

Data To Product Thematic Services Integration into J-CORE

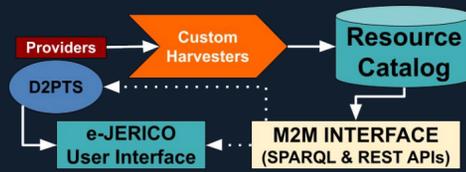
Miguel Charcos¹ (mcharcos@socib.es); Françoise Pearlman² (jsp@sprintmail.com); Jay Pearlman² (jay.pearlman@fourbridges.org); Juan Gabriel Fernández¹ (jfernandez@socib.es); Lorenzo Corgnati³ (lorenzo.corgnati@sp.ismar.cnr.it); Milla Johansson⁴ (milla.johansson@fmi.fi); Lauri Laakso⁴ (Lauri.Laakso@fmi.fi); Taavi Liblik⁶ (taavi.liblik@taltech.ee); Julien Mader⁷ (jmader@azti.es); Carlo Mantovani³ (carlo.mantovani@cnr.it); Simone Marini³ (simone.marini@sp.ismar.cnr.it); Jean Olivier Irissou⁸ (irissou@obs-vlfr.fr); Emma Reyes¹ (ereyes@socib.es); Anna Rubio⁷ (arubio@azti.es); Inma Ruiz¹ (iruib@socib.es); Jukka Seppala⁹ (jukka.seppala@ymparisto.fi); Lars Stemmann⁹ (stemmann@obs-vlfr.fr); Timo Tamminen⁹ (timo.tamminen@ymparisto.fi); Joaquín Tintoré^{1,10} (jtintore@socib.es)

(1) SOCIB, Spain; (2) IEEE, France; (3) CNR, Italy; (4) FMI, Finland; (5) North-West University, South Africa; (6) TalTech, Estonia; (7) AZTI, Spain; (8) Sorbonne Université, LOV, France; (9) SYKE, Finland; (10) IMEDEA (CSIC-UIB), Spain

JERICO e-Infrastructure

JERICO integrates a variety of observing platforms and technologies to observe and monitor the coastal areas in Europe. The system provides complex and coupled information of the physical, chemical and biological processes through data from fixed buoys, piles, moorings, drifters, ferrybox, gliders, HF radars and coastal cable observatories. Providing easy access and disseminating information of these multidisciplinary resources requires a virtual infrastructure capable of linking and integrating each of these resources in a single and standard digital platform. The JERICO Coastal Ocean Resource Environment (J-CORE) addresses the need to integrate resources through access to diverse resource providers

This poster focuses on exemplars of four data and product types to reflect the way J-CORE will integrate data and related products to support user needs. J-CORE's vision is to facilitate the access to federated resources in order to assist cross domain collaboration and interoperability.



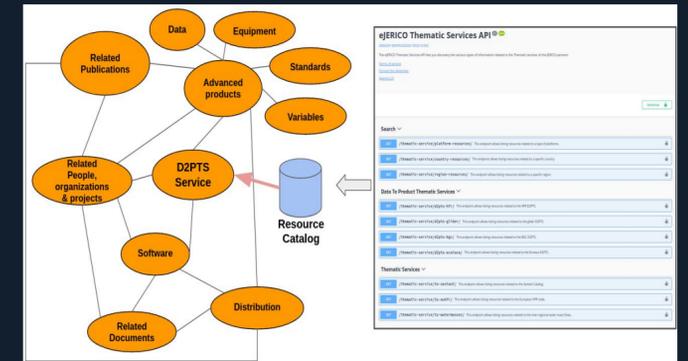
ABSTRACT

The JERICO Coastal Ocean Resource Environment (J-CORE) is an e-infrastructure that represents the whole picture of JERICO in order to support the specific needs of the diversity of its users. Four Data To Product Thematic services are developed in the framework of JERICO-S3 in order to demonstrate the capabilities of J-CORE to support the request of thematic groups, Pilot Supersites and Integrated Regional Sites. Moreover, these D2PTS will provide advanced products that respond to needs of the JERICO community by filling a scientific gap and supporting a given region. A pilot of each D2PTS will be undertaken in designated regions.

