


# ONE million

*In recognition of Argo's collection of 1,000,000 temperature/salinity profiles, each of which consists of up to 1,000 measurements of temperature and salinity at varying depths.*



*As satellites have revolutionized systematic observations of the surface of the oceans, so Argo has transformed how we observe and monitor the oceans below the sea surface, making data that were once impossible to acquire now in easy reach to all who wish to study them.*

# THE ARGO MISSION

**The Argo Program** is a global array of 3,500 free-drifting instruments, spaced about every 3° of latitude and longitude, moving up and down in the water column from the sea surface to 2,000 meters (6,500 feet) every 10 days, and making up to 1,000 measurements of temperature, salinity, and depth during every ascent to the sea surface. Argo provides the first-ever global-scale, all-weather 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. **The first**

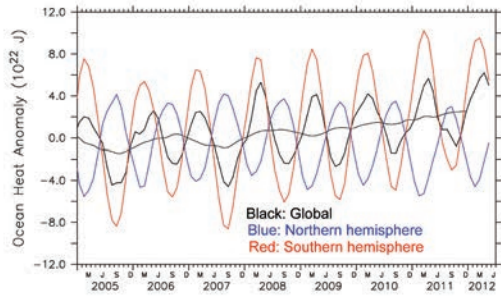
**Argo floats were deployed in late 1999, and by November 2012, Argo had collected its millionth profile, twice the number obtained by research vessels during all of the 20<sup>th</sup> century.** Argo is collecting 120,000 new profiles every year.

**Argo sampling** is global and year-round. Previously there were many fewer observations in the southern hemisphere than in the northern, and many fewer in winter than in summer.

**In the future**, while sustaining present Argo observations, new Argo floats will also sample far below 2,000 meters to the ocean bottom, and many Argo floats will carry new sensors to measure biological and



*By measuring ocean temperature and salinity, Argo tracks the changes in heat content and the balance between rainfall and evaporation (net freshwater input) on a regional and global basis. Below right, we see the pronounced annual variability and the steady warming of the global ocean.*



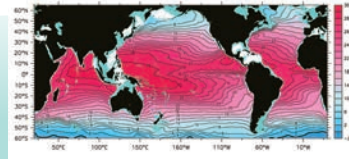
## ARGO AND OCEAN RESEARCH

**Argo provides an unprecedented dataset** for researchers studying the temperature, salinity, and circulation of the global oceans and how these change over periods ranging from days to decades. Argo data are compared with other Argo data to reveal recent variability, or by comparison with historical datasets show multi-decadal changes.

**Oceans moderate** the planet's 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 relative to evaporation, and saltier where it decreases. Observed trends could have global-scale consequences for rainfall and drought patterns.

**Argo data are also used** to study ocean circulation, water mass characteristics, and ocean variability ranging from mesoscale eddies, to the seasonal cycle, to interannual variability (e.g. El Niño), and decadal oscillations (e.g. Pacific Decadal Oscillation, Southern Annular Mode).



*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 .*

## OPERATIONAL APPLICATIONS OF ARGO

Argo data, along with satellite and other ocean data, feed into regional and global forecast models used for ocean and climate prediction over seasons, years, and decades.



## THE VALUE OF ARGO IN EDUCATION AND OUTREACH

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



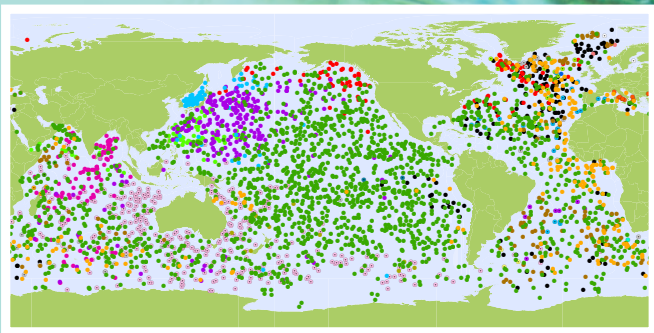
## ACCESS TO ARGO DATA AND FURTHER INFORMATION

### *Where can I learn more about the Argo Program?*

Information on the Argo Program is available from the International Argo Project Office and from the Argo Information Center. For both of these, see <http://www.argo.net>



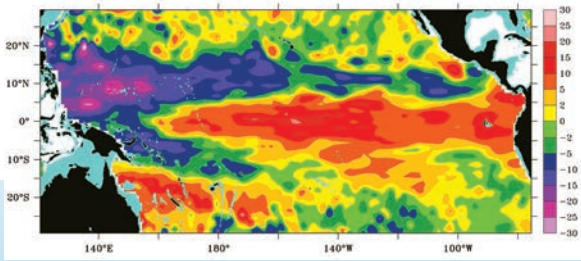
*Below, the most recent position of each active Argo float is indicated, with different colors representing floats provided by different nations.*



# THE INTERNATIONAL ARGO PARTNERSHIP



**Argo is a collaborative partnership** of more than 30 nations from all continents, all working together to provide a seamless global array of over 3,000 floats collecting more than 120,000 temperature/salinity/depth profiles every year. National contributions to Argo include building, deploying, and operating floats, data management and quality control, and communications. As a novel, global data source Argo has also become a central element in operational oceanography and in basic research and has great value in education. Argo is a key component of the Global Ocean Observing System.



*Argo measures the variations in sea level due to temperature and salinity changes. This figure from Argo data shows the change in sea-level in December 2009 during an El Niño episode.*



**Argo makes visible large-scale ocean and climate features and processes that were once hidden to scientists. The network has enabled new revelations about ocean dynamics that are helping society understand and forecast global climate.**

*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://www.argo.net>

Argo Project Office: [argo@ucsd.edu](mailto:argo@ucsd.edu) • Argo Information Center:  
[aic@jcommops.org](mailto:aic@jcommops.org)