Global ocean observing array reaches milestone and faces challenges.

The Argo ocean observing array is about to reach its initial target of operating 3000 robotic floats worldwide. By systematically measuring the temperature and salinity to a depth of 2000m, Argo has already improved estimates and forecasts of sea level rise caused by thermal expansion and is playing a key role in improving seasonal climate forecasts and giving new insights into hurricane activity.

Maintaining the array's size and global coverage in the coming decades is the next challenge if Argo is to build on these initial achievements and establish a system for monitoring and forecasting our seas similar to that operated and used by meteorologists.

In 1998 an international consortium presented plans for an array of 3000 autonomous instruments that would revolutionize the collection of critical information from the upper, climatically important, layers of the worlds' oceans. That vision is now a reality and the Argo array of profiling floats has reached its target and each year provides over 100,000 high-quality temperature and salinity profiles and global-scale data on ocean currents. This is a factor of 20 greater than the rate of collection of comparable ship-based profile measurements and provides immediate access to high quality data throughout the oceans, without seasonal bias. (Most ship measurements, particularly in high latitude regions, are made in the summer season).

Argo's initial success will be a highlight of the Ministerial summit meeting of the Group on Earth Observations in Cape Town, November 30th 2007.

The most obvious benefit from Argo has been a marked reduction in the uncertainty of ocean heat storage calculations. These are a key factor in determining the rate of global climate warming and sea level rise, and in projecting their future progression. The steady stream of Argo data coupled with global scale satellite measurements from radar altimeters has also made possible huge advances in the representation of the oceans in coupled ocean atmosphere models, leading to seasonal climate forecasts and the routine analysis and forecasting of the state of the subsurface ocean. These are advances that could only have been dreamed of a decade ago and have practical applications such as prediction on the fate of oil-spills in the open ocean and as an aid to fisheries.

Argo data are also being used in an ever-widening range of research applications that have led to new insights into how the ocean and atmosphere interact in extreme as well as normal conditions. Two examples are the processes in polar winters when the deep waters that fill most of the ocean basins are formed and, at the other temperature extreme, the transfer of heat and water to the atmosphere beneath tropical cyclones. Both conditions are crucial to global weather and climate and could not be observed by ships.

The Argo array has been deployed by collaboration of more than 30 countries plus the European Union. A guiding principle of Argo is that the program should benefit everyone, so the data are openly and immediately available to anyone wishing to use them.

The total annual operating cost of Argo is approximately $US24million (the sum of all national

contributions). Maintaining the array will require annual deployments of around 800 floats giving an estimated through-life cost of each float of about $US30,000*.

(* The present generation of floats has a design life 4 years when profiling to 2km depth every 10 days. The through-life cost includes the cost of data processing and distribution.)

Having deployed the array and built an effective data delivery system the next challenge is to maintain the full array for a decade in a pre-operational "sustained maintenance" phase. This will allow the array's design to be optimized and its value fully demonstrated and exploited. The USA has committed to maintaining half of the array and other contributing countries are striving to continue the array's strong international nature. As more is learned about floats and their sensors, float lifetimes will be extended further to improve the cost-effectiveness of the program.

The Argo array is the centerpiece of the in-situ ocean observing system promoted by the Joint Commission for Oceanography and Marine Meteorology (JCOMM), co-sponsored by the Intergovernmental Oceanographic Commission of UNESCO and the World Meteorological Organisation. Argo is a pilot project of the Global Ocean and Climate Observing Systems.

For further information see

General information about Argo	http://www.argo.ucsd.edu
Access to all Argo sites	http://www.argo.net/
Argo Information Center	http://wo.jcommops.org
JCOMM	http://ioc.unesco.org/jcomm/
Ocean data assimilation	http://www.godae.org/
GEO	http://www.earthobservations.org/

Some Argo applications

http://www.metoffice.gov.uk/research/ncof/foam/index.html

http://www.mercator-ocean.fr/html/mod_actu/public/welcome_en.php3

http://www.jamstec.go.jp/frcgc/jcope/index.html

Graphical material

Available at ftp.jcommops.org/Argo/3000press/

Photograph of Argo float

Schematic of float operating cycle

Map of 3000 float array (Available from 1 November).

International and national contacts for further information.

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