An example of adopting and adapting SeaDataCloud and INSPIRE data models to map EMODnet nutrients data

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Introduction

- The Marine Strategy Framework Directive **(MSFD)** of the European Commission defines some **obligations** for the implementation of strategies for maintaining good environmental status.

- One of these obligations, described in the **Article 19(3),** prescribes that Member States shall make **data available** in accordance with the **INSPIRE Directive** standards and rules, to the European Environment Agency (EEA) and European Commission.

Introduction

*"The **INSPIRE Directive** aims to create a European Union spatial data infrastructure for the purposes of EU environmental policies".*

Introduction

- The **Technical Group on Marine Data** (TG-DATA) has taken actions for **improving** the MSFD Art.19(3).

- The **TG-DATA** provides **recommendations** for the publication of datasets under the MSFD Art.19(3). These guidelines propose some examples and best practices.

Recommendations for the publication of datasets under MSFD Article 19.3

- **TG-DATA proposed a series of examples to evaluate the feasibility of compliance with INSPIRE:**

  - ➤ Use of Sea Regions: example on Marine Litter (an example will be developed using an OSPAR dataset)

  - ➤ Use of Grids: example on Species distribution (species distribution and Habitats & biotopes)

  - ➤ **Example of nutrients:** use of Environmental Monitoring Facilities data models (the use case is developed by *EMODnet* in collaboration with *MEDCIS* project)

Example based on MSFD Criterion D5C1 "Nutrients concentrations in water"

- **We describe the use of data models from the INSPIRE data themes:**

  ➢ Environmental Monitoring Facilities (EMF)
  ➢ Oceanographic Geographical Features (OF)
  ➢ Observations and Measurements (O&M)

  to map **nutrients** (MSFD Criterion D5C1 "Nutrients concentrations in water") in the Mediterranean.

Example to be included in TG-DATA document

- **Source Data Representations (SeaDataNet Infrastructure)**

  Data used for this case study were provided by **Croatian Institute of Oceanography and Fisheries** (IOF).

  The original metadata format is the SeaDataNet **Common Data Index** (CDI), while data are provided in **Ocean Data View** (ODV) format.

  Some information are described using standard BODC vocabularies.

  For the purposes of this exercise, examples have been developed using **Nitrite** and **Phosphate** data.

  http://seadatanet.maris2.nl/v_cdi_v3/print_ajax.asp?screen=0&n_code=2581516

SeaDataCloud WP8 Deliverable 8.6 - Part a "Review of data formats, also considering INSPIRE data models (O&M)"

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For this study, we **adopted** and **adapted** the solution developed and proposed in the **SeaDataCloud** project.

Review of data formats, also considering INSPIRE data models (O&M)

