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THE COASTAL OCEAN CHALLENGE

The coastal ocean is the scene where complex processes, acting at many different spatial and temporal scales, combine to impact fragile marine ecosystems and important human populations and activities. Understanding and forecasting those processes asks for the identification and integration of the relevant data (e.g. observations from in-situ platforms or remote sensing, model results) and for the ability to extract from these the key relevant information. This is frequently a complex task for many users from the Research, Blue Economy or Service Providers communities.

HOW IS VLAB#1 ADDRESSING THIS CHALLENGE?

By opening to users a Virtual Research Environment providing access to a diversified set of FAIR-oriented tools that take advantage of globally accepted Best Practices and standards to support the identification, processing, exploration, integrations and visualization of coastal ocean observations and complementary information.

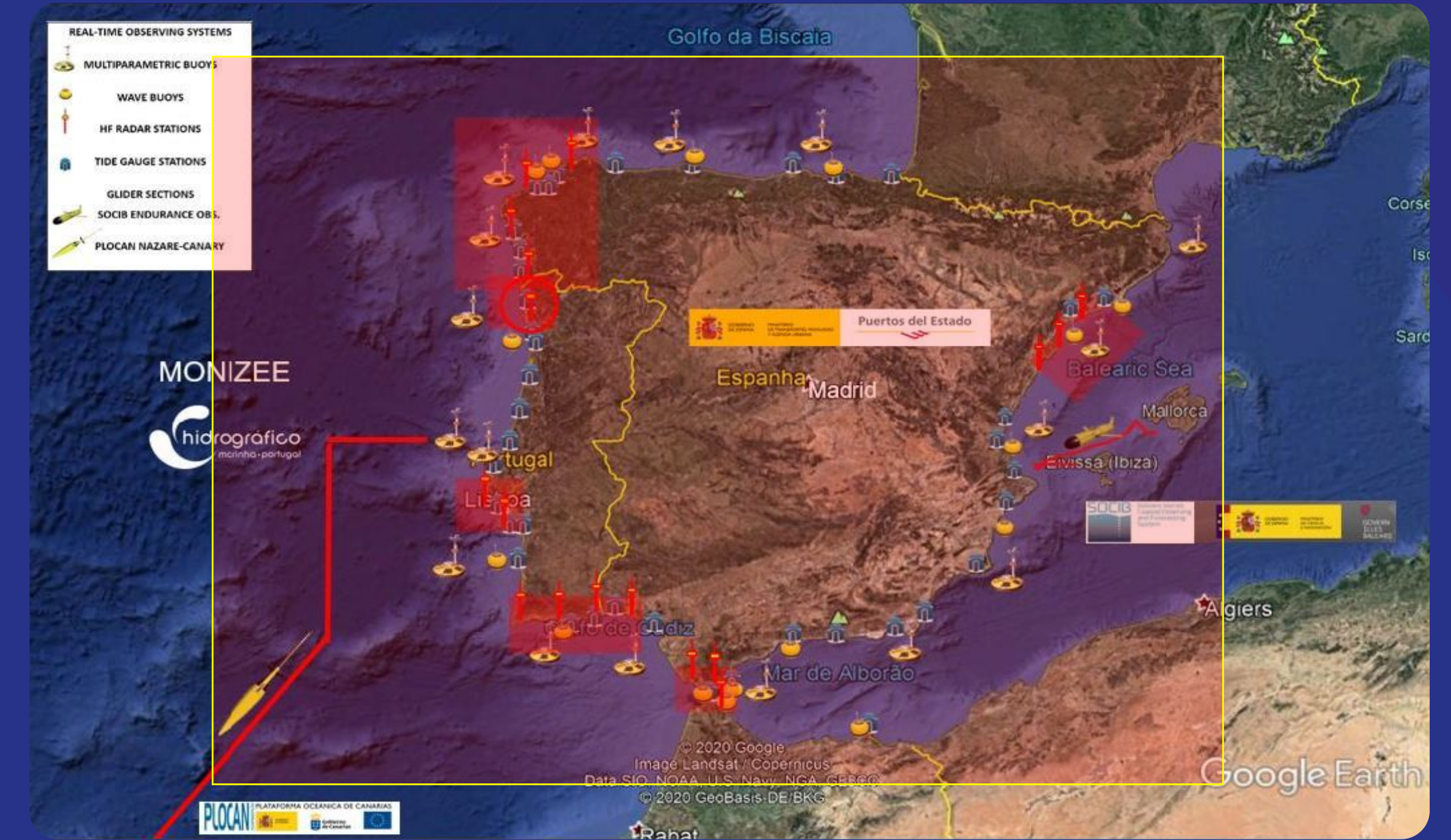
3 Thematic Services Proposed

Demonstration Pilot focusing on the Iberian coastal ocean and transitional waters

VLAB#1 will provide the proof of concept for a VRE dedicated to the coastal ocean processes, leading to the future implementation over the Pan-European coastal ocean domain.

