Antarctic Automatic Weather Station Data

For The Calendar Year

1997

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

February 2001

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, Antarctica. The 1997 network consisted of 49 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, West Antarctica, and climatological locations such as the South Pole. Each unit measures air temperature, wind speed, and wind direction 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 at Madison, Wisconsin, from Service ARGOS, Largo, Maryland, 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, and 4 show the locations of the AWS units in the Antarctic for 1997.

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. The site name does not change. Table 3.2 lists the site name with the ARGOS ID, the site start date, and the ID start and stop dates.

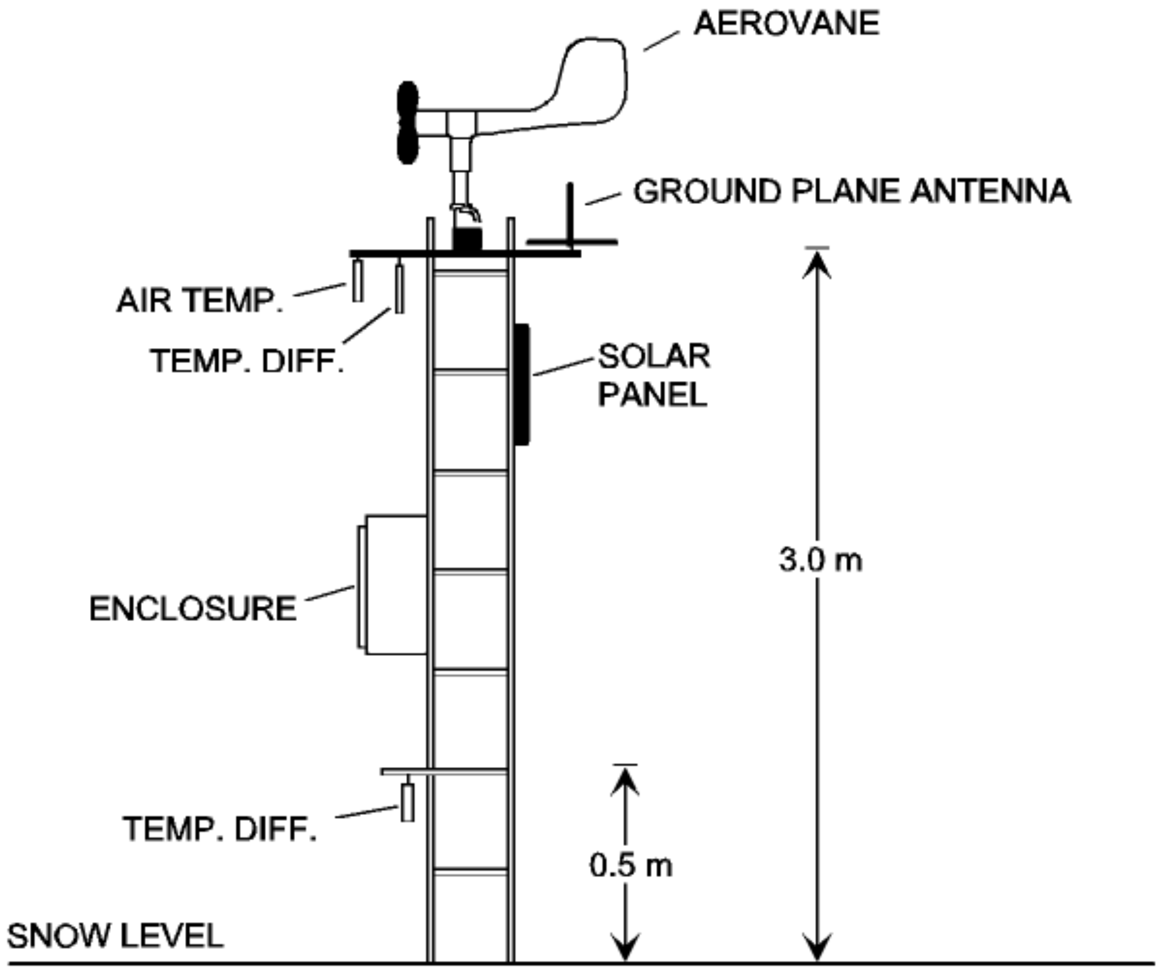

Figure 1. Layout of the AWS unit used in the Antarctic. The installed AWS unit has a 3-meter tower with a horizontal boom supporting the antenna, aerovane for measuring wind speed and direction, air temperature resistance thermometer, upper thermopile for measuring vertical air temperature difference, and the relative humidity sensor. The electronics enclosure is mounted at the midpoint 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 1997.

