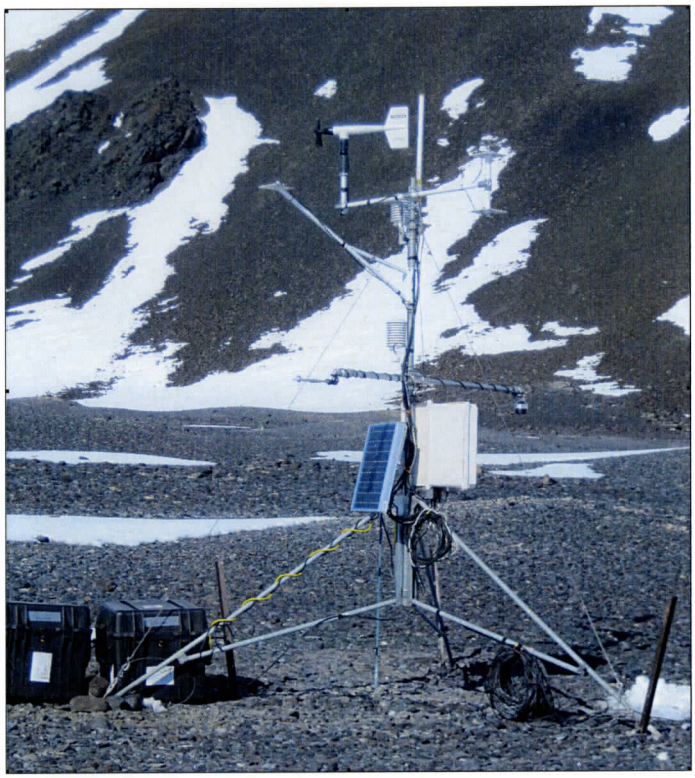
AWS Annual Project Report: NSF-OPP Grant #ANT-0944018, June 9, 2011 to June 29, 2012

Collaborative Research: Antarctic Automatic Weather Station Program

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



Dr. Matthew A. Lazzara, Principal Investigator
Dr. John J. Cassano, co-Principal Investigator
Linda M. Keller, George A. Weidner, Jonathan E. Thom, Melissa Nigro, Lee J. Welhouse, Alice DuVivier - 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 June 29, 2012

Annual Report for Period: 09/2011 - 08/2012
Submitted on: 06/29/2012
Principal Investigator: Lazzara, Matthew A.
Award ID: 0944018
Organization: U of Wisconsin Madison
Submitted By:
Lazzara, Matthew - Principal Investigator
Title:
Collaborative Research: Antarctic Automatic Weather Station Program

Project Participants

Senior Personnel

Name: Lazzara, Matthew
Worked for more than 160 Hours: Yes
Contribution to Project:
Dr. Matthew Lazzara is the Principal Investigator (PI) of the Antarctic Automatic Weather Station Project. He over sees the day to day activities of the project including the data quality control effort. He also co-leads the climatological efforts with Linda Keller, and co-leads the AWS network maintenance effort with Jonathan Thom, Lee Welhouse, and George Weidner. He also supervises the students working on the project.

Post-doc

Graduate Student

Undergraduate Student

Name: Key, Nikki
Worked for more than 160 Hours: No
Contribution to Project:
Nikkie Key has assisted the AWS project with miscellaneous clerical duties.

Name: Knapp, Samuel
Worked for more than 160 Hours: No
Contribution to Project:
In the first year of the project, Sam Knapp has worked on the AWS project, primarily assisting with the relational, GIS enabled, database used to organize the metadata for the AWS stations. Sam has left out group to pursue biology at another institution.

Name: Mindock, Abigail
Worked for more than 160 Hours: No
Contribution to Project:
Abigail Mindock has assisted the AWS project with miscellaneous clerical duties.

Name: Oswalt, Jacqueline
Worked for more than 160 Hours: No
Contribution to Project:
Jacqueline Oswalt has assisted the AWS project with miscellaneous clerical duties.

Name: Snarski, Joey
Worked for more than 160 Hours: No
Contribution to Project:
In the first year of the project, Joey Snarski has assisted with data archive and with the AMRC/AWS web page. He has not participated in the second year of the project.

Name: Hudson, Rebecca

Worked for more than 160 Hours: No

Contribution to Project:

Rebecca assists with aspects of the AWS/AMRC web site, working with the SSEC webmaster.

Name: Trevorrow, Scott

Worked for more than 160 Hours: No

Contribution to Project:

Scott worked on the AWS project for a short time during the second year of the project to assemble monthly summaries of AWS observations.

Name: Weber, Nicholas

Worked for more than 160 Hours: No

Contribution to Project:

Nick has worked on some minor tasks for the AWS project with regards to the data availability on the website, organization of the data files, etc.

Name: Constanza, Carol

Worked for more than 160 Hours: No

Contribution to Project:

Carol is working with and organizing the AWS observational data set, including the summary statistics.

Technician, Programmer

Name: Keller, Linda

Worked for more than 160 Hours: Yes

Contribution to Project:

Linda Keller is a lead researcher on the AWS project, focusing on the quality control of the AWS observations, and works with the PI on the climatological analysis.

Name: Mikolajczyk, David

Worked for more than 160 Hours: Yes

Contribution to Project:

In the first year and half as an undergraduate student, Dave has worked with Linda Keller and the PI on quality control efforts with the AWS observations as well as assisting with the analysis of the AWS observation, in preparation for climatological analysis. In the latter half of the second year, David has continued to do this effort, as a research intern for the project.

Name: Thom, Jonathan

Worked for more than 160 Hours: Yes

Contribution to Project:

Jonathan Thom is the lead AWS field team member and an AWS electronic assembly and designer of the AWS-CR1000 stations. He also manages the AWS coding and decoding software.

Name: Weidner, George

Worked for more than 160 Hours: Yes

Contribution to Project:

George Weidner is the lead designer of the AWS electronic assembly and designer of the Wisconsin AWS-2B stations. He also assists with the software that codes and decodes the AWS observations.

Name: Welhouse, Lee

Worked for more than 160 Hours: Yes

Contribution to Project:

Lee Welhouse is an AWS field team member, and assists with AWS assembly, installation, etc.

He also utilizes AWS observations in research on climate signals and large scale phenomena that impact the Antarctic.

Name: Batzli, Samuel

Worked for more than 160 Hours: Yes

Contribution to Project:

Sam has worked on the AWS database and AWS network pages for the project.

Name: Bellon, Willard (Bill)

Worked for more than 160 Hours: No

Contribution to Project:

Bill is the SSEC webmaster, and has assisted the project with the upkeep of the project web site and associated tools that it requires.

Name: Flynn, Bruce

Worked for more than 160 Hours: No

Contribution to Project:

Bruce has been advising project members on the evolution of the AWS database that is being worked on as a part of the project.

Name: Putnam, Lee

Worked for more than 160 Hours: No

Contribution to Project:

Lee has assisted the AWS project with the fabrication of AWS specific hardware.

her Participant

search Experience for Undergraduates

Organizational Partners

iiversity of Colorado at Boulder

..e Antarctic Automatic Weather Station Project is a collaborative project done with John Cassano, co-PI of the project, at the University of Colorado-Boulder (CU) where both ;earch activities and field work are shared between the CU and University of Wisconsin-ıdison (UW) groups.

Other Collaborators or Contacts

Dr. John Cassano (Co-PI), Melissa Nigro, and Alice Du Vivier all at the University of Colorado-ulder are collaborators on this project.

Additional ad hoc collaborations over the project have included C. Genthon and his colleagues at LGGE, and D. Bromwich and his colleagues at Byrd Polar Research Center, OSU.

Activities and Findings

Research and Education Activities:

y 2011-June 2012

Efforts over the past year have focused on continuing to work on the long-term climate ılysis of observations from the Antarctic Automatic Weather Station (AWS) network, laborating on the dynamics of the low level winds over the Ross Ice Shelf, and

documenting the history of AWS in the Antarctic. These efforts were in parallel to maintaining the AWS network in the Antarctica. Project members continued to conduct ad hoc outreach activities over the past year. In addition, 6 papers were published, accepted or submitted in the past year.

The full field report is attached to this report (it follows the first year report).

The following conference presentations associated with this project were made in the past year:

Genthon, C.; Six, D.; Favier, V.; Lazzara, M. and Keller, L.. Atmospheric temperature measurements biases on the Antarctic plateau. In: Antarctic Meteorological Observation, Modeling, and Forecasting Workshop, 6th, Hobart, Tasmania, Australia, 22-24 June 2011 (preprints). Melbourne, Australia, Bureau of Meteorology, Centre for Australian Weather and Climate Research (CAWCR), 2011, unpaged.

Lazzara, Matthew A.; Thom, Jonathan E.; Welhouse, Lee J.; Keller, Linda M.; Weidner, George A.; DeVivier, Alice and Cassano, John J.. USAP Antarctic Automatic Weather Station plans for the 2011-2012 field season. In: Antarctic Meteorological Observation, Modeling, and Forecasting Workshop, 6th, Hobart, Tasmania, Australia, 22-24 June 2011 (preprints). Melbourne, Australia, Bureau of Meteorology, Centre for Australian Weather and Climate Research (CAWCR), 2011, unpaged.

Lazzara, Matthew A.; Thom, Jonathan E.; Welhouse, Lee J.; Keller, Linda M.; Weidner, George A.; Nigro, Melissa M. and Cassano, John J.. USAP Antarctic Automatic Weather Station program status and field report. In: Antarctic Meteorological Observation, Modeling, and Forecasting Workshop, 6th, Hobart, Tasmania, Australia, 22-24 June 2011 (preprints). Melbourne, Australia, Bureau of Meteorology, Centre for Australian Weather and Climate Research (CAWCR), 2011, unpaged.

One item of note is the accident that occurred to the PI in the past year, causing him to be on medical leave for approximately 3 months of the past year, as well as undergoing a continuing recovery. This has had slight delays/impacts on the project - recovery and catch up activities have been in progress, and will continue into the future year.

September 2010- June 2011

The primary science objective for this project is the long-term climatology for the Antarctic surface as seen from the Automatic Weather Station network. Effort has been on the quality control of the AWS observations, to stage them for climatological analysis.

Field season activities included new installations, servicing existing AWS, and some removals. The proposed educational outreach has been initiated with the three participating middle schools. See attached for the field report for the 2010-2011 field season report and letters of support for the educational outreach from each of the participating schools.

During this period, the following conferences were attended and oral/poster presentations made:

Lazzara attended the Autonomous Polar Observing Systems workshop, Washington, D.C. 30 September - 1 October 2010.

Lazzara, M.A., 2010: Meteorology Observations and Challenges. Autonomous Polar Observing Systems workshop, Washington, D.C. (invited presentation)

zzara, M.A. and, J.J. Cassano, 2010: Antarctic Automatic Weather Station Program. utonomous Polar Observing Systems workshop, Washington, D.C. (poster)

zzara and Welhouse attended the 11th Conference on Polar Meteorology and eanography.

azzara, M.A., J.E. Thom, G.A. Weidner, L.M. Keller, M.A. Nigro, and J.J. Cassano, 2011: The tarctic automatic weather station program. American Meteorological Society 11th nference on Polar Meteorology and Oceanography, Boston, MA (poster).

elhouse, L.J, M.A. Lazzara, G.J. Tripoli, and L.M. Keller, 2011: Composite Analysis of the rface Effects of El Nino Southern Oscillation Teleconnections on Antarctica. American Meteorological Society 11th Conference on Polar Meteorology and Oceanography, Boston, MA (poster).

Findings:

y 2011-June 2012

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y findings and results from the project to date include:

* Publishing of AWS history paper:
- Denoting the full history of the Antarctic AWS, even before the start of the AWS ogram at UW-Madison
- Assisting with the Nigro et al. paper:
---Defining the low level jets off the Transantarctic/Prince Olaf Mtns./Dufek Coast
Bulletin of the American Meteorological Society - State of the Climate
- Continue to reporting the past year's noteworthy AWS observations
* Collaboration with C. Genthon et al. paper:
---Identifying the impacts/limitations of temperature measurement in low wind/sun-up uations
- Collaboration with Bromwich et al. paper.
---Evidence of significant warming in Central West Antarctica from AWS and associated servations.

- AWS ongoing quality control (QC) efforts and climatological analysis are underway.

September 2010-June 2011

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th data quality control efforts underway, there are no findings, as of yet, with regard to the climatological analysis. Initial observations from new AWS installations in West Antarctica report large diurnal ranges at elevation which confirms what is expected. More investigation is warranted.

Training and Development:

y 2011-June 2012

This project continues to support undergraduate project participants, Carol Constanza and Nick Weber. Dave Mikolajczyk is a research intern as employee-in-training for the project. All continue to learn to work with real meteorological observations, how to display/organize the

information, apply quality control procedures, etc.

September 2010-June 2011

This project supports undergraduate students participants, especially Sam Knapp and Dave Mikolajczyk. The activities that are a part of the project have provided them with experiences and the opportunity to learn skills that are not common for undergraduates: working with Antarctic meteorological observations, quality control of meteorological data, etc.

Outreach Activities:

July 2011-June 2012

Outreach effort for this project continues via tours, University science expeditions, Wisconsin State Fair, classroom visits, etc. The medical time away for the PI has delayed the project's efforts to deploy student built sensors - this will be remedied in the upcoming field season, and the resulting subsequent data will be provided to the participating classes for use in the classroom activities as it becomes available.

September 2010-June 2011

This project has had a two prong approach to our outreach activities. First, we have engaged in a focused outreach project with three Middle Schools in Southern Wisconsin. This project has provided an opportunity for the students to gain a hands-on experience building a simple sensor (two-junction thermocouple) that will be installed on an AWS in the Antarctic. This effort is in its first year, and in future years students will work with the data collected by the AWS in the classroom in addition to building the sensors.

Second, we continue to leverage the broad public and student outreach in conjunction with the AMRC. Here we are reaching out to the public at local libraries or in K-12 classrooms. We also engage the public at University events (such as a weekend open house here at the U. Wisconsin campus)

Journal Publications

Lazzara, M.A., L.M. Keller, G.A. Weidner, J.E. Thom, and J.J. Cassano, "Antarctic Automatic Weather Station Program: 30 Years of Polar Observations", Bulletin of the American Meteorological Society, p. , vol. , (2012). Accepted, http://dx.doi.org/10.1175/BAMS-D-11-00015.1

Nigro, M.A., J.J. Cassano, M.A. Lazzara, and L.M. Keller, "Case study of a barrier wind tip jet off the coast of the Prince Olav Mountains, Antarctica", Monthly Weather Review, p. , vol. , (2012). Accepted, 10.1175/MWR-D-11-00261.1

Colwell, S.; Keller, L. M. and Lazzara, M. A.., "Surface Manned and Automatic Weather Station Observations [in "State of the Climate in 2011"]", Bulletin of the American Meteorological Society, p. , vol. , (2012). Accepted,

Bromwich, D.H., J.P. Nicolas, A.J. Monaghan, M.A. Lazzara, L.M. Keller, G.A. Weidner, and A.B. Wilson, "Central West Antarctic among the most rapidly warming regions on Earth", Nature Geoscience, p. , vol. , (2012). Submitted,

Genthon, C., D. Six, V. Favier, M. Lazzara, and L. Keller, "Atmospheric Temperature Measurement Biases on the Antarctic Plateau", Journal of Atmospheric and Oceanic Technology, p. 1598, vol. 28, (2011). Published, 10.1175/JTECH-D-11-00095.1

Lazzara, M.A., L.J. Welhouse, J.E. Thom, J.J. Cassano, A.K. DuVivier, G.A. Weidner, L.M. Keller and L. Kalnajs, "Automatic Weather Station (AWS) Program 2011-2012 Field Season Report", Antarctic Record, p. , vol. , (2012). Submitted,

Books or Other One-time Publications

Web/Internet Site

URL(s):
http://amrc.ssec.wisc.edu/ ftp://amrc.ssec.wisc.edu
Description:
The AMRC/AWS web site provides information about the AWS project, real-time data/observations and links to the archived AWS observations.

Other Specific Products

Product Type:
Data or databases
Product Description:
The Antarctic Automatic Weather Station Project measures a variety of meteorological variables including, temperature, pressure, wind speed, wind direction, relative humidity and at some stations, solar radiation and/or acoustic depth gauge measurements. Some also may have temperature difference from the top (3 meters) to the bottom (0.5 meters) of the AWS tower (a.k.a. Delta-T), and a few may have snow temperature or the occasional water temperature.
Sharing Information:
The AWS observations, and associated information, are made available to others via the following means:

FTP - File Transfer Protocol Server
Web site
Antarctic-Internet Data Distribution (Antarctic-IDD) using the Unidata LDM or Local Data Manager software
E-mail
Global Telecommunications System (GTS)

Contributions

Contributions within Discipline:
The Antarctic Automatic Weather Station (AWS) project contributes to our field with a significant meteorological observational data set for the Antarctic continent. These data are used for a variety of applications including meteorological process studies, numerical model validation, and operational forecasting. The research in progress on the climate of the surface of the Antarctic contributes to the understanding of climate change. The meteorological observations from the AWS aid in our understanding of the synoptic and mesoscale atmospheric behavior of the Antarctic.

Contributions to Other Disciplines:
Other disciplines do benefit from the AWS network and its observations. Glaciology, oceanography, biology, etc. fields utilize the observations in support of their research investigations.

This is increasing the case as more field science activities reach further and further into the more remote portions of the Antarctic - the need for base weather observations to characterize the meteorology and in time, the climate, is in additional demand.

Contributions to Human Resource Development:

This project involves several undergraduate students. Most of these students are majoring in Atmospheric and Oceanic Science, and their experiences working with the AWS data sets, and science activities do contribute to their educational development. Along with this meteorological education, the students are also gaining their first experiences with meteorological interactive processing software systems (e.g. McIDAS, etc.) and modern computing (Unix, etc.).

Contributions to Resources for Research and Education:

The AWS project is a part of the Antarctic Meteorological Research Center (AMRC). The AMRC serves as the center for Antarctic expertise within the Space Science and Engineering Center (SSEC), University of Wisconsin-Madison.

Contributions Beyond Science and Engineering:

AWS observations are clearly aiding to identify the warming of the Antarctic climate. Hence, these finds in turn impact critical reports such as the IPCC which lead to the possible impact on policy, etc.

Conference Proceedings

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
Any Conference

Automatic Weather Station Program
2010-2011 Field Season Report

Field Season Report Author: George A. Weidner[1,2]
Field Team members: Jonathan E. Thom[1], Melissa Nigro[3], Lee J. Welhouse[1]
Principal Investigator: Matthew A. Lazzara[1]

[1] Space Science and Engineering Center
University of Wisconsin-Madison
[2] Department of Atmospheric and Oceanic Science
University of Wisconsin - Madison
[3] Department of Atmospheric and Oceanic Science
University of Colorado – Boulder

The National Science Foundation's Office of Polar Programs funds the University of Wisconsin's Automatic Weather Station Program to design, fabricate, deploy, and maintain an array of automatic weather stations (AWS) 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 AWS electronic 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. A small, but increasing number of AWS sites measure snow accumulation and/or solar radiation. The data are collected by the ARGOS Data Collection System (DCS) on board the National Oceanic and Atmospheric Administration (NOAA) and MetOp (EUMETSAT) series of polar-orbiting satellites. The AWS units are located in arrays for specific research activities and are also used for operational purposes. Any one AWS may support several experiments and all support operational meteorological services - especially support for weather forecasts for aircraft flights at approved sites around the Antarctic continent. This was the 31st field season for project O-283 (formerly S-283) under the direction of Principal Investigators (PI) from the University of Wisconsin – Madison. Emeritus Professor Charles R. Stearns, the PI of the AWS Program from 1980 to 2004, passed away on June 22, 2010. (see Dr. Charles Stearns).

Research areas supported over the years include:

- Barrier wind flow along the Antarctic Peninsula and the Transantarctic Mountains
- Katabatic wind flow down the Byrd and Beardmore Glaciers, the Siple and Adelie Coast
- Mesoscale circulation and sensible and latent heat fluxes on the Ross Ice Shelf
- The Ross Ice Shelf Air Stream.
- Climatology of long operating AWS sites in particular, Byrd and Dome C sites
- Meteorological support for the West Antarctic Ice Sheet Initiative
- Long Term Ecological Research (LTER) along the Antarctic Peninsula
- Meteorological support for United States Antarctic Program flight operations

The following are a sampling of historically supported principal investigators funded by NSF-OPP:

- Dr. Douglas R. MacAyeal: Iceberg Drift in the Near-Shelf Environment, Ross Ice Shelf, Antarctica.
- Dr. Ray Smith, Long Term Ecological Research: Racer Rock, Bonaparte Point, and Santa Claus Island.
- West Antarctic Ice Sheet Initiative: Siple Dome and West Antarctic Divide drilling sites.
- Dr. John Cassano: The Ross Ice Shelf Air Stream
- Aircraft Operation: All AWS sites in Antarctic.
- The Antarctic AWS units support many investigators outside of NSF-OPP.

AMRC collaboration:

- Climatological analysis from the AWS, and other stations (complimenting the activities in the SCAR READER project).
- Continued data collection, archival and distribution of AWS data.
- Continued educational outreach activities (as outlined in the above section and in the following outreach section).
- Utilities developed to generate climatological analyses from AWS observations.

Field work:

One of the unique aspects of maintaining the AWS observational network is the necessary fieldwork. A full time job in and of itself, keeping a network of 50 to 70 AWS systems operating, even with international partners, requires a devoted effort of AWS fabrication and repair team members doubling as field personnel. Flying to remote places around the Antarctic and dealing with polar weather conditions makes maintenance a challenge. The success of the AWS network would not be possible without the support of all those who help, directly or indirectly. Thanks go to Ken Borek Air, the 109th New York Air National Guard, PHI Helicopters, Raytheon Polar Services, our international partners in France, Australia, United Kingdom, Japan, New Zealand and China, and especially the Office of Polar Programs at the National Science Foundation in the USA.

1. INTRODUCTION

Automatic weather station (AWS) units are deployed to collect Antarctic surface weather observations in support of specific meteorological research projects as well as operational activities in Antarctica. The 2009 network consisted of 55 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, East Antarctic, 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, vertical air temperature difference between 0.5 and 3 meters, snow

accumulation, and solar radiation. Measurement heights relative to the actual surface at the site are nominal due to snow accumulation around the AWS unit.

2. DATA TRANSMISSION

Most transmitted AWS data are received and stored by the Data Collection System (DCS) on the NOAA series and MetOp series of polar orbiting satellites. The DCS data are retransmitted by the satellite for use in the High Resolution Picture Transmission (HRPT) broadcast at McMurdo and Palmer Station, Antarctica. The DCS data is also included in the Global Area Coverage (GAC) data, recorded on board the NOAA satellites and downloaded to Gilmore Creek, AK and Wallops Island, VA. These data are rebroadcast to a domestic satellite (DOMSAT) and this broadcast is received here at the University of Wisconsin-Madison. The data are processed into scientific units and are available for local use. CLS America (Service ARGOS), Largo, Maryland, receives the complete DCS data set and sends it to the University of Wisconsin-Madison where it is processed and distributed to the users.

This season saw the first deployment of non-Argos transmitting AWS. A prototype AWS using a Freewave modem was deployed at the Minna Bluff AWS site. The data is transmitted to a receiving system in McMurdo where it is stored and forwarded to users. A relay has been setup to provide this data over the Antarctic-Internet Data Distribution system using the Local Data Manager (LDM), making it available to both science and operational user communities.

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 CLS America (Service ARGOS), and the Global Positioning System. AWS elevation is obtained by barometry and Global Positioning System (GPS) 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, and 3 show the locations of the AWS units in the Antarctic for 2009.

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.

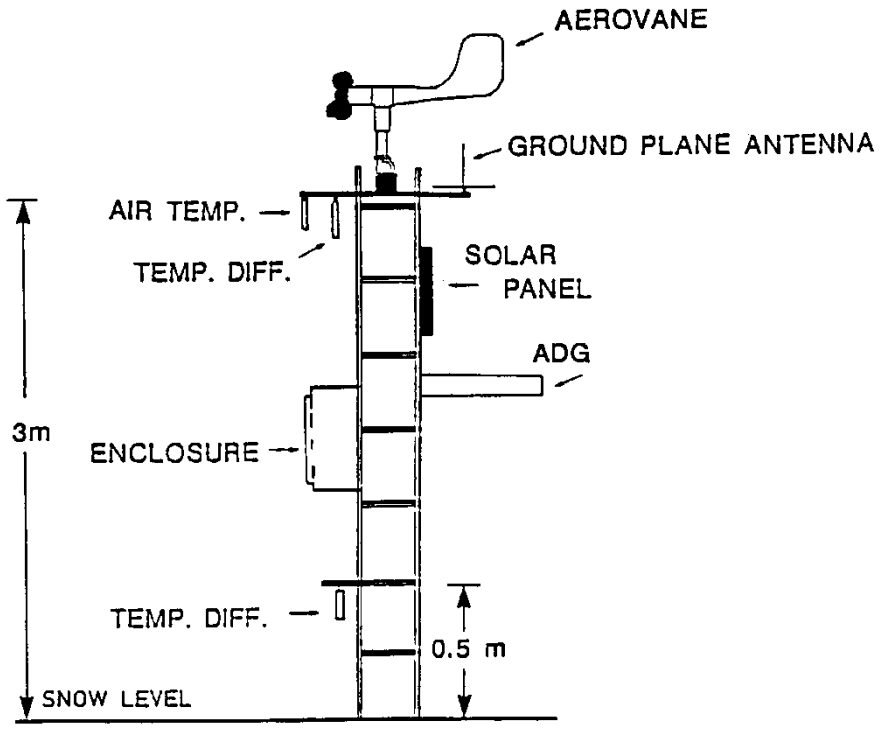


Figure 1. Layout of the AWS unit used in the Antarctic. The installed AWS unit has a 3-meter tower with a horizontal boom supporting the antenna, aerovane for measuring wind speed and direction, air temperature resistance thermometer, upper thermopile for measuring vertical air temperature difference, 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. The Acoustic Depth Gauge (ADG) is installed on some of the AWS units to measure snow accumulation.

Chronological summary of 2010/2011 field season for O-283.

