

# Antarctic Meteorological Data – Collection, Archive, and Distribution

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## 1. Introduction

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

- AMRC in operation since October 1992 – entering its 15<sup>th</sup> year
- Significant data repository for Antarctic scientific community as well as general public
- Offer data free of charge
- Provide original collections as well as data from other sources, including USAP
- Requests for data can be made at any time
- Offer significant case study data (<http://ice.ssec.wisc.edu/casestudy.html>)
  - o Many types of data available
    - Automatic Weather Stations (AWS)
      - In operation since 1980
      - Over 100 stations in operation for 27 years
      - Data Available:
        - o Wind speed & direction, temperature, relative humidity, and pressure data
        - o Some with vertical temperature difference and snow accumulation (Knuth, 2007)
        - o Raw data every 10 minutes
        - o Quality controlled 3-hourly (through Feb. 2002)
        - o New 1-hourly data expected soon
      - AWS data available from other countries
        - o Italy, Netherlands, and Australia
      - AMRC originally created as a repository for AWS data
    - 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 (experimental)
    - Many other types of data available
      - Satellite Data
        - o Polar Orbiting
        - o Navigation tracks
      - METAR
      - Synoptic reports
      - Climate data for each of three U.S. stations (McMurdo, South Pole, and Palmer)
      - Model Data
        - o GFS
        - o EUMETSAT
        - o WWFM
        - o UKMET
        - o CRAS
        - o (<http://cimss.ssec.wisc.edu/model/realtime/index.html>)
      - Ships and Buoys
        - o U.S.
        - o Russia
        - o Argentina
      - Upper Air
      - Pilot Reports
        - o United States Air Force

## 2. Available Data

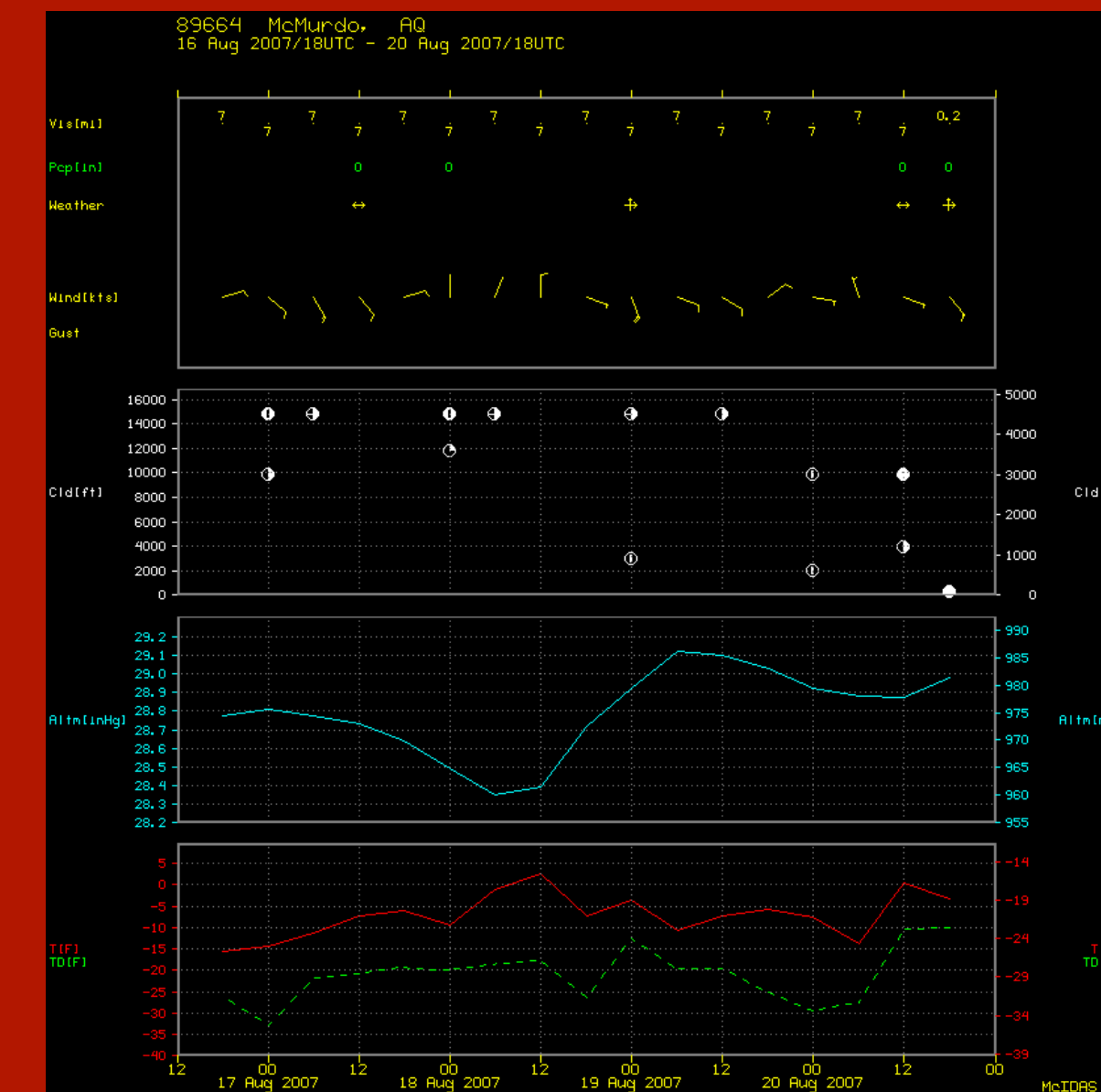


Figure 1. Synoptic meteogram from McMurdo Station depicting weather type, cloud height, pressure, temperature, and dewpoint.