Site Name	ARGOS ID	Lat. (deg)	Long. (deg)	Elev. (m)	Site Start Date	WMO No.
			Adelie Land			
Dome C II	8989	75.121°S	123.374°E	3250	12 Dec 95	89828
Port Martin	8930	66.82°S	141.40°E	39	19 Jan 90	
Cape Denison	8907	67.009°S	142.664°E	31	20 Jan 90	
Penguin Point	8929	67.617°S	146.18°E	30	24 Dec 92	89847
Sutton	8939	67.08°S	141.37°E	871	26 Dec 94	
Cape Webb	8933	67.934°S	146.824°E	37	28 Dec 94	
			West Antarctica			
Byrd Station	8903	80.007°S	119.404°W	1530	05 Feb 80	89324
Mount Siple	8981	73.198°S	127.052°W	230	20 Feb 92	89327
J.C.	21357	85.07°S	135.516°W	549	29 Nov 94	
Theresa	21358	84.599°S	115.811°W	1463	29 Nov 94	89314
Doug	#8922	82.315°S	113.24°W	1433	29 Nov 94	
Elizabeth	21361	82.606°S	137.082°W	549	30 Nov 94	89332
Brianna	21362	83.887°S	134.145°W	549	30 Nov 94	
Erin	21363	84.901°S	128.81°W	1006	29 Nov 94	
Siple Dome*	8900	81.656°S	148.773°W	620	21 Jan 97	89345
Swithinbank*	21356	81.20°S	126.174°W	945	18 Jan 97	
			Ross Island Region			
Marble Point	8906	77.439°S	163.759°E	120	05 Feb 80	89866
Ferrell	8934	77.928°S	170.82°E	45	10 Dec 80	89872
Pegasus North	8927	77.952°S	166.505°E	10	23 Jan 90	89667
Pegasus South	8937	77.99°S	166.576°E	10	14 Jan 91	
Minna Bluff	8988	78.554°S	166.656°E	920	22 Jan 91	89768
Linda	8909	78.48°S	168.375°E	50	21 Jan 91	89769
Willie Field	8901	77.865°S	167.017°E	40	25 Jan 92	
			Ocean Islands			
Whitlock	8921	76.144°S	168.392°E	274	23 Jan 82	89865
Scott Island	8983	67.37°S	179.97°W	30	25 Dec 87	89371
Young Island	8980	66.229°S	162.275°E	30	01 Jan 91	89660
Possession Is.	8984	71.891°S	171.21°E	30	29 Dec 92	89879
			Ross Ice Shelf			
Marilyn	8931	79.954°S	165.13°E	75	16 Jan 84	89869
Schwerdtfeger	8913	79.904°S	169.973°E	60	24 Jan 85	89868
Gill	8911	79.985°S	178.611°W	55	24 Jan 85	89376
Lettau	8908	82.518°S	174.452°W	55	29 Jan 86	89377
Elaine	#8915	83.134°S	174.169°E	60	28 Jan 86	89873
			Reeves Glacier			
Manuela	8905	74.946°S	163.687°E	80	06 Feb 84	89864
Lynn	8935	74.207°S	160.409°E	1772	19 Jan 88	89860