D2PTS Integration

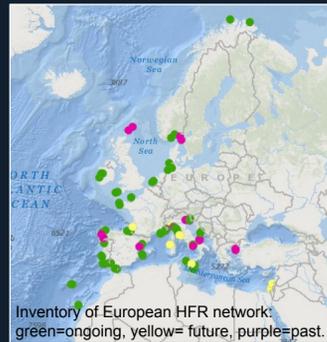
Data To Product Thematic Services (D2PTS) are practical cases testing the functionalities of the J-CORE to support Thematic Services (TS). As noted in the descriptions below, the D2PTS cover different data types and product types for specific thematic interests in the Integrated Regional Sites (IRS) and Pilot SuperSites (PSS) around the coast of Europe. The four D2PTS provide data, tools processing support and end products. Effectively integrating D2PTS implies managing metadata of resources, as well as data and tools related to these services and products (see figure on the right). Harvesting and then providing this information is tied to workflows of each of them. The outcomes are then tested against identified use cases.

Currently, the necessary harvesters have been designed and implemented in J-CORE. The metadata schema of the D2PTS has been refined to allow RESTful APIs to provide their associated linked data. This can enable a more seamless integration of TS. A virtual research infrastructure (VRE) prototype via Jupiter notebooks will be the framework to test comprehensive integration of the D2PTS (see poster 125 - "The JERICO e-Infrastructure").



HFR D2PTS

High Frequency Radar (HFR) is a very effective land-based remote sensing technology to monitor coastal regions all over the world due to its capacity of mapping ocean surface currents and wave fields over wide areas with high spatial and temporal resolution. HFR main applications span research, marine safety and security, pollutant monitoring, tsunami detection, fishery, navigation and renewable energy, thus making HFR technology a powerful tool for the integrated management of coastal zones. Thanks to the efforts carried on by the EuroGOOS HFR Task Team, a mature level of homogenization and standardization operations and products has been achieved, mainly based on a core of shared best practices, documentation and software tools.

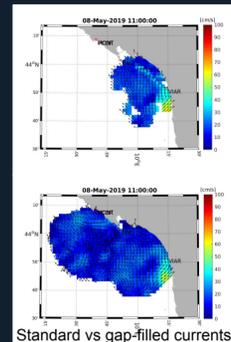


Three main Thematic Services will be implemented in JERICO-S3:

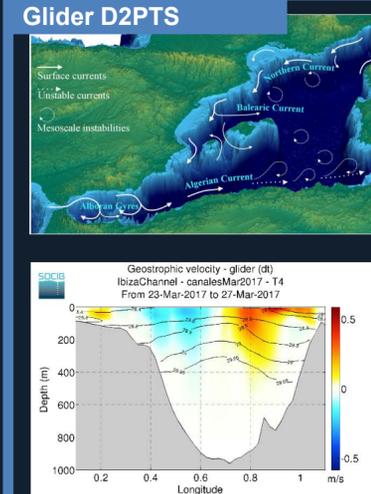
Inventory Thematic Service: interactive map showing the inventory of the European HFR network with filters for selecting the stations visible in EMODnet and CMEMS-INSTAC by status (ongoing, future, inactive), with popups listing metadata. (see figure at left)

HFR resources Thematic Service: Best Practices, Catalogue of References, Guidelines, Tools and Data Reports, Outage database will be made available via the JERICO e-Infrastructure.

HFR Gap-filling Thematic Service (D2PTS): Gap filled surface current fields will be available in J-CORE. Pilot applications will be implemented in Bay of Biscay IRS and NW-MED PSS (see figure at right)



Glider D2PTS

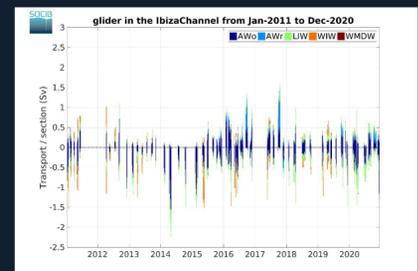


Geostrophic transports are computed from density differences derived from glider data. The code will be available at <https://github.com/socib/water-mass-transport>.

