Plan Overview

A Data Management Plan created using DMPTool-Stage

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Title: Coastal Ocean Processes of North Greenland

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Project abstract:

I propose to analyze a unique 2014-18 ocean data set to investigate dynamics at this scale with mooring, survey, satellite, and modeling data. We hypothesize that canyon dynamics control across-shelf property and energy flux by the interaction of rotation, topography, and friction at tidal to interannual time scales.

Start date: 06-30-2023

End date: 06-29-2026

Last modified: 08-07-2023

Copyright information:

Coastal Ocean Processes of North Greenland

The principal investigator Andreas Muenchow will be responsible for all data management of this project. He will train project personell including the two graduate students Claire Brizzolara and Michael Copella in proper data handling and management skills. The NSF Arctic Data Center will provide data archival, preservation, access, and metadata authoring services for the project.

Ocean data used in this project has been collected between 2014 and 2018 as part of a large and international effort led by the Alfred Wegener Institute in Germany with support from the research icebreaker R/V Polarstern. All sensor data are archived in the public domain at https://www.pangaea.de/ where searches for PS85, PS100, PS109, and PS114 will provide direct access to both survey and mooring data from 2014, 2016, 2017, and 2018. Nevertheless, these data are lightly processed "raw" data that will benefit from additional processing and calibration as done by the Principal Investigator Andreas Muenchow in Muenchow et al. (2020) for a small subset of ADCP mooring data.

Atmospheric and wind data originate from two sources. First, these are standard stations maintained by the Danish Meteorological Institute that are also distributed by the U.S. National Center for Environmental Information. Second, wind data of the European Centre for Medium-Range Weather Forcasting produce ERA-5 will be used.

Remotely sensed optical (LandSat, MODIS), microwave (SSM/I), and synthetic aperature radar (Sentinel-A and Sentinel-B) data from both US and European satellites will be used to describe sea ice distributions. All these data reside in public archives maintained by government organizations in the USA (NASA, USGS) and Europe (ESA, Copernicus).

Software products constitute an essential element to make the science transparent for both research and teaching. Furthermore, my software contains much meta-data and documentation both on the raw data on input as well as the processed data on out. This project includes a software publication effort via GitHub that I planto streamline with RStudio/Posit. This open-source integrated software environment is platform independent, interfaces directly with GitHub, and naturally facilitates/includes shell scripting both within the integrated development environment of the R-language AND well-defined snipets calling scripts, tool, programs, compilers, other languages, open-source graphics such as the General Mapping Tool (GMT). All codes to transform raw binary from sensors to condensed graphical information will be documented with software with each step fully transparent.

Ideas and philosophies of data and software development and sharing featured prominently in a 3-credit problem-based learning class that I taught in the Fall of 2021 to senior undergraduate and junior graduate students. Using RStudio on a large hydrographic data from around Greenland, I empowered students to implement transparent software and data documentation and development. The schedule of this class serves as an example on how to document data and software within an open peer-driven collaborative environment, e.g., http://muenchow.cms.udel.edu/classes/Arctic/schedule.html and links therein.

The "raw" data presently in public German data archives that this project will utilize approaches about 2 TB. We expect that the submission of processes, calibrated, and reduced data will be a factor 1000 smaller, about 2 GB. No high volume satellite or numerical modelling output data will be provided as these data streams are provided and maintained by NASA in the USA and ESA in Europe.

All meta-data will be provided in plain text format. Furthermore, location (longitude, latitude, depth) and time strings (date, hour, minute) are always attached as columns in all ocean mooring and survey files. Additional and partially redundant meta-data are included in pipes of Unix software tools and scripts that call that will be

submitted along with test data to ensure transparency of both data and processing. The

All processed and calibrated data will be provided to the Arctic Data Center as Comma or Space Separated Values.

For the duration of the project all project data not available in public archives will be shared online without restrictions on the server http://muenchow.cms.udel.edu that the principal investigator maintains for professional and public outreach purposes and http://muenchow.cms.udel.edu/ForSohyun/ perhaps serves as an example of internal yet open data sharing. Towards the end of the project the data on that server will transition with modifications to the Arctic Data Center.

No protections are needed.

Value-added, that is processed, calibrated, and condensed data will be submitted to the Arctic Data Center during the last 6 months of the project starting 2026.

The data will be used by an international community of physical oceanographers, ocean engineers, and government scientist with research, monitoring, or commercial interests in north-east Greenland.

The raw data already reside in the public domain and all data products generated by this project will also reside in the public domain after completion of the effort in June of 2026. No restrictions will placed on any data that can be dissiminated freely by anyone for any purpose.

The data manager will follow the NSF Arctic Data Center guidelines to provide accurate and complete documentation for data preservation. The NSF Arctic Data Center will ensure that the data are curated in a relevant long-term archive and ensure data will be available after project funding has ended.