

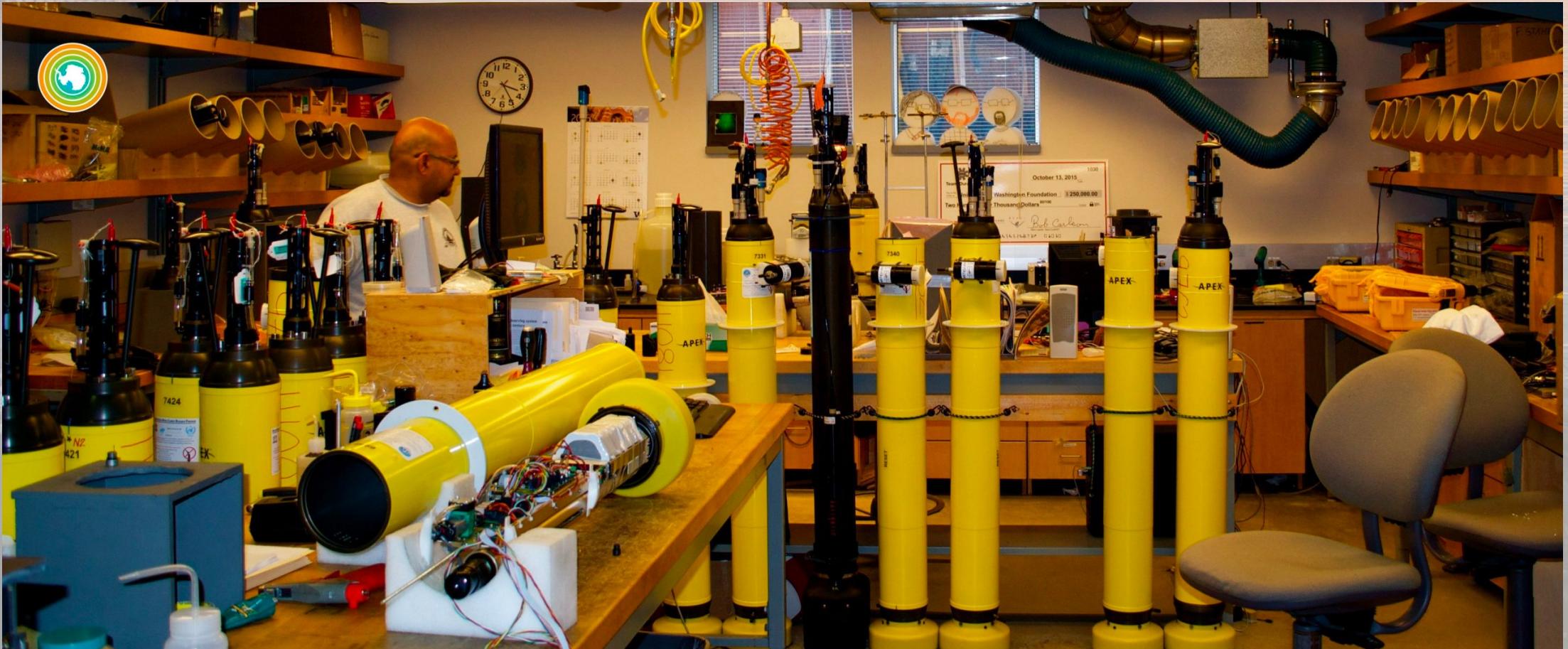
HW2: Argo Profiles in Excel

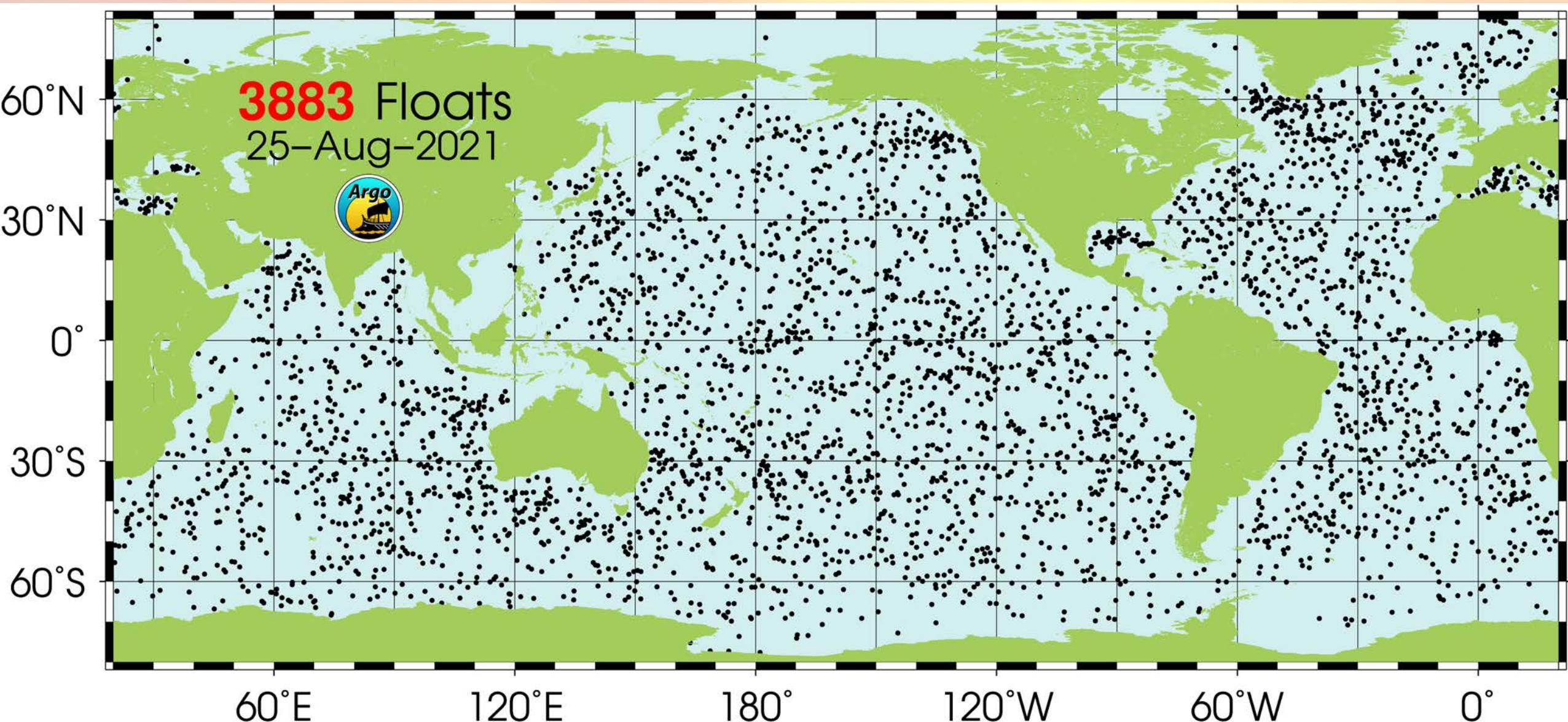
Due 9-Sep-21
by 11:59 pm

Today's emphasized skills

- Downloading freely available data from an international scientific program
- Plotting data in Excel
- Describing the data and where it came from
- Calculating basic statistical properties in Excel
- (Note: this is not a weed-out course! I want you to do well. If you find something especially challenging, please let me, Phyllis, and Bentley know and we will try to help!)
- Bentley Settin's office hours begin next Thursday (9/8), 12:30–1:30 pm, DL 105. This is specifically for working through data analysis assignments with assistance from someone who excelled in this class last year!

