

MELOA Catalogue, Geoportal and Data Services: A Modern approach for a Marine in-situ measurements Spatial Data Infrastructure and Data Services

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Abstract – An implementation of marine in-situ observations Spatial Data Infrastructure and Data Services for the MELOA project and WAVY drifters is presented. The implementation is driven by the FAIR principles and state-of-the-art data visualization technologies, and consists of the following components: 1) A Data Catalogue to make WAVYs data findable and openly accessible in easy to use and standard formats such as CSV and O&M, and metadata standards such as DCAT and GeoDCAT; 2) A Data Geoportal , providing effective data visualization taking advantage of Vector Tiles technology; 3) Data Services, exposing Web Services such as Web Map Services (WMS), Web Feature Service (WFS), Sensor Observation Service (SOS), Sensor Things API and GraphQL API.

Keywords – Open data, Interoperability, In-situ measurements, GEOSS, Sensor Web Enablement, SensorThings API, Sensor Observation Service, Web Feature Service, Web Map Services, Vector Tiles, GraphQL

I. INTRODUCTION

The MELOA project (<https://www.ec-meloa.eu/>) proposes to develop a low-cost, easy-to-handle, wave resilient, multi-purpose, multi-sensor, extra light surface drifter for use in all water environments, ranging from deep-sea to inland waters, including coastal areas, river plumes and surf zones.

Given the low influence of wind upon the drifters' displacements, MELOA will provide a cheap effective way to monitor surface currents and surface dynamic features anywhere in the World Ocean. Through equipping the drifters with thermistors at two different levels, the possibility is open for monitoring "near-skin temperature" and near-surface

A complete Software Ecosystem is developed in MELOA to transmit the measurements from the WAVY drifters' sensors via GPRS or satellite communications (Argos), or Wi-Fi for the raw log files through a Mobile Application (WavyHub); manage the test campaigns and launches and curating the data through the WAVY Operation Software; generate the Data Products in CSV and O&M formats through the L1 Processor; and disseminate and make the data openly accessible through the Catalogue, Geoportal and Data Services.

II. MELOA CATALOGUE

The MELOA Catalogue (<http://catalogue.ec-meloa.eu/>) solution is based on CKAN, a tool for making open data systems, by helping the management and publish of data collections. It is used by national and local governments, research institutions, and other organizations who collect lots of data. Once the data is published, users can use its faceted search features to browse and find the data they need, and preview it using maps, graphs and tables - whether they are developers, journalists, researchers, NGOs.

The main purpose of the Catalogue is to enable search and discovery of the data and metadata from the observations of the WAVYs in order to enable federation and data sharing with other data catalogues and communities such as GEOSS or Copernicus. Currently, MELOA data is also available through the NextGEOOS Catalogue (<https://catalogue.nextgeoss.eu/>) which is harvesting the metadata directly from the MELOA Catalogue.

III. MELOLA GEOPORTAL

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The MELOA Geoportal (<https://geoportal.ec-meloa.eu>) is an online, map based, data visualization tool for the public data stored in the WAVY's online Catalogue.

The main purpose of the MELOA Geoportal is to enable end-users the exploration and visualization of WAVY's data in an easy-to-use way, targeting diverse audiences: From marine scientists to citizens and general public. The usability and user experience have been one of the main objectives to be addressed, bringing user experience research methods to the design process to provide a user-centered perspective during software development.

The data visualization technology is based on Vector Tiles, enabling visualization details up to the individual measurement level and dynamic data management such as filtering and spatial aggregations.

IV. MELOA DATA SERVICES

MELOA provides the following OGC Web Services to access the data, focused on interoperability:

- Web Map Service (WMS): is a standard protocol for serving georeferenced map images over the Internet.
- Web Feature Service (WFS): provides an interface allowing requests for geographical features across the Web using platform-independent calls.
- Sensor Observation Service (SOS): This standard defines a Web service interface which allows querying observations, sensor metadata, as well as representations of observed features in an interoperable way
- SensorThings API: Provides an easy, flexible and efficient way access WAVY data and metadata compliant with the O&M data model. Although it has better performance and it is more user-friendly than SOS, its data model is less restrictive, resulting in weaker semantic relationships.

In addition to these services focused on interoperability, MELOA's software ecosystem includes a developer-friendly query language, based on GraphQL to facilitate the development of apps and other services, by combining different service endpoints and tailoring them to developers' needs. GraphQL provides a complete and understandable description of the data, delivering interlinked resources with a single request and making it easier to evolve and maintain APIs over time.

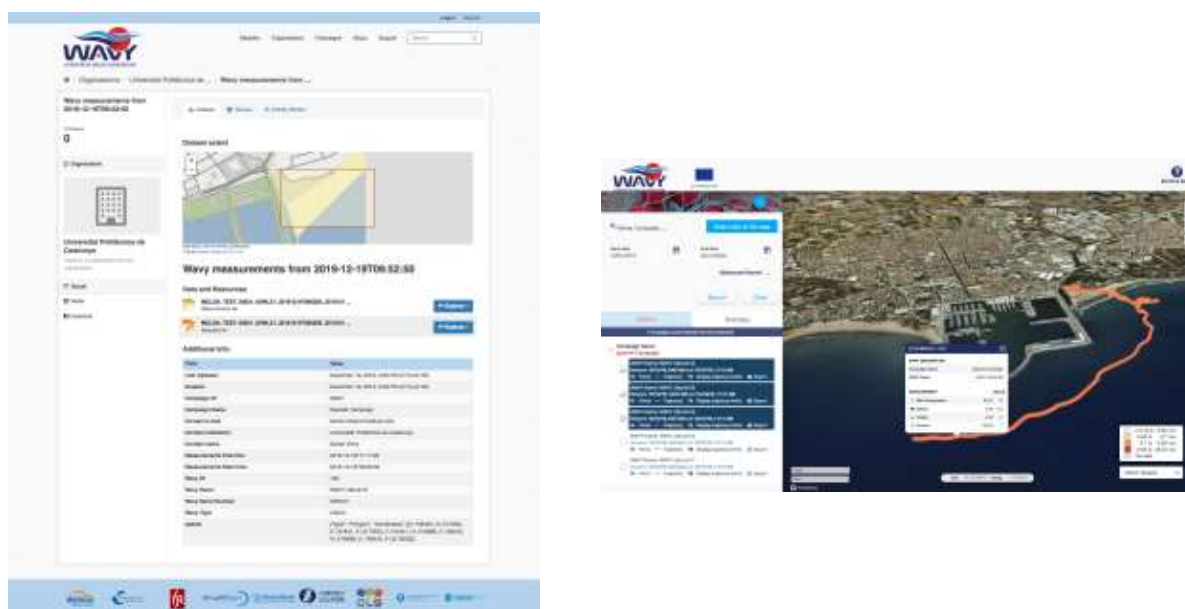


Fig 1. MELOA Catalogue & Geoportal

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