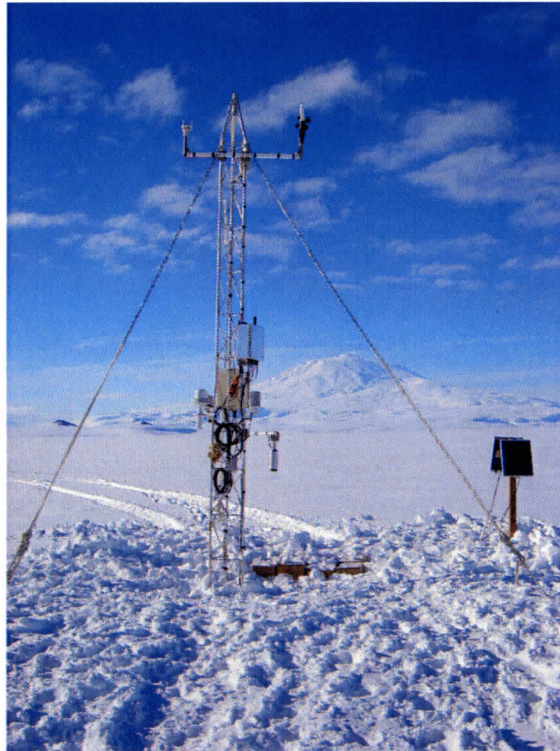


AWS Annual Project Report: NSF-OPP Grant #ANT-0636873, September 1, 2007 to August 31, 2008

Collaborative Research: Antarctic Automatic Weather Station Program: 2007-2010

An Annual Report to the Office of Polar Programs, National Science Foundation



The Schwerdtfeger Library
University of Wisconsin-Madison
1225 W Dayton Street
Madison, WI 53706

Dr. Matthew A. Lazzara, Principal Investigator
Dr. John J. Cassano, co-Principal Investigator
Dr. Gregory J. Tripoli, co-Principal Investigator
George A. Weidner, co-Principal Investigator
Linda M. Keller, Shelley L. Knuth, Jonathan E. Thom - Meteorologists

Space Science and Engineering Center
Department of Atmospheric and Oceanic Sciences
University of Wisconsin-Madison

Department of Atmospheric and Oceanic Sciences
University of Colorado-Boulder

Submitted on August 15, 2008



Colorado
University of Colorado at Boulder



Annual Report for Period: 09/2007 - 08/2008**Submitted on:** 08/15/2008**Principal Investigator:** Lazzara, Matthew A.**Award ID:** 0636873**Organization:** U of Wisconsin Madison**Submitted By:****Title:**

Collaborative Research: Antarctic Automatic Weather Station Program: 2007-2010

Project Participants**Senior Personnel****Name:** Lazzara, Matthew**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Dr. Matthew Lazzara as the Principal Investigator oversees the Automatic Weather Station program, including the coordination of activities and projects within the research group as well as with domestic and international collaborators. Data distribution, data processing and station climatology are some of the efforts he is involved in. He is also active with educational outreach efforts associated with the project.

Name: Tripoli, Gregory**Worked for more than 160 Hours:** No**Contribution to Project:**

Professor Greg Tripoli's effort in the project includes working with Shelley Knuth on snow accumulation studies as well as academic advisor for graduate student Lee Welhouse.

Name: Weidner, George**Worked for more than 160 Hours:** Yes**Contribution to Project:**

As co-Principal investigator, George Weidner's role includes assembly and fabrication of automatic weather station, repair and troubleshooting of electronic equipment, as well as installation and tower raise field work in Antarctica.

Name: Keller, Linda**Worked for more than 160 Hours:** Yes**Contribution to Project:**

The processing and quality control of observations from the automatic weather stations is a critical role executed by Linda Keller. She is also active in investigating Antarctic climatology using the AWS network.

Name: Knuth, Shelley**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Shelley Knuth's primary activities include snow accumulation and precipitation studies at AWS sites as well as assisting with AWS installations and tower raise efforts in the field. She is also active in educational outreach efforts, as she was the primary contact and the lead for our participation in the PolarTrec project.

Name: Thom, Jonathan**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Jonathan Thom's role in the project includes the fabrication, installation, repair and raising of automatic weather stations. He also develops and maintains the AWS decoding processing software as well as participates in educational outreach activities for the project.

Name: Stearns, Charles

Worked for more than 160 Hours: No

Contribution to Project:

Dr. Charles Stearns, as the prior Principal Investigator of the automatic weather station project, serves as a consultant on the current effort.

Post-doc

Graduate Student

Name: Welhouse, Lee

Worked for more than 160 Hours: No

Contribution to Project:

Lee Welhouse joins the project as a graduate student. He will be focusing on studies related to the monitoring of El Nino Southern Oscillation via the automatic weather station network.

Undergraduate Student

Name: Asuma, Jonas

Worked for more than 160 Hours: No

Contribution to Project:

Jonas Asuma is an undergraduate student, working on the web page and other data distribution effort that are a part of the project. He also conducted a historical review and literature survey of El Nino/Southern Oscillation connections to the Antarctic.

Name: Bushnell, Amanda

Worked for more than 160 Hours: No

Contribution to Project:

Amanda Bushnell, an undergraduate student, has assisted the project with minor clerical work.

Technician, Programmer

Name: Batzli, Samuel

Worked for more than 160 Hours: No

Contribution to Project:

Samuel Batzli has aided the project with the generation of the maps that summarize the automatic weather station project utilizing GIS tools.

Other Participant

Name: Tucker, Camillia

Worked for more than 160 Hours: No

Contribution to Project:

Camie Tucker has assisted with the AWS project with minor clerical work.

Research Experience for Undergraduates

Organizational Partners

University of Colorado-Boulder

Other Collaborators or Contacts

US Collaborators:

John Cassano - co-PI of the project at the University of Colorado-Boulder

David Holland (New York University) and Robert Bindshadler (NASA/Goddard Space Flight Center) - Pine Island Glacier AWS

International Collaborators:

Institut polaire francais Paul Emile Victor (IPEV)

Programma Nazionale di Ricerche in Antartide (PNRA)

Chinese Academy of Meteorological Sciences/Chinese Meteorological Administration

Latitudinal Gradient Project (LGP)/Antarctica New Zealand

British Antarctic Survey (BAS)

Activities and Findings

Research and Education Activities: (See PDF version submitted by PI at the end of the report)

Research Activities (Sept 2007 to August 2008):

Field Season activities to repair, update and raise automatic weather stations (AWS).
(Please see attached field season activity presentation).

Estimation of snow accumulation at AWS sites and snow pit verification.

Collaborated with University of Colorado-Boulder on the continued development and improvement of semi-automated automatic weather station quality control software.

Data processing, distribution, quality control and archive of AWS observations.

Long term climatology efforts started for a selection of elemental AWS sites, including routine CLIMAT message generation.

Historical review and literature survey of El Nino/Southern Oscillation and the Antarctic.

Conferences:

European Geophysical Union meeting, Vienna, Austria, April, 2008 (Knuth)

- Presentation on snow accumulation (Knuth)

Space Based Precipitation Measurements, Steamboat Springs, CO, April 2008 (Knuth)

- Presentation on snow accumulation (Knuth)

Antarctic Meteorological Observations, Modeling and Forecasting Workshop, Madison, WI
June 2008 (Asuma, Keller, Knuth, Lazzara, Stearns, Thom, Weidner, Welhouse)

- Presentation on AWS Field season (Weidner)
- Presentation on Williams Field AWS test site (Thom)
- Presentation on overview of the AWS program (Lazzara)
- Presentation on AWS measurement sampling (Weidner)
- AWS Network Future (Weidner and Lazzara)

Biennial Scientific Committee on Antarctic Research (SCAR) Conference, St. Petersburg,
Russia July 2008 (Knuth)

- Presentation on the AWS project (Knuth)
- Poster on snow accumulation (Knuth)

Findings: (See PDF version submitted by PI at the end of the report)

See attached table of the US AWS network and map of all (US and other nations) AWS sites in
the Antarctic (updated as of early summer 2008).

Training and Development:

* Working with new AWS platforms, and training for additional team members including
collaborators at the University of Colorado-Boulder.

Outreach Activities:

* Participation in the PolarTrec Program during the 2007-2008 field season with Kirk
Beckendroff, middle school teacher from Blanco, Texas.

* Special outreach project with Pittsfield, Wisconsin Elementary school (Jelly Bear Outreach
Project).

* Additional outreach activities, joint with the Antarctic Meteorological Research Center:

- Grandparents University, University of Wisconsin-Madison (July 2008)
- Atmospheric, Earth and Space Sciences Workshop for High School Students, University of
Wisconsin-Madison (July 2008)
- SSEC Building Tours (misc. dates)
- Lodi Middle School, Lodi, Wisconsin (January 2008)
- Midwest Severe Storm Tracking and Response Center, Inc., Monona, Wisconsin (January
2008)

Journal Publications

Knuth, S.L. G.J. Tripoli, J.E. Thom, G.A. Weidner, C.R. Stearns, M. Lazzara, and L.M. Keller, "Estimation of snow accumulation in Antarctica
using automated acoustic depth gauge measurements", Bulletin of the American Meteorological Society, p. , vol. , (2008). Submitted,

Books or Other One-time Publications

Web/Internet Site**URL(s):**

http://amrc.ssec.wisc.edu ftp://amrc.ssec.wisc.edu

http://ice.ssec.wisc.edu ftp://ice.ssec.wisc.edu

Description:

These web and FTP sites host real-time and archived AWS observations, related metadata, maps and other historical and background information. These sites are shared with AWS's sister project, the Antarctic Meteorological Research Center (AMRC).

Other Specific Products**Product Type:****Data or databases****Product Description:**

Meteorological observations from the Automatic Weather Stations (AWS) include measurements of temperature, wind speed, wind direction, atmospheric pressure, relative humidity and, in some cases, snow temperature profiles, water temperature, relative snow accumulation, and temperature differences from the top to the bottom of the AWS tower. These observations are made available in a 10 minute gross error checked format, as well as 3 hourly fully quality controlled format. Additional quality controlled formats at 10 minutes, 1 hour and 3 hours have recently started to be made available.

Sharing Information:

Observations from the AWS sites are made available via the following avenues:

1. Real-time:

Web Site
FTP Site
GTS
McIDAS ADDE Server
Antarctic-IDD

2. Archive:

- Web Site
- FTP Site
- Metadata via DIF with the Antarctic Master Directory at NSIDC and NASA Global Master Directory
- Data book covering an annual year of AWS summaries

Contributions**Contributions within Discipline:**

The automatic weather station program offers a valuable resource for the larger meteorological and atmospheric sciences. These observations cover a significant portion of the Antarctic, and are utilized by the larger community (e.g. NCAR/NCEP reanalysis). The availability of new formatted quality controlled 10 minute, 1 hourly and 3 hourly data sets will increase value to the community.

Contributions to Other Disciplines:**Contributions to Human Resource Development:**

Funds from this project will be used to support an MS graduate student (Lee Welhouse) in the

Department of Atmospheric and Oceanic Sciences at the University of Wisconsin-Madison. His efforts here will utilize the AWS observations for ENSO studies, analyzing them in conjunction with other data sets, performing Antarctic field work, as well as presenting and publishing the results in peer reviewed literature.

This project has also partially supported an undergraduate student (Jonas Asuma) in the Department of Atmospheric and Ocean Sciences at the University of Wisconsin-Madison in assisting with the AWS data collection, climatological summaries, etc.

Contributions to Resources for Research and Education:

Contributions Beyond Science and Engineering:

Special Requirements

Special reporting requirements: None

Change in Objectives or Scope: None

Animal, Human Subjects, Biohazards: None

Categories for which nothing is reported:

Any Book

Contributions: To Any Other Disciplines

Contributions: To Any Resources for Research and Education

Contributions: To Any Beyond Science and Engineering

Annual Report for Period:09/2007 - 08/2008

Submitted on: 06/30/2008

Principal Investigator: Cassano, John J.

Award ID: 0636811

Organization: U of Colorado Boulder

Submitted By:

Title:
Collaborative Research: Antarctic Automatic Weather Station Program: 2007-2010

Project Participants

Senior Personnel

Name: Cassano, John
Worked for more than 160 Hours: Yes
Contribution to Project:

Post-doc

Name: Seefeldt, Mark
Worked for more than 160 Hours: No
Contribution to Project:

Graduate Student

Name: Richards, Melissa
Worked for more than 160 Hours: Yes
Contribution to Project:

Undergraduate Student

Technician, Programmer

Other Participant

Research Experience for Undergraduates

Organizational Partners

University of Wisconsin-Madison

Other Collaborators or Contacts

Matthew Lazarra - lead PI of project at University of Wisconsin

Activities and Findings

Research and Education Activities:

Research activities

Sept 2007 to June 2008

Purchase and setup of new Linux workstation to serve as University of Colorado node on Antarctic LDM network

Development of semi-automated automatic weather station quality control software

Contribute chapter on Antarctic climate and weather to 'Antarctica - Global Science from a Frozen Continent'

Analysis of low-level wind field over the Ross Ice Shelf based on Antarctic Mesoscale Prediction System and AWS data

Comparison of global reanalysis cyclone climatologies for the Southern Ocean with a cyclone climatology derived from a high-resolution regional atmospheric model (Antarctic Mesoscale Prediction System)

Conferences attended / presentations

Antarctic Meteorology, Observations, Modeling, and Forecasting Workshop, Madison, WI, June 2008 (Cassano, Richards, Seefeldt)

Cassano, J.J. and M.W. Seefeldt: Comparison of AMPS MM5 and AMPS WRF Forecasts Using Self-Organizing Maps (oral presentation)

Cassano, J.J. and M.W. Seefeldt: Development and Evaluation of Polar WRF (oral presentation)

Seefeldt, M.W. and J.J. Cassano: A Description of the Ross Ice Shelf Air Stream (RAS) Through the Use of Self-Organizing Maps (oral presentation)

Atmospheric Observation Panel for Climate (AOPC-XIV), Geneva, Switzerland, April 2008

Cassano, J.J.: Atmospheric Observations in Polar Regions (invited oral presentation)

Oden Southern Ocean Workshop, Lejondals Slott, Sweden, Feb 2008 (Cassano)

Findings:

Sept 2007 - June 2008

The analysis of the low-level wind field over the Ross Ice Shelf identified three low level jets in this area. Two of these jets are located in well known katabatic prone regions (near Byrd Glacier and at Terra Nova Bay) while the third low-level jet is located over the southern portion of the Ross Ice shelf adjacent to the Transantarctic Mountains. These low-level jets were identified based on Antarctic Mesoscale Prediction System output and the details of these jets still require observational validation.

Training and Development:

Melissa Richards is a first year graduate student in the Department of Atmospheric and Oceanic Sciences at the University of Colorado, and will be supported as a graduate research assistant on this project starting in fall 2009. Ms. Richards' research will focus on an analysis of the mesoscale atmospheric features in the vicinity of Terra Nova Bay. A secondary research focus will be on evaluating Antarctic Mesoscale Prediction System (AMPS) forecasts. Ms. Richards will take part in the 2008/09 AWS field season, thereby gaining experience in polar fieldwork.

Outreach Activities:

The University of Colorado PI (John Cassano) has contributed a chapter on Antarctic weather and climate to the book 'Antarctica - Science From a Frozen Continent' (in preparation). This book is aimed at a general audience, with the goal of bringing Antarctic science to the public. This book is being prepared as part of the International Polar Year.

Journal Publications

Seefeldt, M.W. and J.J. Cassano, "An analysis of low-level jets in the greater Ross Ice Shelf region based on numerical simulations", Monthly Weather Review, p. , vol. , (2008). Accepted,

Seefeldt, M.W. and J.J. Cassano, "An examination of the Antarctic low-level wind field using self-organizing maps", Monthly Weather Review, p. , vol. , (2008). in preparation,

Uotila, P., A.H. Lynch, A.B. Pezza, K. Keay, and J.J. Cassano, "Comparison of low pressure system statistics derived from high resolution NWP output and three re-analysis products over the Southern Ocean", Journal of Geophysical Research, p. , vol. , (2008). in preparation,

Books or Other One-time Publications

John J. Cassano, "Antarctica - Global Science From a Frozen Continent", (2008). Book, in preparation
 Editor(s): David W. H. Walton
 Bibliography: Thames and Hudson

Web/Internet Site

Other Specific Products

Product Type:

Software (or netware)

Product Description:

Semi-automated AWS data quality control program

Sharing Information:

This software has been provided to our collaborators at the University of Wisconsin and has been implemented as part of their AWS quality control procedure.