The International Argo Program





Watch: https://youtu.be/wVwO_VxY7NI



Important graph types for oceanographers

- Profile (midterm)
- Transect
- Section
- Time-series
- Property-property



Important graph types for oceanographers

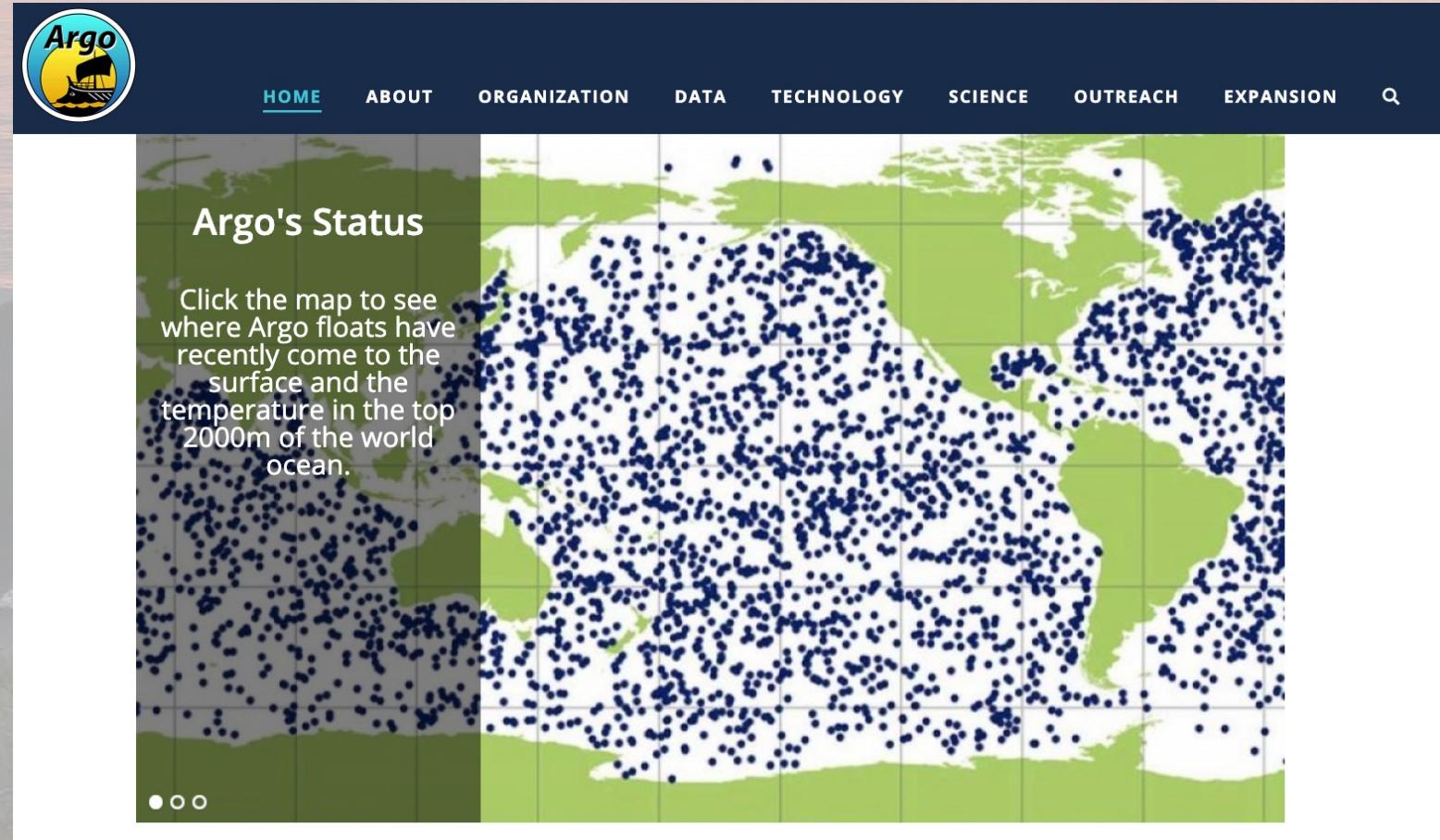
- Profile Elements
 - Y-axis is depth or pressure
 - Inverted, to show shallower (smaller numbers) on top and deeper (larger numbers) below
 - X-axis is variable of interest
- Key features
 - Surface mixed layer
 - 'clines (thermo-, halo-, pycno-, ...)
 - Deep layer
- Pay attention to length scales (is it meters, tens of meters, hundreds of meters?)
- Use physics as your guide (warmer and fresher waters will be less dense and will float; colder and saltier waters will be denser and will sink)

Data Explorations

Accompanies Sea Change, Box 1-1

Visit the Argo website:

<https://argo.ucsd.edu/>



Hover over “DATA” and select “Data Visualizations”

The image shows a screenshot of the Argo website's homepage. The header features a logo with the word "Argo" and a stylized ship icon, followed by a navigation bar with links: HOME, ABOUT, ORGANIZATION, DATA (which is underlined), TECHNOLOGY, SCIENCE, OUTREACH, NEXT PHASE, and a search icon. A large map of the world's oceans displays numerous blue dots representing Argo float locations. On the left side of the map, there is a callout box with the heading "Argo's Status" and the text: "Click the map to see where Argo floats have recently come to the surface and the temperature in the top 2000m of the world ocean." To the right of the map, a vertical sidebar lists several options under the "DATA" category, with "Data visualizations" highlighted in blue.