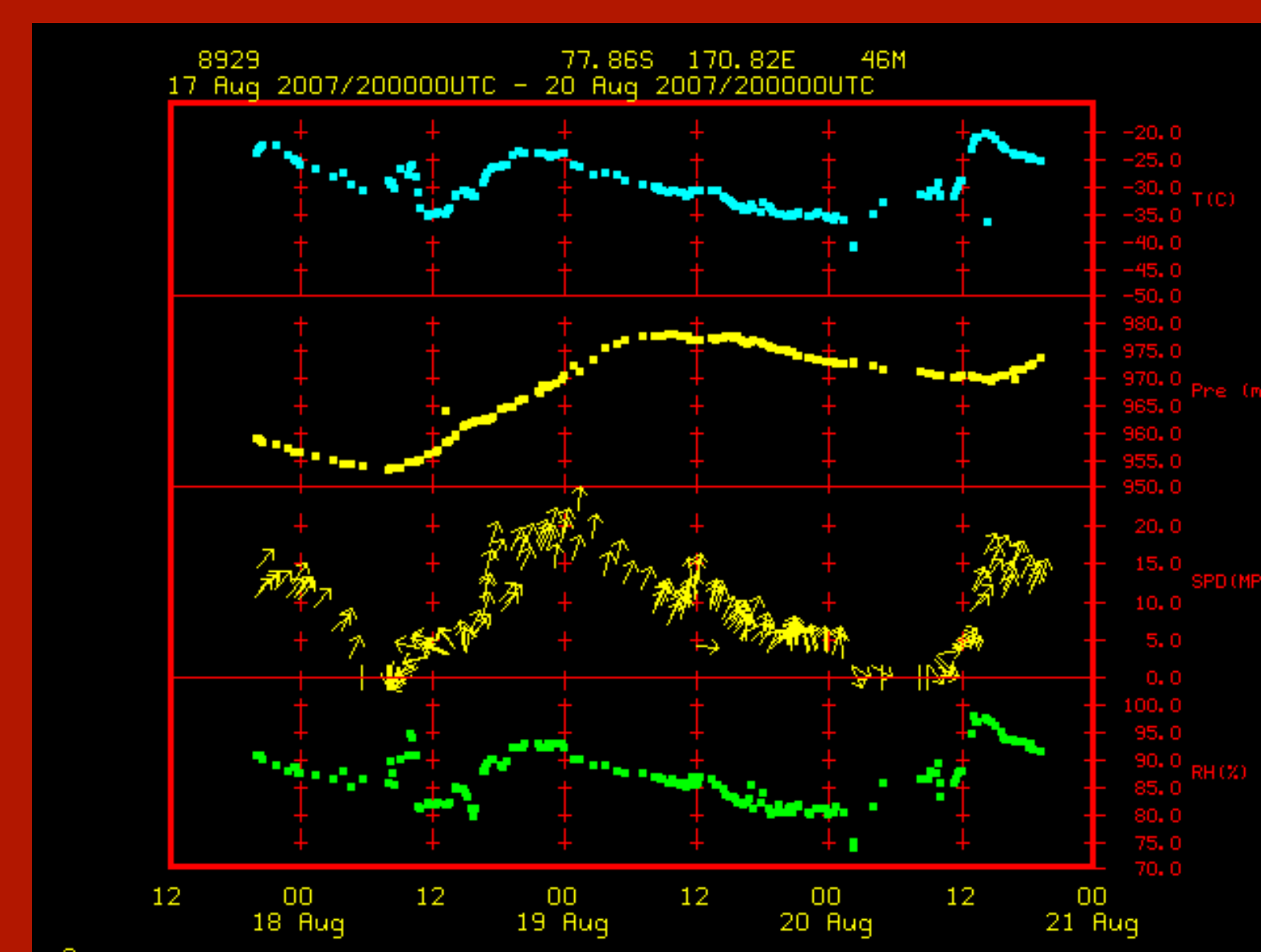


Figure 2. Meteogram from Ferrell AWS depicting temperature, pressure, wind speed, and relative humidity.

