EMODnet Central Portal data services

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What is EMODnet?

- Long-term marine data initiative
- Multidisciplinary network of 150+ organisations amongst seven thematic portals
- Unlock marine data resources
- Facilitate sustainable marine investment through data harmonisation and sharing
- Discover gaps in data availability
EMODnet Central portal and data services

to visualize and provide access to the thematic data products, that are being build and managed in the individual thematic EMODnet projects

organize user services to facilitate and increase access and usage of the EMODnet portal.
Different services for different users

General ‘professional’ user: overview of the data products though a GIS interface and metadata catalogue

Marine spatial planner, practitioner: create a summary overview of the marine area under assessment, based on the data services of EMODnet

Data scientist: describe where to find the services, how to access them and provide examples in different environments (QGIS, R, python…)

General public, outreach, schools: European Atlas of the Seas

Basic idea:
- Retrieve and combine information from multiple thematic data products via one single interface
- Using (OGC) web services
European Atlas of the Seas

Ex: Aquaculture production (2008 to 2016)
Informative, educational, simple and playful
Overview of the data products though a metadata catalogue

196 data product descriptions, harvested (5 providers) in a Geonetwork instance via CSW

- EMODnet Chemistry (52)
- EMODnet Biology (47)
- EMODnet Geology (35)
- EMODnet Human activities (33)
- EMODnet Physics (25)
- EMODnet Seabed habitats (3)
- EMODnet Bathymetry (1)

Metadata: abstract, download and links, about the resource, technical information, metadata information

INSPIRE-metadata rules
Overview of the data products through a GIS interface

- Developed *in house* (Open layers, Javascript, AngularJS, PHP, Symfony, PostgreSQL)
- Displays, animates data products, links from product to metadata and download
- Uses WMS to display products (*getMap*, *getLegendGraphic*, *getFeatureInfo*)
Tool for a preliminary assessment and early phase planning of a particular activity
Retrieves information from multiple thematic data products via one single interface
The tool needs to be easy to use, so comprehensive information can be easily accessed by the ‘marine spatial planner’
Using OGC services (WFS, WCS)

**Query tool - Concept**

- To select an area of interest (bounding box)
- To retrieve summary statistics for the selected layer(s)
- To get a pdf/html report with maps and summary statistics of selected layer(s)

**Basic functionalities**

**Extended functionalities**

- Filtering options
- Select by pre-defined polygons
Query tool 1.0

Retrieve data from data products for specific locations using OGC services (WFS)

Version 1.0: User input: list of coordinates

Drawbacks V.1.0: Does not work for areas, tool and output file too complex
Data services (II): Query tool 2.0

Web application – query tool (JS/HTML)
- New layout
- Extra functionality: map where user can indicate areas

REST API Calls
- INPUT: area
- OUTPUT: Summary/stats, Map, Raw data

REST API
PROCESSING WEBSERVICE
Clipping EMODnet OGC layers (WFS, WMS, WCS)
OGC layers = relevant data products from:
- Bathymetry
- Geology
- Biology
- Chemistry
- Physics
- Seabed habitats
- Human activities

Backend
- Current developments
  - Prototype of web application
  - Html template report
  - Clip polygon layers from
    - Geology
    - Seabed habitats
  - Testing for
    - Bathymetry
Query tool 2.0 prototype
Valuable information from data products

**Bathymetry**

- Mean depth

**Geology**

- Seabed substrate 250k
- % of substrate type in selected area

<table>
<thead>
<tr>
<th>Metric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average depth of selected area</td>
</tr>
<tr>
<td>Minimum depth of selected area</td>
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<tr>
<td>Maximum depth of selected area</td>
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</table>
Valuable information from data products

Chemistry

Concentrations of ammonium, Chla-a, dissolved oxygen, phosphate and silicate, averaged per season, at different depths

<table>
<thead>
<tr>
<th>Year</th>
<th>Winter</th>
<th>Spring</th>
<th>Summer</th>
<th>Autumn</th>
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</tbody>
</table>

Seabed habitats

Broad-Scale Predictive habitat Map

- 36.1% " A5.27: Deep circalittoral sand
- 31.4% " A5.25 or A5.26: Circalittoral fine muddy sand
- 18.5% " A5.15: Deep circalittoral coarse sand
- 6.55% " A5.35: Circalittoral sandy mud
Valuable information from data products