WP8 - Deliverable 8.6 - Part a

HORIZON **2020**

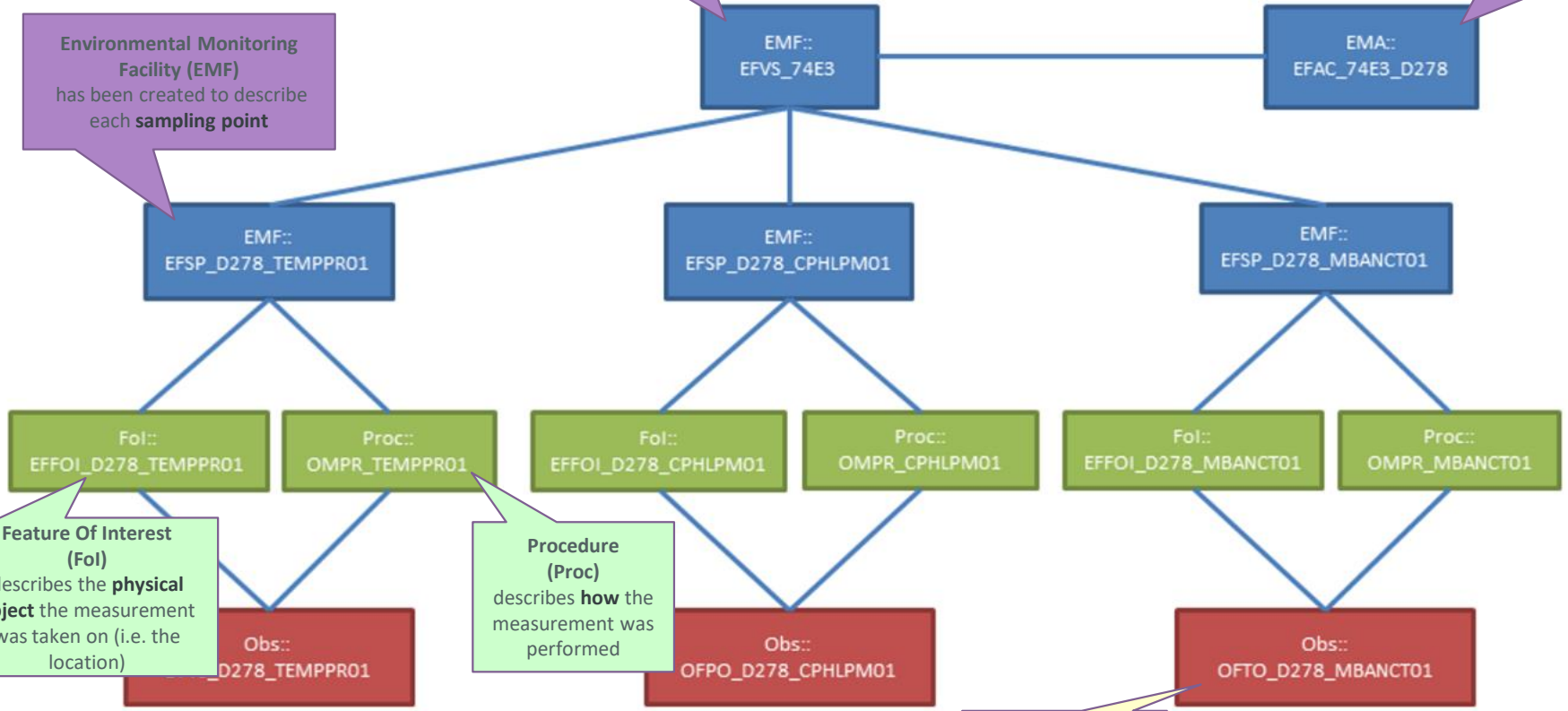sdn-userdesk@seadatanet.org – www.seadatanet.org

SeaDataNet - The pan-European infrastructure for marine and ocean data management

SeaData[...]ata models:

EMF::
EFVS_74E3

EMA::
EFAC_74E3_D278

EMF::
EFSP_D278_TEMPPR01

EMF::
EFSP_D278_CPHLPM01

EMF::
EFSP_D278_MBANCT01

FoI::
EFFOI_D278_TEMPPR01

Proc::
OMPR_TEMPPR01

FoI::
EFFOI_D278_CPHLPM01

Proc::
OMPR_CPHLPM01

FoI::
EFFOI_D278_MBANCT01

Proc::
OMPR_MBANCT01

Obs::
[...]_D278_TEMPPR01

Obs::
OFPO_D278_CPHLPM01

Obs::
OFTO_D278_MBANCT01

SeaDataCloud INSPIRE data models:

For monitoring data, we don't have all information about platform (e.g. Marine Vessel) or activities (vessel cruise). We decided to **adapt the structure proposed by SeaDataCloud** and use Environmental Monitoring Facility (EMF) to collect CDI information.
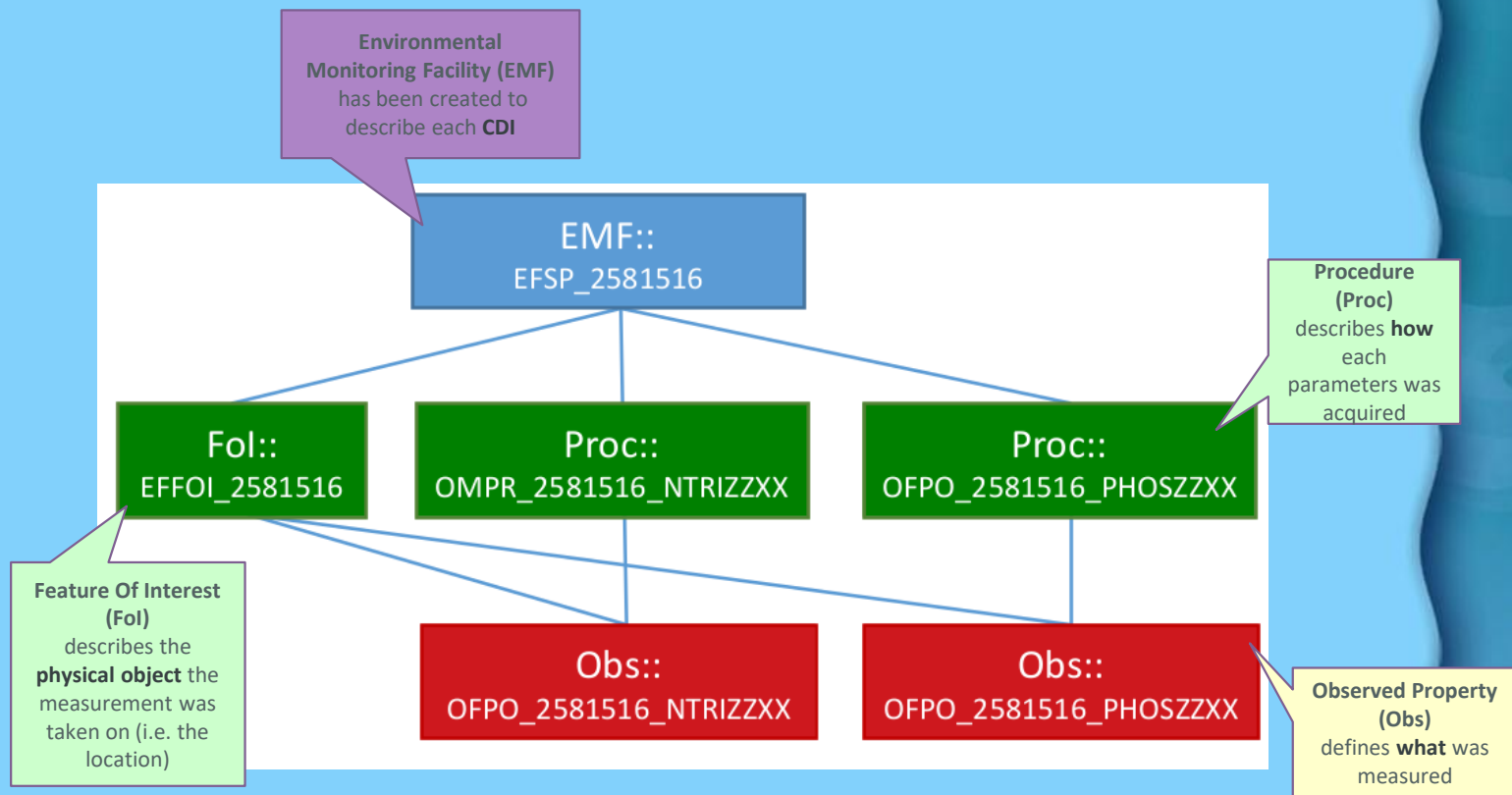
Adapted SeaDataCloud INSPIRE data models:
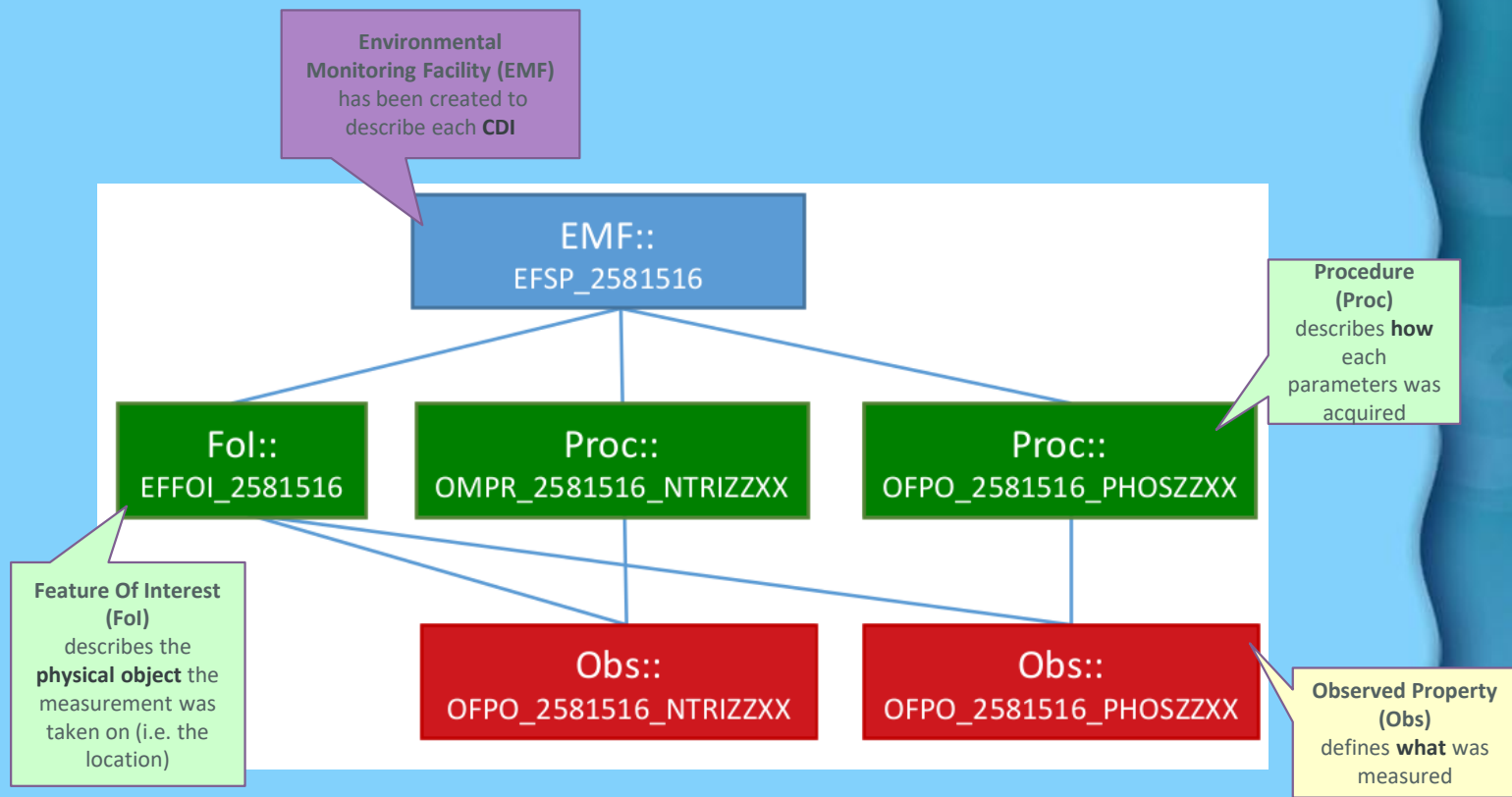
Relationship between different INSPIRE classes:

- in **blue** stem from the INSPIRE Theme EMF

- in **red** stem from the specialized observations utilized for the INSPIRE Theme OF

- in **green** objects are the area of overlap, utilized by both INSPIRE Themes.

IMDIS Conference 2018

Adapted SeaDataCloud INSPIRE data models:

The **Environmental Monitoring Facility** is described as a single Sampling Point, where the **Feature of Interest** in the water column (at 4 depths: 0, 5, 10 and 18 m) at that specific location. The **process** relates with two different parameter analysed, Nitrites and Phosphate, producing as results two **Observations**.

Mapping from source to target

INSPIRE model

SeaDataCloud metadata/data

Attribute Association role Constraint	Values/ Enumerations	Multiplicity		Example	Source	Path
Application Schema 'Environmental Monitoring Facilities' (version 4.0)				Application Schema <provide the name of the application schema>		
gml:id	NCName			_2581516	CDI	EFSP_ + [CDI-record id]
inspire Id	Identifier	1				
localId	CharacterString	1		FSP_2581516	CDI	EFSP_ + [CDI-record id]
namespace	CharacterString	1				
additional Description	CharacterString	0...1			CDI	gmd:MD_Metadata/gmd:identificationInfo/sdn:SDN_DataIdentification/gmd:abstract/gco:CharacterString

The mapping between SeaDataCloud metadata and INSPIRE elements was done using CDI and ODV (http://nodc.ogs.trieste.it/INSPIRE_compliant/INSPIREmatching_MEDCIS.xlsx).