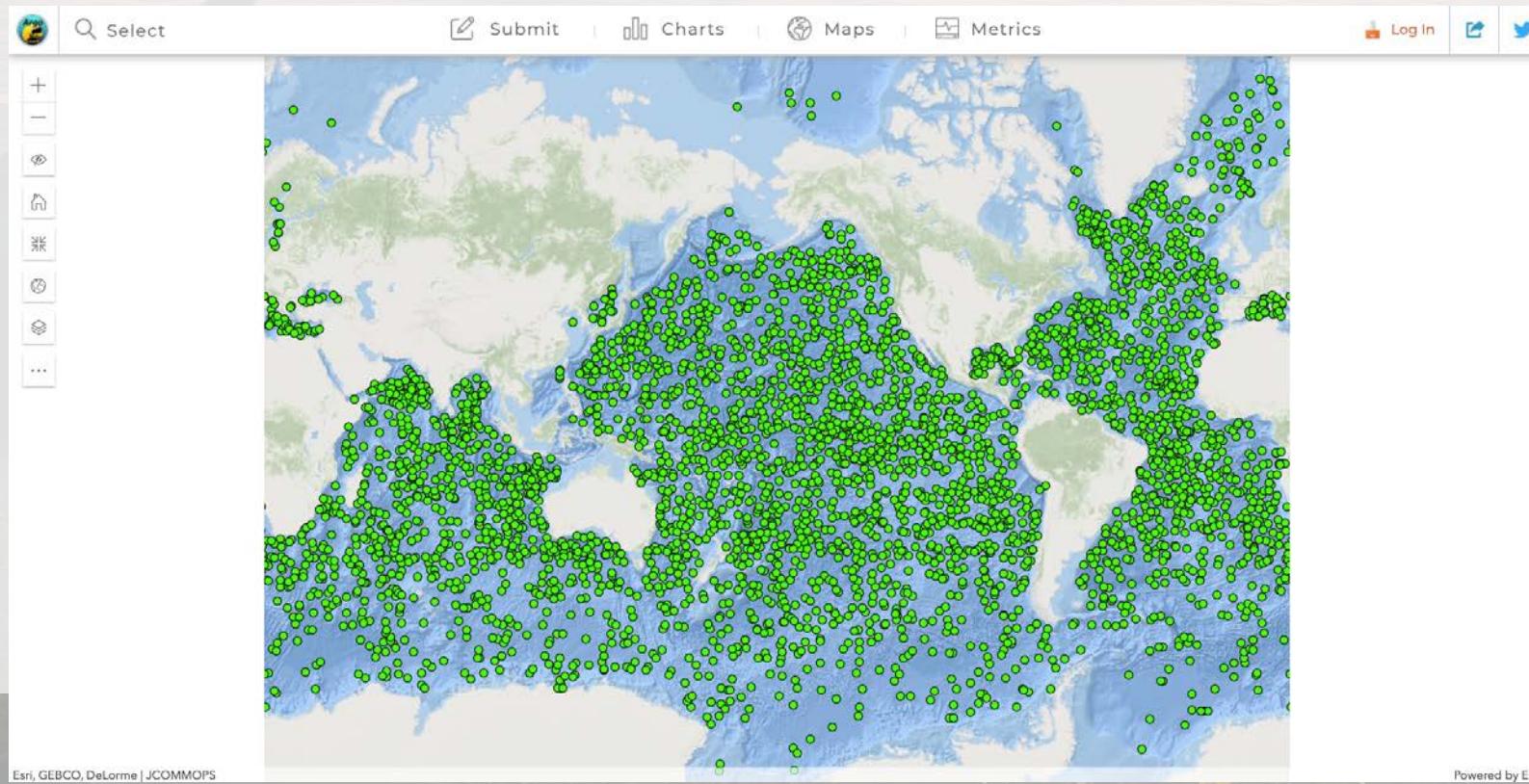
- How to use Argo data files
- Acknowledging Argo
- Data from GDACs
- Data on GTS
- Data FAQ
- Data visualizations**
- Data products
- Software tools