Contributions

Contributions within Discipline:

The research activities of this project have contributed to an improved understanding of synoptic and mesoscale atmospheric processes in the Antarctic. Specifically we have several papers in press and in preparation that describe the details of the low level wind field over the Ross Ice Shelf and describe the synoptic climatology of cyclones over the Southern Ocean.

Contributions to Other Disciplines:

Contributions to Human Resource Development:

Funds from this project will be used to support a PhD student (Melissa Richards) in the Department of Atmospheric and Oceanic Sciences at the University of Colorado. Ms. Richards will gain experience in analyzing observational and model based data, performing Antarctic field work, presenting results of her research at national and international conferences, and publishing her research results in the peer reviewed literature.

Contributions to Resources for Research and Education:

A new Linux workstation was purchased using funds from this project. This workstation will serve as the University of Colorado node on the Antarctic LDM network and will also provide computational resources for project participants at the University of Colorado.

Contributions Beyond Science and Engineering:

Special Requirements

Special reporting requirements: None

Change in Objectives or Scope: None

Animal, Human Subjects, Biohazards: None

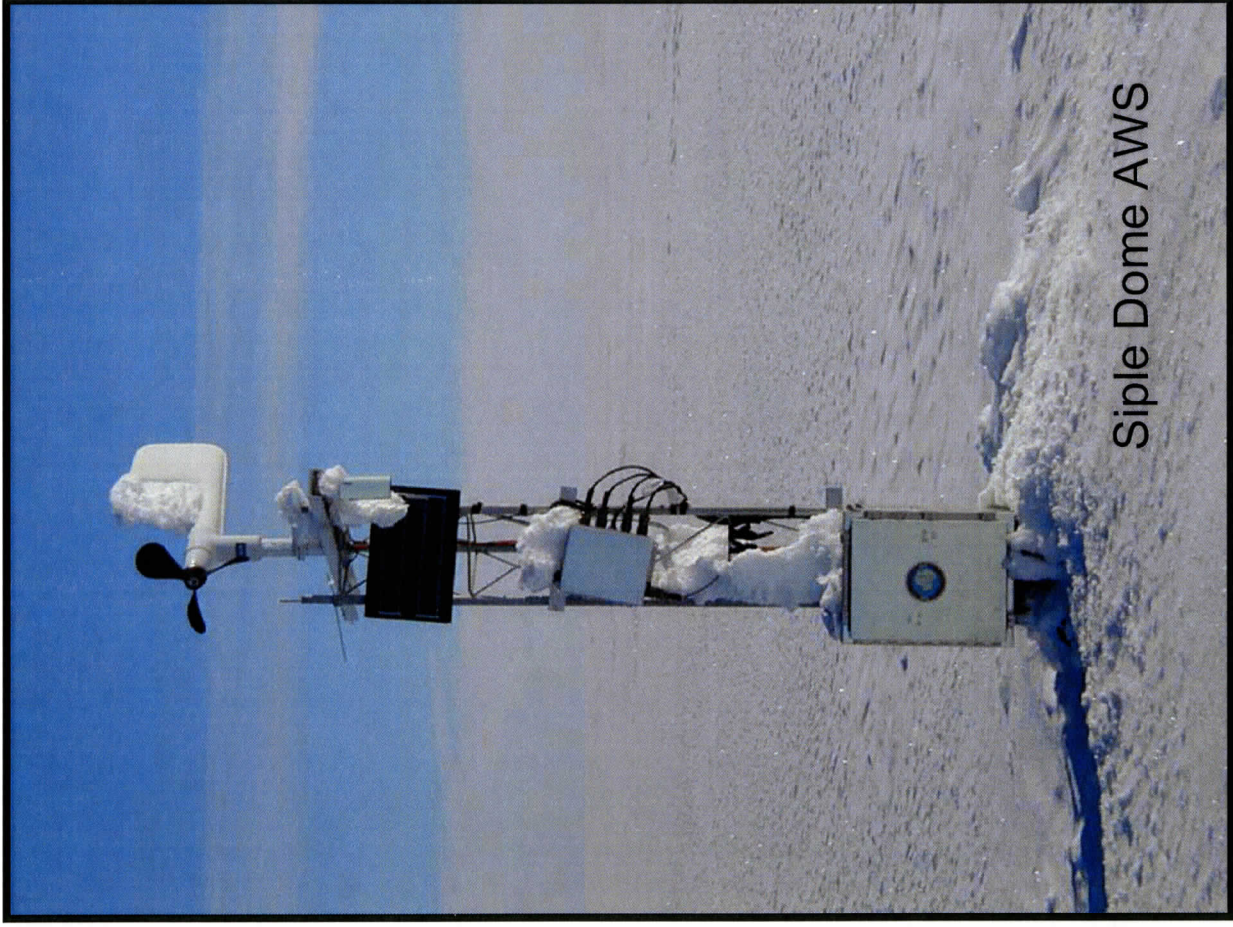
Categories for which nothing is reported:

Any Web/Internet Site

Contributions: To Any Other Disciplines

Contributions: To Any Beyond Science and Engineering

Overview of the Antarctic Automatic Weather Station Project



*M.A. Lazzara, G.A. Wiedner,
J.T. Thom, L.M. Keller,
S.L. Knuth, J.V. Asuma,
G.J. Tripoli & C.R. Stearns*

University of Wisconsin-Madison

J.J. Cassano

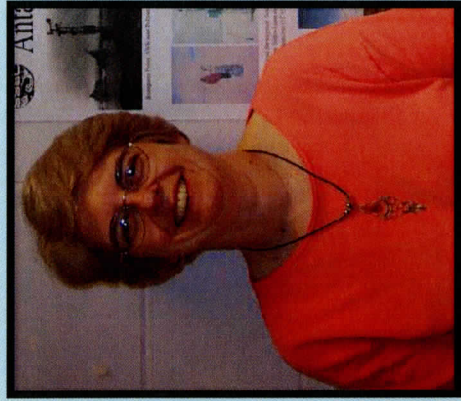
University of Colorado-Boulder



Outline

- The Team
- History
- Specifications
- Applications
- Data
- International Collaborations

The Team



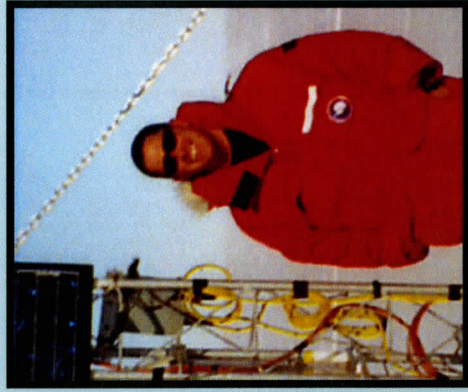
Linda Keller



Matthew Lazzara



Charles Stearns



John Cassano



Jonathan Thom



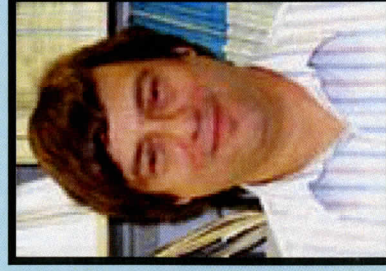
Shelley Knuth



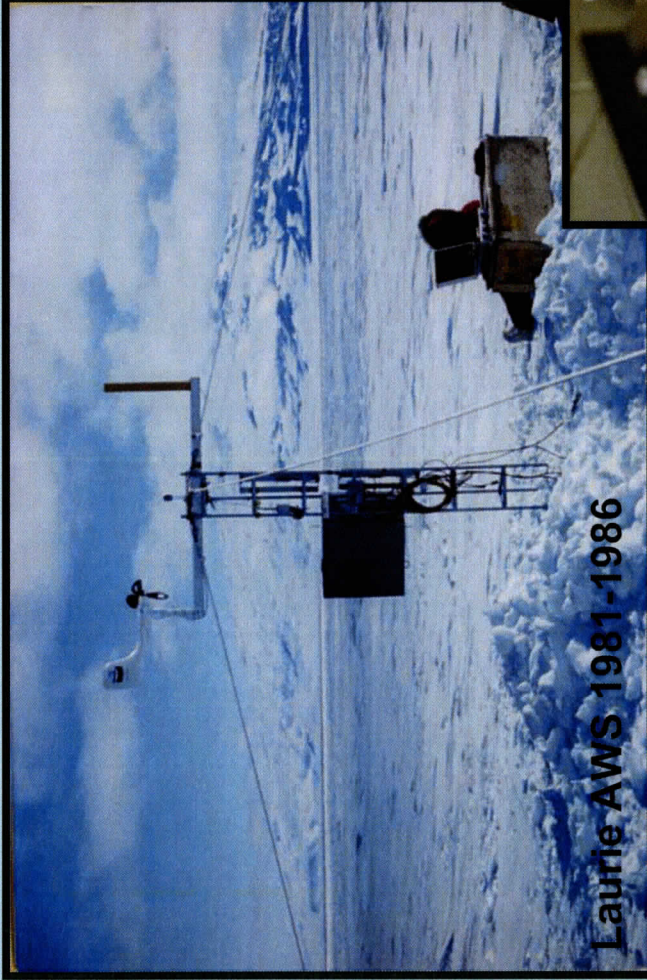
George Weidner



Jonas Asuma



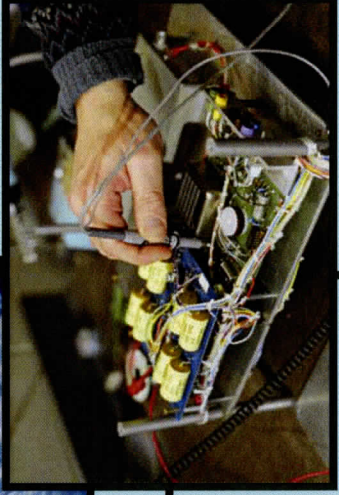
Greg Tripoli



Laurie AWS 1981-1986

AWS History

- Stanford University Radio Science Lab
 - Late 1970s
 - Key developments:
 - Low power electronics (Pioneer Spacecraft)
 - Satellite communications (Nimbus-7)



- University of Wisconsin-Madison
 - Assumed stewardship
 - Meteorological focus

AWS Versions

- ❖ AWS I (nimbus)
- ❖ AWS II (RTG), IIB, IIC, etc.
- ❖ AWS COTS:
 - AWS-10x
 - AWS-1000

Automatic Weather Stations (AWS): Circa 1966-1967
(Courtesy of Maurice Gibbs)



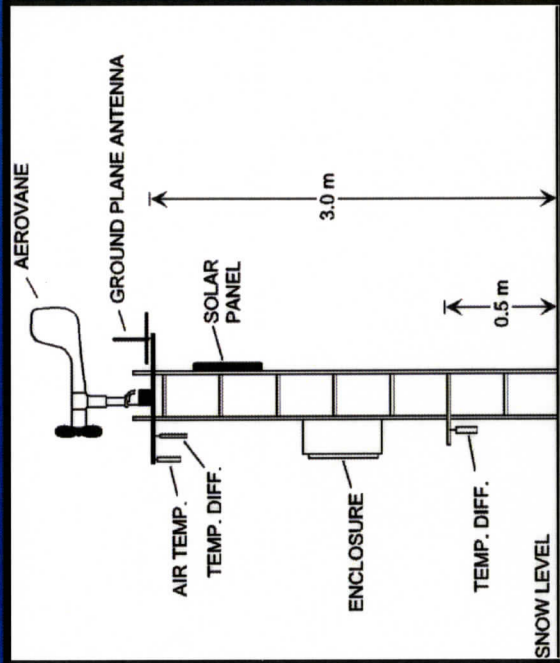
AWS Specifications

* 1300 Watt-Hours power used all year long (power used to run a 60 watt light bulb for ~1 day!)

* Able to send data via satellite DCS ARGOS

* Small memory storage needs: Current AWS uses 256 bytes

Built for extreme cold



Port Martin AWS 1994

AWS Sensor Specifications

<u>Variable</u>	<u>Sensor</u>	<u>Specifications</u>
Air Pressure	Paroscientific Model 215 A	Range: 0 to 1100 hPa Resolution: 0.050 hPa Accuracy: +/- 0.2 hPa (0.2 hPa/year long term drift)
Air Temperature	Weed PRT Two-wire bridge	Range: to -100 C minimum Resolution: 0.125 C Accuracy: +/- 0.5 C * Lowest Recorded is -85.2 C at Dome Fuji 17 July 1996
Humidity	Vaisala HMP-35A (and other models)	Range: 0 to 100% Resolution: 1.0 % Accuracy: +/- 5.0 % down to -55 C Corrections possible for lower temperatures
Wind Direction	10 K Ohm pot.	Range: 0 to 355 Degrees Resolution: 1.5 Degrees Accuracy: +/- 3.0 Degrees
Wind Speed	Bendix/Belfort RM Young Hydro-Tech	Resolution/Accuracy: 0.25 +/- 0.5 m/s Resolution/Accuracy: 0.20 +/- 0.5 m/s Resolution/Accuracy: 0.33 +/- 2% * Maximum speed along Adelie Coast ~50 m/s
Temperature String	Thermocouple Two junction Copper-Cons.	Resolution: 0.06 C Accuracy: +/- 0.125 C

Past:

- Barrier and Katabatic wind studies
- Mesoscale circulations
- Sensible and latent heat flux studies
- Southern Ocean GLOBEC
- Long Term Ecological Research
- Weather forecasting
- Research on Ocean-Atmosphere Variability and Ecosystem Response in the Ross Sea
- West Antarctic Ice Sheet Initiative and International Trans-Antarctic Scientific Expedition
- And more.....

AWS Applications

Current:

- Long term climatology
- Antarctic ENSO studies
- Precipitation/snow accumulation studies
- RAS near surface wind field
- Boundary Layer Studies
- Weather forecasting
- And more....

Real time

- Ground Stations:
 - HRPT
 - McMurdo Station
 - Palmer Station
 - GAC
 - Gilmore Creek, AK
 - Wallops Island, VA
- Two stage processing:
 - SSEC Desktop Ingestor
 - Signal to DCS hex
 - AWS DCS decoder
 - DCS Hex to ASCII science values
 - Only gross error checked
- Data distribution:
 - Antarctic-IDD
 - ADDE, FTP, Web
 - GTS
- All AWS (and AGO)

Data Flow

Archival

- CD CLS America (Argos) to Wisconsin
 - Last month available ~15th of this month
 - All AWS
 - Gross error checked only
 - .r format (ASCII)
 - CLIMAT AWS
 - Complete QC
 - .r, .dat, .q10, .q1h, .q3h (ASCII)
 - Future - netCDF
 - Wisconsin AWS only

The Data: Quality Control

Methodology

- Real time
 - Only gross error checked
- Archive
 - 10 minute (.r format) only gross error checked
 - 3 hourly (.dat format) full quality control
- Joint Machine-Manual QC mix:
 - Software M.W. Seefeldt
 - Lost time saving to increasing AWS to process

New Data Formats

- QC'ed (all ASCII)
 - 10 minute
 - 1 hourly
 - 3 hourly
 - New format!
- Recently available!
 - CLIMAT AWS station
 - Start April 2007 -
- All AWS sites:
 - Start Oct 2001 -
- Future formats
 - netCDF
 - BUFR ?

