

EU Coastal Use Cases Workshop

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EUSkadi Coastal Operational Model validation & user-engagement



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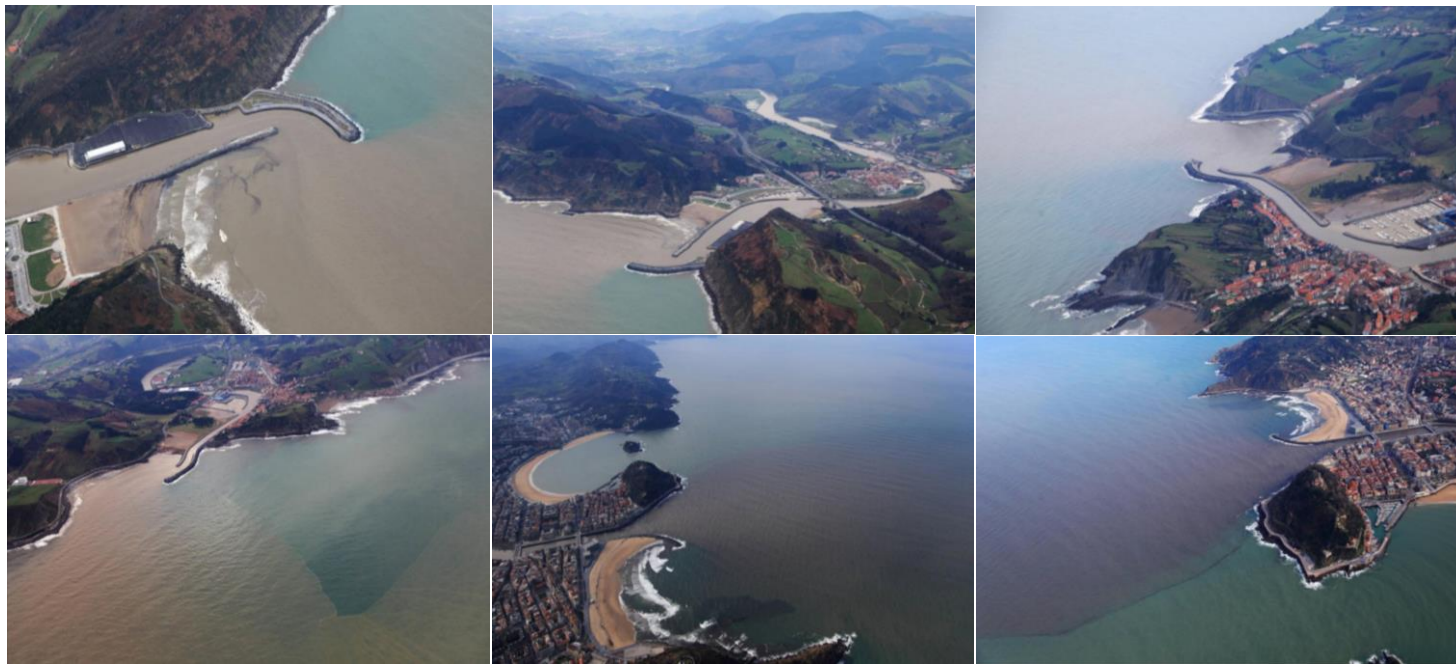
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- **PROJECT IN A NUTSHELL**



EUSCOMvu aims to understand and predict water circulation generated by wind, tides, differences in density of water masses and freshwater discharges in the **Basque Country** region.



