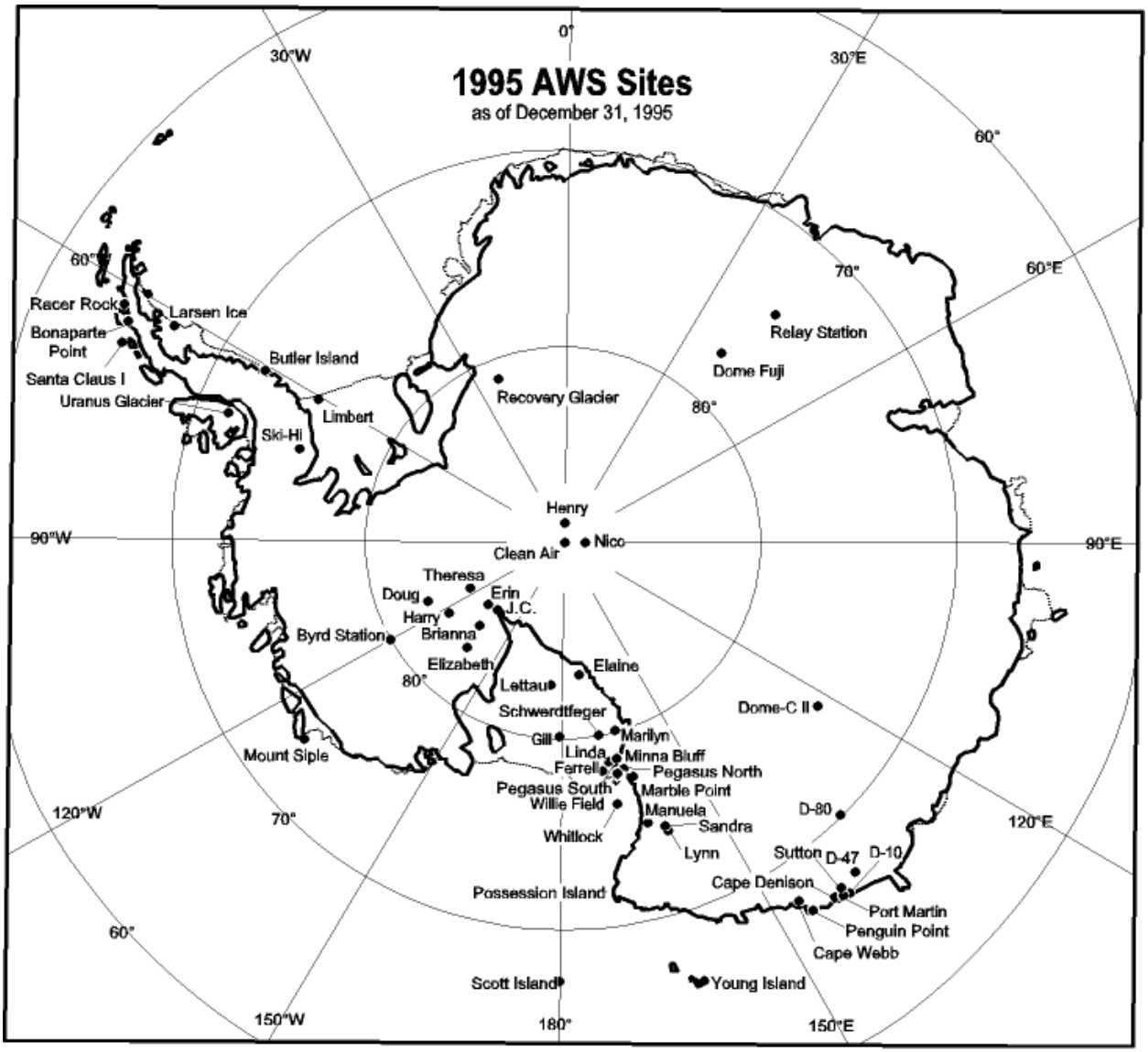

Antarctic Automatic Weather Station Data for the calendar year 1995

by

Linda M. Keller
George A. Weidner
Charles R. Stearns
Matthew T. Whittaker
Robert E. Holmes

Space Science and Engineering Center
University of Wisconsin
1225 W. Dayton St.
Madison, Wisconsin
May 1997

Antarctic Automatic Weather Station Data

for the calendar year

1995

by

Linda M. Keller

George A. Weidner

Charles R. Stearns

Matthew T. Whittaker

Robert E. Holmes

Space Science and Engineering Center
University of Wisconsin
1225 W. Dayton St.
Madison, Wisconsin
April 1997

TABLE OF CONTENTS

1. INTRODUCTION

A network of automatic weather station (AWS) units is deployed to collect Antarctic surface weather observations in support of specific meteorological research projects as well as operational activities at McMurdo. The 1995 network consisted of 48 installed AWS units providing observations on the Ross Ice Shelf, east of the Transantarctic Mountains and north of McMurdo to the Adelie Coast, along the Antarctic Peninsula and climatological locations such as the South Pole. Each unit measures air temperature, wind speed, and wind direction normally at the top of the unit's tower at a nominal height of three meters and air pressure at the electronics enclosure (Figure 1). Some AWS units also measure the relative humidity at three meters and vertical air temperature difference between 0.5 and 3 meters. Measurement heights relative to the actual surface at the site are nominal due to snow accumulation around the AWS unit.

2. DATA TRANSMISSION

The transmitted AWS data are received and stored by the ARGOS data collection system on the NOAA series of polar orbiting satellites. The data are retransmitted by the satellite for reception by a local user terminal (LUT) as at McMurdo, Antarctica. The data are processed into scientific units and are available for local use. The complete data set is received daily at Madison, Wisconsin, from Service ARGOS, Toulouse, France, for processing and distribution to the users.

3. AWS IDENTIFICATION AND LOCATION

Site location is defined by the latitude and longitude which is determined by various methods: sun shots, angles to geographical features, aircraft data, ice breaker data, the platform location system of Service ARGOS, and the Global Positioning System. AWS elevation is obtained by barometry and should be correct to within +/- 5 meters. Site names were introduced for convenience. Table 3.1 lists the site name, ARGOS identification number, latitude, longitude, elevation, start date for the site, and the World Meteorological Organization (WMO) number for the site. Figures 2, 3, 4, and 5 show the locations of the AWS units in the Antarctic for 1995.

The ARGOS identification number (ID) is used to identify the data sets distributed to the users. AWS units are sometimes moved from one location to another, and as a result, the ID at a given site may change from year to year. Table 3.2 lists the site name with the ARGOS ID, the site start date, and the ID start and stop dates.

