Marine Data Management in the Mediterranean Sea within the framework of the Chemistry EMODNET Pilot Project

Iona A., Zarokanellos N., Karagevrekis P.

Hellenic National Oceanographic Data Centre HNODC, Hellenic Centre for Marine Research –HCMR, Anavyssos, GREECE

1. Introduction

The European Commission in response to the EU Green Paper for an integrated maritime policy has initiated the European Marine Observation and Data Network (EMODNET) to improve Europe's marine data infrastructure, increase the availability of high quality data and assemble them under a common framework. EMODNET will network existing and developing European observation systems, linked by a common data management infrastructure covering all European coastal waters, shelf seas and surrounding ocean basins and accessible to everyone. Four preparatory actions (2009-2012) for hydrographic, marine geological, chemical and biological data have been created in order to set up the preliminary version of EMODNET and identify the main challenges in moving from the pilot phase to the operational one. The SeaDataNet standards and services for management, discovery, access and delivery of marine data and metadata have been adopted by EMODNET ensuring thus harmonization within the Network.

2. The Approach

The chemistry pilot project –mainly made up of national oceanographic data centers belonging to SeaDataNet consortium is focused on the marine data groups required for the implementation of the Marine Strategy Framework Directive (MSFD).

Based on their distribution in time and space 17 parameters have been selected for product generation in three regions, the Greater North Sea, the Black Sea and five spots from the Mediterranean Sea.

For the statistical analysis and production of the data products, three regional data pools have been set up: ICES for Greater North Sea, MHI for the Black Sea and HCMR for the Mediterranean.

EMODNET Chemistry Pilot Project is using the SeaDataNet approach for managing the chemical data, adopting and adapting the following elements of the infrastructure:

❖ CDI mechanism to access data with data policy,

❖ ODV format for data input,

❖ SeaDataNet Security Services for users registrations (Authentication, Authorization & Accounting),

❖ SeaDataNet Delivery Services for data access and downloading,

❖ DIVA software tool to produce gridded data from row data,

❖ SeaDataNet Viewing Services for data and data products visualization

3. Methodology

3.1 Data Aggregation in the Mediterranean Sea

More than 10000 stations have been assembled, preprocessed and analyzed by the Hellenic Oceanographic Data Centre (HNODC) of the HCMR in five spots (Figure 1) in the Mediterranean Sea (Balearic Sea, Gulf of Lion, North Adriatic Sea, Gulf of Athens and NE Levantine Basin):
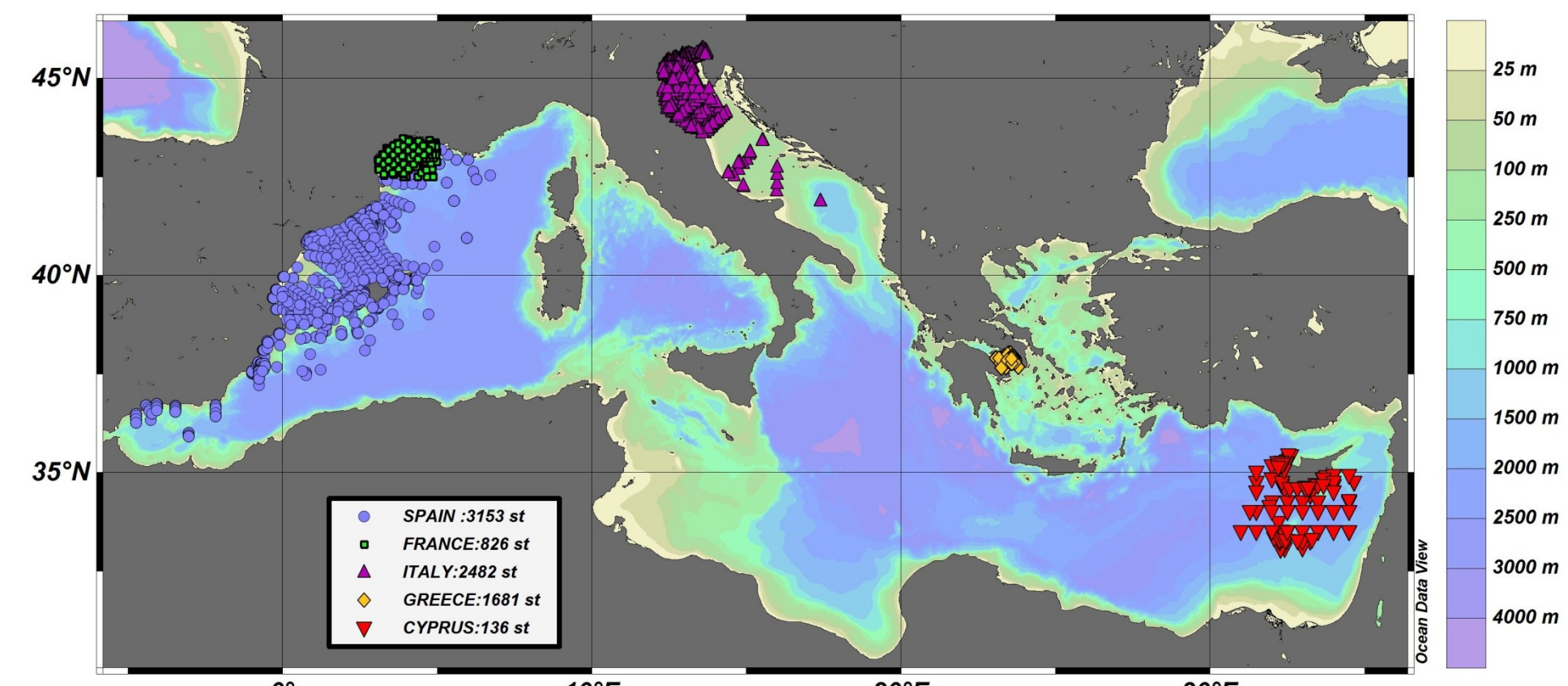