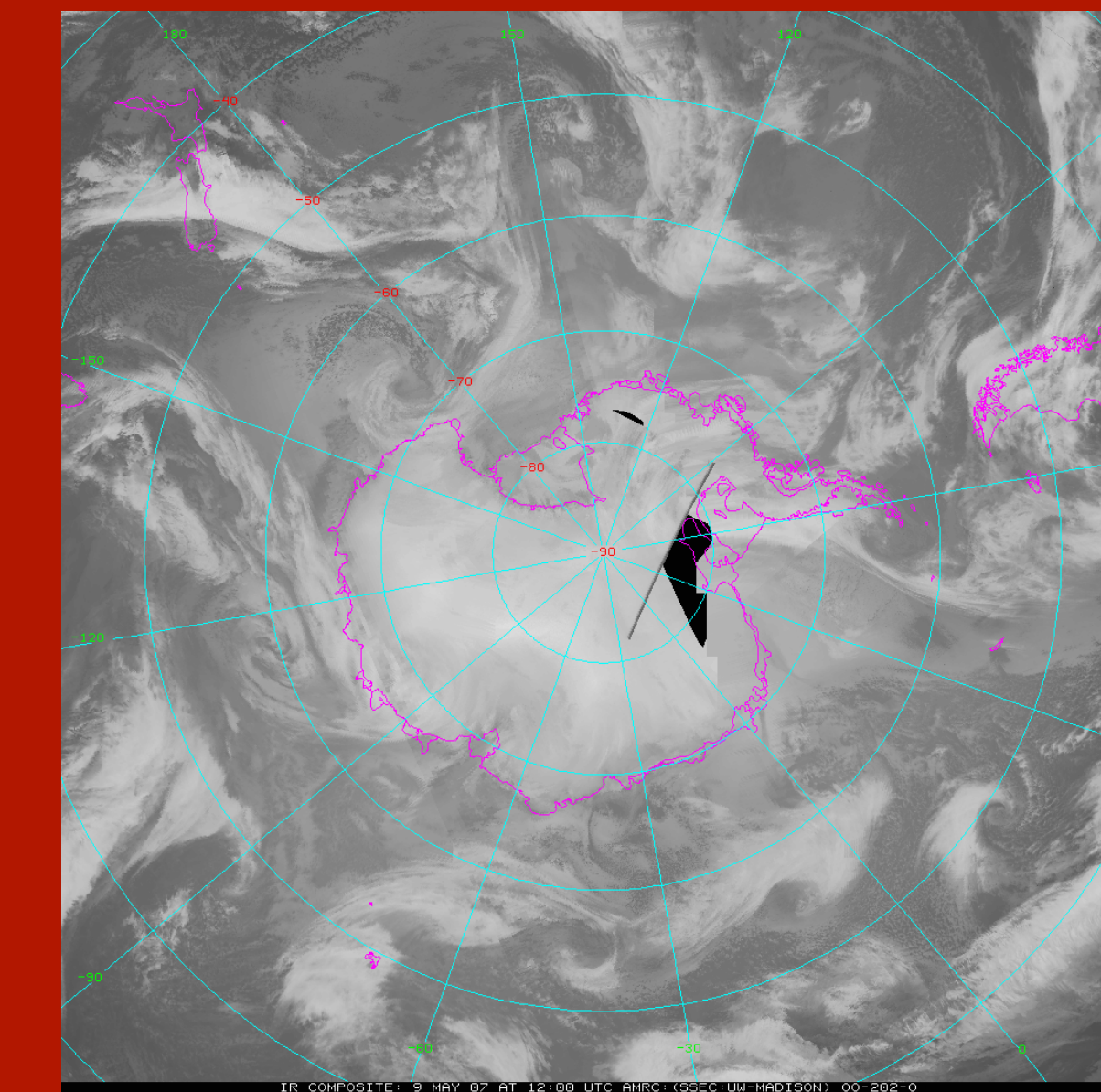


Figure 3. Example of AMRC infrared composite imagery over Antarctica.

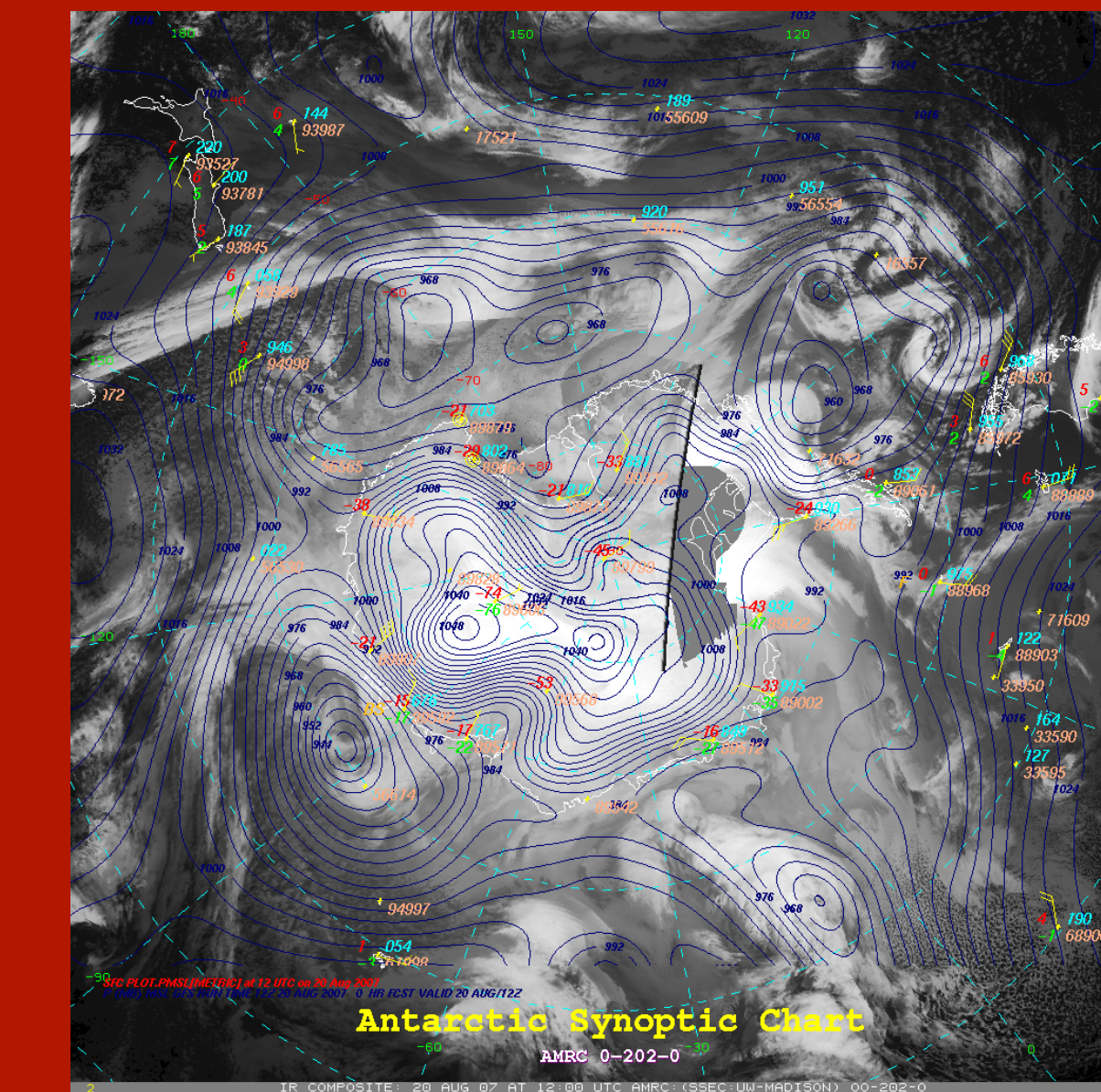


Figure 4. Infrared satellite image of Antarctica with GFS isobars, synoptic plots, and ship and buoy observations overlaid.