CLIMAT Message Project



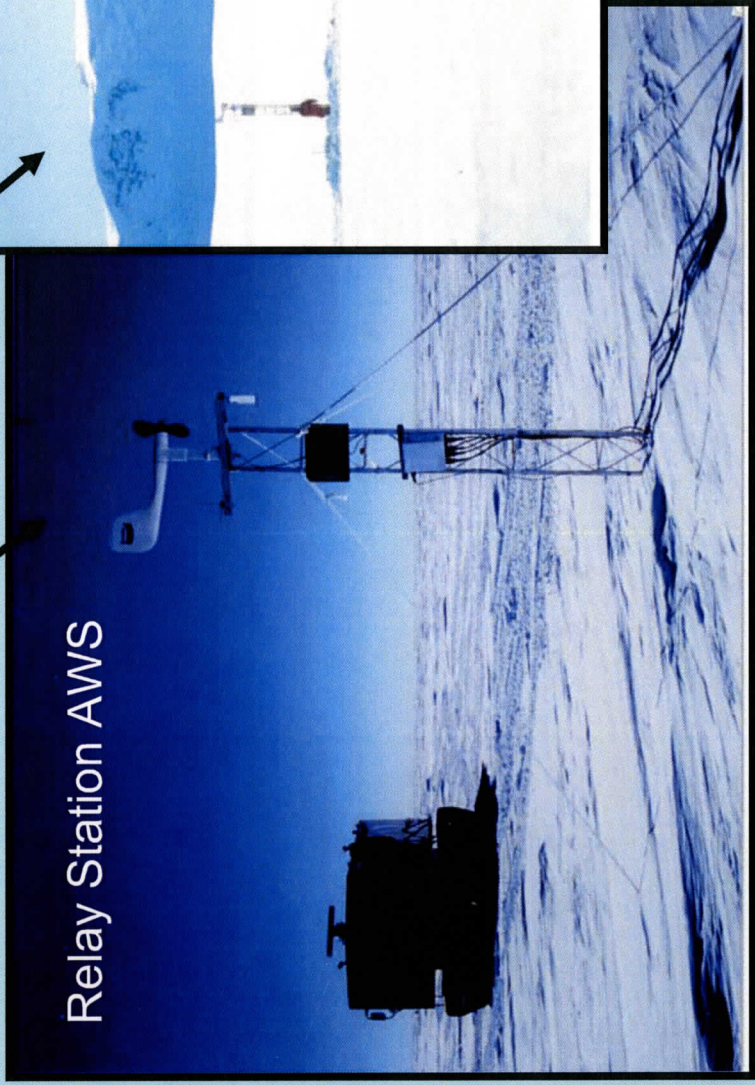
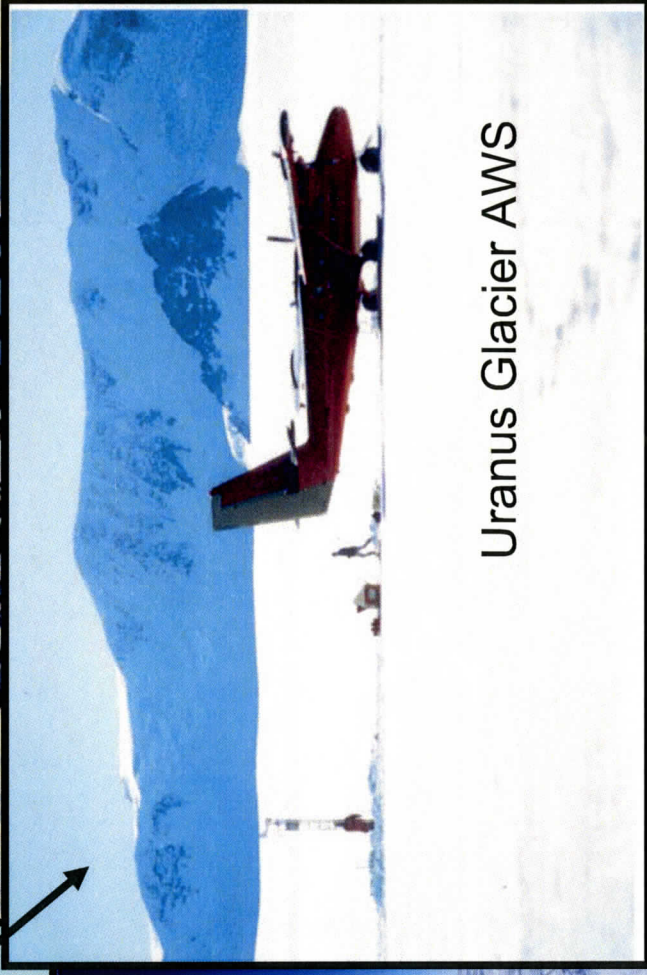
- World Meteorological Organization (WMO)
 - Monthly Climatology Summary
- AWS CLIMAT:
 - “Real-time” from Ferrell, Marble Point, Dome C II, Byrd, Siple Dome, Gill, Possession Island
 - This primarily list to be re-reviewed - NSF/NOAA-NCDC/WMO/UW

- Delivery:
 - NOAA TG
 - Via E-mail
 - Start date: 2006/7
 - AMRC FTP (soon)
- Future:
 - Will do more
(As resources allow)

CSAA01 KWBC 171327	2007137 1432
CLIMAT 04007 89376	
111 19813 31332060 412791386 8000000 9303030	
333 23030 8070100	
444 0123421 1144019 2117621 3147420 5120321 =	
CSAA01 KWBC 171326	2007137 1432
CLIMAT 04007 89828	
111 16431 31623036 415741661 8000000 9303030	
333 23030 8010000	
444 0156770 1168918 2148621 3173618 5111024 =	
CSAA01 KWBC 171342	2007137 1432
CLIMAT 04007 89345	
111 18851 411701269 8000800 9303030	
333 23030	
444 2106917 3141004 5106902 =	

International Collaborations

- France
- United Kingdom
- Japan
- China





Acknowledgements

Thank you to Office of Polar Programs

National Science Foundation OPP-0338147 and ANT-0636873

Thank you to all AWS collaborators and AWS users!



Laurie II AWS

AWS Field Season 2007-2008



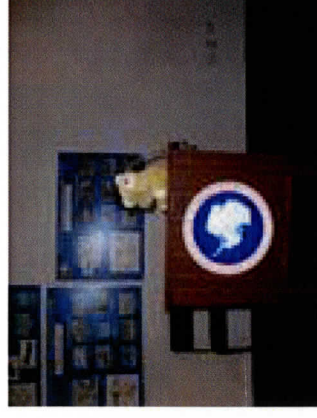
3rd AMOMFW Meeting

June 9-12, 2008

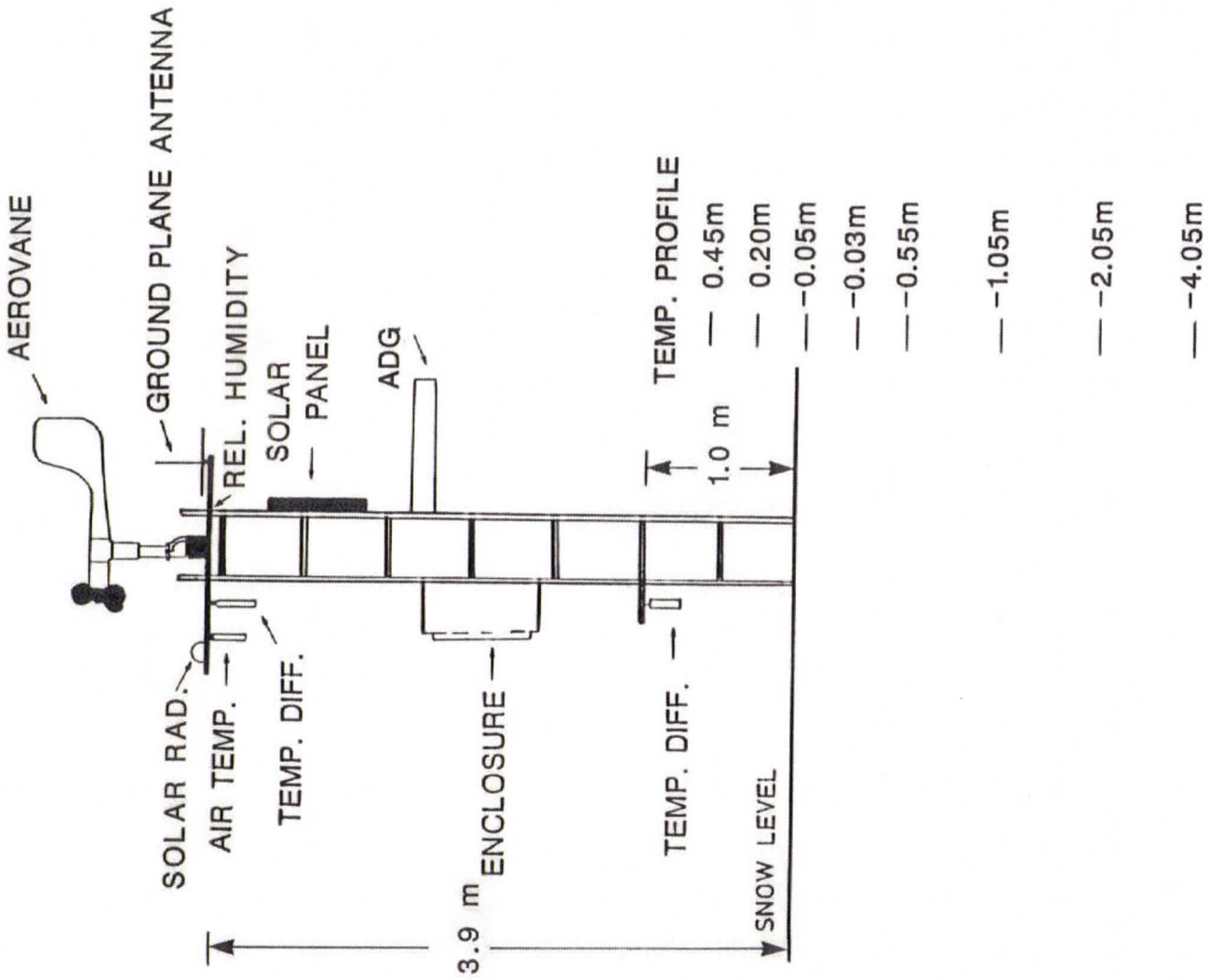
University of Wisconsin –Madison

2007/2008 UW Field Team

- George Weidner
- Jonathan Thom
- Shelley Knuth
- Jonas Asuma
- Kirk Beckendorf (PolarTREC)
- Jelly the Bear
- Short timer – John Cassano



AWS schematic



AWS field work summary

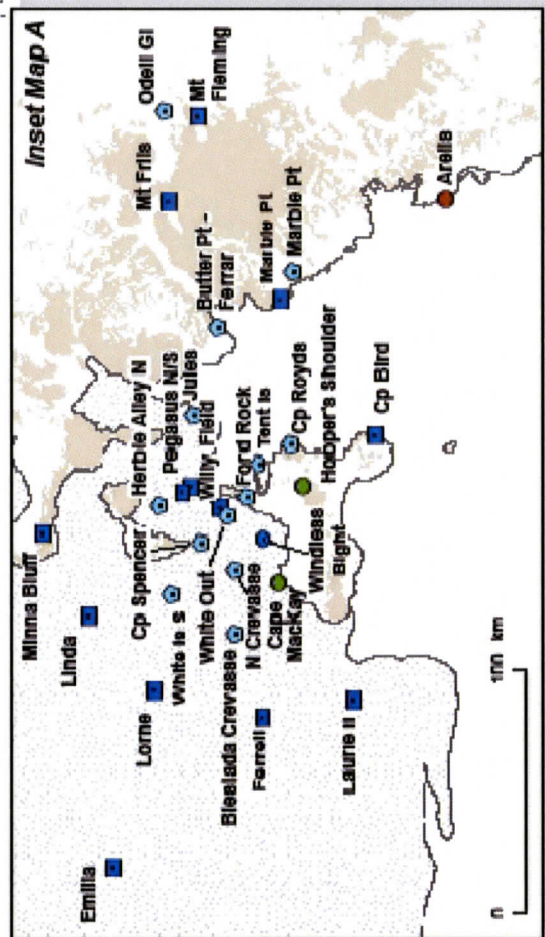
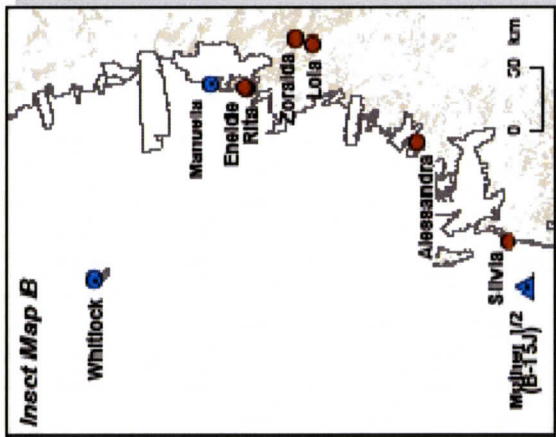
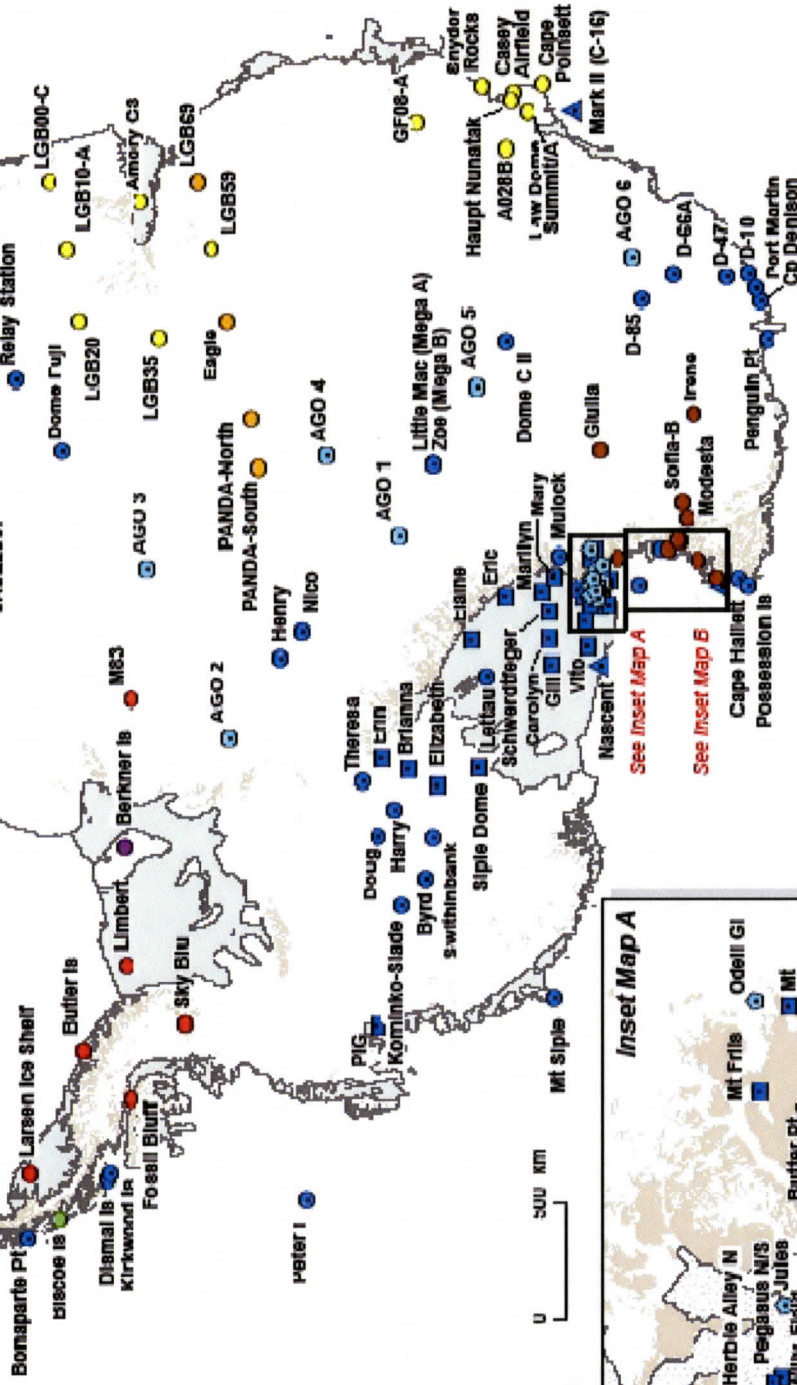
<u>Station</u>	<u>Action taken</u>
• Cape Hallett	Sensors updated and Argos transmitter installed (Thomas Nylen, UNAVCO)
• Cape Bird	Wind sensor replaced (O-283)
• Laurie II	Wind sensor replaced (O-283)
• Ferrell	ADG data downloaded (O-283)
• Windless Bight	ADG serviced /snow pit (O-283)
• Pegasus South	New batteries installed (O-283)
• Pegasus North	New wind sensor installed (O-283)
• Mount Fleming	New tower mount and wind sensor installed (O-283)
• Mount Friis	Pressure sensor installed (O-283)
• Willy Field	Test AWS installed with Iridium, test AWS with temperature shields (O-283)
• Brianna	AWS rebooted (O-283) and batteries added (O-283)
• Theresa	Tower raised , batteries added and AWS rebooted (O-283)
• Swithinbank	New AWS electronics installed (O-283)
• Kominko-Slade (WAIS)	AWS repaired and rebooted (O-283)
• Nico	Tower raised and new batteries installed (O-283)
• Henry	Tower raised and new batteries installed (O-283), rebooted (Brian*, Simon*)
• Scwerdtfeger	Tower raised and new AWS electronics installed, snow pit (O-283)
• Mary	Tower raised, snow pit (O-283)
• Carolyn	New wind sensor installed, ADG added, snow pit (O-283)
• Penguin Point	AWS removed (IPEV)
• Cape Denison	AWS rebooted, new wind sensor installed (Mawson's Hut restoration team**)
• Port Martin	AWS serviced (IPEV)
• D-10	New AWS installed with ADG (IPEV)
• D-66	New AWS installed (IPEV)
• D-85	New AWS installed (IPEV)
• Peninsula AWS	All sites visited by BAS personnel and data downloaded from storage modules
• M83	New AWS installed (BAS)
• Relay Station	New AWS installed (JARE)
• JASE2007 site	New AWS installed (JARE)
• Panda South	New AWS Installed (China)