OM_Observation: profileObservation
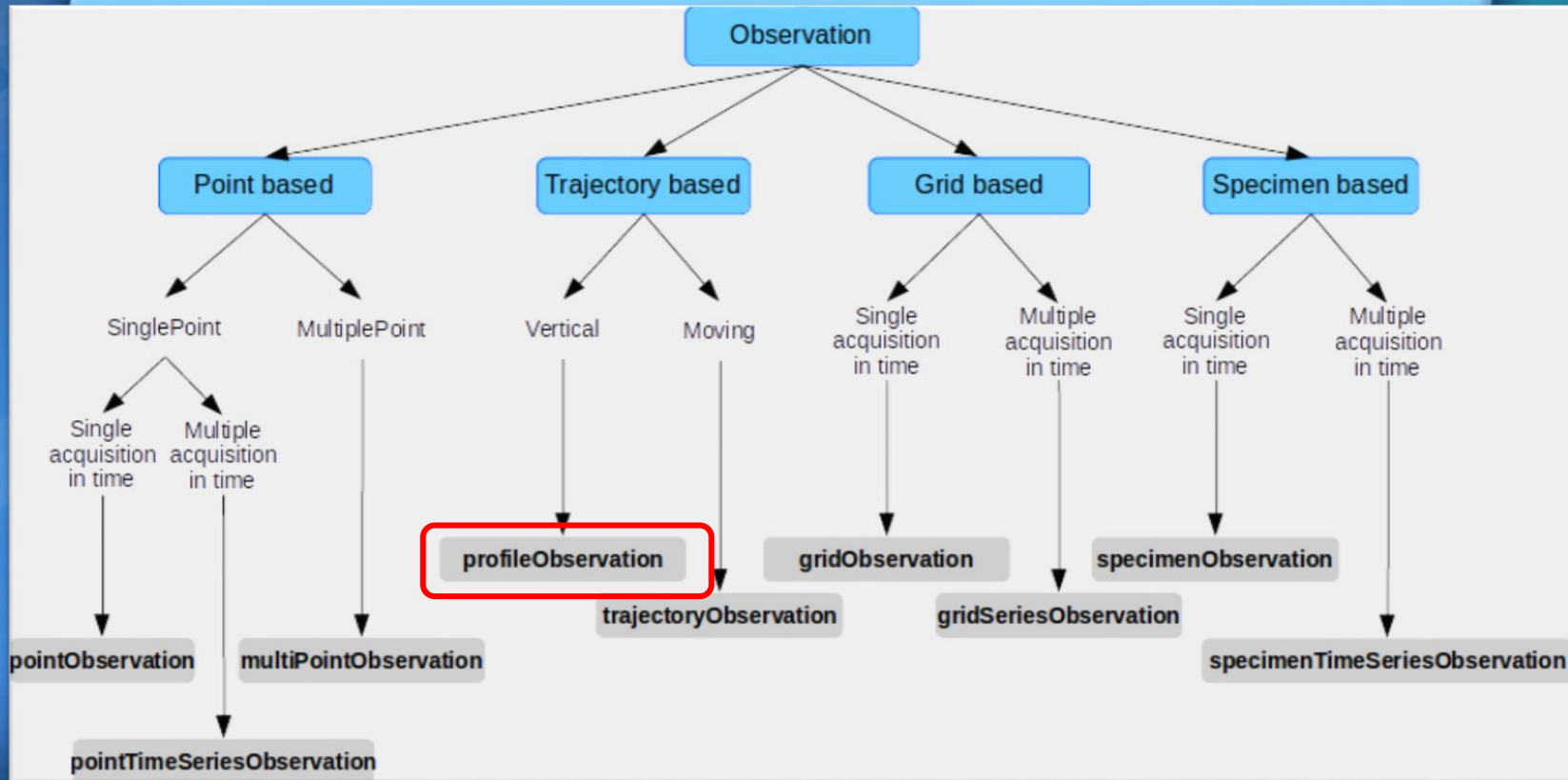
Among the different types of observations that can be described with O&M standards, we decide, **based on the nutrients data** used for testing, to adopt the **ProfileObservation** as XML profile.

