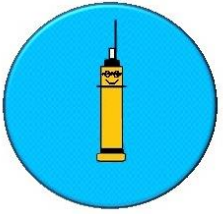


Integrating Ocean Observations in the School Curriculum



- Writing
- Reading
- Maths
- Science



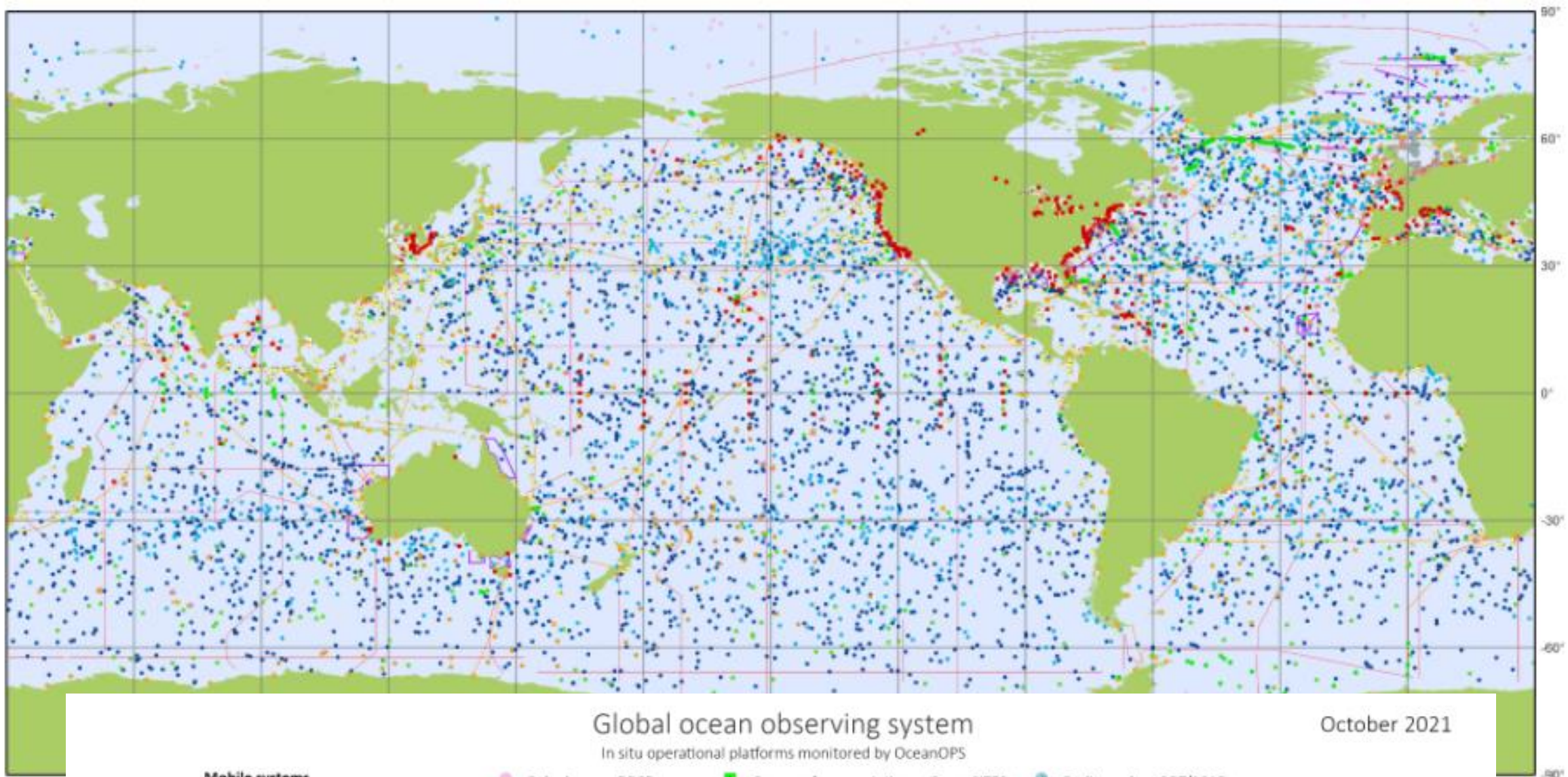
What	How does it work?
Argo Float on water?	Classenberger looks up the Argo Float and looks... ...the satellite.
Argo Float at sea on boat	Argo Float below to process... ...the satellite.
Argo Float deployed	Argo Float lowered over the side in... ...the float, against...
Argo Float at 1000m	The float sinks to 1000m for a... ...the water column.
Argo Float at 2000m	The float sinks to 2000m and... ...the water column.
Argo Float moving up the water column	On the next day, the Argo... ...the water column.
Argo Float sending data to satellite	The recorded data is transmitted... ...the satellite.
Scientists look at the Data Research Centre	Scientists check out the... ...the data.
Argo Float sinks back to 1000m	The float sinks back down to... ...the water column, repeating the...



Why observe the ocean?

- The ocean covers nearly 3 quarters of our planet's surface.
- We rely on it to support human life and our economic, cultural, social and environmental wellbeing.
- To get a better understanding of how society and all life on earth is affected by climate change.
- The ocean is a driving force for Earth's weather.





Global ocean observing system

October 2021

In situ operational platforms monitored by OceanOPS

Mobile systems

- Core floats - Argo
- Deep floats - Argo
- Biogeochemistry floats - Argo
- Underwater gliders - OceanGliders
- Drifting buoys - DBCP

Fixed systems

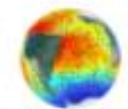
- Polar buoys - DBCP
- Animal borne sensors
- Tsunameters - DBCP
- Offshore platforms - DBCP
- Moored buoys - DBCP

