Metadata description for the datasets managed by the GIS

Activity 4.3 - Creation of an open access GIS WP4 - Implementation of the Georeferenced Open Access Database

SUSHI DROP project (ID 10046731)

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Abstract

WP4 is focused to UUV mission planning, data acquisition and storage. This WP describes the procedures implemented to build a collection of data organized by biological and ecological interest in the form of thematic maps, 3D models, and geodatabases. The processed data can be visualized using open-source tools such as GIS platforms to reach the public and all project stakeholders. This report lists all the procedures implemented to create metadata for the data processed and entered into GIS. The reference INSPIRE legislation and the guidelines followed are identified.

Overview

Metadata is needed for datasets managed by GIS: all the crucial information for each survey processed need to be described in a standard format following the INSPIRE Directive. European Commission (EC) defined the INSPIRE Directive in 2007 to "create a European Union Spatial Data Infrastructure (SDI) for the purposes of EU environmental policies and policies or activities which may have an impact on the environment". In fact, the European SDI can facilitate public access and sharing of environmental spatial information. The INSPIRE Directive tackles up to 34 spatial data topics needed for different environmental applications. For SUSHI DROP project the "Oceanographic geographical features" theme describes is particularly relevant (Figure 1).

FIGURE 1 INSPIRE SPATIAL DATA THEMES IN ANNEX 3 FROM INSPIRE KNOWLEDGE BASE

Background

Thanks to the many sensors available on the Blucy drone, during the missions of the SUSHI DROP project it was possible to acquire a significant amount of data. For the collected data to be useful for the project activities, it is essential that they are processed and stored allowing a correct interpretation. For this purpose, metadata is created, information regarding the data itself. This information can be of different types: statistical, descriptive, administrative, legal, or structural. To allow for the consistent creation of this metadata, it is advisable to rely on reference standards for metric content and quantifiable information. In order to make the acquired resources easily available, a synergic action is necessary on issues such as: organization, availability, accessibility, quality and sharing of spatial data.

EC has developed an INSPIRE Geoportal to enable access to European spatial data. The geoportal is powered by data ingested from the harvesting procedure involving several national geoportals, including the main ones of the partners involved in the project SUSHI DROP:

- Italy: RNDT - Repertorio Nazionale dei Dati Territoriali - Servizio di ricerca (Agenzia per l'Italia Digitale)
- Croatia: NIPP kataloška usluga

INSPIRE for SUSHI DROP project

The metadata description for the information acquired during the SUSHI DROP project and organized in the Geographic Information System (GIS) revolves around three main representations of fundamental units, crucial for the correct identification of the characteristics of all the data collected during survey missions:

1. Geometry representation
2. Coordinate Reference Systems (CRS)
3. Temporal reference system

The guidelines for the aforementioned topics are defined by the “INSPIRE Thematic Working Group Oceanographic geographical features and Sea regions” and published as “D2.8.III.15 INSPIRE Data Specification on Oceanographic geographical features – Technical Guidelines” by the European Commission Joint Research Centre.

Two main chapters describes the requirements: “Data content and structure” and “Reference systems, units of measure and grids”.

Regarding “Geometry representation” (chapter 5.2.6) the requirement is the following:

The value domain of spatial properties defined in this Regulation shall be restricted to the Simple Feature spatial schema as defined in Herring, John R. (ed.), OpenGIS® Implementation Standard for Geographic information – Simple feature access – Part 1: Common architecture, version 1.2.1, Open Geospatial Consortium, 2011, unless specified otherwise for a specific spatial data theme or type.

The implementation defined by Open Geospatial Consortium (OGC) is the standard in modern GIS open source development and currently defined by version 1.2.1 on OGC repository https://portal.ogc.org/files/?artifact_id=25355

Then regarding Identifiers for coordinate reference systems (chapter 6.1.1.4) the requirement is the following:

Coordinate reference system parameters and identifiers shall be managed in one or several common registers for coordinate reference systems.

Only identifiers contained in a common register shall be used for referring to the coordinate reference systems listed in this Section.

The area surveyed for the SUSHI DROP project is contained within a single map projection reference system, thus used as a reference for the project. As shown in Figure 2 the areas of operations fall within longitude between 12°E and 18°E.

