THE ANTARCTIC METEOROLOGICAL RESEARCH AND DATA CENTER: DATA REPOSITORY VERSION 1.0

Matthew A. Lazzara[*1,2], Jean M. Philips[2], Matthew G. Noojin[1], Lee J. Welhouse[1,2], Jerrold O. Robiadek[2], Jeff F. Havens[3], Owen H. Graham[3], Karissa Shannon[2,4], Taylor P. Norton[2,4], David E. Mikolajczyk[2], Bella Onsi[2,4], Ethan Koudelka[2,4], Anastasia J. Tomanek[2,4], Clayton Suplinski[2], and Mercedes Hernandez-Natera[1]

[1]Department of Physical Sciences, School of Engineering, Science, and Mathematics, Madison Area Technical College, Madison, WI

[2]Space Science and Engineering Center, University of Wisconsin-Madison Madison, WI

[3]Department of Computer and Data Science, School of Engineering, Science and Mathematics, Madison Area Technical College, Madison, WI

[4]Atmospheric and Oceanic Sciences Department, University of Wisconsin-Madison, Madison, WI

https://amrdcdata.ssec.wisc.edu/

1. ABSTRACT & INTRODUCTION

Efforts over the past two years have culminated in the creation of version 1.0 of the Antarctic Meteorological Research and Data Center (AMRDC) Data Repository. This meteorological disciplinary data center serves the community as the repository for a variety of datasets including Antarctic Automatic Weather Station (AWS) observations, satellite composite imagery, and field campaign datasets from the Year of Polar Prediction – Southern Hemisphere (YOPP-SH), just to name a few. The repository is built off of the open source CKAN (Comprehensive Knowledge Archive Network) system (Lazzara et al., 2021a). Currently there are over 4700 individual datasets and growing. The repository welcomes contributions from the community to fulfill requirements from funding agencies. Additionally, links to other Antarctic meteorological data archived in other data repositories are included in the AMRDC Data Repository, enabling easier findability of like datasets. This collection of links, "seed" funded by the Scientific Committee on Antarctic Research (SCAR) Near-term Variability and Prediction of the Antarctic Climate System (AntClim^{NOW}) project, will continue to be added to the repository. With support from the National Science Foundation, the AMRDC Data Repository aims to be a community service.

2. COLLECTIONS, THREDDS and ANTCLIMNOW

Over the past year, the repository has organized some of the datasets into logical collections that are easy for users to find data associated by a common theme. As shown in Figure 1, several collections have been created or are being developed. One collection, for example, is a set of meteorological data from the Antarctic Circumnavigation Expedition (ACE). They can be found collected together in the Collections area of the repository.

In working with large datasets – not necessarily in size, but perhaps volume of data files – our repository has been setup to marry together the CKAN system with Unidata Program's Thematic Real-time Environmental Distributed Data Services (THREDDS) Data Service. The use of THREDDS can enable future features that will be advantageous to end users including different serving methods for the data (e.g.

* Corresponding Author: Matthew A. Lazzara
Madison Area Technical College, Madison, WI
E-mail: mlazzara@madisoncollege.edu

via web or hypertext markup language (HTML), Open-source Project for a Network Data Access Protocol or OpenDAP, Web Mapping Services or WMS, to name a few). The AMRDC project will also be using THREDDS directly in the near future to offer real-time datasets directly to the meteorological community.

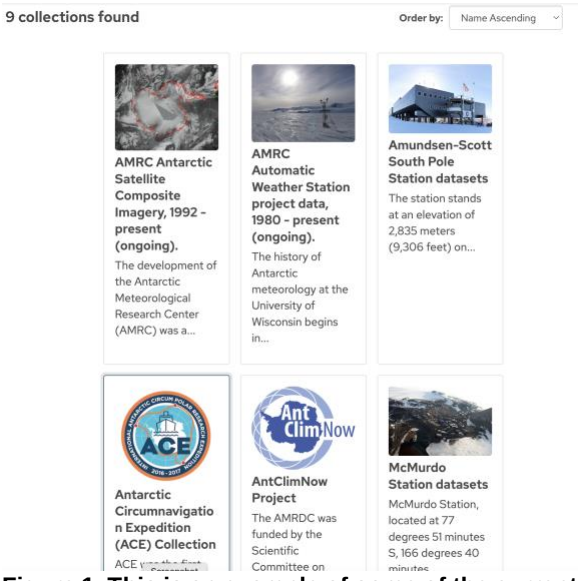

Figure 1. This is an example of some of the current and future planned collections in the AMRDC Data Repository. Additional collections will be added in the near future.

One important collection that is a part of the repository are links to other Antarctic meteorological data in other disparate data repositories around the world. This supplementary effort has been "seed" funded and supported by the SCAR project AntCLIM^{now} with an aim to not create new datasets but find ways to bring datasets together. This will enable AMRDC Data Repository users to find data not only in the repository but data in other external repositories. This is an extension of the FAIR (Findable Accessible, Interoperable, and Reusable) principals this project adheres to. Currently, nearly 99 datasets have a linked entry in the AMRDC Data Repository. Moving forward, we will continue this effort and encourage anyone who wishes us to have a link, to please provide information to us so it may be included.

