

**MAST 467/667: Introduction to Polar Oceanography (Fall 2021)**  
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**Workshop/Homework-1:** Finding, Working, Graphing Online Data

**Data:** Ocean Melts Greenland (OMG) at <https://omg.jpl.nasa.gov/portal/>

**Introduction.** For our first work shop we will be probing Arctic Ocean Water Profiling around Greenland as done by a large NASA program call OMG. Buoys are deployed by aircraft and transmit data of position and ocean depth, temperature, and salinity back to the plane. Please have a quick look at the material (as well as the 4-min video) at

<https://omg.jpl.nasa.gov/portal/about-en>

Together we will explore the waters to the East, North, and West of Greenland as an example of how modern ocean observing systems inform of a changing environment.

Each student will be responsible for a specific sector throughout the semester in a sequence of successively more complex data analysis tasks. The 8 regions for the 8 students in this class will be assigned by random number from the date string of an e-mail you must send me to "request" your sector. [I will add the digits of day, hour, minute, and second and convert this to a single digit, e.g., Aug-31, 11:23:00 would be  $31+11+23+0=65$  which gives  $6+5=11$  which gives  $1+1=2$ .]

**Goal.** Discover and explore what computer skills you presently have and need to acquire to conduct future data analyses projects to inform yourself and others about the Coastal Polar Ocean around Greenland with real data collected in real time. NASA's OMG team is in the last year of a 5-year field operation. I expect new data to become available in Sept.-2021 that is being collected over Greenland in Aug.-2021.

**Expectations.** I expect us all to work within a collaborative environment. Connect with other students in this class to identify which tasks you can and which tasks you cannot do. I do NOT expect that all students can solve all aspects of this assignment. I expect that every person makes an honest attempt and is able to identify and verbalize aspects the she/he/they are unable to conduct without help of the instructor. Substantial help from the instructor is an expectation. We all learn best by doing.

**Assignment.** Determine the number of buoy deployments (and thus ocean profiles) available for your sector of Greenland. Work with the instructor on a set of successively more demanding tasks to process files and the data they contain. Use tools that you usually use in your research.

1. Download manually data from a single buoy deployment, unzip it, and place into a data directory separate from your processing and graphing directory.  
*[move data, make directories]*

2. Look at the (ASCII) files and data that a single buoy deployment gives you:

How many temperature, salinity, and depth readings do you see?

Can you discern a pattern in the filenames?

Can you discern a pattern in the format of the files?

*[inspect files, gather file information, meta-data]*

3. Write a script that opens, reads, and extracts the first, second, and last line of one of the many files and place these lines of data into a different file. Can you loop over many files to get the first line of many or even all files into a new file?

*[edit text, create/execute files/scripts]*

4. Create a plot that shows longitude and latitude on a map.

*[graphing]*

5\*. Could you sketch a plan to determine the speed of the plane that drops buoys into the ocean every 15-20 minutes? What additional information would you need?

*[linear data transformations, regression]*

(\*) Hint: A degree of latitude consists of 60 minutes of latitude and each minute of latitude is always 1.852 km. The same does NOT apply to longitude except at the equator. You need a correction factor  $\cos(\text{latitude})$  that is 1 at latitude=0 degrees and 0 at latitude=90 degrees.