INSPIRE GML

```xml
<!--Result-->
<gml:resultOf>
  <gmlcov:GeneralGridCoverage gml:id="GGC_2581516_PHOSZZXX">
    <gmlcov:DomainSet>
      <gmlcov:GeneralGrid srsName="http://vocab.nerc.ac.uk/collection/P01/current/ADEPZZ01/" axisLabels="DepBelowSurf">
        <gmlcov:DisplacementAxisNest axisLabels="DepBelowSurf" uomLabels="m">
          <gmlcov:P>
            <gmlcov:C>0</gmlcov:C>
            <gmlcov:C>5</gmlcov:C>
            <gmlcov:C>10</gmlcov:C>
            <gmlcov:C>18</gmlcov:C>
          </gmlcov:P>
        </gmlcov:DisplacementAxisNest>
      </gmlcov:GeneralGrid>
    </gmlcov:DomainSet>
    <gmlcov:RangeSet>
      <gmlcov:DataBlock>
        <gmlcov:CV>
          <gmlcov:V>0.13667</gmlcov:V>
          <gmlcov:V>0.117688</gmlcov:V>
          <gmlcov:V>0.106299</gmlcov:V>
          <gmlcov:V>0.167041</gmlcov:V>
        </gmlcov:CV>
      </gmlcov:DataBlock>
    </gmlcov:RangeSet>
    <gmlcov:RangeType>
      <swe:DataRecord>
        <swe:field name="PHOSZZXX" xlink:href="http://vocab.nerc.ac.uk/collection/P01/current/PHOSZZXX/">
          <swe:Quantity>
            <swe:label>PO4</swe:label>
            <swe:uom code="micromol/l" xlink:href="http://vocab.nerc.ac.uk/collection/P06/current/UPOX"/>
          </swe:Quantity>
        </swe:field>
      </swe:DataRecord>
    </gmlcov:RangeType>
  </gmlcov:GeneralGridCoverage>
</gml:resultOf>
</gml:Observation>
</gml:featureMember>
</gml:FeatureCollection>
```
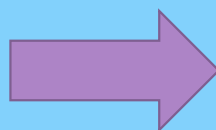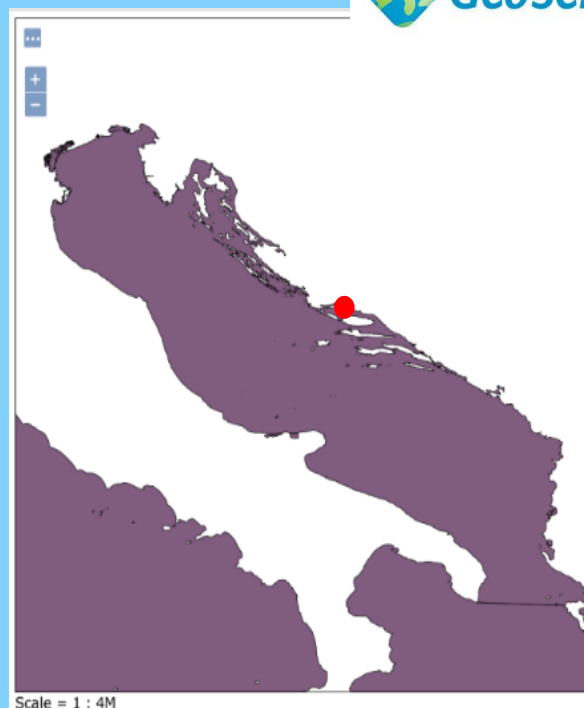
A complete version of XML files are downloadable at the following link:

http://nodc.ogs.trieste.it/INSPIRE_compliant

GML publication

GML to SHP for publication

WMS publication

Scale = 1 : 4M

Feedback by JRC (Joint Research Centre)

We requested a formal approval by JRC:

"The issue raised will be dealt with under the umbrella of MSFD TG DATA, and Art 19(3) in particular.

It must be highlighted that due to resource constraints JRC, as technical coordinator of INSPIRE, is not capable of ensuring compliance of individual datasets.

The provided filed validate against the INSPIRE schemas, so structurally the content is done properly.

The next step would be to check the data through the available validator tools [..] with regards to download services, and content. A sample test result on WFS is available [..]. Once finalised, the approach might be submitted as an INSPIRE good practice, following the process described [..]."

Conclusion

The exercise demonstrates the completeness of **EMODnet Chemistry** metadata with respect to **INSPIRE** requirements and the feasibility to map EMODnet to INSPIRE models.

It shows that EMODnet platform could be used to expose monitoring data following Art.19(3), i.e. compliant with INSPIRE, when a centralized tool will be developed to convert formats.

Thanks for your attention!