OceanOPS Dashboard

Get technical with the site used frequently by the Argo community, [OceanOPS Dashboard](#). Click on a float to pull up metadata, technical information and access to float data. There are many search options including by mission, program, transmission system, sensor, etc. Make plots or look at performance indicators based on your selection or view static maps and indicators produced monthly. Includes data figures produced by Ifremer and shown on several other visualizations

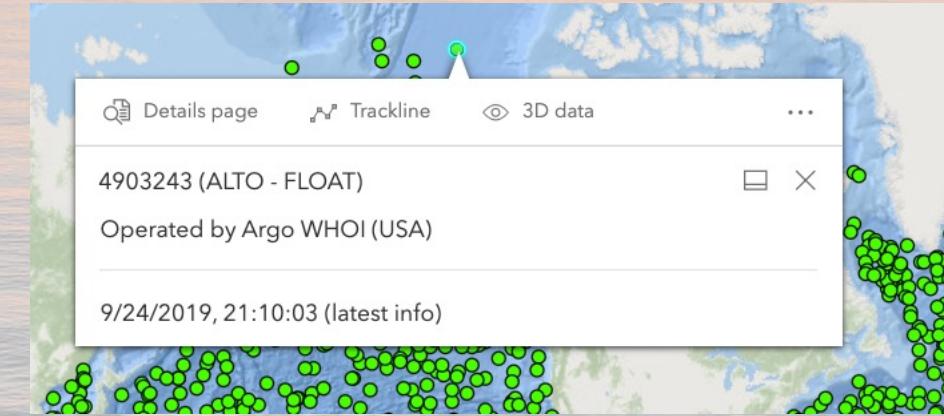
Argo community,
governmental
agencies global

- From Data Visualizations page, select OceanOPS Dashboard (this is the tool which many/most Argo data users access to get their data)



Select a float, note WMO ID

- Here's how to get WMO ID:
 1. Click a green dot in a region of interest
 2. Click "Details page" link
 3. Continued on next slide...



4. Copy WMO ID from that part of the form.

Inspect Float 4903243

About Event log Data QC Operator Media Adopt

Main information Set as sample | Set & View on map

Reference	4903243	WMO ID	4903243
Status	OPERATIONAL <small>i</small>	WIGOS ID	0-22000-0-4903243
Country	UNITED STATES (Argo WHOI)	View in OSCAR	
Model	ALTO (Float)	Telecom	IRIDIUM
		Networks	Argo Global
			Argo Core
		Ship	Argo
			USCGC HEALY (33HQ - United States)

Tracking lifecycle Trajectories (KML)

Deployed		Latest observation	
Latitude	75.4885	75.489	
Longitude	-144.152	-144.152	
Date	2019-09-25 01:30:00	2019-09-25 01:10:03	

