



STOQS: The Spatial Temporal Oceanographic Query System

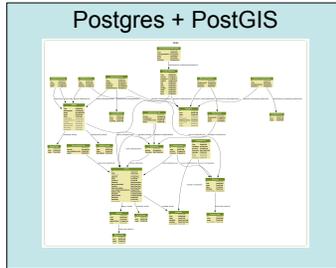
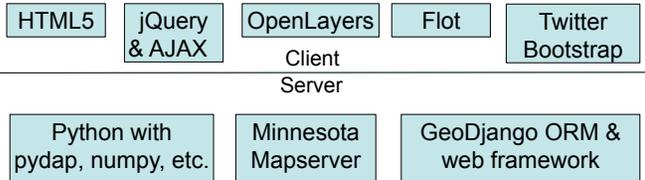
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Abstract

With increasing measurement and sampling capabilities of Autonomous Underwater Vehicles (AUVs), the need to efficiently access and visualize the data they collect is also growing. The Spatial Temporal Oceanographic Query System (STOQS) has been designed and built to provide efficient access and visualization of *in situ* oceanographic measurement data across any dimension. STOQS is an open source software project built upon a framework of free and open source software for geospatial data. STOQS complements CF-NetCDF and OPeNDAP by providing an ability to index data retrieval across parameter and spatial dimensions in addition to the *a priori* indexed coordinate dimensions of CF-NetCDF. It also provides a functional bridge to standards-based GIS technologies. This poster provides a brief overview of the project which is available at <http://code.google.com/p/stoqs/>.

Architecture



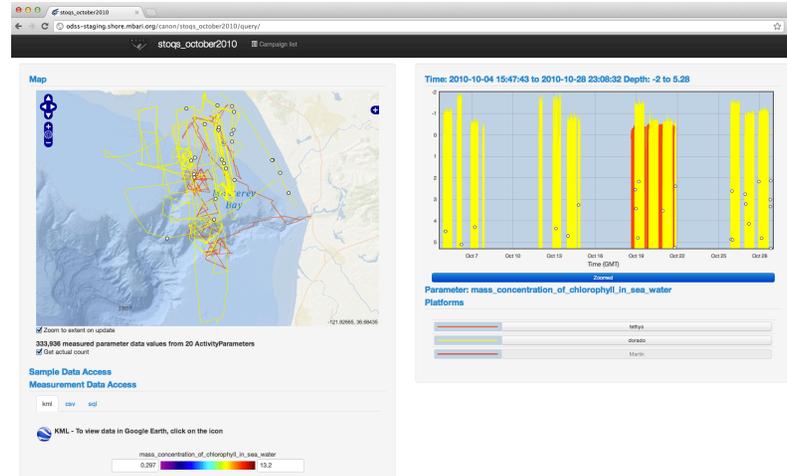
Operation

- 1 Install the STOQS software on a CentOS or Red Hat Linux server
- 2 Vehicles conduct their missions, collecting data
- 3 Create NetCDF files of the instrument data using CF Conventions for Point Observations
- 4 Copy NetCDF files to a location where a THREDDS Data Server can serve them
- 5 Construct a STOQS load script and execute it to populate a database for the campaign
- 6 Data are accessed from the STOQS User Interface and the REST API to the database

The STOQS User Interface allows selection by time and depth, by parameter name, and by platform name. Data are retrieved directly from the database and transformed to formats for further visualization and analysis. A typical campaign produces dozens of NetCDF files containing tens of million measurement values. Performing the kind of visualization demonstrated at right without STOQS would require reading all of NetCDF files, sub-selecting the data and creating the KML – a task that is nearly intractable using common NetCDF client tools.

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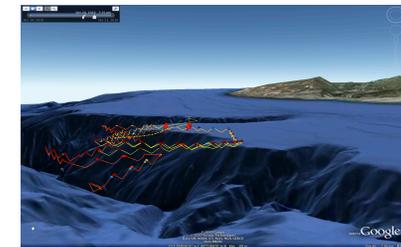
User Interface



The STOQS user interface displays a map of the vehicle tracks and a time series of depth profiles of the vehicles. Any of items on the right may be selected and all the displays will be updated. In the above screen grab a user has selected the "mass_concentration_of_chlorophyll_in_sea_water" parameter and a time depth range that includes three weeks of AUV missions of just the upper 5 meters. The user interface's dynamic query of the database indicates that the "tethys" and "dorado" platforms measured the selected parameter – the platform "martin" is grayed out. Under "Measurement Data Access" the user may set the values of the color lookup table used to generate KML for display in Google Earth as shown in the screen grabs below.



Surface concentrations of chlorophyll are high (red) at the beginning of the campaign to the north of the Monterey submarine canyon.



Later in the campaign high surface concentrations of chlorophyll move over the canyon. The yellow and orange tracks of the AUVs can be seen in this perspective view.

Future Work and Acknowledgements

STOQS is a work in progress. It is licensed under GPL3 and is built upon other free and open source software. For more information please see the project web site at <http://code.google.com/p/stoqs/>. Development of STOQS is supported by the David and Lucile Packard Foundation.