Willie Field extra equipment removed on 1-10-11

Sabrina full station replacement on 1-13-11

Marlene AWS site installed on 1-13-11

Tom AWS installed on 1-13-11

Lettau AWS full station replacement on 1-14-11

Janet AWS installed on 1-17-11

Swithinbank removal on 1-17-2011

Byrd old AWS removed, new AWS installed 1-18-2011

Megadunes AWS removal of 3 stations on 1-18-11

Station Removal from Mulock glacier 1-27-11

Franklin Island AWS (Whitlock) replaced with new AWS on 1-28-11

South Pole test site February 1 - 2 2011

Gill tower raise and full new set of instruments on 2-2-11

Marilyn Aerovane (Belfort) replacement on 2-3-11

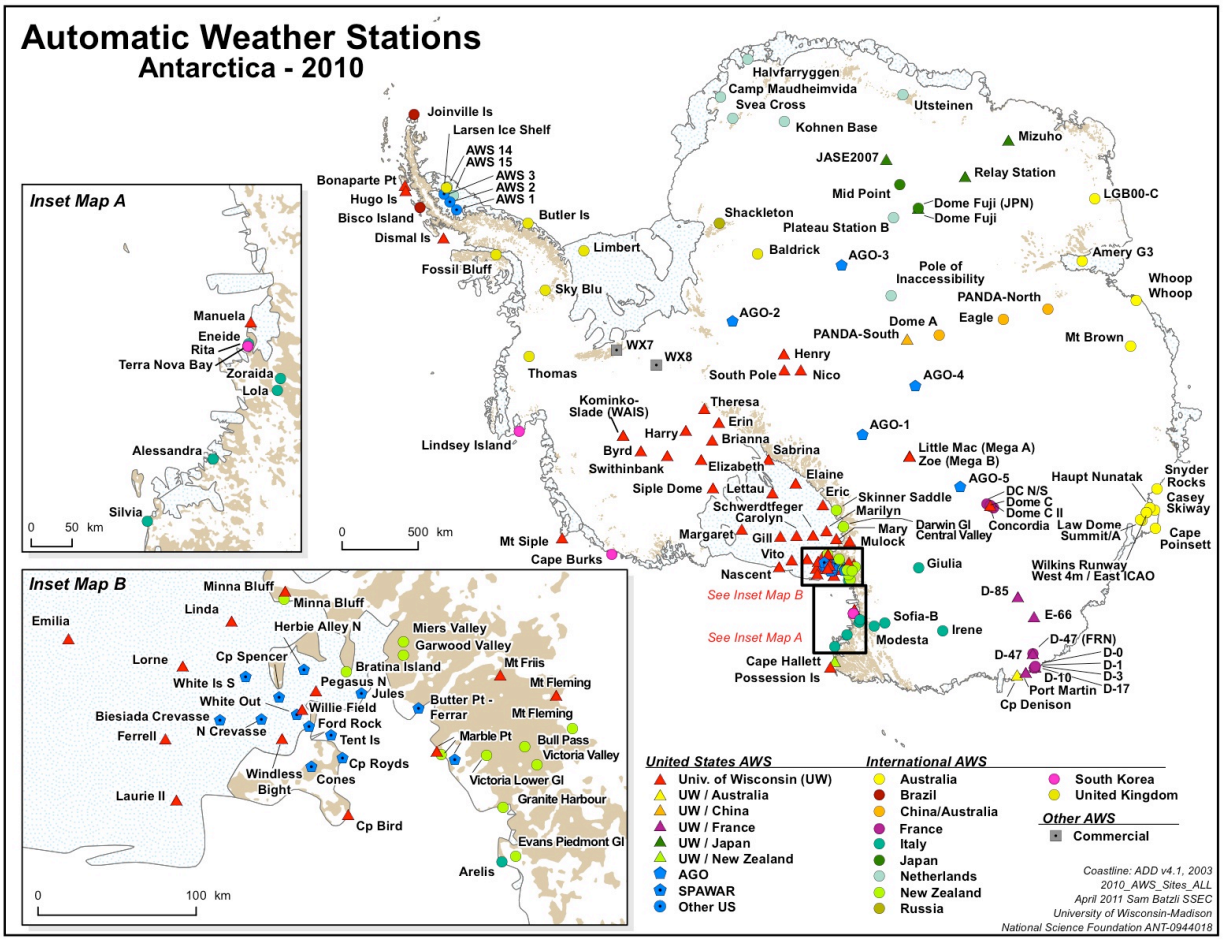
Tall tower installation of instrumentation and power system on 2-3-11

Minna Bluff replacement of Argos transmitter with Freewave transmitter on 2-4-11

Installation of a duplicate tower at Ferrell on 2-10-11

Willy VHF Station installation on 2-10-11

New names for AWS sites by Argos ID
8936 Janet
8987 Alexander (Tall Tower!)
8923 Evans Knoll
8922 Bear Peninsula
8930 Thurston Island
8908 Marlene
8919 Tom
8947 Ferrell II



AWS status table as of 1 June 2011

2516	Megadunes	AWSCR10X					Removed, PTT ID returned Argos
2769	Megadunes	AWSCR10X	80.775oS	124.526oE	2881		Removed, PTT ID returned Argos
8695	Vito	AWS2S	78.509oS	177.746oE	@+52		TX OK
8697	Eric	AWS2S	81.504oS	163.940oE	@+45		TX OK
8722	Carolyn	AWS2S	79.964oS	175.842oE	@+52		Now OFF Day 351
8900	Harry	AWS2B	83.003oS	121.393oW	945		Bat Low, Belfort WS now working
8901	Cape Bird	AWS2B	77.224oS	166.440oE	@42		TX OK, Temp issue?
8902	Butler Island	AWSCR1000	72.207oS	60.160oW	91	89266	TX OK
New 8903	Byrd	AWSCR1000	80.007oS	119.404oW	1530	89324	Installed Byrd Jan 18, 2011
8903	Byrd Station	AWS2B	80.007oS	119.404oW	1530	89324	Removed, return Madison
8904	Dome Fuji	AWSCR1000	77.31oS	39.70oE	3810	89734	New Batteries / Software installed
8905	Manuela	AWS2B	74.946oS	163.687oE	80	89864	Wind out - Belfort
8906	Marble Point	AWS2B	77.439oS	163.754oE	@108	89866	TX OK
8907	Mullock	AWS2HWS	79.018oS	170.819	@378		Removed Jan 30, 2011
New 8908	Marlene	AWSCR1000	83.65oS	167.40E	@82		RIS South #1 Jan 13, 2011
8909	Port Martin	AWS2HWS	66.82oS	141.40oE	39		OFF
New 8909	New AWS HWS	AWSCR1000	66.82oS	141.40oE	39		Installed Jan 6, 2011 by MHS
8910	Roosevelt Island	AWSCR1000	80.00°S	165.00°W	@67		TX OK

8911	Gill	AWS2B	79.985oS	178.611oW	@54	89376	Removed Feb 2, 2011, return MSN
New 8911	Gill	AWSCR1000	79.879oS	178.565oW	@53	89376	Installed Feb 2, 2011
8912	D85	AWS2B	68.912oS	134.655oE			Installed D85 Jan 22, 2011
8913	Schwerdtfeger	AWS2B	79.875oS	170.105oE	@54	89868	TX OK
8914	E-66	AWS2B	68.912oS	134.655oE			Installed Dec 8, 2010
8915	Sabrina	AWSCR1000	84.25 S	169.98 W	@88		Replaced with new AWSCR1000
New 8915	Sabrina	AWSCR1000	84.25 S	170.0W	@88		new AWS installed Jan 13,2011
8916	D-47	AWSCR1000	70,426oS	134.146oE			TX OK
8917	Ski-Hi	AWSCR1000	74.792oS	70.488oW	1395	89272	TX OK
8918	Relay Station	AWSCR1000	74.017oS	43.062oE	3353	89744	TX OK
New 8919	Tom	AWSCR1000	84.43 S	171.46 W	@80		Installed South #2 Jan 13, 2011
8920	Fossil Bluff	AWSCR1000	71.33oS	68.283oW	63	89065	TX OK
8921	Bonaparte Point	AWSCR10X	64.778oS	64.067oW	8	89269	TX OK
New 8922	Bear Peninsula	AWSCR1000	74.55oS	111.89oW	312		Holland, Installed Jan 14, 2011
8923	Madison	AWS2W					Spare Madison ID reused
New 8923	Evans Knoll	AWSCR1000	74.85oS	100.40oW	188		Holland, Installed Jan 12, 2011
8924	Nico	AWS2B	89.000oS	89.669oE	2935	89799	TX OK
8925	Limbert	AWSCR1000	75.422oS	59.851oW	40	89257	TX OK
8926	Larsen Ice	AWSCR1000	66.949oS	60.897oW	17	89262	TX OK
8927	Swithinbank	AWS2B	81.201oS	126.177oW	@959		Removed, Jan 21, 2011 return MSN
8928	Lettau	AWS2B	82.518oS	174.452oW	55	89377	Removed Jan 11, 2011 return MSN
New 8928	Lettau	AWSCR1000	82.475oS	174.587oW	@37.9	89377	Installed at Lettau Site Jan 14,2011
8929	Ferrell	AWS2B	77.865oS	170.819oE	@45	89872	TX OK
8930	Kirkwood Island	AWSCR10X	68.340oS	69.007oW	30		OFF
New 8930	Byrd - Holland	AWSCR1000	80.00oS	199.40oW	1530		Holland AWS/Rock Site 1
8931	Brianna	AWS2B	83.889oS	134.154oW	@525		Wind out - Belfort ws out
8932	Dismal Island	AWSCR10X	68.087oS	68.825oW	10		TX OK
8933	Peter I	AWS2B	68.769oS	90.670oE	90		OFF ID reused
New 8933	New AWS - HWS	AWSCR1000					Hobart to be returned
8934	Marilyn	AWS2B	79.921oS	165.550oE	@62	89869	Belfort replaced Feb 3, 2011
8935	Whitlock	AWS2B	76.142oS	168.394oE	@262	89865	OFF Removed Jan 28, 2011
8935	Santa Claus I	AWSCR1000	64.964oS	65.670oW	25		Data issues
8936	Madison	AWS2C					Spare ID reused
New 8936	Janet	AWSCR1000	77.17oS	123.39oW	@2085		Installed I-189 Jan 13, 2011
8937	Pegasus North	AWSCR1000	77.990oS	166.568oE	@5		TX OK
8938	Siple Dome	AWS2C	81.656oS	148.773oW	@668	89345	TX OK
8939	Minna Bluff	AWS2HWS	78.555oS	166.691oE	@47	89769	Removed Feb 4, 2011 return MSN
8947	French for return	AWS2B	67.397oS	138.726oE	1560	89834	To be returned to Madison
New 8947	Ferrell II	AWSCR1000	77.833oS	170.819oE	@45	89872	Installed Feb 10, 2011
8980	Emilia	AWSCR10X	78.509oS	173.114oE	@+50		TX OK
8981	Mount Siple	AWS2DH	73.198oS	127.052oW	230	89327	Low batteries/Pressure ??
8982	Windless Bight	AWSCR10X	77.728oS	167.703oE	61		TX OK
8983	Mary	AWSCR10X	79.303oS	162.968oE	@+58		TX OK
8984	Possession Is.	AWSDH	71.891oS	171.210oE	30	89879	TX OK
8985	Henry	AWS2B	89.011oS	1.025oW	2755	89108	TX OK
8986	D-85	AWS2B					Removed Jan 26, 2011 return MSN
New 8987	Alexander (Tall Tower!)	AWSCR3000	79.045oS	170.651oE	@55		Installed at Tall Tower Site

8988	Cape Denison	AWS2HWS	67.009oS	142.664oE	31		Removed Jan 6, 2011 return MSN
New 8988	Whitlock	AWSCR1000	76.142oS	168.392oE	@262	89865	Installed Jan 28, 2011
8989	Dome C II	AWS2B	75.121oS	123.374oE	3250	89828	TX OK
9116	Baldrick (BAS)	AWSCR1000	82.774 S	13.054 W	1968		TX OK
21355	Spare - Madison	AWS2B					Spare RMY/Telonics/No PG
21356	Lorne	AWS2B	78.250oS	170.000oE	@45		TX OK
21357	Madison	AWS2B					Spare RMY/Telonics/has PG
21357	Elaine	AWSCR1000	77.952oS	166.500oE	@8	89667	TX OK
21358	Theresa	AWS2B	84.599oS	115.811oW	1463	89314	TX OK
21359	Mizuho	AWS2B	70.70oS	44.29oE	2260		TX OK
21360	Laurie II	AWS2B	77.509oS	170.797oE	@37		TX OK
21361	Elizabeth	AWS2B	82.607oS	137.078oW	@519	89332	TX OK
21362	Linda	AWS2B	78.439oS	168.406oE	@43	89769	TX OK
21363	Erin	AWS2B	84.904oS	128.828oW	@990		TX OK
21364	WAIS K-S	AWS2S	79.468oS	112.086oW	@1833		TX OK
NO TX	WAIS K-S	AWSCR1000	79.468oS	112.086oW	@1833		Snow temp, New batteries installed
28336	Nascent	AWSCR10X	78.127oS	178.497oE	30		TX OK
28338	Cape Hallet	AWSCR10X	72.190 S	170.160 E	@14		TX OK
28339	Mt Friis	AWSCR10X	77.747oS	161.516 E	@1581		Converted to logging, 12/20,2010
30305	JARE 2008	AWS2B	77.000 S	20.000 E	3400		TX OK
30374	D-10	AWSCR10X	66.71oS	139.83oE	243	89832	TX OK
30393	Mt Fleming	AWSCR10X	77.533oS	160.276 E	@1868		Converted to logging, 12/20,2010
30416	Panda South	AWS2B	82.246 S	75.989 E	4027		
30423	Nascent temp string	AWSCR10X	78.127oS	178.497oE	30		Snow temperature data
30477	Willy Field	AWSCR1000					Removed 1/10/11 ID returned to Argos
New VHF AWS	Willie Field test	AWSCR1000	77.867oS	166.947oE	@12		Installed Feb 10, 2011 (NO VHF)
New VHF AWS	McMurdo/Minna Bluff	AWSCR1000					Installed Feb 4, 2011
ICEBERG AWS							
15930 (CR10X)	C16	Transmitting					OFF day 349 (was tx default only)
30504 (CR10X)	B15J Mother 1	Transmitting					OFF
30580 (CR10X)	B15J Mother 2	Transmitting					TX OK
Argos 3 AWS	Madison	AWSCR1000					Test AWS
CR10X AWS							
	8922 (Seimac TX)	AWSCR10X					Madison
	28339 (Seimac TX)	AWSCR10X					Madison
	30393 (Seimac TX	AWSCR10X					Madison (No CR10X)
Inactive Sites							
	J.C.	Not active	85.070oS	135.516oW	549		
	Doug	Not active	82.315oS	113.240oW	1433		
	Scott Island	Not active	67.37oS	179.97oW	30	89371	
	Young Island	Not active	66.229oS	162.275oE	30	89660	
	Penguin Point	Not active	67.617oS	146.180oE	30	89847	
	Pegasus South	Not active	77.990oS	166.568oE	@5		
	Racer Rock	Not active	64.067oS	61.613oW	17	89261	

Cape Denison Servicing

January 6 Mawson Hut Society field team replaces Cape Denison.

On 1/6/11 6:38 AM, David Tingay wrote:

Dear Matthew and George,

I removed the old AWS and replaced it with the new unit (or some thereof) today, thanks to your excellent instructions, which displayed beautifully on the iPad on site!

To summarise:

Items of old AWS removed and replaced with new components intended for Port Martin:

1. Sensor Boom
2. High wind speed system
3. Spoke Antenna
4. AWS enclosure

All cable were disconnected during dismantling and reconnected in the order specified.

I have left the original batteries (all look good when tested), solar panel (photo attached) and junction box (when I checked power cable as per your instructions was producing a nice 12.6V). If you want I can put on the new junction box and panels but it looks fine to me.

Please see attached a photo of the spoke antenna - when we unpacked the box the antenna arms are bent down wards. I assume they should be perpendicular.

The old antenna looked fine but I had basically taken it off so thought I would put the new one on. Do you want me to bend the antenna spokes or leave then?

Out of interest, once I connected the little 12V connector within the enclosure the unit should auto-power up - I saw no lights etc so I hope it has happened.

Enclose a photo of the AWS enclosure box (D52552) in case you need to confirm with records. Interested to know if it is up and going?

If not please advise ASAP. If it is up and running how do we access the data?

We expect blizzard conditions from tomorrow evening our time.

Cheers

David

Dr David Tingay

2010 - 2011 Mawson's Huts Foundation Expedition

Please visit our blog:

www.mawsons-huts.org.au\cms\blog\

Automatic weather station operational once more at Cape Denison

January 8th, 2011

Accurate and detailed recording of the meteorological conditions were a feature of Mawson's 1911 – 1914 Australasian Antarctic Expedition. Back then all measurements were manually recorded, quite a task as it often involved going outside in horrendous conditions.

Now days accurate meteorological data is just as important in Antarctica but the process has been automated. The use of Automatic Weather Stations (AWS) means that meteorological data can be recorded in remote and uninhabited parts of the continent.

One such AWS exists at Cape Denison and is managed by the Antarctic Meteorological Research Center in the University of Wisconsin-Madison as part of the US Antarctic Program.

Unfortunately the Cape Denison AWS has had a broken wind direction indicator for a couple of seasons meaning this all important data, used by forecasters as part of the World Weather Watch program, has been incomplete.

This season we were sent an entirely new AWS system to install. The AWS sits on a tower on a high ridge behind Mawson's Huts. The system consists of a series of atmospheric, wind and temperature sensors with an Argos transmitter that sends the data back to the University of Wisconsin. The base of the tower houses the control box enclosure, solar panels and battery bank to power the unit through the long dark winter.

Yesterday we had a calm and clear day which was ideal to scale the tower and remove the old system and replace with the new one. The whole process took about 6 hours as caution was needed hoisting and fixing the delicate instruments. In addition, the proximity to the coast means that fixing bolts quickly become corroded. Not that there was any complaining with a spectacular view across Boat Harbor and beyond.

Overnight we received confirmation that the system was operational and recorded wind speeds of close to 40 knots whilst we were tucked up in our sleeping bags. Today, a marginal but far from awful day, wind speeds of 30 knots were recorded with lulls of 15 knots. Not hard to see why this place is the windiest place on Earth.

It is a great pleasure to be able to help the on going, and essential, collaborative science that occurs down here.

Dr David Tingay

Ed note: once the University AWS website has been re-jigged to show the data for all to see, we will put the link on the blog.

Willie Field servicing on 1/10/2011.

Team: Melissa Nigro and Lee Welhouse

A picture of the station upon arrival is shown below. We removed the instrumentation from the Willie Field AWS, except for the solar panel and the batteries. The solar panel is mounted to the tower with the cable coiled and taped to the tower. The battery cables have been taped to prevent moisture from getting into the plug, and the cables have been secured to the tower with electrical tape.

The experimental tower at Willie Field (pictured below Figure Willy Experimental) has been removed. We dug down about 6 ft to reach the bottom of the tower. All of the tower sections and the base have been recovered. Additionally, the power cable that had previously been strung to the battery bank of the radiation test site was removed.

Willy Field AWS tower

Willy Field Experimental Station Tower

Sabrina AWS servicing

Coordinates: -83.65, -167.40 (83.65 S , 167.40 W)
Full station replacement on 1-13-11 (approximate ground time 2.5 hours)
Team: Melissa and Jonathan
Pilots: Randy and Travis

We had good weather. About a 1.5-hour flight from CTAM.

Upon arriving at the station, the snow line was about a foot down from the top of the 5' tower section (from looking at the installation pictures of Sabrina, my guess is that there has been approximately a foot of accumulation since Feb 2009). A before picture is shown below. We found north with the handheld GPS. The original install was pointed at approximately 320 deg (therefore a -40 deg correction should be applied to the previous wind direction measurements).
UNAVCO GPS was set out. Approximate times were 11:15-1:45 (very rough estimate).
We removed all of the instruments from the station. The original heights were as follows:

ADG	29 cm
Wind	266 cm
Lower temp	90 cm
Upper temp	266 cm
Enclosure	110 cm
J-box	82 cm
Solar panel	168 cm

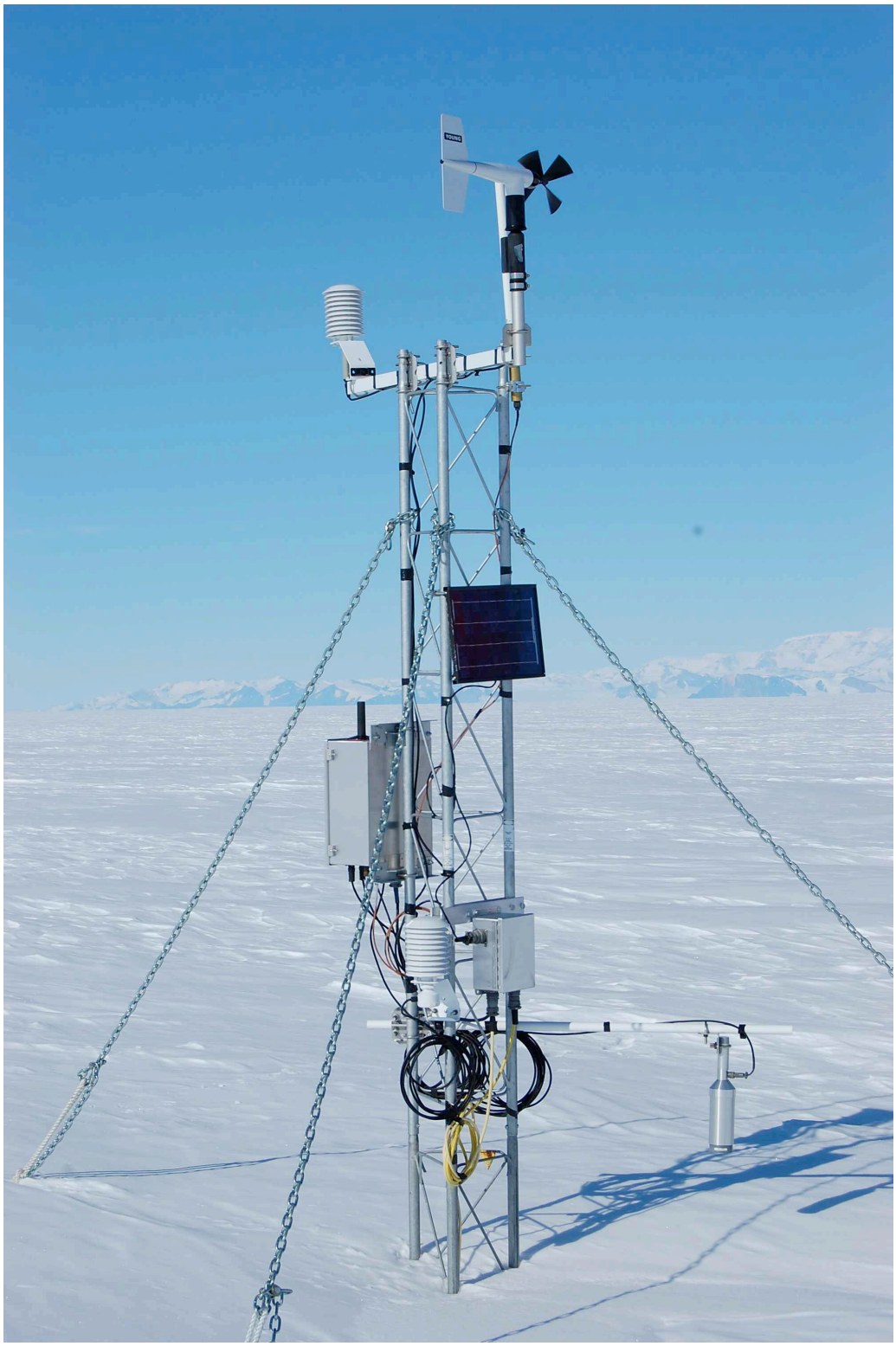
We added a 7' tower section and installed all new instruments (see list of heights below). Two additional batteries were added to the site. The enclosure number is 14635 and the Argos ID is 8915. The computer was plugged in and we received good data.