Click Data tab on top



Scroll down to bottom

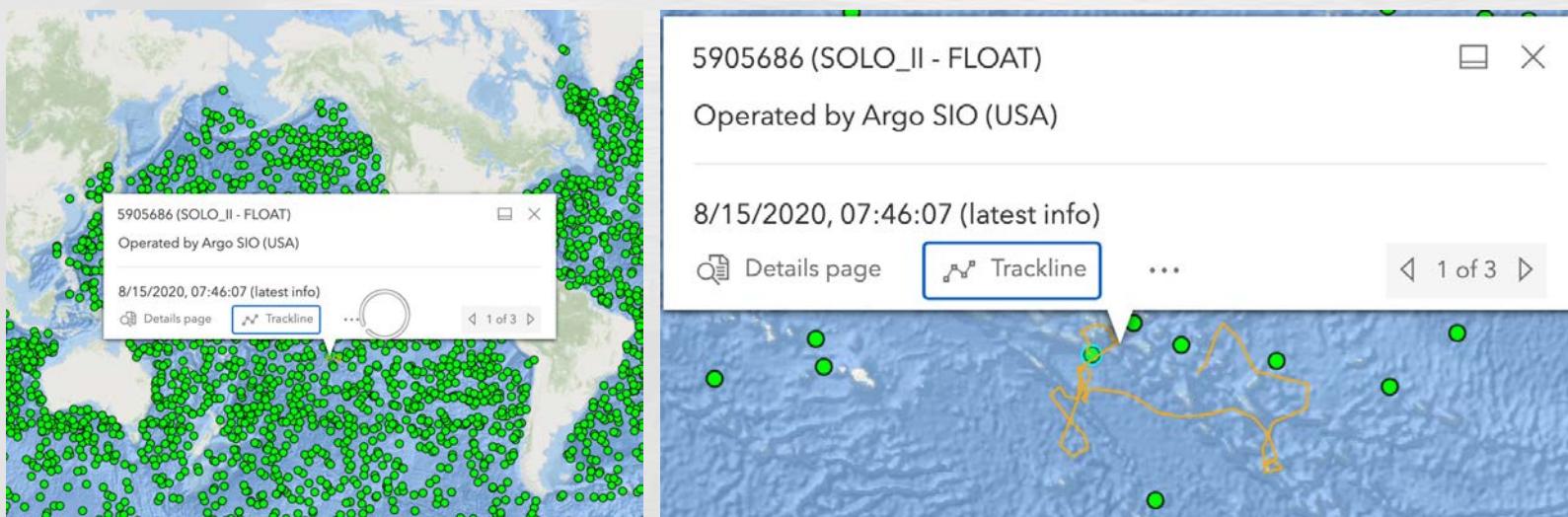
- Under Download sub-menu, click on Profiles TXT.

Assignment: Due by Sep. 9, 11:59 pm

- Submit in Canvas a 2–3 pages (12 pt font, single-spaced, 1" margins) analysis of your float including the following (these can be found on the various tabs of the Details page)
 - Your name and the date that you are submitting your report
 - WMO ID
 - An overview of the variables measured by that float (~ 1 sentence)
 - An overview of the networks that the float is a participant in (~ 1 sentence)
 - Two side-by-side images of float trajectory (screenshots)—see next slide
- Cont'd next slide...

