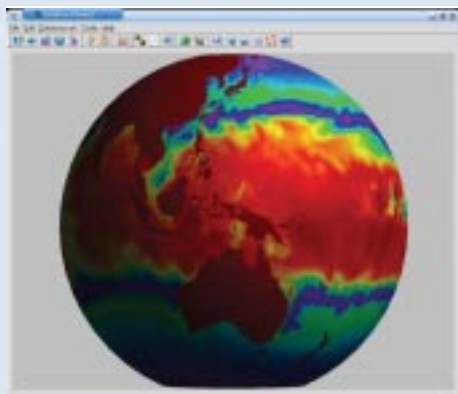


GODIVA – Modelling climate and oceans

GODIVA's (Grid for Ocean Diagnostics, Interactive Visualisation and Analysis) objectives are straightforward but could have global impact. First, this project funded by NERC (Natural Environment Research Council) will allow large sets of data from ocean and climate models to be visualised and explored collaboratively and remotely. Secondly, it will help researchers use such visualisation tools to find signals associated with climate change, through detecting processes affecting the thermohaline circulation, which in turn controls the way the oceans transport heat around the globe. Finally, GODIVA will exploit distributed computing to analyse large ocean data sets in order to help understand these climatically important signals.



Thus, the project aims both to solve technological problems associated with remote visualisation and distributed computing on very large data sets, and to develop demonstrators that illustrate these abilities in action to solve oceanographic and climate problems.

The Environmental Systems Science Centre (ESSC) at Reading University is leading the project and is working on data serving and

distributed computing aspects of ocean diagnostics. The Southampton Oceanography Centre (SOC) is working on tailoring visualisation software for detecting ocean convection signals. Manchester Computing Laboratory and the Rutherford Appleton Laboratory are working on different aspects of remote 4D visualisation software. Imperial College London is handling new unstructured mesh ocean modelling, visualisation and data storage.

GODIVA products and infrastructure include, Data Services, Visualisation Services, Grid Computing Facilities, and Ocean Science Results and Demonstrators. The Data Services include the data delivery Web Service GADS, which serves over 1 terabyte (1 Tb) of ocean model data from NERC models and the UK Met Office daily ocean forecast products. A freeware version of GADS has been released and is now the primary data source for the GODIVA project forming the data delivery mechanism for remote visualisation tools. Some of the data held by GODIVA can be accessed through an open web portal (www.nerc-essc.ac.uk/godiva) which allows a remote client to construct their own movies of the evolving ocean circulation on their browser. Anyone can use this portal but there are security layers for scientists wishing to access restricted datasets.

Within the project itself considerably more advanced visualisation services are available including steerable 4D perspective views of data sets and remapping capabilities to compare different ocean quantities with each other. Some of these services require specialist computer hardware but this can be operated remotely with only the final image arriving on the working scientists screen. Blue skies aspects of GODIVA research are

also investigating the use of high-powered graphics cards used in the computer games industry for scientific applications.

The main focus of most groups within GODIVA over the past year has been on extending its remote 3D visualisation capabilities to allow researchers to investigate very large ocean data sets. The Imperial College team has, for example, developed new data compression methods that dramatically shorten transmission and rendering times. These developments are working synergistically to make visualisation smooth on inexpensive workstations.

At Reading, distributed ocean diagnostic studies have been run on the Reading campus grid, allowing researchers to calculate budgets of water in different temperature, salinity and density classes in the North Atlantic. The rates of water conversion between the classes due to atmospheric interactions or due to mixing in the ocean interior can be evaluated and compared with theoretical ideas. The intention is to monitor changes in these quantities over time from the ocean observations and from models which will then give new insights into how the ocean works and whether any important long term changes are indeed underway.

The GODIVA project has been running for two years and the aim is to make some of the demonstrators available to the wider research community at the end of the project.

www.soc.soton.ac.uk/JRD/e-science/godiva
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