Antarctic Automatic Weather Stations
Field Report for 1998-1999

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The National Science Foundation's Office of Polar Programs funds the placement of automatic weather station (AWS) units in remote areas in Antarctica in support of meteorological research, applications and operations. The basic AWS units measure air temperature, wind speed and direction at a nominal height of 3 meters above the surface. Air pressure is measured at the height of the electronic's enclosure. Some units measure relative humidity at 3 meters above the surface and the air temperature difference between .5 and 3 meters above the surface at the time of installation. The data are collected by the ARGOS Data Collection System (DCS) on board the National Oceanic and Atmospheric Administration (NOAA) series of polar-orbiting satellites.

The AWS units are located in arrays for specific proposals and at other sites for operational purposes. Any one AWS may support several experiments and all support operational meteorological services - especially support for weather forecasts for aircraft flights.

Research areas supported include:

1. Barrier wind flow along the Antarctic Peninsula and the Transantarctic Mountains.
2. Katabatic wind flow down the Reeves, Byrd and Beardmore Glaciers, the Siple and Adelie Coast.
3. Mesoscale circulation and sensible and latent heat fluxes on the Ross Ice Shelf.
4. Climatology of Byrd and Dome C sites.
5. Meteorological support around the South Pole.
6. Meteorological support for the West Antarctic Ice Sheet Initiative and the International Trans-Antarctic Scientific Expedition.
7. Long Term Ecological Research (LTER) along the Antarctic Peninsula.
8. Meteorological support for flight operations at McMurdo Station.

Table 1 gives the site name, ARGOS identification number (ID), location, start date for the United States Antarctic Program AWS sites, and the World Meteorological Organization (WMO) number for the Global Telecommunications System (GTS) if the site is used in the GTS. Figure 1 shows the locations of the USAP AWS sites on a map of Antarctica along with the USAP Automatic Geophysical Observatory (AGO) sites. Table 2 lists the USAP AWS sites in the order of the ARGOS ID and Figure 2 gives the ARGOS ID for the sites. Figure 3 shows the USAP AWS and AGO sites, the Australian National Antarctic Research Expedition (ANARE) AWS sites, and one Programma Nazionale Di Ricerche in Antartide AWS site. Figure 4 shows the sites in Figure 3 identified by the ARGOS ID. Figures 5, Ross Island area fog forecasting; Figure 6, Ross Sea, Ross Ice Shelf, and West Antarctica; Figure 7, Adelie Coast; and Figure 8,

Antarctic Peninsula; show the AWS sites in areas where the sites are close together.

Field work completed for 1998-1999

A. Polar Sea based operations:

For the 1998-1999 field season Charles R. Stearns boarded the ice breaker Polar Sea at Hobart, Tasmania on 13 December 1998 and departing from Hobart on 15 December 1998 for the cruise to McMurdo, Antarctica. The first stop was at D-10 on the Adelie Coast near Dumont d'Urville on 20 December 1998. Visibility was near zero due to fog and it was not possible to fly to Dumont d'Urville, D-10, Sutton, Port Martin, or Cape Denison. The poor visibility was forecast to continue so the decision was made to transit to Cape Webb arriving there the morning of 21 December 1998. The weather was clear and a helicopter flight was made to Penguin Point with Dr. Anthony Worby assisting in the repair of the AWS unit. AWS 8929, boom, aerovane, and antenna were removed. The antenna had a 1/4" rod through the 9/16" diameter delrine at the antenna base and apparently did not damage the transmitter due to the impedance mismatch in the base. The high wind speed and direction systems were installed along with AWS 8910. The site was in good shape, the battery voltage was 13.5 vdc after disconnecting the power. The rocks in the area were covered with snow. AWS 8910 cycled properly. AWS 8929, boom, aerovane, and antenna were returned to the ice breaker.

After lunch the two helicopters were loaded for the trip to Cape Webb. Gerd Wendler and C. Stearns were in the first helicopter and looking for a better site for the Cape Webb AWS. After flying over the old site we landed in the general area due to confusion about where we were and where we were going. Gerd Wendler saw a line of rocks on the rim of the bowl were the old site was located. He took off across the snow for the line of rocks and reached them in about 30 minutes. C. Stearns took off after him as he neared the top of the rim. The second helicopter landed at Gerd Wendler's location. After C. Stearns reach the rim, and a short discussion took place between Gerd Wendler and C. Stearns, it was agreed that Gerd had located an excellent site for the AWS unit and it could be anchored to the rocks easily. The equipment was unloaded from the helicopter which then flew to the old site to dismantle the AWS unit under the guidance of Anthony Worby. The tower had collapsed and was partially buried in the snow covered ice. The antenna end of the boom of the boom was buried in the ice as was the electronics box on the underside of the tower and the aerovane tail was buried. The battery boxes could not be recovered but two batteries were removed. The recovered equipment consisted of the tower, solar panel, electronics box, junction box, antenna, aerovane, and high wind speed anemometer. The antenna was broken off at the base. The high wind speed system was not working because the top bearing was broke, and the power plug was severed close to the electronics box. The helicopter was loaded and flew to the new site at the rocks.

Due to the damage to the equipment and the inability to remove any of the chain it was not possible to install the unit at the new site without going to the ice breaker for the necessary equipment. Contact with the ice breaker revealed that the ice breaker was in fog and if we returned we would not be able to fly back to the site. The two battery boxes, all tower sections, and the solar panel were left at the new site because there was insufficient room in the two helicopters for the people and the equipment. We left for the ice

breaker. When we landed the visibility was about 100 m. The visibility was still limited the next morning so we left for the cruise around the ice going north of the Balleny Islands and east of Scott Island for Cape Hallett.

We could not get to Terra Nova Bay and Manuela site on Inexpressible Island because of ice conditions. On January 3, 1999 C. Stearns and MST Kelly stopped at Whitlock site on Franklin Island and found that the snow was up to the top of the tower and partially covering the solar panel. The aerovane was replaced and the solar panel was uncovered in the hopes that the AWS unit would start if the batteries could be charged. There was about one foot of snow over ice at the tower so we did not try to raise the tower. The ice breaker limited our time on the island to two hours because they were behind schedule for ice breaking to McMurdo. During the next field season the unit should be dug out and the tower raised and anchored. C.R. Stearns arrived at McMurdo on 4 January 1999. Whitlock AWS was being received for a few transmissions so the unit is operating but the solar panel was covered with snow again.

B. McMurdo Based Operations:

AWS 8938, programmed for a snow temperature profile to 10 m and intended for installation at Siple Dome, was tested for the multiplexer channel in cycle 2 and found to be correctly wired and that all levels of temperature measurement were operating properly along with the -10 m snow temperature. The data words are: 5, 6, short for amplifier zero; 0.00 m to lower delta T on tower, 7; 1 m to 0.75 m, 8; 0.75 to 0.50 m, 9; 0.50 m to 0.25 m, 10; 0.25 m to 0.00 m, 11; 0.00 m to -.025 m, 12; -0.25 m to -0.50 m, 13; -0.50 m to -1.00 m, 14; -1.00 m to -2.00 m, 15; -2.00 m to -4.00 m, 16; -4.00 m to -7.00 m, 17, -7.00 m to -10.00 m, 18; air temperature, 1 and 2; -10.00 m snow temperature, 3 and 4; cycle count, 27; battery voltage, 31.

