METEOROLOGICAL DATA FLOW IN THE UNITED STATES ANTARCTIC PROGRAM

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1. OVERVIEW

Antarctic meteorological observations and datasets originate from various sources both on and off the Antarctic continent. The movement of the data takes place over a variety of communication methods. This poster outlines a first attempt to create a complete data flow diagram for the United States Antarctic Program (USAP) meteorological data. A series of datasets included are automatic weather station data, radiosondes, numerical weather prediction output, and satellite observations. Input and output beyond the USAP are included in this assessment as well, but a more comprehensive analysis is needed. Discussions on additions, improvements and forgotten data will be encouraged via feedback and discussions with workshop participants.

2. INCOMING DATA

The methods by which the Antarctic Meteorological Research Center (AMRC) receives Antarctic meteorological data are via file transfer protocol (FTP), Local Data Manager (LDM), e-mail, and domestic satellite (DOMSAT) relay. This data is further archived at the AMRC and placed on either their website or FTP website for public use. The data comes from a variety of countries and stations.

The satellite observations are retrieved from both the University of Wisconsin-Madison's SSEC Data Center's satellite relay (co-located with the AMRC) and direct broadcast reception at McMurdo Station. Also, some weather station observations are relayed via satellite links. The observations acquired are used to generate satellite composite imagery. Terra, Aqua, GOES, Meteosat, Himawari, and numerous other satellites are used in the generation of this composite (Kohrs et al. 2013; Lazzara et al. 2003).

The ARGOS and Iridium satellite networks are utilized to relay Automatic Weather Station (AWS) observations. The ARGOS communications system is found on older NOAA satellites (NOAA-19 and older) and the MetOp polar orbiting satellite series. As of 2018, use of UHF communications for the Wisconsin AWS has come to an end. This method also required other relay to complete the distribution and availability of the observations.

Monthly observation data collections are provided by some staffed stations in Antarctica including Palmer, Neumayer, South Pole, and McMurdo. Some of this data flows over satellite telecommunications networks, but the protocols used include basic secured shell (SSH), secure-FTP or LDM. These are non-real-time, archive-intended datasets.

3. OUTGOING DATA

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The AMRC sends out data via LDM, FTP, website, as well as archiving data on tapes and online. Historically, some datasets were automatically e-mailed to interested users. These are the means for providing these datasets to the public for general use. Efforts are in progress to provide real-time AWS observations in GRIB format to the Global Telecommunications System via NOAA. This is in addition to monthly climate summaries or CLIMAT messages for a selection of Wisconsin AWS sites that are already constructed and provided to NOAA for distribution on GTS.

4. SUGGESTIONS AND FUTURE WORK

While a rich network of data collection, archive and distribution is on-going, there are several areas in need of attention. Currently there is not a complete exchange of observational datasets between AMRC and the McMurdo Station forecasters (Naval Information Warfare Center or NIWC) on station. With a particular focus on the AWS observations in real-time, this would aid on-site weather forecasters and weather briefers to have the most recent information available, as it would come from recently-installed equipment to get the available data. There are limits to resolving this issue, as AMRC capabilities to capture real-time AWS observations in McMurdo are limited by current hardware systems (designed to work only through the current NOAA-19 satellite) and the health of the current direct broadcast systems (where data is truly shared between the forecasters and grantees such as the AMRC).

Future work remains to have this exchange of data be robust and supportive of both the operational (forecasting) and grantee (research) communities. They are symbiotically connected to the same sources of data to make their respective work successful: observations (e.g. AWS, satellite), generated products (e.g. satellite composites), etc.. Dialogue must continue between all partners to ensure the vitality of this essential web/network of data and exchange.

5. ACKNOWLEDGEMENTS

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6. REFERENCES

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