

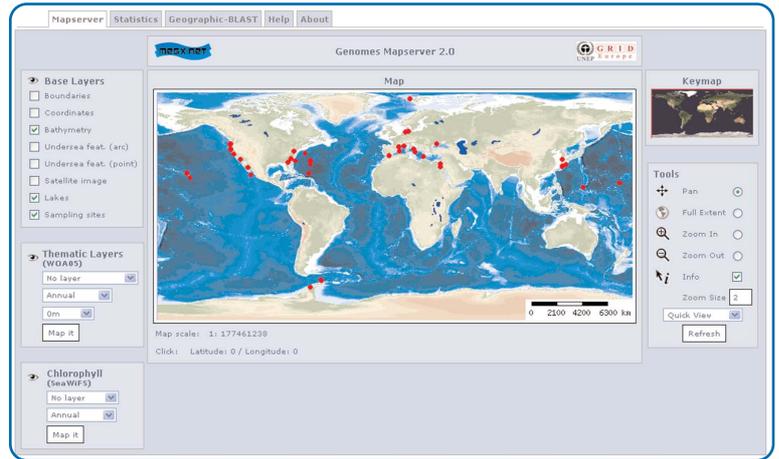


# OceaniaDB

A global scale oceanographic GIS database accessible through <http://metafunctions.grid.unep.ch/mapserver/>

## Background

OceaniaDB stems from the involvement of UNEP/DEWA/GRID-Europe in the Metafunctions Project, a collaborative research activity funded by the European Community and led by the Max Planck Institute in Bremen. Within this project, GRID-Europe was given the responsibility to develop a global "oceanographic/environmental" database and several tools to visualise, analyse and retrieve oceanographic information through an Internet Geographic Information Systems application.



Oceans are a dominant proportion of the biosphere but remain largely unexplored and mysterious. They contain a large proportion of global species and genetic diversity and represent a major food web. Gathering key environmental layers describing this very complex system is essential to better understand and manage crucial oceanic resources and habitats, especially when facing global environmental challenges such as climatic change, water pollution, over-fishing, threats to biodiversity and selection of protected areas.

"Key" environmental data layers consist of essential environmental variables for aquatic ecosystems, such as physical, chemical, geological and biological parameters (e.g. ocean water temperature and salinity, concentration of pollutants, nutrients and organic matter, etc.). OceaniaDB constitutes a unique spatial framework for data visualization and analysis through the Internet. Key environmental layers can be prepared at different geographical scales, from global views to sampling sites, by making available time-series of the data.

## OceaniaDB Development

OceaniaDB was developed with several partners to have an integrative system combining genomic and ecological data in a GIS Mapserver. The system allows the detection and assigning of functions to habitat-specific gene patterns.

### The role of GRID-Europe in the Metafunctions project consists of :

- > developing an oceanographic/environmental database,
- > processing selected environmental GIS data sets to create "key" environmental data layers.
- > providing access to oceanographic data through an Internet Mapserver to retrieve and analyze information

All environmental data are compatible with Open Geospatial Consortium standards and are described with exhaustive meta-information consistent with the ISO 19115 standard. The web application and database are based on Open Source software (PostgreSQL/PostGIS, PHP running on a Linux/Apache web server) and a modular approach; responding to the needs of the scientific community and allowing future developments in line with technological progress.

## Data Sources

The different layers were created from three sources:

*World Ocean Atlas*: a set of objectively analyzed (one decimal degree-gridded) climatological fields of *in situ* measurements.

*World Ocean Database*: a collection of scientific, quality-controlled ocean profiles.

*Remote Sensing*: based on SeaWiFS data.

The data sets available are:

Temperature	Dissolved Oxygen
Nitrate	Apparent Oxygen
Phosphate	Utilization
Salinity	Percent Oxygen
Silicate	Saturation
Chlorophyll	

These are all at 33 standard depth levels for annual, seasonal and monthly compositing periods.

## Benefits for UNEP and DEWA

*OceaniaDB could become an information system supporting a large number of applications and has high potential utility. It will enable the scientific community to query a new and mostly unexplored data source.*

OceaniaDB could have therefore a large impact on scientific and technological capabilities in marine, aquatic and environmental research and applications. It could support new interdisciplinary linkages and thus help addressing questions of ecological, health and biotechnological relevance. Thus the aim of OceaniaDB within UNEP/DEWA is therefore to create added value from available oceanographic data through an Internet-based GIS application.

OceaniaDB also aims to support other UNEP and/or UN projects such as the UNEP Regional Seas Programme, Global Programme of Action on Land-based Sources of Marine Pollution (GPA-the Hague), Convention for Biological Diversity project on marine protected areas, and the UN Shelf Project. The GEO Data Portal could also benefit from the input of OceaniaDB with a more complete set of marine variables at the country level.