Ship based measurements

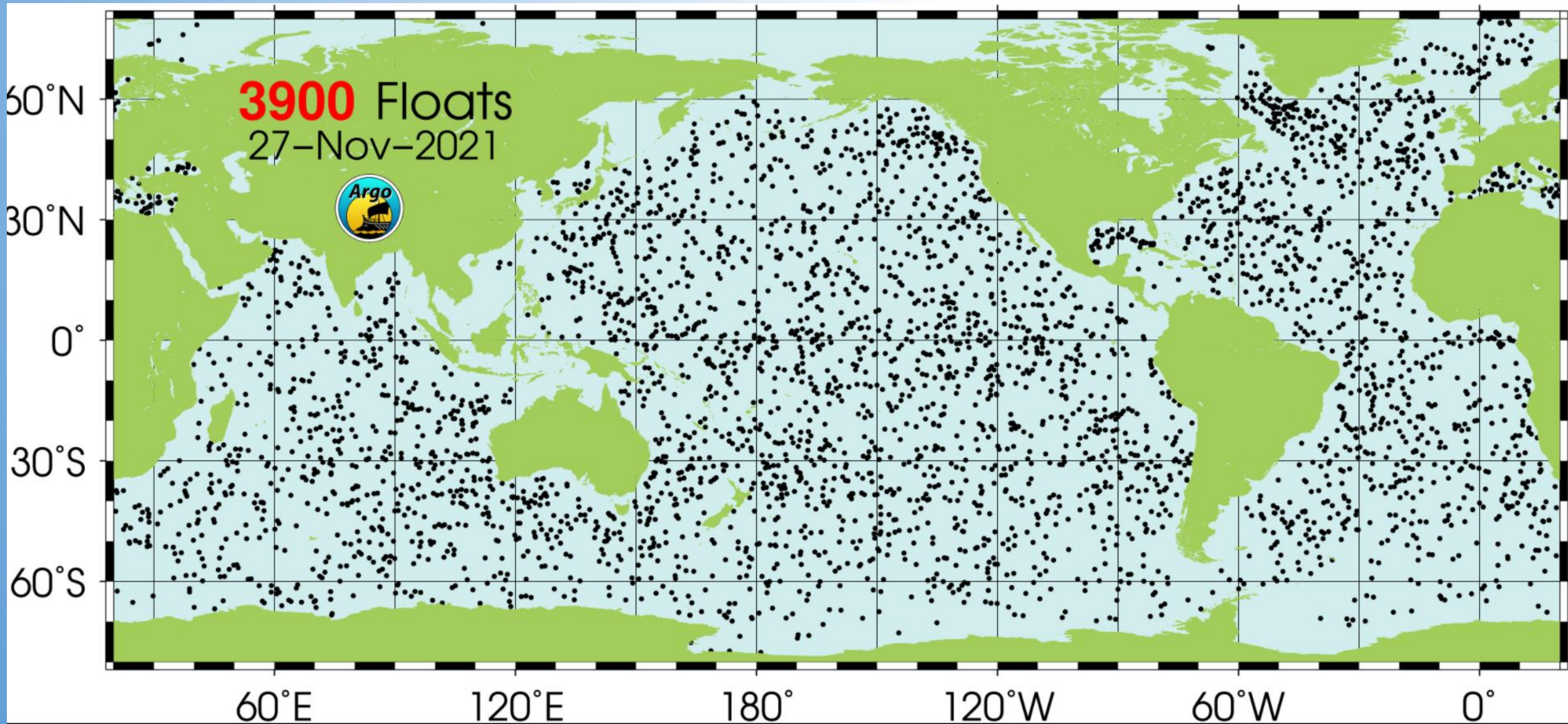
- Ocean reference stations - OceanSITES
- Sea level gauges - GLOSS
- High Frequency radars
- Manned weather stations - SOT/VOS
- Automated weather stations - SOT/VOS

Reference lines and areas

- Radiosondes - SOT/ASAP
- Repeat hydrography - GO-SHIP
- eXpendable BathyThermographs - SOT/SOOP
- Sampled sites - OceanGliders



Generated by ocean-ops.org, 2021-11-06
 Projection: World Plate Carree (-150.0000)



The Journey of an Argo Float...



The Argo Float is tested and activated on wharf



The Argo Float travels on a ship to location in ocean



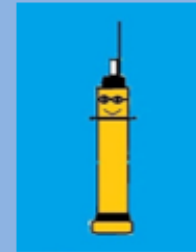
The Argo Float is deployed off side of ship



The Argo Float sinks back down to 1000m



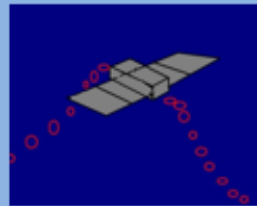
The Argo Float sinks to 1000m and floats with the current at this depth for 9 days

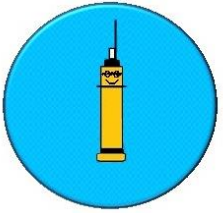


Information is then accessed by oceanographers and anyone else interested in the ocean

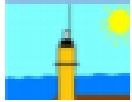
The Argo Float sends the data it has collected to a satellite

On the 10th day the Argo Float sinks to 2000m and for the next 10 hours, measures the temperature and salinity in the water column all the way to the surface





The Argo Float is tested and activated on the wharf.



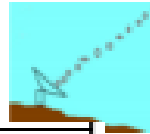
The Argo Float sinks to 1000m and floats with the current at this depth for 9 days.



On the 10th day the Argo Float sinks to 2000m (or deeper) and for the next 10 hours, measures the temperature and salinity in the water column all the way to the surface.



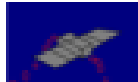
Information is accessed by oceanographers and anyone else interested in the ocean.



The Argo Float is deployed off the side of the ship.



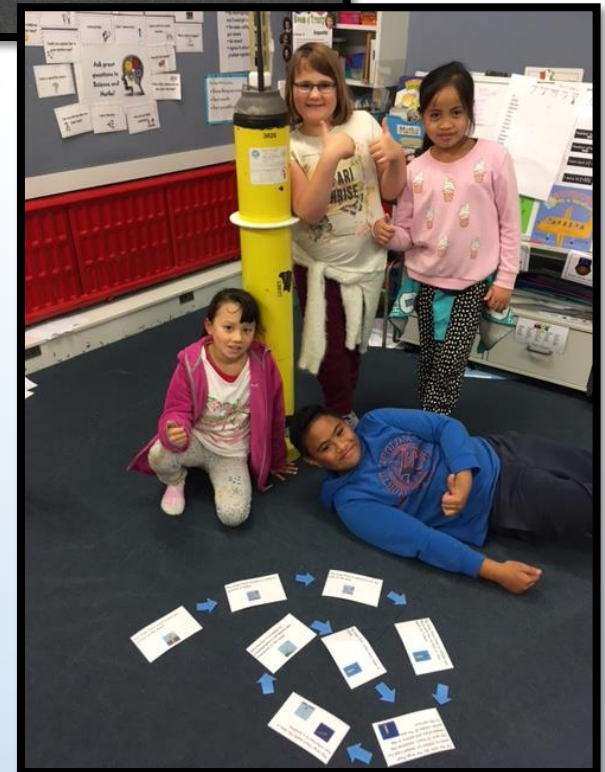
The Argo Float sends the data it has collected to a satellite.



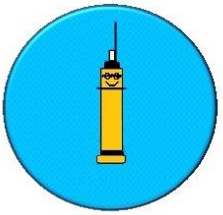
The Argo Float sinks back down to 1000m.



float travels on a ship to ocean.