Final instrument heights:

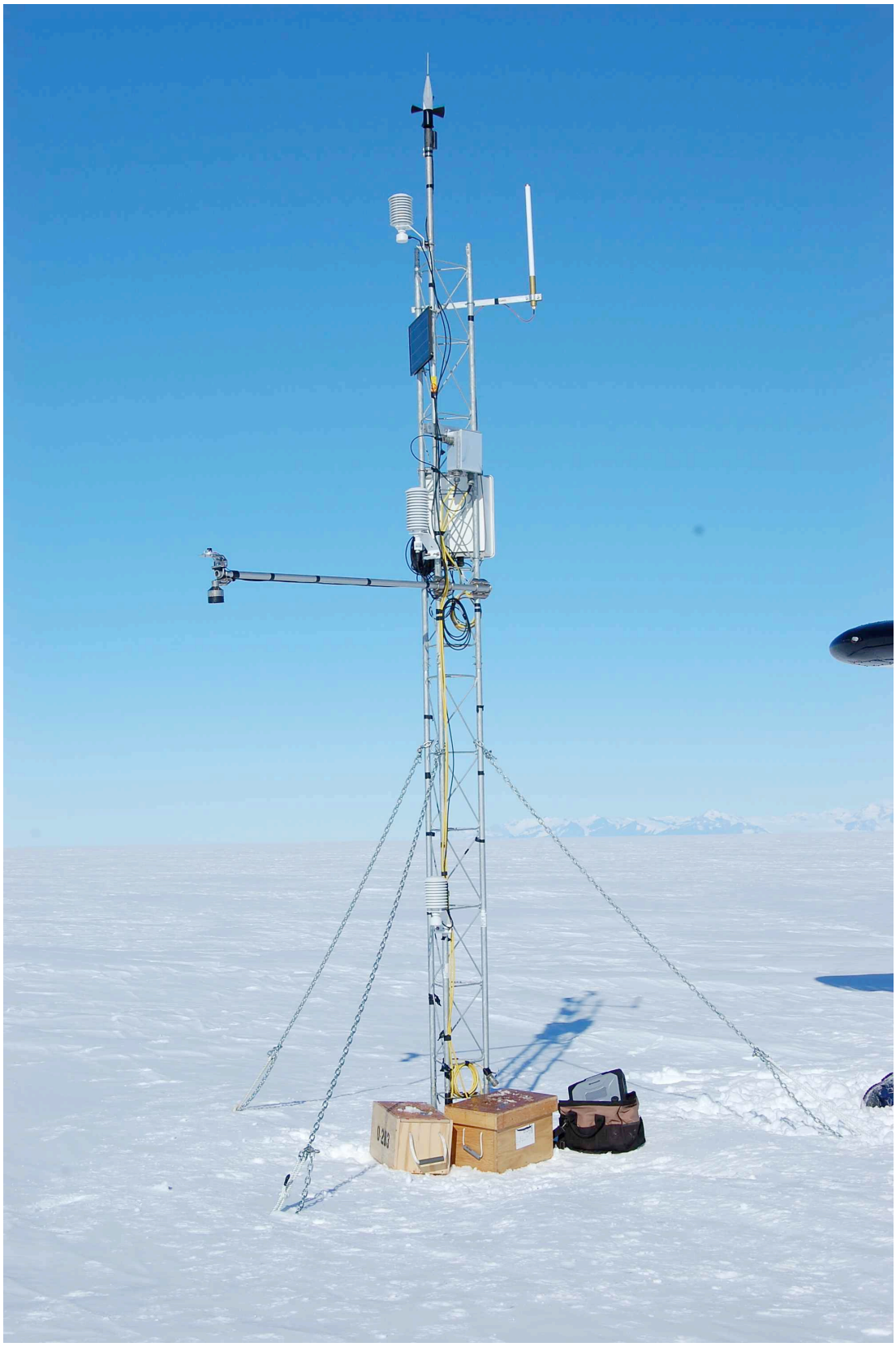
ADG	265 cm
Wind	521 cm
Lower temp	122 cm
Upper temp	480 cm
J-box	350 cm
Pyronometer	287 cm
HMP	216 cm

I've attached before and after photos below. I have full resolution pictures if anyone wants them when I return to the States. A few other notes that are quite important...

We re-used the junction box and solar panel. So, the panel plugs and battery plugs will be the old style. We also replaced the power plug in the junction box (to fit with the new enclosure). This may need to be upgraded on a subsequent visit. Installed on 1-13-11 (approximate ground time 2 hours).



Sabrina AWS before servicing on January 13th 2011



Sabrina AWS after servicing on January 13th, 2011

Priority 1 site south Ross Ice Shelf - Name Marlene AWS site
Team: Melissa and Jonathan
Pilots: Randy and Travis

This was about a 10-15 minute flight from Sabrina. The ground is smooth and crevasse free. The snow is a bit softer here.

UNAVCO GPS was set out. Approximate times were 2:15-4:15 (very rough estimate).

A new station was installed with a 5' base and two 7' tower sections. The tower and guides have been installed approximately 2' into the snow. 2 sets of battery boxes were installed at this site. All instruments are the new style AWS. The enclosure number is 14632 and the Argos ID is 8908.

The final instrument heights are:

Lower temp sensor	130 cm
J-box	213 cm
Enclosure	244 cm
HMP (humidity probe)	324 cm
Boom (ADG and pyronometer)	357 cm
Upper temp sensor	521 cm
Aerovane – RM Young 05103	560 cm

Final picture of the station shown below. Again, I have these in full resolution (and other pics) if anyone wants them.

Melissa

Marlene AWS site after installation on January 13th, 2011

Priority 2 Site south Ross Ice Shelf – Named Tom AWS site
Installed on 1-13-11 (approximate ground time 1.5 hours)
Coordinates: **-84.43, -171.46**

Team: Melissa and Jonathan
Pilots: Randy and Travis

This was about a 20-30 minute flight from Priority #1. The ground is smooth. No crevasses in the immediate area (satellite imagery shows a crevasse area approximately 8.5 km to the south, southwest). The snow is more wind blown, with a crust layer in this area.

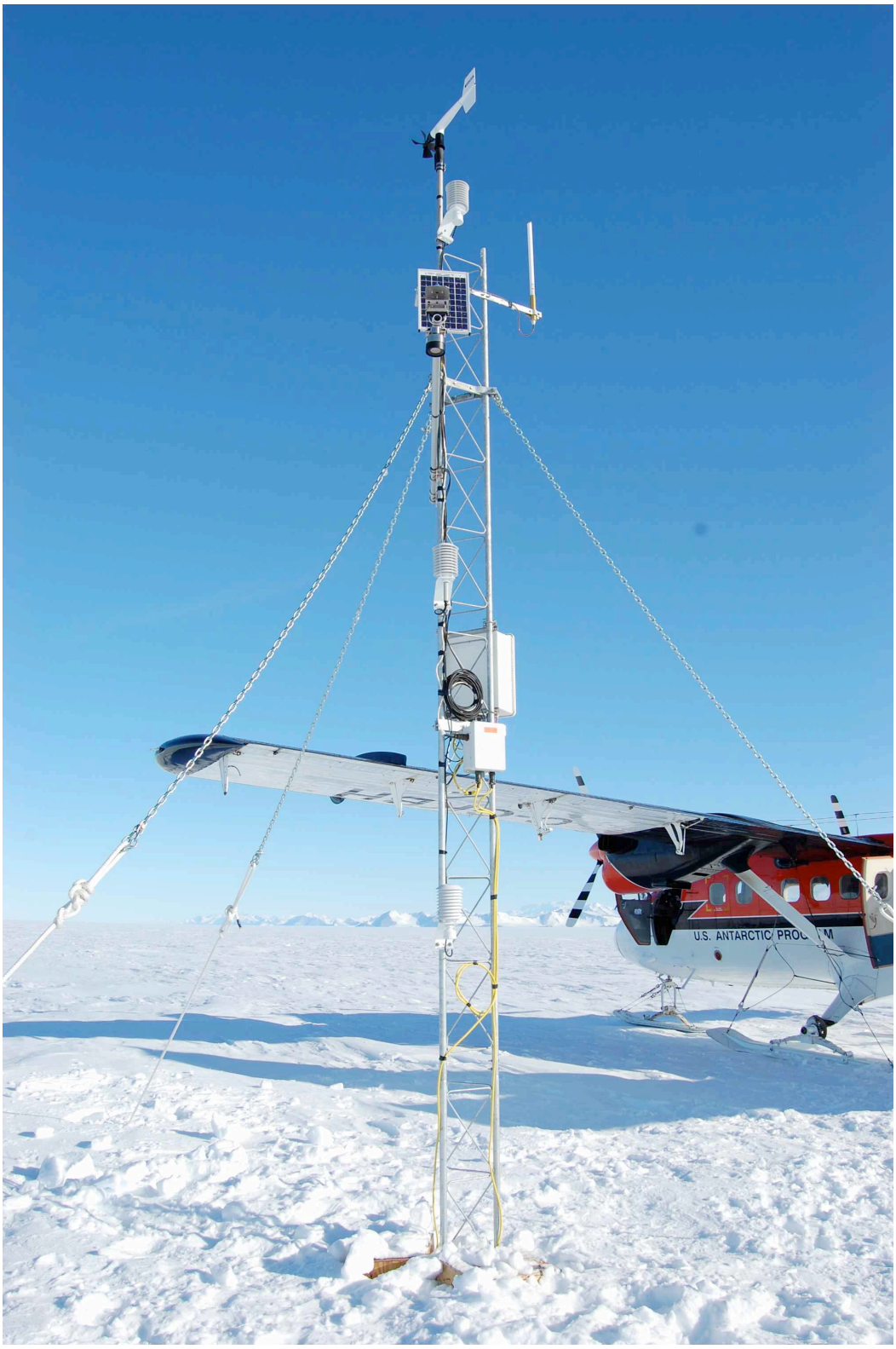
UNAVCO GPS was set out. Approximate times were 4:30-6:30 (very rough estimate).

A new station was installed with a 5' base and two 7' tower sections. The tower and guides have been installed approximately 2' into the snow. 2 sets of battery boxes were installed at this site. All instruments are the new style AWS. The enclosure number is 14633 and the Argos ID is 8919.

The final instrument heights are:

Lower temp	145 cm
J-box	217 cm
Enclosure	260 cm
HMP	307 cm
Boom (ADG and pyronometer)	372 cm
Upper temp	527 cm
Aerovane	560 cm

Picture of the newly installed station shown below. Again, I have these in full resolution (and other pictures) if anyone wants them.



Tom AWS after installation on January 13th, 2011

Lettau AWS
Full station replacement on 1-14-11 (approximate ground time 3 hours)

Team: Melissa and Jonathan
Pilots: Randy and Travis

The weather started out good, but the clouds moved in on us quickly. About a 1.75 hour flight from CTAM.

UNAVCO GPS was set out. Approximate times were 10:45-1:45 (rough estimate).

We removed all of the instruments from the station (a before picture is shown below). The original heights were as follows:

Lower temp	21 cm
J-box	63 cm
Enclosure	102 cm
Solar Panel	162 cm
Upper temp	199 cm
Boom (old style for aerovane)	218 cm

The station had the old style tower sections. Therefore, we bolted a 5' base and two 7' tower sections to the old tower. The new tower was installed about 2' in the snow supported by a plywood base and new guidelines. The 5' tower section was secured to the old tower using 2 sets of metal plates (this can be seen in the second "after" picture). Two additional batteries were added to the site. A full set of new style AWS instruments were installed at the site. The enclosure number is 14414 and the Argos ID is 8928. The computer was plugged in and we received good data.

Note, the new style vertical aerovane boom was misplaced. Therefore, the white boom (that was removed from Sabrina) was used to install the aerovane. The next time the site is visited a new style vertical aerovane boom should be installed.

Final instrument heights:

Lower temp	135 cm
J-box	220 cm
Enclosure	252 cm
HMP	310 cm
Boom (ADG and pyronometer)	380 cm
Upper temp	530 cm
Aerovane	555 cm

Lettau AWS site before servicing January 14th , 2011

Lettau AWS after servicing on January 14th, 2011

Megadunes AWS removal
Removed 3 stations on 1-18-11

Team: Melissa and Jonathan
Pilots: Randy and Travis

Megadues was about a 2.5 hour flight from CTAM.

We visited the most northern site first (approximate ground time 1.5 hours).
Upon arriving at the station, the wind generator was no longer working. The station instruments were fully above the snow surface.

UNAVCO GPS was set out. Approximate times were 1:45-3:15 (very rough estimate).

We removed the AWS plywood box (this houses both the batteries and the AWS), which was about 1' below the snow level. This box has been marked with a "#1" in black marker. The full tower and instruments were removed (again, about 1' below the snow level). The antennae and mounting pole were removed. The wind generator and mounting pole were removed. The solar panel was removed.

We visited the middle site next (approximate ground time 0.5 hours). This was about a 5 min taxi from the first site.

UNAVCO GPS was set out. Approximate times were 3:15-3:45 (very rough estimate).

This station did not have a tower. A cup anemometer and temperature sensor were installed on a single pole. The AWS plywood box for this station was removed. Again, it was about 1' below the snow level. The pole, cup anemometer and temperature sensor were removed. The antennae and mounting pole were removed. The solar panel was removed.

We visited the most southerly site late (approximate ground time 1 hour). This was about a 10 min taxi from the second site. The snow was more rough and wind blown in this area.

UNAVCO GPS was set out. Approximate times were 3:45-4:45 (very rough estimate).

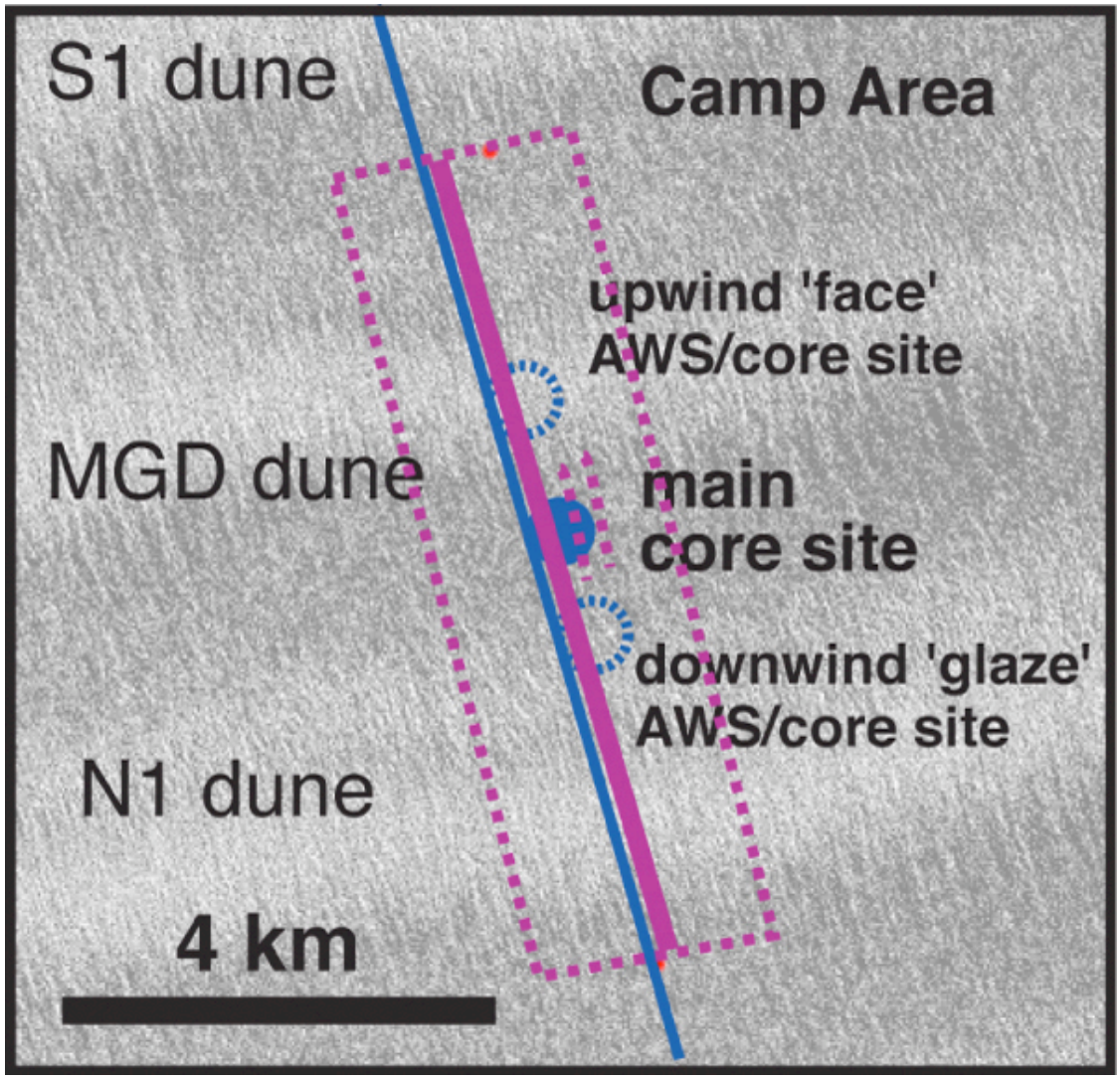
Upon arriving at the station, the wind generator was no longer working, the solar panel was buried by snow and the cup anemometer was buried by snow and no longer working. This site had significantly more accumulation than either of the other sites.

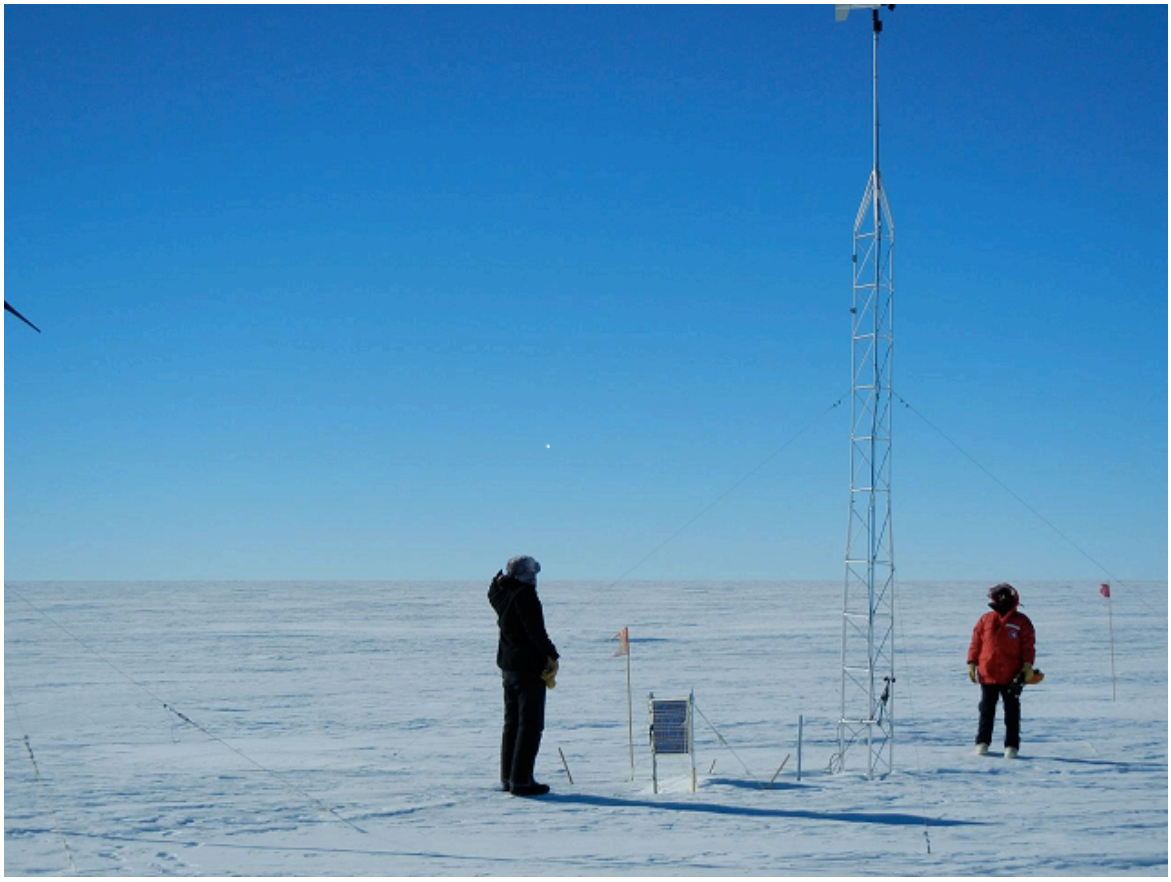
We removed the AWS plywood box, which was about 4-4.5' below the snow surface. The towers and all instruments were removed (again the bottom of the tour was about 4-4.5' below the snow surface). The antennae and mounting pole were removed (although, we were unable to remove the very bottom of this mounting pole and it had to be cut). The wind generator and mounting pole were removed. The solar panel was removed.

Melissa

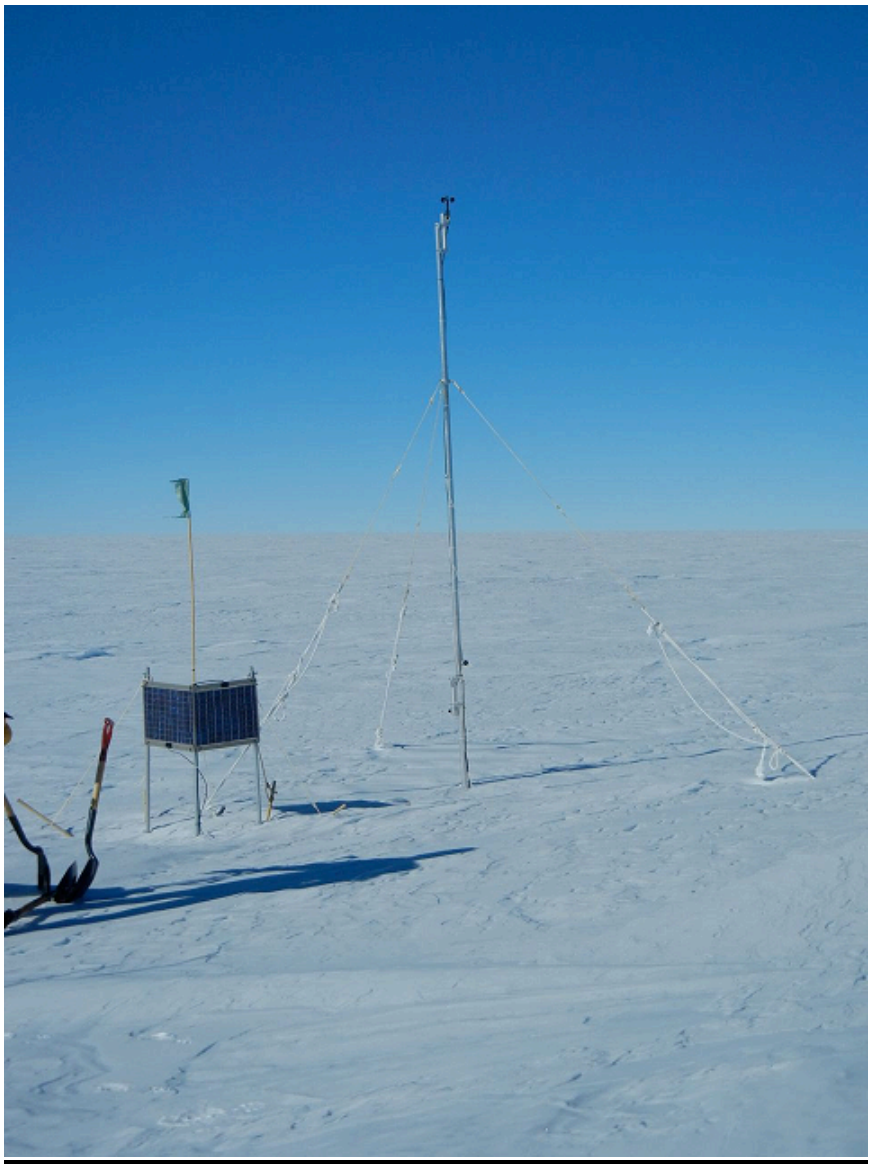
Mac site (MGD 160 AWS, ARGOS ID 2516):
Latitude: 80.79008° S
Longitude: 124.43450° E
Elevation: 2884 meters above WGS84 ellipsoid

Zoe site (N1 360 AWS, ARGOS ID 2769):
Latitude: 80.77546° S
Longitude: 124.52668° E
Elevation: 2881 meters above WGS84 ellipsoid

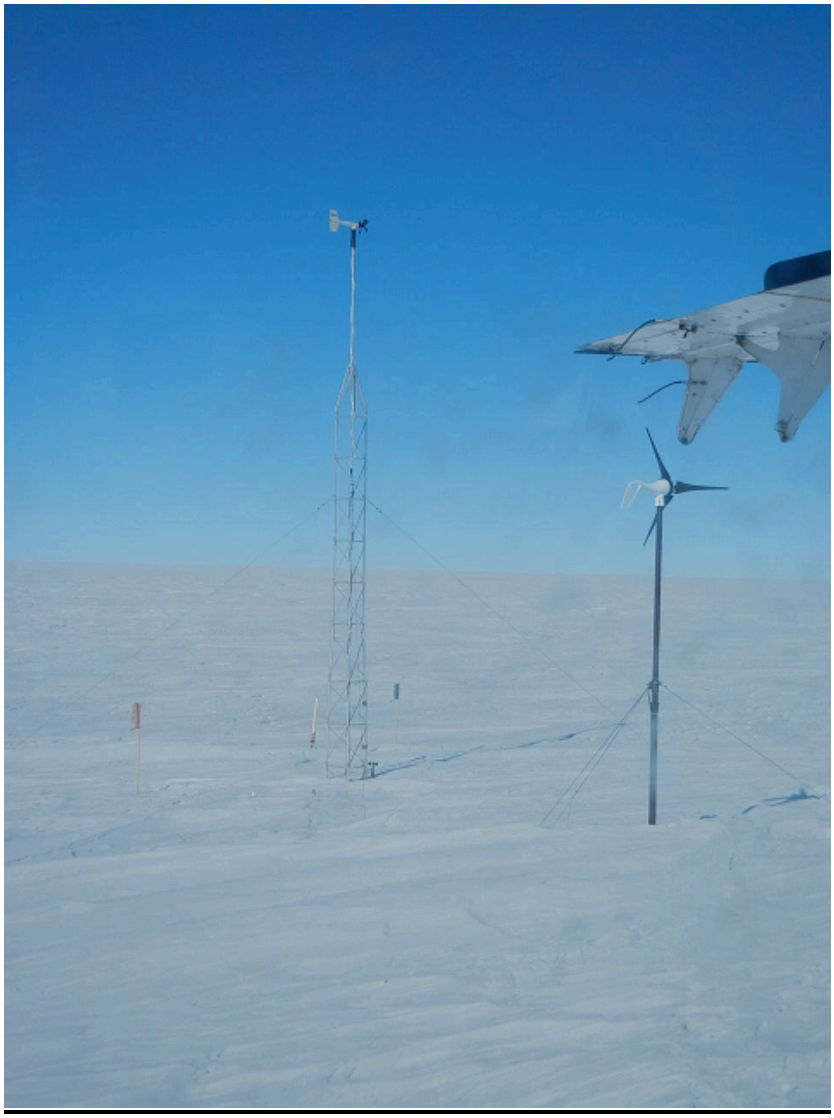




North Megadunes



Middle Megadunes



South Meagdunes

Janet AWS Installation
I-189 Fuel Cache, New Station install. Ground time approximately 5 hours.

Team: Lee, Todd, and Cecelia
Pilots: Lexy, and Claire

Flying out of Byrd with the assistance of two camp members we were able to install a station at I-189. Instruments heights and notes follow:

Enclosure # 14413
Argos ID # 8936

Final Component Heights (cm):

Lower T	125
ADG	145
Pyronometer	173
Junction box(measured from bottom)	120
Enclosure	159
Upper T	379
HMP	378
Aerovane	437

Janet AWS after installation on January 17th, 2011

Janet AWS after installation on January 17th, 2011

Byrd AWS conversion

Field Team: Lee Welhouse, Galit Sorokin, Andrew Lloyd, Katie Koster

Final conversion from AWS2B type AWS to CR1000 type AWS completed on 1-18-2011.

