

# Analysis of ocean in situ observations and marine data products: Web-visualization and Services for EMODnet Chemistry

Giorgio Santinelli, Deltares (Netherlands), giorgio.santinelli@deltares.nl  
 Gerrit Hendriksen, Deltares (Netherlands), gerrit.hendriksen@deltares.nl  
 Alexander Barth, ULG (Belgium), a.barth@ulg.ac.be

## Introduction

For the EMODnet chemistry dynamic visualisations and plotting, observations of chemical species are made available via state of the art techniques using globally accepted web services (OGC services). This has been done by using functions and scripts, reading so-called enriched ODV files and inserting data directly into a relational geodatabase in the cloud. The main table is the one with observations which contains the main data and meta-data associated with the enriched ODV files. A particular implementation in data loading is used in order to improve on-the-fly computational speed.

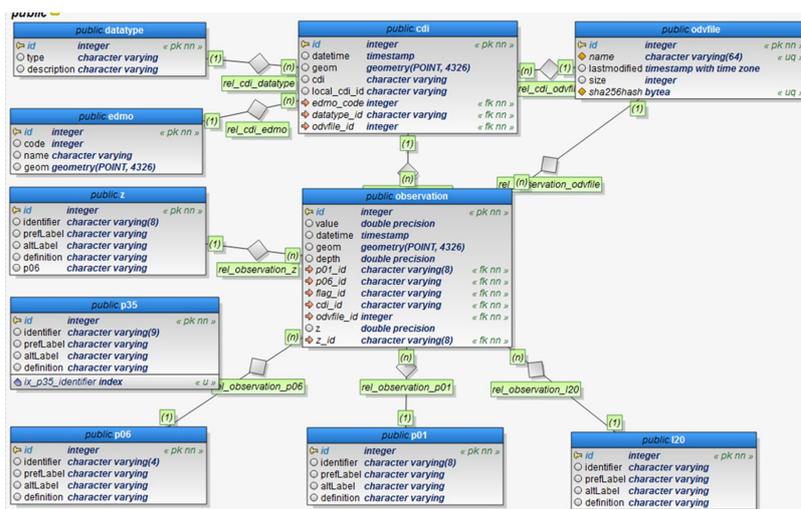


Fig 1 : ODV database schema

## EMODnet database and Web Services

Data from Baltic Sea, North Sea, Mediterranean, Black Sea and part of the Atlantic region has been entered into the geodatabase, and consequently being instantly available from the OceanBrowser EMODnet portal. Furthermore, Deltares has developed an application that provides additional visualisation services for the aggregated and validated data collections. The visualisations are produced by making use of part of the OpenEarthTool stack (<http://www.openearth.eu>), by the integration of Web Feature Services (OGC) and by the implementation of Web Processing Services. The goal is the generation of server-side plots of timeseries, profiles, timeprofiles and maps of selected parameters from data sets of selected stations.

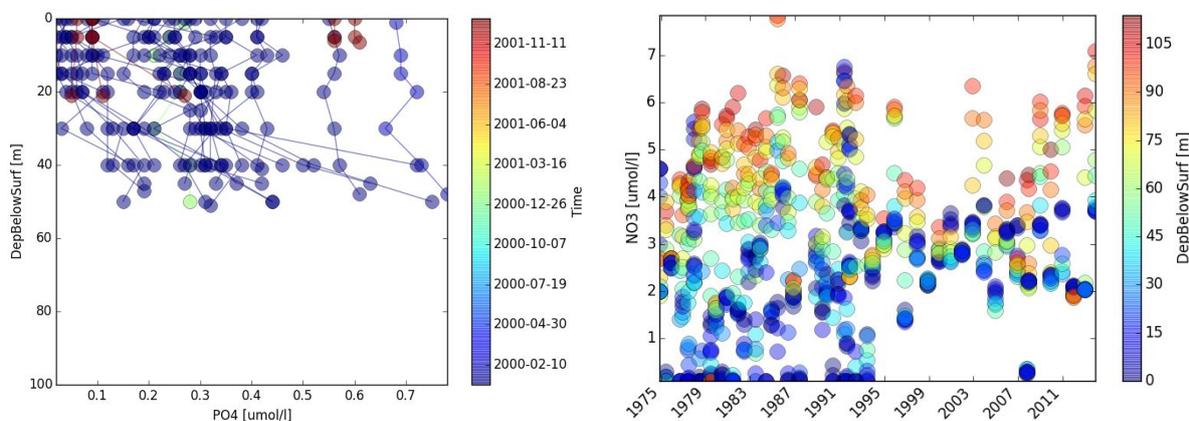


Fig 2 : Dynamic visualization: profiles and timeseries

Regional data collections are retrieved using EMODnet Chemistry cloud relational geo-database. The spatial resolution in time and the intensity of data availability for selected parameters is shown using Web Service requests via the OceanBrowser EMODnet Web portal. Selections in Oceanbrowser also result as a list of hypertext links for further data shopping and download.

