BYTHOS online visualization of ocean forecast

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As a rich internet application the BYTHOS data base initially was developed to search, visualize and download oceanographic in-situ data [1], [2]. The recent improvements of the BYTHOS system is the ability to access and visualize the CYCOFOS forecasting data and overlay the forecasting fields with observing data. BYTHOS can be accessed at:
http://www.oceanography.ucy.ac.cy/BythosV2_ms/BythosV2_MapServer.swf

BYTHOS architecture

The software for data access and visualization consists of two parts, the server and the user interface. The server includes an oceanographic database, a map service, php-modules providing interaction between server and client applications and python-modules processing the netCDF files with the CYCOFOS forecasts.

MapServer was chosen to be a map service.

To operate the database, MySQL data management system was chosen.

Presentation of data is achieved with the help of Flex Rich Internet application, used for the creation of BYTHOS front end. The front end is responsible for the search and retrieval of data from database, OPENDAP server and visualization through the map, currently served by MapServer.

BYTHOS in-situ database access and visualization

Data visualization is achieved through the use of Mapserver and is performed in three steps:

- The first step allows the user to perform search and filtering of data based on the type of data, the data center providing the data, the region of interest and a date range.
- The second step shows to the user a list of data collections available based on the performed search. The user may then select one or more data collections to be plotted on the map.
- The final step is the visualization of the data collections on the map as points. For each point representing the geographical location, vertical profile for a given data set is plotted on a separated window. On-line interactive capability of the system allows to view the values of the data versus depth. Metadata information is also available for each data set with ability to download the data set for a single location/station or the entire set of the data for a given cruise.
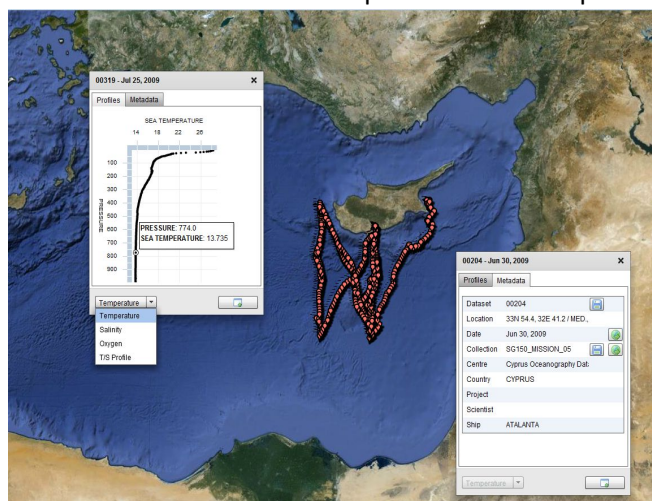

Fig. 1: Example of vertical profile and metadata from a glider station in the Levantine Basin

BYTHOS forecasting data access and visualization

At present BYTHOS provides access and visualization of forecasting and satellite remote sensing data which are obtained from the CYCOFOS-Cyprus Coastal Ocean Forecasting System. CYCOFOS provides a variety of operational predictions such as high and medium resolution hydrodynamic ocean forecasts in the Levantine Basin and the Eastern Mediterranean Sea, sea state forecasts in the Mediterranean and the Black Sea, tide forecasts in the Mediterranean and the Black Sea, ocean remote sensing in the Eastern Mediterranean.

The CYCOFOS data are kept at OPENDAP Server in netCDF format. To search, process and visualize it, dedicated php and python scripts were developed. The CYCOFO data visualization is achieved through Mapserver.

The BYTHOS interface to access the CYCOFOS forecasting data allows to search the forecasting parameters, by region, depth and time. Also it provides the capability to superimpose different forecasting and observing data, that can be used for complex analyze of sea basin aspects.

To access forecast map it is necessary to select Region, Field, Depth, Date and Time and click View. Then user can click at the map to see a profile.

REFERENCES

[1] Zodiatis George, Daniel Hayes, Stavros Stylianou, Iacovos Constantinou, Andria Karaolia, Ermis Koufou, Stavros Michael and ElenaZhuk (2011). "Bythos: A new online Data Management System", IOC/IODE 50th Anniversary International Conference, Book of Abstracts, p.48.
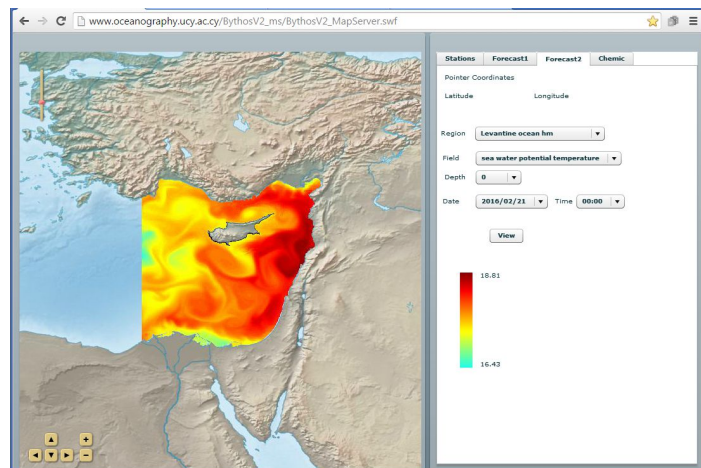
Fig. 2: Sea surface velocity from CYCOFOS Levantine model

[2] Zodiatis George, Daniel Hayes, Stavros Stylianou, Iacovos Constantinou, Andria Karaolia,Ermis Koufou, Stavros Michael, and Elena Zhuk (2011). "Towards a new generation of BYTHOS system for data management in the Mediterranean and Black Sea", EGU General Assembly, Geophysical Research Abstracts, Vol. 13, EGU 2011-10411-1