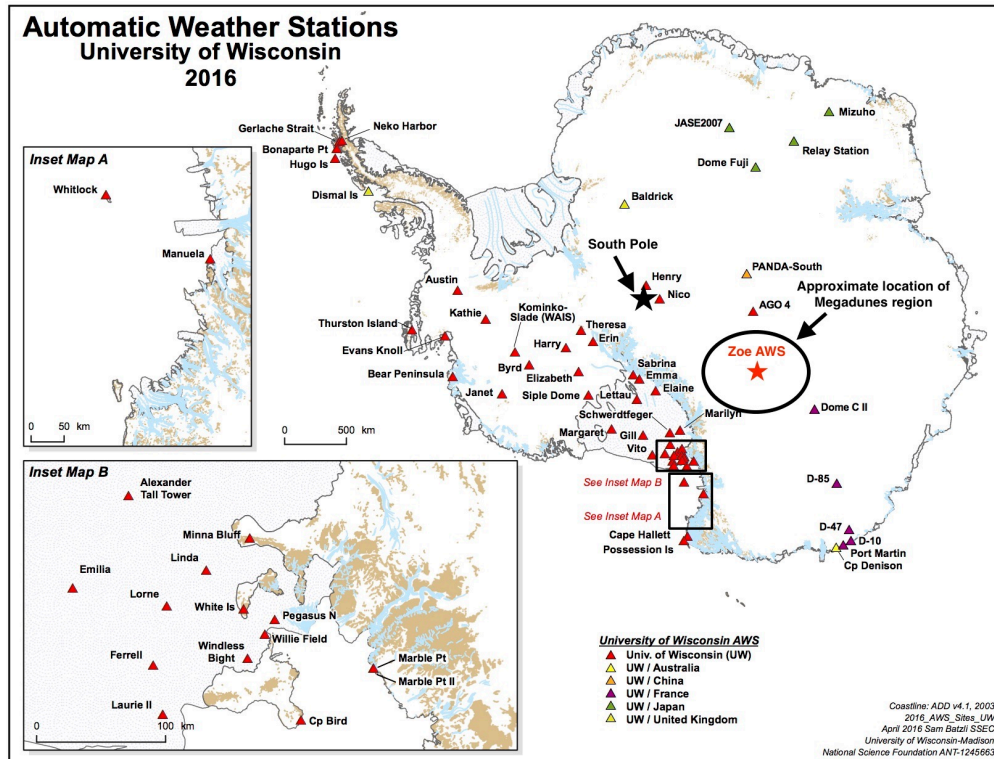


Collaborative Research: Optimized Deployment of Antarctic Surface Weather Observations: NSF-OPP Grant #1542789, June 01, 2016 to May 31, 2017

University of Wisconsin-Madison

A Report to the Division of Polar Programs, Geoscience Directorate, National Science Foundation



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 David E. Mikolajczyk, co-Investigator and Meteorologist

Space Science and Engineering Center
 University of Wisconsin-Madison

Submitted on May 30, 2017



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Preview of Award 1542789 - Annual Project Report

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Cover

Federal Agency and Organization Element to Which Report is Submitted:	4900
Federal Grant or Other Identifying Number Assigned by Agency:	1542789
Project Title:	Collaborative Research: Optimized Deployment of Antarctic Surface Weather Observations
PD/PI Name:	Matthew A Lazzara, Principal Investigator
Recipient Organization:	University of Wisconsin-Madison
Project/Grant Period:	06/01/2016 - 05/31/2018
Reporting Period:	06/01/2016 - 05/31/2017
Submitting Official (if other than PD/PI):	Matthew A Lazzara Principal Investigator
Submission Date:	05/30/2017
Signature of Submitting Official (signature shall be submitted in accordance with agency specific instructions)	Matthew A Lazzara

Accomplishments

* What are the major goals of the project?

The overarching goal of this project is to determine and verify the optimal placement of surface meteorological observations in Antarctica that will sufficiently aid in forecast products made by the Antarctic Mesoscale Prediction System (AMPS). This study is based on prior work by Bumbaco et al. 2014 (<http://journals.ametsoc.org/doi/abs>

[/10.1175/MWR-D-13-00401.1](#)). A particular point of interest in determining the impact of surface observations on AMPS output is in East Antarctica, specifically in the Megadunes region. Specific tasks include:

1. Available Wisconsin and non-Wisconsin Automatic Weather Station (AWS) data from the Megadunes region, observing surface temperature, pressure, and wind speed and direction, are to be quality-controlled.
2. Provide quality controlled and review datasets for other non-Wisconsin AWS or staffed stations across Antarctica that will be of benefit to the project.
3. Offer assistance and advice on any existing Wisconsin AWS observations and other miscellaneous help with weather observations to aid the project.

*** What was accomplished under these goals (you must provide information for at least one of the 4 categories below)?**

Major Activities: Data were acquired for two non-Wisconsin AWS in the Megadunes region: Little Mac (years 2004-2005) and Zoe (years 2004-2012). These were acquired from the National Snow and Ice Data Center (NSIDC). The quality control work was done at UW-Madison.

Specific Objectives: 1. Data from Zoe were quality-controlled for the years 2008 and 2009, for use in analysis with AMPS model output. With quality-controlled data from Zoe AWS, an important step was to determine the impact of the observations on the 2-meter temperature field from AMPS output.

a. Zoe AWS in the following monthly file-types:

- i. 10-minute
- ii. one-hourly
- iii. three-hourly

A link to a webpage with more information about this is provided in the Products section.

