

Antarctic automatic weather stations:

austral summer 1988-1989

Charles R. Stearns

George A. Weidner

Department of Meteorology

University of Wisconsin

Madison, Wisconsin 53706

The United States Antarctic Program (USAP) automatic weather station project places automatic weather station (AWS) units in remote areas of Antarctica in support of meteorological research. Stearns and Weidner (1986) describe the AWS system.

The USAP AWS units support the following studies:

1. Barrier wind flow along the Antarctic Peninsula and the Transantarctic Mountains,
2. Katabatic wind flow down the slope to the Adelie Coast, Reeves Glacier, Byrd Glacier, and Beardmore Glacier,
3. Mesoscale circulation and the sensible and latent heat fluxes on the Ross Ice Shelf, and
4. Climatology of Byrd, Siple, and Dome C stations.

Stearns and Wendler (1988) reviewed the results from the above studies. The data are used for support of air operations at Williams Field, Antarctica and of oceanographic work in the Ross Sea.

Table 1 gives the AWS unit location, identification number (ID), latitude, longitude, elevation, and the I.D. start date for the 27 AWS units in operation during 1989. Three units have been abandoned since 1980.

The field work during AS 1988-1989 started with C.R. Stearns boarding the ice breaker, Polar Sea, at Hobart, Tasmania for the trip to McMurdo Station, Antarctica. On 27 December 1988 the Polar Sea reached the Balleny Islands. Buckle Island was surrounded by low clouds below the level of the AWS unit installed in 1987 so no attempt was made to recover the AWS unit and the Polar Sea proceeded to Scott Island arriving there on 28 December 1988. The AWS unit on Scott Island had been installed on a snow bank and the movement of the snow bank during the year had strained the guys and tipped the tower. The aerovane had been totally destroyed by ice accumulation. One should not try to measure the wind speed and direction on Scott Island. Another AWS unit was installed without the aerovane. Scott Island will need a different design for the AWS unit to protect the unit from the salt and ice.

The Polar Sea reached Terra Nova Bay on 1 January 1989. Pat Site was installed near the junction of the Reeves and Priestley glaciers. The surface was melt ice and very solid. Holes were drilled into the ice and anchoring was to a 4"x4" stuck in the hole about two feet. Manuela site was in good condition. Dr. David Bromwich's AWS unit from Polar Research Laboratory was installed near the snow cave on Inexpressible Island. On the trip to McMurdo the Polar Sea stopped at Franklin Island so that a helicopter inspection flight could be made to Whitlock Site. The AWS unit was in excellent condition. The Polar Sea arrived at McMurdo on 2 January 1989.

George Weidner and Yinsheng Zhang of the Institute of Glaciology and Geocryology, Lanzhou, China arrived at McMurdo 4 January 1989. The

AWS electronics shipped by air were apparently damaged by X-Rays limiting the work that would be done during AS 88-89 and requiring that priorities be established. The Marble Point AWS was removed and the tower dismantled so that the radioactive thermal generator (RTG) could be removed. A battery powered unit was installed nearby. A battery powered unit was installed at Byrd Station but failed to operate for more than a few days. The RTG was removed from Byrd Station by Lt. Singlaub. There was a helicopter accident on one flight to Ferrell Site. As a result there was one less helicopter available. The plan to install an AWS unit on Mount Erebus was cancelled.

A Twin Otter flight was made to Elaine Site to remove the AWS unit and on the return to McMurdo the tower at Marilyn Site was raised and the AWS electronics replaced. On another Twin Otter flight the AWS electronics at Lynn Site was replaced. The transmitter had failed. The AWS unit intended for Mount Erebus was installed at Pegasus Site on the blue ice near Williams Field.

Alan Osborne of the British Antarctic Survey serviced the AWS units at Larsen Ice Shelf and Butler island, removed the AWS unit from Dolleman Island and installed an AWS unit at Cape Adams near the edge of the Ronne Ice Shelf.

On a traverse by Expedition Polaris Francaises Didier Simon removed the AWS unit at D-57 and repaired the AWS unit at D-47.

This work was sponsored by the National Science Foundation grant DPP-86-06385. The logistic support of the British Antarctic Survey and Expedition Polaris Francaises are appreciated.

References

Stearns, C. and G. Weidner. 1986. Antarctic automatic weather stations, austral summer, 1985-1986. Antarctic Journal of the U.S., 21(5), 233-234.