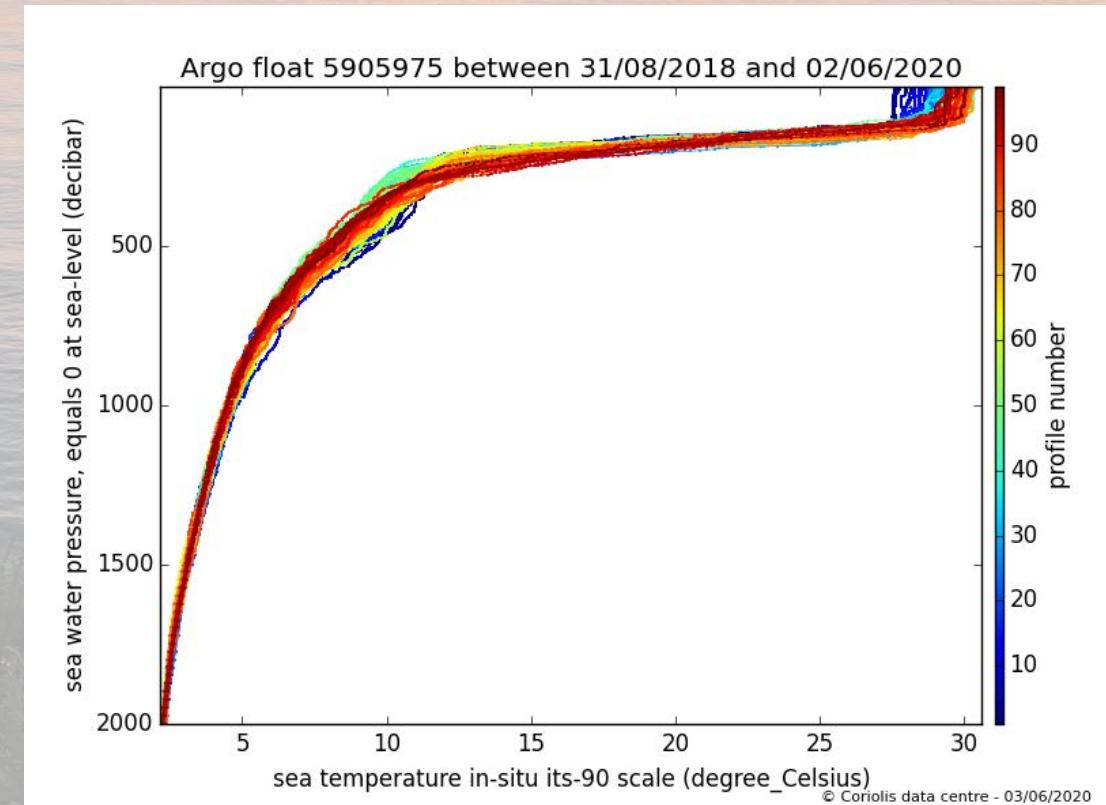
How to get float trajectory

- There are several ways but this is one of the easiest
- Show two side-by-side images of zoomed in and out so that we know where in the world it is and what its trajectory looks like



Analytical Procedure (Excel)

1. Using Excel, **create a figure** of depth (or pressure) vs. one of the main physical (temperature or salinity) or biogeochemical (e.g., oxygen, pH, chlorophyll, nitrate, suspended sediment, etc.) variables. The figure to the right is an example of that sort of figure.
Notes: you don't need to color code by profile number like the fig to the right. You also can plot just one profile rather than all of them in your file.
2. Depth MUST be on the y-axis; your variable on the x-axis. I will take off points if you do it the other way.
3. **Describe the variable** (e.g., on this slide, why does it say "its-90"?). How was it measured? Look up the sensor using the information on the Details page and describe the model number, manufacturer, other details on the sensor (how accurate does the manufacturer say it is)
4. **Describe the features** that you see in the profile(s). Are the profiles really similar to each other? Why or why not, do you think? What date range does your data file cover? How might that contribute? What spatial area does your data file cover (hint: put some lat/lon coordinates into Google Maps, Google Earth, or your tool of choice; also consider the trajectory images you've already created)