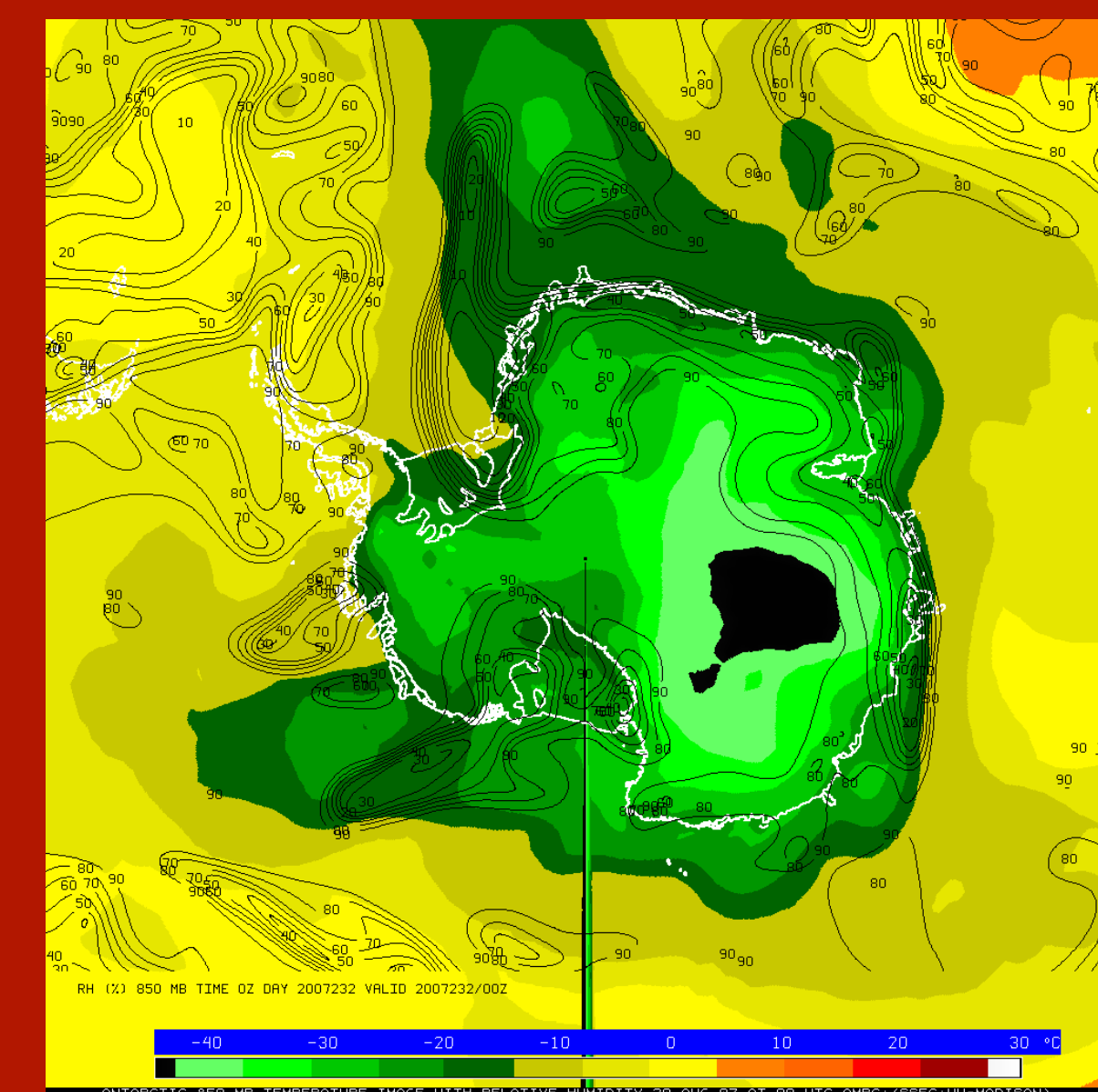


Figure 5. Example of model output from the GFS showing temperatures and relative humidities at 850 mb across the continent.

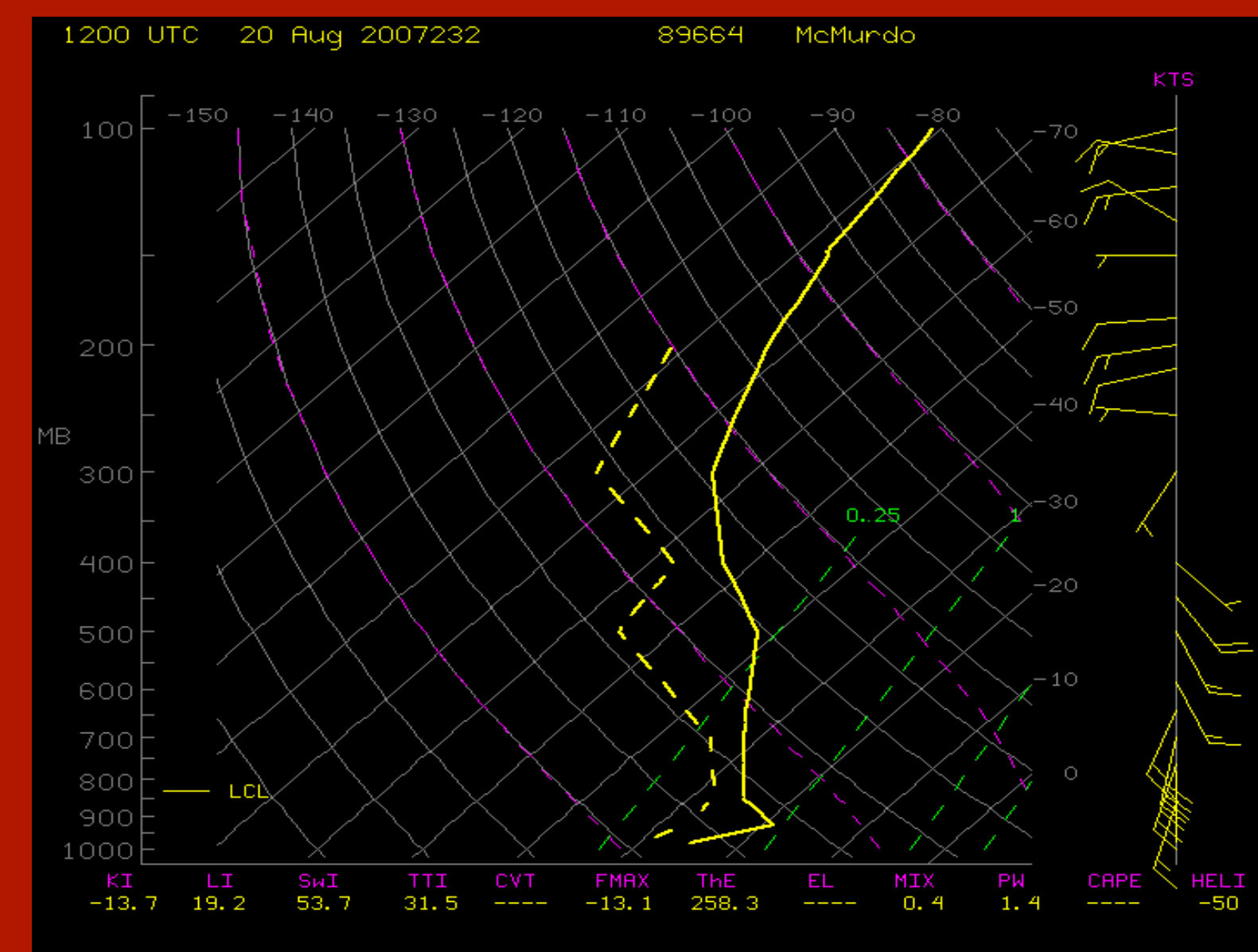


Figure 6. Skew-T diagram from McMurdo Station.