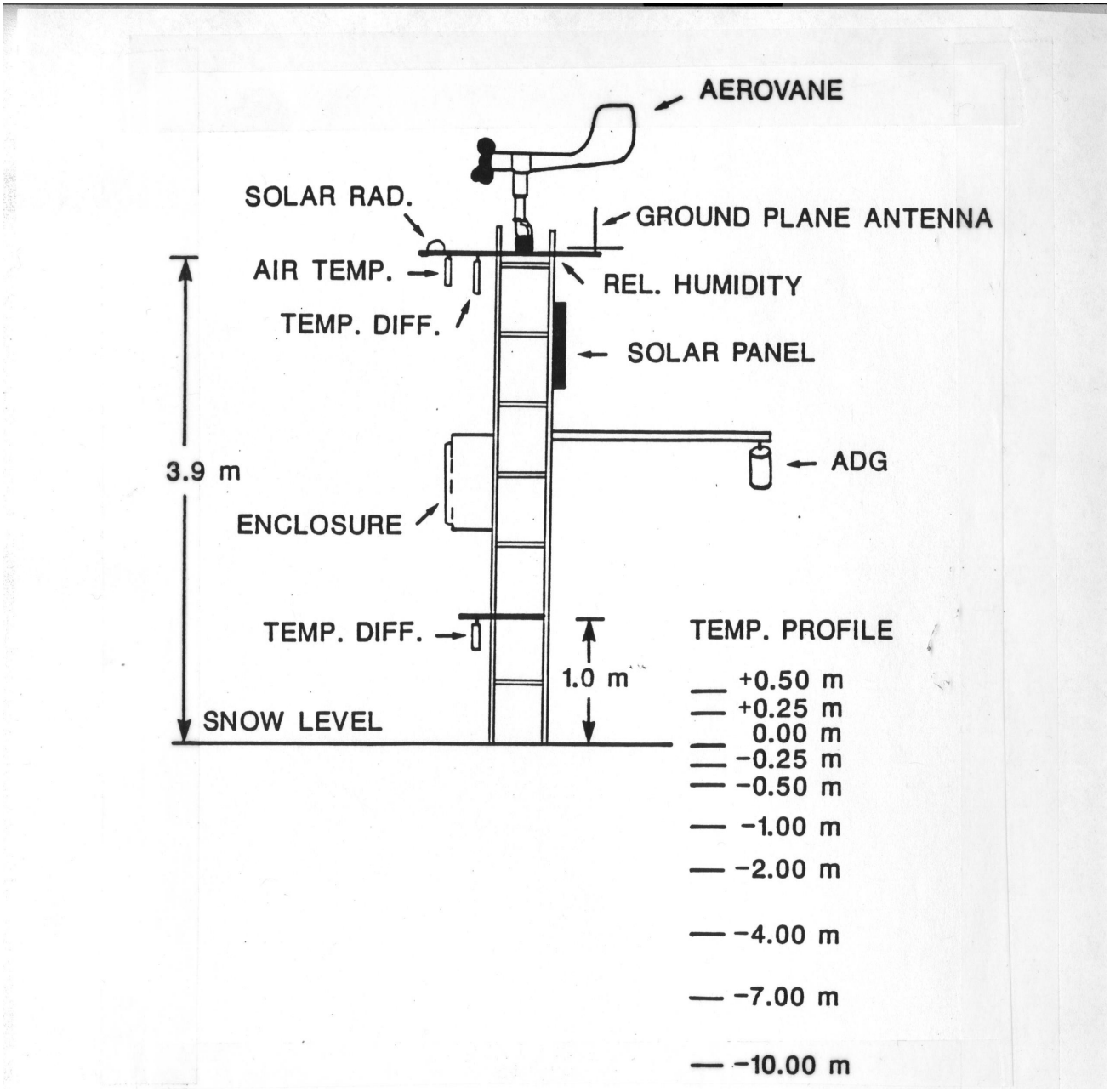

Figure 1. Layout of the AWS unit used in the Antarctic. The installed AWS unit has a 3-meter tower with a horizontal boom supporting the antenna, aerovane for measuring wind speed and direction, air temperature resistance thermometer, upper thermopile for measuring vertical air temperature difference, and the relative humidity sensor. The electronics enclosure is mounted at the mid point of the tower. The gel cell batteries are placed at the tower base. The solar panel, located near the tower top, faces north.

Table 3.1

AWS site name, geographic location and elevation, site start date, and WMO number for 1995.

Site name	ARGOS Id	Lat. deg	Long. deg	Elev. m	Site Start Date	WMO No.
			Adelie Land			
D-10	8914	66.71°S	139.83°E	243	08 Jan 80	89832
D-80	8919	70.04°S	134.88°E	2500	14 Jan 83	89836
Dome C	8904	74.50°S	123.00°E	3280	05 Feb 80	89828
Dome C II#	8989	75.12°S	123.37°E	3250	12 Dec 95	89828
Port Martin	8930	66.82°S	141.40°E	39	19 Jan 90	
Cape Denison	8907	67.01°S	142.66°E	31	20 Jan 90	
Penguin Point	8929	67.62°S	146.18°E	30	24 Dec 92	89847
Sutton	8939	67.08°S	141.37°E	871	26 Dec 94	
Cape Webb	8933	67.93°S	146.82°E	37	28 Dec 94	
			West Antarctica			
Byrd Station	8903	80.00°S	119.40°W	1530	05 Feb 80	89324
Mount Siple	8981	73.20°S	127.05°W	230	20 Feb 92	89327
Harry	21355	83.00°S	121.39°W	945	29 Nov 94	
J.C.	21357	85.07°S	135.52°W	549	29 Nov 94	
Theresa	21358	84.60°S	115.81°W	1463	29 Nov 94	89314
Doug	21359	82.32°S	113.24°W	1433	29 Nov 94	
Brianna	21362	83.89°S	134.15°W	549	30 Nov 94	
			Ross Island Region			
Marble Point	8906	77.44°S	163.69°E	120	05 Feb 80	89866
Ferrell	8934	77.93°S	170.82°E	45	10 Dec 80	89872
Pegasus North	8927	77.95°S	166.51°E	10	23 Jan 90	89667
Pegasus South	8937	77.99°S	166.58°E	10	14 Jan 91	
Minna Bluff	8988	78.55°S	166.66°E	920	22 Jan 91	89768
Linda	8915	78.48°S	168.38°E	50	21 Jan 91	89769
Willie Field	8901	77.87°S	167.02°E	40	25 Jan 92	
			Ocean Islands			
Whitlock	8921	76.14°S	168.39°E	274	23 Jan 82	89865
Scott Island	8983	67.37°S	179.97°W	30	25 Dec 87	89371
Possession Is.	8984	71.89°S	171.21°E	30	29 Dec 92	89879
			Ross Ice Shelf			
Marilyn	8931	79.95°S	165.13°E	75	16 Jan 84	89869
Schwerdtfeger	8913	79.90°S	169.97°E	60	24 Jan 85	89868
Gill	8911	79.99°S	178.61°W	55	24 Jan 85	89376
Lettau	8908	82.52°S	174.45°W	55	29 Jan 86	89377
Elaine	8900	83.13°S	174.17°E	60	28 Jan 86	89873
			Reeves Glacier			
Manuela	8905	74.95°S	163.69°E	80	06 Feb 84	89864
Sandra	8923	74.48°S	160.48°E	1525	19 Jan 88	89861
Lynn	8935	74.21°S	160.41°E	1772	19 Jan 88	89860
			Antarctic Peninsula			
Larsen Ice	8926	66.95°S	60.91°W	17	21 Oct 85	89262
Butler Island	8902	72.21°S	60.17°W	91	01 Mar 86	89266
Uranus Glac.	8920	71.43°S	68.93°W	780	06 Mar 86	89264
Racer Rock	8947	64.07°S	61.61°W	17	15 Oct 89	89261
Bonaparte Pt.	8912	64.78°S	64.07°W	8	05 Jan 92	89269
Recovery Glcr.	8932	80.82°S	22.26°W	1220	18 Jan 94	
Ski-Hi	8917	74.98°S	70.77°W	1395	21 Feb 94	89272
Santa Claus Is	8910	64.96°S	65.67°W	25	10 Dec 94	
Limbert#	8925	75.42°S	59.95°W	40	30 Nov 95	89257
			High Polar Plateau			
Clean Air	8987	90.00°S	2835	29 Jan 86	89208	
Nico	8924	89.00°S	89.67°E	2935	26 Jan 93	89799
Henry	8985	89.01°S	1.30°W	2755	26 Jan 93	89108
Relay Station#	8918	74.02°S	43.06°E	3353	01 Feb 95	89744
Dome Fuji#	8982	77.31°S	39.70°E	3810	08 Feb 95	89734