On 11 January, 1999, Marble Point AWS site was visited by helicopter. Two boxes of batteries were installed. A new set of coordinates were obtained using differential GPS and equipment borrowed from the UNAVCO group. On 13 January, Pegasus North AWS site was visited by truck. AWS 8927 was replaced with 8928. Willie Field AWS was also visited and a two-meter snow pit was also dug for the purpose of snow sampling by Sarah Das.

Ferrell AWS site was visited by helicopter on 14 January. The unit was nearly completely buried in the snow. Two boxes of batteries were left at the site for installation at a later date when the unit could be properly raised.

On 16 January AWS 8929, removed from Penguin Point and equipped to measure relative humidity, was put on the air and found to be operating correctly. At 0825 local time the Parascientific gauge indicated 14.2629 PSIA and the data words 1-8 were 059 211 190 000 182 240 002 097. The unit was installed at Willie Field about 1300 local time along with a Bendix aerovane, relative humidity, but without a vertical air temperature difference. The boom height was about 2.5 m. AWS 8901 was removed in November for installation at Windless Bight. This removal was a mistake because we did not have records at Williams Field for fog events prior to 16 January 1999.

On 17 January, Pegasus North AWS site was visited again by truck. A new boom was installed. On 18 January 1999 the relative humidity on AWS 8927 was not working and the reason was the terminal screw for the output was missing so the relative humidity output was not connected. The screw was found in the plastic bag enclosing the electronics and reinstalled and upon testing the

relative humidity was being measured. The transmitter is a PRL. The TX test had data words 1-8 as 060 003 196 073, 250 207 000 093 and the Parascientific pressure was 14.4049 PSIA.

On 19 January 1999 the helicopter flight to Ferrell site was turned around 5 nm west of Ferrel due to fog which was present to the south and north at the turn around point. On 21 January 1999 a flight was made to Cape Bird with Peter Brookman, NZ and John Wilson, NZ to select a site for the Cape Bird AWS unit. A slightly sloping area was found east of and slightly above of the hut that would be very satisfactory. There was a spot 300 m away that could be used to land a sling load of equipment to avoid hauling everything up the rather steep slope from the normal helicopter landing site. Skuas are occupying some of the area near the site and are not to be disturbed.

Fog was over the sound and around McMurdo on 25 January 1999. On 26 January 1999 a flight was made by C. Stearns and Tony Worby to Minna Bluff where AWS 8935 was installed using a high wind speed boom with an HMP 35A relative humidity sensor. The use of this unit meant that we could not install a high wind speed system at Manuela Site using the ice breaker. The site was easily found. The RMY wind bird was broken. AWS 21360 and the boom and high wind speed sensor were removed. We stopped at Pegasus South on the return flight and replaced the boom. The relative humidity did not operate so the electronics needs to be remove. If this is done the temperature profile in the ice to a depth of 1.6 m will be disconnected and may not be placed in operation again. We flew back to McMurdo to unload, gassed up, and loaded the equipment for Windless Bight. AWS 8927, along with the boom with an HMP35A and RMY wind bird that was tested together earlier, were installed at Windless Bight. AWS 8901, boom and wind bird were returned to McMurdo. While at Windless Bight fog was moving towards us from Cape MacKay. We took off about 1500 and at the time we left the fog had reached our position moving from east to west.

On 21 January, Ferrell AWS site was again visited by helicopter. The unit was raised by one five-foot tower section and the new batteries were installed. A new solar panel and junction box were also installed. A two-meter snow pit was also dug for the purpose of snow sampling by Sarah Das.

In the evening of 23 January, Robert Holmes and Sarah Das left McMurdo Station for Siple Dome field camp. On 24 January, Siple Dome AWS was visited by snowmobile. AWS 8900 was replaced with AWS 8938 and a new antenna was installed. The construction of the snow pit and hole for the installation of the 10 m vertical snow temperature profile was began. On 25 January, the site was again visited by snowmobile and the installation of the snow temperature profile was completed. AWS 8900 was installed at Harry site replacing AWS 21355.

On 26 January, Lettau AWS site was visited by twin otter from Siple Dome field camp. The unit was raised by one five-foot tower section and new batteries were installed. A two-meter snow pit was also dug for the purpose of snow sampling by Sarah Das.

AWS 8901 was put on the air at 1600, 26 January 1999 for testing. On 28 January 1999 C. Stearns installed Cape Bird AWS 8901 assisted by Rosemary and Carl from the BFC. The wind speeds were above 30 kts during the installation. The relative humidity did not work and may have been damaged during the helicopter sling load to Cape Bird. The wind system, pressure, and temperatures were working properly after the installation. The 3 m tower was anchored by four 25 foot 1/2" nylon ropes to 25 foot chains to 3' x 4' plywood

boards piled high with rocks with one stake driven into the ground at the front of the board.

AWS 21360 was put on the air for checking prior to installation at Cape Crozier. Poor flying weather due to fog prevented installation at Cape Crozier prior to leaving McMurdo for Christchurch. The unit is in the storage hut for installation during the 1999-2000 season.

The AWS units at White Out and White Island are for SPAWAR for fog forecasting for Williams Field. About 30 or 31 January 1999 the AWS units were removed from the sites in Table 1 and 2 and installed at Cape Spencer, ID 8697, 77.97°S, 167.55°W and Herbie Alley, ID 8722, 78.10°S, 166.67°E.

C. Field work by the Institut Francais Pour la Recherche et la Technologie Polaires (IFRTP) at Dumont D'Urville:

AWS Site	ARGOS ID	Lat. (deg)	Long. (deg)	Alt (m)
D-10	8914	66.71°S	139.83°E	243
D-47	8986	67.397°S	138.726°E	1560
D-57	8912	68.199°S	137.538°E	2105
D-80	8916	70.040°S	134.878°E	2500
Dome C II	8989	75.121°S	123.374°E	3250

AWS equipment was to be transported to Dumont d'Urville from the Polar Sea. The visibility was low enough that the helicopters could not fly when the Polar Sea reached Dumont d'Urville and the equipment could not be transported to the station although we waited 24 hours for the visibility to increase.

The IFRTP raised the tower, repaired the wind sensor, and installed AWS 8912 at D-57 and was operating properly at the end of April 1999. D-10 (AWS 8914) stopped in the middle of the summer, was reboooted, and was operating satisfactorily at the end of April 1999 as was D-57 and Dome C II. D-80 was not repaired due to the lack of the equipment from the Polar Sea.

D. Field work by the Japanese Antarctic Expedition from Dome Fuji:

No field work was done during the 1998-1999 field season.

E. Field work by the British Antarctic Survey (BAS) from Rothera Station:

Larsen Ice	8926	66.949°S	60.914°W	17
Butler Island	8902	72.207°S	60.171°W	91
Uranus (Atoll)	8920	71.43°S	68.93°W	780
Limbert (Shelf)	8925	75.422°S	59.948°W	40
AGO-A84	8932	84.36°S	23.86°W	2103
Ski-Hi (Ski Blu)	8917	74.975°S	70.766°W	1395

Limbert site was visited on 25 October 1998 and the aerovane was replaced. The tower was raised 2 sections and the antenna was replaced on 31 January 1999. The Limbert site AWS transmits intermittently and needs new batteries.