This database already allows, for instance, extracting interpolated values from time-series of several physico-chemical and biological parameters such as Temperature, Dissolved oxygen, Nitrate and Chlorophyll concentration. It has the potential to develop spatially-explicit predictions or variables of interest observed on point locations around the globe (fish and plankton distribution, physico-chemical characteristics).

The applications supported by OceaniaDB could take place at different scales (from global to regional) as a function of the specific needs of a project.

## Functionalities

The data sets can be visualized in two ways:

*Through a mapping module* allowing the user to interactively manipulate data and make them easier to understand than the raw data. It is possible to zoom to get more detail, to query selected points, etc.

*Through a statistical module*, enabling the user to query the database in order to get interpolated values for any location at any depth and period of time. Following the user's choice, results are seen as tables (also downloadable) or as graphs.

## Future developments

The modules that will be implemented in the next version of the Mapserver are:

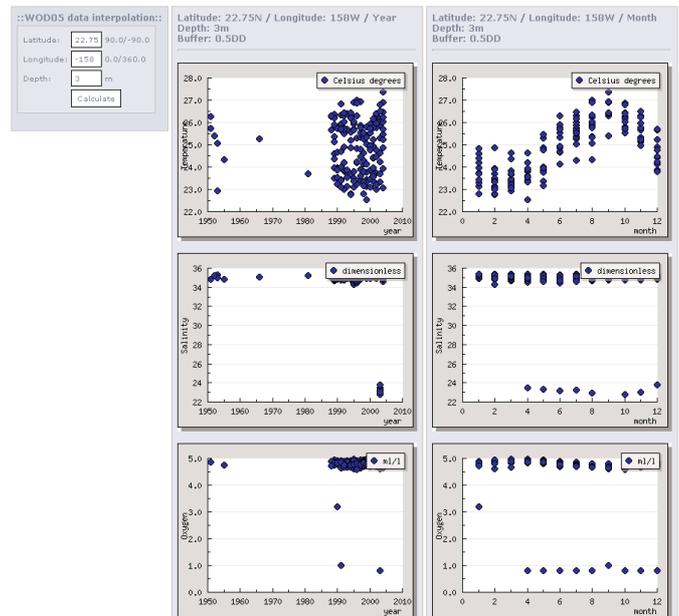
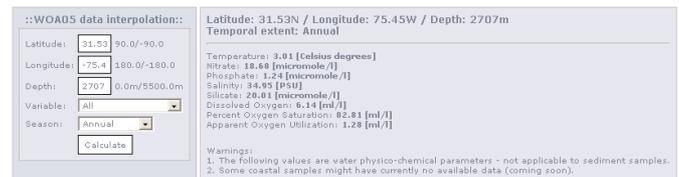
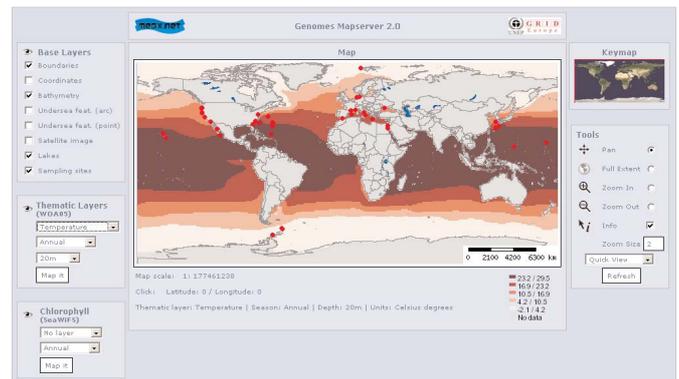
- > *New thematic layers:* Diffuse Attenuation, Solar Radiation, Total Carbon, Total Alkalinity, Mixed Layer Depth.
- > *Spatial predictions module.*
- > *Global regionalization of oceans in ecoregions.*

[www.grid.unep.ch](http://www.grid.unep.ch)

**www.unep.org**

United Nations Environment Programme  
DEWA/GRID-Europe  
Ch. des Anémones 11, CH-1219 Châtelaine  
Tel: +4122-9178294  
Fax: +4122-9178029  
info@grid.unep.ch





- > *New base layers:* Large Marine Ecosystems, Marine Ecoregions, Seamounts, River Discharge, Coral Reefs, Oceanic Currents.
- > *Metadata* based on ISO 19115.
- > *Data sharing* and download through different webservices.
- > *Printing* and reporting tools.
- > Working with vertical profiles (oceanic profiles, etc.)