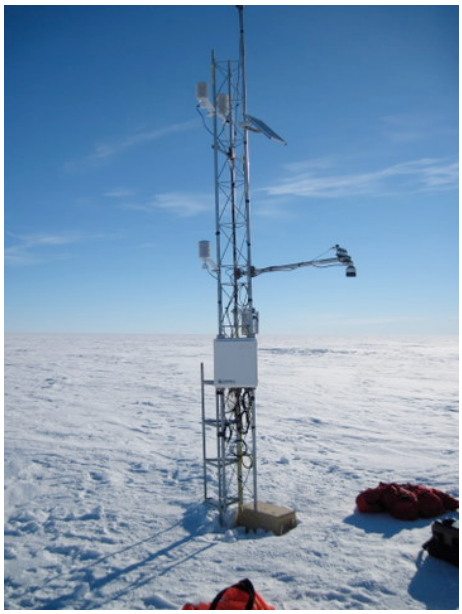
Multiple trips were taken to the station to ensure correct installation.
On 1-14 a new prop was installed. Then the station was replaced with a new enclosure and instrumentation. Two boxes of batteries, the boom, the solar panel, enclosure, and junction box were recovered. One of the plugs was locked in place so the cable was cut. The old Boom height was at approximately 162 in. The new station was installed on 1-16, and an adjustment to the direction of the aerovane was performed on 1-19 to ensure prevailing wind did not occur in a dead spot in the potentiometer. Site was turned 180 degrees normal southern alignment.

Old heights:

Boom	162 in
Solar Panel	133 in
Junction	105 in
Enclosure	65 in

New instrument measurements.

Aerovane	192 in
Upper temp	144 in
RH	144 in
Pyronometer	110 in
Lower Temp	106 in
ADG	104 in



New AWS installed at Byrd AWS site on January 18th, 2011

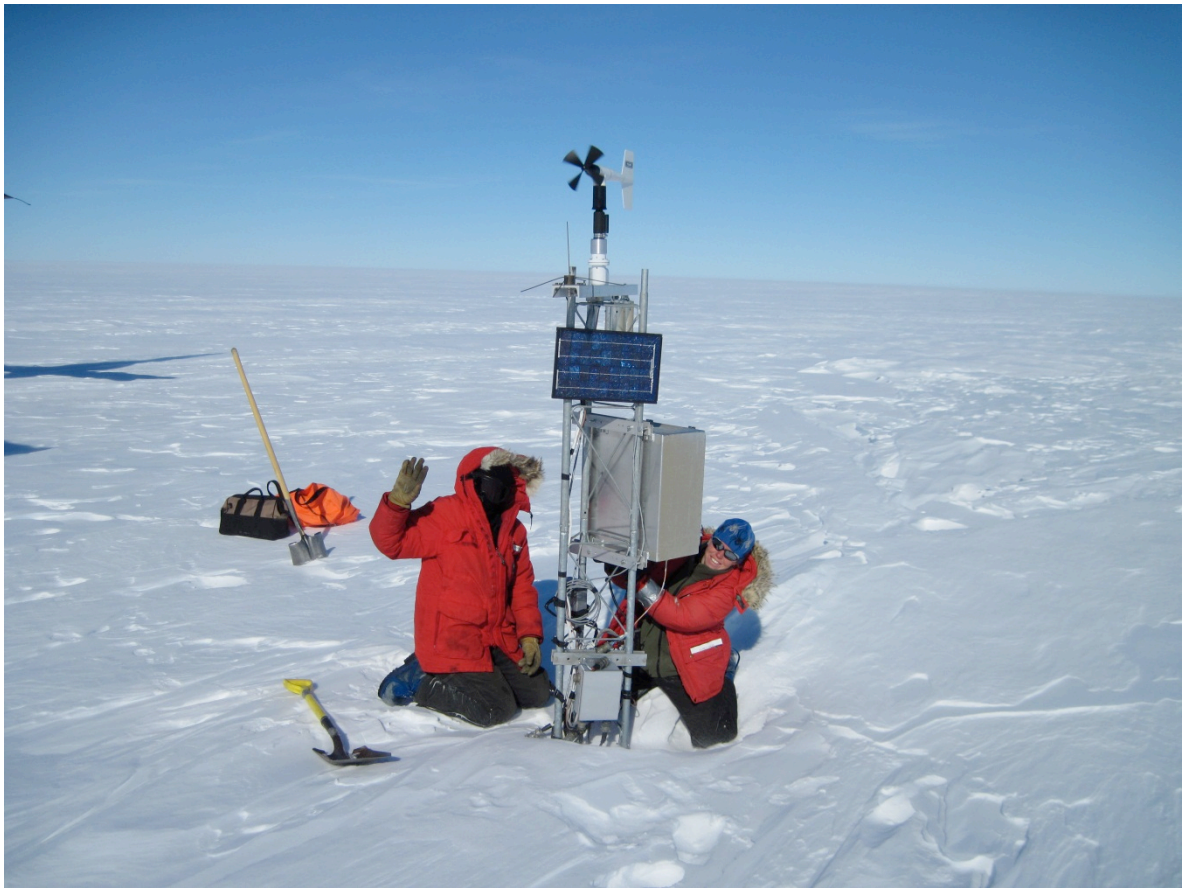
Swithinbank AWS removal
On 1/21/2011 10:17 AM, Lee Welhouse wrote:
Removed 1 station on 1-17-2011

Team: Lee, Galit, Marsha
Pilots: Lexy, Claire

Flight from Byrd station took approximately 40 minutes, and the ground time was approximately an hour.

Station was found with approximately 183 cm exposed. The boom, junction box, solar panel, and enclosure were removed. Solar panel looked to be damaged. Digging down we discovered the top 2 tower sections were short 3 foot sections. We dug to a depth of approximately 5 feet and found 1 battery box and 3 capped, disconnected wires. The Battery was at approximately 2 feet below the surface. The plugs were removed and the exposed wire covered. There is still tower section, and presumably batteries at this station. Unavco GPS was not deployed at this station as it was at the exact location the 2008 coordinates indicated.

Lee



Swithinbank AWS before removal on January 21st, 2011

Mulock AWS removal

2009-10 Location
-79.0256, 160.1937
S 79° 01.48', E 160° 11.624'
1.075 km downstream from 2005 coords

Estimated 2010-11 Location
-79.025, 160.194
S 79° 01.418' , E 160° 11.623'
1.369 km downstream from 2005 coords

Claire was able to obtain the coordinates from 2008-09 and 2009-10, b/c we were able to locate the site in satellite imagery. Claire estimated that the station has moved about 1.3 km since installation. From what we can tell, it has stayed between the same two crevasses since it was installed.

Helo Pilot: Dustin, Helo tech:
Team Members: Lee Welhouse, Kris Young, Jen Erxleben

Approximate helo flight time was an hour, ground time was approximately 2 hours.

The tower base was approximately 18 inches below surface level, with the deadmen anchors approximately 30 inches below surface level.

Electronics box	140 cm
Junction box	267 cm
Boom Height	343 cm

Notes: Upon arrival one of the battery cables was found loose. One of the attached pictures illustrates this. All portions of the station was recovered successfully.

Mulock AWS before removal on January 21st, 2011

Whitlock AWS (Franklin Island)
Full station replacement on 1-28-11 (approximate ground time 3.5 hours)

Team: Jonathan Thom and Melissa Nigro
Pilot: Sven

UNAVCO GPS was set out. Approximate times were 11:45-3:15.

It was about a 5 minute helo flight from the Oden. Sven dropped the passengers off first and then sling loaded the equipment.

A portion of the electronics box was buried in snow. We removed all of the instruments from the station. The original heights were as follows:

Boom	57"
Electronics Box	-12"
Solar panel	39.5"

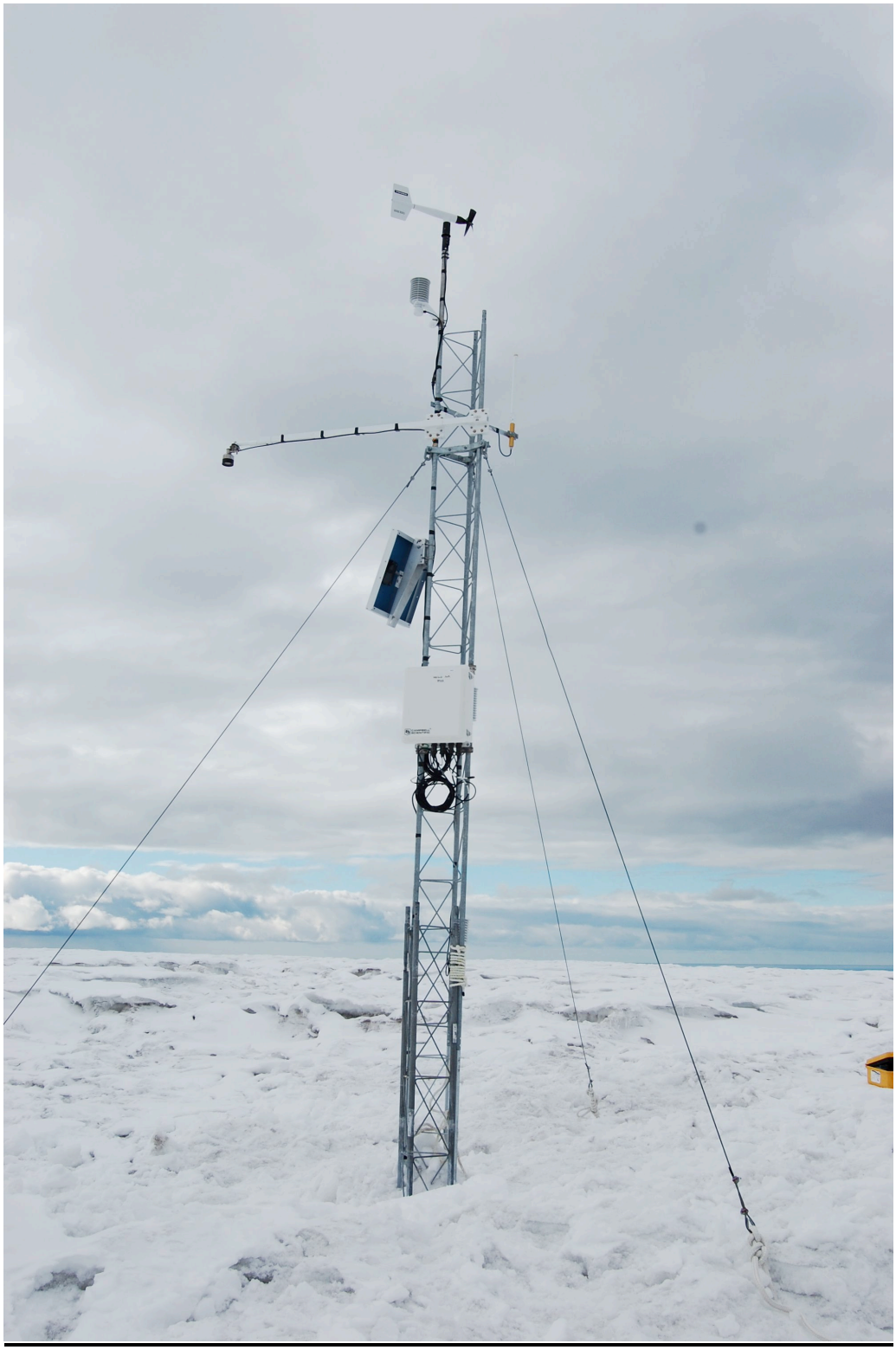
The old station had a 5' new style tower section roped to the old style tower sections. These tower sections were leaning and we could not straighten them out. Therefore, we installed a 5' and two 7' tower sections next to the existing site. The new tower sections are on a wooden base and were guided. The new tower has also been tied to the old tower using rope. Three 100 amp hour batteries were installed at the site. These were wired up in a medium sized harding case. The charge controller is wired inside the harding case and therefore this station does not have a junction box. A new set of instruments were installed on the tower.

Final instrument heights:

Aerovane	219"
Upper temp	204"
ADG	172"
Electronics box	92"
Lower temp	53"
RH	102"

-Melissa

Whitlock AWS2HWS AWS before replacement on Januray 28th , 2011



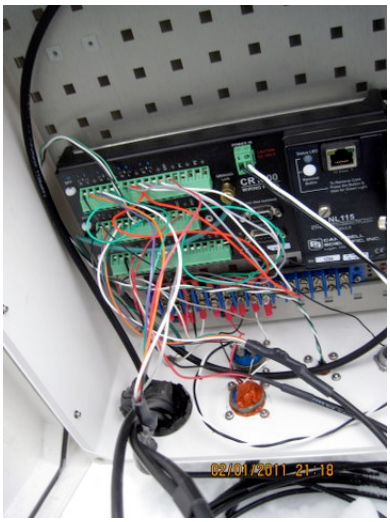
Whitlock AWS (Franklin Island) after conversion to new CR1000 AWS on January 28th, 2011

South Pole

Field Team: Lee Welhouse

February 1 - 2 2011

Approximately 6 inches of drift/accumulation was found near the site, leaving the sensor bar still above surface height though frost was found on the radiation shields so raising the station may be necessary soon. Solar panel mounts, and the antenna have been removed, and the cup anemometer was successfully added to the station. Cable for a tachometer on the aspirated shield was unable to be installed as the aspirated shield lacked the necessary connection. Data was retrieved, and the system had stopped recording mid-June and failed to come back on until after a new OS and program had been installed on the station. WEEDgill2 sensor reported anomalous data when the system was running again, reporting 70-100C temperatures or reporting NaN. Faulty connections could not be found to explain this.



-Lee

Gill AWS Servicing

Last two locations from last visit to Gill AWS site were
79.985S/ 178.611W 55 m 08/02/94 Twin otter GPS
79.922S/ 178.586W 54 m UNAVCO GPS in 2005

Neglecting the change in longitude of .611 -.586 (slight eastward change) of .025 degrees this would be 19.27 km (one degree longitude at 80 deg latitude) * .025 is about .5 km or 500 meters. OR less than 50 meters per year movement to the east.

The distance northward (latitude) is .063 deg latitude or about 0.063 * 111km or 7 km north from 1994 position or about 635 meters to the north per year.

Note that we have tracked Ferrell site moving north on average of about 1 km per year so this seems reasonable.

Hence since 2005 expect Gill to have moved north about --- 3.82 km and slightly to the east by about 275 meters. If not spotted, would suggest Mark's solution to go to last location and fly north.
From Mark's report in January 2005
The Twin Otter went airborne a second time, started heading directly north, and the AWS site was found. Gill AWS had moved 3.8 nm from the previous GPS position. Upon arriving at the site, the sensor boom was 1.57 m above the surface and the lower delta-T was buried 0.63 m below the snow surface. The site was determined to be in good working condition and a 2.1 m Rohn tower section was added. The junction box was raised to the extent of the battery cables. A transmission was verified and the sensor boom was measured to be 3.84 m above the surface.

Gill AWS after 2005 visit

Gill AWS servicing 2011

Tower raise and full new set of instruments on 2-2-11 (approximate ground time 2.25 hours)

Team: Jonathan and Melissa
Moral: Matthew and Jeffrey
Pilots: Brian and Jason

UNAVCO GPS was set out. Approximate times were 11:00-2:15.

It was about a 1.5 hour Twin Otter flight from Pegasus.

The lower temperature sensor and junction box were below the snow level. We removed all of the instruments from the station. The original heights were as follows:

Electronics box	24"
Solar panel	68"
Boom	99"
J-box	at the surface
Lower temp	below the surface

We added a 7' tower section and installed all new instruments. Two additional batteries were placed at the site. The telonics received a good transmission.

Final instrument heights:

Lower temp	60"
RH	85"
Electronics box	87"
ADG	138"
Upper temp	190”
Aerovane	204"

I've attached before and after pictures below.

Gill AWS before servicing on February 2nd, 2011

Gill AWS after servicing on February 2nd, 2011

Marilyn AWS Servicing
Aerovane (Belfort) replacement on 2-3-11 (approximate ground time 25 minutes)

Team: Jonathan and Melissa
UNAVCO: Marianne
Rigger: Erin and Dan
Pilots: Brian and Jason

UNAVCO GPS was set out. Approximate times were 11:40-12:00.

We flew by the Tall Tower site on the way out of McMurdo (about 35 minutes flight). The site was covered by fog. Erin was able to see the very top of the tower through the fog, but we were not able to land. We flew on to the Marilyn AWS site (about a 30 minute flight from Tall Tower).

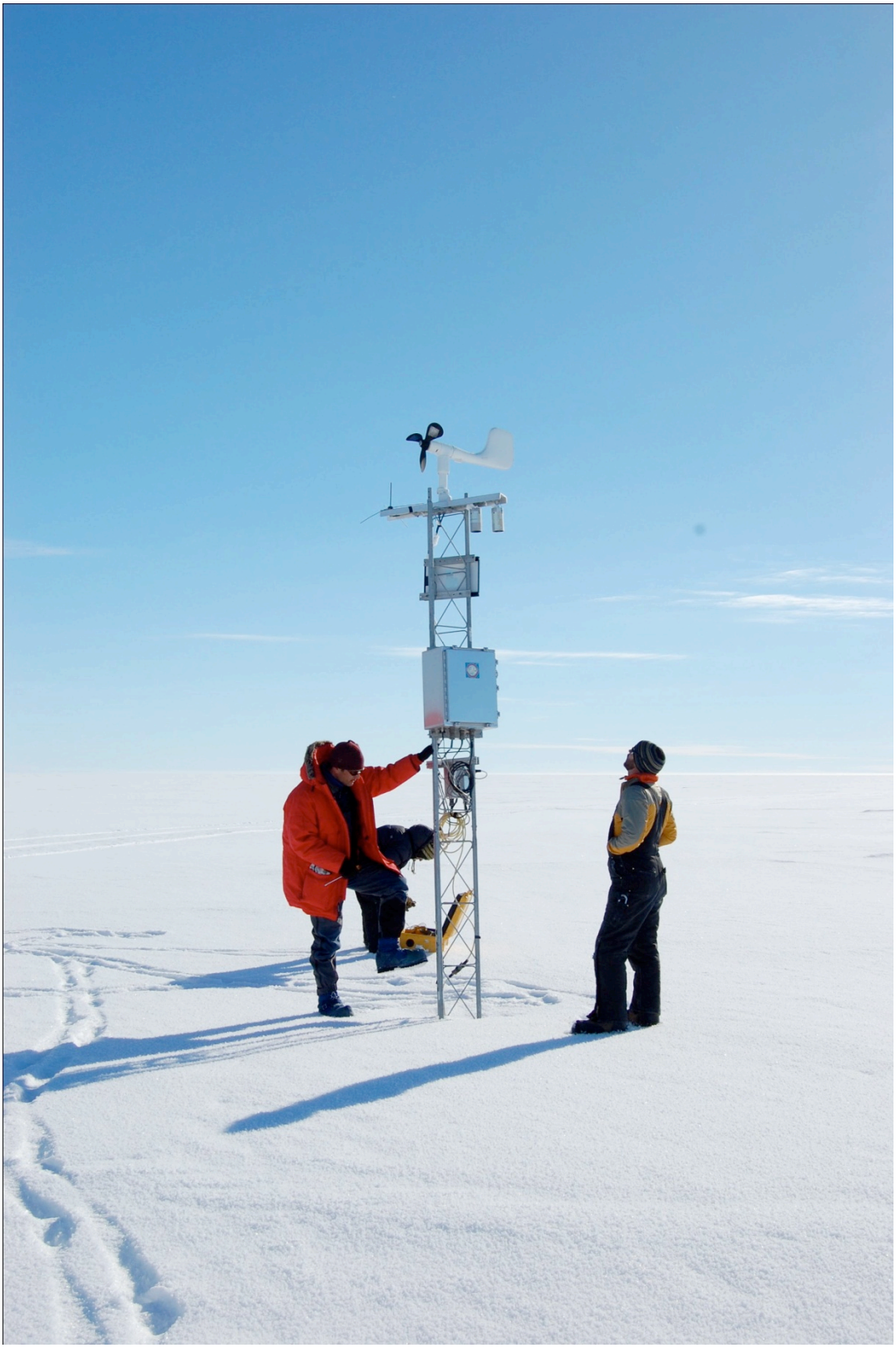
The Belfort aerovane was replaced.

Instrument heights are:

J-box	57"
Electronics box	72"
Boom	133"

The boom is oriented facing 316 deg.

Note: the tower is leaning quite a bit. A new tower should probably be installed at the next visit.



Marilyn AWS during replacement of Aerovane on February 3rd, 2011

Tall tower installation

Installation of instrumentation and power system on 2-3-11 (approximate ground time 6 hours)

Team: Jonathan and Melissa
UNAVCO: Marianne
Rigger: Erin and Dan
Pilots: Brian and Jason

UNAVCO GPS was set out. Approximate times were 1:00-6:30.

It was about a 30 minute flight from the Marilyn AWS and about a 35 minute flight from Pegasus. Upon arrival there was still quite a bit of fog in the area. The tower and the South Pole Traverse road were visible, which enabled us to land.
The riggers worked on re-tensioning the guidelines (the tower has settled since it was originally installed) before climbing the tower. All of the instruments were installed on the levels as planned:

Level 6 (top level)	radiation sensor, aerovane, RH, temp
Level 5	aerovane, temp
Level 4	aerovane, temp, RH
Level 3	aerovane, temp (ADG and antennae were installed on a second boom just underneath the boom for level 3)
Level 2	cup anemometer, temp
Level 1	cup anemometer, temp

The heights of the top four levels are the boom installation heights given to the riggers when the tower was installed.
For the rest of the instruments:

Cup anemometer level 1	52"
Temp level 1	43"
Cup anemometer level 2	93"
Temp level 2	83"
Electronics box	100"
ADG and antennae	136"

Boom was oriented at 346 deg.
The power supply was installed about 21' to the north of the tower. All voltages were checked. The red/green LED light for the cycling of the solar panels was blinking red and off instead of red and green. We believe that the green light bulb may be out. The solar panels were charging the batteries while we were there.

-Melissa

Tall Tower tower before installation of sensors on February 3th, 2011

Tall tower after instruments installed on February 3th, 2011

Minna Bluff AWS conversion

Replacement of AWS2B version AWS with Argos transmitter with CR1000 based AWS using Freewave transmitter on 2-4-11 (approximate ground time 2.75 hours)

Team: Jonathan, Lee and Melissa
Pilot: Paul + Helo Tech

UNAVCO GPS was not set out. The coordinates for this station should not have changed.

It was about a 0.5 hour 212 helo flight from McMurdo.

The original instrument heights were:

Boom	60"
Electronics box	27"

And the boom was oriented at 328 deg.

We removed all of the instruments from the existing tower. We removed the existing batteries, tower and base.

The station is on dirt (actually, very hard permafrost). We chiseled out a hole large enough to fit a metal base. We leveled the base and installed a 7' tower section. We used the existing guide lines to secure the tower. We also covered the metal base with rocks from the surrounding area. The existing boom was re-installed on the station. A new solar panel, antennae (Freewave), electronics box, junction box and 2 battery boxes were installed. The battery boxes were placed with the cables facing each other in order to protect the cables. A rock wall was then built around the battery boxes and the remaining tower in order to help with stability and protection.

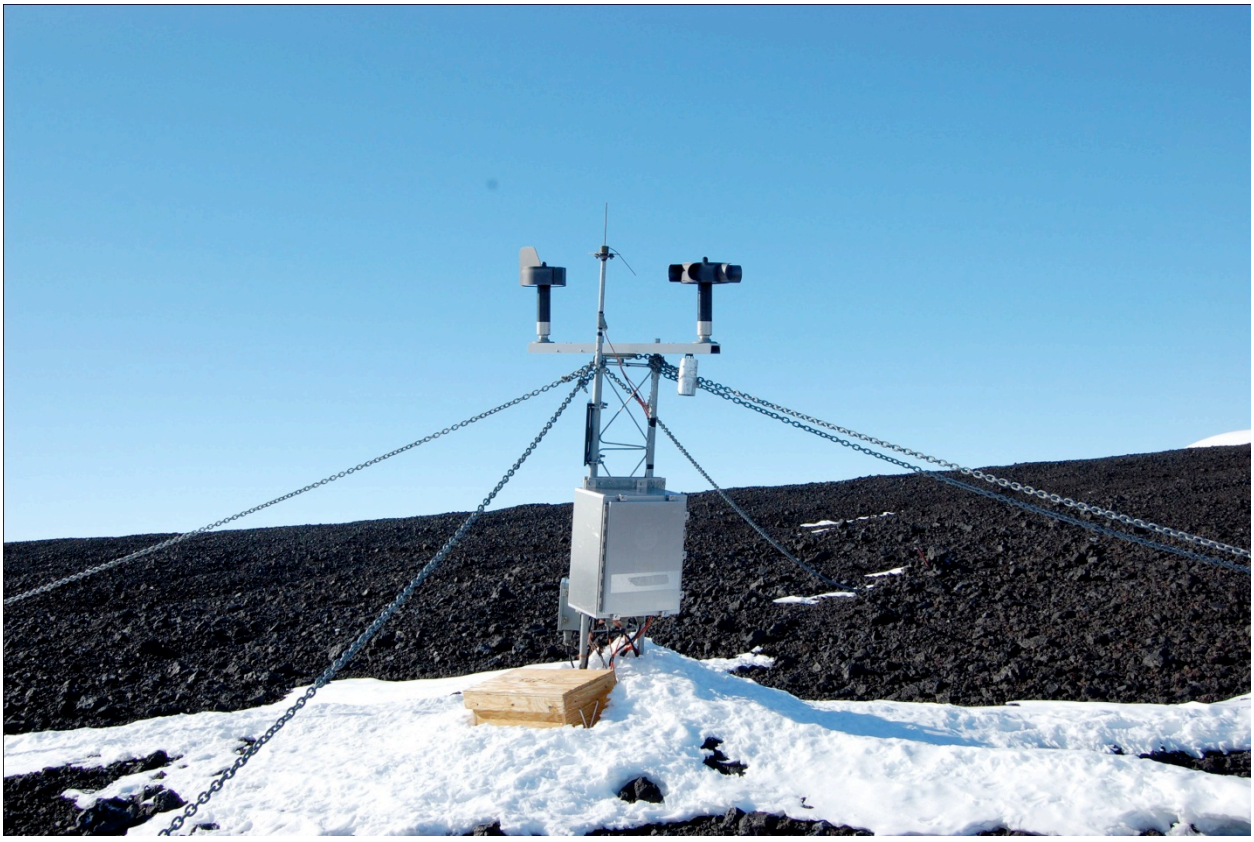
We received good readings on the computer. We will be able to test the effectiveness of the Freewave transmitter after the antennae installation at McMurdo on Tuesday.