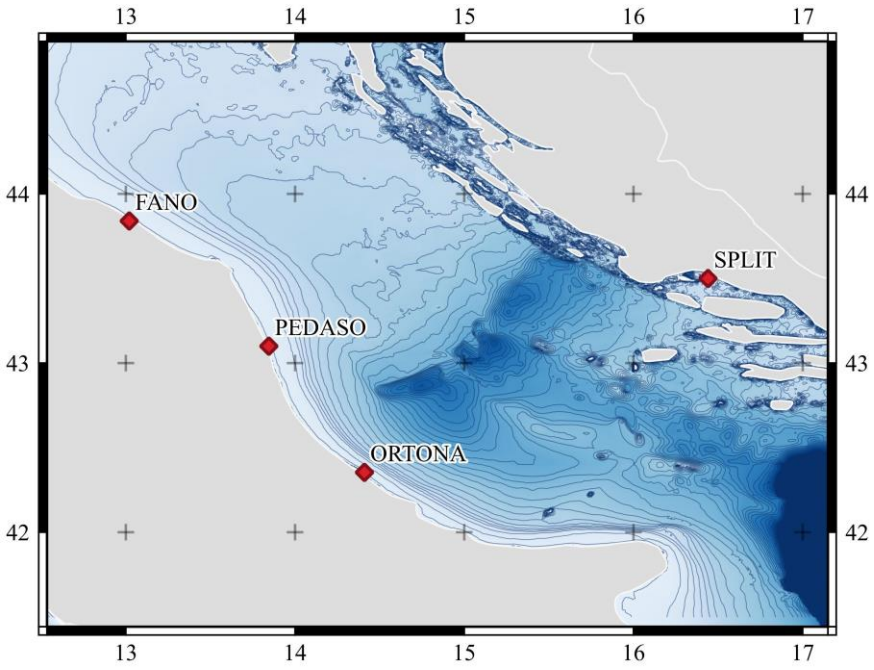

FIGURE 2 AREA OF SUSHI DROP MISSIONS

The cartographic projection that corresponds to this reference is “2D TM projection in European Terrestrial Reference System 1989 (ETRS89) on Geodetic Reference System 1980 (GRS80), zone 33 North (12°E to 18°E)” (in short “ETRS89-TM33N”) identified by European Petroleum Survey Group (EPSG) code 3045.

Coordinate reference system	Short name	EPSG Code
3D Cartesian in ETRS89	ETRS89-XYZ	4936
3D geodetic in ETRS89 on GRS80	ETRS89-GRS80h	4937
2D geodetic in ETRS89 on GRS80	ETRS89-GRS80	4258
2D LAEA projection in ETRS89 on GRS80	ETRS89-LAEA	3035
2D LCC projection in ETRS89 on GRS80	ETRS89-LCC	3034
2D TM projection in ETRS89 on GRS80, zone 26N (30°W to 24°W)	ETRS89-TM26N	3038
2D TM projection in ETRS89 on GRS80, zone 27N (24°W to 18°W)	ETRS89-TM27N	3039
2D TM projection in ETRS89 on GRS80, zone 28N (18°W to 12°W	ETRS89-TM28N	3040
2D TM projection in ETRS89 on GRS80, zone 29N (12°W to 6°W)	ETRS89-TM29N	3041
2D TM projection in ETRS89 on GRS80, zone 30N (6°W to 0°)	ETRS89-TM30N	3042
2D TM projection in ETRS89 on GRS80, zone 31N (0° to 6°E)	ETRS89-TM31N	3043
2D TM projection in ETRS89 on GRS80, zone 32N (6°E to 12°E)	ETRS89-TM32N	3044
2D TM projection in ETRS89 on GRS80, zone 33N (12°E to 18°E)	**ETRS89-TM33N**	**3045**
2D TM projection in ETRS89 on GRS80, zone 34N (18°E to 24°E)	ETRS89-TM34N	3046
2D TM projection in ETRS89 on GRS80, zone 35N (24°E to 30°E)	ETRS89-TM35N	3047
2D TM projection in ETRS89 on GRS80, zone 36N (30°E to 36°E)	ETRS89-TM36N	3048
2D TM projection in ETRS89 on GRS80, zone 37N (36°E to 42°E)	ETRS89-TM37N	3049
2D TM projection in ETRS89 on GRS80, zone 38N (42°E to 48°E)	ETRS89-TM38N	3050
2D TM projection in ETRS89 on GRS80, zone 39N (48°E to 54°E)	ETRS89-TM39N	3051
Height in EVRS	EVRS	5730
3D compound: 2D geodetic in ETRS89 on GRS80, and EVRS height	ETRS89-GRS80-EVRS	7409

The EPSG code is of fundamental use to keep in a univocal and coherent way and at the same time recorded with a synthetic numerical information, the indication of a reference system used in GIS.

The corresponding XML (Extensible Markup Language) description for EPSG (European Petroleum Survey Group) code 3045 is officially described at http://www.opengis.net/def/crs/EPSG/0/3045 and reported in the following image.