Figure 1: *Geographical distribution of chemical stations*

Tables 1, 2 and 3 shows the data group distribution per country in water column (Table 1), biota (Table 2) and sediment (Table 3).

PARAMETER GROUP	SPAIN	FRANCE	ITALY	GREECE	CYPRUS
Fertilisers	3153 stations	826 stations	4711 stations	1681 stations	136 stations
Heavy metals				702 stations	
Organic matter		826 stations	3102 stations	629 stations	
Radionuclides					15 (>50 stations)

Table 1: *Stations in Water Column*

PARAMETER GROUP	SPAIN	GREECE
Heavy metals	33 stations	154 stations
Synthetic compounds	33 stations	133 stations
Hydrocarbons including oil pollution	33 stations	

Table 2: *Stations in Biota*

PARAMETER GROUP	ITALY	GREECE
Heavy metals		40 stations
Hydrocarbons including oil pollution		77 stations
Organic matter	222 stations	

Table 3: *Stations in Sediment*

3.2 Quality Control and Assurance

Quality Control and Quality Assurance guidelines are being developed within the project to ensure that the data and their products are delivered in uniform quality. Special efforts have been dedicated to the correct parameter mapping with the SeaDataNet vocabularies and especially for those complex parameters from the sediment and biota since additional information on the instruments, methods, species, etc. is needed to ensure that data coming from different sources are comparable.

At national level data and metadata are processed using the SeaDataNet formats, standards, vocabularies and tools. For example, at HNODC, NEMO tool is used for data reformatting at ODV and Medatlas format and MIKADO tool for metadata preparation at the XML ISO19115 compliant schema. For the quality control of oceanographic data, besides ODV, additional dedicated software is used in accordance with the SeaDataNet protocols and procedures.

3.3 Statistical Data Analysis and Products

Based on the spatial and temporal distribution of the data, two kind of products are delivered by the project:

a) interpolated maps using the SeaDataNet tool DIVA for parameters with homogeneous basin scale distribution and sufficient data coverage in time and space and,

b) time series plots using the SeaDataNet tool ODV for parameters with no homogeneous distribution like coastal monitoring stations or datasets with fragmented coverage.