Site Name	ARGOS ID	Lat. (deg)	Long. (deg)	Elev. (m)	Site Start Date	WMO No.
			Antarctic Peninsula			
Larsen Ice	8926	66.949°S	60.914°W	17	21 Oct 85	89262
Butler Island	8902	72.207°S	60.171°W	91	01 Mar 86	89266
Uranus Glacier	8920	71.43°S	68.93°W	780	06 Mar 86	89264
Limbert	8925	75.422°S	59.948°W	40	30 Nov 95	
Racer Rock	8947	64.067°S	61.613°W	17	15 Oct 89	89261
Bonaparte Pt.	#8923	64.778°S	64.067°W	8	05 Jan 92	89269
AGO-A84	8932	84.36°S	23.86°W	2103	09 Jan 96	
Ski-Hi	8917	74.975°S	70.766°W	1395	21 Feb 94	89272
Santa Claus Is.	#21364	64.964°S	65.67°W	25	10 Dec 94	
			High Polar Plateau			
Clean Air	8987	90.00°S		2835	29 Jan 86	89208
Henry	8985	89.011°S	1.025°W	2755	26 Jan 93	89108
Nico	8924	89.00°S	89.669°E	2935	26 Jan 93	89799
Relay Station	8918	74.017°S	43.062°E	3353	01 Feb 95	89744
Dome Fuji	#8904-8982	77.31	39.70°E	3810	08 Feb 95	89734