3045.xml — XML

```
<gml:ProjectedCRS xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:epsg="urn:x-ogp:spec:schema-xsd:EPSG:2.2:dataset"
xmlns:gml="http://www.opengis.net/gml/3.2" gml:id="epsg-crs-3045">
<gml:metaDataProperty>
<epsg:CommonMetaData>
<epsg:type>projected</epsg:type>
<epsg:alias code="2836" codeSpace="7307" alias="ETRS - TM33">
<epsg:remarks>
This identifier is as used by the information source but has been superseded by the INSPIRE identifier.
</epsg:remarks>
</epsg:alias>
<epsg:alias code="2899" codeSpace="7307" alias="DE_ETRS89 / UTM"/>
<epsg:alias code="2939" codeSpace="7307" alias="NO_ETRS89 / UTM"/>
<epsg:alias code="6509" codeSpace="1025" alias="ETRS89 / UTM zone 3"/>
<epsg:alias code="6518" codeSpace="7307" alias="DE_ETRS89 / UTM_BB"/>
<epsg:alias code="6519" codeSpace="7310" alias="ETRS89 / UTM zone 33">
<epsg:remarks>This is the EPSG name for CRS code 25833.</epsg:remarks>
</epsg:alias>
<epsg:alias code="10590" codeSpace="7301" alias="ETRS89 / TM33"/>
<epsg:alias code="10591" codeSpace="1029" alias="ETRS89-TM33"/>
<epsg:informationSource>
A. Annoni et al., "Map Projections for Europe", European Commission Joint Research Centre, reference EUR 20120 EN, 2003.
</epsg:informationSource>
<epsg:revisionDate>2021-11-04</epsg:revisionDate>
<epsg:changes>
<epsg:changeID xlink:href="https://apps.epsg.org/api/v1/Change/2005.18/export?format=gml"/>
<epsg:changeID xlink:href="https://apps.epsg.org/api/v1/Change/2005.46/export?format=gml"/>
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<epsg:changeID xlink:href="https://apps.epsg.org/api/v1/Change/2010.003/export?format=gml"/>
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<epsg:changeID xlink:href="https://apps.epsg.org/api/v1/Change/2012.078/export?format=gml"/>
<epsg:changeID xlink:href="https://apps.epsg.org/api/v1/Change/2019.024/export?format=gml"/>
<epsg:changeID xlink:href="https://apps.epsg.org/api/v1/Change/2020.026/export?format=gml"/>
<epsg:changeID xlink:href="https://apps.epsg.org/api/v1/Change/2020.031/export?format=gml"/>
<epsg:changeID xlink:href="https://apps.epsg.org/api/v1/Change/2021.101/export?format=gml"/>
</epsg:changes>
<epsg:show>true</epsg:show>
<epsg:isDeprecated>false</epsg:isDeprecated>
<epsg:Usage>
<epsg:extent xlink:href="https://apps.epsg.org/api/v1/Extent/2127/export?format=gml"/>
<gml:scope>Pan-European medium scale conformal mapping.</gml:scope>
</epsg:Usage>
</epsg:CommonMetaData>
</gml:metaDataProperty>
<gml:identifier codeSpace="EPSG">3045</gml:identifier>
<gml:name>ETRS89 / UTM zone 33N (N-E)</gml:name>
<gml:remarks>
ETRS89-LCC (CRS code 3034) used for conformal mapping at 1:500,000 and smaller scales. ETRS89-LAEA (CRS code 3035) used for
statistical applications at all scales. See ETRS89 / UTM zone 33N (CRS code 25833) for CRS with preferred east-north axis order.
</gml:remarks>
<gml:scope/>
<gml:conversion xlink:href="https://apps.epsg.org/api/v1/Conversion/16033/export?format=gml"/>
<gml:baseGeodeticCRS xlink:href="https://apps.epsg.org/api/v1/CoordRefSystem/4258/export?format=gml"/>
<gml:cartesianCS xlink:href="https://apps.epsg.org/api/v1/CoordSystem/4500/export?format=gml"/>
</gml:ProjectedCRS>
```

Lines: 53 Characters: 3.322 Location: 1 Line: 0 — 3,33 KB Unicode (UTF-8) LF

Regarding “Temporal reference system” (chapter 6.1.2) the requirement is the following:

The default temporal reference system referred to in point 5 of part B of the Annex to Commission Regulation (EC) No 1205/2008 shall be used, unless other temporal reference systems are specified for a specific spatial data theme in Annex II.

NOTE 1 - Point 5 of part B of the Annex to Commission Regulation (EC) No 1205/2008 (the INSPIRE Metadata IRs) states that the default reference system shall be the Gregorian calendar, with dates expressed in accordance with ISO 8601.

NOTE2 - ISO 8601 Data elements and interchange formats – Information interchange – Representation of dates and times is an international standard covering the exchange of date and time-related data. The purpose of this standard is to provide an unambiguous and well-defined method of representing dates and times, so as to avoid misinterpretation of numeric representations of dates and times, particularly when data is transferred between countries with different conventions for writing numeric dates and times. The standard organizes the data so the largest temporal term (the year) appears first in the data string and progresses to the smallest term (the second). It also provides for a standardized method of communicating time-based information across time zones by attaching an offset to Coordinated Universal Time (UTC).

Acronyms

- CRS: Coordinate Reference System
- EC: European Commission
- EPSG: European Petroleum Survey Group
- ETRS: European Terrestrial Reference System
- EVRS: European Vertical Reference System
- GIS: Geographic Information System
- GRS: Geodetic Reference System
- OGC: Open Geospatial Consortium
- SDI: Spatial Data Infrastructure
- XML: Extensible Markup Language

Acknowledgement

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