Significant Results: Additional files of all observational data for Little Mac and Zoe AWS were acquired from NSIDC which were separate from the ones available directly on the NSIDC ftp site. These files contained the entire data record for each AWS and had numerous columns of data, including the four main variables this study were interested in, as indicated above. Since these AWS also included other measurements at multiple levels, including air temperature, snow temperature, and wind speed and direction, it was vital to confirm the columns of data in these additional files used were correct by cross-checking the data with information given on NSIDC's webpage: http://nsidc.org/data/docs/agdc/nsidc0283_fahnestock/. This alone has enabled a more readily available record from the original Megadunes project of the observational data collected in the original experiment.

Key outcomes or
Other achievements:

*** What opportunities for training and professional development has the project provided?**

This project has afforded the opportunity for the staff member at Wisconsin to work with non-Wisconsin AWS data types via tools used for the Wisconsin AWS observational data quality control methods and procedures. Further, all project participants held monthly teleconferences providing updates about work accomplished and going over objectives for the following month. All have gained skills in working as a cohesive unit across institutions.

*** How have the results been disseminated to communities of interest?**

Nothing to report.

*** What do you plan to do during the next reporting period to accomplish the goals?**

Any quality control will be completed on any applicable AWS data that is determined to be useful for the project. This will provide more opportunities for project participants to investigate the effects of AWS surface weather observations on AMPS model output and help determine where ideal locations for AWS are on the Antarctic continent, in relation to aiding in AMPS model performance.

Products**Books****Book Chapters****Inventions****Journals or Juried Conference Papers****Licenses****Other Conference Presentations / Papers****Other Products****Other Publications****Patents****Technologies or Techniques****Thesis/Dissertations****Websites**

UW-Madison AMRC Optimized Antarctic Surface Observations Network

http://amrc.ssec.wisc.edu/optimal_antobs/optimal_antobs.html

This webpage within the Antarctic Meteorological Research Center includes information on the UW-Madison contribution to this project, Optimized Deployment of Antarctic Surface Weather Observations.

Supporting Files

Filename	Description	Uploaded By	Uploaded On
zoe_temp_200806.pdf	This graph shows 10-minute temperature observational data from Zoe AWS for June 2008. The green- and magenta-colored marks indicate data removed in the quality-control process. Black-colored marks are valid data.	Matthew Lazzara	05/30/2017

Participants/Organizations

What individuals have worked on the project?

Name	Most Senior Project Role	Nearest Person Month Worked
Lazzara, Matthew	PD/PI	0
Mikolajczyk, David	Other Professional	0

Full details of individuals who have worked on the project:**Matthew A Lazzara**

Email: mattl@ssec.wisc.edu

Most Senior Project Role: PD/PI

Nearest Person Month Worked: 0

Contribution to the Project: Lazzara has overseen and directed the Wisconsin contribution to this project, especially the data and quality control efforts.

Funding Support: N/A

International Collaboration: No

International Travel: No

David Mikolajczyk

Email: david.mikolajczyk@ssec.wisc.edu

Most Senior Project Role: Other Professional

Nearest Person Month Worked: 0

Contribution to the Project: Worked on the quality control of Megadunes area AWS observations.

Funding Support: N/A

International Collaboration: No

International Travel: No

What other organizations have been involved as partners?

Name	Type of Partner Organization	Location
Greg Hakim	Academic Institution	University of Washington
Jordan Powers	Academic Institution	National Center for Atmospheric Research
Kevin Manning	Academic Institution	National Center for Atmospheric Research

Full details of organizations that have been involved as partners:**Greg Hakim**

Organization Type: Academic Institution

Organization Location: University of Washington

Partner's Contribution to the Project:

Collaborative Research

More Detail on Partner and Contribution:

Jordan Powers

Organization Type: Academic Institution

Organization Location: National Center for Atmospheric Research

Partner's Contribution to the Project:

Collaborative Research

More Detail on Partner and Contribution:

Kevin Manning

Organization Type: Academic Institution

Organization Location: National Center for Atmospheric Research

Partner's Contribution to the Project:

Collaborative Research

More Detail on Partner and Contribution:

What other collaborators or contacts have been involved?

Ted Scambos - NSIDC (National Snow and Ice Data Center); Andy Stillinger - University of Colorado-Boulder

Impacts

What is the impact on the development of the principal discipline(s) of the project?

By performing quality control on the Zoe AWS data for 2008, this provides future researchers with error-free surface meteorology observational data at this location to aid in their research.

What is the impact on other disciplines?

By performing quality control on the Zoe AWS data for 2008, this provides future researchers with error-free surface meteorology data at this location to aid in their research.

What is the impact on the development of human resources?

Nothing to report.

What is the impact on physical resources that form infrastructure?

Nothing to report.

What is the impact on institutional resources that form infrastructure?

Nothing to report.

What is the impact on information resources that form infrastructure?

This project has provided public access to quality-controlled data from Zoe AWS, which can be found at the following URL: <ftp://amrc.ssec.wisc.edu/pub/requests/gregh/>

What is the impact on technology transfer?

Nothing to report.

What is the impact on society beyond science and technology?

Nothing to report.

Changes/Problems

Changes in approach and reason for change

Minor change in approach: The data acquired for both Zoe and Little Mac AWS had many missing observations. It was difficult to find a period of time where there was complete data for months at a time. In addition, the data between Zoe and Little Mac did not cover the same time period, so we decided to use only Zoe data for a one-month period for analysis with AMPS.

Actual or Anticipated problems or delays and actions or plans to resolve them

Nothing to report.

Changes that have a significant impact on expenditures

Nothing to report.

Significant changes in use or care of human subjects

Nothing to report.

Significant changes in use or care of vertebrate animals

Nothing to report.

Significant changes in use or care of biohazards

Nothing to report.