* Twin Otter pilots Brain and Simon

** Tony Stewart and Peter Morse

2008 Automatic Weather Stations University of Wisconsin - Madison

King George Is



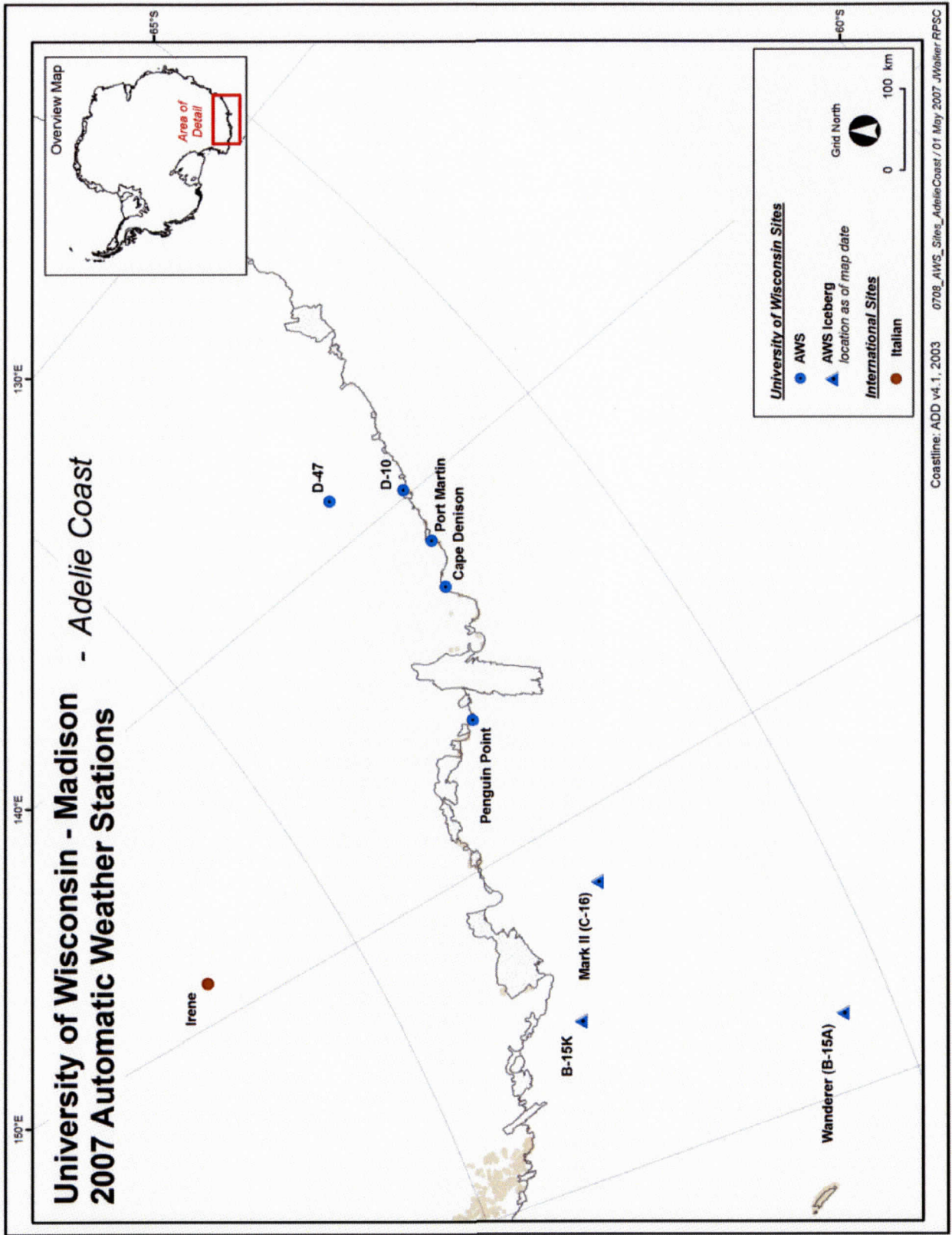
- University of Wisconsin Sites**
- AWS
 - ▲ AWS - Iceberg location as of map date
 - AWS - UNAVCO positioned
- Other US Sites**
- AGO
 - SPAWAR
- International Sites**
- Australian
 - Brazilian
 - Chinese/Australian
 - Dutch
 - Italian
 - Malaysian
 - United Kingdom

Coastline: ADD v1.1, 2003
2008_AWS_Sites_ALL
/by 2008 Sam Bantz SSEO-ERRC

Adelie Coast Table

SITE	ARGOS ID	ARGOS ID	Lat.	Long.	Alt.(m)	Date	WMO#
	OLD/Status	NEW/Action				STARTED	
	Adelie Coast						
D-10	8986 replaced	30374 (CR10X)	66.71oS	139.83oE	243	Jan-80	89832
D-47	8947		67.397oS	138.726oE	1560	Nov-82	89834
D-66	8912 installed	New AWS				Dec 07	
D-85		8916 Installed				DEC 07	
Dome C II	8989		75.121oS	123.374oE	3250	Dec-95	89828
Port Martin	8909	8914(?) new	66.82oS	141.40oE	39	Jan-90	
Cape Denison	8988	Serviced	67.009oS	142.664oE	31	Jan-90	
Penguin Point	8910	Removed	67.617oS	146.180oE	30	Dec-93	89847

Adelie Coast AWS Map

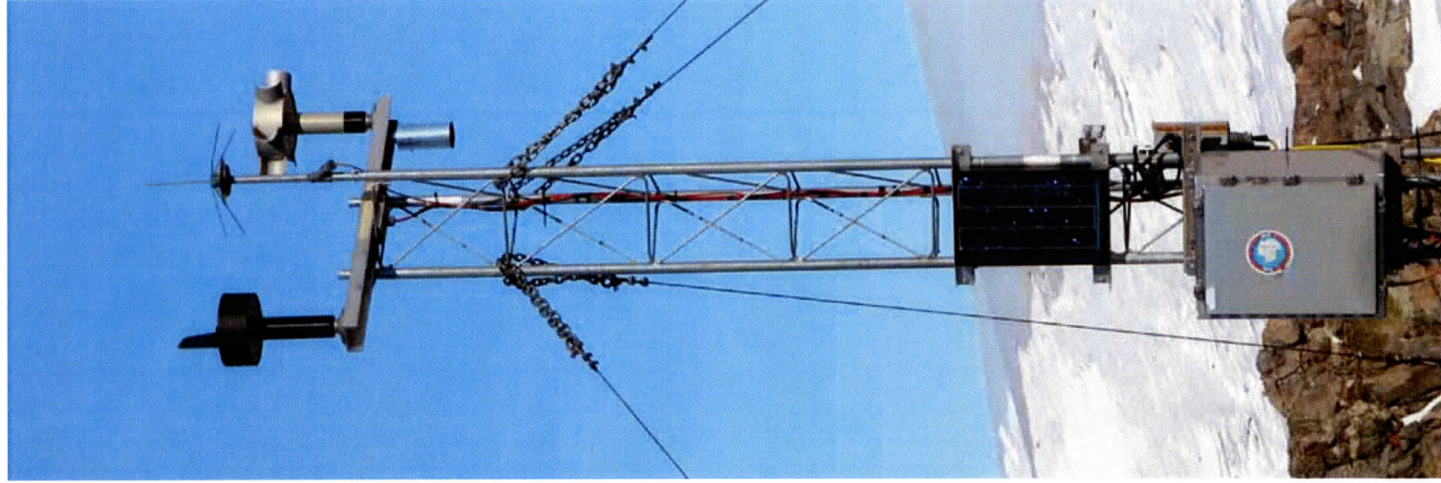


Cape Denison AWS

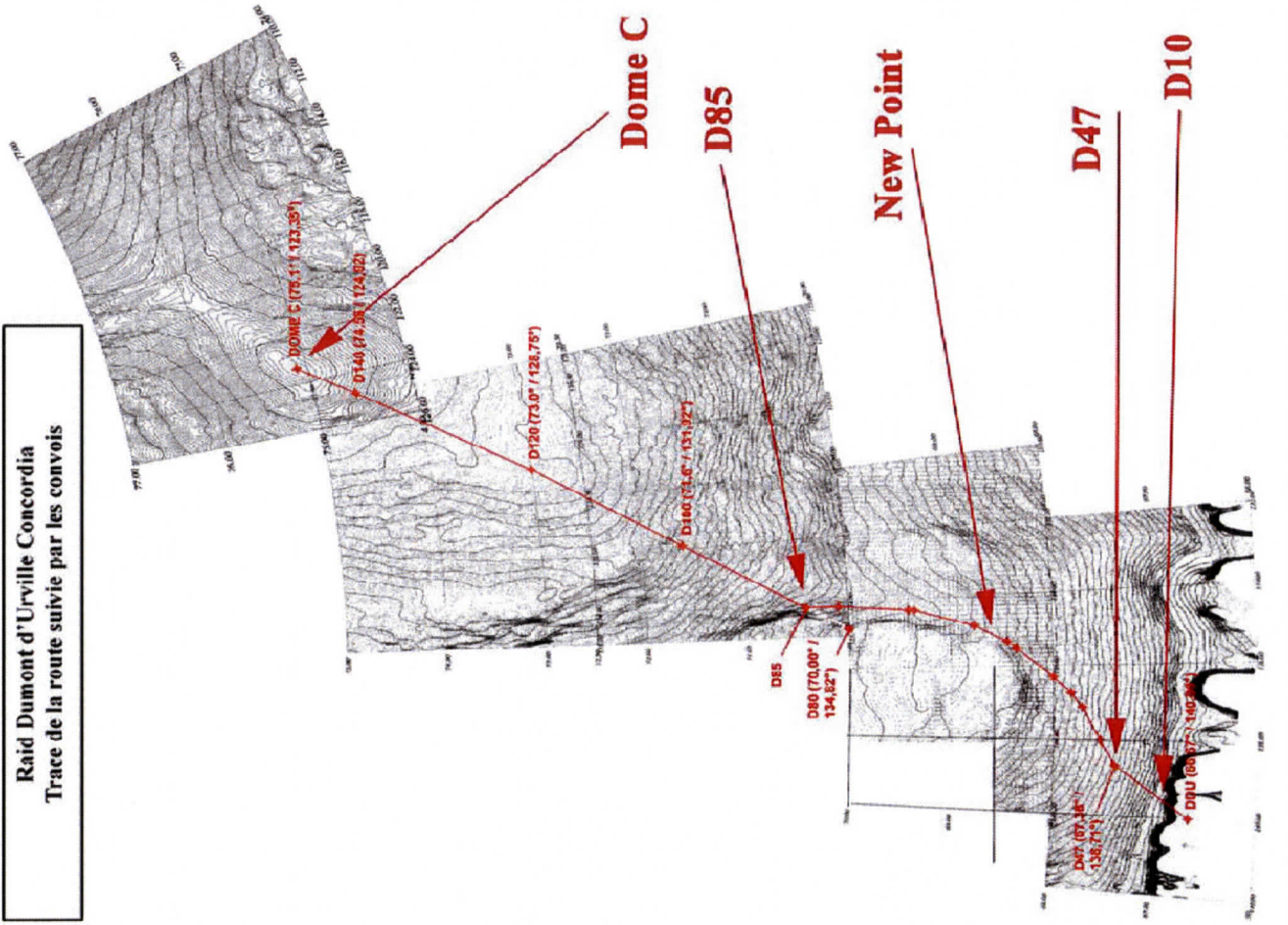
Wind Speed sensor replaced
New antenna installed and
AWS rebooted by
Tony Stewart
Peter Morse

through

Rob Easter
Expedition Manager
Mawson's Huts Foundation, Australia



Raid Dumont d'Urville Concordia
Trace de la route suivie par les convois



IPEV RAID

Route

New sites

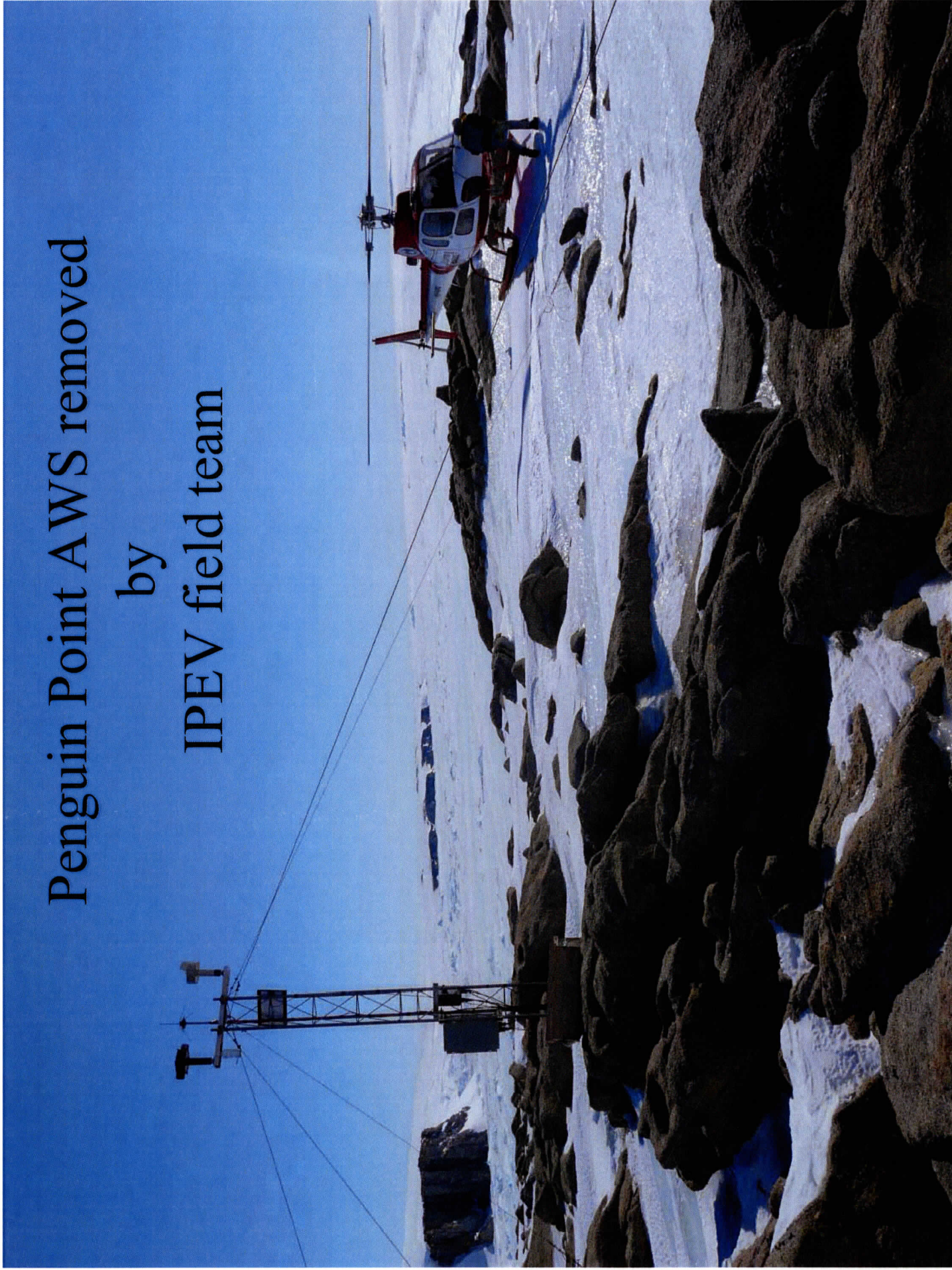
D85 : 70 deg 25.550 min S
134 deg 08.784 min E