Stearns, C. and G. Wendler. 1988. Research results from Antarctic automatic weather stations. Review of Geophysics, 26(1), 45-61.

Table 1
AWS locations for 1989

Site Name	ID	Lat. (deg)	Long. (deg)	Elev. (m)	ID Start Date
<u>Purpose: Katabatic wind flow; G. Wendler, Univ. of Alaska.</u>					
D-10	8912	66.71°S	139.81°E	240	15 Jan 84
D-47	8916	67.38°S	138.72°E	1560	13 Nov 85
D-80	8919	70.03°S	134.74°E	2500	11 Dec 85
Dome C	8904	74.72°S	123.96°E	3280	13 Jan 83
<u>Purpose: Climatic record; C. Stearns, Univ of Wisconsin.</u>					
Siple Stat.	8910	75.96°S	84.23°W	1054	10 Dec 87
Clean Air	8918	90.00°S		2836	28 Jan 86
<u>Purpose: NSFA Support network.</u>					
Marble Point	8906	77.44°S	163.77°E	120	5 Feb 80
Ferrell	8907	77.97°S	170.82°E	45	10 Dec 80
Whitlock	8913	76.24°S	168.70°E	275	23 Jan 82
Scott Is.	8916	67.37°S	179.97°W	30?	25 Dec 87
<u>Purpose: Ross Ice Shelf network; C. Stearns, Univ of Wisconsin.</u>					
Marilyn	8915 U,T	79.96°S	164.96°E	75	16 Jan 84
Schwerdt.	8924 U,T	79.94°S	169.83°E	60	24 Jan 85
Gill	8925 U,T	80.03°S	178.64°W	55	24 Jan 85
Lettau	8908 U,T	82.54°S	174.37°W	55	29 Jan 86
Martha II	8900 U,T	78.35°S	173.37°W	18	11 Feb 87

Purpose: Reeves katabatic flow; Bromwich and Parish, Oh & Wy

Manuela	8905	U,T	74.94°S	163.69°E	80	28 Dec 87
Shristi	8909	U,T	74.72°S	161.58°E	1200	28 Dec 87
Sushila	8921	T	74.41°S	161.28°E	1431	20 Jan 88
Sandra	8923		74.51°S	160.42°E	1525	19 Jan 88
Lynn	8927	U,T	74.23°S	160.29°E	1772	19 Jan 88
Pat	8931	U,T	74.88°S	163.10°E	30	01 Jan 89

Purpose: Barrier Wind, Antarctic Peninsula; C. Stearns, U of W.

Larsen Ice	8926		67.00°S	60.45°W	17	1 Jan 86
Butler Is.	8902		72.21°S	60.17°W	91	1 Mar 86
Cape Adams	8917		75.01°S	62.53°W	?	28 Jan 89
Uranus Gl.	8920		71.43°S	68.91°W	780	6 Mar 86

Purpose: Testing

Jimmy	8901		77.84°S	166.72°E	200	12 Jan 88
Pegasus U,T	8911		77.97°S	166.49°E	50	22 Jan 89

U - AWS unit has relative humidity sensor

T - AWS unit has vertical temperature difference sensor

Sushila site is not equipped with a pressure gauge.

The latitude and longitude are determined by the ARGOS system

Abstract

Antarctic automatic weather stations:

austral summer 1987-1988

Charles R. Stearns

George A. Weidner

Department of Meteorology

University of Wisconsin

Madison, Wisconsin 53706

The United States Antarctic Program (USAP) automatic weather station project places automatic weather station (AWS) units in remote areas of Antarctica in support of meteorological research. The AWS units measure wind speed, wind direction, air temperature, and air pressure. The AWS units transmit the data at 200 second intervals to the data collection system on polar orbiting satellites of the NOAA series. The USAP AWS units support the following studies: 1. Barrier wind flow along the Antarctic Peninsula and the Transantarctic Mountains, 2. Katabatic wind flow down the slope to the Adelie Coast, Reeves Glacier, Byrd Glacier, and Beardmore Glacier, 3. Mesoscale circulation and the sensible and latent heat fluxes on the Ross Ice Shelf, 4. Climatology of Byrd Station, Siple Station, and Dome C. The data are used for support of air operations at Williams Field, Antarctica and of oceanographic work in the Ross Sea. During the austral summer 1988-1989 Aws units were installed at three sites in Antarctica and two radio active thermal generators were removed and the AWS units were replaced with battery powered units. Twenty seven AWS units were in place in Antarctica for the year 1989.