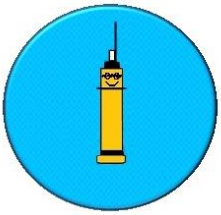


- Procedural writing
- Reluctant writers
- Engaging kids in things they are interested in



What	How come or why
Argo Float on wharf	Oceanographer 'wakes up' the Argo Float and links communication between the Float and the satellite
Argo Float at sea on boat	Argo Float taken to precise latitude location
Argo Float deployed	Argo Float lowered over the side in its cardboard box, the box disintegrates and the Float appears
Argo Float at 1000m	The Float sinks to 1000m for 9 days, following the ocean current

• Examples of kids writing



ARGO FLOATS

Name: MAXIM

at first an Argo float is delivered from it's factory to a port, there it is activated and tested. Next the float travels on a ship to a specific location in the ocean, there it is deployed off the ship either as it is or in a cardboard box. When the ship leaves the float starts it's journey. In the first day it sinks to one thousand meters

Argo Float

Name: Kemly

The Argo float is this really heavy thing. It gets taken on this ship. Then the ship drops the Argo float in the water. The Argo float sinks down and it measures the temperature. For 9 days. Then when 9 days have past. On the 10th day it sinks to 2000m. Then it comes back up and sends a message.

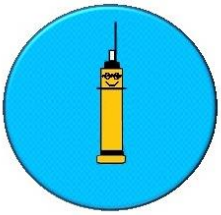
measure the temperature, salinity and water current. The Argo float is on the wharf where it is activated and tested with a magnet. The Argo float goes on a ship so it has its own specific place. It is deployed off the side of the ship because it doesn't have wheels. The float sinks down to 1000m and stays for 9 days so it can't hit the boats on the top. On the 10th day

Argo floats

Name: Hana age 6

Argo floats measure how warm or cold it is. All the colours are yellow, green, black, and grey. First it goes down to 1000 metres. On the tenth day it goes 2000 metres. This information gets sent off to a satellite in the sky and scientists use this to tell them what's happening in the ocean. The Argo float goes back down to 1000m for 9 more days while the Argo float goes with the ocean currents.

Reading



Teacher notes

Instructional focus – Reading

Science (Nature of Science, level 3 – Understanding about science: Appreciate that science is a way of explaining the world and that science knowledge changes over time.)

English (Level 3 – Ideas: Show a developing understanding of ideas within, across, and beyond texts.)

Text excerpts from "59.5 Degrees South"	Students (what they might do)	Teacher (possible deliberate acts of teaching)
<p>What is an Argo Float? Argo floats are special devices that measure the temperature and salinity of sea water. The data they collect is used by scientists around the world to learn more about the oceans. Today, Argo floats are adrift in the Southern Ocean. The floats are in containers that hold research vials.</p>	<p>The students use the heading, information from their prior knowledge of floats and buoys, the previous section of text, and the photos to form the hypothesis that Argo floats are used to collect scientific data.</p>	<p>PROMPT the students to slow down their reading and to make connections that will help them understand the text.</p> <ul style="list-style-type: none"> Think about floats – what do you already know about them? How might Argo floats be similar to ones you've seen in the sea? Keep the information you've already learnt in mind, both from this article and from your studies. Think about things you already know about sea temperature.

Text characteristics from the year 6 reading standard

figurative and/or ambiguous language that the context helps students to understand

some ideas and information that are conveyed indirectly and require students to infer by drawing on several related pieces of information in the text

ARGO ADAPTATIONS
Our trip to Antarctica is in March, at the end of summer. At night, we notice a little sea ice forming around our ship, warning that winter is on its way. During the winter months, the sun rises twice a day and sets for twenty-four hours a day. Without the sun, temperatures drop so low that the surface of the sea freezes over. The Argo floats that are in this area must stay well below the surface or they might be damaged by the ice.

The Argo floats we've released near Antarctica have special sea sensors. These check the water temperature each time the float ascends. If the temperature is close to freezing near the surface, the float returns to its parking depth a week later, it tries again. Sometimes it can take several months before the ice has melted and the Argo float can finally surface to send its data.

STILL AT SEA
Two days later, on our way home, Clive shows me a printout of the data from our sixth float. He's also printed a map that shows the Argo floats we've deployed. It's exciting to see – and just as exciting to imagine where our floats will go to sea! The best thing is that I can keep visiting the website (www.argo.ucsd.edu) to see for myself. But for now, I want to concentrate on the amazing environment that, tomorrow morning, we'll see as we arrive at Campbell Island. We'll get to visit an albatross colony, and we'll have a couple of days walking around on land. What a nice change that will make from these endless ocean views.

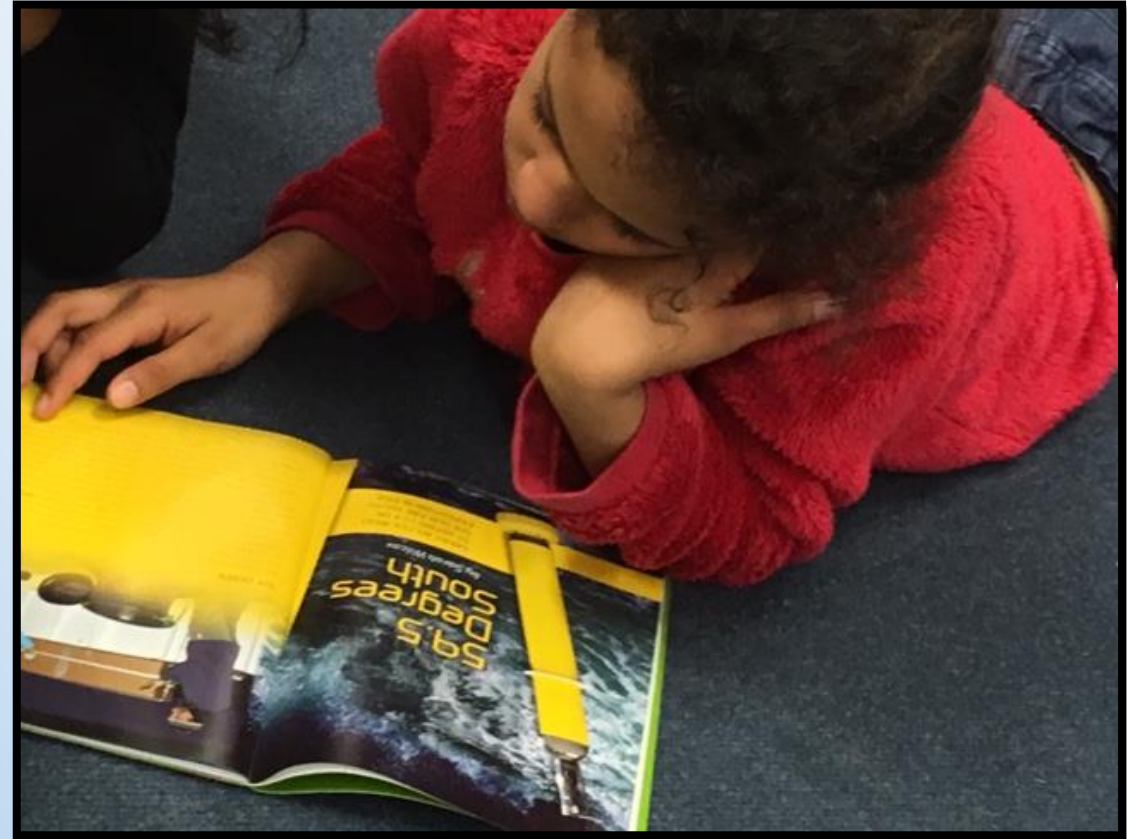
For the South Argo float deployment visit