The final instrument heights are:

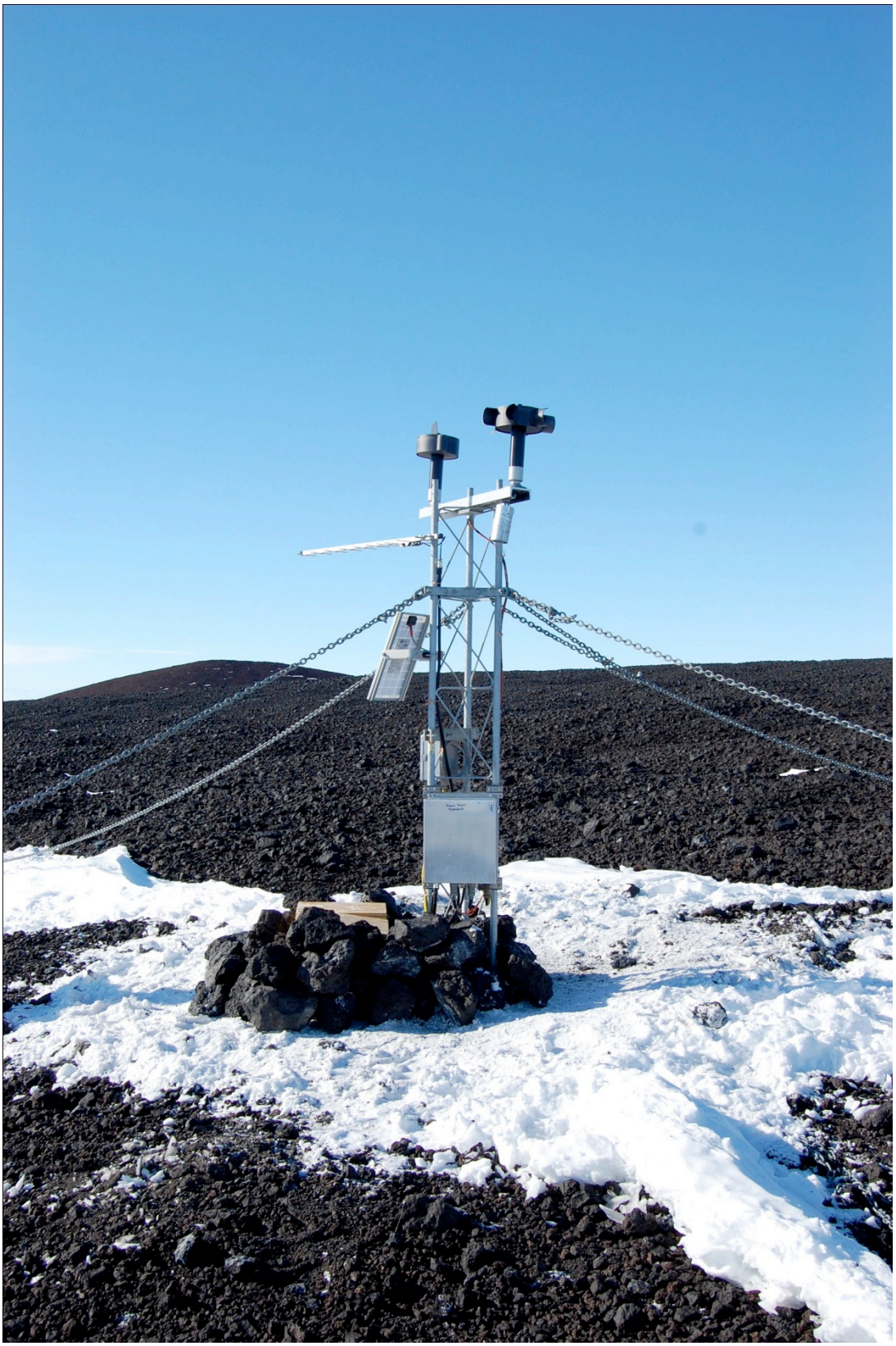
Boom	87"
Electronics box	22"

Boom is oriented at 359 deg.

Before and after pictures follow below:



Minna Bluff AWS2B version AWS prior to changeover to new AWS on February 4th, 2011



Minna Bluff CR1000 based AWS using Freewave 900MHz transmitter on February 4th, 2011

Whitlock AWS (Franklin Island)
Full station replacement on 1-28-11 (approximate ground time 3.5 hours)

Team: Jonathan Thom and Melissa Nigro
Pilot: Sven

UNAVCO GPS was set out. Approximate times were 11:45-3:15.

It was about a 5 minute helo flight from the Oden. Sven dropped the passengers off first and then sling loaded the equipment.

A portion of the electronics box was buried in snow. We removed all of the instruments from the station. The original heights were as follows:

Boom	57"
Electronics Box	-12"
Solar panel	39.5"

The old station had a 5' new style tower section roped to the old style tower sections. These tower sections were leaning and we could not straighten them out. Therefore, we installed a 5' and two 7' tower sections next to the existing site. The new tower sections are on a wooden base and were guided. The new tower has also been tied to the old tower using rope. Three 100 amp hour batteries were installed at the site. These were wired up in a medium sized harding case. The charge controller is wired inside the harding case and therefore this station does not have a junction box. A new set of instruments were installed on the tower.

Final instrument heights:

Aerovane	219"
Upper temp	204"
ADG	172"
Electronics box	92"
Lower temp	53"
RH	102"

-Melissa

Ferrell I servicing and II AWS installation
Installation of a duplicate tower at Ferrell on 2-10-11 (approximate ground time 2.5 hours)

Team: Jonathan, Lee and Melissa
Pilot: Dean
Helo Tech: Roger

UNAVCO GPS was set out. Approximate times were 8:00 pm - 10:30 pm.

It was about a 45 minute 212 helo flight from McMurdo.

The instrument heights on the original tower are as follows:

Lower temp	62 cm
ADG	60 cm
Electronics box	127 cm
ADG electronics box	53 cm
ADG solar panel	57 cm
Junction box	27 cm
Solar panel	201 cm
Boom	277 cm

Boom oriented at 6 deg

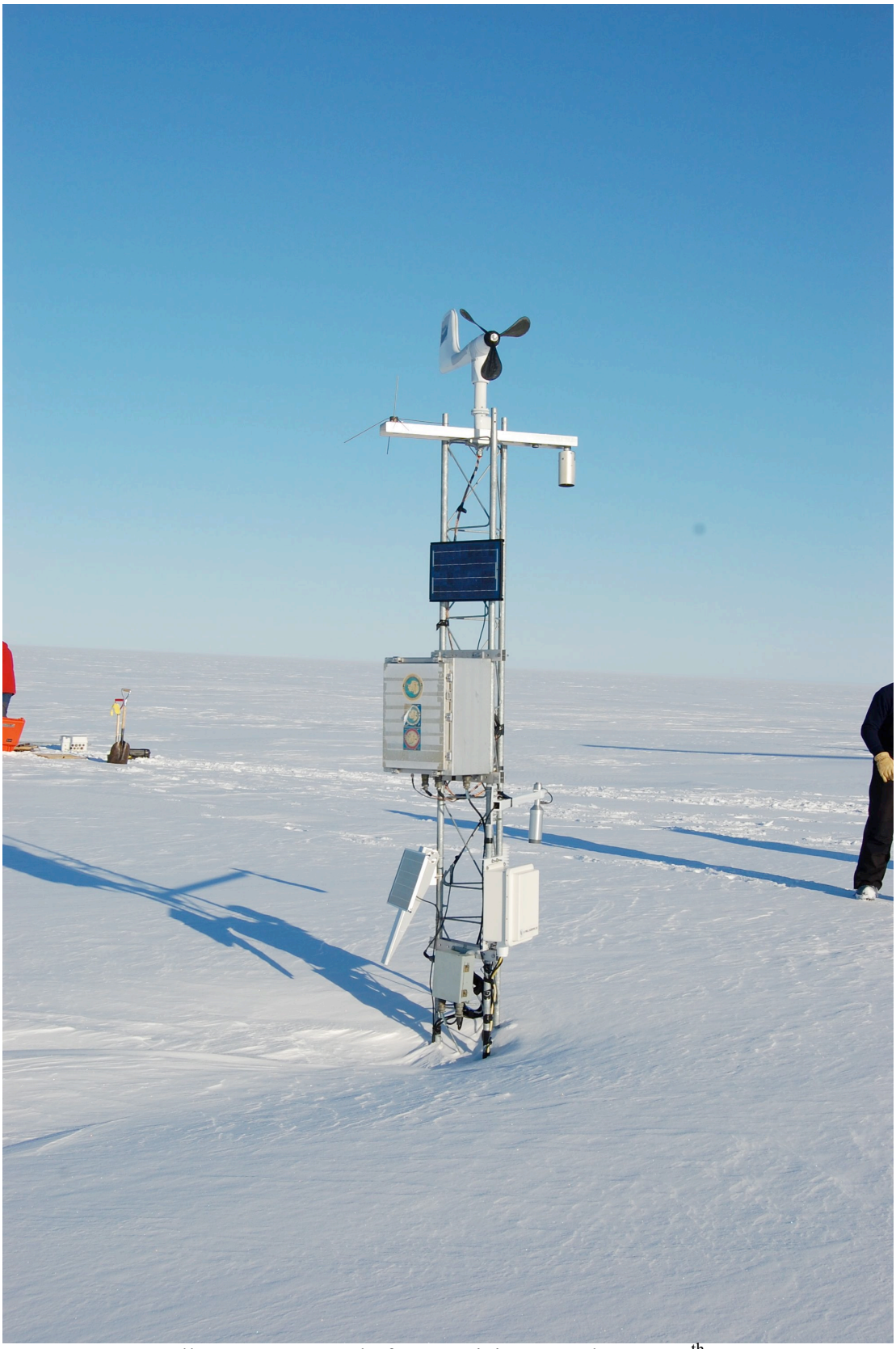
The ADG, ADG electronics box, lower temperature and ADG solar panel were removed from this station. Otherwise this station remains as is.

We installed a full new station about "21 Jonathan paces" to the east of the original station. This station will be used to test the difference in measurements between the old style AWS station and the new style AWS station. A 5' and two 7' tower sections were installed. The tower and guides have been installed approximately 2-3 feet into the snow. Two sets of batteries and a full set of instruments were installed at this site.

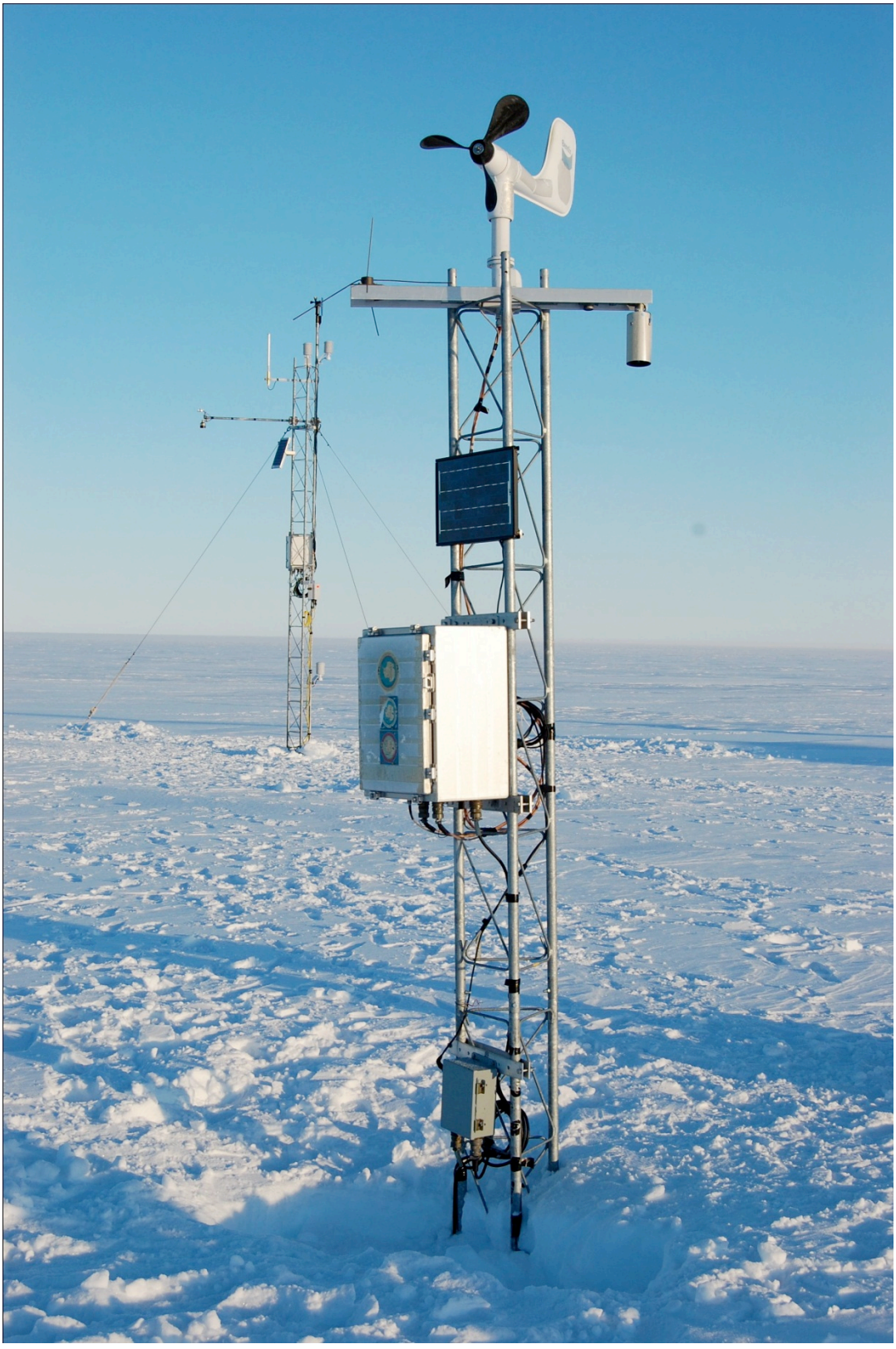
The final instrument heights were:

Lower temp	102 cm
J-box	207 cm
Electronics box	240 cm
ADG and pyronometer	432 cm
Solar panel	365 cm
Upper temp and HMP	524 cm
Aerovane	568 cm

Before and After pictures are attached below.



Ferrell AWS2B AWS before servicing on February 10th, 2011



Ferrell AWS2B AWS after servicing and Ferrell II new AWS in background on February 10th, 2011

Willy VHF Station installation
Installation on 2-10-11 (approximate ground time 1.75 hours)

Team: Jonathan, Lee, Melissa and Julien Nicholas

UNAVCO GPS was set out. Approximate times are 2:00-3:30pm.

It was about a 0.5 hour pickup truck ride out to the site from McMurdo.

The station was initially empty, except for a solar panel that we removed (all of the remaining instruments were removed at an earlier visit this season). One battery box was also removed.

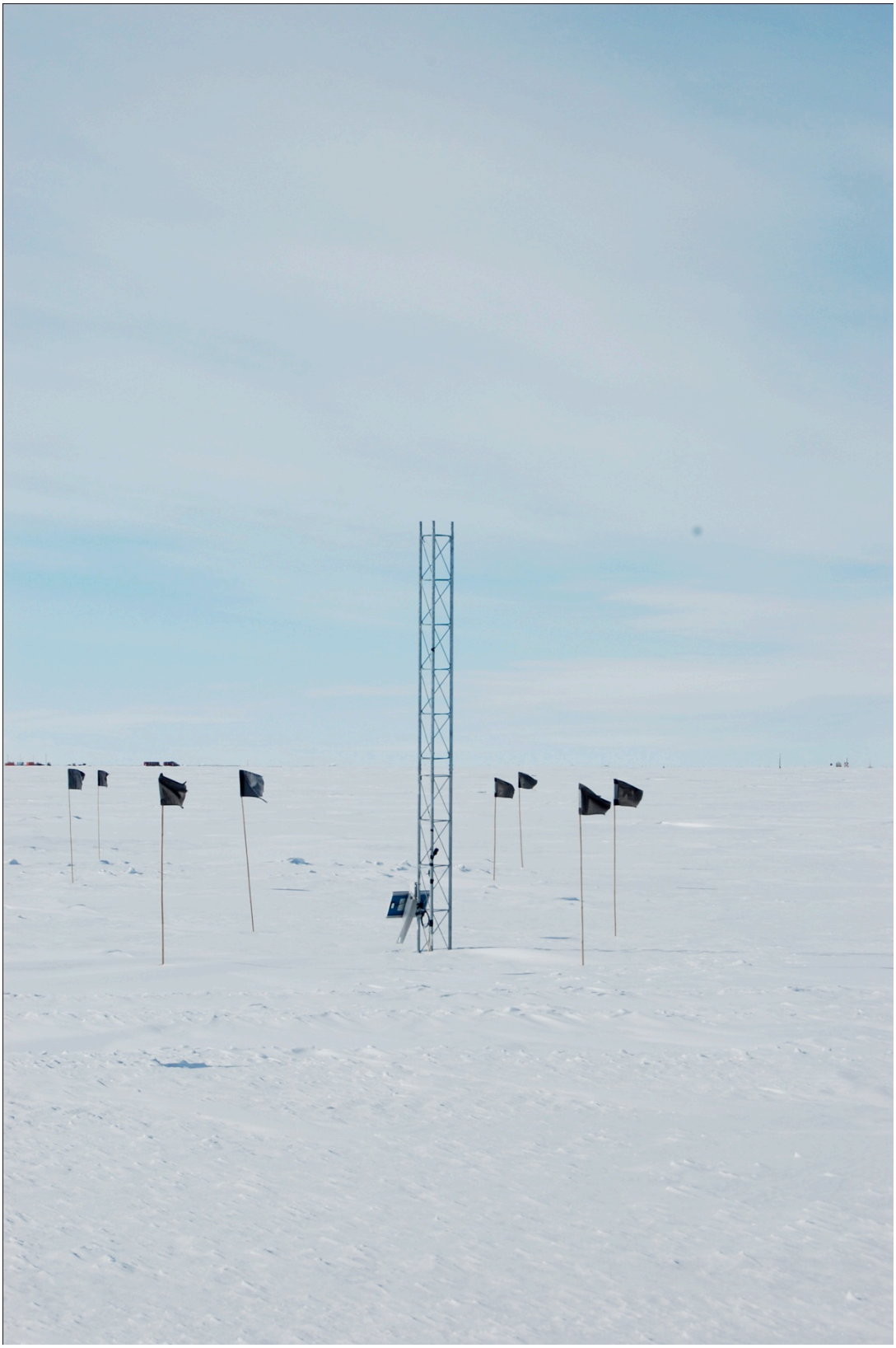
We installed an aerovane, upper temp, lower temp, HMP, solar panel, electronics box and junction box. We put out 2 sets of batteries at the site. Note: the junction box is an old style box. Therefore the solar panel has been hardwired into the junction box and the battery cables are the old style. Also, we removed the freewave transmitter from the site, due to the fact that the freewave receiving antennae on top of Crary will not pick up the signal from this site. Therefore, a data card will collect the data and will need to be retrieved next season. The computer was connected to the station and the data collection looked good.

The final instrument heights are as follows:

Lower temp	127 cm
Electronics box	204 cm
Pressure	239 cm
Junction box	142 cm
HMP	381 cm
Upper temp	394 cm
Aerovane	435 cm

Before and after pictures are attached.

- Melissa



Willy Field Site before installation of new CR1000 based AWS with Freewave transmitter

Willy Field CR1000 based AWS for testing Freewave transmitter

Freewave data

The new AWS using Freewave transmitters (900MHz line of site) rather than the standard Argos (satellite) transmitters require a receiving station in the McMurdo area. Matt Lazzara has put together a system for the proper movement of the Minna Bluff real-time observations being sent via Freewave radio-modem from the Minna Bluff AWS to the Crary Lab computer (flounder.usap.gov ?), and then to the site **herbie.usap.gov** and then on to here:

ftp://amrc.ssec.wisc.edu/pub/aws/freewave/

This is just the first step. We will have to get this filed much more logically (broken up by year and month), else we'll have very large unwieldy files. We need to:

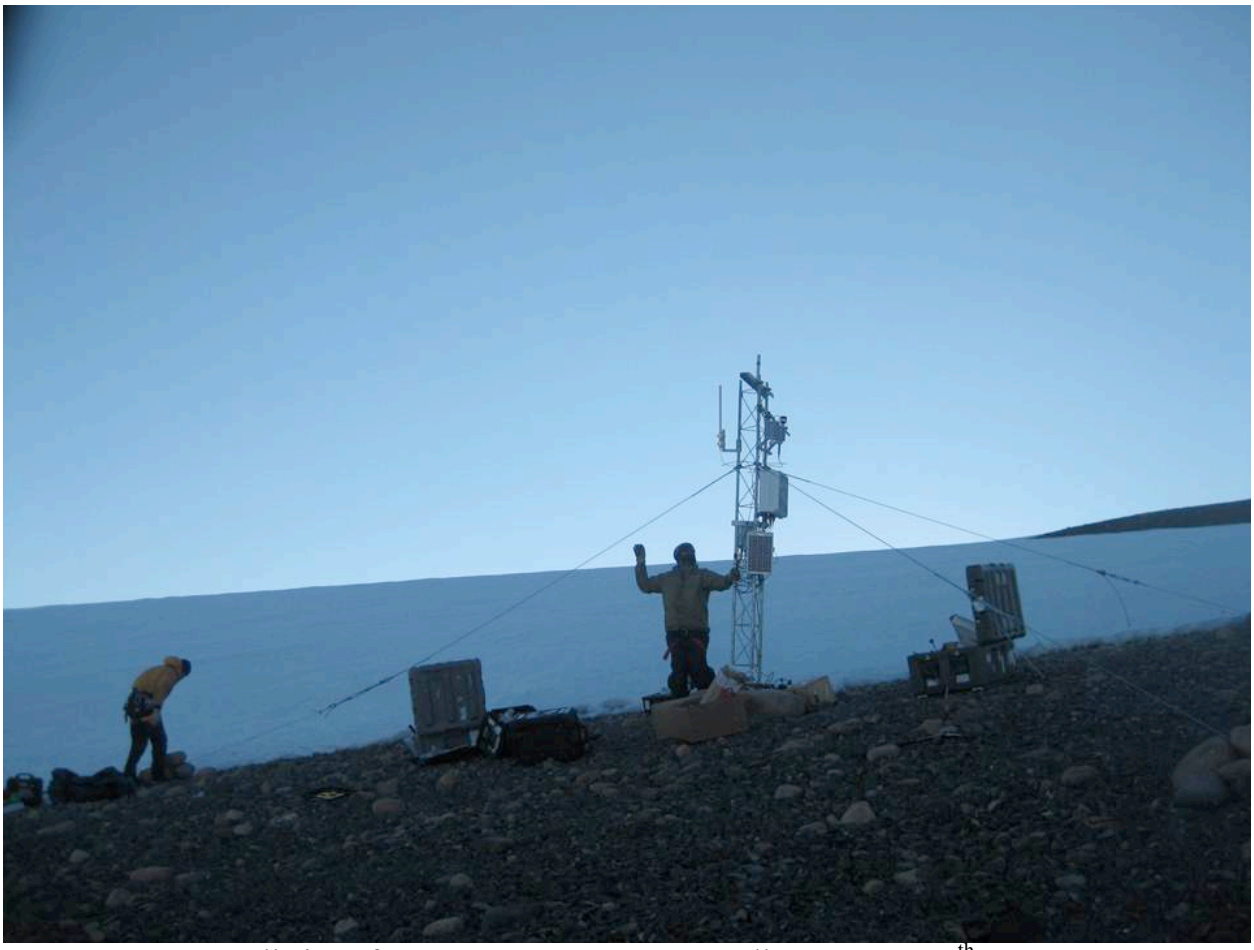
1. Handle inserting this to McIDAS based systems for real-time display
2. Handle how we'll work on QC
3. Get the data to Mac Weather for operational use

We will update everyone when we have a better organization for this on the FTP site. We will also have it automatically go on both amrc.ssec.wisc.edu and aws.ssec.wisc.edu

Collaborative AWS Servicing and Installations

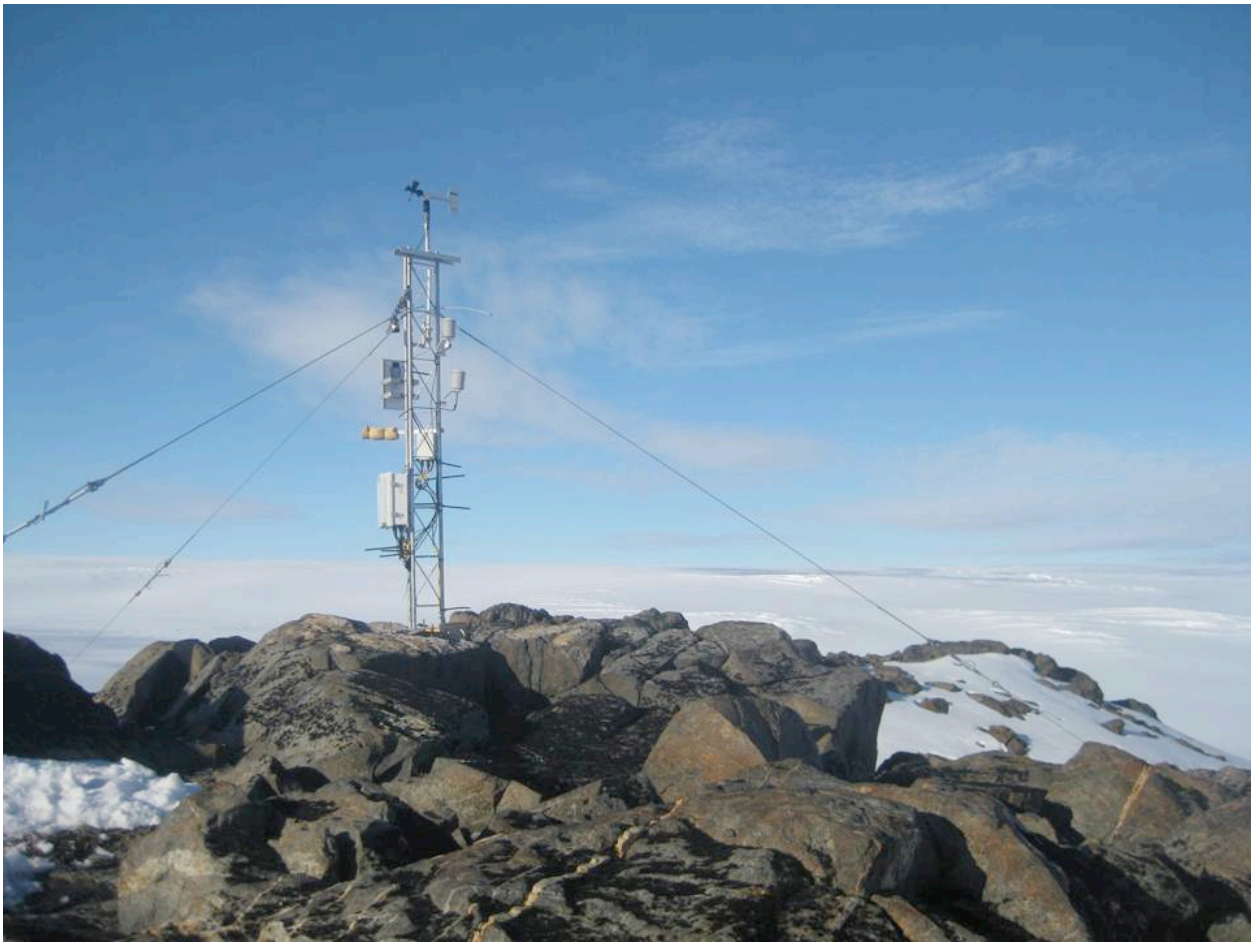
David Holland West Antarctic AWS

Three UW CR1000 AWS were unable to be deployed during the 2009-2010 field season and were stored at Byrd Surface Camp by David Holland's field team. This season the three AWS were successfully deployed by David Holland's field team. They were deployed on Evans Knoll, Bear Peninsula and Thurston Island.



