

STATUS OF THE ANTARCTIC METEOROLOGICAL RESEARCH CENTER

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1. INTRODUCTION

The Antarctic Meteorological Research Center (AMRC) mission is research in observational meteorology and the stewardship of meteorological data along with the ability to provide such data and expert assistance to the Antarctic community in support of research and operations. The AMRC is working to accomplish these goals by continuing its long-term Antarctic meteorological data activities, educational outreach, and Antarctic satellite composite research studies.

Over the past year, emphasis has been on the modernization of computing resources, continued generation of Antarctic composite imagery, and data collection, archival, and distribution. Efforts now underway include (but are not limited to) research on deriving atmospheric motion vectors and storm track studies. Educational outreach continues to be an important grass roots activity in both public and classroom venues.

2. COMPUTING MODERNIZATION

The modernization of computing equipment has been a priority, especially on systems deployed at McMurdo and Palmer Stations. Older equipment and outdated systems were no longer able to meet United States Antarctic Program (USAP) Information Technology (IT) standards. New ingest systems have been installed at McMurdo and Palmer Stations and new serving equipment as well at McMurdo in the last two years. The new systems will provide ready access to satellite imagery for the Antarctic composite generation. They will also provide real-time automatic weather station (AWS) observations for operational, research and educational interests. These systems also serve data on-station to the McMurdo community, which in turn saves bandwidth usage off continent.

Future efforts in the next year include the remaining equipment upgrades with the installation of a backup system at McMurdo. It will be a hot spare in case of failure of the polar wind generating system and main serving system. This last leg will complete the modernization effort.

3. EDUCATIONAL OUTREACH

Educational outreach is an important pillar in the mission of the AMRC. This year, outreach and assistance to the Antarctic community, students in the classroom and the general public, continued. Approximately 600 e-mails exchanges with clientele took place in the last 11 months. Several schools were visited, include those at the elementary, middle school level including public organizations (public libraries, service organizations, etc.), which has been an emphasis over the last two years. Outreach efforts include keeping in touch with classrooms and others while deployed to Antarctica, via simple means such as via e-mail.



Figure 1. Educational Outreach to public groups such shown here at the Mt Horeb Public Library book club is an aim of the AMRC.

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4. DATA

Antarctic meteorological data continues to be an important focus for the AMRC. Efforts are underway at multiple levels. First and foremost, data collection and archival is an on-going activity. The AMRC is the primary host site for USAP manned station observations from McMurdo Station, South Pole Station and Palmer Station. Other collections are a part of the AMRC archive, including USAP Automatic Weather Station (AWS) from both the UW-Madison and Mac Weather/ SPAWAR groups. Field camp weather observations from the USAP summer locations, the McMurdo Area Wind Sensor network, and other collections are a part of this collection. Antarctic datasets from the Global Telecommunications System are also collected and archived. Of course, the AMRC Antarctic Satellite Composite imagery is produced, collected and archived along with a backup archive of NOAA/POES polar orbiting observations from McMurdo and Palmer Stations.

Real-time data sets are made available via AMRC's Web, FTP, ADDE and Antartic-IDD services. Figure 2 outlines the usage of the Web and FTP. Usage via the FTP service varies depending on the staging specific data requests, which are highly variable in size. Data products from the AMRC are due to continue to be improved in the coming year.

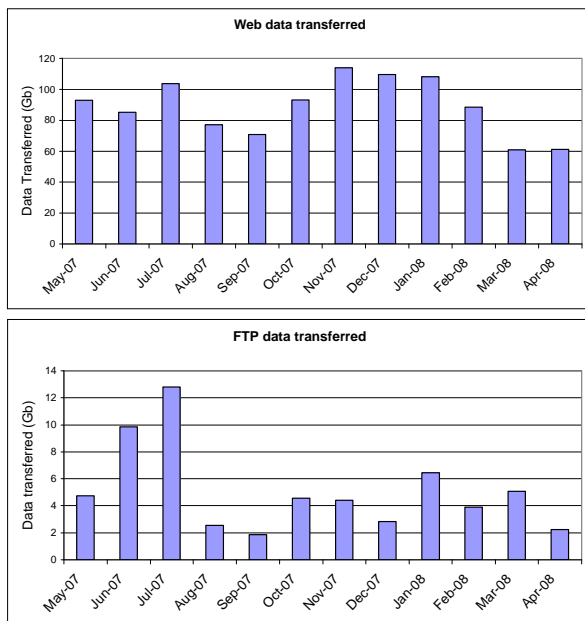


Figure 2. Web and FTP usage statistics for the last year for AMRC serving systems.