Uranus Glacier was raised 2 tower sections on 3 November 1998, a damaged solar panel was replaced, and new connections made to the cable to the regulator box which is buried in the snow. The batteries are not holding the charge and need to be replaced.

Butler Island aerovane was replaced on 25 October 1998 because the wind direction had jammed due to ice. The batteries are not holding charge as the AWS unit is transmitting intermittently.

Larsen was visited on 1 February 1999 and found to be over 10 nm from the ice edge. The aerovane failed due to a loose screw and a failed wind direction resistor and was replaced with the repaired aerovane from Limbert site.

The Ski Hi AWS unit was moved to Sky Blu on 6-7 February and erected on the east side of the approach to Sky Blu ice runway. A new location for the site is needed. The only site not received in April 1999 was AGO-A84. The three sites with weak batteries are not likely to operate in the absence of sunlight.

F. Field work based at Palmer Station:

Racer Rock	8947	64.067°S	61.613°W	17
Bonaparte Point	8923	64.778°S	64.067°W	8
Santa Claus Is.	21364	64.964°S	65.670°W	25

Two boxes of three batteries each and battery cables were added to Racer Rock AWS unit on 23 December 1998 by Kevin Bliss. Upon testing the AWS unit was operating properly and data were received at the end of April 1999.

Bonaparte Point was visited on 27 February 1999 and the wiring from the solar panel was connected backwards. After reversal the batteries started charging and at the end of April 1999 data were being received.

Santa Claus Is. AWS unit started transmitting garbage on 27 February 1999 and then ceased transmitting. A trip was made to the island by Jeff Otten on the L.M. Gould and no signal was detected. The batteries and solar panel checked out okay. The AWS electronics, boom and associated sensors were removed to the ship and returned to Palmer Station. Later testing showed that the AWS unit was operating properly but the antenna and antenna cable were shorted by salt water. Another unit with an enclosed antenna was shipped to Palmer Station for installation at Santa Claus Island.

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.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.

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 5 digit 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 Lazzara at mattl@ssec.wisc.edu. We can also be reached by phone at (608) 265-4816 or fax at (608) 263-6738. By mail, please contact:

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Table 1. The 1999 Antarctic automatic weather station site name, ARGOS identification number, latitude, longitude, altitude above sea level, site start date and WMO number for the Global Telecommunications System.

Site	ARGOS ID	Lat. (deg)	Long. (deg)	Alt. (m)	Date Start	WMO#
			Adelie Coast			
D-10	8914	66.71°S	139.83°E	243	Jan 80	89832
D-47	8986	67.397°S	138.726°E	1560	Nov 82	89834
D-57	#8912	68.199°S	137.538°E	2105	Jan 96	
D-80		70.040°S	134.878°E	2500	Jan 83	89836
Dome C II	8989	75.121°S	123.374°E	3250	Dec 95	89828
Port Martin	8930	66.82°S	141.40°E	39	Jan 90	
Cape Denison	8907	67.009°S	142.664°E	31	Jan 90	
Penguin Point	#8910	67.617°S	146.180°E	30	Dec 93	89847
Sutton	8939	67.08°S	141.37°E	871	Dec 94	
Cape Webb		67.943°S	146.812°E	60?	Dec 94	
			West Antarctica			
Byrd Station	8903	80.007°S	119.404°W	1530	Feb 80	89324
Brianna	21362	83.887°S	134.145°W	549	Nov 94	
Elizabeth	21361	82.606°S	137.082°W	549	Nov 94	89332
J.C.	21357	85.070°S	135.516°W	549	Nov 94	
Erin	21363	84.901°S	128.810°W	1006	Nov 94	
Harry	#8900	83.003°S	121.393°W	945	Nov 94	
Theresa	21358	84.599°S	115.811°W	1463	Nov 94	89314
Doug	8922	82.315°S	113.240°W	1433	Nov 94	
Mount Siple	8981	73.198°S	127.052°W	230	Feb 92	89327
Siple Dome	#8938	81.656°S	148.773°W	620	Jan 97	89345
Swithinbank	21356	81.200°S	126.174°W	945	Jan 97	
			Ross Island Region			
Marble Point	8906	77.439°S	163.754°E	108	Feb 80	89866
Ferrell	8934	77.910°S	170.817°E	45	Dec 80	89872
Pegasus North	#8928	77.952°S	166.505°E	10	Jan 90	89667
Pegasus South	8937	77.990°S	166.576°E	10	Jan 91	
Minna Bluff	#8935	78.554°S	166.656°E	920	Jan 91	89768
Linda	8919	78.480°S	168.375°E	50	Jan 91	89769
Willie Field	#8929	77.865°S	167.017°E	40	Jan 92	
Windless Bight*	#8927	77.728°S	167.703°E	61	Nov 98	
White Out*	#8697	77.871°S	168.160°E	30?	Nov 98	
White Island*	#8722	78.086°S	168.012°E	30?	Nov 98	
Cape Bird*	#8901	77.221°S	166.433°E	70?	Jan 99	
			Ocean Islands			
Whitlock	8921	76.144°S	168.392°E	274	Jan 82	89865
Scott Island	8983	67.37°S	179.97°W	30	Dec 87	89371
Young Island	8980	66.229°S	162.275°E	30	Jan 91	89660
Possession Is.	8984	71.891°S	171.210°E	30	Dec 92	89879
Manuela	8905	74.946°S	163.687°E	80	Feb 84	89864
			Ross Ice Shelf			
Marilyn	8931	79.954°S	165.130°E	75	Jan 84	89869
Schwerdtfeger	8913	79.904°S	169.973°E	60	Jan 85	89868
Gill	8911	79.985°S	178.611°W	55	Jan 85	89376
Elaine	8915	83.134°S	174.169°E	60	Jan 86	89873
Lettau	8908	82.518°S	174.452°W	55	Jan 86	89377
			Antarctic Peninsula			
Larsen Ice	8926	66.949°S	60.914°W	17	Oct 85	89262
Butler Island	8902	72.207°S	60.171°W	91	Mar 86	89266
Uranus	8920	71.43°S	68.93°W	780	Mar 86	89264
Limbert	8925	75.422°S	59.948°W	40	Dec 95	89257
Racer Rock	8947	64.067°S	61.613°W	17	Nov 89	89261
Bonaparte Point	8923	64.778°S	64.067°W	8	Jan 92	89269
AGO-A84	8932	84.36°S	23.86°W	2103	Jan 96	
Ski-Hi (Sky Blu)?	8917	74.975°S	70.766°W	1395	Feb 94	89272
Santa Claus I		64.964°S	65.670°W	25	Dec 94	
			High Polar Plateau			
Clean Air	8987	90.00°S		2835	Jan 86	89208
Henry	8985	89.011°S	1.025°W	2755	Jan 93	89108
Nico	8924	89.000°S	89.669°E	2935	Jan 93	89799
Relay Station	8918	74.017°S	43.062°E	3353	Feb 95	89744
Dome Fuji	8982	77.31°S	39.70°E	3810	Feb 95	89734

* New site for 1999: # New ARGOS ID at the site for 1999: ? New location not known:

Table 2. The 1999 Antarctic automatic weather station site name, ARGOS identification number, latitude, longitude, altitude above sea level, site start date and WMO number for the Global Telecommunications System.