* New sites started during 1997
# New ARGOS ID for 1997 at the site

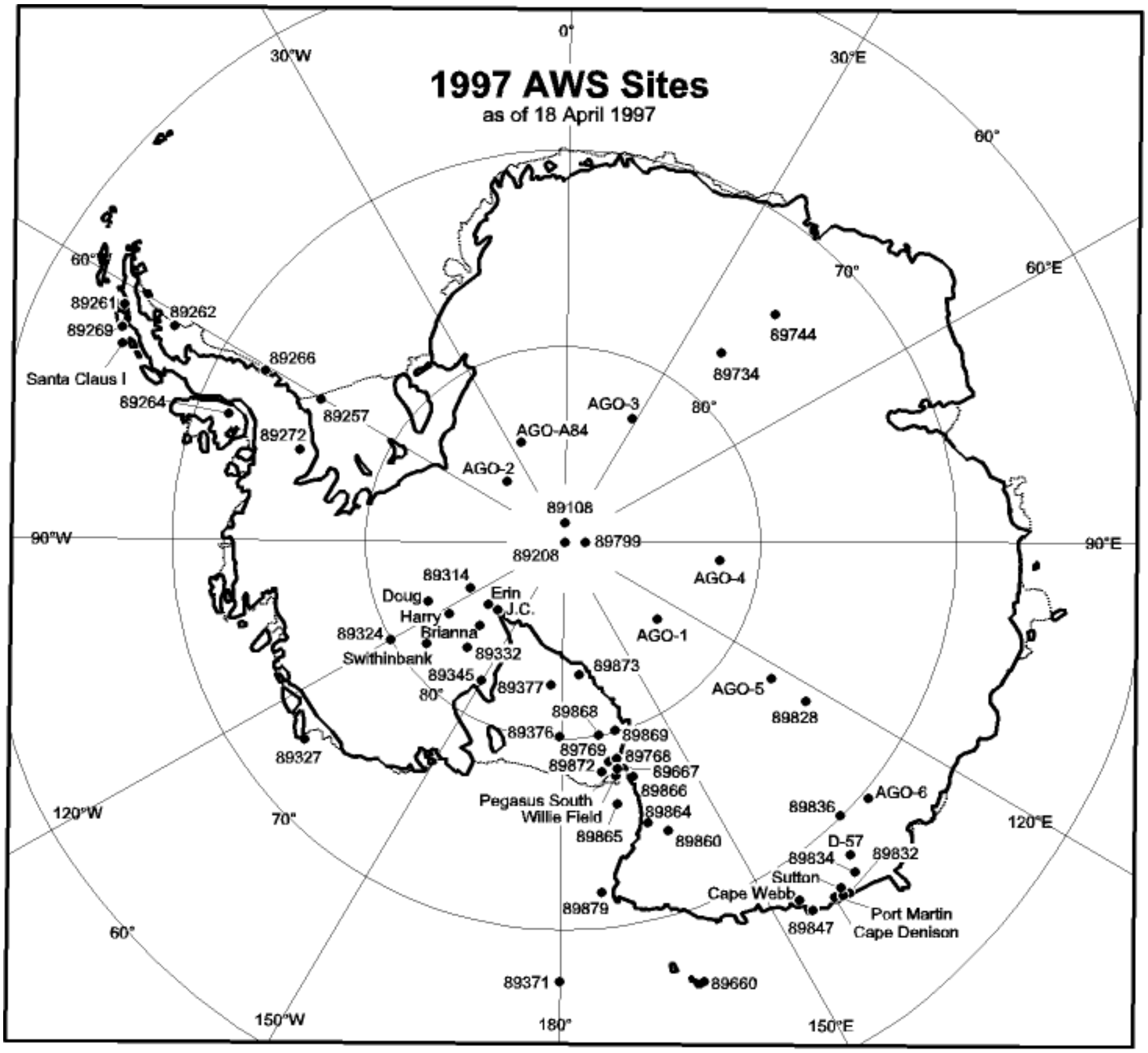

Figure 2. Antarctic automatic weather station locations during 1997 identified by the site name. Area around Ross Island is shown in Figure 3. Adelie Coast area is shown in Figure 4.

Figure 3. Location of Antarctic automatic weather stations in the vicinity of Ross Island, Antarctica during 1997.

Figure 4. Location of Antarctic automatic weather stations along the Adelie Coast during 1997.

Table 3.2

1997 Antarctic AWS site name, ARGOS identification number (ID), site start date, ID start date, and ID stop date if occurring in 1997.

Site	ARGOS ID	Site Start Date	ID Start Date	ID Stop Date
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	
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	20 Jan 97
	8922		20 Jan 97	
Elizabeth	21361	30 Nov 94	17 Jan 96	
Brianna	21362	30 Nov 94	30 Nov 94	
Erin	21363	29 Nov 94	18 Jan 96	
Siple Dome	8900	21 Jan 97	21 Jan 97	
Swithinbank	21356	18 Jan 97	18 Jan 97	
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	8909	21 Jan 91	24 Jan 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	
Young Island	8980	01 Jan 91	01 Jan 91	
Possession Island	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	23 Jan 93	23 Jan 93	02 Jan 97
	8915		02 Jan 97	
Lettau	8908	29 Jan 86	29 Jan 86	
Manuela	8905	06 Feb 84	15 Feb 87	
Lynn	8935	19 Jan 88	23 Jan 92	
Larsen Ice Shelf	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	
Limbert	8925	30 Nov 95	30 Nov 95	
Racer Rock	8947	15 Oct 89	08 Dec 91	
Bonaparte Point	8923	05 Jan 92	23 Dec 96	23 Dec 96
AGO-A84	8932	09 Jan 96	09 Jan 96	
Ski-Hi	8917	21 Feb 94	21 Feb 94	
Santa Claus Is.	21364	10 Dec 94	26 Dec 96	
Clean Air	8987	29 Jan 86	25 Jan 94	
Henry	8985	26 Jan 93	26 Jan 93	
Nico	8924	26 Jan 93	26 Jan 93	
Relay Station	8918	01 Feb 95	01 Feb 95	
Dome F	8904	08 Feb 95	04 Feb 97	
Dome Fuji	8982	08 Feb 95	08 Feb 95	25 Dec 97

4. AWS DATA SUMMARIES

The data received by the University of Wisconsin, Space Science and Engineering Center, 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 forty minutes, 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 1997 Antarctic AWS data for publication should acknowledge the support of NSF-OPP Grant 94-19128 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, ^{o}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, ^{o}C.	Maximum value for the month.
Minimum air temperature, ^{o}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. Data Summaries

After the data are received from Service ARGOS, ten minute interval data are created for each AWS unit. The data are calibrated for the individual station instruments, but no other corrections are made. This data set is created for those users who need fairly current information. These data are available by anonymous FTP (see Section 8).

The 10 minute data set for each AWS unit for the month is scanned to pick out the nearest observation within forty minutes 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 forty minutes of 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 10 minute 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 Section 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 $0^{o}C$. 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 to check the temperature calibration.