 # New sites started during 1995

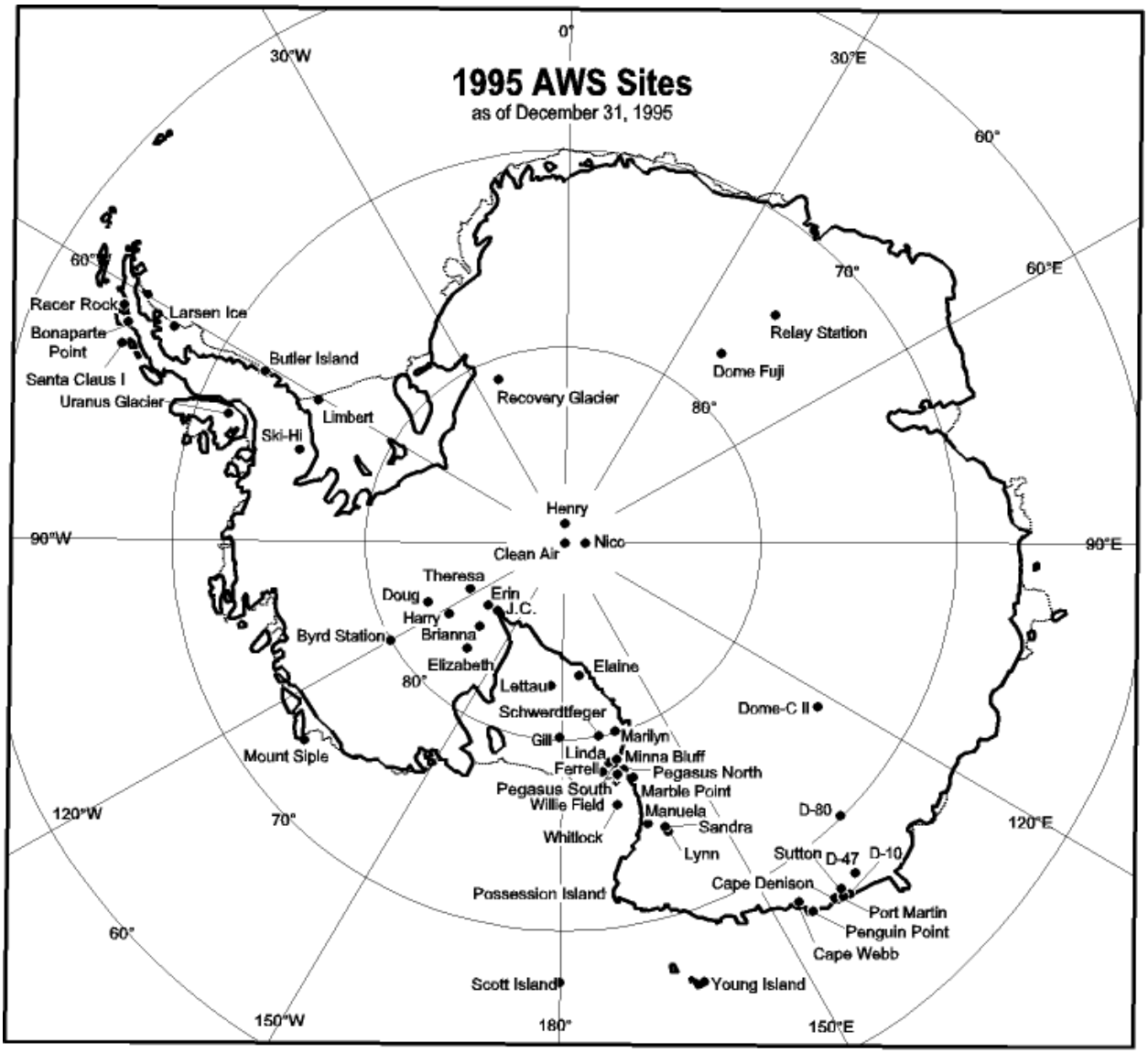

Figure 2. Antarctic automatic weather station locations during 1995 identified by the site name. Area around Ross Island is shown in Figure 3. Adelie Coast area is shown in Figure 4.