Site	ARGOS	Lat.	Long.	Alt.	Date	WMO#
	8695					
White Out*	#8697	77.871°S	168.160°E	30?	Nov 98	
White Island*	#8722	78.086°S	168.012°E	30?	Nov 98	
Harry	#8900	83.003°S	121.393°W	945	Nov 94	
Cape Bird*	#8901	77.221°S	166.433°E	70?	Jan 99	
Butler Island	8902	72.207°S	60.171°W	91	Mar 86	89266
Byrd Station	8903	80.007°S	119.404°W	1530	Feb 80	89324
	8904					
Manuela	8905	74.946°S	163.687°E	80	Feb 84	89864
Marble Point	8906	77.439°S	163.759°E	120	Feb 80	89866
Cape Denison	8907	67.009°S	142.664°E	31	Jan 90	
Lettau	8908	82.518°S	174.452°W	55	Jan 86	89377
	8909					
Penguin Point	#8910	67.617°S	146.180°E	30	Dec 93	89847
Gill	8911	79.985°S	178.611°W	55	Jan 85	89376
D-57	8912	68.199°S	137.538°E	2105	Jan 96	
Schwerdtfeger	8913	79.904°S	169.873°E	60	Jan 85	89868
D-10	8914	66.71°S	139.83°E	243	Jan 80	89832
Elaine	8915	83.134°S	174.169°E	60	Jan 86	89873
	8916					
Ski-Hi (Sky Blu)?	8917	74.975°S	70.766°W	1395	Feb 94	89272
Relay Station	8918	74.017°S	43.062°E	3353	Feb 95	89744
Linda	8919	78.480°S	168.375°E	50	Jan 91	89769
Uranus	8920	71.43°S	68.93°W	780	Mar 86	89264
Whitlock	8921	76.144°S	168.392°E	274	Jan 82	89865
Doug	8922	82.315°S	113.240°W	1433	Nov 94	
Bonaparte Point	8923	64.778°S	64.067°W	8	Jan 92	89269
Nico	8924	89.000°S	89.669°E	2935	Jan 93	89799
Limbert	8925	75.422°S	59.948°W	40	Dec 95	89257
Larsen Ice	8926	66.949°S	60.914°W	17	Oct 85	89262
Windless Bight*	#8927	77.728°S	167.703°E	61	Nov 98	
Pegasus North	#8928	77.952°S	166.505°E	10	Jan 90	89667
Willie Field	#8929	77.865°S	167.017°E	40	Jan 92	
Port Martin	8930	66.82°S	141.40°E	39	Jan 90	
Marilyn	8931	79.954°S	165.130°E	75	Jan 84	89869
AGO-A84	8932	84.36°S	23.86°W	2103	Jan 96	
	8933					
Ferrell	8934	77.928°S	170.820°E	45	Dec 80	89872
Minna Bluff	#8935	78.554°S	166.656°E	920	Jan 91	89768
	8936					
Pegasus South	8937	77.990°S	166.576°E	10	Jan 91	
Siple Dome	#8938	81.656°S	148.773°W	620	Jan 97	89345
Sutton	8939	67.08°S	141.37°E	871	Dec 94	
Racer Rock	8947	64.067°S	61.613°W	17	Nov 89	89261
Young Island	8980	66.229°S	162.275°E	30	Jan 91	89660
Mount Siple	8981	73.198°S	127.052°W	230	Feb 92	89327
Dome Fuji	8982	77.31°S	39.70°E	3810	Feb 95	89734
Scott Island	8983	67.37°S	179.97°W	30	Dec 87	89371
Possession Is.	8984	71.891°S	171.210°E	30	Dec 92	89879
Henry	8985	89.011°S	1.025°W	2755	Jan 93	89108
D-47	8986	67.397°S	138.726°E	1560	Nov 82	89834
Clean Air	8987	90.00°S		2835	Jan 86	89208
	8988					
Dome C II	8989	75.121°S	123.374°E	3250	Dec 95	89828
	21355					
Swithinbank	21356	81.200°S	126.174°W	945	Jan 97	
J.C.	21357	85.070°S	135.516°W	549	Nov 94	
Theresa	21358	84.599°S	115.811°W	1463	Nov 94	89314
	21359					
	21360					
Elizabeth	21361	82.606°S	137.082°W	549	Nov 94	89332
Brianna	21362	83.887°S	134.145°W	549	Nov 94	
Erin	21363	84.901°S	128.810°W	1006	Nov 94	
Santa Claus I	21364	64.964°S	65.670°W	25	Dec 94	

* New site for 1999: # New ARGOS ID at the site for 1999: ? New location not known:

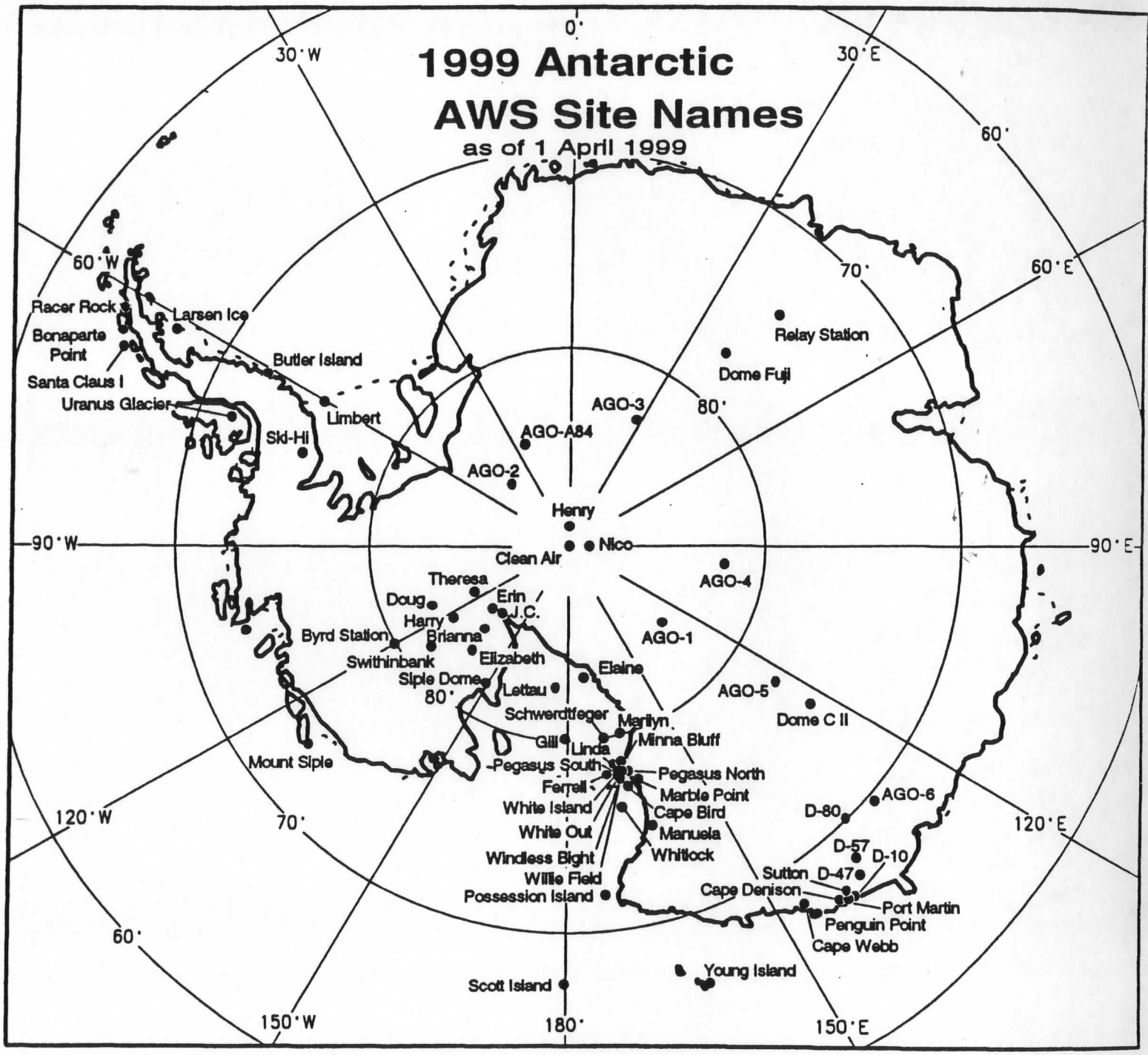

Figure 1. Map of Antarctica showing the locations of widely spaced USAP automatic weather stations (AWS) for 1999. Identification of the sites is by the site name. The locations of the USAP AGO sites are included but are not a part of the AWS program.

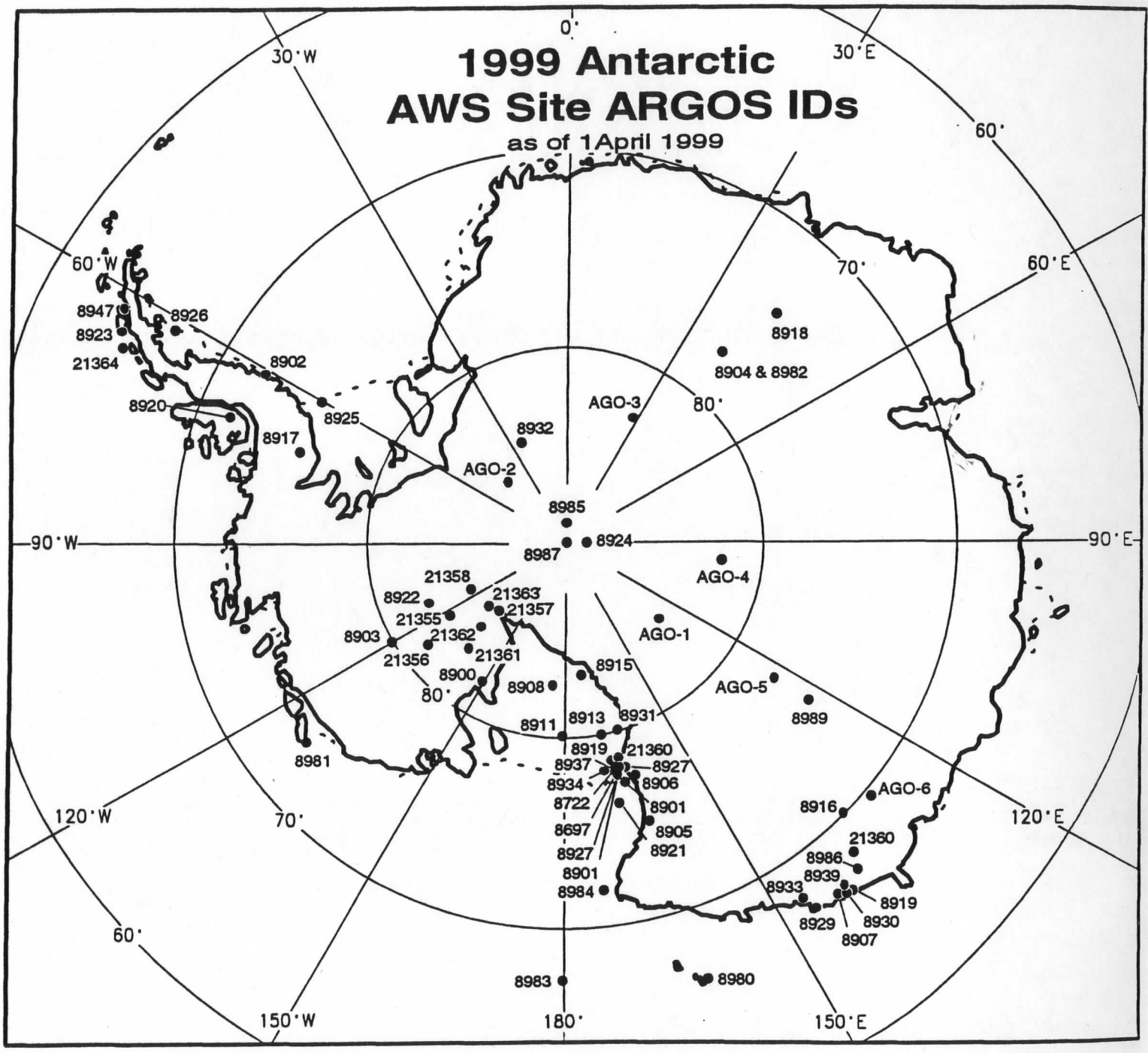

Figure 2. Antarctic AWS sites identified by the ARGOS identification number for 1999.