D66A: 68 deg 54.700 min S
134 deg 39.300 min E

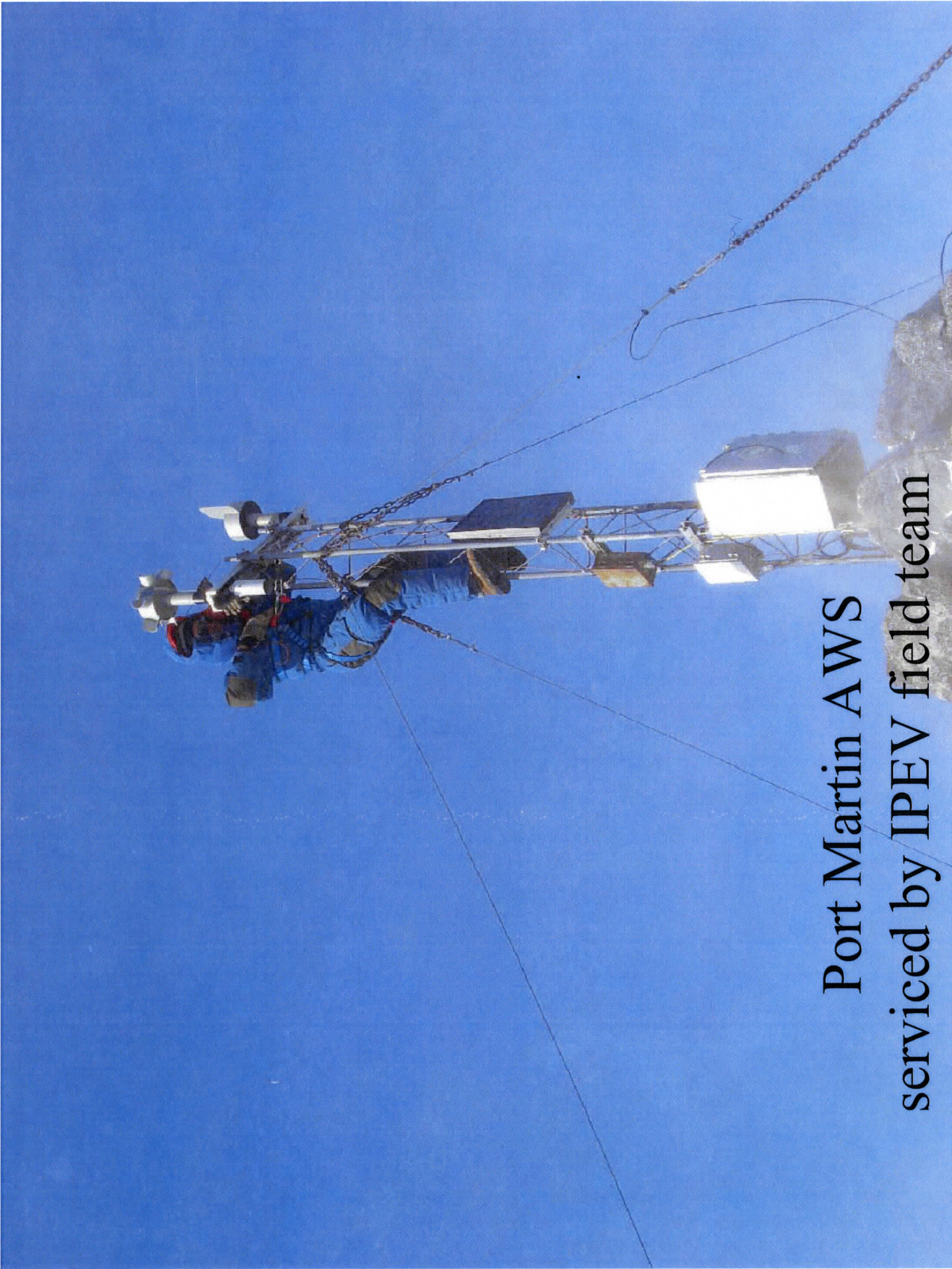
Penguin Point AWS removed

by

IPEV field team





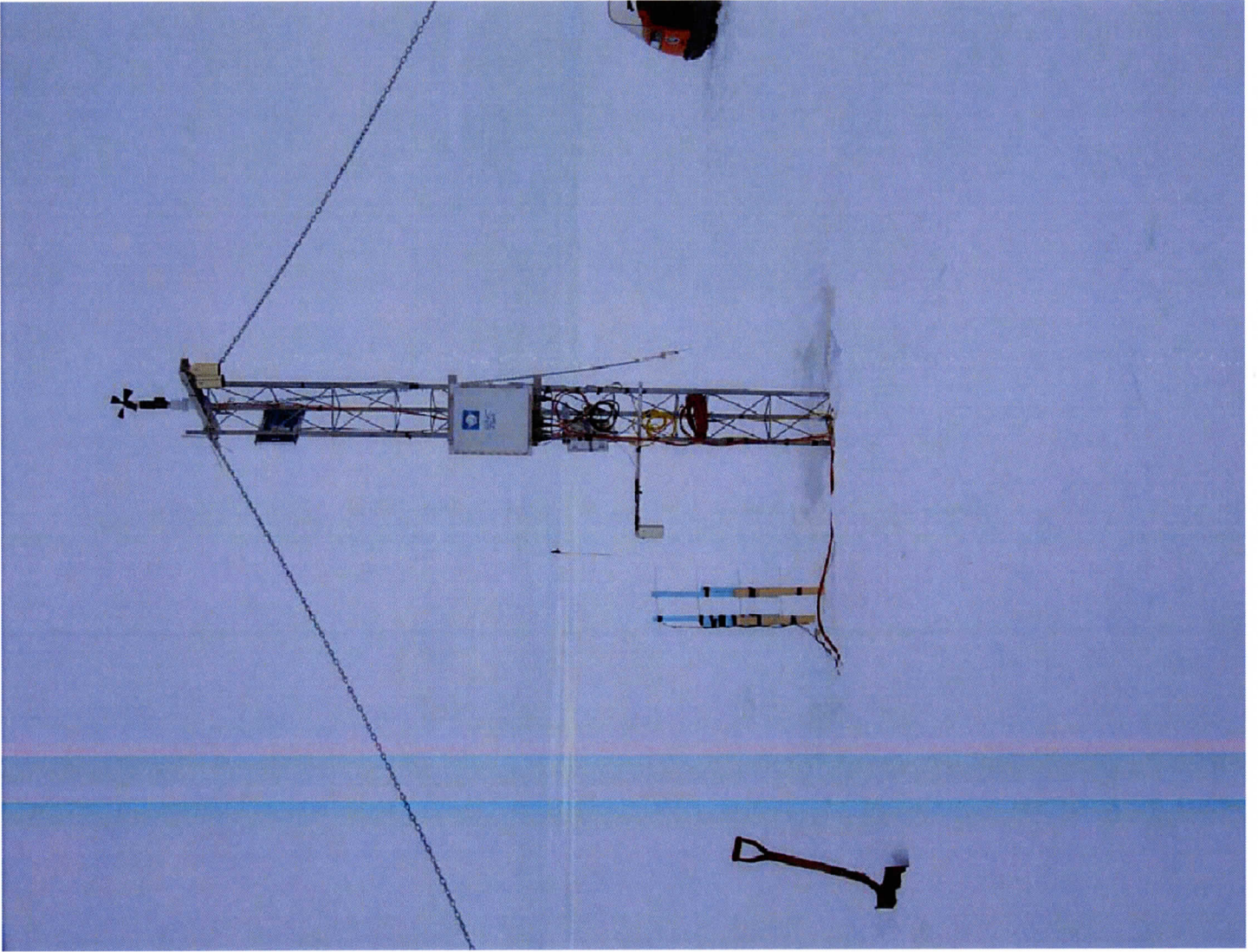


Port Martin AWS
serviced by IPEV field team

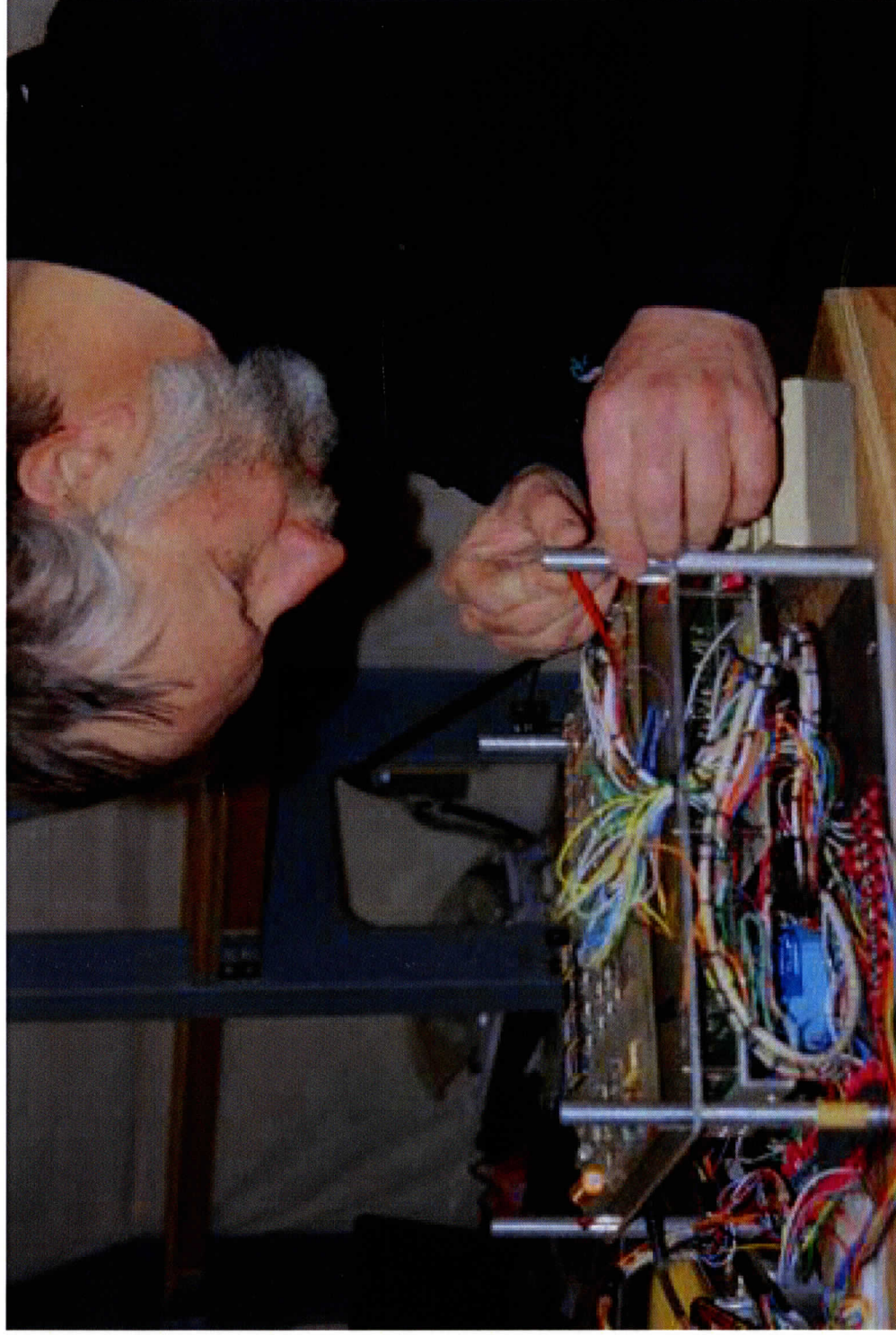
West Antarctic Sites

SITES	ARGOS ID	ARGOS ID	Lat.	Long.	Alt.(m)	Date	WMO#
WEST ANTARCTICA	OLD/Status	NEW/Action			UNAVCO = @	STARTED	
Byrd Station	8903	Visited	80.007oS	119.404oW	1530	Feb-80	89324
Brianna	8931	Serviced	83.889oS	134.154oW	@525	Nov-94	
Elizabeth	21361		82.607oS	137.078oW	@519	Nov-94	89332
J.C.	No AWS	Not active	85.070oS	135.516oW	549	Nov-94	
Erin	21363		84.904oS	128.828oW	@990	Nov-94	
Harry	8900		83.003oS	121.393oW	945	Nov-94	
Theresa	21358	Serviced	84.599oS	115.811oW	1463	Nov-94	89314
Doug	No AWS	Not active	82.315oS	113.240oW	1433	Nov-94	
Mount Siple	8981		73.198oS	127.052oW	230	Feb-92	89327
Siple Dome	8938		81.656oS	148.773oW	@668	Jan-97	89345
Swthinbank	21355	8927 installed	81.201oS	126.177oW	@959	Jan-97	
WAIS K-S	8936	Serviced	79.468oS	112.086oW	@1833	Jan-06	