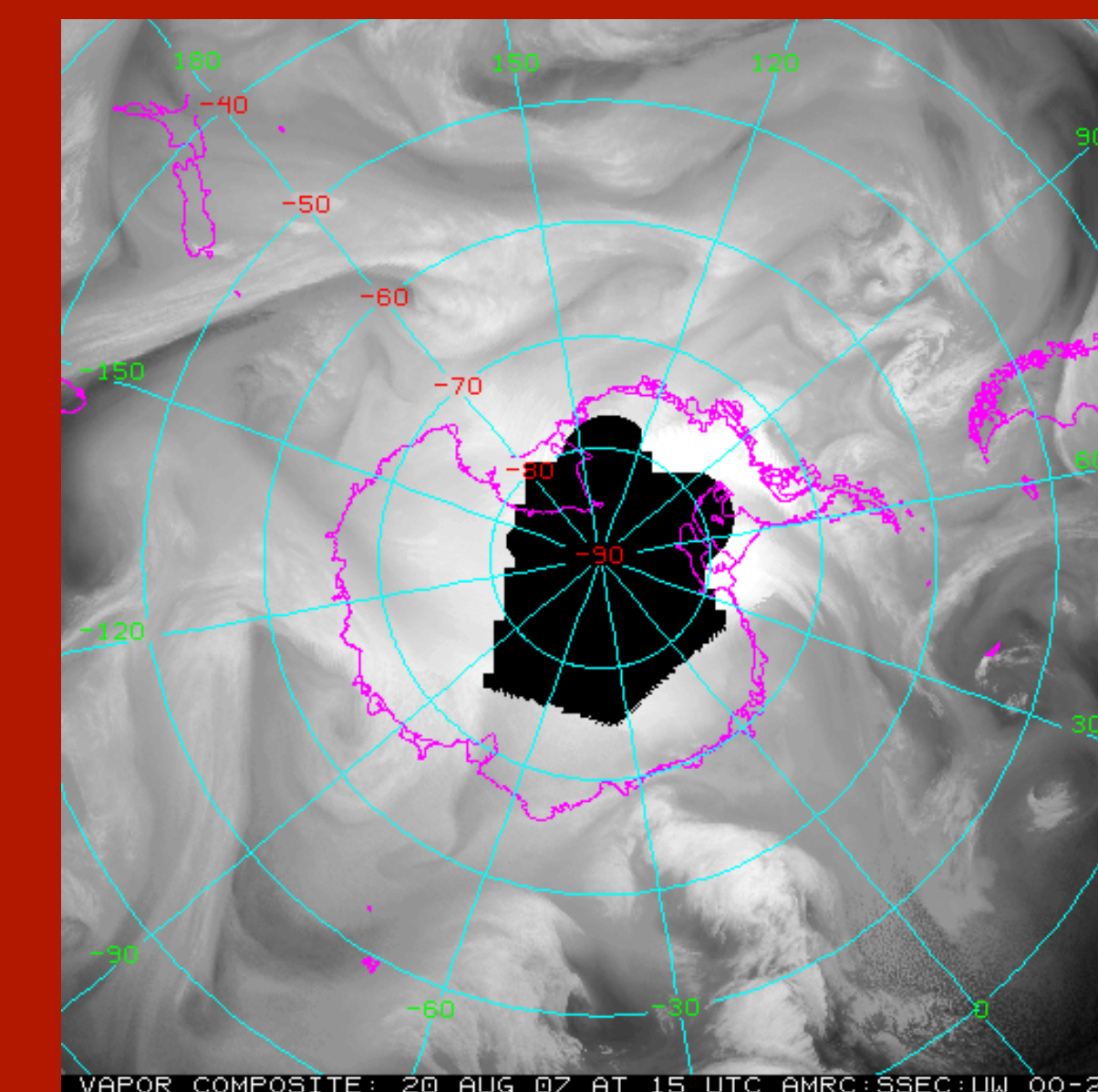


Figure 7. Example of AMRC water vapor composite imagery over Antarctica.