Glossary
 current: water that flows along the same path
 eddy: a circular current, flowing in a different direction from the main current
 GPS: Global Positioning System
 salinity: the amount of salt in water
 tropic: the area on either side of the Equator, where it is warm all year round

sentences that vary in length and in structure (for example, sentences that begin in different ways and different kinds of complex sentences with a number of subordinate clauses)

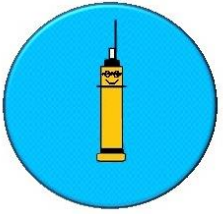
some information that is irrelevant to the identified purpose for reading (that is, some competing information), which students need to identify and reject as they integrate pieces of information in order to answer questions

illustrations, photographs, text boxes, diagrams, maps, charts, and graphs that clarify or extend the text and may require some interpretation



School Journal article - "59.5 Degrees South", School Journal, level 3, August 2013

Reading standard: by the end of year 6



www.sciencelearn.org.nz

← → ↻ sciencelearn.org.nz

Sci Science Learning Hub
Pokapū Akoranga Pūtaiao

Topics Concepts Citizen science Teacher PLD Glossary

Welcome to the Science Learning Hub Pokapū Akoranga Pūtaiao

Explore our New Zealand science education resources

What do you want to discover today?

Argo project

- Argo project Article >
- New Zealand and the Argo project Video >
- What we are learning from Argo Video >

SEE FULL SEARCH RESULTS GLOSSARY SEARCH

Ocean currents with different properties





- Field Trip Home**
- Teacher Support:**
 - Curriculum
 - Resources
 - Share and Support
- Prepare Students:**
 - Activities
 - Background: Easy
 - Background: Std
 - Glossary
- Field Trip**
 - Ambassadors
 - Audioconferences
 - Diaries
 - Evaluation & Prize
 - Experts and Careers
 - Newsletters
 - Panoramas
 - Photo Gallery
 - Questions and Answers
 - Videos

Argo Floats - tracking the pulse of world oceans



Welcome to the *Argo Floats* field trip taking place 16-25 June 2014. This LEARNZ field trip is supported by the New Zealand Ministry of Education, [NIWA](#) and [NOAA](#). For similar topics go to the [Field Trip Chooser](#).

Introduction

Argo Floats are mechanical robots that float in the oceans and send important information to satellites. This voyage onboard the *RV Tangaroa* will have scientists from NIWA, NOAA and [CSIRO](#) who will be deploying both 'regular' Argo Floats and a new Deep Argo Float that will descend to 5,500m below the surface.

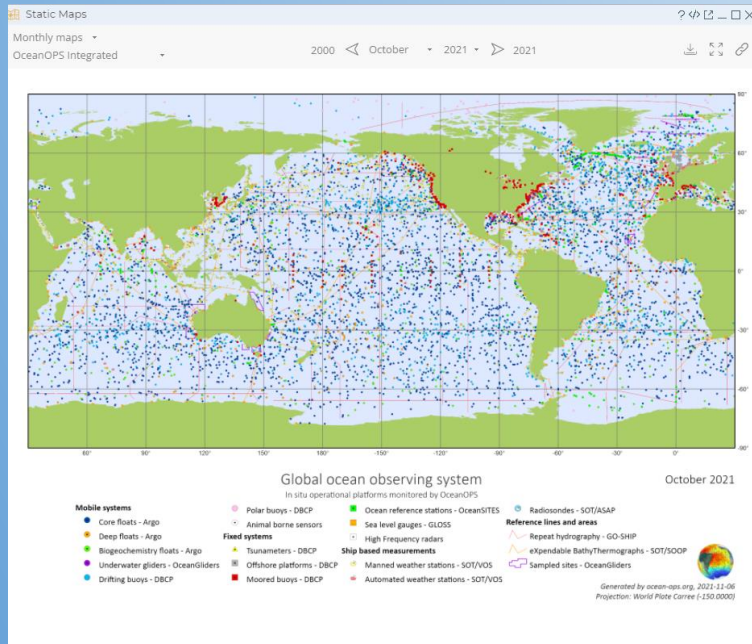
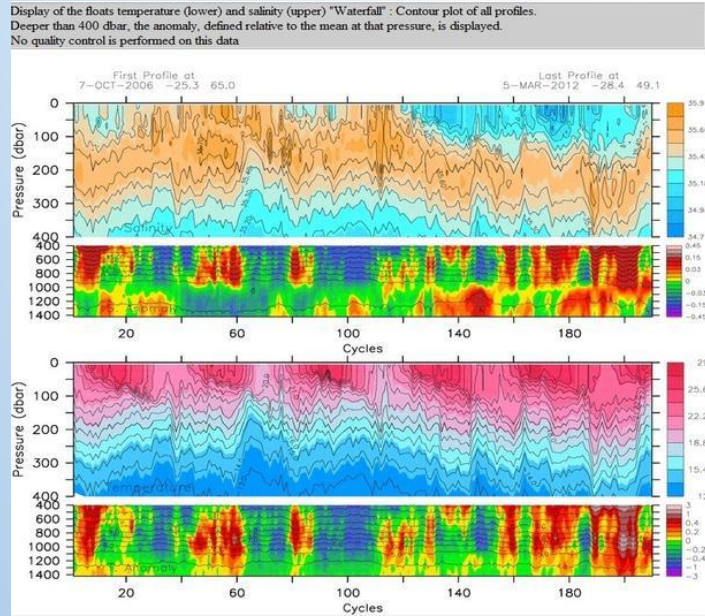
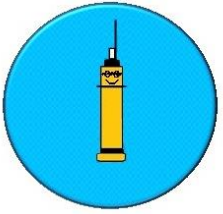
View the [preview slideshow](#) and watch the [intro video](#) for an overview of the field trip.