5.2. Pressure

The atmospheric pressure transducer is a Parascientific model 215A digiquartz pressure gauge. The transducer frequency changes from a nominal 40 kHz at zero pressure to a nominal 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. Recalibration of each pressure transducer would be desirable when each unit is serviced.

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^{o}. 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^{o} end of the boom may point in a direction other than south. At Manuela site, the 180^{o} 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^{o} 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 1997. 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 10,000 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^{o}C temperature difference between the junctions at 0.0^{o}C, dropping to 60 microvolts at -80^{o}C. Zero output is adjusted to 0.4 volts, so that 0 to 1 volt corresponds to a -6^{o}C to +9^{o}C range of air temperature differences between 3 m and 0.5 m. The resolution is 0.05^{o}C. 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 1997

6.1. AWS Performance

Forty-seven AWS units were installed at the start of 1997 and 49 were installed by the end of 1997. Based on the installation months the AWS units delivered 75% of the temperature data, 73% of the pressure data and 63% of the wind data during 1997. Complete data sets were received from 6 AWS units and 29 AWS units operated for the installed period. Twenty AWS units were not received for one month or more during the year or stopped during the year. Many of the stations were not received during the winter months due to low battery voltage. Some exceptional periods of bad weather during the 1996-1997 austral summer prevented maintenance work including replacing batteries.

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. he 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. We have begun to install a new wind system manufactured by R.M. Young.

Site	Performance
Dome C II	OK.
Port Martin	Station began transmitting sporadically in March and stopped in April due to low battery voltage. A Hydro-Tech anemometer is installed instead of delta-T sensor. Pressure corrected for high wind speed conditions.
Cape Denison	Erratic transmissions after March due to low battery voltage. Transmissions stopped in August. Aerovane failed but Hydro-Tech

	anemometer installed instead of delta-T sensor continued to function. Pressure corrected for high wind speed conditions.
Penguin Point	A Vaisala anemometer is installed instead of the delta-T sensor. Wind speed from the Vaisala anemometer was substituted for the Belfort aerovane wind speed after Mar. 23 since the aerovane wind speed was not functioning. Pressure corrected for high wind speed conditions.
Sutton	Transmitted only parts of January, February, March, June, August, September, October because tower may be leaning or have fallen. Wind speed and direction removed after January. A Hydro-Tech anemometer is installed instead of a delta-T sensor.
Cape Webb	Aerovane not operating. A Hydro-Tech anemometer is installed instead of the delta-T sensor. The station stopped 23 February.
Byrd	Station resumed transmitting on 18 January after power was disconnected and reconnected. Aerovane operated intermittently June through November.
Mount Siple	Pressure erratic in summer half of year. Site has a "dog house" AWS without wind speed and direction.
J.C.	New batteries were installed and the R.M. Young wind sensor was replaced on 21 January. No humidity sensor. Delta-T sensor not functioning. Station stopped 8 August.
Theresa	Station not functioning from early May to early August. Delta-T not functioning properly mid-February to mid-November.
Doug	New station installed 20 January. Station stopped 7 May.
Elizabeth	Station transmitted erratically January to early February, August, September, November, and December. Aerovane operated intermittently April through September.
Brianna	Station transmitted intermittently after mid-May and stopped 13 July due to low battery voltage.
Erin	Aerovane not functioning. Station stopped 19 July due to low battery voltage and resumed transmission in late September as battery recharged in the austral spring.
Siple Dome	New station installed 21 January. Delta-T sensor not installed. Aerovane operated intermittently April through October.
Swithinbank	New station installed 18 January. Delta-T sensor not functioning.
Marble Point	Station transmitted intermittently between August and mid-September due to low battery voltage.
Ferrell	Aerovane operated intermittently July through September.
Pegasus North	Relative humidity sensor not functioning properly. Aerovane operated intermittently February through May and then not at all for the rest of the year. Station did not transmit from mid-June through mid-August.
Pegasus South	Relative humidity sensor not functioning.
Minna Bluff	Station stopped 5 July.
Linda	Station stopped transmitting mid-May through mid-June and stopped 9 September. Aerovane operated intermittently in July and August.
Willie Field	OK.
Whitlock	Station did not transmit from July through mid-October. Delta-T sensor not functioning. Aerovane operated intermittently in April and May.
Scott Island	New station installed on 13 February. Site has a "dog house" AWS without wind speed and direction.
Young Island	Station stopped transmitting 20 December. Site has a "dog house" AWS without wind speed and direction.