Installation of CR1000 AWS at Evans Knoll on January 12th, 2011

Installation of CR1000 AWS at Bear Peninsula on January 14th, 2011 by David Holland's field team



Installation of CR1000 AWS on Thurston Island on January 19th, 2011 by David Holland's field team

AWS servicing in Adelie Land by IPEV

D10
Just to inform you that D10 AWS mast station has been realigned vertically.
So, no electric disconnection was required.
This has been done Friday 18 Feb during one hour between 06H00 UTC and 07H00 UTC.
(16h00 and 17h00 DDU time)

Precise height of snow accumulation sensor will be done soon/later by Alexander Trouviller.
(Person which work with C. Genthon)

NB : Due to mast snow accumulation, next year a new mast section will be added on existing D10 AWS mast section/station.

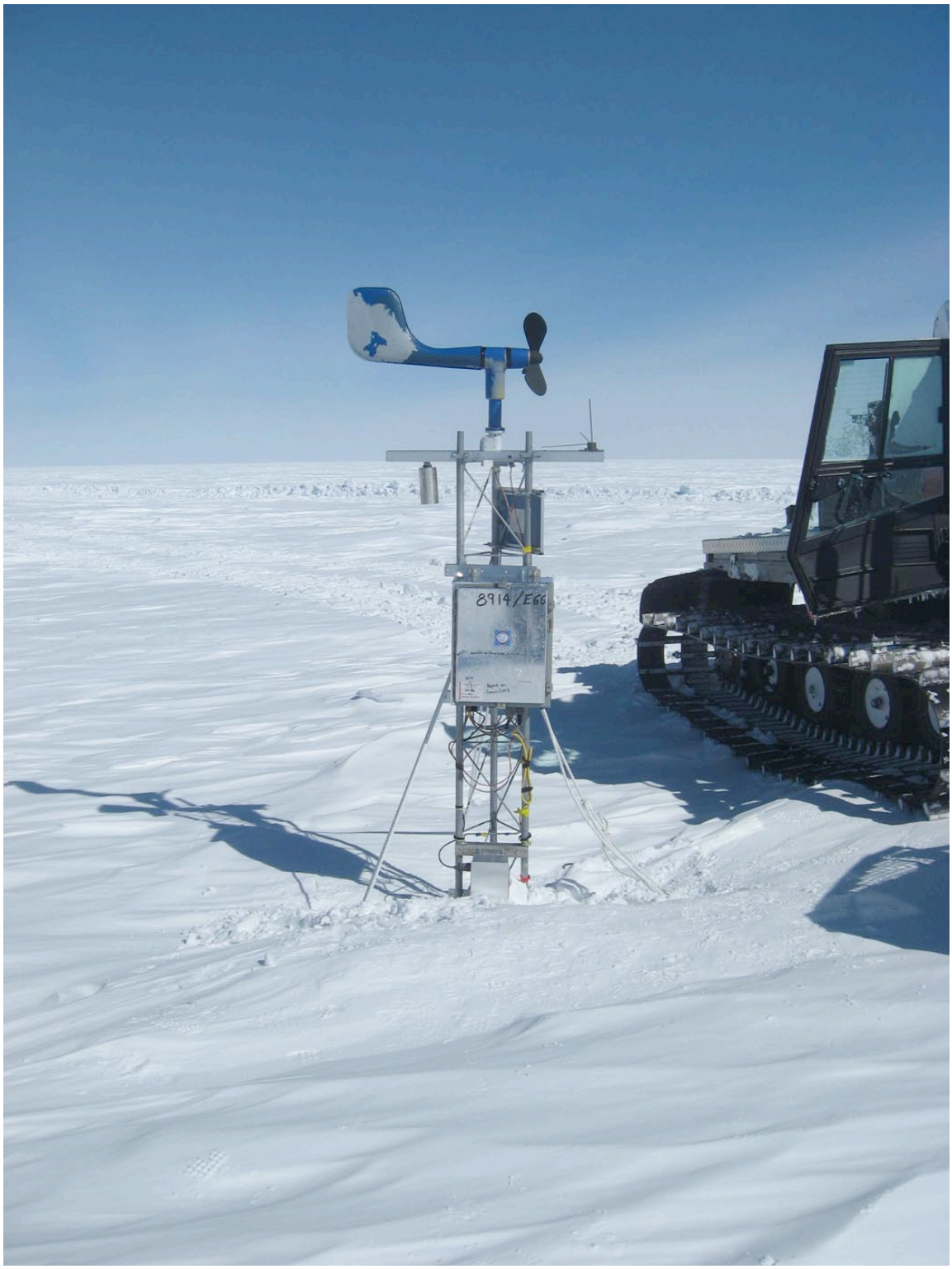
Best regards
IPEV
Scientific coordination
Alain PIERRE

E66
AWS 8914 has been installed December 7th, 2010 0045 UTC.
Station is pretty snowed in, we repositioned solar panel and 8914, we will have to think about adding to the mast. I will send you pictures of all stations on the way to Dome C once I get back to Dumont d'Urville. I will let you know parts required in order to proceed.
I hope station is received okay.
Cheers
Philippe Dordhain

D85

Hi George,
E85 AWS has been replaced on Januray 22nd, 2011 with AWS 8912.
regards - Philippe

Following images of AWS line from Dumont D'Urville to Dome C II taken on the early traverse from Dumont D'Urville to Dome Concordia.



E66 AWS after replacement of AWS 8986 with 8914 (both AWS2B AWS)

D85 AWS 8986 before being replaced with AWS 8912 (both AWS2B type AWS)

Here's the summary of our AWS 2011-2012 field season meeting

We've identified the following new CR1000 AWS requirements for next year:
---

* AGO collaboration - New install
* POLENET collaboration - New install
* Cape Hallett - removal of two AWS, new install CR1000 AWS
* I-157 (which will be renamed...fyi) , new install of CR1000 AWS
* Kominko-Slade/WAIS, removal of Wisconsin AWS 2B, new install of CR1000 AWS
* Dome C II, new install of CR1000 AWS (removal of old AWS 2B?)
* Manuela, removal of old non-high speed wind Wisconsin AWS 2B, new install of CR1000 AWS - (unit is coming back from Port Martin)

We've identified the following replacement AWS2B needed:
---

* Carolyn - Off the air replacement with a standard RM Young AWS2B AWS
* Eric - replacement with a standard RM Young AWS2B AWS
* Vito - replacement with a standard RM Young AWS2B AWS

We'll plan on removing the following:
---

* Brianna - No longer needed.
* South Pole Radiation Test Facility - No longer needed.
* Erin and/or Elizabeth are low on the priority list and may be removed if time/transportation available.

We'll visit/service:
---

* Janet - Reverse tower and see how the accumulation is going...
* Harry needs batteries and conversion to RM Young AWS2B AWS
* Tall Tower - Check on settling and several other items, TBD
* Margaret - Reprogram CR1000, and check on a raise?
* Hugo Island - Not working well - may need a host of servicing?? (marine issues?)
* Siple Dome needs new electronics/possible move/temperature string???

Lower priority for servicing:

* Converting CR10X based AWS to CR1000 based AWS

SCHOOL DISTRICT OF LODI
Lodi, WI 53555

District Office	High School (9-12)	Middle School (6-8)	Elementary School (3-5)	Primary School (Pre-K-2)
115 School Street	1100 Sauk Street	900 Sauk Street	101 School Street	103 Pleasant Street
Phone: 608.592.3851	Phone: 608.592.3853	Phone: 608.592.3854	Phone: 608.592.3842	Phone: 608.592.3855
Fax: 608.592.3852	Fax: 608.592.1045	Fax: 608.592.1035	Fax: 608.592.1025	Fax: 608.592.1015

November 4, 2010

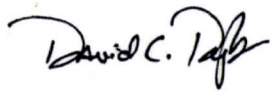
To Whom It May Concern,

It is with great appreciation that I grant approval for Dr. Matthew Lazzara, Research Meteorologist for the Antarctic Meteorological Center, University of Wisconsin-Madison, to work with Lodi Middle School (LMS) students. Together with Sara Hook (Seventh Grade Science Teacher), Dr. Lazzara has developed and implemented unique projects to enhance our existing meteorology and science curriculum.

Most recently, students have collected daily data from automated weather stations on Antarctica for several weeks, analyzed the data, and researched more facts about the location of the station before finally presenting their information in poster format. Our current instructional philosophy allows teachers the freedom to identify resources that will enhance the curriculum as they see fit to optimize student achievement. Hands-on and practical applications such as those developed by Dr. Lazzara meet and exceed our standards. In addition, they have been highly motivating to the students of LMS. In accordance with the United States Codes, any updated curriculum will be available for parents to access from the district's Eclipse online software and through classroom instructors.

On behalf of our students, I wish to thank Dr. Lazzara and the University for their continued interest in our students and that we look forward to the new and exciting projects that our students will be able to participate in because of this working partnership.

Sincerely,



David C. Dyb
Principal
Lodi Area Middle School
dybda@lodi.k12.wi.us

cc: Sue Miller, Board of Education President
Mike Shimshak, District Administrator
Tiffany Loken, Director of Instruction
Sara Hook, 7th Grade Science Teacher

February 22, 2011

It is with great appreciation that I grant approval for Dr. Matthew Lazzara, Research Meteorologist for the Antarctic Meteorological Center, University of Wisconsin-Madison, to work with Velma Hamilton Middle School students. Dr. Lazzara will be working with sixth grade teacher, Barbara Williams to develop and implement unique projects to enhance our existing Foss weather curriculum.

Students have begun the process of collecting daily data from automated weather stations on Antarctica; they will analyze the data, and research more facts about the location of the station before presenting their information in poster format. We are fortunate to be able to have the freedom to identify resources that will enhance the curriculum as we see fit in order to optimize student achievement. Hands-on and practical applications such as those developed by Dr. Lazzara meet and exceed our standards. In addition, they have been highly motivating for our students. In accordance with the United States Codes, any updated curriculum will be available for parents through classroom instructors.

On behalf of our students, I wish to thank Dr. Lazzara and the University for their interest in our students and we look forward to the new and exciting projects that our students will be able to participate in because of this partnership.

Sincerely,

Hank Schmelz
Principal
Velma Hamilton Middle School
cc: Maya Cole, Board of Education President
Dr. Pam Nash, Assistant Superintendent

Deerfield Community School District

Excellence and Equity in Education

April 28, 2011

To Whom It May Concern,

It is with great appreciation that I grant approval for Dr. Matthew Lazzara, Research Meteorologist for the Antarctic Meteorological Center, University of Wisconsin-Madison, to work with Deerfield Middle School students. Together with Melissa Frame (Seventh Grade Science Teacher), Dr. Lazzara will develop and implement unique projects to enhance our existing meteorology and science curriculum.

We are excited to be able to offer our students opportunities to collect daily data from automated weather stations on Antarctica, analyze the data, and research more facts about the location of the station. Our current instructional philosophy allows teachers the freedom to identify resources that will enhance the curriculum as they see fit to optimize student achievement. Hands-on and practical applications such as those developed by Dr. Lazzara meet and exceed our standards. In accordance with the United States Codes, any updated curriculum will be available for parents to access through our classroom instructors.

On behalf of our district, I wish to thank Dr. Lazzara and the University for their interest in sharing these types of learning opportunities with our students. We look forward to the new and exciting projects that our students will be able to participate in because of this working partnership.

Sincerely,

Michelle R. Jensen
District Administrator

CC: Brad Johnsrud, MS/HS Principal
Chris Page, Deerfield School Board President
Melissa Frame, MS Science Teacher

Deerfield Elementary
340 West Quarry
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Fax (608) 764-8652

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Deerfield Middle/High
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Deerfield, WI 53531
(608) 764-5431
Fax (608) 764-5433

www.deerfield.k12.wi.us

Automatic Weather Station Program
2011-2012 Field Season Report

Field Season Report Author: Lee J. Welhouse[1]
Field Team Members: Jonathan E. Thom[1], John J. Cassano[2], Alice K. DuVivier[2], Lee J. Welhouse[1]
Principal Investigator: Matthew A. Lazzara[1]

[1] Space Science and Engineering Center
University of Wisconsin - Madison
[2] Department of Atmospheric and Oceanic Science
University of Colorado - Boulder

The National Science Foundation's Office of Polar Programs funds the University of Wisconsin's Automatic Weather Station Program to design, fabricate, deploy, and maintain an array of automatic weather stations (AWS) 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 AWS electronic enclosure. Some units measure relative humidity at 3 meters above the surface and the air temperature difference between 0.5 and 3 meters above the surface at the time of installation. A small, but increasing number of AWS sites measure snow accumulation and/or solar radiation. The data are collected by the ARGOS Data Collection System (DCS) on board the National Oceanic and Atmospheric Administration (NOAA) and MetOp (EUMETSAT) series of polar-orbiting satellites. This year saw an increase in the stations using Freewave modems to transmit to a receiving station in McMurdo. The AWS units are located in arrays for specific research activities and are also used for operational purposes. Any one AWS may support several experiments and all support operational meteorological services - especially support for weather forecasts for aircraft flights around the Antarctic continent. This was the 32nd field season for project O-283 (formerly S-283) under the direction of Principal Investigators (PI) from the University of Wisconsin – Madison.

Research areas supported over the years include:

- Barrier wind flow along the Antarctic Peninsula and the Transantarctic Mountains
- Katabatic wind flow down the Byrd and Beardmore Glaciers, the Siple and Adelie Coast
- Mesoscale circulation and sensible and latent heat fluxes on the Ross Ice Shelf
- The Ross Ice Shelf Air Stream.
- Climatology of long operating AWS sites, in particular Byrd and Dome C sites
- Meteorological support for the West Antarctic Ice Sheet Initiative
- Long Term Ecological Research (LTER) along the Antarctic Peninsula
- Meteorological support for United States Antarctic Program flight operations

The following are a sampling of historically supported principal investigators funded by NSF-OPP:

- Dr. Douglas R. MacAyeal: Iceberg Drift in the Near-Shelf Environment, Ross Ice Shelf, Antarctica.
- Dr. Ray Smith, Long Term Ecological Research: Racer Rock, Bonaparte Point, and Santa Claus Island.
- West Antarctic Ice Sheet Initiative: Siple Dome and West Antarctic Divide drilling sites.
- Dr. John Cassano: The Ross Ice Shelf Air Stream
- Aircraft Operation: All AWS sites in Antarctic.
- The Antarctic AWS units support many investigators outside of NSF-OPP.

AMRC collaboration:

- Climatological analysis from the AWS, and other stations (complimenting the activities in the SCAR READER project).
- Continued data collection, archival and distribution of AWS data.
- Continued educational outreach activities (as outlined in the above section and in the following outreach section).
- Utilities developed to generate climatological analyses from AWS observations.

Field work:

One of the unique aspects of maintaining the AWS observational network is the necessary fieldwork. A full time job in and of itself, keeping a network of 50 to 70 AWS systems operating, even with international partners, requires a devoted effort of AWS fabrication and repair team members doubling as field personnel. Flying to remote places around the Antarctic and dealing with polar weather conditions makes maintenance a challenge. The success of the AWS network would not be possible without the support of all those who help, directly or indirectly. Thanks go to Ken Borek Air, the 109th New York Air National Guard, PHI Helicopters, Raytheon Polar Services, our international partners in France, Australia, United Kingdom, Japan, New Zealand and China, and especially the Office of Polar Programs at the National Science Foundation in the USA.

For the 2011-2012 field season, the field team consisted of Jonathan Thom (O-283), and Lee Welhouse (O-283) from the University of Wisconsin-Madison Space Science Engineering Center, and John Cassano (O-283), and Alice DuVivier (O-283) from the University of Colorado- Boulder. Jonathan Thom and Lee Welhouse deployed to McMurdo on November 4th, 2011 for the early portion of the season which consisted of updating a number of stations in the Ross Island region to Freewave transmitters, some AWS service work in the Ross Ice Shelf as well as the consolidation of the stations in Cape Hallett. Jonathan Thom departed McMurdo on December 7th, 2011 for return to Madison. Lee Welhouse completed the middle portion of the season, which consisted of work out of Siple Dome station, WAIS-D camp, Byrd camp, and South Pole Station though weather issues would require a return to Byrd camp later in the season. John Cassano and Alice DuVivier arrived in McMurdo on January 2nd, 2012 to complete the final portion of the season. The final portion of the season consisted of work out of Byrd Camp done by Lee Welhouse and Alice DuVivier, and work on the Ross Ice Shelf and around the Ross Island region completed by John Cassano and Alice DuVivier.

Summary of 2011/2012 field season for O-283:

Sabrina faulty pressure sensor replaced, program updated, and compact flash card replaced 11/15/2011

Tom power system replaced, compact flash card replaced 11/15/2011

Elaine instrumentation was raised 11/15/2011

Windless Bight instrumentation was raised 11/17/2011

Cape Hallett LTER station consolidated with New Zealand AWS at AWS location 11/20/2011

E-66 French Station fully removed 11/27/2011

Minna Bluff removal of old enclosure and antenna 11/28/2011

Minna Bluff installation of new enclosure and antenna 11/30/2011

Marble Point II installation of new freewave station 12/1/2011

Cape Bird removed old enclosure and instrumentation and installed new freewave station 12/2/2011

Lorne removed old enclosure and instrumentation and installed new freewave station 12/3/2011

Siple Dome removed old argos station and installed new argos station 12/8/2011

Kominko-Slade removed old station, installed new station and consolidated snow temperature probe. 12/17/2011

South Pole Test Station removed all instrumentation, enclosures and batteries 12/29/2011

Lorne removed yagi antenna and enclosure, installed argos antenna, enclosure was installed later by Lars Kalnajs of O-324 01/14/2012

Harry raised instruments 01/19/2012

Mary full removal of the enclosure, instruments, and one 7 foot tower section. 01/20/2012

Erin raised instruments 01/21/2012

Siple Dome adjusted wind speed direction 01/21/2012

Alexander Tall Tower inspected tower and retrieved data 01/26/2012

Schwerdtfeger Installed new batteries 01/31/2012

Carolyn replaced AWS and raised instruments 02/04/2012

Lettau removed for diagnosis and repair 02/04/2012

Manuela replaced AWS station with new enclosure and instruments 02/07/2012

Amsler Island AWS placed by Jim Bockheim

Cierva Cove AWS placed by Jim Bockheim

Argos AWS							
8695	Vito	AWS2S	78.509oS	177.746oE	@+52		TX OK
8697	Eric	AWS2S	81.504oS	163.940oE	@+45		TX OK
8983	Carolyn	AWS2S	79.964oS	175.842oE	@+52		AWS installed Feb 2012
8900	Harry	AWS2B	83.003oS	121.393oW	945		AWS serviced Jan 2012
Freewave	Cape Bird	AWSCR1000	77.224oS	166.440oE	@42		TX OK
8901	Cape Bird	AWS2B	77.224oS	166.440oE	@42		Replaced day 335 2011
8902	Butler Island	AWSCR1000	72.207oS	60.160oW	91	89266	TX OK
8903	Byrd	AWSCR1000	80.007oS	119.404oW	1530	89324	TX OK
8904	Dome Fuji	AWSCR1000	77.31oS	39.70oE	3810	89734	TX OK
8905	Manuela	AWS2B	74.946oS	163.687oE	80	89864	OFF, Wind out - Belfort
8905	Manuela	AWSCR1000	74.946oS	163.687oE	80	89864	New AWS test data Jan 13
8906	Marble Point	AWS2B	77.439oS	163.754oE	@108	89866	TX OK
Freewave	Marble Point	AWSCR1000	77.439oS	163.754oE	@108	89866	TX OK
New 2011 8907	New AWS 2011	AWS test ID					Madison WI
8908	Marlene	AWSCR1000	*83.65oS*	*167.40E*	*TBD*		TX OK
8909	Port Martin	AWS2HWS	66.82oS	141.40oE	39		OFF
8909	Cape Denison	AWSCR1000HWS	67.009oS	142.664oE	31		OFF Day 161, 2011
8910	Roosevelt Island	AWSCR1000	80.00°S	165.00°W	@67		TX OK/Turn off NL115
8911	Gill	AWSCR1000	*79.985oS*	*178.611oW*	*@54*	89376	TX OK
8912	D85	AWS2B	68.912oS	134.655oE			TX OK
8913	Schwerdtfeger	AWS2B	79.875oS	170.105oE	@54	89868	TX OK/Low batteries
8914	E-66	AWS2B	68.912oS	134.655oE			Removed 331 2011(site inactive)
New 8915	Sabrina	AWSCR1000	84.25 S	169.98 W	@88		TX OK visited 2011/12
8916	D-47	AWSCR1000	70,426oS	134.146oE			TX OK
8917	Ski-Hi	AWSCR1000	74.792oS	70.488oW	1395	89272	TX Infrequent check
8918	Relay Station	AWSCR1000	74.017oS	43.062oE	3353	89744	TX OK
8919	Tom	AWSCR1000	*84.43 S*	*171.46 W*	*TBD*		On visited 2011/112
8920	Fossil Bluff	AWSCR1000	71.33oS	68.283oW	63	89065	TX OK
8921	Bonaparte Point	AWSCR10X	64.778oS	64.067oW	8	89269	TX Data to be checked
8922	Bear Peninsula	AWSCR1000	TBD	TBD	TBD		TX OK
8923	Evans Knoll	AWSCR1000	TBD	TBD	TBD		TX OK
8924	Nico	AWS2B	89.000oS	89.669oE	2935	89799	TX OK
8925	Limbert	AWSCR1000	75.422oS	59.851oW	40	89257	TX OK
8926	Larsen Ice	AWSCR1000	66.949oS	60.897oW	17	89262	TX OK
New 2011 8927	AGO 4	AWSCR1000	82.017 S	96.767 E	3565		TX OK
8928	Lettau	AWSCR1000	82.518oS	174.452oW	55	89377	OFF Day 208
8929	Ferrell	AWS2B	77.865oS	170.819oE	@45	89872	TX OK
8930	Thurston Island	AWSCR1000	TBD	TBD	TBD		TX OK
8931	Brianna	AWS2B	83.889oS	134.154oW	@525		TX OK, Low Battery
8932	Dismal Island	AWSCR10X	68.087oS	68.825oW	10		TX OK
New 8933	New AWS - HWS	AWSCR1000HWS					Hobart found to be returned
8934	Marilyn	AWS2B	79.954oS	165.130oE	(72)@64	89869	TX OK
8935	Santa Claus I	AWSCR1000	64.964oS	65.670oW	25		TX, Data issues
8936	Janet	AWSCR1000	77.17 S	123.39 W			TX OK
8937	Pegasus North	AWSCR1000	77.990oS	166.568oE	@5		TX OK
8938	Siple Dome	AWS2C	81.656oS	148.773oW	@668	89345	Replaced day 335 2011
New 2011 8939	McMurdo	AWSCR1000					

