

MAST 4667/667: Introduction to Arctic Oceanography (Fall 2014)

Workshop/Homework-1: Finding, Working, Graphing Online Data

Data: Ice-Tethered Profiler (ITP) at <http://www.whoi.edu/website/itp/overview>

Introduction. For our first workshop we will be probing Arctic Ocean Profiling buoy data of position, depth, temperature, and salinity. Together we will explore the waters under the moving sea ice in both the Beaufort Sea to the north of Canada and the US as well as the Nansen Basin to the north of Russia and Spitsbergen.

Goal. Get mean ice speed from ITP buoy tethered to an ice floe. Discover and explore what computer skills we presently have and need in order to conduct future projects and homeworks to learn about the Arctic Ocean with real data collected in real time.

Assignment. 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 data from a single buoy, unzip it, and place into a data directory separate from your processing and graphing directory.

[move data, make directories]

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

How many files does your buoy reveal?

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 places these lines of data into a different file. Can you loop over many files to get the first line of all files into a new file?

[edit text, create/execute files/scripts]

4. Create a plot that shows longitude and latitude as a function of time.

[graphing]

5*. Convert longitude and latitude to distance (in km) from the starting point, then plot distance $D(t)$ as a function of time t . Eyeball a straight line through the data from which to estimate an average speed of the buoy in meters per second.

How can one formalize the “eye-balling” to get a more formal velocity estimate?

[linear data transformations, regression]

(*) A degree of latitude consists of 60 minutes 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 $\text{latitude}=0$ degrees and 0 at $\text{latitude}=90$ degrees.