For example in Greece Case for water column, we choose the seasonal time scale and selected years as the best scales for the products preparation (Figure 2a,b,c and d).
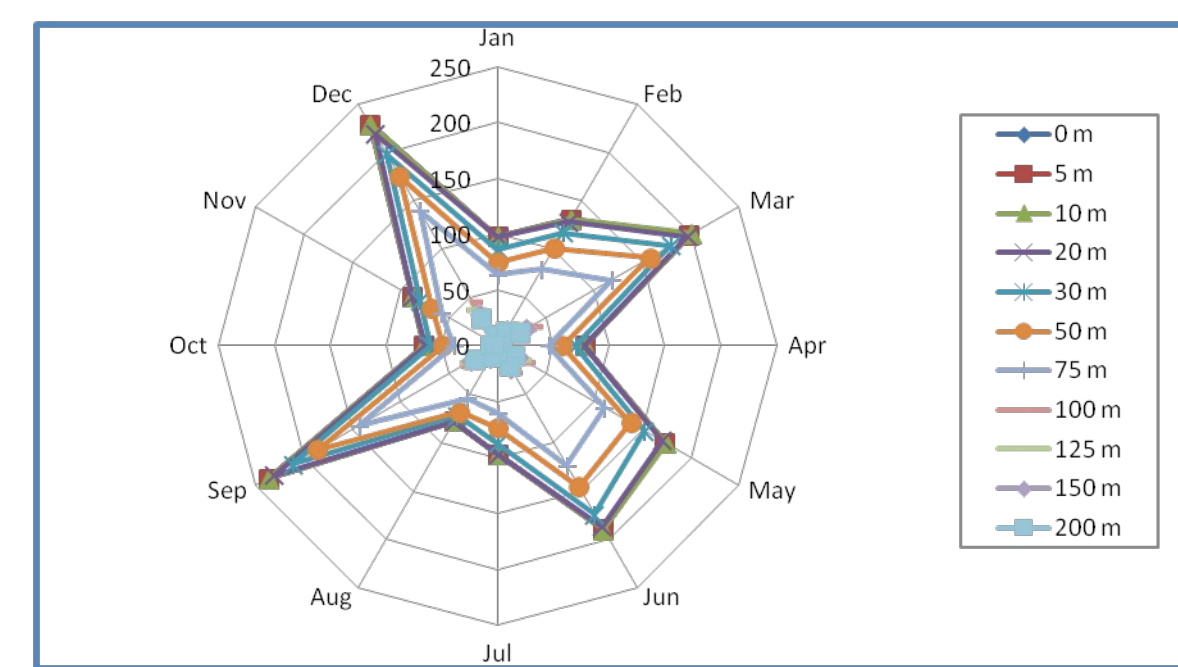