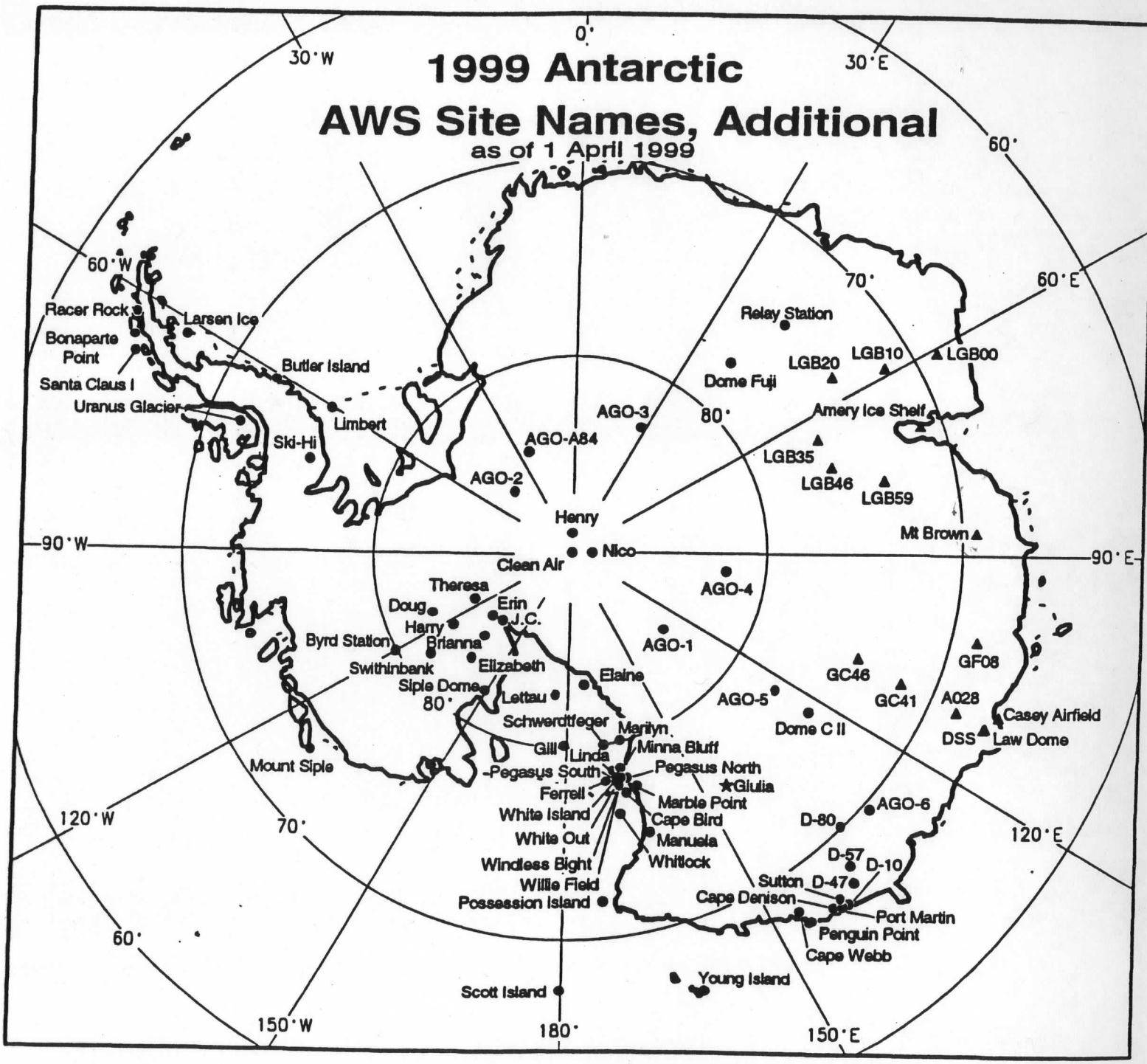

Figure 3. Additional AWS sites in Antarctica for 1999 to those shown in Figure 1. The triangle identifies the Australian sites and the star identifies one Italian site. There are several other Italian sites in the vicinity of Terra Nova Bay and Manuela site.

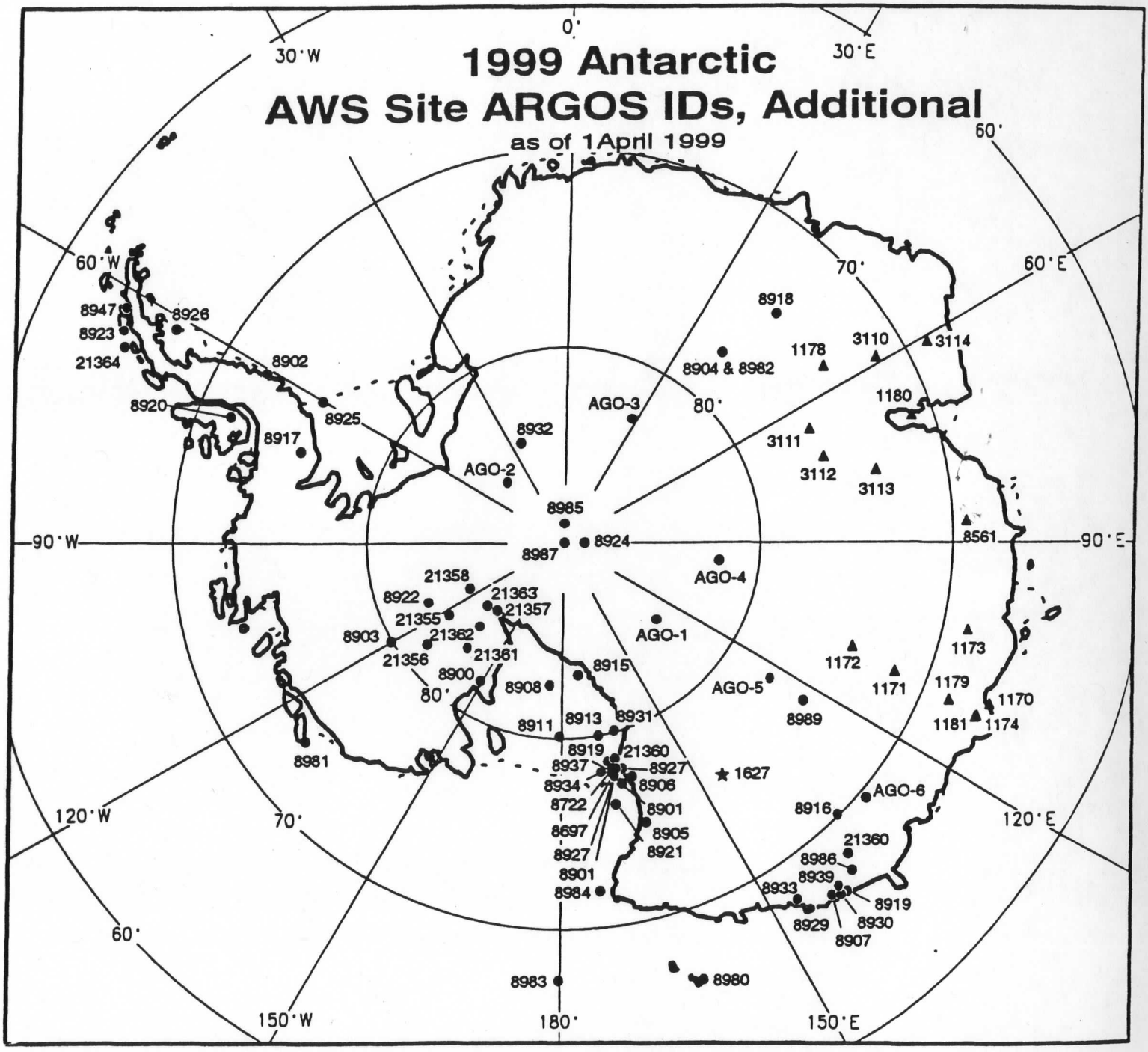

Figure 4. Additional sites for 1999 indicated by the ARGOS ID except for the USAP AGO sites.

