Antarctic Meteorological Data – Collection, Archive, and Distribution
Shelley L. Knuth, Charles R. Stearns, Matthew A. Lazzara, George A. Weidner, Linda M. Keller, and Jonathan E. Thom
Antarctic Meteorological Research Center
Space Science and Engineering Center
University of Wisconsin-Madison

1. Introduction

Purpose: To introduce the full extent of the Antarctic Meteorological Research Center’s (AMRC) collection of weather data for the Antarctic.

- AMRC is in operation since October 1992 – entering its 15th year
- Significant data repository for Scientific community as well as general public
- Offers free of charge
- Provides original collections as well as data from other sources, including ISMAP
- Requests for data can be made at any time
- Offers significant case study data

AMRC originally created as a repository for AWS data

2. Available Data

- Many types of data available
  - Automatic Weather Stations (AWS)
  - In operation since 1980
  - Over 110 stations in operation for 27 years
  - Data Available:
    - Wind speed & direction, temperature, relative humidity, and pressure data
    - Snow with vertical temperature difference and snow accumulation (Knuth, 2007)
    - Raw data every 10 minutes
    - Quality controlled 3-hourly (through Feb. 2002)
    - New 1-hourly data expected soon
  - AWS data available from other countries
  - In Judy, Netherlands, and Australia
  - AMRC originally created as a repository for AWS data

- Many other types of data available
  - Satellite Composite Imagery
    - Satellites cross at or near pole <= 50 minutes within the top of the hour
    - Satellite data collected and used for imagery from the United States, Europe, China, Japan, and India
  - Data collected and arranged in single image to create composite
    - Generated every 3 hours
  - Infrared (1992), water vapor (2001), infrared pseudo-color (2004), and visible imagery (experimentally)

- Many other types of data available
  - Satellite Data
    - Polar Orbiting
    - Navigation tracks
  - MTSAT
  - Nyspic reports
  - Clouds for each of three U.S. stations (McMurdo, South Pole, and Palmer)
  - Model Data
    - GFS
    - EUMETSAT
    - UKMET
    - ERAS
    - ftp://ice.ssec.wisc.edu/pub
  - Oceanic data
    - U.S.
    - Russia
    - Argentina
    - Upper Air
    - Print Reports
    - United States Air Force

3. Distribution of Data

- Entire collection is available public
- Most available via the following methods:
  - Web and FTP
    - http://ice.ssec.wisc.edu
    - ftp://ice.ssec.wisc.edu
  - Antarctic Internet Data Distribution System (Lazzara, 2006)
    - Place data in data streams
    - Grabbed by anyone who is a part of IDD
    - Very efficient and fast
    - To join IDD email amrc@ssec.wisc.edu
  - Any data not found from the above locations can be ordered by special request via email

4. Science and Data

- Icebergs
- Use of AWS and satellite
- Track tabular iceberg movements
- Causes behind iceberg calving
- Relationship to ocean tides
- Snow Accumulation
- Acoustic depth gauges onboard AWS track accumulation
- Initial categorical partitions for determining origins of accumulation have been undertaken (Knuth, 2007)
- Ice Sheet Tracking
- GPS onboard AWS shows movement of ice sheets over time

5. Summary

- AMRC has an extensive collection of Antarctic meteorological data
  - Data includes, but not limited to, satellite composite imagery, automatic weather station data, station climate information, synoptic data, and ship reports
- All data available via web, ftp, and Antarctic IDD free of charge
- Data is important for many scientific projects, including tracking icebergs, snow accumulation measuring, and tracking ice sheet movement

References

Knuth, Shelley L., 2007: Estimation of snow accumulation in Antarctica using automated acoustic depth gauge measurements. US-choir, Dept. of Atmospheric and Oceanic Sciences, University of Wisconsin-Madison, 89 pp

Acknowledgments

This project is funded by NSF Grant Nos. OPP-0578277 and OPP-0538147

Contact Information

Address: 1325 W. Dayton St., Madison, WI 53706. USA
Email: amrc@ssec.wisc.edu
Phone: (608) 265-8100

Figure 1. Synthetic meteogram from McMurdo Station depicting weather type, cloud heights, pressure, temperatures, and dewpoint.
Figure 2. Meteogram from Ferrel AWS depicting temperature, pressure, wind speed, and relative humidity.
Figure 3. Example of AMRC infrared composite imagery over Antarctica.
Figure 4. Infrared satellite image of Antarctica with GPS isolines, example plan, and ship and buoy observations overlaid.
Figure 5. Example of model output from the GFS showing temperatures and relative humidities at 850 mb across the continent.
Figure 6. Sheu-T diagram from McMurdo Station.
Figure 7. Example of AMRC water vapor composite imagery over Antarctica.
Figure 8. Map locations and data collected across the Antarctic.
Figure 9. Plot showing all locations where radarnets are released across Antarctica and parts of the southern hemisphere.
Figure 10. Biograph from McMurdo Station.
Figure 11. Example of AMRC infrared pseudo-color composite imagery over Antarctica.
Figure 12. Image depicting satellite navigation tracks over Antarctica.
Figure 13. Example of AMRC infrared pseudo-color composite imagery over Antarctica.

http://cimss.ssec.wisc.edu/model/realtime/index.html
http://ice.ssec.wisc.edu/casestudy.html
http://cimss.ssec.wisc.edu/model/
http://ice.ssec.wisc.edu/pub

http://amrc.ssec.wisc.edu