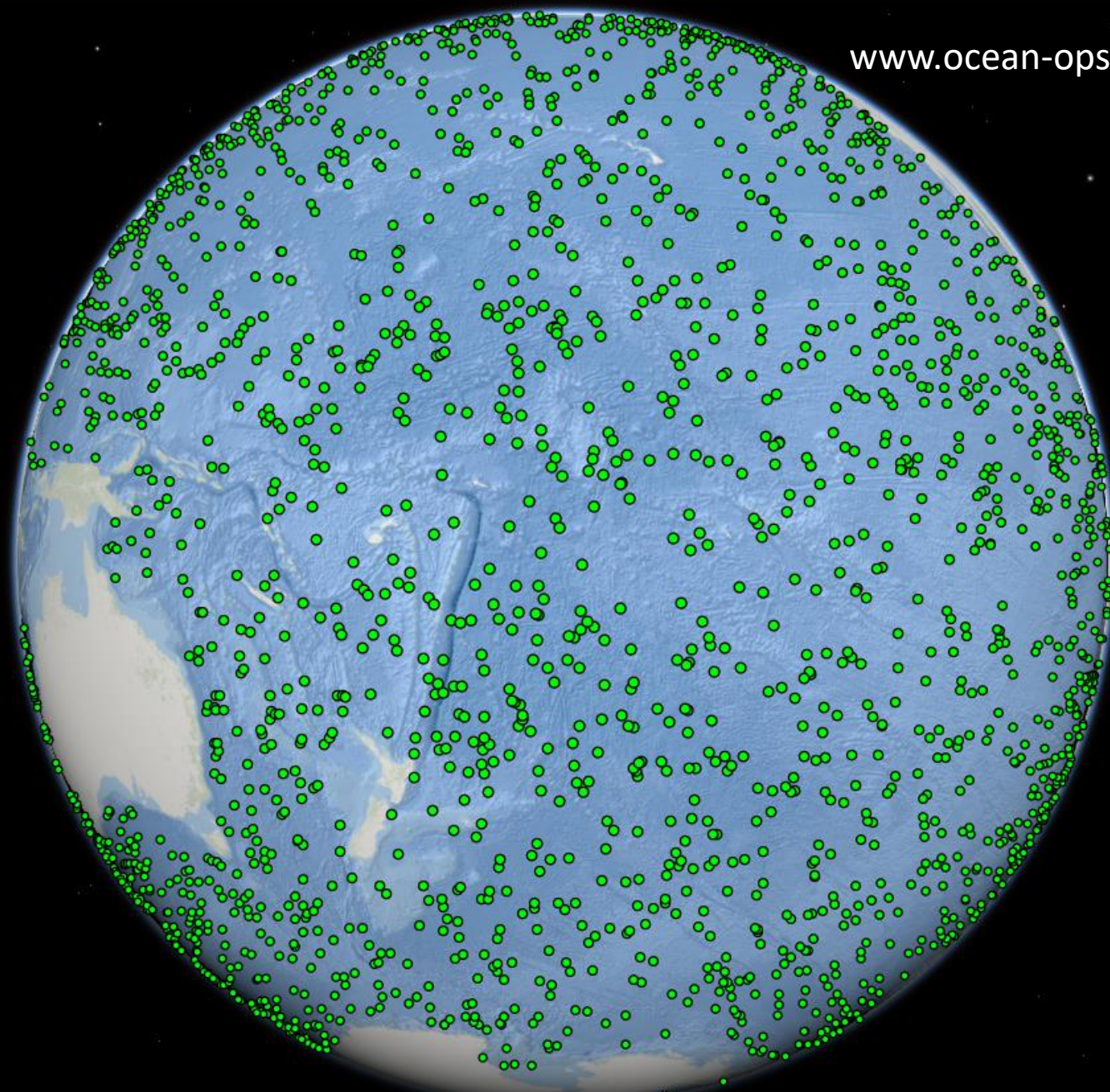
Location

Your journey starts in Wellington where you will board the *RV Tangaroa* for a 9-day voyage north-east toward the Kermadec Islands, where the sea floor is over 5,000m deep! You will return to Auckland on the 25th of June.

Maths Activities

- Measurement - depth
- Coordinates
- Interpreting graphs
- Temperature





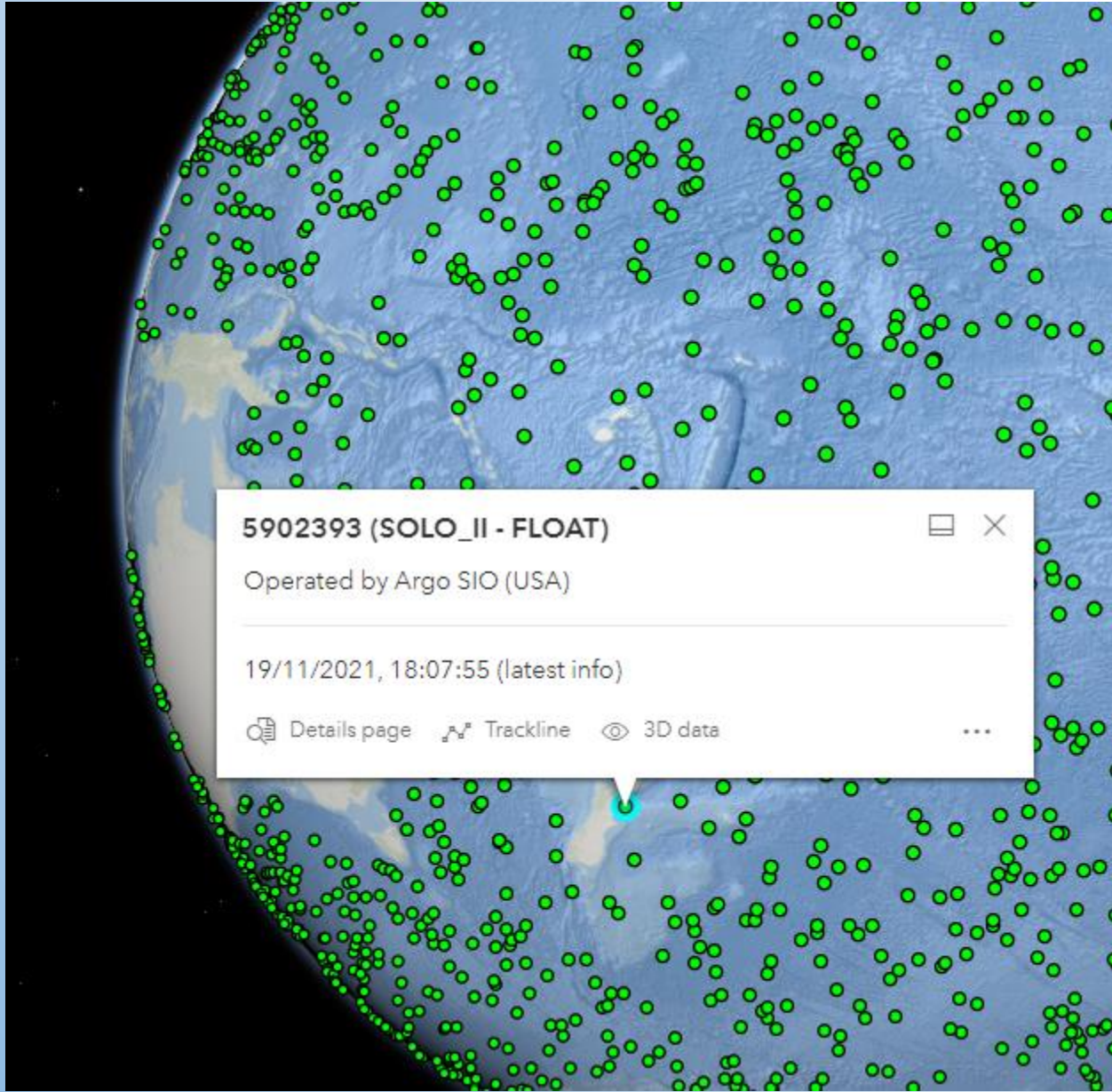
Map navigation and projection controls:

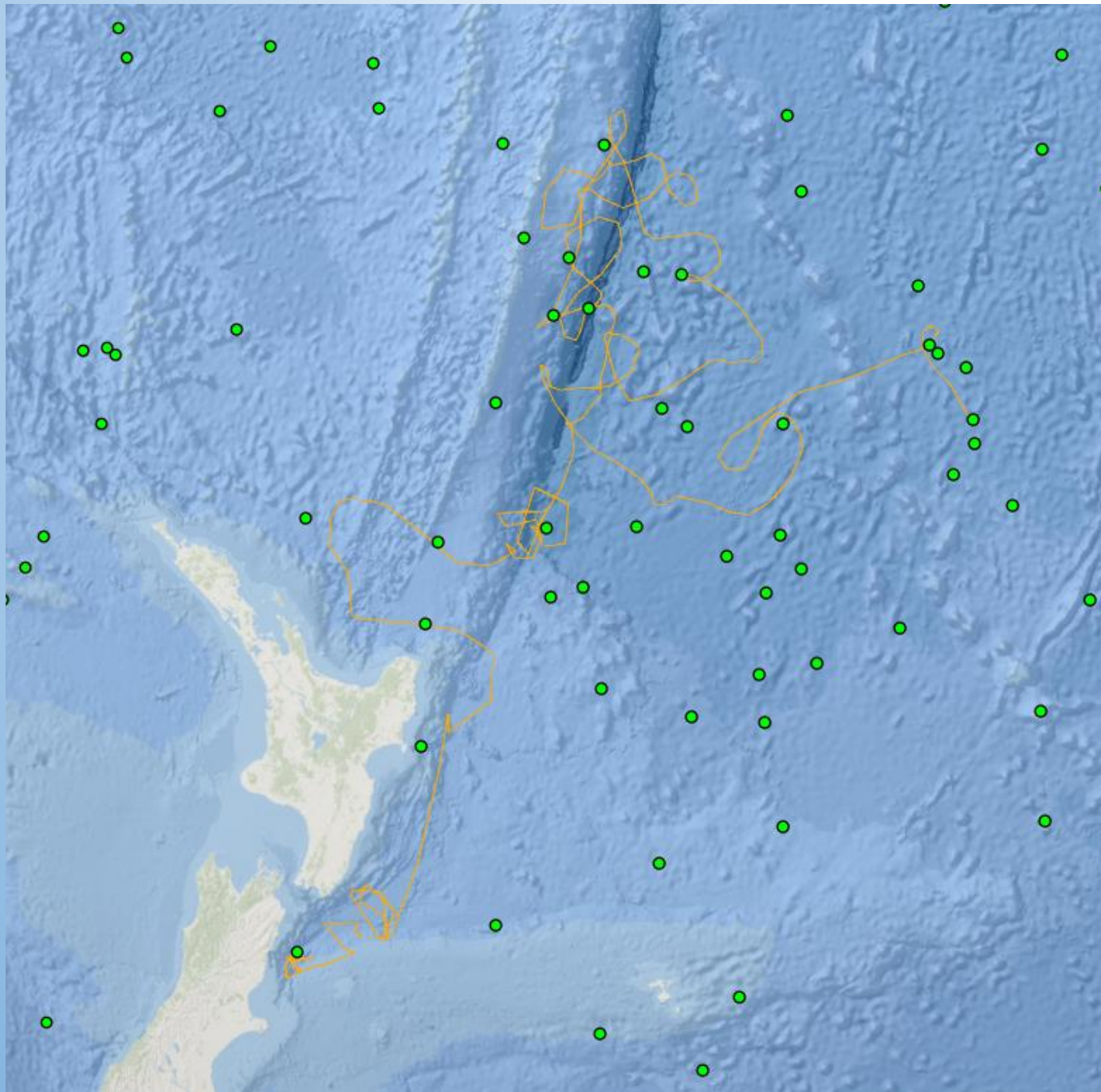
- Zoom in (+)
- Zoom out (-)
- Home (crosshair)
- Refresh (circular arrow)
- Compass (compass icon)
- Eye (visibility toggle)
- Projection menu (left arrow icon)
- Layers menu (stacked layers icon)
- More options (three dots)

Projection list:

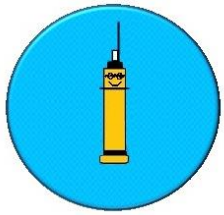
- Plate Carrée (origin = -150°)
- Web Mercator
- Plate Carrée
- UPS North
- UPS South
- Goode Homolosine
- Fuller
- Azimuthal
- Azimuthal (origin = -150°)
- Robinson (origin = -150°)
- 3D globe
- 3D flat
- Spilhaus

A red arrow points to the left arrow icon in the projection menu.