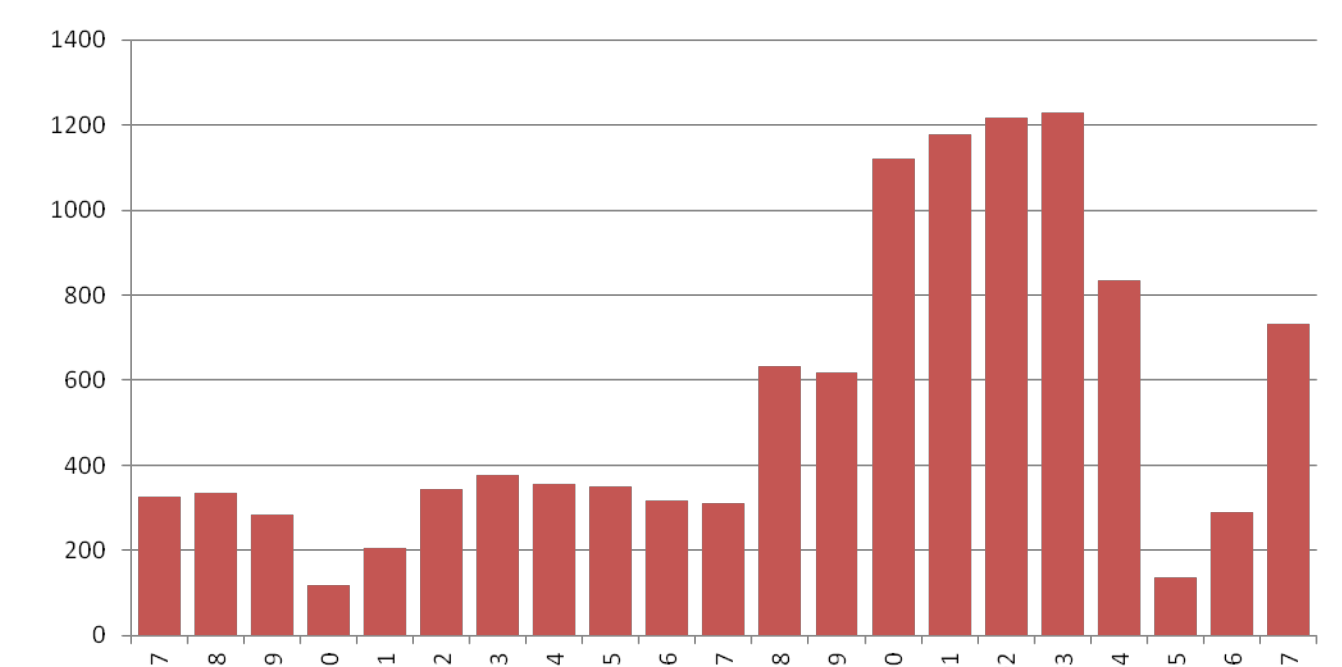**Figure 2a:** *Data distribution per month and depth*

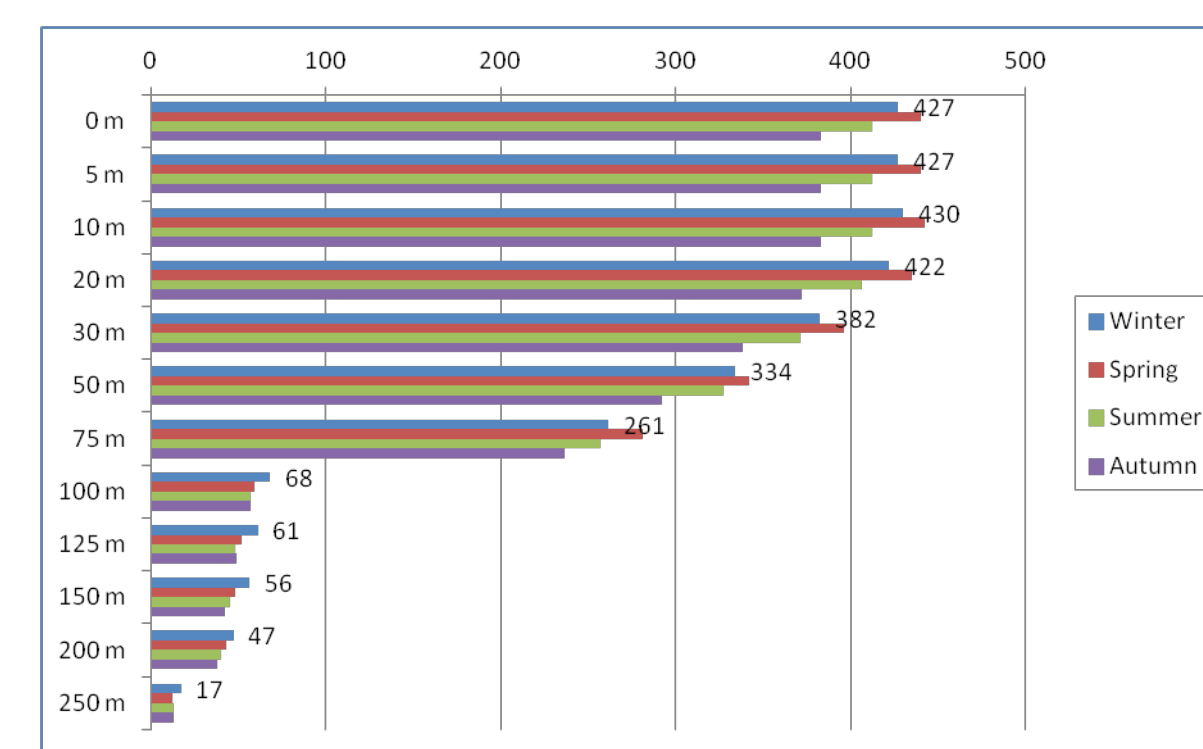**Figure 2c:** *Data distribution per year*