8947	Ferrell II	AWSCR1000	77.865oS	170.819oE	@45	89872	TX OK
8980	Emilia	AWSCR10X	78.509oS	173.114oE	@+50		TX OK
8981	Mount Siple	AWS2DH	73.198oS	127.052oW	230	89327	OFF Day 214/Low Batteries
8982	Windless Bight	AWSCR10X	77.728oS	167.703oE	61		TX OK
8983	Mary	AWSCR10X	79.303oS	162.968oE	@+58		Removed Jan 2012
8984	Possession Is.	AWSDH	71.891oS	171.210oE	30	89879	TX OK/Low Battereies
8985	Henry	AWS2B	89.011oS	1.025oW	2755	89108	TX OK/Low Battereies
New 2011 8986	Mcmurdo	AWSCR1000					
8987	Alex	AWSCR3000	79.045oS	170.651oE	TBD		TX OK
8988	Whitlock	AWSCR1000	76.144oS	168.392oE	(275) @206	89865	TX OK
8989	Dome C II	AWS2B	75.121oS	123.374oE	3250	89828	TX OK
9116	M83 (BAS) Baldrick	AWSCR1000	82.774 S	13.054 W	1968		TX OK
21355	Spare - Madison	AWS2B					Spare RMY/Telonics/No PG
New 21355	Mcmurdo	AWSCR1000					TX ON Day 230
21356	Lorne	AWS2B	78.250oS	170.000oE	@45		Mcmurdo test day 339
8901	Lorne	AWS2B	78.250oS	170.000oE	@45		TX OK
21357	Elaine	AWSCR1000	77.952oS	166.500oE	@8	89667	TX OK Visitied 2011/12
21358	Theresa	AWS2B	84.599oS	115.811oW	1463	89314	TX OK/Lower deltaT buried
21359	Mizuho	AWS2B	70.70oS	44.29oE	2260		TX OK/Low Batteries
21360	Laurie II	AWS2B	77.509oS	170.797oE	@37		TX OK/delta T bad
21361	Elizabeth	AWS2B	82.607oS	137.078oW	@519	89332	TX OK/Check wind sensor
21362	Linda	AWS2B	78.439oS	168.406oE	@43	89769	TX OK
21363	Erin	AWS2B	84.904oS	128.828oW	@990		TX Data issues
21364	WAIS K-S	AWS2S	79.468oS	112.086oW	@183 3		AWS removed 2011/12
21364	WAIS K-S	AWSCR1000	79.468oS	112.086oW	@183 3		TX OK AWS installed 2011/12
NO TX	WAIS K-S	AWSCR1000	79.468oS	112.086oW	@183 3		Snow temp, New batteries installed
28336	Nascent	AWSCR10X	78.127oS	178.497oE	30		TX OK
28338	Cape Hallet	AWSCR10X	72.190 S	170.160 E	@14		replaced 2011/12
28338	Cape Hallet	AWSCR1000	72.190 S	170.160 E	@14		TX OK New AWS
Spare 28339	Madison	AWSCR10X/Seimac					
30305	JARE 2008	AWS2B	77.000 S	20.000 E	3400		TX OK
30374	D-10	AWSCR10X	66.71oS	139.83oE	243	89832	TX OK
Spare 30393	Siple Dome	AWSCR1000	81.656oS	148.773oW	@668	89345	Installed 335 2011
Spare 30393	Madison	AWSCR10X/Seimac					
30416	Panda South	AWS2B	82.246 S	75.989 E	4027		TX OK
30423	Nascent T string	AWSCR10X/Seimac	78.127oS	178.497oE	30		TX OK/Snow temp data
Argos 3 AWS	Madison	AWSCR1000					Test AWS
VHF AWS							
Freewave	Willie Field test	AWSCR1000	77.866oS	166.983oE	@14		Data received
Freewave	Minna Bluff	AWSCR1000	78.555oS	166.691oE	@47	89769	Data received
Freewave	Cape Bird	AWSCR1000	77.224oS	166.440oE	@42		Data received
Freewave	Marble Point	AWSCR1000	77.439oS	163.754oE	@108	89866	Data received

Freewave	Lorne	AWS2B	78.250oS	170.000oE	@45		No reception
Iceberg AWS							
15930 (CR10X)	C16	CR10X					OFF day 339 (2010 -default mode)
30504 (CR10X)	B15J Mother 1	CR10X					OFF Day 066 (2010)
30580 (CR10X)	B15J Mother 2	CR10X					Last TX Day 349 (2011)
Argos 3 AWS	Madison	AWSCR1000					Test AWS
Recording Only							
	Mt Fleming	AWSCR10X	77.533oS	160.276 E	@1868		Converted to logging, 12/20,2010
	Mt Friis	AWSCR10X	77.747oS	161.516 E	@1581		Converted to logging, 12/20,2010
Inactive Sites							
	E66	Deactivated Nov 2011	68.912oS	134.655oE			Removed 331 2011(site inactive)
	Mary	Deactivated Jan 2012	79.303oS	162.968oE	@+58		Removed Jan 2012(site inactive)
	J.C.	Not active	85.070oS	135.516oW	549		
	Doug	Not active	82.315oS	113.240oW	1433		
	Scott Island	Not active	67.37oS	179.97oW	30	89371	
	Young Island	Not active	66.229oS	162.275oE	30	89660	
	Penguin Point	Not active	67.617oS	146.180oE	30	89847	
	Pegasus South	Not active	77.990oS	166.568oE	@5		
	Racer Rock	Not active	64.067oS	61.613oW	17	89261	

Sabrina

Visited on 11/15/2011
Pilots: Ted and Braden (KBA)
Field Team: Jonathan Thom and Lee Welhouse
Location 84.25°S, 170.07°W

Instrumentation:
Upper and lower temperature: R.M. Young RTD probe
Humidity: Vaisala HMP 155
Wind speed and Direction: RM Young Wind Monitor
Acoustic Depth Gauge (ADG): CSI Canada SR50A
Pressure: Vaisala Pressure Sensor
Radiation Sensor: LI200X

Heights:
ADG: 89”
Humidity: 104”
Enclosure: 104”
Lower temperature: 30.5”
Upper temperature: 169”
Wind: 175”

Sabrina pressure readings had failed soon after installation. The Paroscientific pressure sensor was replaced with a Vaisala PTB110 pressure sensor. The compact flash card was replaced and a new program was uploaded to the station for the new pressure sensor. Some loose cables were tied down. All data was nominal when we departed and Argos transmissions were received.

Sabrina after visit

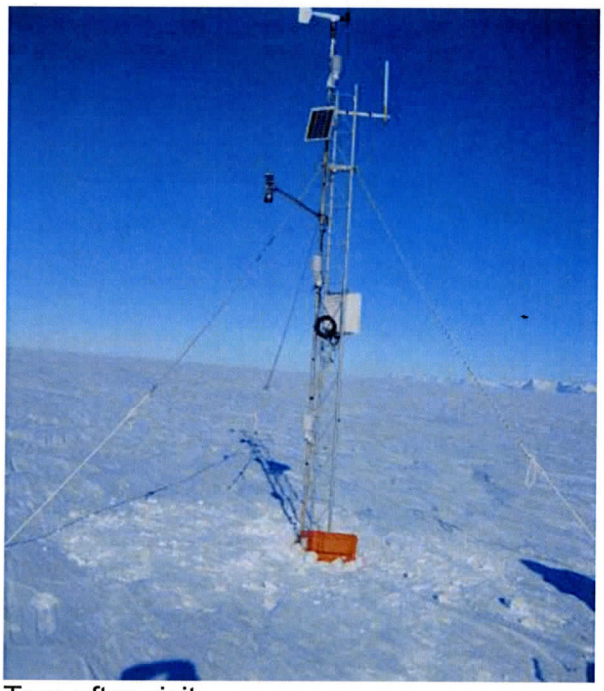
Tom

11/15/2011
Pilots: Ted and Braden (KBA)
Field Team: Jonathan Thom and Lee Welhouse
Location: 84.43°S, 171.48°W

Instrumentation:
Upper and lower temperature: R.M. Young RTD probe
Humidity: Vaisala HMP 155
Wind speed and Direction: RM Young Wind Monitor
ADG: CSI Canada SR50A
Pressure: Paroscientific Pressure Gauge
Radiation Sensor: LI200X

Heights:
ADG: 136”
Humidity: 112”
Enclosure: 89”
Lower temperature: 45”
Upper temperature: 193”
Wind: 208”

Tom experienced a total power system failure during the winter. The station resumed transmitting as the sun came up, but only when solar panel was in full sun. The power system was replaced with new batteries, charge controller and solar panel. The compact flash card was replaced and the station restarted. All data was nominal when we departed and Argos transmissions were received.



Tom after visit

Elaine

11/15/2011
Pilots: Ted and Braden (KBA)
Field Team: Jonathan Thom and Lee Welhouse
Location: 83.094°S, 174.285°E

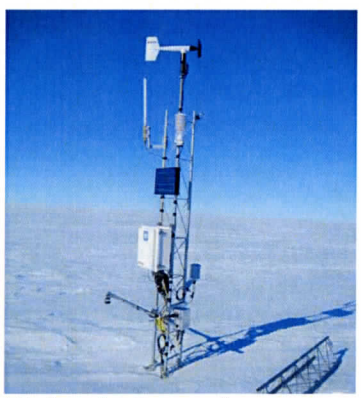
Instrumentation:
Upper Temperature: R.M. Young RTD Probe
Snow Temperature: Weed Platinum Resistance Thermometer (PRT)
Humidity: Vaisala HMP 155
Wind speed and Direction: RM Young Wind Monitor
ADG: CSI Canada SR50A
Pressure: Vaisala Pressure Sensor
Radiation Sensor: LI200X

Heights:
ADG: 25"
Humidity: 36"
Enclosure: 44"
Lower temperature: snow temperature
Upper temperature: 94"
Wind: 118"

Elaine was working, but some instrumentation needed to be raised and changed location. The ADG boom was raised and the pyranometer was moved to the ADG boom. The CR1000 firmware was updated to the current version and a new program was uploaded. The compact flash card was recovered. However, the compact flash card was not readable and the data could not be recovered.

The new ADG height is 90" and the new pyranometer height is 105"

The station will need to be raised in one to two years. When the station is raised a new 14-plate radiation shield for the HMP155 should be used to replace the current radiation shield. Bring the small U-bolts for the CSI cross-arm mount plates as the incorrect U-bolts were used to mount the plates to the tower.


Elaine before raise


Elaine after raise

Windless Bight

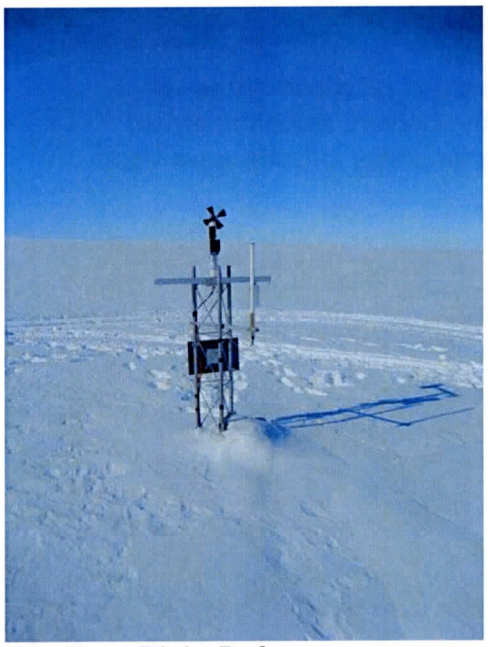
11/17/2011
Snowmobile trip to Windless Bight
Field Team: Jonathan Thom and Lee Welhouse
Location 77.726°S, 167.684°E

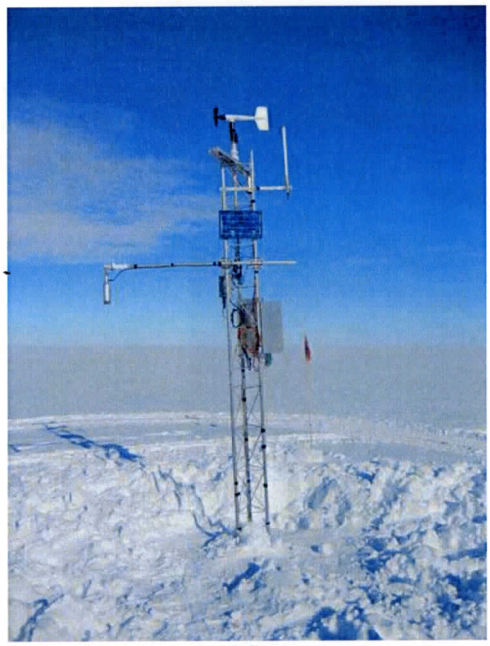
Instrumentation:
Upper and lower temperature: R.M. Young Resistance Temperature Device (RTD) probe
Humidity: Vaisala HMP 155
Wind speed and Direction: RM Young Wind Monitor
ADG: CSI Canada SR50A
Pressure: Vaisala Pressure Sensor
Radiation Sensor: LI200X

Heights:
ADG: below snow surface
Boom: 46”
Box: bottom of the box in the snow

The station needed to be raised as the bottom of the box was in the snow and the ADG boom was buried about two feet beneath the snow. The station was raised one 7-foot tower section. Argos transmission was received after the station was powered back up.

Final Heights:
ADG: 86”
Box: 73”
Boom: 144”
Antenna: 137”


Windless Bight Before


Windless Bight After

Cape Hallett

11/20/2011
Field Team: Jonathan Thom and Lee Welhouse
Locations:
Removed LTER AWS: S 72 19.183' E 170 13.623'
Current AWS: S 72 19.199' E 170 13.597'
Camp Site: S 72 19.440' E 170 12.502'

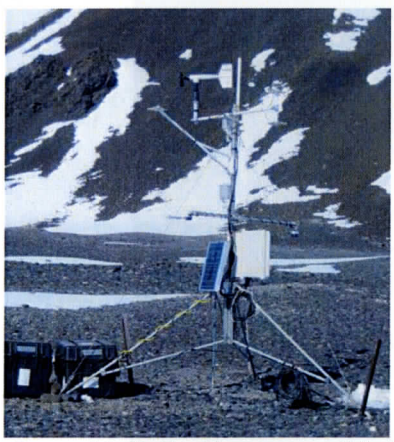
Instrumentation:
Upper temperature: R.M. Young RTD probe
Humidity: Vaisala HMP 45
Wind speed and Direction: RM Young Wind Monitor
ADG: CSI Canada SR50A
Pressure: Paroscientific Pressure Sensor
Radiation Sensor: CNR2 and Photosynthetically active radiation sensor (PAR)
Soil Moisture probes

Two-night trip to Cape Hallett with Cindy Dean and John Rand. Moved LTER station to the location of the New Zealand AWS to incorporate the soil moisture and temperature sensors. The heights of the LTER station will be the same as when the station was originally installed.

The stakes holding the LTER station were not recoverable from the permafrost. The three stakes were buried below the surface.

Final Heights:
ADG: 65"
Box: 49"
RTD: 76"
Wind: 119"
HMP: 105"
PAR: 112"
Net Radiometer: 71"
Solar in: 120"
Solar out: 108"


Cape Hallett before consolidation


Cape Hallett after consolidation

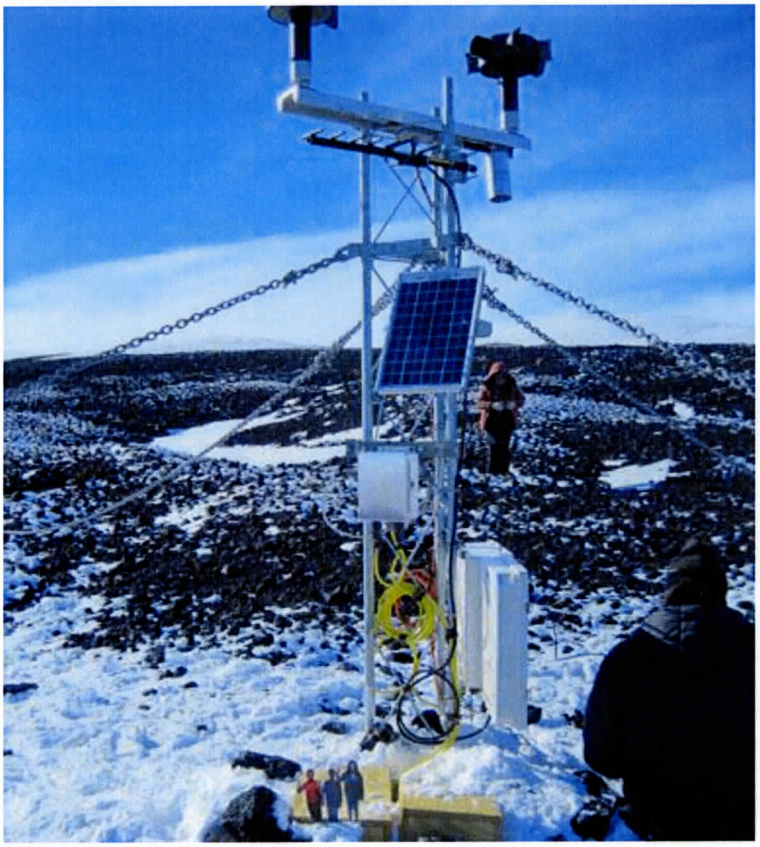
Minna Bluff

11/25/2011 and 11/26/2011
Field Team: Jonathan Thom and Lee Welhouse
Location: 78.555°S, 166.691°E

Minna Bluff was visited twice over two days. The first trip involved removing the old antenna and AWS enclosure. On arrival at the site, the existing Freewave Yagi antenna was hanging loosely on the tower. Although the antenna was loose, connections were made periodically to the station. The second trip we installed the new Minna Bluff enclosure and a new Freewave Yagi Antenna. The new enclosure will allow data and power connections with the ozone instrumentation. The new Yagi has a much more robust antenna mount and should not loosen as the other one did. The polarization of the antenna is still horizontal.

Instrumentation:
Temperature: Weed PRT
Humidity: Vaisala HMP 45
Wind speed and Direction: Taylor High Wind Speed System
ADG: None installed
Pressure: Vaisala Pressure Sensor
Radiation Sensor: None installed

Heights:
Boom: 87”



Minna Bluff after visit

Marble Point II

12/01/2011
Field Team: Jonathan Thom and Lee Welhouse
Riggers: Jay Cairns, Alec Chin
Location: 77.439°S, 163.759°E

We installed a second AWS at Marble Point east of the existing AWS. Jay Cairns and Alex Chin from the rigger shop helped with the installation of the new tower. The new AWS relays data via Freewave. The Marble Point AWS is a repeater site for Cape Bird AWS. The new installation went well and everything was operating nominally.

Instrumentation:
Upper and lower temperature: R.M. Young RTD probe
Humidity: Vaisala HMP 155
Wind speed and Direction: RM Young Wind Monitor
ADG: CSI Canada SR50A
Pressure: Paroscientific Pressure Sensor
Radiation Sensor: LI200X

Heights:
ADG: 116”
Pyranometer: 124”
Box: 34”
Lower temperature: 85”
HMP: 213”
Upper temperature: 213”
Wind: 231”

Marble Point II after installation

Cape Bird

12/05/2011
Field Team: Jonathan Thom and Lee Welhouse
Location: 77.217°S, 166.439°E

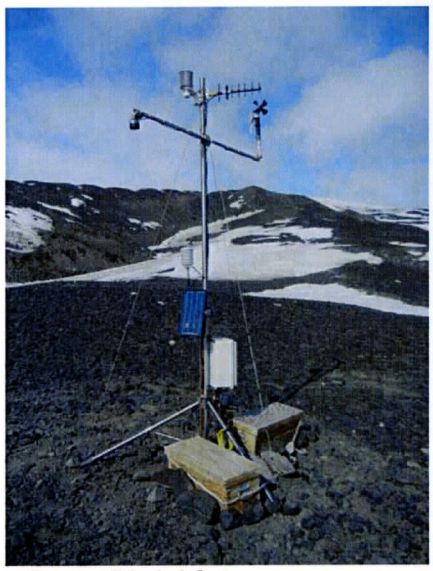
Existing Heights:
Boom: 110"
Box: 43"

Replaced the AWS at Cape Bird with a new Freewave based AWS. The tower section was replaced with a stainless steel tripod. The power system was reused. The power system for the AWS should probably be replaced next year. There was a lot of corrosion on the connectors and the solar panel has lost most of its back coating.

Instrumentation:
Temperature: R.M. Young RTD probe
Humidity: Vaisala HMP 155
Wind speed and Direction: RM Young Wind Monitor
ADG: CSI Canada SR50A
Pressure: Paroscientific Pressure Sensor
Radiation Sensor: None installed

Heights:
Box: 20"
Pressure: 39"
HMP: 70"
ADG: 113"
Wind: 127"
Temperature: 135"


Cape Bird Before


Cape Bird After

Lorne

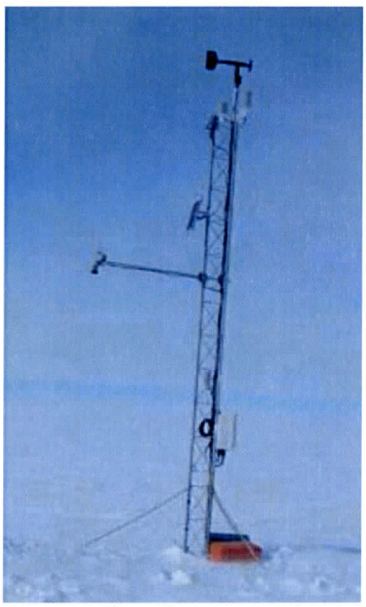
12/03/2011 and 01/14/2012
Field Team: Jonathan Thom and Lee Welhouse
Location: 78.222°S, 170.0145°E

Existing Heights:
Box: 47”
Boom: 122”

Replaced the AWS at Lorne with a Freewave based AWS. We were unable to make a Freewave connection to McMurdo while we were in the field. This may be due to the distance and low angle of the Lorne Yagi. The Freewave modem was replaced with an Argos transmitter later in the season. If possible we may try and install a repeater site on White Island in the future, which would involve reinstalling a Freewave modem at this station.

Instrumentation:
Upper and lower temperature: R.M. Young RTD probe
Humidity: Vaisala HMP 155
Wind speed and Direction: RM Young Wind Monitor
ADG: CSI Canada SR50A
Pressure: Paroscientific Pressure Sensor
Radiation Sensor: LI200X

Heights:
Box: 51”
Lower temperature: 81”
Pyranometer/ADG boom: 130”
Upper temperature: 206”
Wind: 228”



Lorne after freewave install

Willie Field
12/04/2011
Field Team: Lee Welhouse, Jonathan Thom

Update the AWS enclosure with a freewave radio and antenna. The station is now connected into the Freewave network. The CR1000 at Willie Field displayed some hardware issues. The serial number is not visible through "Device Configuration" and there are issues with the CF card writer. The CR1000 module should be replaced in the future and the existing CR1000 returned to Campbell Scientific for evaluation. There were gaps in the data written to the CF card.

Instrumentation:
Upper and lower temperature: R.M. Young RTD probe
Humidity: Vaisala HMP 45
Wind speed and Direction: RM Young Wind Monitor
ADG: CSI Canada SR50A
Pressure: Vaisala Pressure Sensor
Radiation Sensor: None installed

Heights
Lower temperature: 29"
Box: 61"
Upper temperature: 130"
HMP: 130"
Wind: 149"


Willie Field after Freewave conversion

Siple Dome

12/08/2011 and 01/21/2012
Field Team: Lee Welhouse
Location: 81.656°S,148.772°W

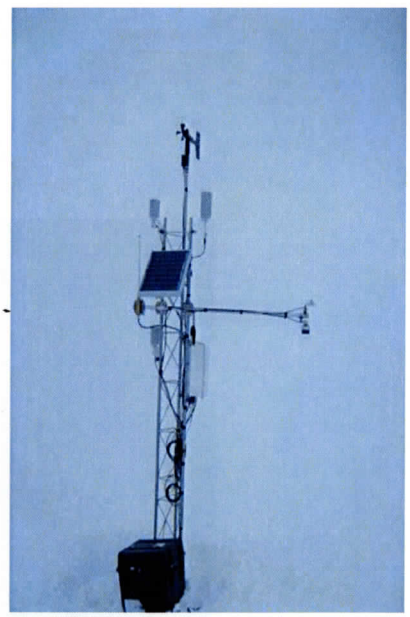
Existing boom: 18”

Upon arrival station was mostly buried. The old enclosure and boom were removed, a new tower section was added to increase the height and a new station was installed. This station may be moved closer to the Siple Dome refueling station. The later visit was to adjust the direction of the aerovane as it was improperly oriented.

Instrumentation:
Upper and lower temperature: R.M. Young RTD probe
Humidity: Vaisala HMP 155
Wind speed and Direction: RM Young Wind Monitor
ADG: CSI Canada SR50A
Pressure: Paroscientific Pressure Sensor
Radiation Sensor: LI200X

Lower Temperature: 79”
Enclosure: 63”
Acoustic Depth Gauge: 72”
Pyranometer : 82”
High temperature: 123”
Humidity sensor: 123”
Aerovane: 136”


Siple Dome before


Siple Dome after

Kominko-Slade

02/17/2011
Field Team: Lee Welhouse
Assisted by: August Allen
Location: 79.466°S, 112.1062°W

The old station was removed, except for the snow temperature string which is connected through a secondary enclosure to the new station. The new station was successfully installed with assistance.

Old Heights:
Lower boom: at surface
Lower enclosure (snow string): 16”
Middle temperature boom: 40”
Primary enclosure (AWS): 60”
AWS Boom: 125”

Instrumentation:
Temperature: R.M. Young RTD probe, Weed PRT and snow profiles
Humidity: Vaisala HMP 155
Wind speed and Direction: RM Young Wind Monitor
ADG: CSI Canada SR50A
Pressure: Paroscientific Pressure Sensor
Radiation Sensor: CNR2

New Heights:
Lower boom: 64”
Secondary enclosure: 63”
Primary enclosure: 40”
Acoustic Depth Gauge: 112”
Lower Temperature: 121”
Humidity: 232”
High Temperature: 232”
Wind: 248”


Kominko-Slade before reinstall


Kominko-Slade after reinstall

South Pole

12/30/11
Field Team: Lee Welhouse

The test station was successfully removed and returned to McMurdo. All batteries, tower sections, and instrumentation were recovered.

Test station before removal

AGO 4

12/30/11
Field team: Michelle Brown
Location: 82.01°S, 96.76°E

Most of my time at the AGO was spent installing an Automated Weather Station (AWS). The AWS will record information about the weather at AGO 4, providing important data for scientists and the public (including my classes) to study. I installed the towers, enclosure, and instrumentation.

