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Changing knowledge perspective in a changing world: The Adriatic multidisciplinary TDS approach

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The use and exploitation of the marine environment in recent years has been increasingly high, therefore calling for the need of a better description, monitoring and understanding of its behavior. However, marine scientists and managers often spend too much time in accessing and reformatting data instead of focusing on discovering new knowledge from the processes observed and data acquired.
There is therefore the need to make more efficient our approach to data mining, especially in a world where rapid climate change imposes rapid and quick choices.
In this context, it is mandatory to explore ways and possibilities to make large amounts of distributed data usable in an efficient and easy way, an effort that requires standardized data protocols, web services and standards-based tools.
Following the US-IOOS approach, which has been adopted in many oceanographic and meteorological sectors, we present a CNR experience in the direction of setting up a national Italian IOOS framework (at the moment confined at the Adriatic Sea environment), using the THREDDS (THematic Real-time Environmental Distributed Data Services) Data Server (TDS).
A TDS is a middleware designed to fill the gap between data providers and data users, and provides services allowing data users to find the data sets pertaining to their scientific needs, to access, visualize and use them in an easy way, without the need of downloading files to the local workspace. In order to achieve this results, it is necessary that the data providers make their data available in a standard form that the TDS understands, and with sufficient metadata so that the data can be read and searched for in a standard way.
The TDS core is a NetCDF- Java Library implementing a Common Data Model (CDM), as developed by Unidata (http://www.unidata.ucar.edu), allowing the access to “array-based” scientific data.
Climate and Forecast (CF) compliant NetCDF files can be read directly with no modification, while non-compliant files can be modified to meet appropriate metadata requirements.
Once standardized in the CDM, the TDS makes datasets available through a series of web services such as OPeNDAP or Open Geospatial Consortium Web Coverage Service (WCS), allowing the data users to easily obtain small subsets from large datasets, and to quickly visualize their content by using tools such as GODIVA2 or Integrated Data Viewer (IDV).
In addition, an ISO metadata service is available through the TDS that can be harvested by catalogue broker services (e.g. GI-cat) to enable distributed search across federated data servers.
Example of TDS datasets from oceanographic evolutions (currents, waves, sediments...) will be described and discussed, while some examples can be accessed directly to the Venice site http://tds.ve.ismar.cnr.it:8080/thredds/catalog.html (Bergamasco et al., 2012) also within the framework of RITMARE Project.

References

Bergamasco A., Benetazzo A., Carniel S., Falcieri F., Minuzzo T., Signell R.P. and M. Sclavo, 2012. From inter-operability to knowledge discovery using large model datasets in the marine environment: the THREDDS Data Server example. Advances in Oceanography and Limnology, 3(1), 41-50. DOI:10.1080/19475721.2012.669637