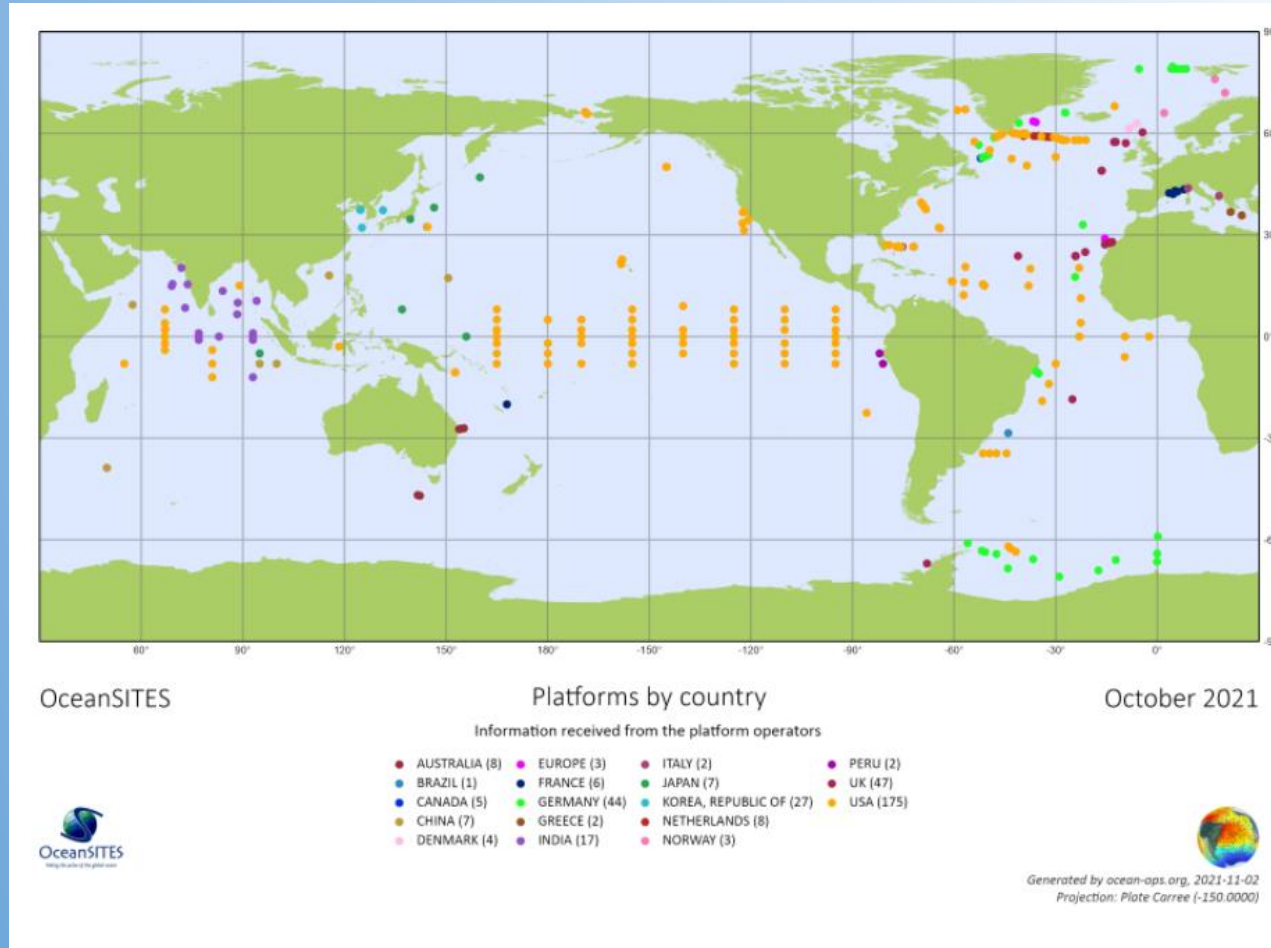




Map work and the international collaboration of countries



Just under 4000 floats, 34 countries



Argentina	Australia	Brazil	Bulgaria	Canada
Chile	China	Denmark	Ecuador	Europe
Finland	France	Gabon	Germany	Greece
India	Ireland	Italy	Japan	Kenya
Republic of Korea	Lebanon	Mauritius	Mexico	Netherlands
New Zealand	Norway	Peru	Poland	South Africa
Spain	Turkey	United Kingdom	United States	

Many other countries including Cook Islands, Fiji, Iceland, Indonesia, Kiribati, Marshall Islands, Micronesia, Mozambique, New Caledonia, Niue, Papua New Guinea, Russia, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, and Vanuatu have assisted greatly with float deployments using everything from small research vessels to huge container ships to aircraft.

Science experiments

Stacking Colours

What you need:

- Cups of coloured water – 1 with lots of salt, 1 with a bit of salt, 1 no salt
- Straws

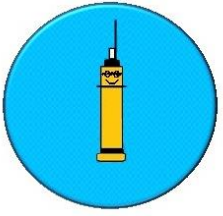


Density

What you need:

- Cup
- Golden Syrup
- Oil
- Coloured water
- Objects to float/sink

Blubber Hands

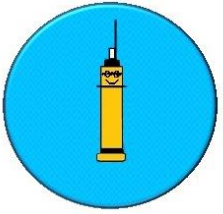


What you need:

- Ice water
- Disposable gloves
- Plastic Bag
- Lard



Science experiments



Hot Air/Cold Air

- Plastic bottle with balloon over end
- Small container of ice
- Small container of warm water



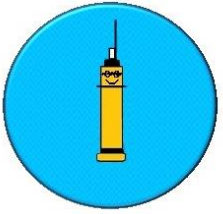
Salt Water

What you need:

- 2 jars of water – one with salt added
- Ice
- Food colouring



Science experiments



Cartesian Diver

What you need:

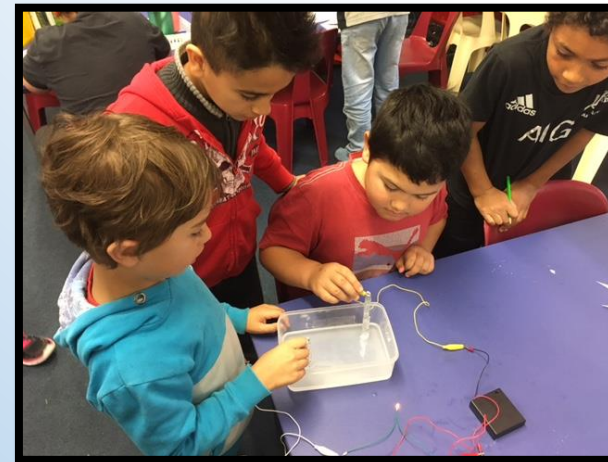
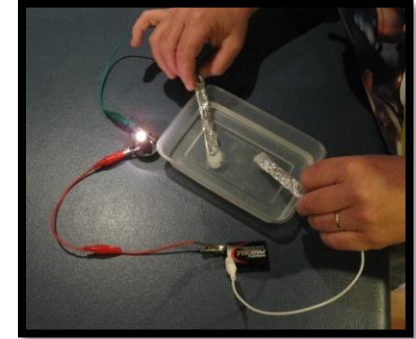
- Plastic bottle
- Bendy straw
- Paper clip
- Plasticine



