

Float transmits data to users via satellite

Descent to depth: 6 hours

1,000m: drift approx. 9 days


Total cycle time: 10 days

Temperature and salinity profiles are recorded during ascent: 6 hours

Float descends to begin profile from a greater depth: 2,000m

ARGO

Argo makes visible large-scale ocean and climate features, properties and processes that were once hidden from scientists. The Argo network has enabled new revelations about ocean properties and dynamics that are transforming our ability to understand and forecast global climate and its changes.

An underwater photograph of an Argo float. The float is a white cylindrical instrument with a red buoy on top. A person is visible on the surface of the water, looking down at the float. The water is clear and blue.

As satellites have revolutionized systematic observations of the ocean's surface, so Argo has transformed how we observe and monitor the ocean below the sea surface. The Argo Program makes data it collects easily accessible to all who wish to study them.

THE ARGO MISSION

The Argo Program is a global array of 3,800 free-drifting instruments, spaced about every 3° of latitude and longitude, including in the seasonal sea-ice zone and marginal seas. The floats move up and down in the water column from the sea surface to 2,000 meters every 10 days and collect up to 1,000 measurements of temperature, salinity and depth. Argo provides the first ever global-scale, all-weather, all-season subsurface observations of the oceans.

Before Argo, the temperature and salinity of the subsurface oceans could only be measured from ships

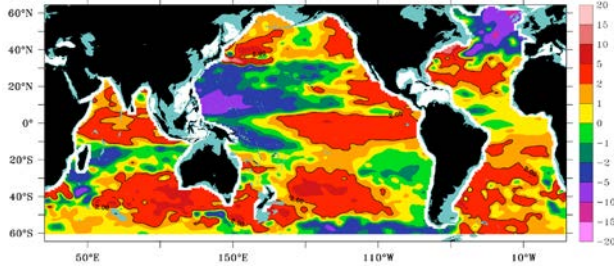
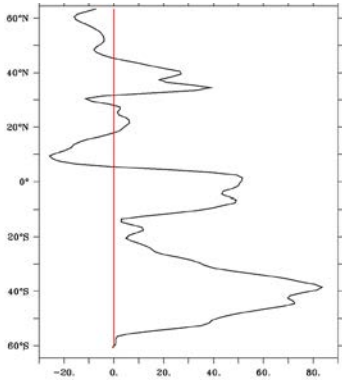
or fixed point moorings. Since the first Argo float deployments in late 1999, over 1.6 million profiles have been collected which more than doubles the number from research vessels during all of the 20th century. Each year, Argo adds more than 120,000 new profiles.

Pilot programs to enhance the core Argo Program are in various stages of development. Some of these enhancements include floats sampling deeper than 2,000 meters, carrying additional sensors to measure biogeochemical parameters, and increased coverage in polar regions and in areas of the ocean with high variability.



Right, 0-2000 dbar zonally summed heat gain (MW per meter of latitude)

Below, 0-2000 heat gain (W/m^2), based on linear regression, 2006 – 4/2016. The contour lines indicate regions greater than $2 W/m^2$. Note the strong warming in the mid-latitude Southern Hemisphere. Trends over the 10-year record are influenced by interannual variability.



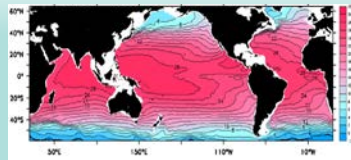
ARGO AND OCEAN RESEARCH

Argo provides an unprecedented dataset which is freely available for researchers studying the temperature, salinity, and circulation of the global oceans and how these change over periods ranging from days to decades. There is an unprecedented opportunity to map the detailed structure of the ocean, at both surface and subsurface levels, and both globally and locally. These estimates allow the development of climate indicators such as the recent changes in ocean heat content and sea level.

Oceans moderate the climate by storing heat and moving it from the tropics to mid-latitudes. More than 90 percent of the heat absorbed by the Earth over the past 50 years is stored in the oceans.

Changes in ocean salinity observed by Argo reveal variations in the hydrological cycle – the oceans become fresher where rainfall increases and saltier where it decreases. Observed trends could have global-scale consequences for rainfall and drought patterns.

Argo data are used to study water mass characteristics and ocean variability ranging from meso-scale eddies, to the seasonal cycle, to interannual variability (e.g. El Niño), and climate variations at decadal time scales.



The temperature of the sea surface is the temperature at the base of the atmosphere and determines evaporation and hence the Earth's water cycle. Warming and expansion of sea water accounts for 1/3 of global sea-level rise. Ocean temperature is a fundamental index of the state of climate.



