Using Google Earth in Marine Research and Operational Decision Support

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Introduction

Historically, Geographical Information Systems (GISs) have been large, expensive, complex and vendor-specific. This poster shows how the freely-available Google Earth software can be used in conjunction with open geospatial Web Services as simple but powerful tools to explore marine information in both a research and operational context.

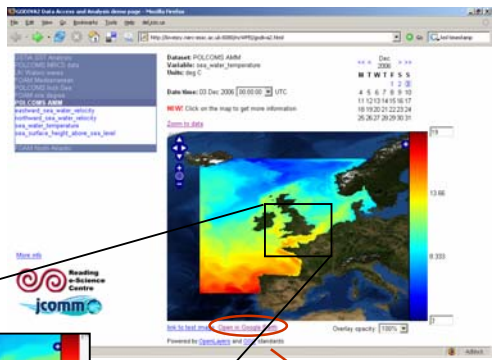
The Godiva2 system

http://lovejoy.nerc-essc.ac.uk:8080/Godiva2

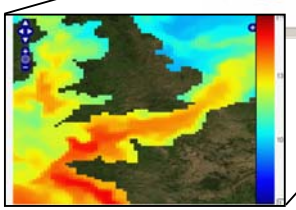
The **Godiva2** system combines a dynamic website that uses **AJAX** technology [1] with an image and metadata server that conforms to the Open Geospatial Consortium's **Web Map Service** (WMS) [2] specification.

Godiva2 is a portal to a multi-terabyte store of environmental data from numerical models and satellites, including real-time NCOF [3] ocean forecasts. It allows scientists to explore these datasets interactively over the web, without downloading large amounts of data.

1. The user starts on the Godiva2 website and selects the dataset (e.g. POLCOMS AMM model) and field (e.g. sea water temperature) to view.



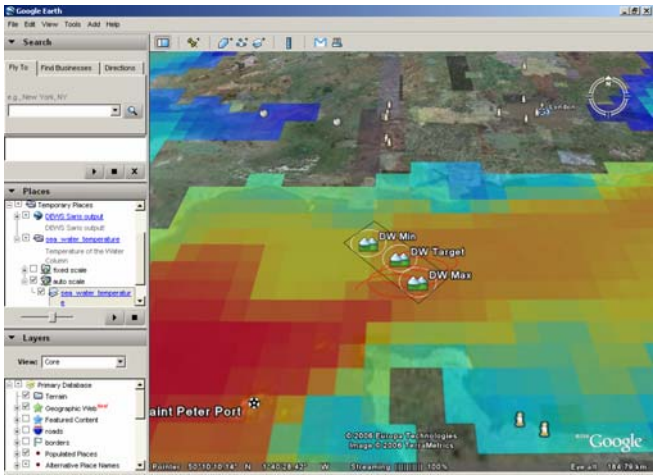
2. The user can zoom in, pan around and change the colour scale to highlight features of interest, such as these Gulf Stream eddies. New image tiles are generated and displayed automatically as the user navigates the map.



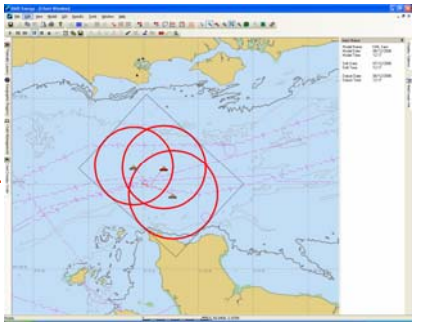
3. By clicking on "Open in Google Earth", the currently-displayed data are loaded into the Google Earth desktop application via the WMS.

Google Earth as a lightweight GIS

Using Google Earth, the search-and-rescue data can be displayed alongside relevant oceanographic information from the Godiva2 system: here we show the Search Area Determination (black rectangle) and the drift path (red line) superimposed upon the sea surface temperature data. Such combinations of data from different sources can greatly aid decision support.



The SARIS application can output its results in KML format for import into Google Earth



BMT's SARIS application, showing the most likely target location (middle circle) and the two extremes of the range of possible target locations, following a Search Area Determination. The bounding rectangle shows the area that will be searched to give the maximum chance of finding the target.

Search and Rescue

When a person or object falls overboard at sea, the UK Coastguard employs search-and-rescue software (SARIS: Search and Rescue Information System) from BMT Cordah Ltd. to predict the drift path. The software significantly reduces the time to recovery.

A person falling overboard will often quickly become separated from his or her vessel, due to the difference in buoyancy and windage. Survival times in cold oceans can be very short and so it is important to know the sea temperature along the drift path.

Discussion

KML provides an easy data interchange format for a variety of simple geographic features. More complex geospatial features require a more sophisticated description in Geographical Markup Language (GML). The DEWS project [4] is investigating this.

Currently, Google Earth cannot display images that are below the sea surface, and the ocean bathymetry is not properly rendered in three dimensions. Resolving these limitations would greatly increase the usefulness of Google Earth as a scientific tool.

References and definitions

[1] AJAX, Asynchronous Javascript and XML, http://en.wikipedia.org/wiki/Ajax_%28programming%29
[2] Open Geospatial Consortium Web Map Service, http://www.opengeospatial.org/standards/wms
[3] NCOF, National Centre for Ocean Forecasting, http://www.ncof.gov.uk/
[4] DEWS, Delivering Environmental Web Services, http://www.resc.rdg.ac.uk/projects.php