Possession Island	Station tranmission became more erratic in November and December. Site has a "dog house" AWS without wind speed and direction.
Marilyn	Aerovane operated intermittently in June and October.
Schwerdtfeger	Wind system operated intermittently from mid-June until the end of the year. Relative humidity sensor functioning erratically after February.
Gill	Aerovane operated intermittently from May through July and not at all from August through mid-November. Relative humidity sensor not functioning.
Lettau	Station transmitted erratically from the end of January and stopped 23 February. It began transmitting erratically again at the end of September.
Elaine	Station replaced 2 January. Aerovane operated intermittently April-May and did not operate from June-December.
Manuela	Aerovane replaced on 10 February. Aerovane stopped 3 August after several days of high winds.
Lynn	Aerovane not functioning properly after mid-June.
Larsen Ice	Aerovane replaced 5 February. Station operated intermittently from the end of June through the end of August due to low battery voltage. Aerovane operated intermittently in September.
Butler Island	Aerovane replaced 11 February. Pressure had to be corrected due to a failure of the precision time-based correction to the system clock. Aerovane “frozen” most of the time in May and August through November.
Uranus Glacier	Station off the first week of January and the second week of February. Station stopped 24 June due to low battery voltage and resumed transmission at the end of August.
Limbert	Aerovane “frozen” most of the time from the end of March to the end of November.
Racer Rock	Intermittent data transmission until the end of September.
Bonaparte Point	Aerovane occasionally not functioning properly May-June and September. Transmissions more erratic October-December. Relative humidity sensor not functioning.
AGO-A84	Intermittent data transmission January-March. Station stopped transmitting end of March due to low battery voltage. Only a few transmissions received September-October.
Ski-Hi	Intermittent data transmissions.
Santa Claus Island	Wind system fixed 8 January. Station transmissions became more intermittent November-December.
Clean Air	Pressure jumps erratically during the colder months.
Henry	Station stopped 11 September due to low battery voltage and resumed transmission 16 October as battery recharged in the austral spring.
Nico	Aerovane occasionally “frozen” during the winter months.
Relay Station	OK.
Dome Fuji	Two stations were installed at this location for 1997. The original station had a problem with the pressure and an old wind system. The new station has a newer model wind system but the transmissions are more erratic. The new station will appear in the monthly summary statistics.

6.2. AWS Antarctic Field Activities

Field activities for 1997 began with the arrival of Robert Holmes in late December of 1996. On 2 January, a Twin Otter flight was made to Elaine AWS site. The site was raised by on 0.9 m tower section and the lower delta-T sensor was raised to a height of 1.0 m. AWS 8900 was replaced with AWS 8915.

For the next twelve days, efforts to fly via Twin Otter to Lettau AWS site were hampered by fog at Lettau. On 13 January, a Twin Otter flight was made to Lettau AWS site, but the aircraft was unable to land due to fog.

On 17 January, R.E. Holmes left McMurdo Station for Siple Dome field camp via LC-130. On 18 January, Byrd AWS site was visited by Twin Otter. The unit began operating after disconnecting and reconnecting power. The unit was raised by one 1.5 m tower section. The solar panels and power junction box were also replaced. Also on 18 January, AWS 21356 was installed in West Antarctica. This new location is called Swithinbank.

On 20 January, a Twin Otter flight was made to J.C. AWS site. The aircraft was unable to land due to fog at J.C. site and continued on to Doug AWS site. AWS 21359 was removed and replaced with AWS 8922.