The method has been described by Heslop et al (2012). Two other publications provide weekly to seasonal and inter-annual long term variability of the circulation and water mass transport by using the method of this D2PTS - Juza & Tintoré (2021 in press); & Heslop et al (2021 - In progress)

The NW Mediterranean is an ideal site for the glider operations. Repeated and sustained glider missions enable high resolution monitoring of physical and biogeochemical characteristics at key hotspots to study the variability of the circulation at scales from weeks to seasonal & inter-annual. This D2PTS will address:

- Significant variability of the circulation
- Impact on North/South water mass exchanges
- Impact on marine ecosystem, bluefin tuna, jellyfish, ...
- > 10 years of sustained & semi-continuous glider data



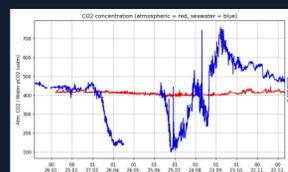
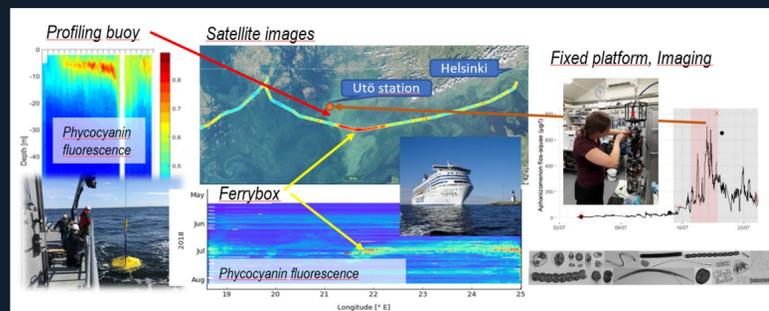
Data is processed, quality controlled, salinity corrected before calculating the water mass transport. Advanced products of the glider D2PTS are time series of the transport of the circulation and water masses identified.

BGC D2PTS

"Biogeochemical state of coastal areas" D2PTS will provide regional, combined multiplatform observations products from the Gulf of Finland. This is a broad topic with important impacts on society - e.g. the HAB (harmful algal bloom), which is an annual phenomenon in July and August (main holiday season) and impacts many of the coastal activities by the Gulf of Finland.

Results will be:

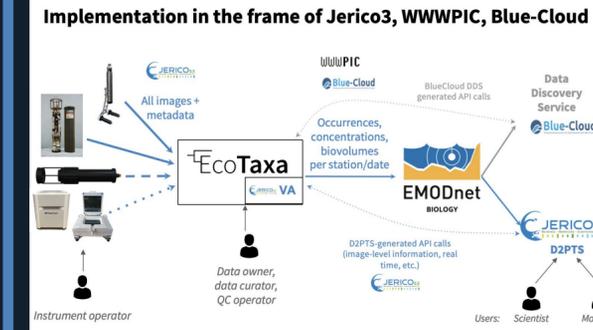
- **Near real-time observations:** physical, biological and chemical data from two fixed island stations and three FerryBox lines.
- **Data products:** the weekly HAB review, data for remote sensing reference.
- **Tools** for data processing, quality control, metadata creation, product creation.



Potential users:

- General public, tourist and fishing industry for the HAB information.
- Scientists using data or tools for data processing.
- Remote sensing community.

EcoTaxa D2PTS



The API ECOTAXA (<https://ecotaxa.obs-vlfr.fr/>) has been designed at LOV to provide a tool for a network analysis of images. Currently it hosts more than 143,945,712 images of plankton and particles collected and analysed by more than 1052 registered users, in 340 organisations. ECOTAXA is connected to EMODNET for the long term archiving of plankton counts. In the frame of J-CORE, the ECotaxa D2PTS offers to the community a VA to its services (upload, download, recognition algorithms, expert validation) allowing image datasets import and their distribution to the users through ECOTAXA, EMODNET and J-CORE.

Plankton and marine particles are ubiquitous components of the water column. They have been identified as Essential Ocean Variables (EOVs) by the Global Ocean Observing System and as Essential Climate Variables (ECVs) under GCOS (Global Climate Observing System). Traditional methods to study them require collection and analysis of samples using different methods. Thus, the delay of the processing make real time monitoring is not possible.

Being solid objects, they can be sensed optically by imaging sensors and their images can be sorted and measured to allow automatic recognition. Now, advanced imaging in situ sensors or inlab instruments foster data collection and analysis. The provided information is less qualitative than the traditional methods and can inform on the evolution of community composition of plankton and/or size distribution of marine particles.