K-S AWS at installation
in January 2006



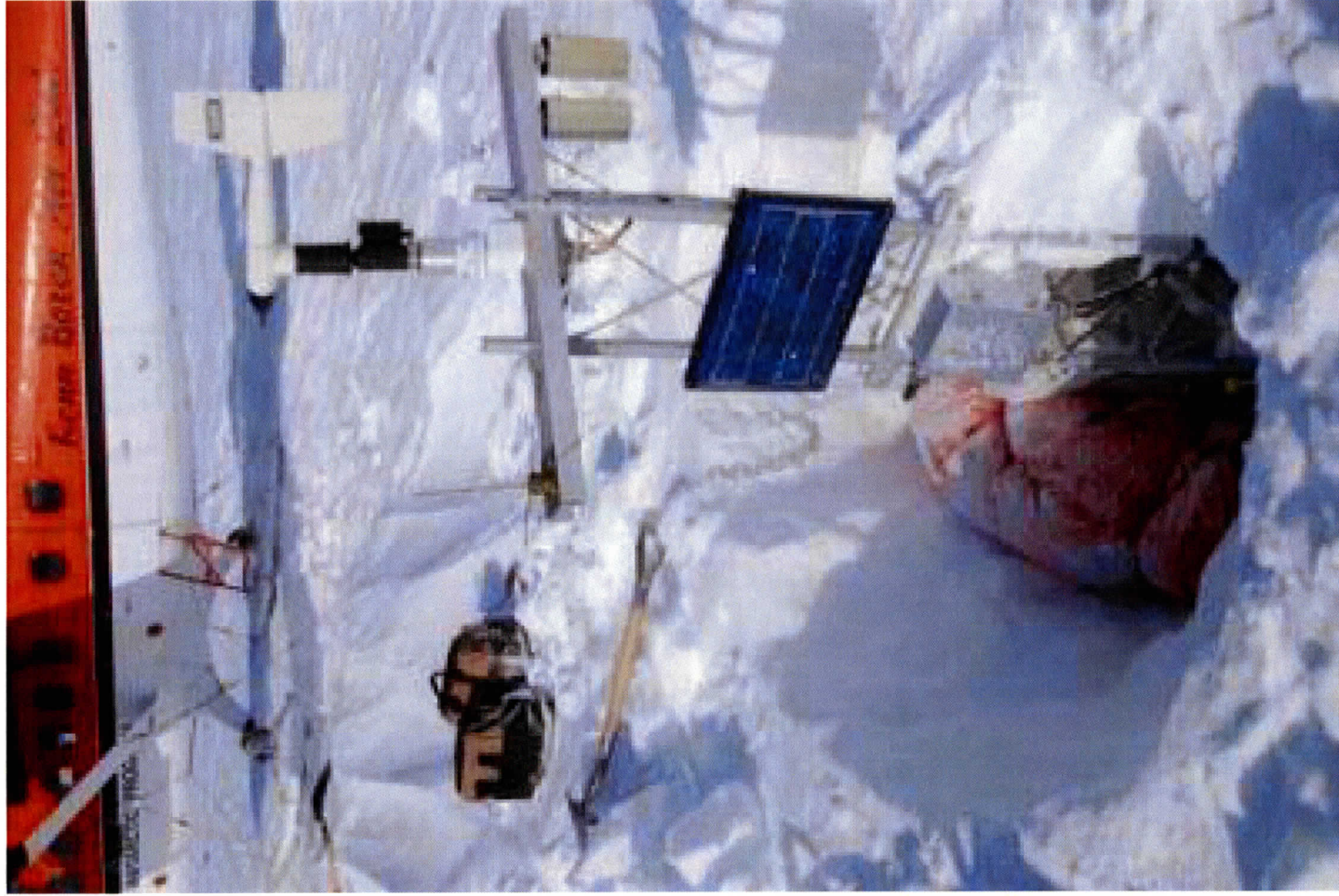
AWS repair at WAIS Divide



Theresa AWS



Theresa AWS part two



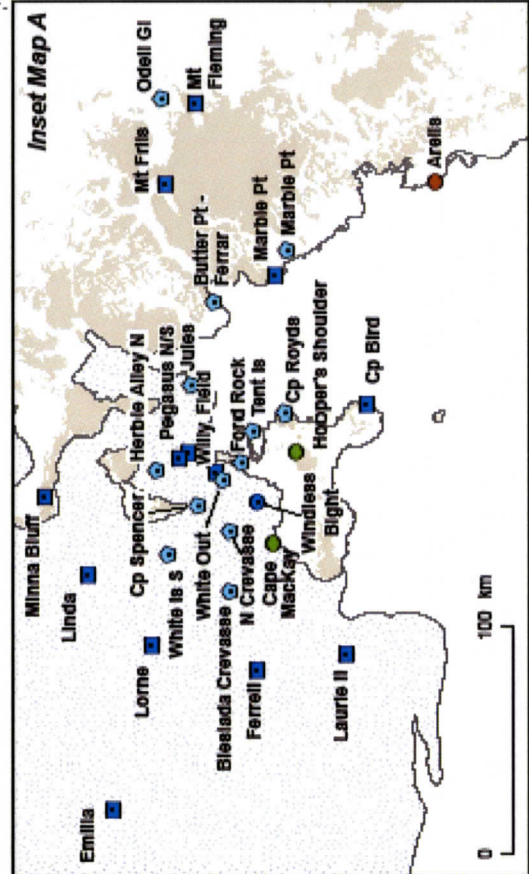
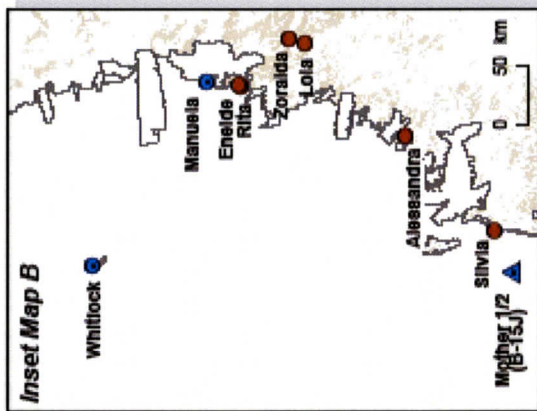
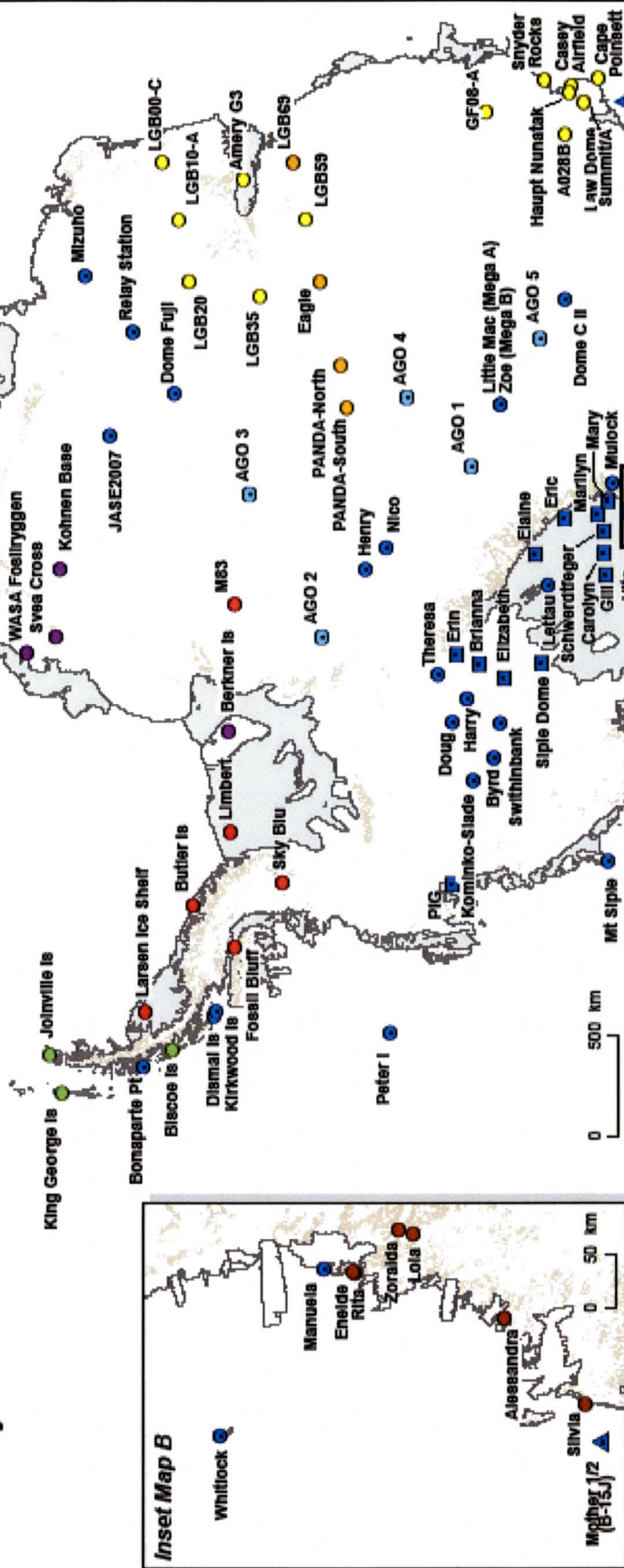
Theresa AWS and Kirk Beckendorf



Ross Island Sites

SITES Ross Island	ARGOS ID		ARGOS ID		Lat.	Long.	Alt.(m)	Date		WMO#
	OLD/Status	NEW/Action	ARGOS ID	NEW/Action				STARTED		
Marble Point	8906				77.439oS	163.754oE	@108		Feb-80	89866
Ferrell	8929		ADG data		77.865oS	170.819oE	@45		Dec-80	89872
Pegasus North	21357		Serviced		77.952oS	166.500oE	@8		Jan-90	89667
Pegasus South	8937		Serviced		77.990oS	166.568oE	@5		Jan-91	
Minna Bluff	8939				78.555oS	166.691oE	@47		Jan-91	89769
Mullock	8907				79.018	170.819	@378		Oct-06	
Willie Field	21364		Serviced		77.866oS	166.983oE	@14		Jan-92	
Willie Field	Iridium AWS		Installed		77.866oS	166.983oE	@14		Jan-92	
Willie Field	CR1000 AWS		Serviced		77.866oS	166.983oE	@14		Jan-92	
Windless Bight	8982		Serviced		77.728oS	167.703oE	61		Nov-98	
Cape Bird	8901		Serviced		77.224oS	166.440oE	@42		Jan-99	
Laurie II	21360		Serviced		77.509oS	170.797oE	@37		Jan-00	
Linda	21362				78.439oS	168.406oE	@43		Jan-91	89769
Lorne	21356				78.250oS	170.000oE	@45		Jan-07	
Mt Friis	28339		Updated		77.747oS	161.516 E	@1581		Jan-07	
Mt Fleming	30393		Serviced		77.533oS	160.276 E	@1868		Nov-06	
Cape Hallet	28338		Added Argos		72.190 S	170.160 E	@14		Nov-07	

2008 Automatic Weather Stations University of Wisconsin - Madison



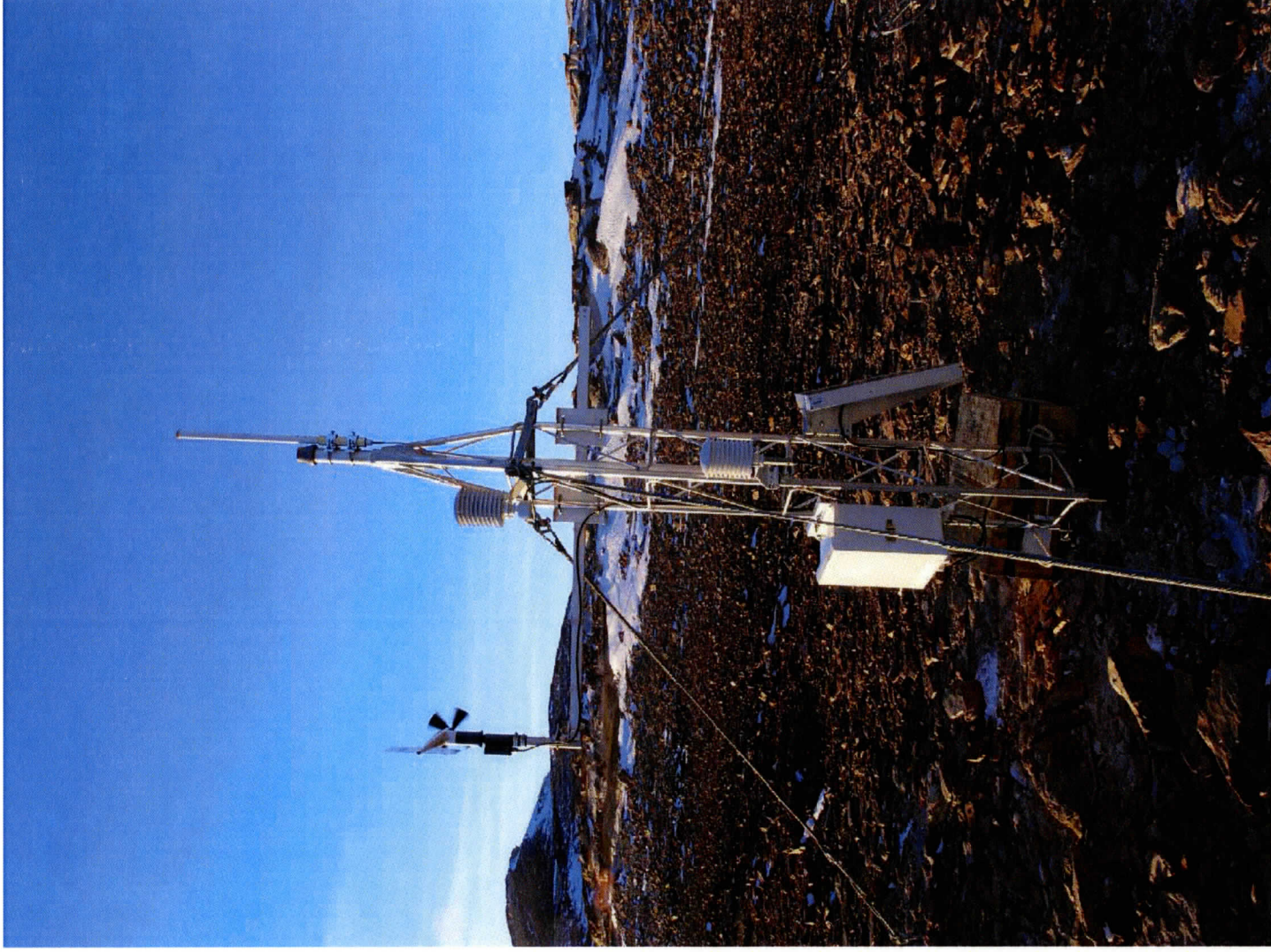
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- AWS
 - ▲ AWS - Iceberg location as of map date
 - AWS - UNAVCO positioned
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 - United Kingdom
- Coastline: ADD v4.1, 2003
2009_AWS_Sites_ALL
1 May 2009 Sam Bazal SSEC-ERSC