On 21 January, AWS 8900 was installed approximately 3 km to the true east of the Siple Dome field camp. This new location is called Siple Dome. Also on this day, the crew of the Twin Otter visited J.C. AWS site on their way to South Pole. They replaced the R.M. Young wind sensor and installed two boxes of three gel-cell batteries.

On 25 January, a USCG helicopter flight was made to Cape Bird to search for a suitable location to install an AWS unit. On 29 January, a USCG helicopter flight to install a new AWS unit at a location east of Cape Crozier was cancelled due to weather.

On 30 January, A USCG helicopter flight was made to a location east of Cape Crozier, but the aircraft was unable to land due to fog. AWS 8983 was installed in the doghouse on the USCG Icebreaker Polar Sea for deployment on Scott Island.

On 31 January, the USCG helicopter flight to install the new AWS unit east of Cape Crozier was again cancelled due to weather. On 2 February, an aerovane was brought aboard the USCG Polar Sea to be installed at Manuela AWS site.

On 10 February, the Coast Guard icebreaker crew, under the direction of Lt. John Talbert, replaced the wind system at Manuela AWS site in spite of the -60^{o}F wind chill. The crew installed a doghouse AWS unit, ID 8983, on Scott Island on 13 February. They were able to remove the electronics, thermometer, and antenna from the old unit. This is the first time we have recovered anything from a doghouse AWS unit that has stopped operating. We now have the triangle of Young Island, Possession Island, and Scott Island operational again.

On the Antarctic Peninsula, the British Antarctic Survey (BAS) visited the Larsen Ice Shelf AWS site on 5 February. The tower was raised 3 feet, two deadmen and guys were installed, and the wind vane and prop were replaced. The site is 18 miles from the ice edge. At Butler Island AWS site on 11 February, the tower was raised 3 feet, and the wind vane was replaced.

The Japanese (JARE) installed AWS 8904 near AWS 8982 at Dome Fuji on 4 February.

7. GLOBAL TELECOMMUNICATIONS SYSTEM

The data from 34 Antarctic AWS units were entered into the Global Telecommunications System (GTS) during 1997. 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 Largo 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.

8. DATA AVAILABILITY

The data from our Automatic Weather Stations are available by anonymous FTP. The IP number is 144.92.108.169 (ice.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 in this format. 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.updates” 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. To subscribe, send email to majordomo@ice.ssec.wisc.edu with the subject line left blank. In the message body, type “subscribe three yourname@email.address” (do not use quotation marks) and substitute your own email address for ”yourname@email.address”.

The directory pub/summary/monthly 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/monthly.

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 what station's data are contained in which files.

Several important readme files are located in pub/10min/rdr. 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 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, and the file “readme.mailinglist” contains information on joining a mailing list to receive notification by email of data changes and updates. To subscribe, send email to majordomo@ice.ssec.wisc.edu with the subject line left blank. In the message body, type “subscribe ant yourname@email.address” (do not use quotation marks) and substitute your own email address for “yourname@email.address”. If you would like to see a list of all available mailing lists, please send email to majordomo@ice.ssec.wisc.edu with the subject line blank. In the message body type “list”.

Our site is available 24 hours a day, 7 days a week. If you have questions or problems, send email to aws@ice.ssec.wisc.edu. We can also be reached by phone at (608) 265-4816 or fax at (608) 262-5947. By mail, please contact:

Linda M. Keller
University of Wisconsin
Department of Atmospheric and Oceanic Sciences
1225 W. Dayton St.
Madison, WI 53706
USA

9. ACKNOWLEDGMENTS

This work is supported by the National Science Foundation, Office of Polar Programs, Grant 9419128 under the management of Dr. Bernhard Lettau. Expeditions Polaires Francaises installs and maintains the AWS units from the Adelie Coast to Dome C II. The British Antarctic Survey maintains the AWS units on the east side of the Antarctic Peninsula and south of Adelaide Island. The Japanese Antarctic Research Expedition (JARE) installs and maintains the AWS units at Relay Station and Dome Fuji.

Antarctic Automatic Weather Station Data for the calendar year 1997

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

February 2001