Salt Water Circuit

What you need:

- Wire
- Light bulb
- Battery
- Ice block sticks
- Foil
- Salt water



argo.ucsd.edu/



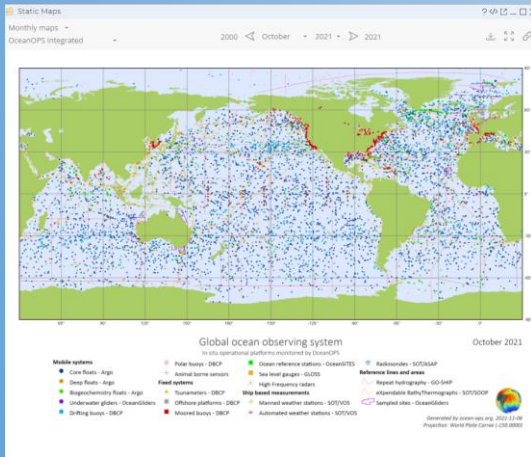
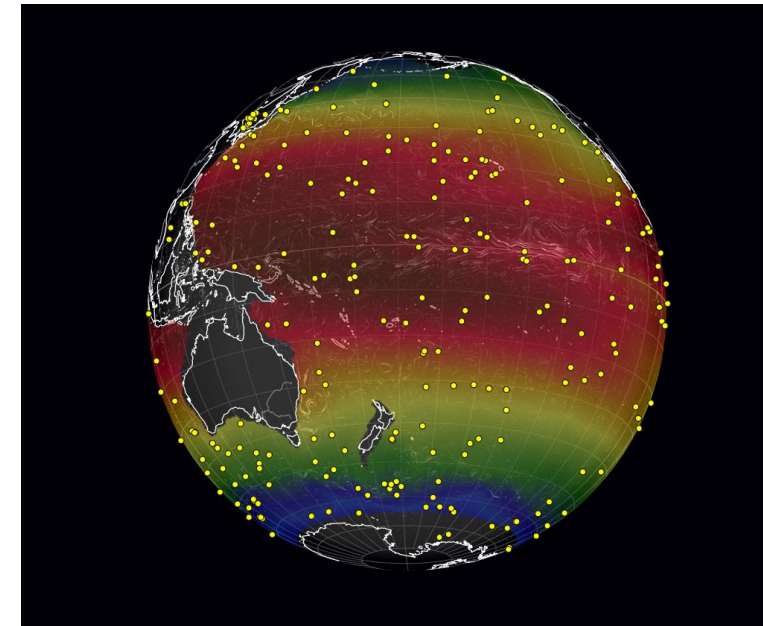
Data visualizations

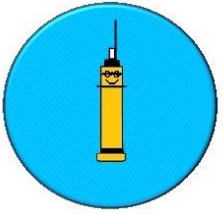
ARGO DATA DATA VISUALIZATIONS

Sometimes accessing and decoding the freely available Argo data files in NetCDF format can be difficult (see the quick start guide to get started) for those not familiar with the format or how to use the data. While there are existent data viewers like Ocean Data View (ODV) and Java Ocean Atlas (JOA) that can read in Argo profile data, several visualizations and web applications have been developed to help a wide range of users access and view Argo data. Browse through the table below to learn more about the available options. If you have a way to visualize Argo data that you would like added to the table below, email argo@ucsd.edu.

Compare visualization features here

Visualization	Description	Target Audience	Region
Argovis	Visualize temperature, salinity, and BGC data by location at argovis.colorado.edu or access data via an API. View float trajectory forecasts, compare gridded fields with Argovis' grid visualization module or co-locate Argo data with Atmospheric Rivers. Stay tuned for additional modules using satellite and other Earth science datasets. See the Argovis quickstart page for more information on its features.	Public, educators, Argo community, scientific community	global
Global Marine Argo Atlas	The Global Marine Argo Atlas makes it easy for users to look at Argo data and compare it to other global data sets in one free program. The Atlas, made to view gridded netCDF datasets, particularly Argo, Reynolds SST and Aviso altimetry, comes with the data already included and can be updated quarterly to receive new data as it becomes available. Note: the Atlas must be downloaded and the large dataset takes up a few GBs. The Windows version uses an old version of the graphing program and no longer has full capability for some difficult computations. Please consider Argovis's gridded module instead.	Public, educators, Argo community, scientific community	global
Mon Océan et moi website	Mon océan et moi (My Ocean and Me) & Adopt a Float are France-based educational projects designed specifically to raise students awareness of ocean science and help students follow floats in the ocean. Explore the interactive map showing BGC Argo float locations and figures of BGC Argo data.	Public & educators	global
Earthnullschool.net	If you want to see how ocean currents move in real time across the globe, check out Earth Null School . Used by classrooms to study weather and climate, this data viz site now has a beta version of Argo data available at this link . Note: this is a beta version with limited Argo data.	Public & educators	global
Argo Google Earth Layer	Monitor the Argo network in real-time using Google Earth software (GE). This Argo layer for Google Earth shows the positions of all active and inactive floats, features stories about a select number of floats and shows where floats will be deployed. Includes data figures produced by Ifremer and shown on several other visualizations. Note: it is no longer well supported. Please consider Argovis, EuroArgo Dashboard or JCOMMOPS instead.	Public, educators, Argo community, governmental agencies	global
EuroArgo Dashboard	The EuroArgo dashboard provides an interactive map interface that features metadata and technical data used mostly by the Argo community, but also float locations, trajectories and figures. It is the only site that tracks float battery life and other technical aspects of floats, making it an excellent tool to monitor the health of the Argo fleet. Includes data figures produced by Ifremer and shown on several other visualizations	Argo community	global
EuroArgo Selection Tool	The EuroArgo Selection Tool provides an interactive map interface that allows users to click on individual float locations and to make regional selections. There are also options to select what parameters users would like, the data quality mode and time period of interest. Users can select to download the data chosen in csv, Argo netCDF or Copernicus netCDF format.	Public, educators, Argo community, scientific community	global
Indian Argo Tableau	Get a dashboard view of the spatial distribution, DAC distribution and status of Argo floats using Indian Argo Tableau .	Argo community	global
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
Ocean Navigator	Compare model results that use Argo data on the Canada Ocean Navigator . Stay tuned as this site develops a tool to compare real observations to model data.	Scientific community	Northern hemisphere





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 @cbrieseman

<https://sites.google.com/view/argofloats>