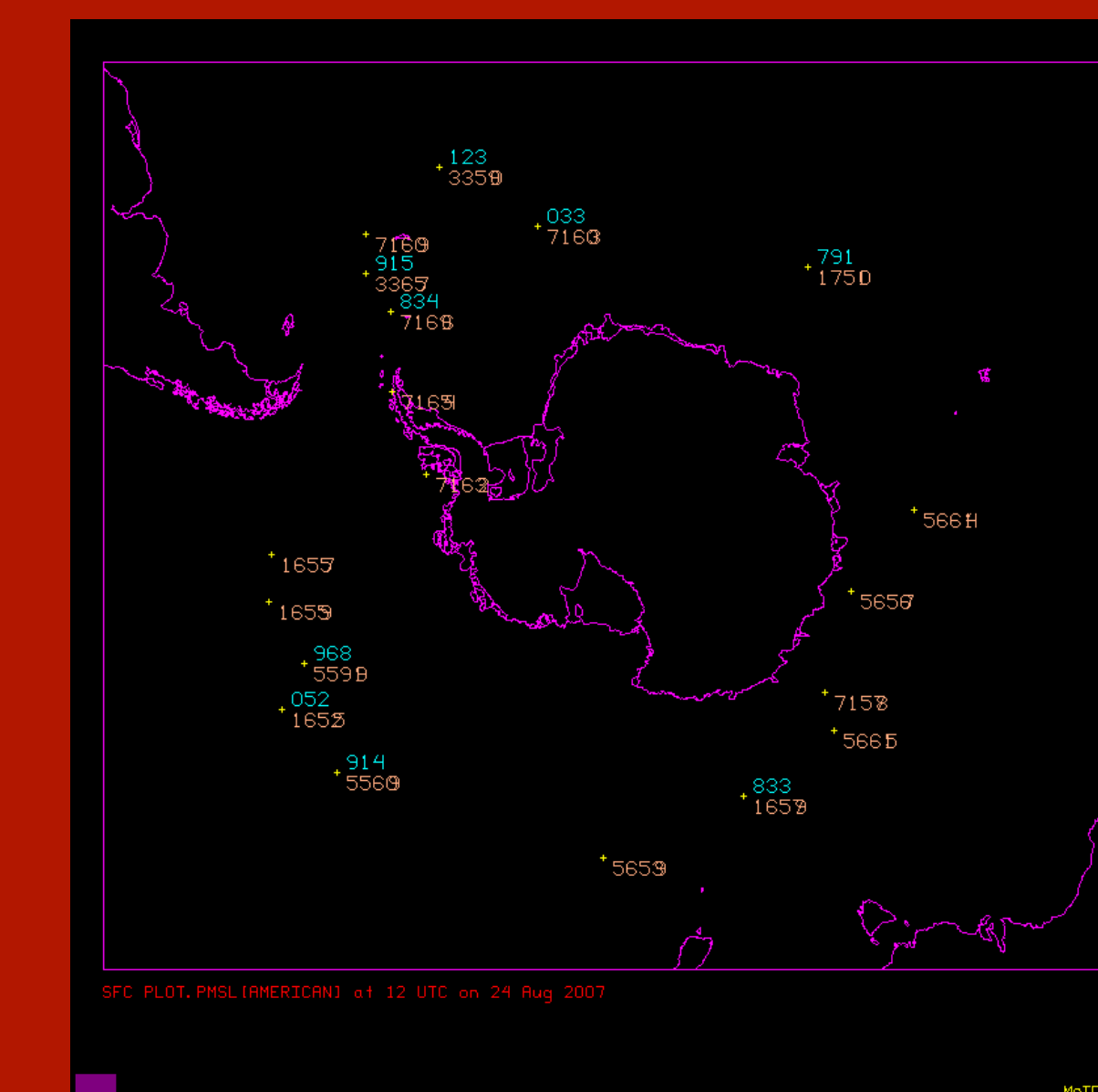


Figure 8. Ship locations and data collected across the Antarctic.

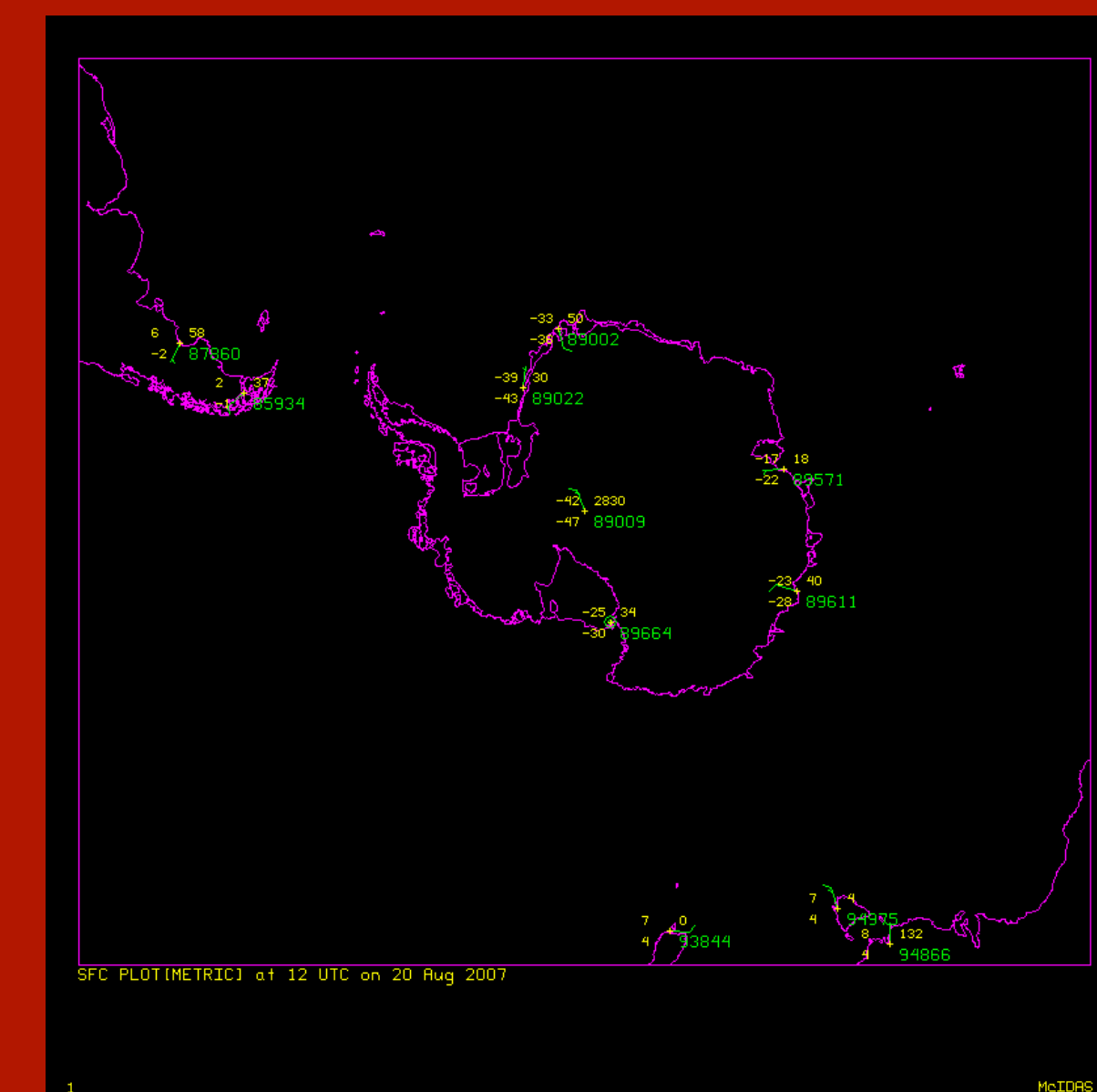


Figure 9. Plot showing all locations where radiosondes are released across Antarctica and parts of the southern hemisphere.