Final step: calculate heat content

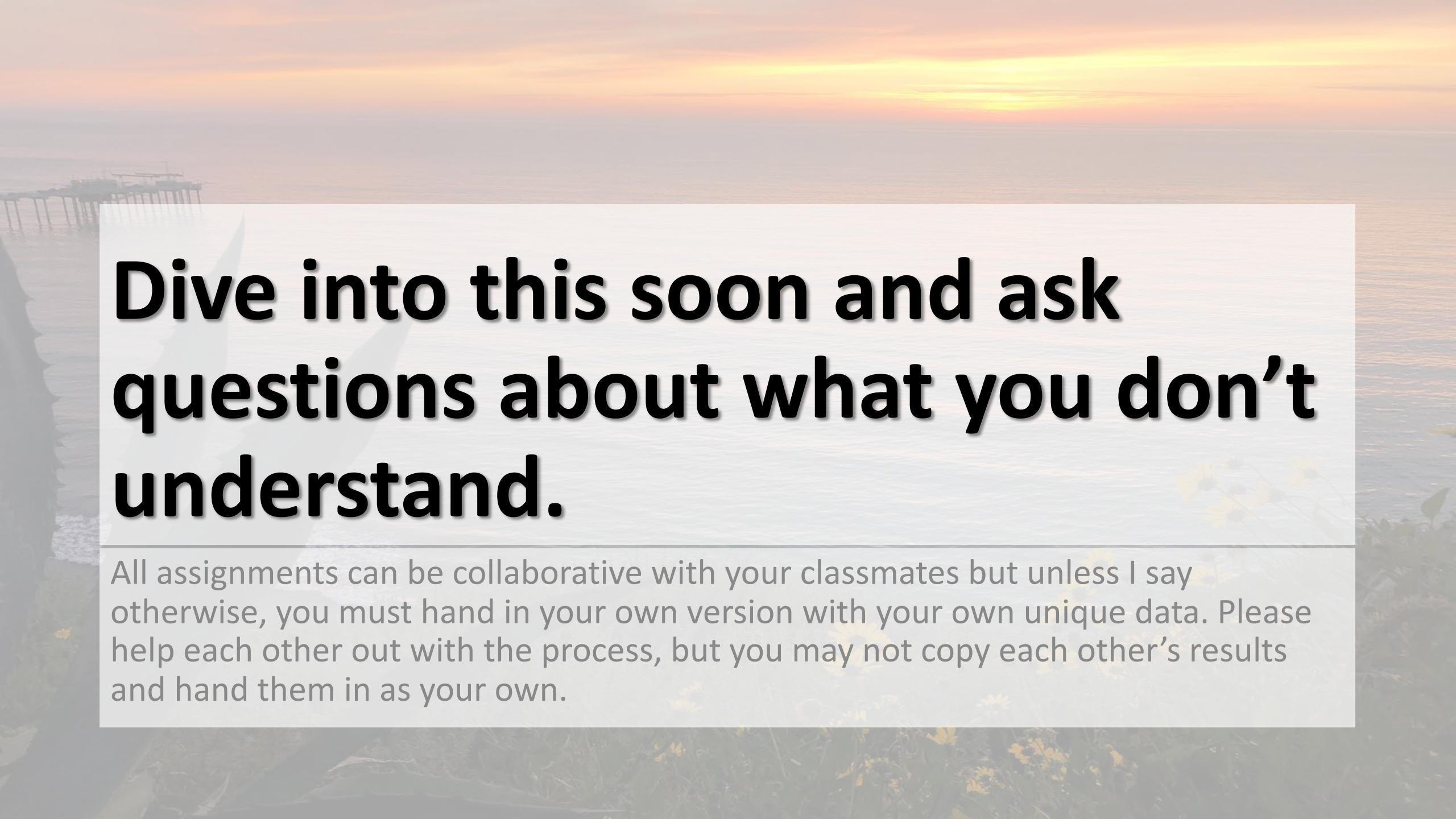
1. Every Argo float has temperature. Even if this was not your variable of choice for the previous analysis, locate the temperature column in the data you downloaded.
2. Locate the row number where the date changes (usually by about 10 days).
3. **Calculate and report** the average temperature over that first profile (i.e., from the top of the spreadsheet to the row just before it changes).
4. **Calculate and report** how much heat would have to be added to warm that water to an average temperature of 10 °C. Assume the float was measuring in a 1 m x 1 m (or 1 m²) box from 0–2,000 m deep
Use the specific heat (C_p) and density (ρ) from
http://sam.ucsd.edu/sio210/lect_2/lecture_2.html and the formula:
Heat added = ΔH = ρ * C_p * ΔT * V
CRITICAL: ΔT is not actual temperature; it's the difference between your average temperature from #3 and 10 °C (i.e., T_{avg_yourfloat} – 10)
Your answer should be in units of Joules

Important constants

- The density of seawater is about 1025 kg/m^3 and the specific heat is about 3850 J/(kg C) .
- From http://sam.ucsd.edu/sio210/lect_2/lecture_2.html

Grading

- Grading will be on a scale of 0–5
- I am looking for the ability to follow directions (and, of course, if you don't understand something, ask, but before the due date!)
- Accuracy matters. I will check your answers for the calculations.
- Aesthetics matter. Please label the figures that you generate with title, x and y axis labels. Please use captions below your figures that describe what the figure shows in just one or a couple sentences, even though you know that I might know what it shows.
- Submit as Word doc or PDF



**Dive into this soon and ask
questions about what you don't
understand.**

All assignments can be collaborative with your classmates but unless I say otherwise, you must hand in your own version with your own unique data. Please help each other out with the process, but you may not copy each other's results and hand them in as your own.

Additional notes for assignments

- Create a folder on your computer called “OCN350” (or similar)
- Within that folder, create a subfolder called “Analyses” (or similar)
- Within the OCN350/Analyses folder, put your raw data file (i.e., the CSV or TXT file)
- Open that file in Excel and then click “Save As,” save it as an .xlsx file, and choose a new name for it, like “HW02_ArgoData.xlsx”

HW 2 Data Explorations

More on Excel charts here: <https://support.microsoft.com/en-us/office/present-your-data-in-a-scatter-chart-or-a-line-chart-4570a80f-599a-4d6b-a155-104a9018b86e#:~:text=Select%20the%20data%20you%20want,Click%20Scatter.>