THE ANTARCTIC METEOROLOGICAL RESEARCH & DATA CENTER: A PROPOSAL

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1. OVERVIEW

Significant advancements have been made in Antarctic meteorology over the last 50 years. Our capability to make observations in Antarctica, both in situ via Automatic Weather Stations (AWS; Lazzara et al., 2012) and via weather satellites (Lazzara et al., 2003), was the precursor to improved numerical weather prediction and weather forecasting (Powers et al., 2003). Numerous studies have leveraged both observations and numerical model simulations to gain a more complete understanding of how the Antarctic weather and climate behave (e.g. Parish et al., 2006; Bromwich and Nicholas, 2014; Cassano et al., 2016; Nigro et al., 2017; Mateling et al., 2017). Today, it is a reality to rely on 3- to 5-day forecasts – something which was not possible several decades ago (Cayette, pers. communication).

The Antarctic meteorological enterprise within the United States Antarctic Program has long been a community effort. This "soup-to-nuts" community is comprised of forecasters, observers, numerical modelers, researchers, and archivists, to name only a few of the roles found across the US Antarctic Program (USAP). Antarctic meteorological datasets are used in traditional research, education, flight briefings, and even educational outreach. Weather is a significant factor that enables the USAP to succeed in meeting its mission requirements for grantee science and the forecasting support. Weather and climate are cornerstone research areas in Antarctica. It takes a community effort to be able to accomplish the goals and meet the needs of a diverse community with such a wide variety of objectives.

While the USAP weather effort has been fortunately successful, it is in dire need of attention as the infrastructure is getting older and some capabilities have not kept pace with technological advancements. Several reports within the last 12 months inspected the whole Antarctic meteorological enterprise. These examinations have illustrated the meteorological needs of the USAP and make firm recommendations for improving the enterprise. The specific reports are:

- A Strategic Vision for Antarctic Meteorological Activities as a National Enterprise, unpublished
  - Compiled by Jeremy Rusin, NSF, 2017
- 2017 Cyberinfrastructure Meteorological Task Force Report, published
  - Compiled by Lubin et al., 2017
- Joint Task Force (JTF) Support Forces Antarctica (SFA) Meteorological Support for Operation DEEP FREEZE 2017-2018, unpublished to date/in revision
  - Compiled by Capt. Lauren Hogg, JTF-SFA, 2018 (See Capt. Lauren Hogg's talk in this session).

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Each of these reports outlines a wide variety of critical topics and discusses many different needs of the USAP meteorological enterprise. It is not possible to address all of the recommendations here. Hence, as a starting point, this proposal addresses these four specific needs:

Task #1: Designate the Antarctic Meteorological Research Center (AMRC) as a formal, recognized data center with a modest set of data curation and archive tasking (to become the Antarctic Meteorological Research and Data Center or AMRDC). A part of this task includes continuing the creation of satellite composites and the collection, decoding, and distribution of real-time AWS data.

Task #2: Focus on the distribution of decoded, real-time Wisconsin AWS observational data to the Global Telecommunications System (GTS) via partnerships between the National Science Foundation (NSF) and National Oceanic and Atmospheric Administration (NOAA) in World Meteorological Organization (WMO) approved formats (i.e. Binary Universal Form of Representation of meteorological data (BUFR))

Task #3: Initiate a steering committee for the AMRDC to provide oversight, guidance, and create recommendations with regard to on-going and future activities in partnership with a designated point of contact within the NSF Office of Polar Programs.

Task #4: Conduct basic diagnostic studies and case study reviews of Antarctic meteorological phenomena and events, for the benefit of the USAP community.

These goals are a start to creating a more sustainable Antarctic meteorological enterprise, which is critical for the USAP and beyond. Benefits to all users are gained by making data acquisition easier and creating a strong infrastructure. With a real and significant effort placed into creating the Antarctic meteorological enterprise reports, the conclusions will outline the clear need for change and action. These initial tasks must be put into place to start down the path to create the best possible US Antarctic meteorological enterprise.

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