### OceanBrowser

The sparsity of observations poses a challenge common to various ocean science disciplines. Even for physical parameters where the spatial and temporal coverage is higher, current observational networks undersample a broad spectrum of scales. The situation is generally more severe for chemical and biological parameters because related sensors are less widely deployed.

OceanBrowser is a Web-interface to visualize gridded data sets in NetCDF, explore horizontal and vertical sections, scalar and vector fields. It is used in SeaDataNet and EMODnet Chemistry.

The analysis tool DIVA (Data-Interpolating Variational Analysis) is designed to generate gridded fields from in situ observations. DIVA has been applied to various physical (temperature and salinity), chemical (concentration of nitrate, nitrite and phosphate) and biological parameters (abundance of a species) in the context of different European projects. The in situ observation visualization service allows one to display vertical profiles and time series and it is built upon OGC standards (the Web Feature Service and Web Processing Services) and following recommendation from the INSPIRE directive. In those projects it is used to visualize gridded data sets generated by the tool DIVA.

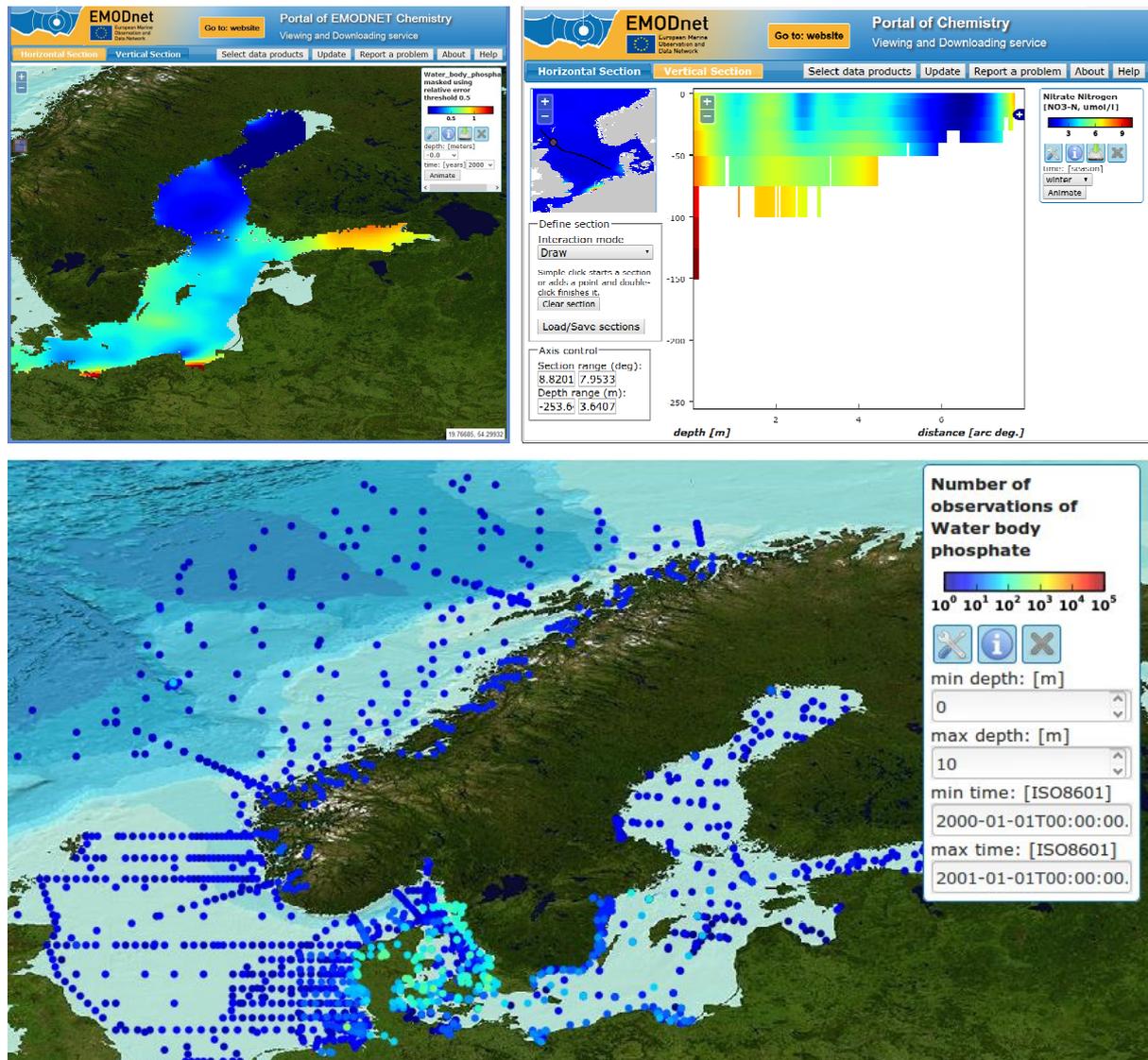


Fig 3 : Snapshots from OceanBrowser <http://ec.oceanbrowser.net/emodnet/>