5. ANTARCTIC COMPOSITE SATELLITE RESEARCH STUDIES

Efforts are underway to test the feasibility of deriving atmospheric motion vectors (AMV) or cloud drift winds from AMRC's trademark Antarctic composite satellite imagery (See Figure 3). This effort is an informal collaboration with the Cooperative Institute for Meteorological Satellite Studies (CIMSS), housed in the same department at UW-Madison as the AMRC. CIMSS is a natural collaborator with expertise in AMVs from both polar orbiting and geostationary satellite (Key, et al., 2003; Velden, et al., 2005). A by-product of the feasibility tests include increased temporal resolution for the Antarctic composite satellite imagery. This will be of immediate benefit to weather forecasting efforts, and later will aid researchers who utilize the composite.

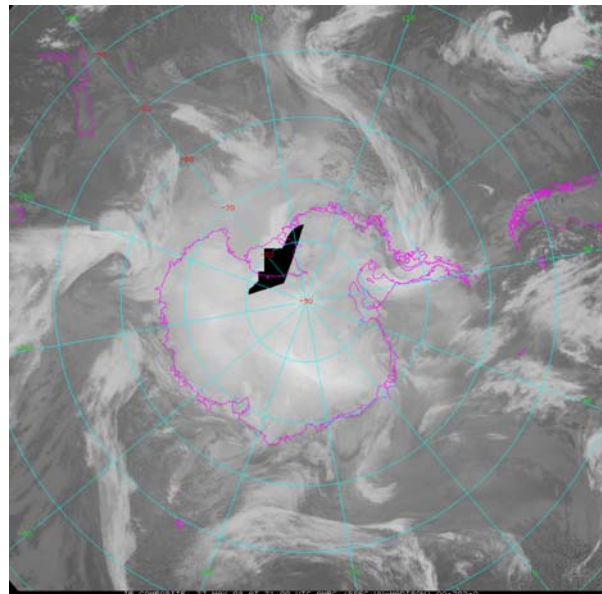


Figure 3. A example Antarctic composite satellite image from 27 May 2008 at 21 UTC.

Also as a part of this effort is a collaborative effort with Pennsylvania State University in characterizing the cloud climatology via the self-organizing maps (SOM) pattern analysis method (Kohonen, 2001; Reusch et al, 2007). Initial efforts have demonstrated the capability to process the composite satellite data with the SOM software to produce representative patterns suggestive of distinct cloud distributions (See Figure 4). Preprocessing of the satellite imagery to enhance the cloud features before applying the SOM analysis has been determined to be important in the analysis. More testing will be accomplished before larger time periods are processed for full analysis.

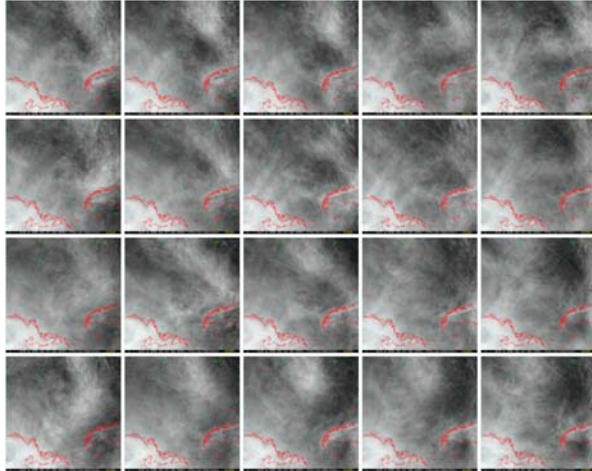


Figure 4. A sample of a 4 by 5 SOM for June 2004 centered over the South Pacific Ocean quadrant of the AMRC Antarctic composite.

6. USAP STATION CLIMATOLOGY

Two efforts have started to put together a more complete climatology and meteorological station data and metadata for the main USAP stations of South Pole and McMurdo Station. Efforts as a part of a joint effort with the South Pole Meteorology Office/Raytheon Polar Services have led to a review of South Pole's observational dataset. The improved and rechecked observations have become the source for the creation of CLIMAT messages, with seed funding from the NOAA/NCDC. Data from 1957-1976 and 1997-2006 has been processed, and it is expected that the remaining years of data will be finished within the next several months.

Attention turns to applying lessons learned from South Pole to McMurdo Station's observational dataset. Some efforts started to look at this dataset (Lazzara, 2008). More effort is required on this dataset, especially with regards to gathering metadata on the observational dataset. Work toward meeting this goal will be on going over the next year.

7. ACKNOWLEDGEMENTS

The authors wish to thank the Office of Polar Programs at the National Science Foundation for its commitment to fund this effort, specifically grants ANT-0537827. Thanks goes to the NOAA/NCDC for its seed funding of the South Pole CLIMAT project. The authors wish to thank all of its collaborators, especially Raytheon Polar Services, South Pole Meteorology Office, SPAWAR Office of Polar Programs, McMurdo Weather Office, Antarctic Mesoscale Prediction group at National Center of Atmospheric Research, and Byrd Polar Research Center at The Ohio State University. The authors also thank all of the users of AMRC's data

collection for their use of this valuable community resource.

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