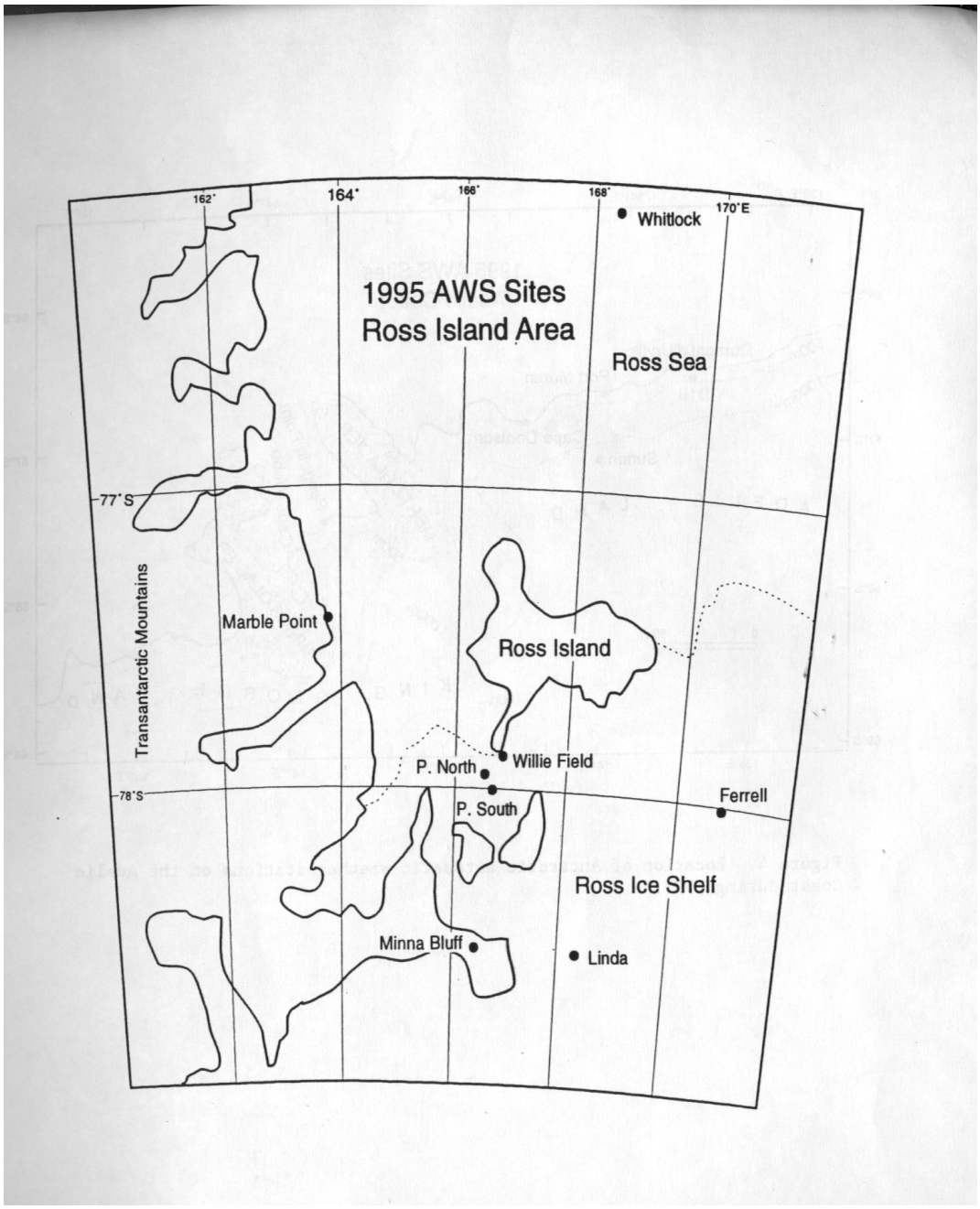

Figure 3. Location of Antarctic automatic weather stations in the vicinity of Ross Island, Antarctica during 1995.

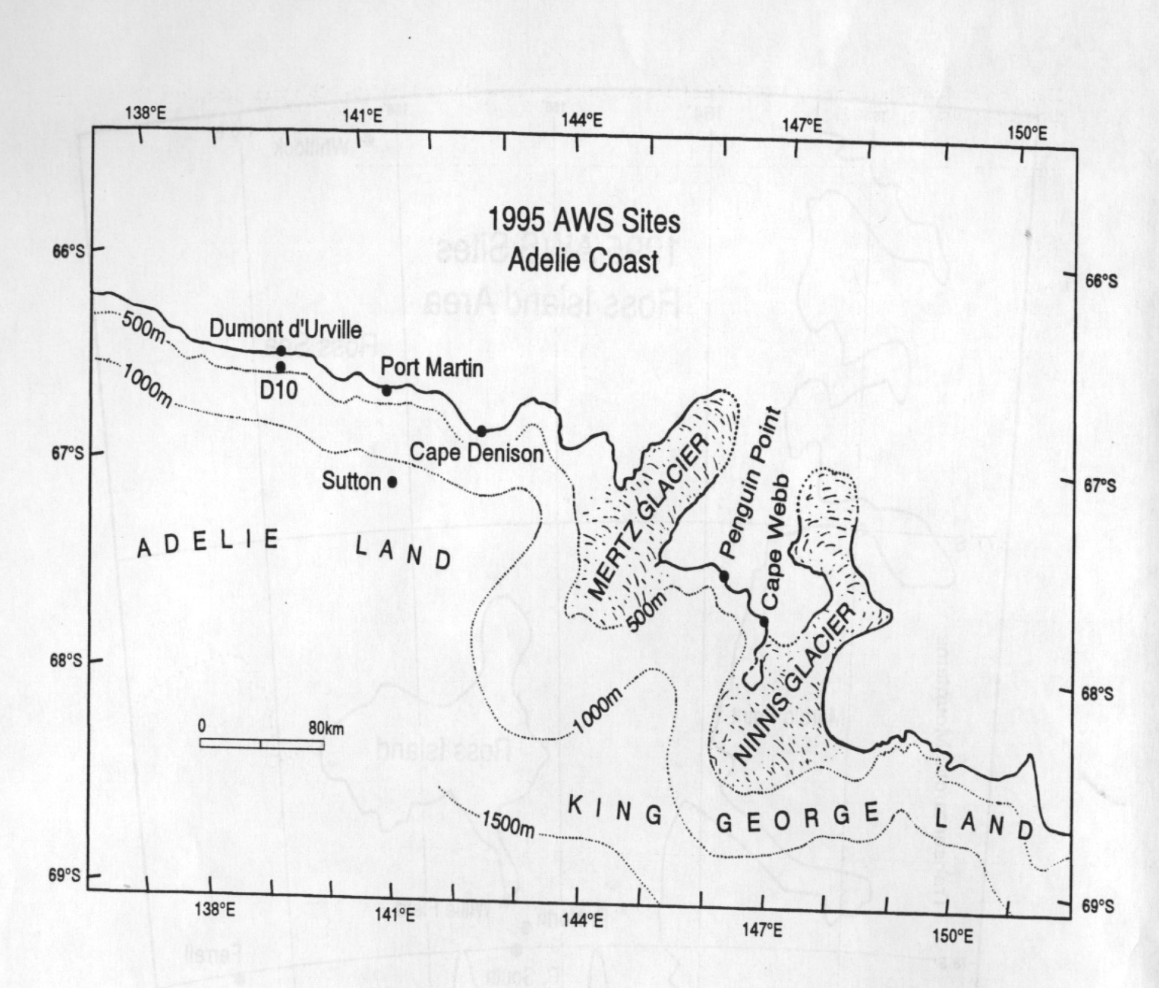

Figure 4. Location of Antarctic automatic weather stations on the Adelie Coast during 1995.

