HOW TO USE EMODNET CHEMISTRY TO SUPPORT THE MARINE STRATEGY IN EUTROPHICATION AND CONTAMINANT ASSESSMENT

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Abstract
Thanks to the intensive dialogue between EMODnet community, ICES and MSFD actors, EMODnet Chemistry results, including the regional chemical data collections and the visualization products are tuned and adapted to be used for the assessment of eutrophication (D5) and contamination (D8) as required by the MSFD. The aggregated and validated data collection for the Mediterranean Sea, including nitrate, nitrite, phosphate, silicate and ammonium as well as concentrations of hydrocarbons (PHAs and others), metals, pesticides and antifoulants is produced and made available under dedicated agreement. Besides, the data are dynamically visualized as standards WMS and WPS OGC services. Basin scale concentration maps are computed for the main nutrients with a 10-year moving window spanning from 1960 to 2014 for all standard vertical layers.

Keywords: Eutrophication, Pollution, Nutrients, Mediterranean Sea

The European Marine Observation and Data network (EMODnet) is a long term marine data initiative developed through a stepwise approach aiming to ensure that European marine data will become easily accessible, interoperable and free of restrictions on use. Supported by the European Commission, EMODnet Chemistry (http://www.emodnet-chemistry.eu/) started in 2009 to fulfill the Marine Strategy Framework Directive (MSFD) requirements for the assessment of eutrophication and contaminants [1], following INSPIRE Directive rules. The aim is twofold: the first task is to make available and reusable the big amount of fragmented and inaccessible data, hosted in the European research institutes and environmental agencies. The second objective is to develop visualization services useful for the requirements of the MSFD. With this purpose, aggregated and validated regional dataset are produced for nutrients, pH, alkalinity, dissolved oxygen, chlorophyll-a and contaminants (with hydrocarbons including PHAs and others, metals, pesticides and antifoulants).

With the start of EMODnet phase II, DG MARE, DG ENV and relevant actors met and agreed on a coordinated process and started developing potential contributions to identify how EMODnet can best contribute in practical terms to the MSFD and what concrete actions are required to make this happen. The contribution of ICES, acting as Data Center for a number of large dataset collections related to the marine environment in the North sea and in the Baltic area, is crucial to find complementarities. EMODnet Chemistry extended metadata to easily identify data suitable for inclusion in MSFD reporting (based on QA and QC procedures used in collecting it). ICES, as EMODnet Chemistry partner, is working to complement data in communication with regional sea conventions (RSC) contracting parties and to simplify the data flow. While much of the chemistry and contaminant data are well organized within OSPAR and HELCOM, EMODnet Chemistry has a more useful role in the Mediterranean where these outputs are less well organized. The dialogue with OSPAR and HELCOM helps to share the long established experience in data management and environmental assessment with the other basins and to provide Europe-wide perspectives for benefit to the other regions. A Memorandum of Understanding with the Commission on the Protection of the Black Sea against Pollution (Bucarest Convention) to formalize the cooperation in terms of providing dedicated access to EMODnet Chemistry regional products for supporting management of MSFD indicators as well as increasing participation in the Advisory Groups meetings is under preparation. A similar step is under discussion with the Information and Communication Regional Activity Center (INFO-RAC) through the United Nations Environmental Programme, Coordinating Unit for the Mediterranean Action Plan for the Barcelona Convention (UNEP/MAP).

The first output of EMODnet Chemistry consists in the aggregated and validated regional datasets which have been quality controlled according to standard protocols agreed at EU scale. Data for all European basins are accessible through a user-friendly data portal. Concerning D5 (eutrophication), EMODnet provides (for a geobox relevant for EU waters 80 Lat N;-30 Long W; 20 Lat S; 45 Long E) data of nutrients (phosphates, nitrates and silicates), as well as chlorophyll-a and dissolved oxygen (Fig. 1) from 301010 stations.

The second output consists in visualization products useful for MSFD implementation. In particular, for D5, indicator "Nutrients concentration in the water column", concentration maps of nutrients (nitrate, phosphate and silicate) have been produced using Data-Interpolating Variational Analysis [2].

Fig. 1. Distribution of "Nutrients" stations in the geobox relevant for EU waters, namely 80 Lat N;-30 Long W; 20 Lat S; 45 Long E

In order to facilitate the visualization of spatial and temporal patterns and trends, interpolated maps are available at seasonal scale and are generated as ten years running means and produced for standard vertical depths, from the surface to the bottom. Data available for long term monitoring stations are visualized as dynamic plots which allow rapid identification of long term variability.

Finally, beside the delivery of data and visualization products, the results of EMODnet Chemistry, thanks to the involvement of a wide consortium of institutes for all European Seas, provide a useful starting point for a gap analysis to gain understanding where the future monitoring efforts should be focused.

References
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