Figure 2b: *Data distribution per season and depth*
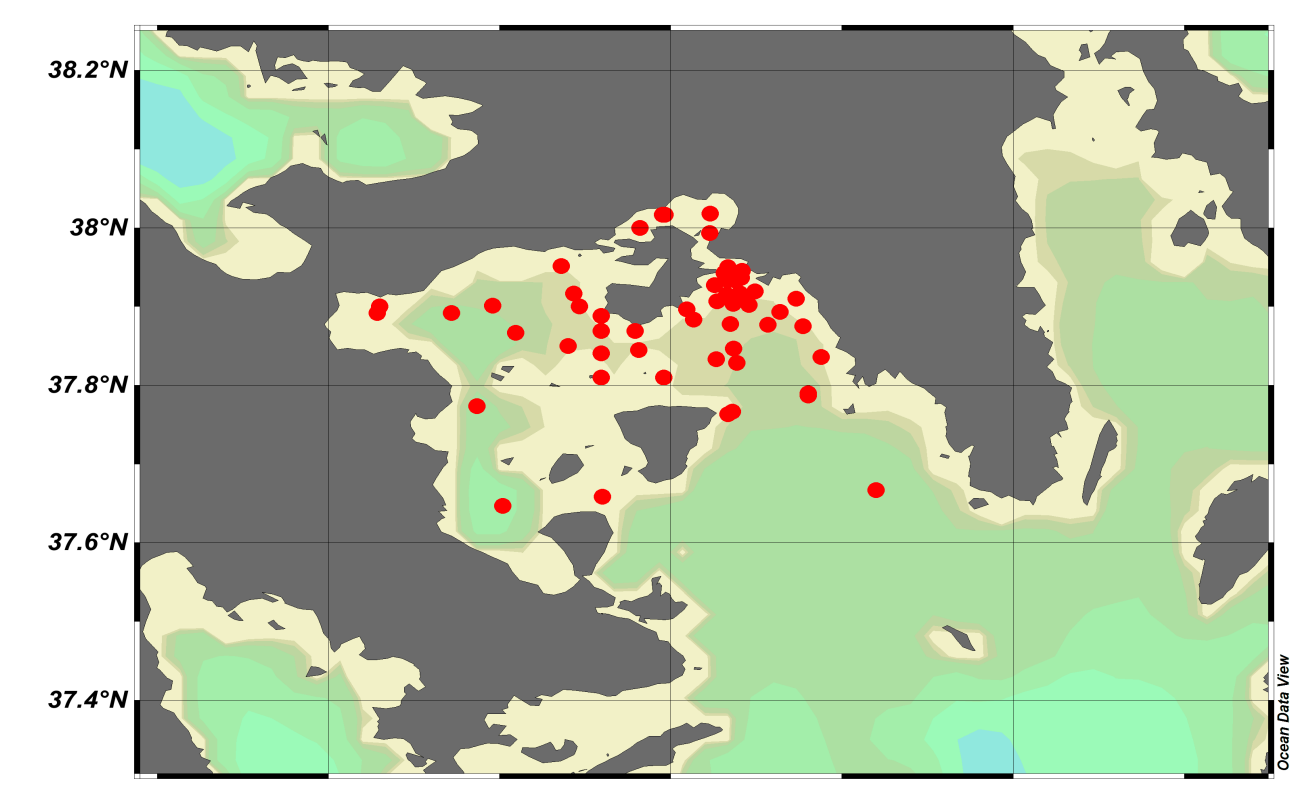

Figure 2d: *Spatial data distribution*

The analysis parameters like correlation length and signal to noise ratio are optimized using the DIVA software tools and utilities, and filtered vertically using bounds adapted in each region separately.

The Ocean Browser Products viewing service is used for the visualization of the products maps plots and time series plots with links to the station plots.