Table 3.2

1995 Antarctic AWS site name, ARGOS identification number (ID), site start date, ID start date, and ID stop date if occurring in 1995.

Site	ARGOS ID	Site Start Date	ID Start Date	ID Stop Date
D-10	8914	08 Jan 80	01 Jan 91	25 Dec 95
	21364		25 Dec 95	
D-80	8919	14 Jan 83	11 Dec 85	
Dome C	8904	05 Feb 80	05 Feb 80	02 Jan 96
Dome C II	8989	12 Dec 95	12 Dec 95	
Port Martin	8930	19 Jan 90	23 Dec 92	
Cape Denison	8907	20 Jan 90	27 Dec 94	
Penguin Point	8929	24 Dec 92	24 Dec 92	
Sutton	8939	26 Dec 94	26 Dec 94	
Cape Webb	8933	28 Dec 94	28 Dec 94	
Byrd Station	8903	05 Feb 80	05 Feb 80	
Mount Siple	8981	20 Feb 92	20 Feb 92	
Harry	21355	29 Nov 94	29 Nov 94	
J.C.	21357	29 Nov 94	29 Nov 94	
Theresa	21358	29 Nov 94	29 Nov 94	
Doug	21359	29 Nov 94	29 Nov 94	
Brianna	21362	30 Nov 94	30 Nov 94	
Marble Point	8906	05 Feb 80	05 Feb 80	
Ferrell	8934	10 Dec 80	13 Jan 93	
Pegasus North	8927	23 Jan 90	23 Jan 90	
Pegasus South	8937	14 Jan 91	14 Jan 91	
Minna Bluff	8988	22 Jan 91	12 Jan 94	
Linda	8915	21 Jan 91	10 Jan 94	24 Nov 95
	8909		24 Nov 95	
Willie Field	8901	25 Jan 92	25 Jan 92	
Whitlock	8921	23 Jan 82	23 Feb 94	
Scott Island	8983	25 Dec 87	27 Dec 92	
Possession Is.	8984	29 Dec 92	29 Dec 92	
Marilyn	8931	16 Jan 84	18 Jan 91	
Schwerdtfeger	8913	24 Jan 85	22 Jan 93	
Gill	8911	24 Jan 85	25 Jan 91	
Elaine	8900	28 Jan 86	23 Jan 93	
Lettau	8908	29 Jan 86	29 Jan 86	
Manuela	8905	06 Feb 84	15 Feb 87	
Sandra	8923	19 Jan 88	19 Jan 88	08 Nov 95
Lynn	8935	19 Jan 88	23 Jan 92	
Larsen Ice	8926	21 Oct 85	01 Jan 86	
Butler Island	8902	01 Mar 86	01 Mar 86	
Uranus Glacier	8920	06 Mar 86	24 Jan 92	
Racer Rock	8947	15 Oct 89	08 Dec 91	
Bonaparte Pt.	8912	05 Jan 92	05 Jan 92	
Recovery Glac.	8932	18 Jan 94	18 Jan 94	
Ski-Hi	8917	21 Feb 94	21 Feb 94	
Santa Claus Is.	8910	10 Dec 94	10 Dec 94	
Limbert	8925	30 Nov 95	30 Nov 95	
Clean Air	8987	29 Jan 86	25 Jan 94	
Nico	8924	26 Jan 93	26 Jan 93	
Henry	8985	26 Jan 93	26 Jan 93	
Relay Station	8918	01 Feb 95	01 Feb 95	
Dome Fuji	8982	08 Feb 95	08 Feb 95	

4. AWS DATA SUMMARIES

The data received by the University of Wisconsin, Department of Atmospheric and Oceanic Sciences, contain all the information received by the ARGOS system including duplicate and erroneous transmissions. Invalid data are eliminated during a quality check, and the valid data are converted to scientific units producing the complete data set. Data selected at three hourly intervals, plus or minus one hour, produce a three hourly data set for each AWS unit month. Section 6.1, AWS Performance, provides some explanations for missing and invalid data.

Use of the 1995 Antarctic AWS data for publication should acknowledge the support of NSF-OPP Grant 9303569 and 9419128 or reference this publication.

4.1 Monthly Data Summaries

The monthly summaries consist of the monthly means, from the three hourly data set, and the extremes, from the complete data set. For monthly values to be included, 25% of the three hourly observations must be available. Months with 50-75% of data missing occur most often when a station is started or stopped in the middle of the month. This can cause a bias in the monthly mean, especially during seasons when parameters such as temperature change rapidly. Annual means are calculated only when twelve months of data are available. The data are presented in the same order as the sites listed in Table 3.1. Definitions of the monthly data summary headings are listed below.

Heading	Definition
Mean air temperature, °C.	Mean value for the month.
Percent of monthly data missing.	Ratio of the number of missing observations to the number of possible observations X 100.
Maximum air temperature, °C.	Maximum value for the month.
Minimum air temperature, °C.	Minimum value for the month.
Mean wind speed, m/s.	Mean value for the month.
Percent of monthly data missing.	Ratio of the number of missing observations to the number of possible observations X 100.
Resultant wind speed, dir/vv.	Resultant speed and direction for the month.
Constancy.	Ratio of the monthly resultant to the monthly mean wind speed.
Maximum wind speed, dir/vv.	Maximum wind speed and direction for the month.

Mean air pressure, mb.	**Mean value for the month.**
Percent of monthly data missing.	**Ratio of the number of missing observations to the number of possible observations X 100.**
Maximum air pressure, mb.	**Maximum value for the month.**
Minimum air pressure, mb.	**Minimum value for the month.**

4.2 Three Hourly Data Summaries

The data set for each AWS unit for the month is scanned to pick out the nearest observation within one hour of the UTC hours 00, 03, 06, 09, 12, 15, 18, and 21 to produce the three hourly data set. If valid data are not available within the three hourly time interval, then the entry is left blank to indicate missing data. The means, standard deviations, resultant wind speed and direction, the distribution of temperature, and wind speed with wind direction are determined from the three hourly observations and are presented as a monthly summary at the bottom of each page. A wind direction value of zero indicates a wind speed less than 0.50 m s^{-1}. North is indicated by a value of 360 degrees. The maximum and minimum values are taken from the complete data set, not the three hourly data set. The appropriate monthly data from the three hourly data set are used for the monthly summaries presented in 4.1. In the presence of sunlight the air temperatures are questionable if the wind speed is less than 1 m s^{-1}. These summaries are available by anonymous FTP (see Section 8). If you are unable to access the Internet, we will send the information either on diskettes or paper. Please contact us for further information (the address is at end of Section 8).