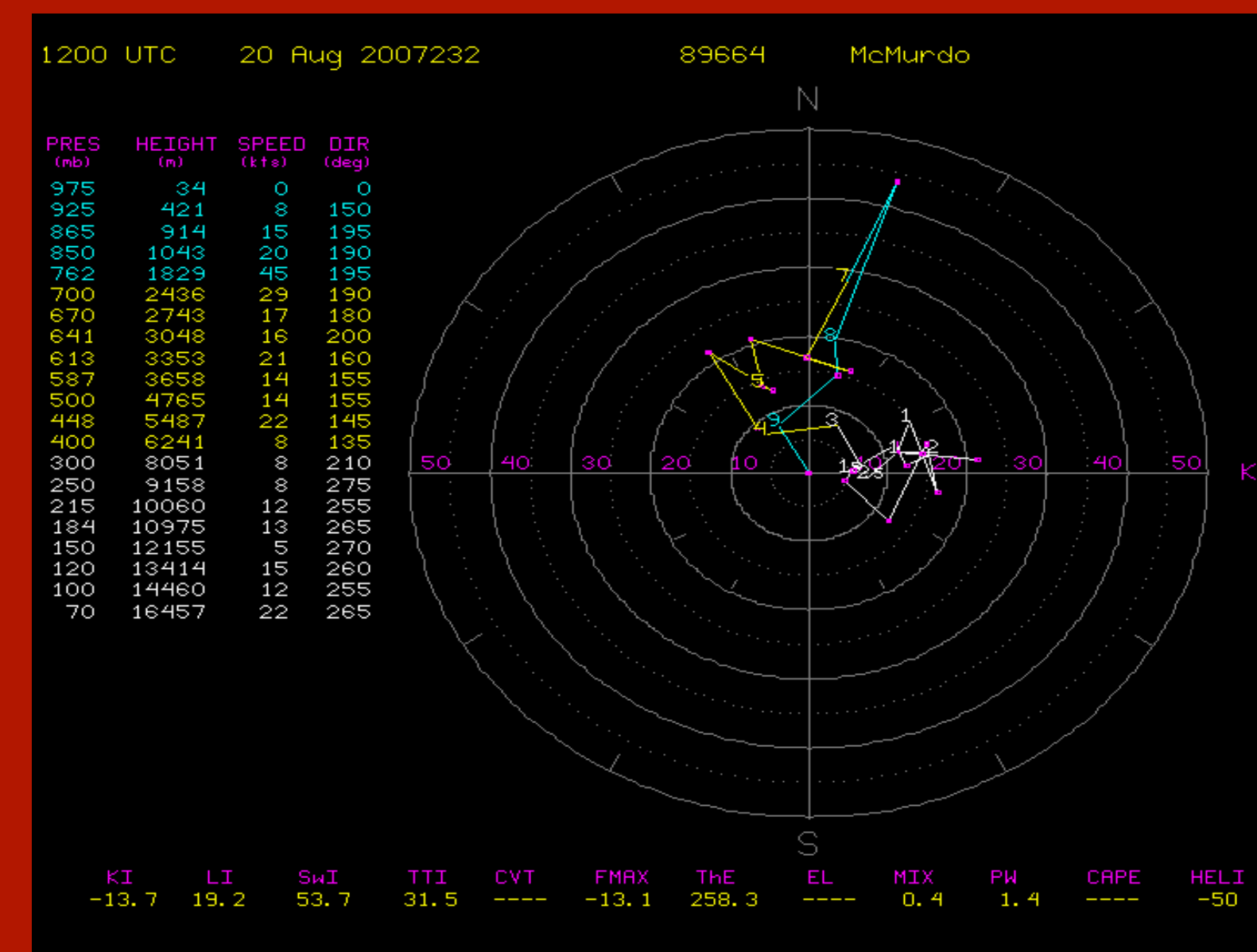


Figure 10. Hodograph from McMurdo Station.