Results

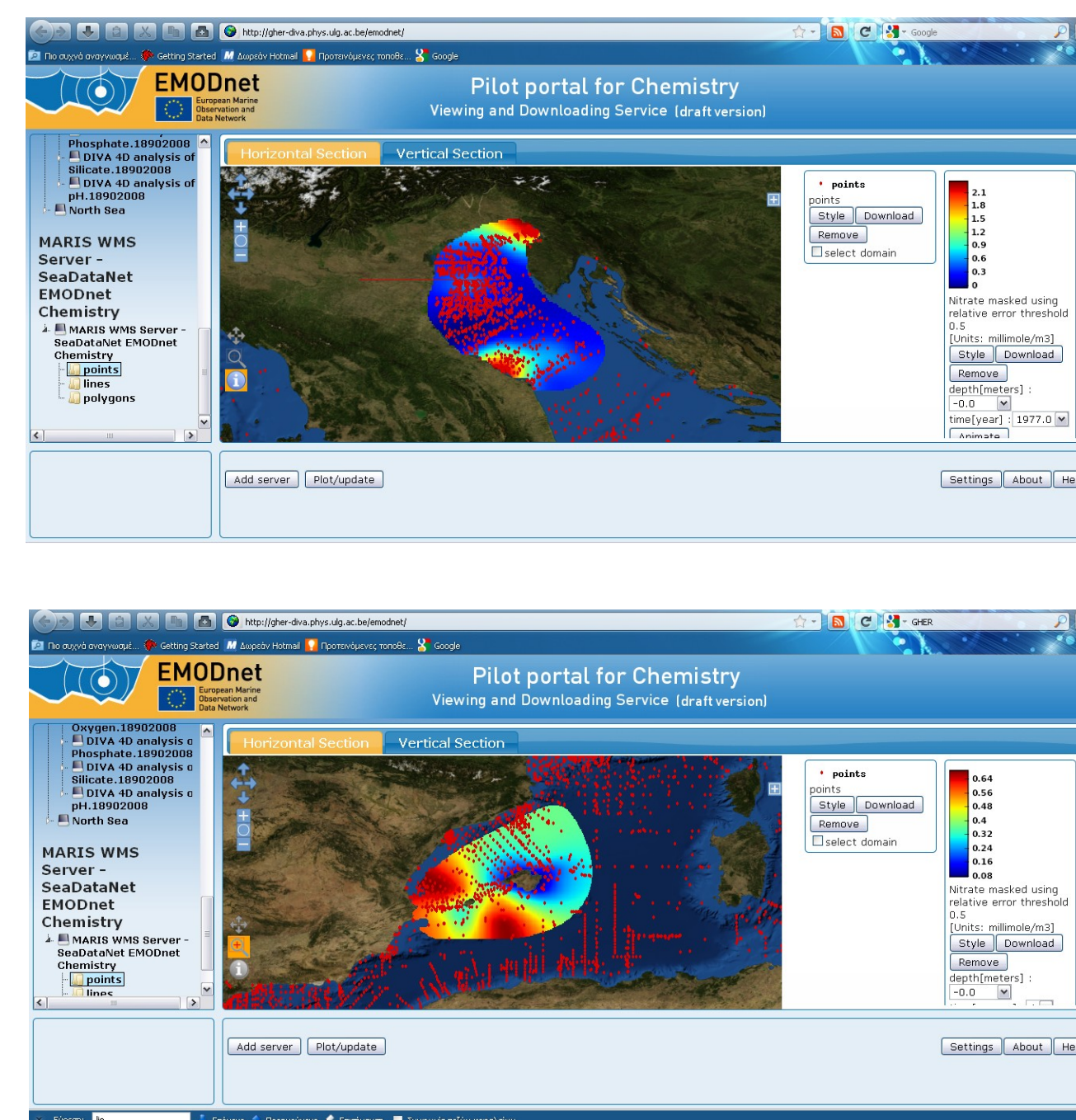Figure (3a and b) shows some of the computed products at the Mediterranean Spots.