Mt Fleming

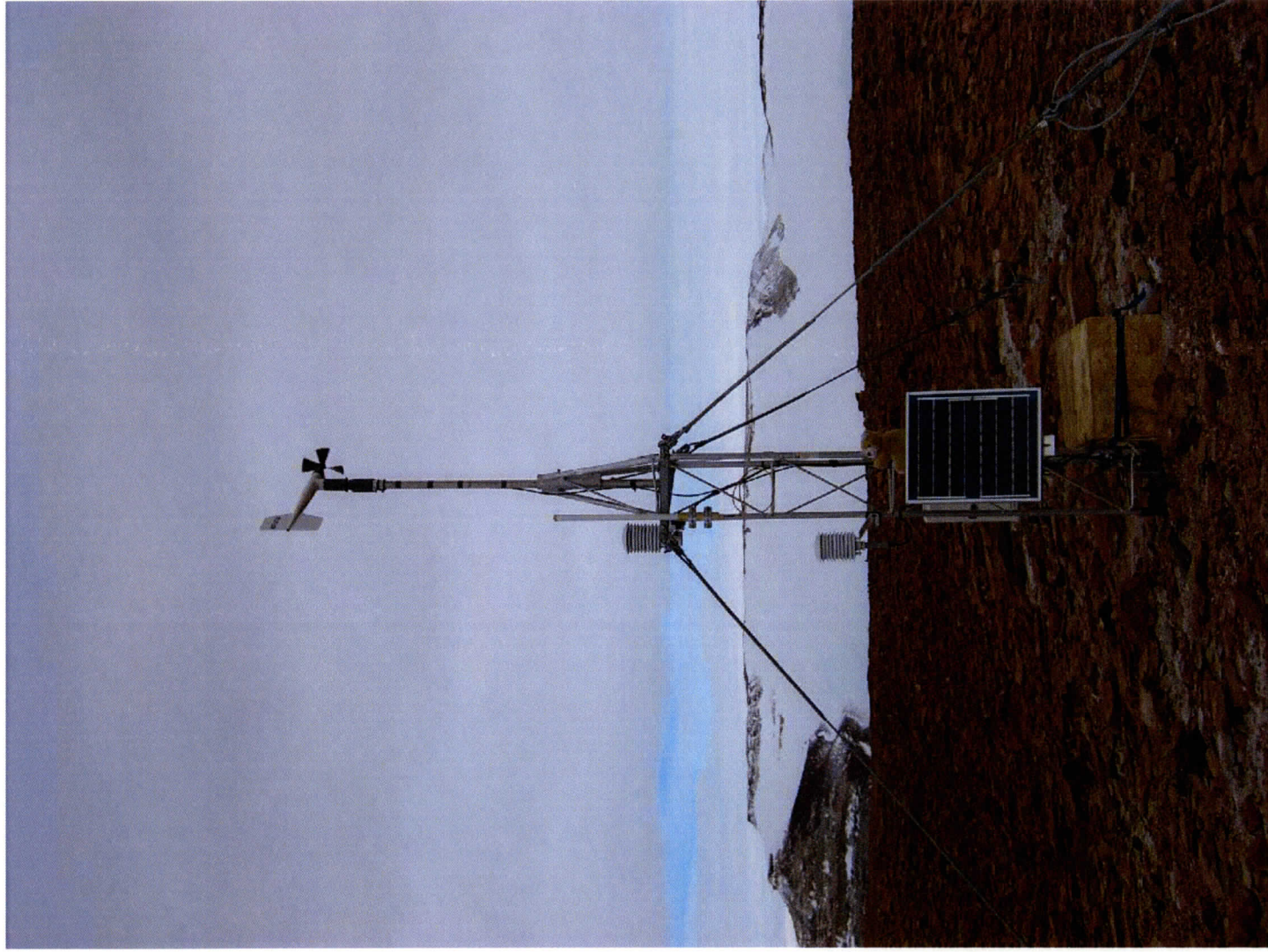
Wind system damaged

Wind system replaced

AWS tower rebuilt



Mt Fleming repaired

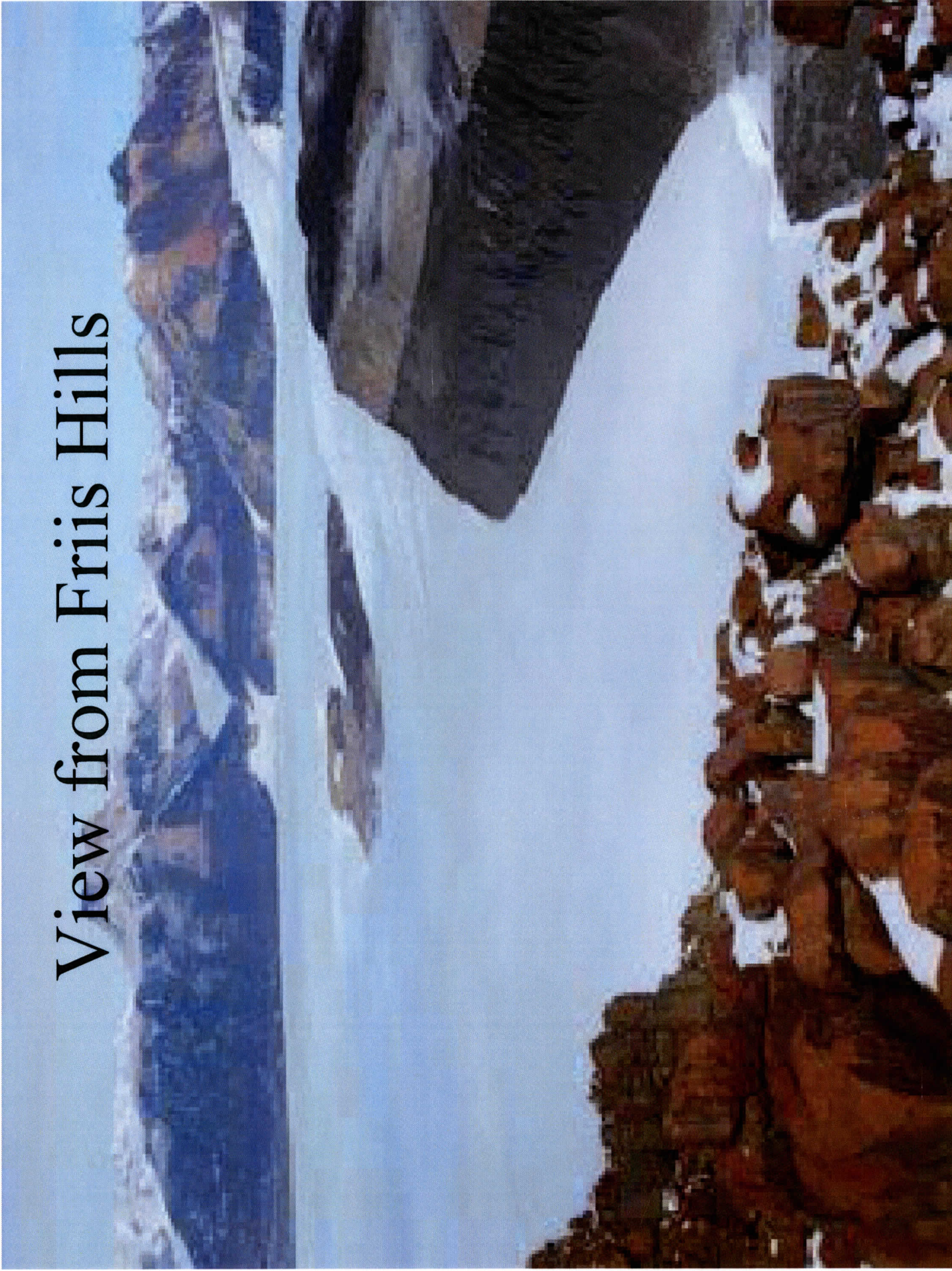


AWS at Friis Hills

- * added pressure sensor and updated program



View from Friis Hills



Cape Hallet AWS

- * Sensors replaced
- * Argos Transmitter added
- * Software updated

Thomas Nysten
UNAVCO



Ross Ice Shelf Sites

Ross Ice Shelf	ARGOS ID	ARGOS ID	ARGOS ID	Lat.	Long.	Alt.(m)	Date	WMO#
		OLD/Status	NEW/Action			@ Unavco	STARTED	
Marilyn	8934		Serviced	79.954oS	165.130oE	(72)@64	Jan-84	89869
Schwerdtfeger	8913		Serviced	79.875oS	170.105oE	@54	Jan-85	89868
Gill	8911			79.985oS	178.611oW	@54	Jan-85	89376
Elaine	8987			83.134oS	174.169oE	@59	Jan-86	89873
Lettau	8928			82.518oS	174.452oW	55	Jan-86	89377
Vito	8695			78.509oS	177.746oE	@+52	4-Feb	
Emilia	8980(new ID)			78.509oS	173.114oE	@+50	4-Feb	
Carolyn	8722		Serviced	79.964oS	175.842oE	@+52		
Mary	8983		Serviced	79.303oS	162.968oE	@+58		
Nascent	28336			78.127oS	178.497oE	30		
Eric	8697			81.504oS	163.940oE	@+45		
Roosevelt Island			To be Installed					
South Ross Ice Shelf			To be Installed					

Carolyn AWS

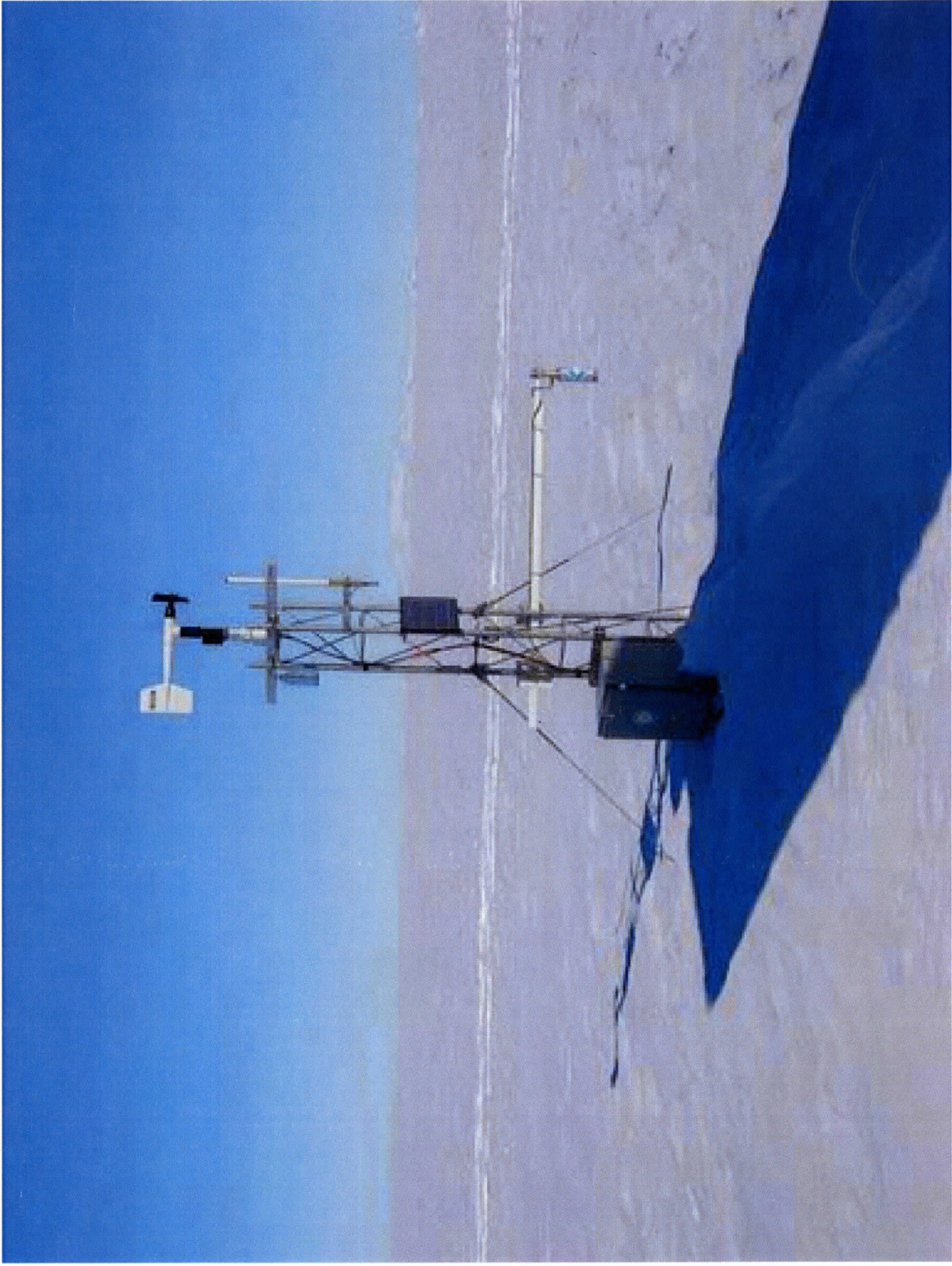
- Wind sensor replaced
- ADG installed



Shelley in one of
her snow pits



Mary Site on arrival



Mary AWS site being raised



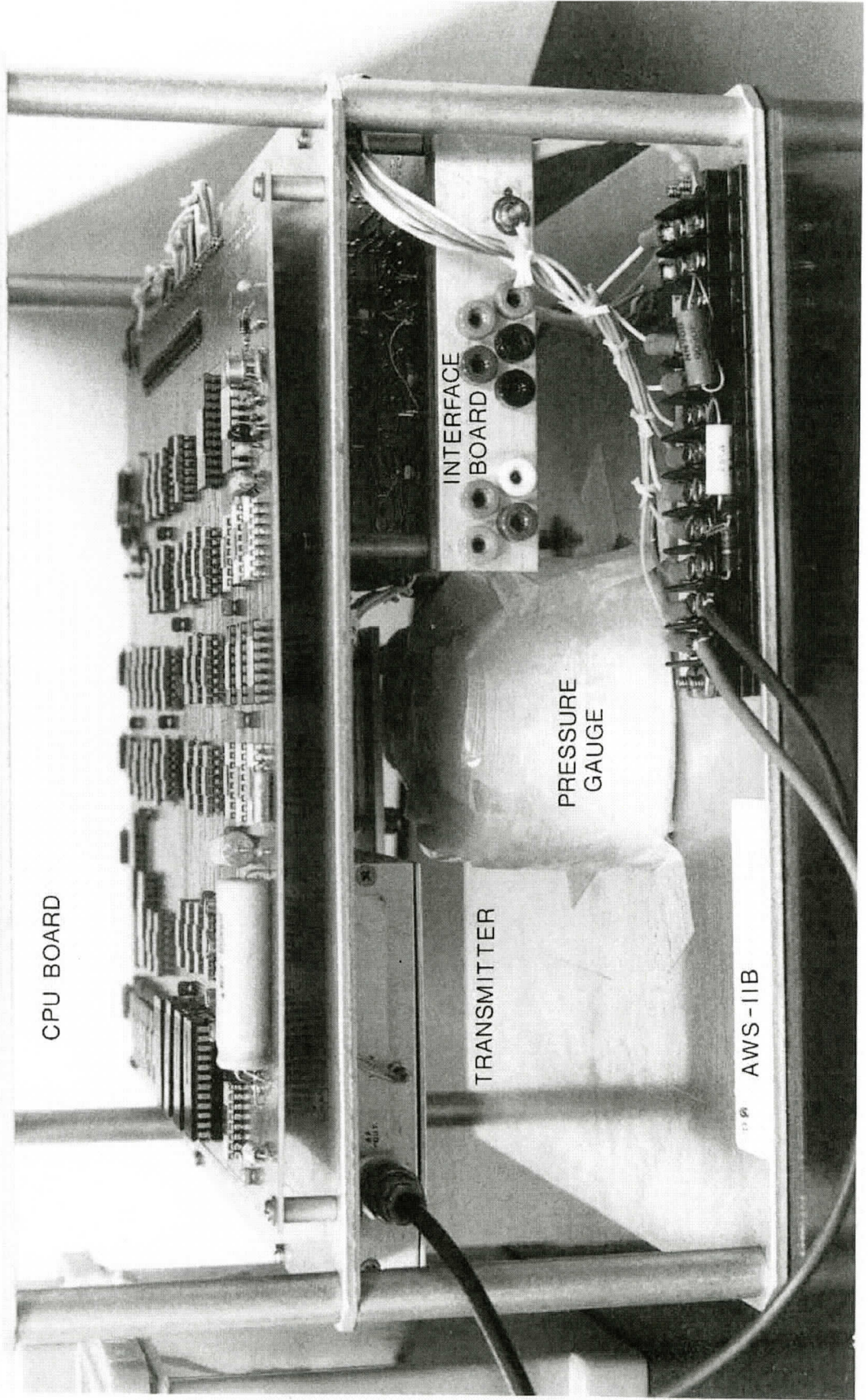
High Polar Plateau AWS sites

SITE	ARGOS ID	ARGOS ID	Lat.	Long.	Alt.(m)	Date	WMO#
	OLD/Status	NEW/Action				STARTED	
Henry	8985	Serviced	89.011oS	1.025oW	2755	Jan-93	89108
Nico	8924	Serviced	89.000oS	89.669oE	2935	Jan-93	89799
Relay Station	8918	8918 new	74.017oS	43.062oE	3353	Feb-95	89744
Dome Fuji	8904	Retrieved	77.31oS	39.70oE	3810	Feb-95	89734
Mizuho	21359		70.70oS	44.29oE	2260	Oct-00	
JARE 2008	30305	Installed	77.000 S	20.000 E	3400	Dec-07	
Megadunes	2769/2516		80.775oS	124.526oE	2881	Jan-04	
Panda South	30416	Installed	82.246 S	75.989 E	4027	Jan-08	
M83 (BAS)	9116	Installed	82.774 S	13.054 W	1968	Jan-08	