Instrumentation:
Temperature: R.M. Young RTD probe
Humidity: Vaisala HMP 155
Wind speed and Direction: RM Young Wind Monitor
ADG: Not installed
Pressure: Paroscientific Pressure Sensor
Radiation Sensor: LI200X

Heights:
Temperature: 92”
Humidity: 82”
Wind speed: 116”
Enclosure: 42”
Radiation Boom: 70”

Ago4 station mid install

Harry

01/19/2012
Field Team: Lee Welhouse and Alice DuVivier
Location: 83.005°S, 121.4033°W

This day we attempted to visit Harry, Brianna, and Erin. The region around Brianna was found to be heavily crevassed, so no visit was viable. Harry was the only station available, upon visiting the station was raised by a single tower section.

Instrumentation:
Temperature: Weed PRT
Wind Speed: Belfort/Bendix Aerovane
Humidity: Vaisala HMP 45
Pressure: Paroscientific Pressure Sensor

Heights before raise:
Enclosure: 10”
Solar panel: 45”
Boom: 59”

Heights after raise:
Boom: 143"
Enclosure: 66"
Jct. Box: 31"
Solar Panel: 108"


Harry before raise


Harry after raise

Mary

01/12/2012 Field
Field team: John Cassano
Helo crew: Flo and John (heli-tech)
Morale: Lisa and Dan
Location: 79.310°S, 163.037°E

Remove Mary AWS. Removed boom, solar panel, AWS enclosure, junction box, lower boom / ADG, and one 7' tower section. All other tower sections, anchors, and battery boxes were left at the site.

Instruments:
Temperature: Weed PRT
Wind speed and direction: RM Young Wind Monitor
Humidity: Vaisala HMP 45
Pressure: Paroscientific Pressure Sensor

Instrument heights:
Upon arrival the AWS enclosure, junction box, and lower boom/ADG were all buried.
Boom: 65"

Mary before removal

Erin:

1/21/2012
Field team: Lee Welhouse
Location: 84.90269°S, 128.8528°W

The station was found to be partially buried, with the junction box, solar panel, and main instrument boom being above surface. The instruments were raised by two 7' tower sections, and the station transmitted successfully. Issues with temperature, wind speed, and delta-T were discovered later.

Instruments:
Temperatures: Weed PRT
Wind speed and direction: RM Young Wind Monitor
Humidity: Vaisala HMP 45
Pressure: Paroscientific Pressure Sensor

Initial heights:
Junction box: surface
solar panel: 16”
Boom: 37”

Heights after raise:
Boom: 212”
Enclosure: 112”
lower temp: 99”


Erin before raise


Erin after raise

Alexander Tall Tower

01/26/2012
Field Team: John Cassano, Alice DuVivier
Riggers: Jay Cairns, Alec Chin
Location: 79.0387°S, 170.661°E

Removed 1GB memory card and installed a new memory card. The tower was inspected by the riggers and it appeared to be in good condition. The guy wires were retensioned and the tower was vertical.

Heights:
Level 1 anemometer: 35”
Level 1 temperature: 24”
Level 2 anemometer: 73”
Level 2 temperature: 61”
AWS enclosure: 80”

Tall tower

Schwerdtfeger

01/31/2012
Field team: John Cassano, Alice DuVivier
Twin Otter crew: Mark and Derek
Morale: Trish and Mimi
Location: 79.837°S, 170.271°E

The station was found to be in good condition. Two new battery boxes were installed, the height of the station didn't require raising.

Instruments:
Temperature: Weed PRT
Wind speed and direction: Belfort/Bendix Aerovane
Humidity: Vaisala HMP 45
Pressure: Paroscientific pressure sensor

Instrument heights:
Jct. box: 35"
AWS enclosure: 48"
Solar panel: 74"
Boom: 152"

Schwerdtfeger after visit

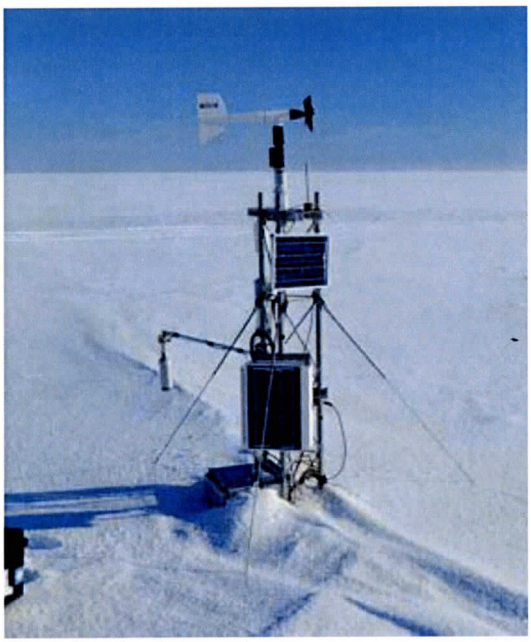
Carolyn

02/04/2012
Field team: John Cassano, Alice DuVivier
Twin Otter crew: Mark and Derek
Morale: Carey and Kathyrn
Location: 79.920°S, 175.917°E

The batteries were checked, and reported 12.6 V from each battery box, with12.6 V recorded at the AWS enclosure. We disconnected and reconnected the power and checked for data transmission with no successful transmission recorded. The AWS was replaced with AWS 8983 (removed from Mary on 20 Jan 2012). A 7' tower section was added and the junction box, AWS, solar panel, and boom were all raised. We removed lower delta T boom, ADG, and ADG Campbell logger. All instruments appeared to be in good condition.

Instruments:
Temperature: Weed PRT
Wind speed and direction: RM Young Wind Monitor
Humidity: Vaisala HMP 45
ADG: CSI SR50A
Pressure: Paroscientific Pressure Sensor

Instrument heights after being raised (all heights to bottom of instrument):
Jct. box: 44"
Solar panel: 54"
AWS enclosure: 71"
Boom: 146"


Carolyn before raise


Carolyn after raise

Lettau

02/04/2012
Field team: John Cassano, Alice DuVivier
Twin Otter crew: Mark and Derek
Morale: Carey and Kathyrn
Location 82.472°S, 174.596°W

The power system was reporting 6.4V from each battery box, with the solar panel reporting 14V and 14V at the plug going to the CR1000. The CR1000 electronics gave no signal when a connection was attempted, so the enclosure was removed for return to Madison. All instruments appeared to be in good condition and the station did not need to be raised. It appears that there is a problem with the batteries (and possibly junction box?) and these should be replaced during the next site visit.

Instrumentation:
Upper and lower temperature: R.M. Young RTD probe
Humidity: Vaisala HMP 45
Wind speed and Direction: RM Young Wind Monitor
ADG: CSI Canada SR50A
Pressure: Vaisala Pressure Sensor
Radiation Sensor: LI200X

Instrument heights (all heights to bottom of instrument):
Lower T: 37"
Jct. box: 76"
AWS enclosure: 88"
HMP: 108"
ADG / Pyranometer: 134"
Solar panel: 174"
Upper T: 193"

Lettau before enclosure removal

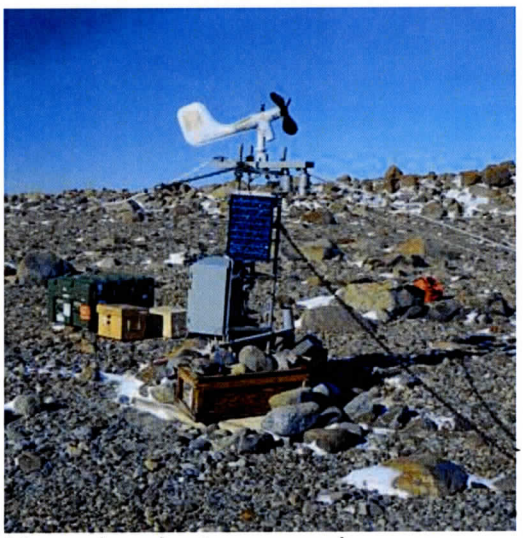
Manuela

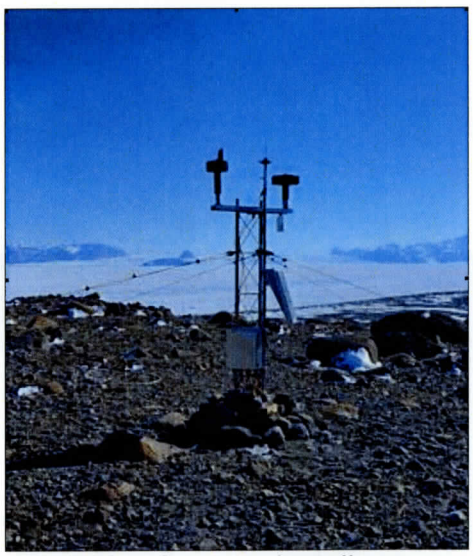
02/07/2012
Field team: John Cassano, Alice DuVivier
Rigger: Dan Mahon
Helo pilot: Christopher Dean
Location: 74.945°S, 163.692°E

Instrumentation:
Temperature: Weed PRT
Humidity: Vaisala HMP 45
Wind speed and Direction: Taylor High Wind Speed System
ADG: None installed
Pressure: Vaisala Pressure Sensor
Radiation Sensor: None installed

We removed old AWS, batteries, and tower, installed a new 7' tower and re-anchored it to the rock surface. A CR1000 (ID 8905) AWS, 5-prong antenna, high wind system, and boom with T and RH were installed.
Note: The boom was oriented with the wind speed sensor pointing towards 350 degrees.

Instrument heights were not measured.
The boom was at the top of the 7 foot tower.


Manuela prior to removal


Manuela after new install

Amsler Island and Cierva Cove

Two AWS units installed by Jim Bockheim's group this year. These stations are located at 64°46'S, 64°04'W, and 64°09'S, 60°57'W respectively. They are measuring air temperature, relative humidity, rainfall, solar radiation, wind speed and direction, and soil moisture, temperature and electrical conductivity at four depths.

Summary of AWS 2012-2013 Field Season Meeting:

Station visits planned:
Elaine will need to be raised and new radiation shield for the HMP 155 RH sensor
Windless Bight will need to be raised and potentially replaced with a freewave AWS
White Island will be a new AWS install, if approved, with Freewave/relay
Lorne will be replaced with a freewave station if a White Island relay station is installed
Willie Field the CR1000 was having issues and will need repair.
Pegasus North the CR1000 was having issues and will need repair.
Lettau the electronics were removed to Wisconsin for repair, so they will need to be reinstalled
Port Martin will be a new AWS installation.
Cape Denison will be a new AWS installation.
Elizabeth will be in need of a raise.
Vito will require a raise.
Emilia will require a raise.
Margaret will require a raise, replacing the data card, and basic servicing.
Ferrell I/II one of these stations will be removed.
Nascent potentially needs a visit for a raise.
Erin is having issues with some of the data so will require a visit for repair.
Brianna crevasses were found in the vicinity during the 2011-2012 season, depending on conditions removal if satellite imagery shows the area is more open.

Annual Report for Period: 09/2011 - 08/2012 **Submitted on:** 06/07/2012

Principal Investigator: Cassano, John J. **Award ID:** 0943952

Organization: U of Colorado Boulder

Submitted By:

Cassano, John - Principal Investigator

Title:

Collaborative Research: Antarctic Automatic Weather Station Program

Project Participants

Senior Personnel

Name: Cassano, John

Worked for more than 160 Hours: Yes

Contribution to Project:

Cassano is the University of Colorado PI for the AWS project. He supervises University of Colorado graduate student (Melissa Nigro) and is leading the analysis of Ross Ice Shelf low level wind field dynamics. He is also leading the Small Unmanned Meteorological Observer (SUMO) unmanned aerial vehicle (UAV) portion of project.

Post-doc

Graduate Student

Name: Nigro, Melissa

Worked for more than 160 Hours: Yes

Contribution to Project:

Ms. Nigro is analyzing the dynamics of the low level wind field over the Ross Ice Shelf using a combination of automatic weather station and numerical model output. She has also assisted with automatic weather station fieldwork.

Undergraduate Student

Technician, Programmer

Other Participant

Research Experience for Undergraduates

Organizational Partners

University of Wisconsin-Madison

University of Wisconsin is the lead institution for this project.

Other Collaborators or Contacts

Matthew Lazzara - lead PI of project (at University of Wisconsin)

Martin Mueller - provide Small Unmanned Meteorological Observer (SUMO) UAVs

Activities and Findings

Research and Education Activities:

June 2011 - June 2012
The primary research activities over the past year has been continued analysis of the dynamics of the low level winds over the Ross Ice Shelf, fieldwork led by the University of Colorado during the second half of the 2011-12 Antarctic field season, and demonstration of SUMO UAVs for boundary layer studies in the Antarctic. Cassano also contributed to a new overview article on the Antarctic automatic weather station project which has been accepted for publication in the Bulletin of the American Meteorological Society (Lazzara et al. 2012).

Dynamics of the low level wind field over the Ross Ice Shelf

A case study of a high wind event (wind speeds >20 m/s for nearly 2 days) at Sabrina AWS on the southern Ross Ice Shelf (RIS) has been completed and is currently in press (Nigro et al. 2012).

We have also developed a surface wind climatology over the RIS based on 2 years of 15 km horizontal grid spacing Antarctic Mesoscale Prediction System (AMPS) output. This wind climatology improves upon previous RIS wind climatologies which were based on coarser resolution AMPS output. Comparison of previous wind climatologies and the current 15-km resolution climatology with AWS observations from the RIS show a more realistic depiction of the RIS low level winds in the current version of AMPS.

The AMPS wind climatology has been used to identify the dominant wind regimes over the RIS. These regimes include RIS air stream (RAS), northward flow over the eastern RIS, katabatic, mesocyclone influenced, and weak wind patterns. All subsequent analysis will focus on the RAS patterns which occur 34% of the time in our two year sample.

Further analysis of the RAS events indicates three broad classes of these events with strong northward flow across the entire width of the RIS, strong northward flow confined to a narrow band adjacent to the Transantarctic Mountains, and strong northward flow through the center of the RIS.

We are currently preparing a manuscript that describes this RIS low level wind climatology and discusses the dynamics of the RAS events that have strong winds adjacent to the Transantarctic Mountains. We plan to analyze the dynamics of the other RAS events in a future manuscript.

Previous research analyzing low level jets over the RIS (Seefeldt and Cassano 2012) was published during the last year.

2011-12 Antarctic field season

co-PI Cassano led the January-February 2012 portion of the Antarctic automatic weather station field season. In addition to Cassano University of Colorado graduate student Alice DuVivier participated in this portion of the field season as did Lee Wellhouse from the University of Wisconsin. This portion of the field season included site visits to the following AWS:

Mary AWS (removed)
Lettau AWS (remove AWS electronics for repair at University of Wisconsin)
Carolyn AWS (replace faulty AWS electronics and raise AWS)
Schwerdtfeger AWS (install new batteries)
Tall Tower AWS (check AWS and retrieve data from this site)
Inexpressible Island AWS (removed old AWS and install new AWS)

Boundary layer observations with SUMO UAVs

During the January-February 2012 portion of the field season the University of Colorado team demonstrated the use of Small Unmanned Meteorological Observer (SUMO) unmanned aerial vehicles (UAVs) for making boundary layer observations. SUMO flights were conducted at Williams Field near McMurdo Station. Flights were restricted to periods when no manned aircraft were in the vicinity of McMurdo station. Despite this restriction SUMO flights were conducted on 4 days during January.

For all of the SUMO flights boundary layer profiles from the surface to 1000 to 1500 m AGL were conducted. Boundary layer features observed during these flights included a deep convective boundary layer, shallow surface based inversions, and a boundary layer which underwent rapid deepening over several hours, including deepening by 100 m in less than 15 minutes between a SUMO spiral ascent and descent pair of profiles.

Conferences attended / presentations  

'assano attended the Antarctic Meteorological Observation, Modeling, and Forecasting workshop, Hobart, Australia. 22-24 June 2011.

Cassano, J.J. and M.A. Nigro, 2011: Case study of a high wind event off the coast of the Prince Olav Mountains, Antarctica. Antarctic Meteorological Observation, Modeling, and Forecasting workshop, Hobart, Australia (oral).

Cassano attended the International Union of Geodesy and Geophysics General Assembly, Melbourne, Australia. 27 June - 1 July 2011.

'assano, J., S. Knuth, and M. Nigro, 2011: Use of autonomous observing platforms to study polar mesoscale features. International Union of Geodesy and Geophysics General Assembly, Melbourne, Australia (invited).

'assano attended SUMO UAV training, Hildesheim, Germany, 1-4 August 2011.

Cassano attended the COST Unmanned Aerial Systems (UAS) in atmospheric research workshop, Winterthur, Switzerland, 19-21 September 011.

Cassano, J.J., 2011: Plans for Antarctic UAV flights. COST Unmanned Aerial Systems (UAS) in atmospheric research workshop, Winterthur, Switzerland (oral).

Cassano and Nigro attended the World Climate Research Program Open Science Conference, Denver, CO, 24-28 October 2011.

'assano and Nigro attended the American Geophysics Union fall meeting, San Francisco, CA, 5-9 December 2011.

Nigro, M.A. and J.J. Cassano, 2011: The influence of synoptic forcing on the path and strength of the Ross ice shelf air stream, Antarctica. American Geophysical Union fall meeting, San Francisco, CA (poster).

Cassano and DuVivier deployed to McMurdo Station, Antarctica, 1 January - 10 February 2012.

'assano, J., S. Knuth, and M. Nigro, 2012: Using autonomous observations and numerical models to understand the Antarctic atmosphere. Vednesday night science lecture, McMurdo Station, Antarctica (oral).

Cassano, J., S. Knuth, and M. Nigro, 2012: Using autonomous observations and numerical models to understand the Antarctic atmosphere. nstitute for Marine and Antarctic Studies, University of Tasmania, Hobart, Australia (invited).

Cassano attended the COST Unmanned Aerial Systems (UAS) in atmospheric research workshop, Sheffield, United Kingdom, 11-13 April 012.

Cassano, J.J., 2011: Antarctic boundary layer measurements with SUMO UAVs. COST Unmanned Aerial Systems (UAS) in atmospheric esearch workshop, Sheffield, United Kingdom (oral).

Cassano, J.J., S. Knuth, and M. Nigro, 2012: Using autonomous observations and numerical models to understand the Antarctic atmosphere. Department of Atmospheric Science, University of Wyoming, Laramie, WY (invited).

September 2010 - June 2011

'he primary research activities on this award are a continuation of activities started during the previous Antarctic automatic weather station ward (ANT 0636811). In addition we have also begun preparing for the deployment of two Small Unmanned Meteorological Observer (SUMO) unmanned aerial vehicles (UAVs) for the 2011-2012 austral summer field season.

010-2011 austral summer field season

University of Colorado graduate student Melissa Nigro deployed as part of the University of Wisconsin field team to install and service utomatic weather stations during January-February 2011.

AWS sites visited by Melissa Nigro include:
Villie Field

Sabrina
Marlene (new install)
Tom (new install)
Megadunes (3 removals)
Lettau
Whitlock (Franklin Island)
Minna Bluff
Tall Tower (new install)
Ferrell (new install next to old station)
Marilyn
Gill

Dynamics of the low level wind field over the Ross Ice Shelf

Using data from the Sabrina AWS (installed February 2009) the University of Colorado has been analyzing the dynamics of strong low level jets over the southern Ross Ice Shelf. This analysis has used a combination of automatic weather station data and output from the Antarctic Mesoscale Prediction System (AMPS). The strong wind event being analyzed (6-8 September 2009) is characterized by surface wind speeds in excess of 20 m/s for a 2 day period. These winds are roughly parallel with the front of the Transantarctic Mountains. AMPS forecasts closely match the observations at the Sabrina AWS and indicate that the wind speed increases downwind of the Sabrina AWS site. The dynamics responsible for this acceleration are consistent with a tip jet and are tied to the projection of the Prince Olav Mountains into the barrier parallel wind field.

SUMO UAV

As part of a supplemental award to this project the University of Colorado has purchased two SUMO UAVs which will be deployed during the 2011-2012 austral summer field season. These UAVs will make measurements of the atmospheric temperature, pressure, humidity, and winds between the surface and 2 km AGL over an area up to 15 km from the launch site. The data from the SUMO UAVs will primarily be used to study the boundary layer structure in the vicinity of the recently installed Tall Tower AWS site on the Ross Ice Shelf and to study local features of the wind field in the vicinity of McMurdo Station and the USAP runways.

Conferences attended / presentations

Cassano attended the Autonomous Polar Observing Systems workshop, Washington, D.C. 30 September ? 1 October 2010.

Cassano, J.J., 2010: Observational needs for polar atmospheric science. Autonomous Polar Observing Systems workshop, Washington, D.C. (invited).

Cassano attended the WWRP ? THORPEX ? WCRP Polar Prediction workshop, Oslo, Norway, 6-8 October 2010.

Cassano, J.J., 2010: Autonomous polar atmospheric observations. WWRP ? THORPEX ? WCRP Polar Prediction workshop, Oslo, Norway (invited).

Nigro, M. and J. Cassano, 2010: Case study of a high wind ever over the Ross Ice Shelf, Antarctica. Department of Atmospheric and Oceanic Sciences poster conference (poster).

Cassano and Nigro attended the American Meteorological Society 11th Polar Meteorology and Oceanography Conference, Boston, MA, 2-5 May 2011.

Lazzara, M.A., J.E. Thom, G.A. Weidner, L.M. Keller, M.A. Nigro, and J.J. Cassano, 2011: The Antarctic automatic weather station program. American Meteorological Society 11th Conference on Polar Meteorology and Oceanography, Boston, MA (poster).

Nigro, M.A. and J.J. Cassano, 2011: Case study of a high wind event off the coast of the Prince Olav Mountains, Antarctica. American Meteorological Society 11th Conference on Polar Meteorology and Oceanography, Boston, MA (oral).

Findings:

June 2011 - June 2012

ased on analysis of 2 years of AMPS output we have identified the following wind regimes (and frequency of occurrence) over the RIS:
- RAS (34%)
- Northward flow over the eastern RIS (9%)
Katabatic (16%)
Mesocyclone over the RIS (20%)
- Weak winds (21%).

ased on our analysis of low level jets over the RIS (Seefeldt and Cassano 2012) we have found that:

- the RAS occurs primarily when a cyclone is present in the Ross Sea
the RAS occurs mostly during the winter and rarely during the summer
- the structure and position of the RAS is dependent on the position of the Ross Sea cyclone

eptember 2010 - June 2011 

The dynamics of the low level jet over the southern Ross Ice Shelf have been clarified based on our analysis of AWS and AMPS data. Previous rticles that discussed this jet hypothesized that this feature was a tip jet or was a knob flow. Our analysis has shown that this feature is onsistent with the dynamics of a tip jet, as first discussed by Moore and Renfrew for Greenland.

raining and Development:

Melissa Nigro is a graduate student in the Department of Atmospheric and Oceanic Sciences at the University of Colorado and will complete her Ph.D. during 2012. Ms. Nigro's research has focused on the dynamics of high wind events over the Ross Ice Shelf. A secondary research ocus has been on evaluating Antarctic Mesoscale Prediction System (AMPS) forecasts. Ms. Nigro gained Antarctic field experience from her articipation in the 2008-2009 and 2010-2011 AWS field seasons.

Outreach Activities:

assano maintained a blog during the 2011-12 Antarctic field season that provided insights into living and working in Antarctica and was used (to our knowledge) in two high schools (Joyce Kilmer Academy, Indianapolis, IN and Winton Woods High School, Cincinnati, OH) and one ommunity college (Anoka-Ramsey Community College, Coon Rapids, MN).

Cassano has contributed a chapter on Antarctic weather and climate to the book 'Antarctica - Science From a Frozen Continent' (in press). This book is aimed at a general audience, with the goal of bringing Antarctic science to the public.

Journal Publications

ligro, M.A., J.J. Cassano, M. Lazzara, and L. Keller, "Case Study of a Barrier Wind Corner Jet Off the Coast of the Prince Olav Mountains, Antarctica", Monthly Weather Review, p. , vol. , (2012). Accepted,

eefeldt, M.W. and J.J. Cassano, "A description of the Ross Ice Shelf air stream (RAS) through the use of self-organizing maps (SOMs)", Journal of Geophysical Research, p. , vol. , (2012). Accepted,

azzara, M.A., G.A. Weidner, L.M. Keller, J.E. Thom, and J.J. Cassano, "Antarctic automatic weather station program: 30 years of polar observations", Bulletin of the American Meteorological Society, p. , vol. , (2012). Accepted,

ligro, M.A. and J.J. Cassano, "Analysis of high winds over the Ross Ice Shelf, Antarctica Part 1: Barrier winds along the Transantarctic Mountains", Monthly Weather Review, p. , vol. , (2012). in preparation,

Books or Other One-time Publications

ohn J. Cassano, "Climate of Extremes", (2012). Book, Accepted

Editor(s): David W.H. Walton
Collection: Antarctica - Global Science from a Frozen Continent
Bibliography: Cambridge University Press

Web/Internet Site

URL(s):
http://dl.dropbox.com/u/53700947/Antarctic_blog/index.html
Description:
This site is a blog maintained by co-PI Cassano during the 2011-12 Antarctic field season.

Other Specific Products

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 two papers in press that describe the details of the low level wind field over the Ross Ice Shelf and another paper in preparation.

We have demonstrated the utility of a small, inexpensive, and logistically simple UAV for atmospheric boundary layer studies. This platform will greatly increase the potential for Antarctic boundary layer studies.

Contributions to Other Disciplines:

Contributions to Human Resource Development:
Funds from this project are being used to support a PhD student (Melissa Nigro) in the Department of Atmospheric and Oceanic Sciences at the University of Colorado. Ms. Nigro has gained 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:
Two SUMO UAVs have been purchased as part of this project. These UAVs will allow us to make three-dimensional measurements of the boundary layer structure and map details of the mesoscale wind field.
Contributions Beyond Science and Engineering:

Conference Proceedings

Special Requirements

Special reporting requirements: None
Change in Objectives or Scope: None
Animal, Human Subjects, Biohazards: None

Categories for which nothing is reported:

Any Product
Contributions: To Any Other Disciplines
Contributions: To Any Beyond Science and Engineering
Any Conference