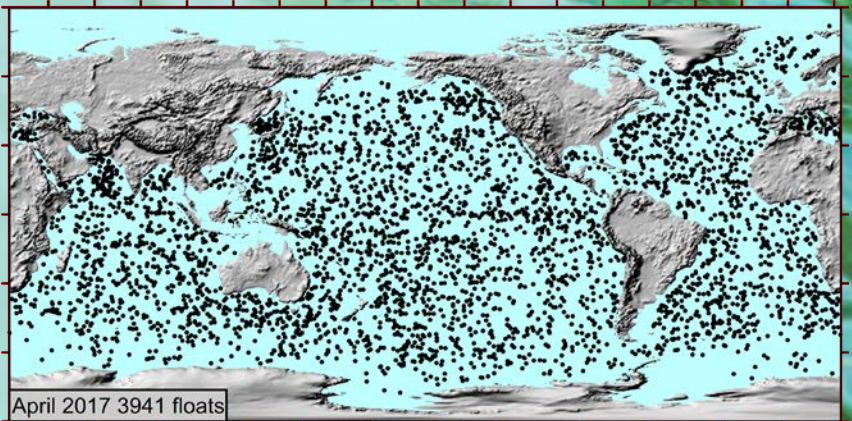
A BGC float sensor head on the left, and a Core Argo one on the right

OPERATIONAL APPLICATIONS OF ARGO

Argo data are now vital for climate and ocean forecasting services (from days to years), which are used for many applications such as search and rescue, through crop management, and disaster preparedness.

THE VALUE OF ARGO IN OCEAN LITERACY

High school students, university undergraduates, graduate students, and postdoctoral investigators are using Argo from their desktops to explore the global ocean and its evolution.

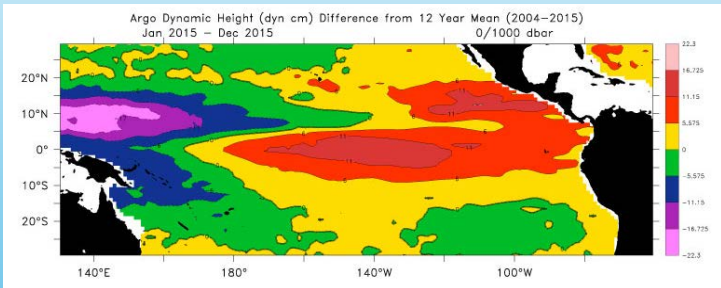
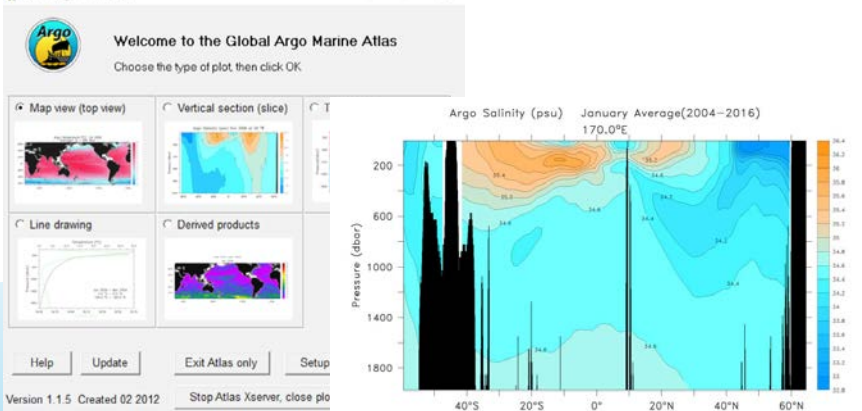


THE INTERNATIONAL ARGO PARTNERSHIP



Argo is a global collaborative partnership where contributing nations deploy and operate floats, manage data and quality control, and ensure real-time delivery of data. As a novel and global data source Argo has become the central element in operational oceanography, basic research and ocean literacy. Argo is a key component of the Global Ocean Observing System.

Countries currently involved in Argo include: Argentina, Australia, Brazil, Bulgaria, Canada, China, Ecuador, Finland, France, Germany, Greece, India, Ireland, Italy, Japan, Kenya, Mauritius, Mexico, Netherlands, New Zealand, Norway, Poland, South Africa, South Korea, Spain, Turkey, UK, and USA.



The Global Marine Argo Atlas makes it possible to create plots of Argo data using a simple, free interface. The Atlas is available at http://www.argo.ucsd.edu/Marine_Atlas.html and is updated monthly.

Where can I learn more about Argo data?

The Argo Steering Team website gives information on the Program, its data and how to use it. <http://www.argo.ucsd.edu>

Where can I access Argo monitoring tools?

The JCOMMOPS Argo Information Centre tracks the array in real time and provides, through its website, a wide range of monitoring tools, including maps and statistics. The innovative website enables the discovery of Argo floats and observations through an advanced search engine. <http://argo.jcommops.org>

Where can I access Argo data?

All Argo data are made publicly available as quickly as possible, usually within 24 hours of collection. Argo data can be accessed via <http://www.argo.net>, <http://doi.org/10.17882/42182>



<http://www.argo.net>

Argo Project Office: argo@ucsd.edu

Argo Information Centre: argo@jcommops.org