**Biology**

- Species list - number of observations (and possible gridded abundances) of species per
  - EOV group
  - Protection status
  - Invasive status
  - Indicator species

- Number (#) of species in selected area: xxx (download full list)
- # of records in selected area: xxx (download)
- # of Red list species in selected area: xxx (download)
- # of HAB species in selected area: xxx (download)
- # of Invasive species in selected area: xxx (download)
- # of MSFD indicator species: xxx (download)
- # of Habitat directive species: xxx (download)

**Human activities**

- Location of human activities, installations, infrastructure (e.g. aquaculture, pipelines, wind farms, oil/gas platforms, shipping routes, etc.)

- Presence/absence, count
Query tool 2.0 prototype
Query tool 2.0 prototype
Query tool 2.0 prototype – report

Building block for Environmental Impact Assessment (EIA)
How to access the EMODnet data directly using *webservices*

List of the base url’s of all thematic portals:

- **EMODnet Bathymetry**  http://ows.emodnet-bathymetry.eu/ows
- **EMODnet Biology**  http://geo.vliz.be/geoserver/Emodnetbio/ows
- **EMODnet Chemistry**  http://emodnet02.cineca.it/geoserver/ows
- **EMODnet Geology**  http://drive.emodnet-geology.eu/geoserver/EMODnetGeology/ows
- **EMODnet Human Act**  http://www.emodnet-humanactivities.eu/geoserver/emodnet/ows
- **EMODnet Physics**  http://geoserver.emodnet-physics.eu/geoserver/emodnet/ows
- **EMODnet Seabed Hab**  https://ows.emodnet-seabedhabitats.eu/ows

<table>
<thead>
<tr>
<th><strong>WMS</strong></th>
<th><strong>WFS</strong></th>
<th><strong>WCS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>GetCapabilities</td>
<td>GetCapabilities</td>
<td>GetCapabilities</td>
</tr>
<tr>
<td>GetMap</td>
<td>DescribeFeatureType</td>
<td>DescribeCoverage</td>
</tr>
<tr>
<td>Getfeatureinfo</td>
<td>GetFeature</td>
<td>GetCoverage</td>
</tr>
</tbody>
</table>
Examples of implementation in R, Python

= hacketon package

```r
# library(data.table)
# library(sf)

# list the parts of the wfs url
base_url <- 'https://geo.wilix.be/gweserver/wms'
service <- '?request=GetFeature&service=WFS&version=1.1.0'
typeName <- 'occupationDataportalEuropa'
resultType <- 'resultType=results'
viewParams <- '?viewParameters=context:010001'
paramAlpha <- paste0('agpiaId:', agpiaID)
paramsGeo <- paste0('where:(up.gmd:objectIds 61 ARRAY[''
                   , xpgis:WGS84ID, ''])')
outFormat <- 'outputFormat=csv'

# combine to wfs url, providing the agpiaID and the MSCID
wfs_url <- paste0(base_url, service, typeName, resultType,
                  viewParams,
                 -urlencoded(paste0(paramAlpha, paramGeo, sep=';'))), reserved = TRUE),
outFormat)

# get the csv directly by the wmservice url
Larus_fuscus_NV_w2_web <- fread(wfs_url,
       header = TRUE,
       sep = ',')

# but you can also directly get the spatial data:
wfs_url <- paste0(base_url, service, typeName,
                  viewParams,
                 -urlencoded(paste0(paramAlpha, paramGeo, sep=';'))), reserved = TRUE),
'outputFormat=application/json')

Larus_fuscus_NV_web_sf <- st_read(wfs_url)
```
Tackling the following domains:
- Fisheries
- Energy
- Tourism
- Environment
- Aquaculture

OSL 1: 7 teams with exciting challenges
Team 3 (ImarDis)

winners of ‘Best Pitch’, produced a tool for scuba divers to identify where to dive for wrecks. Users would be able to identify suitable wreck dive sites based on a range of parameters.
Open Sea Lab 2: the story continues

Autumn 2019, city of Antwerp!
Your gateway to marine data in Europe