

Float on with Argo

Grades 9 - 12
Activity



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Main Objective

Learners dive into ocean monitoring with the international Argo project. Discover how scientists observe water properties like temperature and salinity to understand and monitor climate change. Explore scientific data collected by this program to become familiar with important oceanic measurements.

Learning Outcomes

(Suggested level grades 9 - 12)

- Explain the importance of ocean monitoring
- Identify one way that the international community monitors the ocean
- Interpret ocean data gathered by Argo floats
- *Optional Challenge:* Investigate scientific studies to learn more about the information Argo floats provide, and share your findings

Length of Activity: 4-6 hours

We recommend planning for each step to take at least one hour-long class.

Step 1+2: Intro to Ocean Monitoring and Argo (1-2 hours)

Step 3: Data Collection Practice (1 hour)

Step 4: Research (2-3 hours)

Materials Required

Internet enabled device(s)

Attached Worksheet as a Google Doc (or printed handout)

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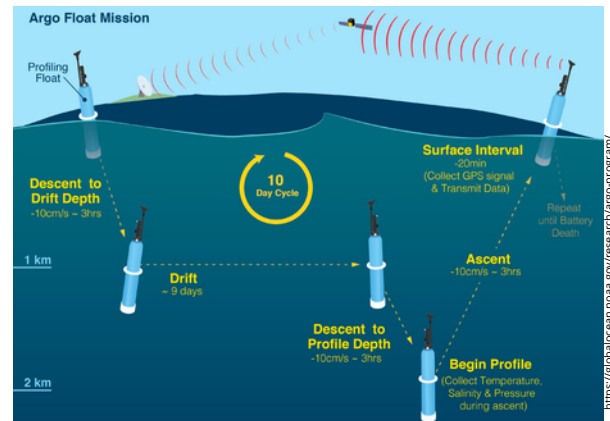
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Background Information

Ocean policy should be developed with accurate and detailed scientific evidence. How can scientists measure changes in the ocean over a long period of time? How can we track ocean conditions in detail with the international community?

In answer to these questions, the Argo International Program was started in 2000 by an international team of scientists to measure ocean water properties around the globe. This program has increased global marine knowledge with the help of over 30 countries that have now contributed to this program!



The Argo International Program is collecting information around the world! Robotic instruments called “floats” are launched into the ocean to help record information. These floats sink down into the ocean and collect data, before floating back to the surface approximately every 10 days to send the information they collect up to satellites. From the satellite, this data is first sent to regional data processing centres.

Once the data goes through strict quality checks, it is then shared with two global data centres that offer the information to the world- for free! All of this data can be used by scientists, governments, and the public to get a better understanding of our oceans, informing ocean policy and international ocean governance. The original Argo floats collected data about temperature and salinity - now, many groups are finding ways to add sensors to Argo floats! These new sensors help collect information about variables like pH, chlorophyll, and nitrate and oxygen concentrations.

Are you a fan of Greek mythology?

The name “Argo” came from the myth of Jason and the golden fleece! The array of floats are nicknamed after Jason’s ship, the Argo. And the satellites the floats send info to? They’re called the Jason earth observing satellites! To learn more about the Jason satellites, visit NASA’s page:

<https://sealevel.jpl.nasa.gov/missions/jason-1/summary/>

Activity

Step 1: Ocean Monitoring Video

Watch this video with your class to learn more about what ocean monitoring is, and why it is important:



[Ocean monitoring of Canada's West Coast](#)

While watching or reflecting on the video, consider sharing the guided note worksheet (attachment) with students for recording information in a way that works for them.

Step 2: Introduce the Argo International Program

Explore the Argo Story Map with students to learn how the international community has collaborated for over two decades to collect and share detailed information about the ocean:

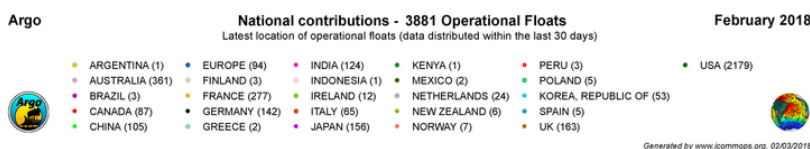
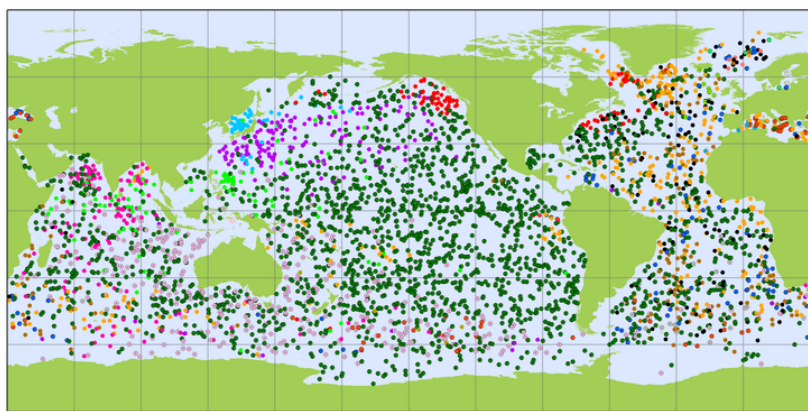


[Argo International Program Story Map](#)

Using this resource, students can add to the guided note worksheet to record and reflect on their understanding.

Step 3: Practice Collecting and Reading Data

Time to explore some data! Use the accompanying worksheet to encourage students to practice finding and reading data gathered from Argo floats.



There are many different filters you can apply, and you may wish to show your learners how to navigate the site to answer basic questions; for instance, check out the different national contributions from 2018! How does this information differ from today?

Watch out for bias!

“Bias” means a “systematic error introduced into sampling or testing by selecting or encouraging one outcome or answer over others” (Merriam-Webster, n.d.). In a scientific study, bias is important to think about and avoid.

For example, let’s pretend you conducted a study about students’ favourite movies at your school. You might personally think that Shrek is a great movie, and your hypothesis is that Shrek will be the favourite movie choice according to other students too. If you only ask the people you think also like Shrek for their answer, you are conducting a biased study - you’re not gathering data randomly and fairly, you’re choosing people you think will give you the answer you want. Even if Shrek actually IS the favourite movie at your school, you won’t know if your study is accurate, and people may not trust your findings if they know you only asked Shrek fans for their thoughts.

To help avoid bias, try to collect information without thinking about whether or not it proves your hypothesis, or if it matches what you think is the right or acceptable answer. In your Argo research, don’t change your mind if the data from the float you select isn’t what you’re expecting. Instead, record the information, and consider gathering data from more floats, or dates. More data points can give us a more detailed understanding of trends, and sometimes, things don’t go as expected!

Step 4: Data Gathering and Interpretation

When learners are feeling confident with using the data sites, they can choose a research question or design their own. They will collect data related to their chosen research question (we recommend using at least 20 data points in your research exercise). Then, guide them to interpret their data by graphing their findings and responding to a few questions.

 <https://dataselection.euro-argo.eu/>

Step 5 (Optional): Take it Further

For students looking to take their learning further, the Argo Project has a bibliography of published studies available! Students can explore the publications linked below to learn more about scientific writing, and how information collected by Argo floats is communicated.

 <https://argo.ucsd.edu/outreach/publications/bibliography/#2023>

References

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