5. AWS CALIBRATION

5.1. Temperature

The external and internal temperatures are calibrated using a 1000 ohm 0.05% resistor in place of the platinum resistance thermometers with 1000 ohms resistance at 0°C. Because the other resistances in the temperature circuit are known only to 1%, the temperature calibration will vary from one electronic unit to another. The correction factor determined from the calibration resistor is programmed into the read-only-memories for each unit. After the correction factors have been programmed into the AWS, a calibration box with 0.1% resistors is used in the field to check the temperature calibration.

5.2. Pressure

The atmospheric pressure transducer is a Parascientific model 215 digiquartz pressure gauge. The transducer frequency changes from 40 kHz at zero pressure to about 36 kHz at 1000 hPa. The pressure resolution is about 0.05 hPa.

Paulin aneroid barometers calibrated against a mercury barometer of 10 mm bore are used to check the pressure gauge calibration. Comparisons are made between AWS units, a Parascientific Model 760-16B accurate to +/- 0.1 hPa, and with the mercury barometers at Scott Base, Antarctica. The calibrations should be within +/- 0.2 hPa. Two mercury barometers have been purchased for use at McMurdo, Antarctica but are not yet available.

The reference vacuum on the older pressure transducers can degrade with time with a maximum observed 4 hPa shift to lower pressure after five years. Thus, recalibration of each pressure transducer would be desirable every two to three years.

5.3. Wind direction and Speed

The Belfort model 123 aerovane measures wind direction and speed. The aerovane rotates a potentiometer wiper, and the fraction of full scale of the potentiometer is measured. The wind direction is checked by positioning the aerovane to the cardinal directions relative to the boom supporting the aerovane. North or the potentiometer zero is towards the antenna on the boom and has a dead zone of 5°. During the field installation the boom is usually aligned along the north-south line as determined from the sun's azimuth, longitude, and Greenwich Mean Time. In some cases the 180° end of the boom may point in a direction other than south. At Manuela site, the 180° end of the boom points up the glacier and a correction is added to the data during processing. At Byrd site the wind is usually out of the north so the boom was rotated 120° and the correction added during the data processing. The wind speed is determined from the aerovane tachometer voltage output as 0.0472 volt per meter per second. The aerovane tachometers are spun at 1800 rpm with a load of 1071.5 ohms and the output should be 9.20 +/-0.05 vdc.

Three additional wind sensors were used with AWS units for 1995. These were the Vaisala anemometer model WAA-15, the R.M. Young wind monitor model 05103, and the Hydro-Tech WS-3 rotor anemometer. The Vaisala WAA-15 and the Hydro-Tech WS-3 were used as backup sensors for measuring wind speed in the Adelie Coast area. The WAA-15 is a 3-cup opto-electronic anemometer. When rotating, the anemometer produces a pulsed output that is proportional to the wind speed. Rated accuracy is +/- 2% up to 75 m/s. The pulsed output was input into one of the digital counter channels for 5 seconds. This resulted in a calibration value of .293 m/s/bit. The Hydro-Tech WS-3 is a disk rotor, 3 in. high and 12 in. overall diameter, with radial cups, and the threshold sensitivity is 3 mph. The anemometer utilizes a commercial dc tachometer generator. Output is 0 to +5 vdc (and 0 to 1 ma) over the desired full scale wind speed of 85 m/s. Accuracy is +/- 2%.

The R.M. Young monitor 05103 also used a 10000 ohm potentiometer so that the wind direction was recorded identically with the Belfort/Bendix aerovanes. The wind speed was from the range of 0 to 1.0 volt full scale corresponding to 50 m/s. Thus the calibration for wind speed was a nominal .195 m/s/bit for the R.M. Young with +/- 1% up to 50 m/s.

5.4. Relative Humidity

The Vaisala HMP-35A humidity sensor output voltage varies linearly with relative humidity (U). The sensor is calibrated by placing it over saturated salt solutions with known relative humidities at room temperature: sodium chloride (U=75%), and lithium chloride (U=12%) are used. In addition, a dry inert gas, forced past the sensor, gives a 0% U, and the sensor output can be zeroed. Then, the gain setting can be set directly using a salt solution with a high relative humidity, such as sodium chloride. The resolution of the humidity sensor is about 1% and the drift is 2 to 3% per year in the field. The relative humidity data are not included on the summary pages but are included in the 3 hourly data sets.

5.5. Vertical Air Temperature Difference

Two junction thermocouples are used to measure the air temperature difference between 3 m and 0.5 m on the tower. The output is about 78

microvolts for 1.ºC temperature difference between the junctions at 0.0ºC, dropping to 60 microvolts at -80ºC. Zero output is adjusted to 0.4 volts, so that 0 to 1 volt corresponds to a -6ºC to +9ºC range of air temperature differences between 3 m and 0.5 m. The resolution is 0.05ºC. Calibration of the individual systems is done by applying known voltages to the amplifier input. The vertical temperature difference data are not included on the summary pages but are included in the 3 hourly data sets.

6. AWS OPERATIONS SUMMARY FOR 1995

6.1. AWS Performance

Forty-three AWS units were installed at the start of 1995 and 46 were installed by the end of 1995. Based on the installation months the AWS units delivered 80% of the temperature data, 80% of the pressure data and 76% of the wind data during 1995. Complete data sets were received from 15 AWS units and 18 AWS units operated for the installed period. Fourteen AWS units were not received for one month or more during the year or stopped during the year.

The wind system has the poorest performance. If the wind speed is zero or the wind direction is constant for extended periods (days to months) then the data is considered invalid. The reason for this behavior is not known but is believed to be due to the build up of frost on the wind system. This usually occurs in the winter season and at several AWS sites. The wind speed is most frequently zero when the wind direction is constant. Another problem with the wind system involves the tachometer for measuring wind speed. The brushes on the Belfort aerovane quickly wear down and fill the gaps between the contacts with brush material, shorting out the tachometer output. As a result we do not know the calibration. The problem is in the construction of the tachometer, so we have begun to install a new wind system manufactured by R.M. Young. They are currently operating at Nico, Henry, Pegasus North, Minna Bluff, Willie Field, Ski-Hi, J.C., Theresa, Doug, and Brianna sites.

Site	Performance
D-10	Station stopped 10 June with sporadic reports in July and August due to low battery voltage, new station installed 25 December.
D-80	Station stopped 18 January. Transmission resumed 27 September.
Dome C	Disconnected from RTG and connected to batteries 19 December. No wind reports for the rest of the month.
Dome C II	Installed 10 December.
Port Martin	Station transmitting sporadically from April to September due to low battery voltage. As battery recharges, more transmissions received. A Hydro-Tech anemometer is installed instead of delta-T sensor.
Cape Denison	Intermittent transmission May-July. A Hydro-Tech anemometer is installed instead of delta-T sensor.