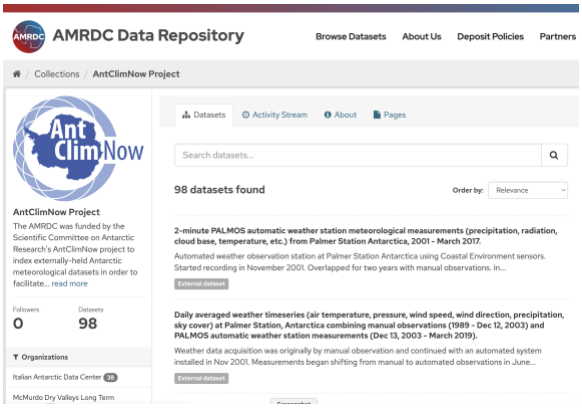

Figure 2. Here is an example of a collection, from the AntCLIM^{now} project.

3. SUNSET OF AMRC FTP SITE

In roughly one year, it is expected that all datasets the AMRC has historically offered via its file transfer protocol, or FTP site, will be moved into the new AMRDC Data Repository. Once this work is completed, the FTP site will be sunset and turned off. Additionally, rsync services will come to an end. The replacement for this will be the use of CKAN's API for automatic acquisition of data posted to the repository. To those impacted by this change, it is strongly encouraged that you do engage us on any concerns or complications that this presents.

4. OTHER AMRDC TASKS

The AMRDC project has several other associated tasks that are currently in progress. A data visualizer is being constructed to look at AWS observations directly from the repository. A new AMRDC website is also being developed to replace the Antarctic Meteorological Research Center (AMRC) site. The AMRDC project is committed to offering a set of data services for the Antarctic meteorological community (e.g. LDM (see Figure 4), ADDE, THREDDS). The signature Antarctic satellite composite imagery has some work requirements to be completed to keep the most recent satellites included, rotate the composite to 0° longitude, and develop a second generation of the composite during the day to have the most satellite imagery

possible. Of course, student engagement and community outreach along with special tasks with ICAMS (see Lazzara, 2023) and WMO are on-going.

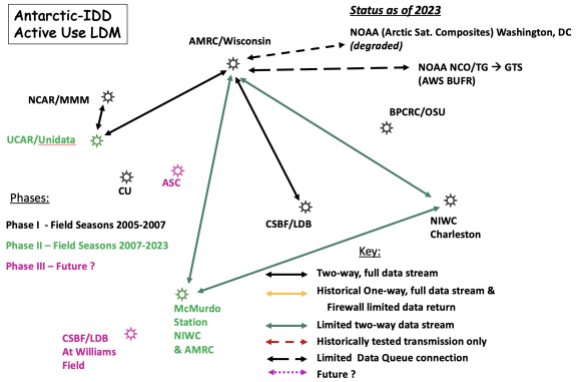

Figure 4. This is the current status of the Antarctic-IDD and more that Antarctic-IDD effort is discussed in Lazzara et al., 2021b.

5. ADVISORY BOARD

Elements that are essential to this project's success include the AMRDC Advisory Board (AAB). We continue to be fortunate to have a diverse group of peers providing guidance and expert advice (see Table 1). The AAB will meet two to three times a year, with other informal check-ins. Changes in membership over the past year are noted in Table 1.

Table 1. Members of the AMRDC Advisory Board (AAB). Those in italics are new members who have replaced those who have rolled off the AAB.

AMRDC Member	Institution
Mike Carmody	ASC
Michael Johnson	NIWC
Carol Costanza	NCAR
Bob Dattore	NCAR
Mckenzie Dice	U. Colorado
Jonathan Pundsack	U. Minnesota
Mariana Litell	OSU/BPCRC
Matthew Lazzara, ad hoc	Madison College

6. FUTURE

The coming two years of this project will be focused on continuing the momentum of the AMRDC Data Repository efforts. The other tasks associated with the AMRDC are also of importance in the near term as well. Engagement with the community to raise awareness of the value of the AMRDC is essential for all.

7. ACKNOWLEDGEMENTS

This material is based upon work supported by the National Science Foundation, Directorate for Geosciences, Office of Polar Programs, under Grants 1951603 and 1924730. Thanks for the advice and efforts by the AMRDC Advisory Board, the Madison College Grants Office, and Space Science & Engineering Center support staff, without whom this project would not be possible.

8. REFERENCES

Lazzara, M.A., and the AMRDC team: 2021a: The Antarctic Meteorological Research and Data Center: A Phoenix Rising from the Ashes. 16th Workshop on Antarctic Meteorology and Climate (WAMC), Columbus, OH, (Virtual).

Lazzara, M.A., and the AMRDC team, 2021b: The Antarctic – Internet Data Distribution System: The Global Antarctic Telecommuniations System, 16th WAMC. Columbus, OH. (Virtual).

Lazzara, M.A., and the AMRDC team 2022: The Antarctic Meteorological Research and Data Center: A Data Repository for the Antarctic Meteorological Community. 17th WAMC, Madison, WI.

Lazzara, M.A., 2023: Working Group on Observational Data (WG/OD): Implications for the US Antarctic Program. 18th WAMC, Madison, WI.