The geographical area for the VLAB#1 demonstration pilot and some of the observing systems that will be used

(operated by partners of the Joint European Research Infrastructure for the Coastal Ocean – JERICO)



THEMATIC SERVICE #1 – offers a suite of tools enabling the users in the advanced exploration of **TRANSBOUNDARY PROCESSES AND CONNECTIVITY**, a thematic of particular importance in the coastal ocean areas open to influences from riverine discharges, from the deep ocean or transported from remote regions.

TS#1 WORKFLOW



Coordinates
 Draw
 Latitude: Min 36.70799, Max 37.42642
 Longitude: Min -9.31038, Max -7.092754
 Time range
 Start Date: 2024-05-03
 Select parameters
 surface currents
 Available data
 The data available is (%)
 OA 54.3 OT HF radar
 OA 100.0 OT Nemo model

Dashboard environment allowing users to select geographical area and time of interest, presenting the available datasets for user selection and accessing the selected data.

EUROPEAN HF RADAR NODE
 HF hourly surface currents
 ADDITIONAL QC
 GAP FILLING
 LOW-PASS FILTERING
 36h RUNNING MEAN
 OUTPUT IN VLAB FORMAT
 DATA EXPLORATION, INTEGRATION & VISUALIZATION

NEMO model surface currents
 Daily mean averaged
 OUTPUT IN VLAB FORMAT

Preprocessing (if required) of selected data to meet the requirements of data exploration and integration for this Thematic Service.

EXPLORATION TOOLS
 FIRST STAGE OF DEVELOPMENT
 - BASIC STATISTICS FOR INDIVIDUAL VARIABLES/SUMMARS
 - WATER MASS IDENTIFICATION
 - VARIABILITY STRUCTURE
 - CORRELATION ANALYSIS

INTERMEDIATE TOOLS
 FIRST STAGE OF DEVELOPMENT
 - COMBINED PROFILES (TEMPERATURE)
 - INTEGRATED ANALYSIS
 - CROSS-CORRELATION ANALYSIS
 - COMBINED VARIABILITY STRUCTURE
 - "SLAP" FILLING IN TRANSVERSE
 - USER DATA INSPECTION

ADVANCED INTEGRATION TOOLS
 - COASTAL OCEAN RESPONSE

Users selection of multiple products for data exploration and integration with outputs in tabular and graphical forms. Advanced visualization tools to be implemented during the development of the VLAB.

THEMATIC SERVICE #2 – following the approach of TS#1, but offering tools specifically addressing the thematic of **EXTREME EVENTS** impacting the coastal ocean environment

THEMATIC SERVICE 3: OCEAN GLIDER, demonstrating the added value chain of glider missions from data acquisition to advanced products and visualisations for improved coastal information, integrating ocean state and variability derived from glider transects

Backend: Slocum raw data, Pre-processing Toolbox, OG1.0 dataset, Processing Toolbox, Mission metadata
 Vlab 1 Frontend: Embedded interactive visualizations, User Workspace, Advanced data product, Static and dynamic figures

JupyterHub approach: User will experiment in Jupyter Notebook to display the relevant information
 OG 1.0 datasets can be uploaded by the Thematic Service's user to produce the advance dataset for each mission. As an alternative, the user can upload Slocum raw data and/or mission metadata, which will be used by the preprocessing tool to produce this OG 1.0 dataset.

Viewers System tool, developed by Socib, is used to provide this thematic service with a visual user friendly interface, that will go through three steps to display the relevant information.

Design - Overall view Jupyter notebooks
 User will experiment in Jupyter Notebook to display the relevant information

1. Processing tool
2. Data source selector
3. Data visualization

Once the user customizes the values for the mission to process using Jupyter Notebooks, the advanced data product will be stored in the user's workspace so it can be accessed easily in the future. Once all the desired variables are selected and set, the user will plot the static and dynamic figures relevant to the mission.

All those figures will be stored in the user's workspace in order to be able to use them outside the viewer.



WATCH THE INTERVIEW!



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