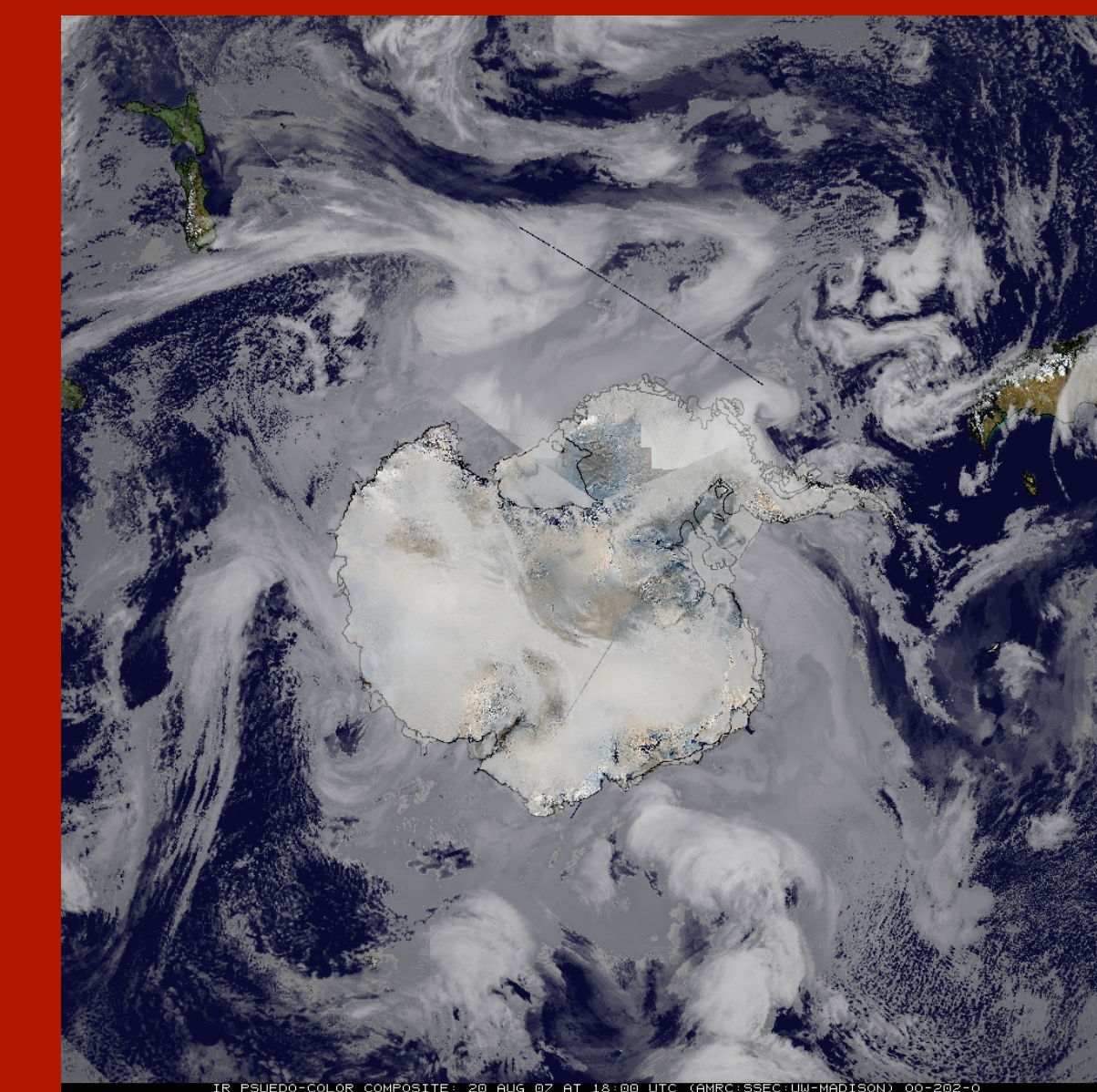


Figure 11. Example of AMRC infrared pseudo-color composite imagery over Antarctica.

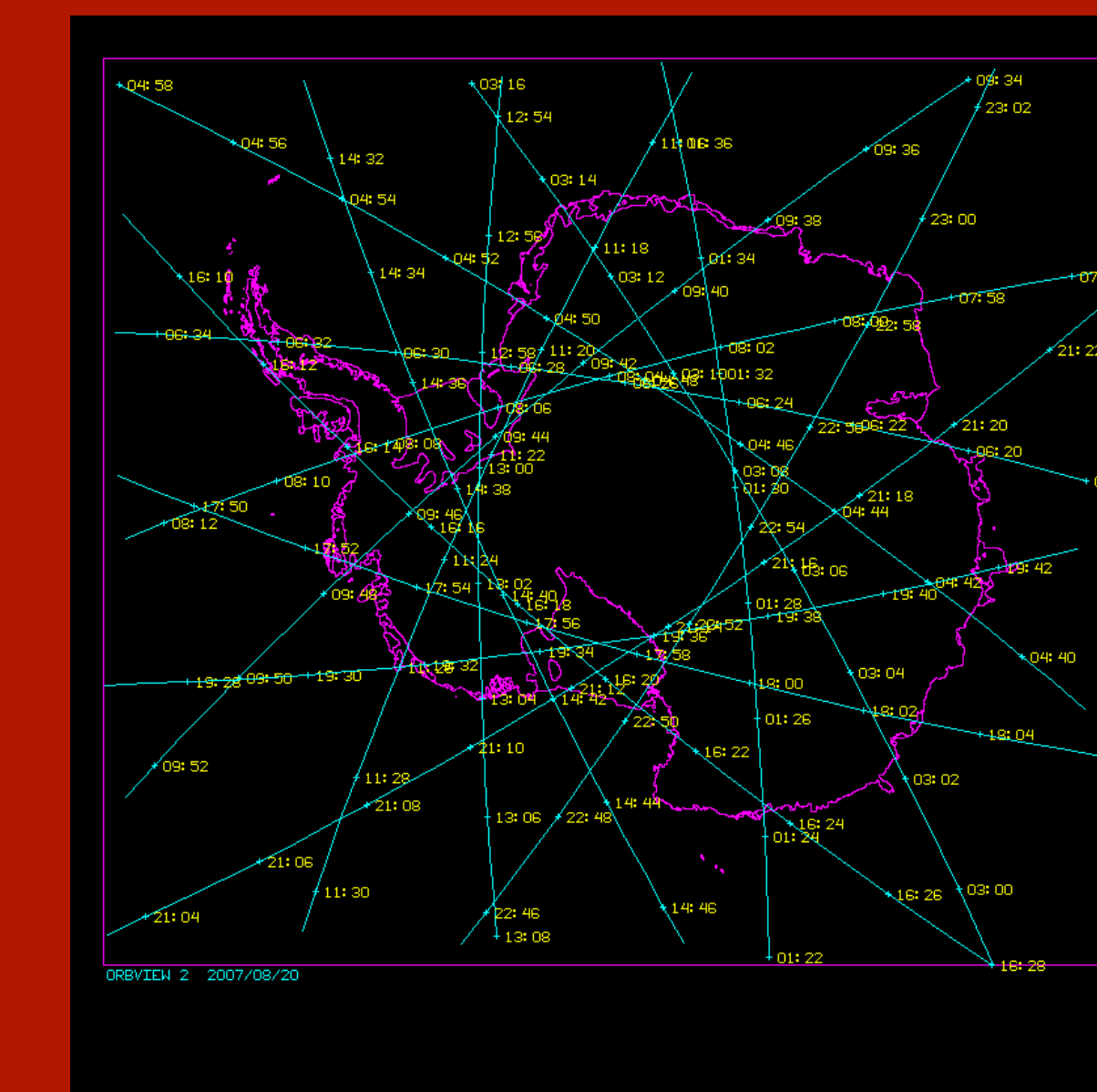


Figure 12. Image depicting satellite navigation tracks over Antarctica.

## 3. Distribution of Data

- Entire collection is available to public
- Most available via the following methods:
  - Web and FTP
    - <http://ice.ssec.wisc.edu>
    - <ftp://ice.ssec.wisc.edu/pub>
- Antarctic Internet Data Distribution system (Lazzara, 2006)
  - Place data in data stream
  - Grabbed by anyone who is a part of IDD
  - Very efficient and fast
  - To join IDD email [amrc@ssec.wisc.edu](mailto: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 partitionings for determining origin 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. M.S. thesis, Dept. of Atmospheric and Oceanic sciences, University of Wisconsin-Madison, 89 pp.

Lazzara, M.A., Langbauer, G., Manning, K.W., Redinger, R., Seefeldt, M.W., Vehorn, R., and Yoksas, T., 2006: Antarctic Internet Data Distribution (Antarctic-IDD) System. 86th American Meteorological Society Annual Meeting, Atlanta, GA.

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