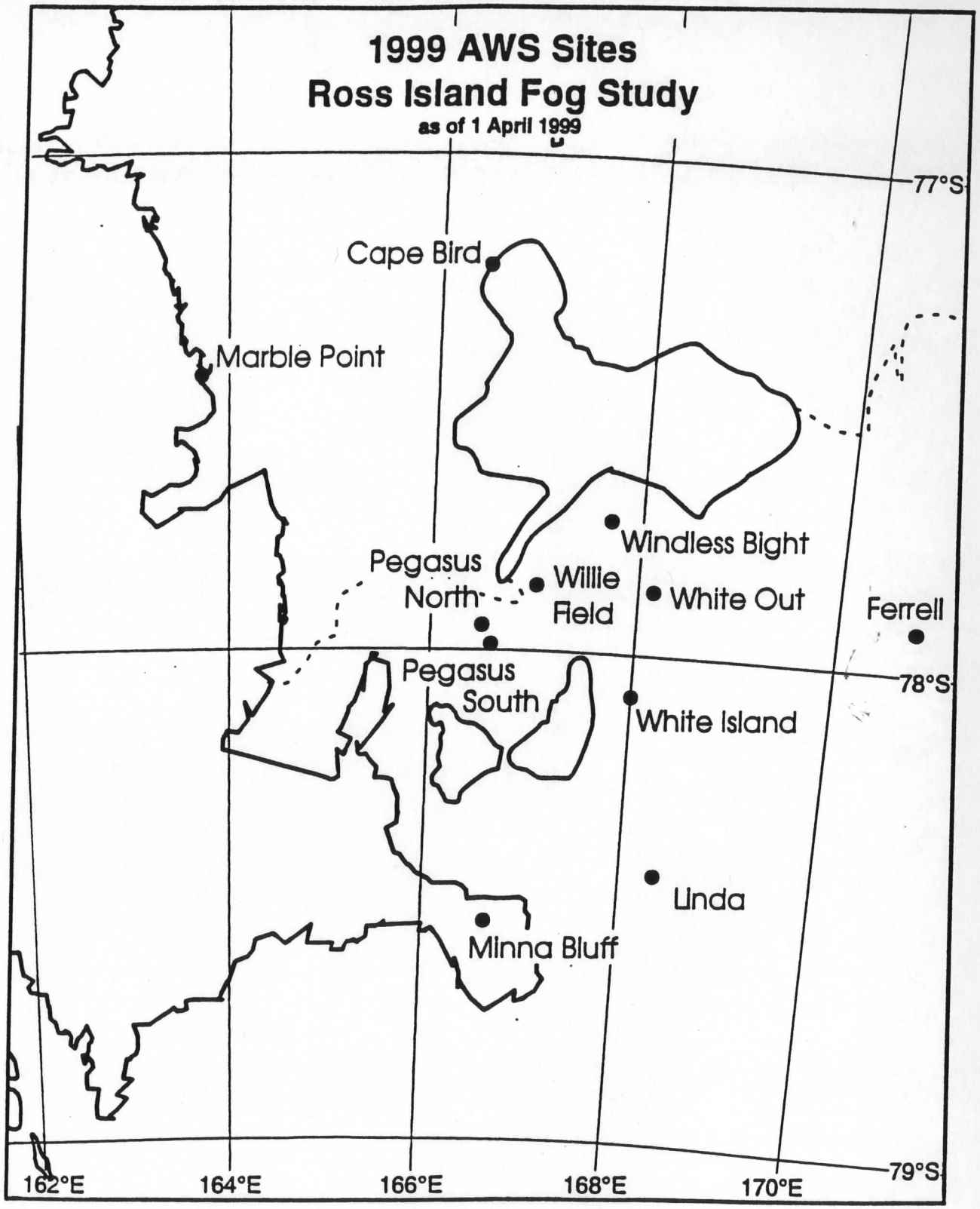

Figure 5. USAP AWS sites in the Ross Island area used for fog forecasting identified by the site name and the ARGOS identification number in parenthesis for 1999.

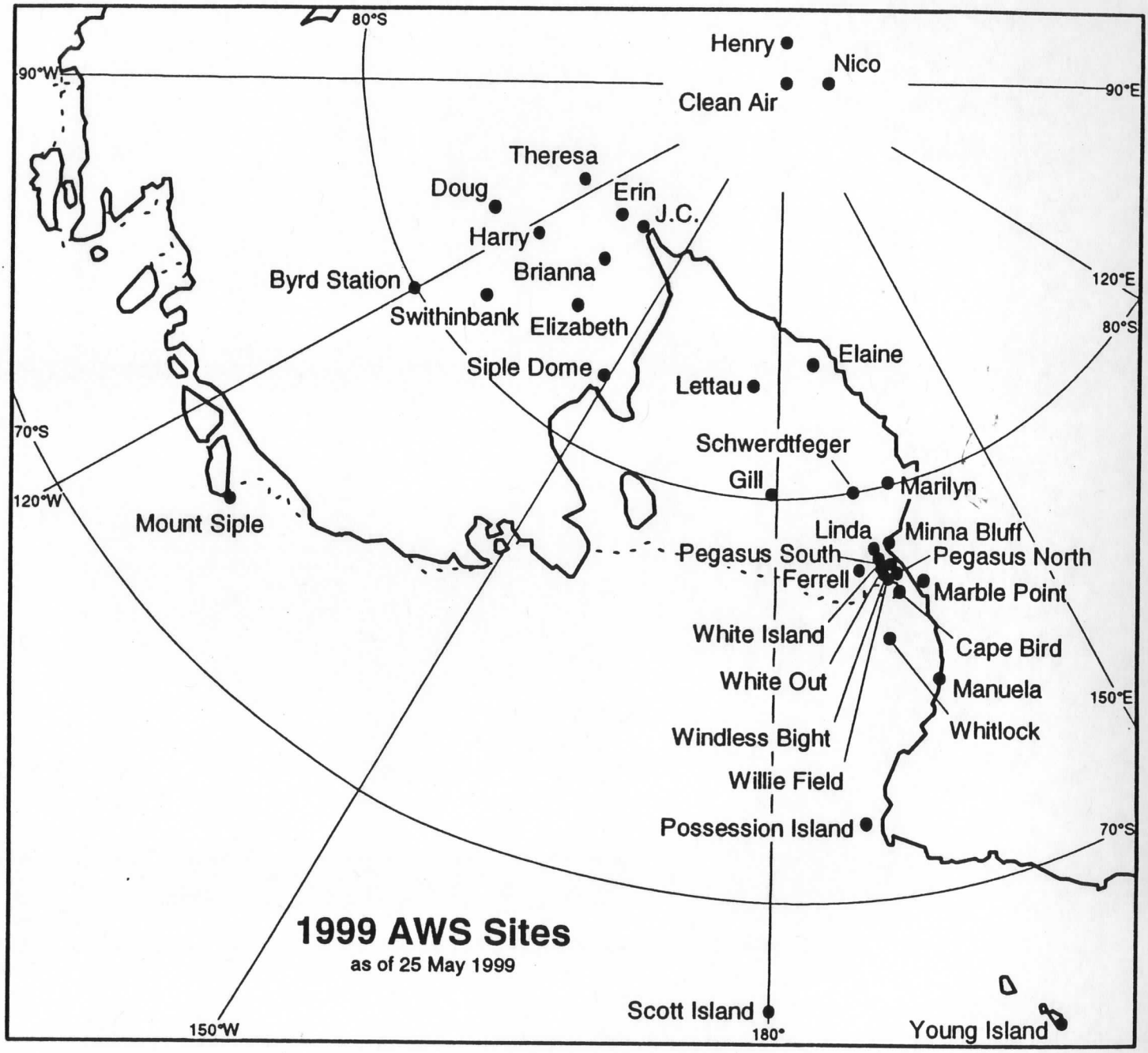

Figure 6. USAP AWS sites in the Ross Sea, Ross Ice Shelf, and West Antarctic areas identified by the site name for 1999.