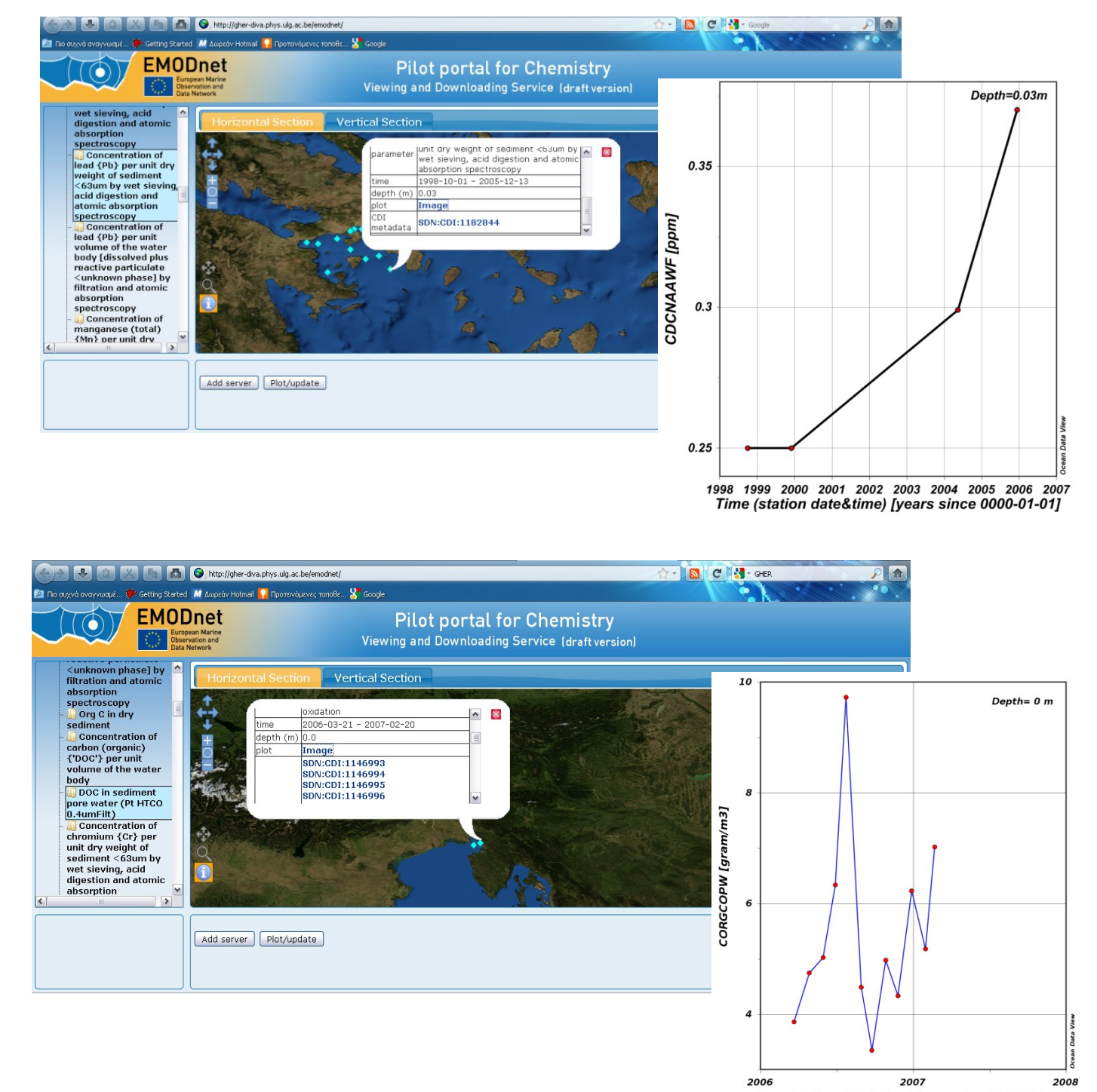**Figure 3a:** *Nitrate interpolated maps on surface*

Figure 3b: *Time series plots*

Work is under development to further improve the data products by filling the data distribution gaps and by using new and upgrading analysis modules.

Visit the portal at: www.emodnet-chemistry.eu