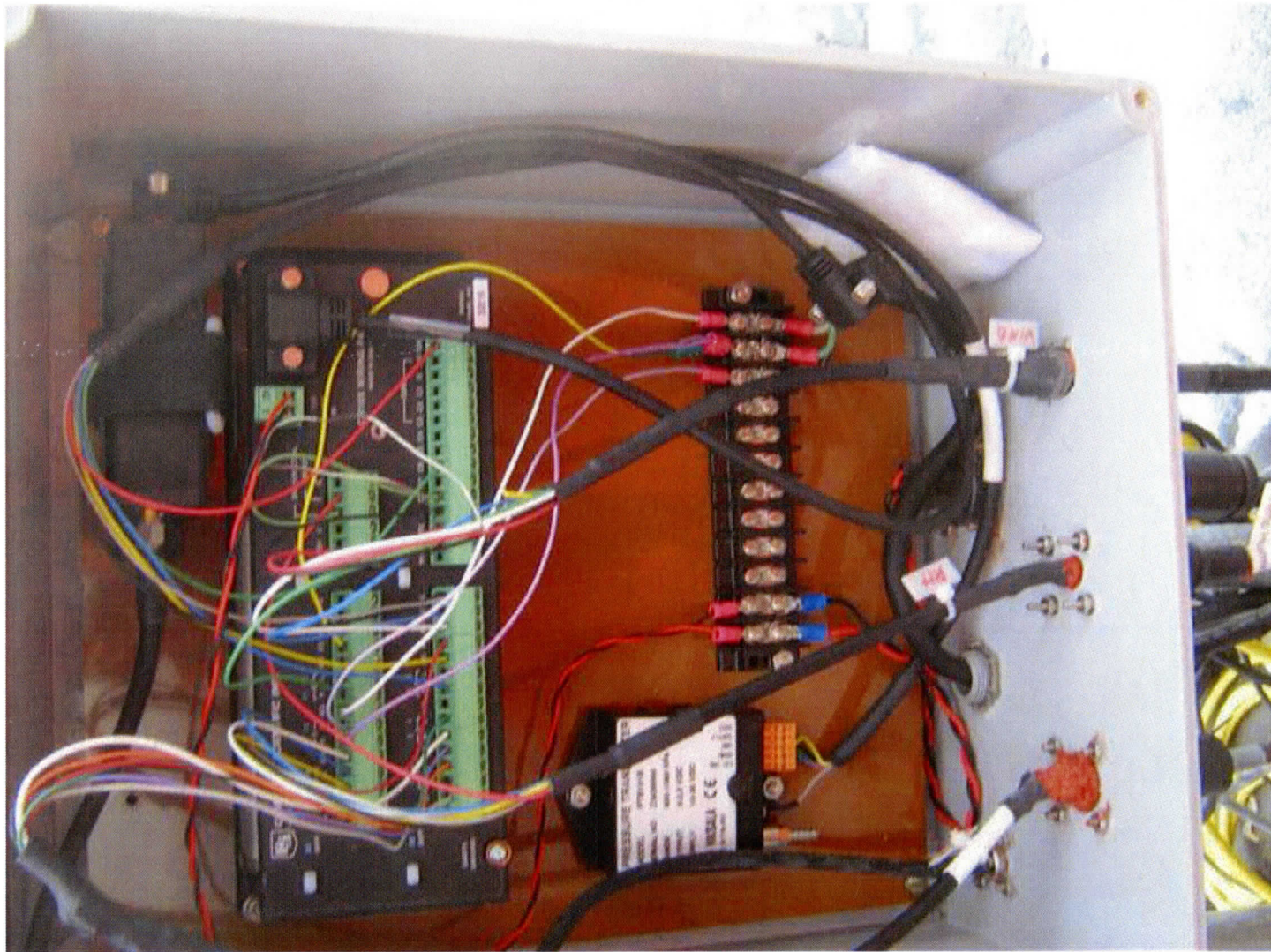
Iceberg AWS status

B15J Mother 1	30504	Transmitting
B15J Mother 2	30580	Transmitting
B15K	9116	Off 2007 ID to BAS
B15A Wanderer	30477	Off Dec 2007
C16	15930	Transmitting
Drygalski Fountain	30416	Off Jan 2007 Id to Chinese AWS

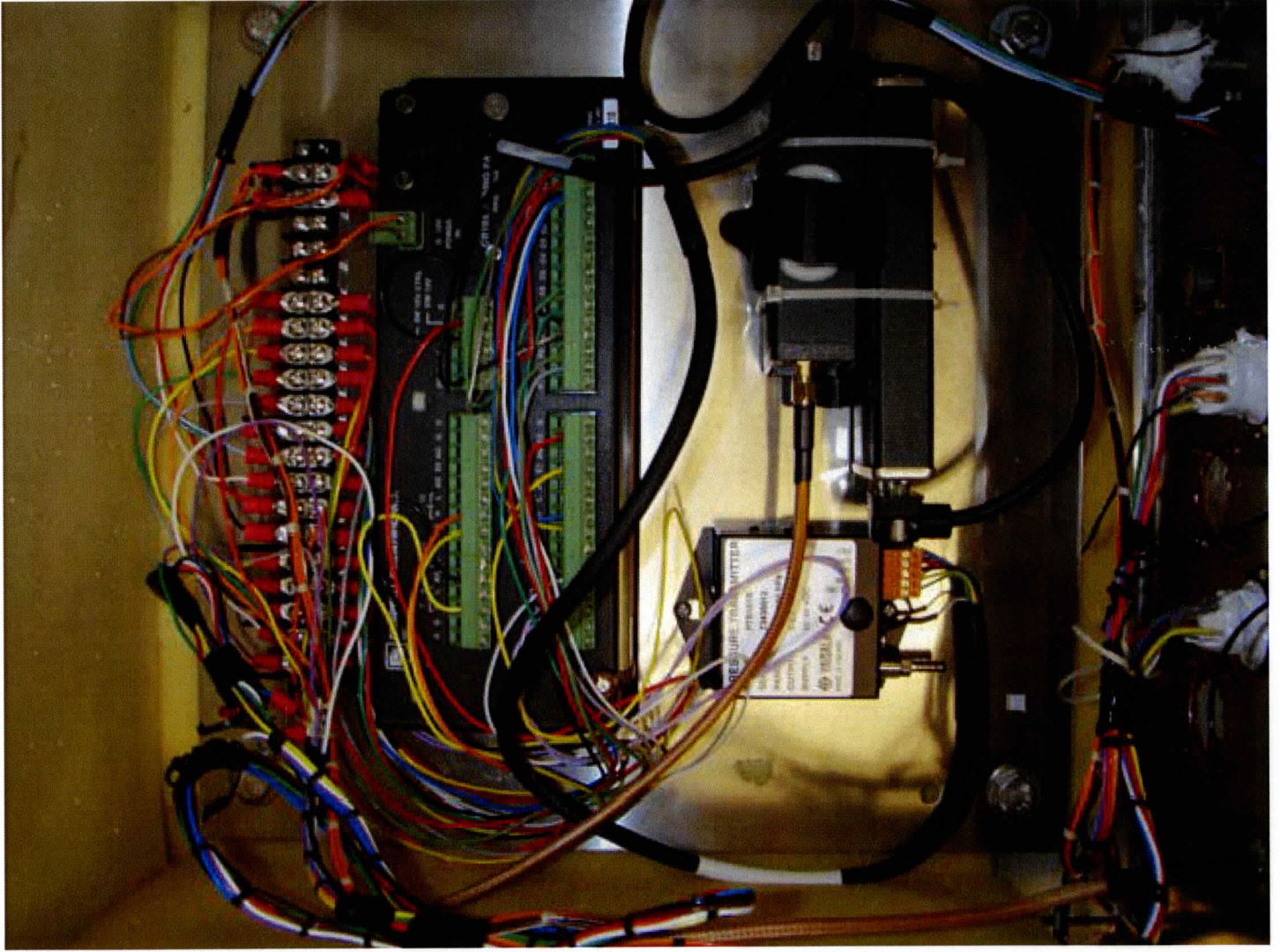
AWS2B 1983 – present



AWS CR10X version



CR1000 based AWS



Work delayed until 2008/2009

- Ross Ice Shelf locations for Installations at Roosevelt Island and South Ross Ice Shelf will be determined at a later date.
- 1. Roosevelt Island may require a fuel depot / refueling depot depending on location relative to Roosevelt Island.
- 2. The South Ross Ice Shelf site may be located at the refueling site used to reach POLENET sites last season. This will be determined at our AWS meeting in early June. Hence, this AWS could be deployed via a ship of opportunity with a flight to the refueling site by some other program. Current other proposed locations are at for an AWS on the southern part of the Ross Ice Shelf:
 - 85.00 deg S, 150 deg W
 - 84.25 deg S, 170 deg W (this site could be located where the S. Pole traverse route crosses 170 W, making it accessible from the traverse for future servicing).
- Megadunes AWS servicing:
 1. Current proposed work at the Megadunes site is to retrieve the non working AWS 2516, the recording AWS located between AWS 2516 and 2769, and service as necessary AWS 2769.
 2. Two O-283 team members (possibly one O283 and one Mountaineer).

Table 1: AWS for 2008. An '@' in the 'Altitude' column indicates a location obtained from UNAVCO GPS. A red line indicates a site visit in 2007/2008. Blue sites were not visited as planned.

SITE	ARGOS ID	ARGOS ID	Lat.	Long.	Alt.(m)	Date	WMO#
	OLD/Status	NEW/Action				STARTED	
Adelie Coast							
D-10	8986 replaced	30374 (CR10X)	66.71oS	139.83oE	243	Jan-80	89832
D-47	8947		67.397oS	138.726oE	1560	Nov-82	89834
D-66 NEW		8912 installed	68.912oS	134.655oE		Dec 07	
D-85 NEW		8916 Installed	70.426oS	134.146oE		Dec 07	
Dome C II	8989		75.121oS	123.374oE	3250	Dec-95	89828
Port Martin	8909	8914(?)	66.82oS	141.40oE	39	Jan-90	
Cape Denison	8988	Serviced	67.009oS	142.664oE	31	Jan-90	
Penguin Point	8910	AWS Removed	67.617oS	146.180oE	30	Dec-93	89847
West Antarctica							
Byrd Station	8903	Visited	80.007oS	119.404oW	1530	Feb-80	89324
Brianna	8931	Serviced	83.889oS	134.154oW	@525	Nov-94	
Elizabeth	21361		82.607oS	137.078oW	@519	Nov-94	89332
J.C.	No AWS	Not active	85.070oS	135.516oW	549	Nov-94	
Erin	21363		84.904oS	128.828oW	@990	Nov-94	
Harry	8900		83.003oS	121.393oW	945	Nov-94	
Theresa	21358	Serviced	84.599oS	115.811oW	1463	Nov-94	89314
Doug	No AWS	Not active	82.315oS	113.240oW	1433	Nov-94	
Mount Siple	8981		73.198oS	127.052oW	230	Feb-92	89327
Siple Dome	8938		81.656oS	148.773oW	@668	Jan-97	89345
Swithinbank	21355 New ID	8927 installed	81.201oS	126.177oW	@959	Jan-97	
WAIS K-S	8936	Serviced	79.468oS	112.086oW	@1833	Jan-06	
Ross Island Region							
Marble Point	8906		77.439oS	163.754oE	@108	Feb-80	89866
Ferrell	8929	ADG data	77.865oS	170.819oE	@45	Dec-80	89872
Pegasus North	21357	Serviced	77.952oS	166.500oE	@8	Jan-90	89667
Pegasus South	8937	Serviced	77.990oS	166.568oE	@5	Jan-91	
Minna Bluff	8939		78.555oS	166.691oE	@47	Jan-91	89769
Mullock	8907		79.018	170.819	@378	Oct-06	
Willie Field	21364	Serviced	77.866oS	166.983oE	@14	Jan-92	
Willie Field test	Iridium AWS	Installed	77.866oS	166.983oE	@14	Jan-92	
Willie Field test	CR1000 AWS	Serviced	77.866oS	166.983oE	@14	Jan-92	
Windless Bight	8982 (CR10X)	Serviced	77.728oS	167.703oE	61	Nov-98	
Cape Bird	8901	Serviced	77.224oS	166.440oE	@42	Jan-99	
Laurie II	21360	Serviced	77.509oS	170.797oE	@37	Jan-00	
Linda	21362		78.439oS	168.406oE	@43	Jan-91	89769
Lorne	21356		78.250oS	170.000oE	@45	Jan-07	
Mt Friis	28339 (CR10X)	Updated	77.747oS	161.516 E	@1581	Jan-07	
Mt Fleming	30393 (CR10X)	Serviced	77.533oS	160.276 E	@1868	Nov-06	
Cape Hallet	28338 (CR10X)	Added Argos	72.190 S	170.160 E	@14	Nov-07	
Ocean Islands							
Whitlock	8935	Not serviced	76.144oS	168.392oE	(275)@206	Jan-82	89865
Scott Island	No AWS		67.37oS	179.97oW	30	Dec-87	89371
Young Island	No AWS		66.229oS	162.275oE	30	Jan-91	89660
Possession Is.	8984		71.891oS	171.210oE	30	Dec-92	89879

Manuela	8905		74.946oS	163.687oE	80	Feb-84	89864
Peter I	8933		68.769oS	90.670oE	90	Feb-06	
	Ross Ice Shelf						
Marilyn	8934	Serviced	79.954oS	165.130oE	(72)@64	Jan-84	89869
Schwerdtfeger	8913	Serviced	79.875oS	170.105oE	@54	Jan-85	89868
Gill	8911		79.985oS	178.611oW	@54	Jan-85	89376
Elaine	8987		83.134oS	174.169oE	@59	Jan-86	89873
Lettau	8928		82.518oS	174.452oW	55	Jan-86	89377
Vito	8695		78.509oS	177.746oE	@+52	4-Feb	
Emilia	8980 (CR10X)		78.509oS	173.114oE	@+50	4-Feb	
Carolyn	8722	Serviced	79.964oS	175.842oE	@+52		
Mary	8983 (CR10X)	Serviced	79.303oS	162.968oE	@+58		
Nascent	28336		78.127oS	178.497oE	30		
Eric	8697		81.504oS	163.940oE	@+45		
Roosevelt Island		To be Installed					
South Ross Ice Shelf		To be Installed					
	Antarctic Peninsula						
Larsen Ice	8926 (CR1000)	Data download	66.949oS	60.897oW	17	Oct-85	89262
Butler Island	8902 (CR1000)	Data download	72.207oS	60.160oW	91	Mar-86	89266
Fossil Bluff	8920 (CR1000)	Data download	71.33oS	68.283oW	63	Dec-01	89065
Limbart	8925 (CR1000)	Data download	75.422oS	59.851oW	40	Dec-95	89257
Ski-Hi	8917 (CR1000)	Data download	74.792oS	70.488oW	1395	Feb-94	89272
Bonaparte Point	8923 (removed)	8921 CR10X	64.778oS	64.067oW	8	Jan-92	89269
Santa Claus I		8935 CR1000	64.964oS	65.670oW	25	Dec-94	
Racer Rock		Not active	64.067oS	61.613oW	17	Nov-89	89261
Kirkwood Island	8930 (CR10X)	Off	68.340oS	69.007oW	30	May-01	
Dismal Island	8932 (CR10X)	Works summer	68.087oS	68.825oW	10	May-01	
	High Polar Plateau						
Henry	8985	Serviced	89.011oS	1.025oW	2755	Jan-93	89108
Nico	8924	Serviced	89.000oS	89.669oE	2935	Jan-93	89799
Relay Station	8918	8918 new AWS	74.017oS	43.062oE	3353	Feb-95	89744
Dome Fuji	8904	Retrieved ?	77.31oS	39.70oE	3810	Feb-95	89734
Mizuho	21359		70.70oS	44.29oE	2260	Oct-00	
JARE 2008	30305	Installed	77.000 S	20.000 E	3400	Dec-07	
Megadunes	2769 (CR10X)		80.775oS	124.526oE	2881	Jan-04	
Panda South	30416	Installed	82.246 S	75.989 E	4027	Jan-08	
Baldrick M83 (BAS)	9116 (CR1000)	Installed	82.774 S	13.054 W	1968	Jan-08	
	Iceberg AWS stations						
B15J Mother 1	30504 (CR10X)	Transmitting					
B15J Mother 2	30580 (CR10X)	Transmitting					
B15K	9116 (CR10X)	Off ID to BAS					
B15A Wanderer	30477 (CR10X)	Off Dec 2007					
C16	15930 (CR10X)	Transmitting					
Drygalski Fountain	30416 (CR10X)	Off Jan 2007					
		ID to Panda S					