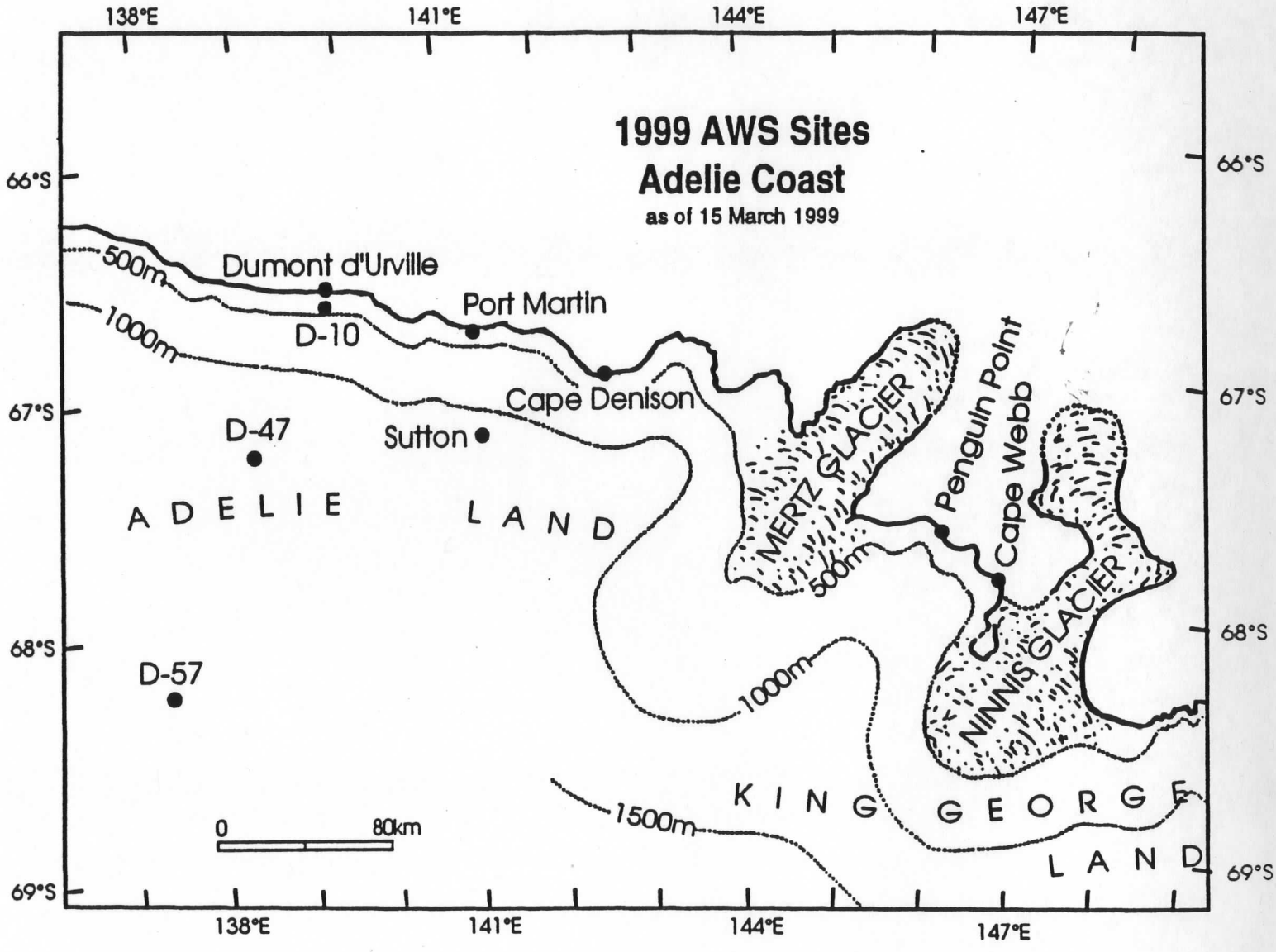

Figure 7. USAP AWS sites for 1999 in the vicinity of the Adelie Coast, Antarctica identified by the site name.

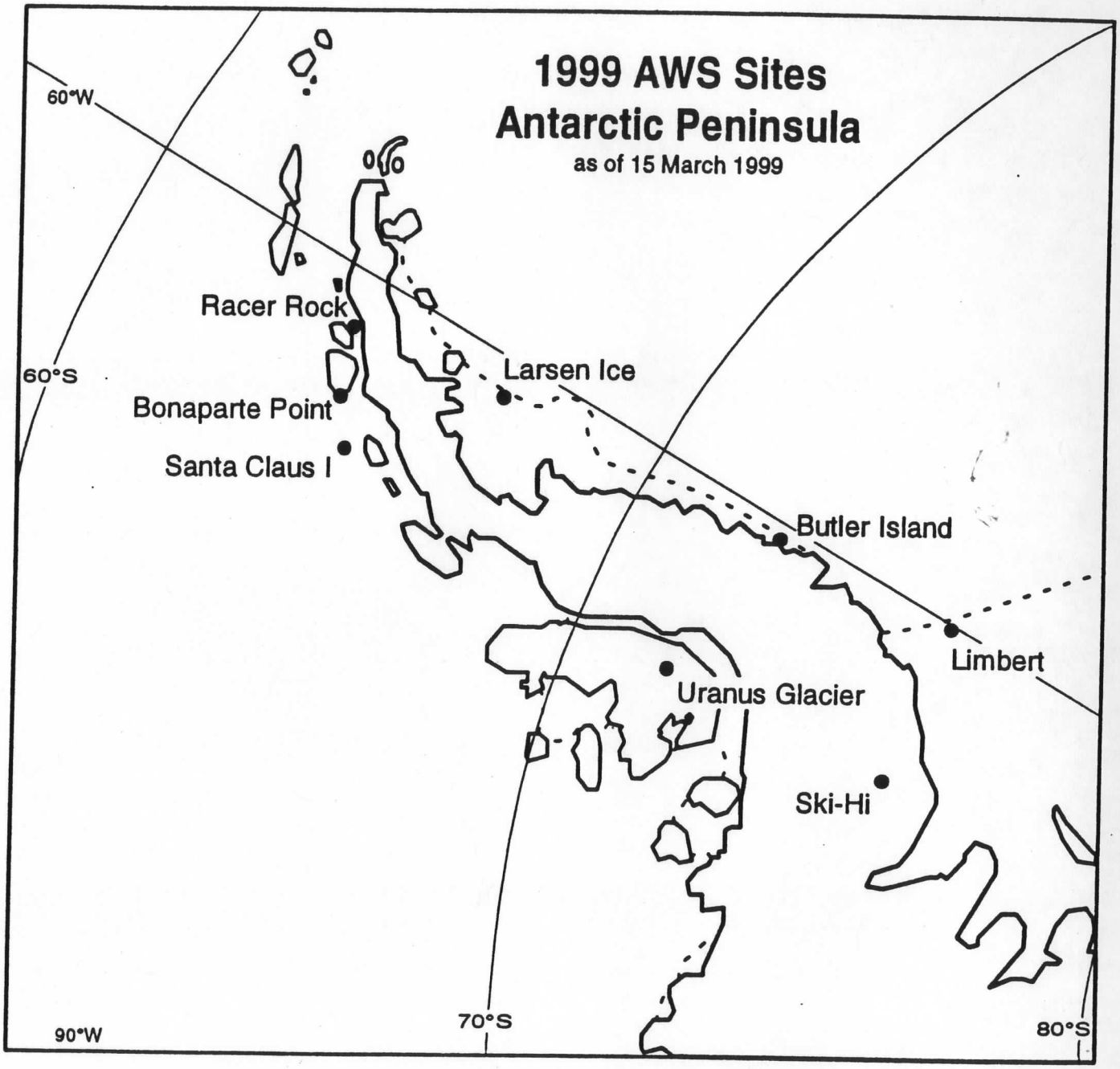

Figure 8. USAP AWS sites for 1999 in the vicinity of the Antarctic Peninsula identified by the site name.