Penguin Point	**Aerovane did not operate in parts of April-July. Station stopped 5 July. Station resumed transmitting 26 December after power supply was disconnected and reconnected. A Vaisala anemometer is installed instead of the delta-T sensor.**
Sutton	**No pressure reports for January. Station stopped 17 November. A Hydro-Tech anemometer is installed instead of delta-T sensor.**
Cape Webb	**Intermittent transmission March-May. Few wind reports June-August. Station stopped 3 September. Station resumed transmitting 26 December after power supply was disconnected and reconnected. A Hydro-Tech anemometer is installed instead of the delta-T sensor.**
Byrd	**Aerovane not operating last part of May through November.**
Mount Siple	**Pressure erratic in summer half of year. Site has a "dog house" AWS without wind speed and direction.**
Harry	**Pressure erratic in summer half of year. Wind system sporadically not operating April-November.**
J.C.	**Station stopped 24 May.**
Theresa	**Sporadic transmission in April. Station stopped 20 November.**
Doug	**Pressure erratic end of February to September. Station stopped 30 September. Resumed transmission 29 October.**
Brianna	**OK.**
Marble Point	**OK.**
Ferrell	**OK.**
Pegasus North	**No pressure reports due to calibration problem. Station stopped 4 April. Sporadic transmission resumed September. New batteries installed 17 November.**
Pegasus South	**Wind system not operating end of March.**
Minna Bluff	**Wind system not operating beginning of January.**
Linda	**Wind system not operating Last half of June to last half of November. Station was replaced on 18 November.**
Willie Field	**OK. New batteries installed 27 November.**
Whitlock	**Pressure gauge installed 3 January. Intermittent wind data from April to October.**
Scott Island	**Station stopped 1 January. Site has a "dog house" AWS without wind speed and direction.**
Possession Island	**OK, site has a "dog house" AWS without wind speed and direction.**
Marilyn	**Station stopped transmitting 30 May due to low battery voltage. As battery recharges in the austral spring, transmissions are received again in September.**
Schwerdtfeger	**Station transmitting erratically through June and then only relative humidity and delta-T until it was removed for repair on 9 November.**

Gill	**Aerovane operated intermittently during May-August.**
Lettau	**Station stopped 11 August due to low battery voltage. As battery recharges in the austral spring, transmissions are received again in November.**
Elaine	**Station transmitted sporadically Jul-August and stopped 27 August. The station resumed transmitting 4 October.**
Manuela	**Aerovane did not operate after 6 May due to a buildup of ice.**
Sandra	**Aerovane was destroyed the previous year and repairs could not be made due to bad weather.**
Lynn	**Station began to transmit on 15 March and stopped again on 25 August. The station was completely removed on 8 November.**
Larsen Ice	**Aerovane operated intermittently August-October.**
Butler Island	**Temperature sensor not functioning correctly in January and February, aerovane operated intermittently in May.**
Uranus Glacier	**Aerovane operated intermittently July-October.**
Racer Rock	**Station missing a few days of data for January, November and December.**
Bonaparte Point	**Intermittent data transmission, very sparse from last half of June through September.**
Recovery Glacier	**Station stopped 24 April, resumed transmissions 15 June and stopped again 27 December. Loose and/or corroded connections are suspected.**
Ski-Hi	**Intermittent data transmission most of the year. No transmissions in August. Aerovane did not operate during most of October.**
Santa Claus Island	**Intermittent data transmissions which increased in number during the winter.**
Limbert	**Aerovane did not operate occasionally during June and October. Sea water temperature sensor did not function due to a defective probe.**
Clean Air	**Installed on the Ronne Ice Shelf 30 November.**
Nico	**Pressure jumps erratically March-August.**
Henry	**Occasional missing wind data July-August. Station stopped 18 September due to low battery voltage and resumed transmitting 27 September.**
Relay Station	**Station transmitted sporadically end of August to end of October due to low battery voltage.**
Dome Fuji	**OK, installed 1 February.**
	OK, installed 8 February.

6.2 AWS Antarctic Field Activities

John Cassano and Mark Seefeldt from the University of Wisconsin-Madison finished work on the Adelie Coast stations in December of 1994 and headed toward McMurdo at the beginning of 1995. On 3 January a USCG flight was made to Manuela AWS site. The site was not located due to poor visibility. A second flight was made to Whitlock AWS site. The antenna had a missing prong. Parts of the station were replaced and a pressure gauge was installed.

Cassano and Seefeldt arrived at McMurdo on 4 January, and a United States Coast Guard (USCG) helicopter flight was made to both Pegasus North and Pegasus South AWS sites on 7 January. Both stations were in good working order. A new location for Pegasus South was obtained using the GPS.

Willie Field AWS site was visited by truck on 7 January. New batteries for the CR-10 data logger were installed as well as a solar panel to charge the batteries.

Two AWS units were shipped to the Japanese Antarctic Research Expedition (JARE) for installation at Relay Station and Dome Fuji by Takao Kameda. AWS 8918 was installed at Relay Station on 01 February. AWS 8982 was installed at Dome Fuji on 08 February. The Dome Fuji AWS unit is the highest in Antarctica. These are the first inland meteorological measurements in the northeast sector of the Antarctic Continent since Plateau Station.

The Antarctic field season resumed in November 1995 when G. Weidner and R. Holmes from the University of Wisconsin-Madison returned to McMurdo. A Twin Otter flight was made to Sandra AWS site on 8 November. The unit was completely removed, and AWS 8923 was returned to McMurdo to be repaired and redeployed at another site. A Twin Otter flight was made on 9 November to Gill AWS site. Unfortunately, the site could not be located. The flight continued to Schwerdtfeger AWS site. One 1.5 m tower section was added and AWS 8913 was removed and returned to McMurdo to be repaired.

Weather prevented aircraft operations until 14 November, when a Twin Otter flight to Elaine site was made. The aerovane was stuck in one direction because of a buildup of ice. The aerovane was replaced with a Belfort aerovane. Two boxes of three gel-cell batteries were installed, and the lower delta-T sensor was unburied and raised to a height of 0.7 meters above the snow.

Pegasus North AWS site was visited by snowmobile on 17 November. Two boxes of three gel-cell batteries were installed. On 18 November, an Naval Support Force Antarctica (NSFA) helicopter flight was made to Linda AWS site. A Bendix aerovane was installed. Upon return to the lab, it was discovered that the aerovane removed from Linda AWS site was in good working order. Therefore, the problem with the wind direction at Linda was not the aerovane, but rather some other component. Weather prevented our scheduled return to Linda AWS site on 21, 22, and 23 November. On 24 November, an NSFA helicopter flight was made to Linda AWS site. AWS 8915 was removed and replaced with AWS 8909. A new 0.9 m boom was installed along with a new lower delta-T unit. The height of the lower delta-T unit was 1.1 m above the snow surface.

Willie Field AWS site was visited by truck on 27 November. Two boxes of three gel-cell batteries were installed, and the station was raised by one 1.8 m tower section. The Ultrasonic Depth Gauge (UDG) data were downloaded from the CR-10 data logger, and the UDG sensor was raised to a height of 1.36 m. The lower delta-T unit was raised to a height of 1.1 m.

Weidner and Holmes left McMurdo to return to Madison, WI on 30 November.

On the Antarctic Peninsula, members of the British Antarctic Survey raised the AWS unit at Uranus Glacier on 28 November and installed AWS 8925 at Limbert site on the Ronne Ice Shelf on 30 November. On 10 December, Ski Hi site was visited, and the station was in good working order and did not need to be raised.

Members of Institut Francais pour la Recherche et la Technologie Polaires (IFRTP) installed AWS 8989 at Dome-C II on 12 December. On 15 December, Dome C AWS unit was disconnected from the Radioactive Thermonuclear Generator and was connected to batteries. The station ran for approximately 18 days before the batteries were drained of power. AWS 8904 operated flawlessly from 13 January 1983 until 2 January 1996.

The Polar Star cruise to deploy new AWS units on some of the island stations and to repair AWS units along the Adelie Coast left Hobart with Dr. C.R. Stearns and J. Thom on board on 20 December. Two dog house units were assembled for deployment on Young and Scott Islands. The dog house units did not function properly. AWS 8980 transmitted abnormally and no air pressure data was transmitted by 8983, so the trips to the islands had to be canceled.

On 25 December a USCG helicopter flight was made to D-10 where AWS 8914 was removed and returned to the ship to be repaired. A second flight was made to D-10, and AWS 21364 was installed as well as a new 0.8 m boom equipped with vertical temperature difference and relative humidity sensors. The 1/8 inch diameter antenna was replaced with a 1/4 inch diameter antenna. On the return flight a search was made for Sutton site, but it could not be located. A flight was then made to Port Martin site. The tower was leaning and one guy cable was broken. A new guy cable was installed after returning from the Polar Star. The return flight stopped at Cape Denison, and the unit was found to be in good working order.

A USCG helicopter flight was made to Cape Webb on 26 December. The power supply was disconnected and then reconnected and the station began to cycle normally. A search for a more suitable site for the AWS was done by air, but a better site was not located. A USCG helicopter flight was made to Penguin Point. As with Cape Webb, the power supply was disconnected and then reconnected, and the station began to cycle normally. The 1/8 inch diameter antenna was replaced with a 1/4 inch diameter antenna.

7. GLOBAL TELECOMMUNICATIONS SYSTEM

The data from 35 Antarctic AWS units were entered into the Global Telecommunications System (GTS) during 1995. The data are collected by Service ARGOS. As soon as the data are received, Service ARGOS processes them and sends them on to the National Weather Service which distributes the data to the GTS. The data headers are:

SMAA14 KARS YYGGgg
SIAA14 KARS YYGGgg
SNAA14 KARS YYGGgg

where S indicates surface, M is main observations (at 00, 06, 12, and 18 UT), I is

intermediate observations (at 03, 09, 15, and 21 UT), and N is any other time. AA14 is for Antarctica, and KARS stands for the Landover receiving center (backup is LFPW for the center in Toulouse, France). YY indicates the day in the month, GG is the hour, and gg is the minutes. Table 3.1 contains the WMO # used by the GTS grouped according to their purpose and proximity where possible.

The University of Wisconsin-Madison is responsible for obtaining WMO numbers for AWS sites and for providing Service ARGOS with calibration information for processing the data. The main reason for getting the AWS data into the GTS is to make sure that the data are available in near real time for all organizations operating in Antarctica. Of all the meteorological data in the GTS received by the Australian Bureau of Meteorology at Hobart, Tasmania, the AWS units provided more surface meteorological data than all the manned stations.

8. DATA AVAILABILITY

The data from our Automatic Weather Stations are available by anonymous FTP. The IP number is 144.92.108.169 (uwaaws.ssec.wisc.edu). The login is "anonymous" (do not use the quotation marks), and the password is your email address. Once you have logged in, change to the pub subdirectory. A listing of our station locations, names, and ARGOS ID numbers is located in the file "biglist" in this subdirectory. It is meant to serve as a guide to our stations as their ID numbers sometimes change. A complete guide for navigating the site may be found in the file “readme.faq”.

Our three-hourly interval data for Antarctica are contained in the year subdirectories of pub/antrdr. The data have been corrected, i.e. an effort has been made to remove the bad data points. These data take longer to process, so the data for recent months are not available. Within each of the year subdirectories of pub/antrdr, there are text files named "3hrlist??" (where ?? indicates the last two digits of the year). These files list what station's data are contained in which files. The file “readme.aupdates” in pub/antrdr contains information on updates and/or corrections to the data, and the file “readme. 3format” contains file name construction information and format of the three-hourly data. The file "readme.mailinglist" contains information on joining a mailing list which distributes information on data updates and changes.

The directory pub/summary contains printable text files of the paper data summary sheets. The format of the files can be found in the file "readme.sum" while updates and corrections to the data are located in "readme.sumupdates". The data are located in year subdirectories of pub/summary.

For those users who need more current information, we have created 10 minute interval data for each station. These data are located in year subdirectories of pub/10min/rdr. The data have been calibrated for the individual station instruments, but no other corrections have been made. The data are generally available up to and including the last full month of this year. The year subdirectories also contain a text file named "namelist??" (where ?? indicates the last two digits of the year in question). These files list specifically what station's data are contained in which files.

Several important readme files are located in pub/10min/rdr. The file "readme.10min" contains basic information about the data and the compressed archives of ten-minute data, located in pub/10min/rdr/months. The file "readme.5digit" contains information on the Siple Coast stations which have a different station identification. The file "readme.format" contains information on filename construction of the data, as well as file content and is a must for those unfamiliar with the data. The file "readme.updates" contains important information on changes/additions to the data.

Our site is available 24 hours a day, 7 days a week. If you have questions or problems, send email to Matt at front242@uwaaws.ssec.wisc.edu. We can also be reached by phone at (608) 265-4816 or fax at (608) 263-6738.
By mail, please contact:

Linda M. Keller
University of Wisconsin
Space Science and Engineering Center
1225 W. Dayton St.
Madison, WI 53706
USA

9. ACKNOWLEDGMENTS

This work is supported by the National Science Foundation, Office of Polar Programs, Grants 9303569 and 9419128 under the management of Dr. Bernhard Lettau of the National Science Foundation. Expeditions Polaires Francaises installs and maintains the AWS units from the Adelie Coast to Dome C. The British Antarctic Survey maintains the AWS units on the east side of the Antarctic Peninsula and south of Adelaide Island.