- **CONSORTIUM**



PROGRAMME OF
THE EUROPEAN UNION

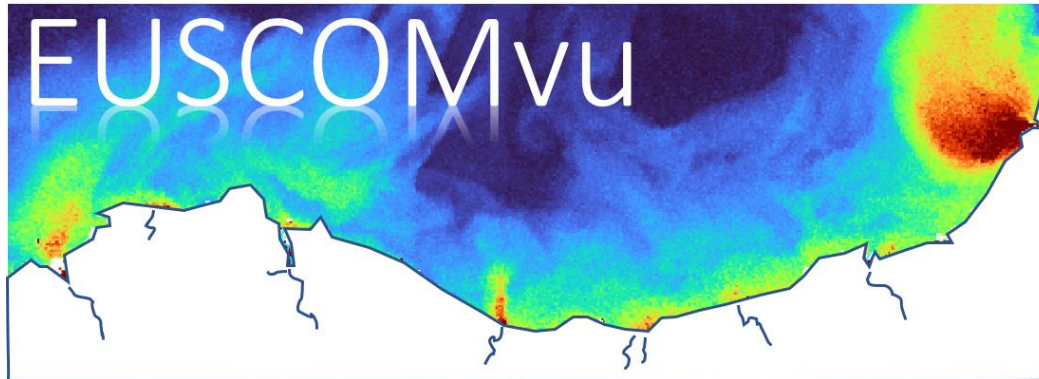


implemented by



**MERCATOR
OCEAN**
INTERNATIONAL

- NOLOGIN (official NOW -Nologin Oceanic Weather- Systems website): <https://www.nowsystems.eu>
- AZTI (official website): <https://www.azti.es/en/>

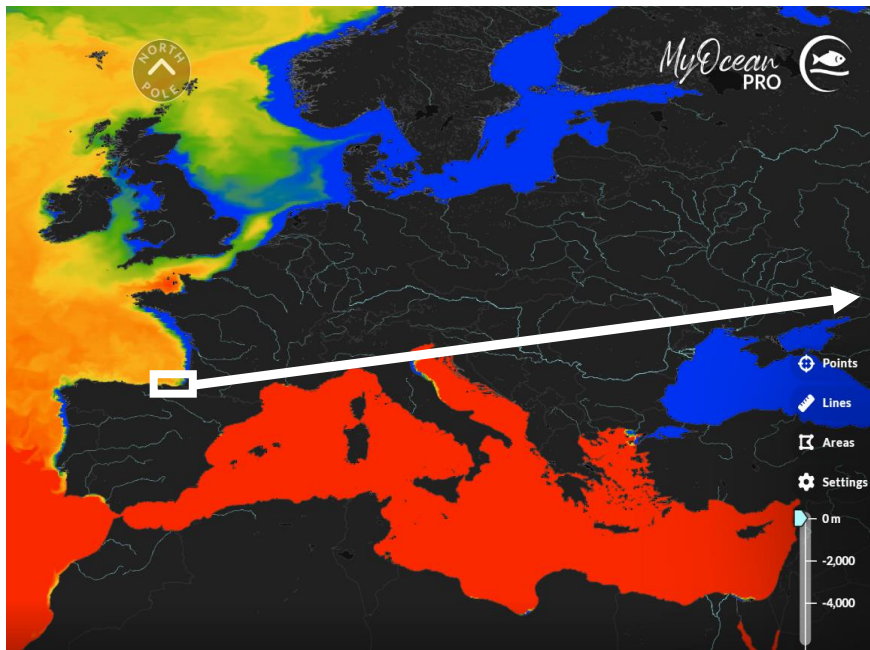


- **COPERNICUS MARINE PRODUCTS
AND COASTAL MODEL**

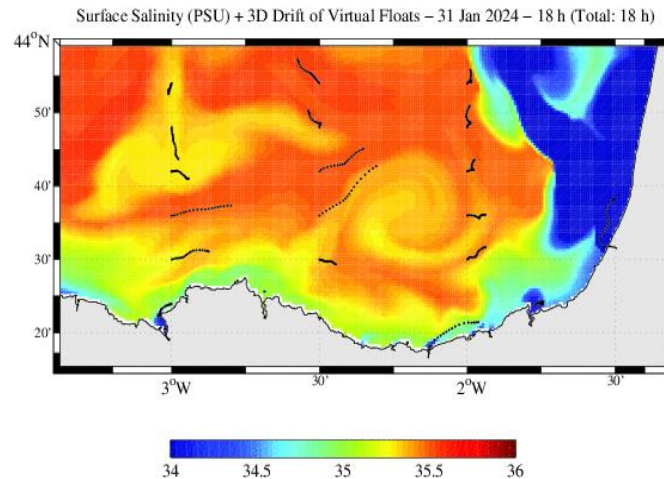




The first objective is to update the pre-operational coastal modelling system based on **CROCO (Coastal and Regional Ocean Community model)** which is used in the SE Bay of Biscay.



Study area in Europe:
Basque Country waters (Spain)
43.24° N – 44 N°, 3.4° W - 1.3° W



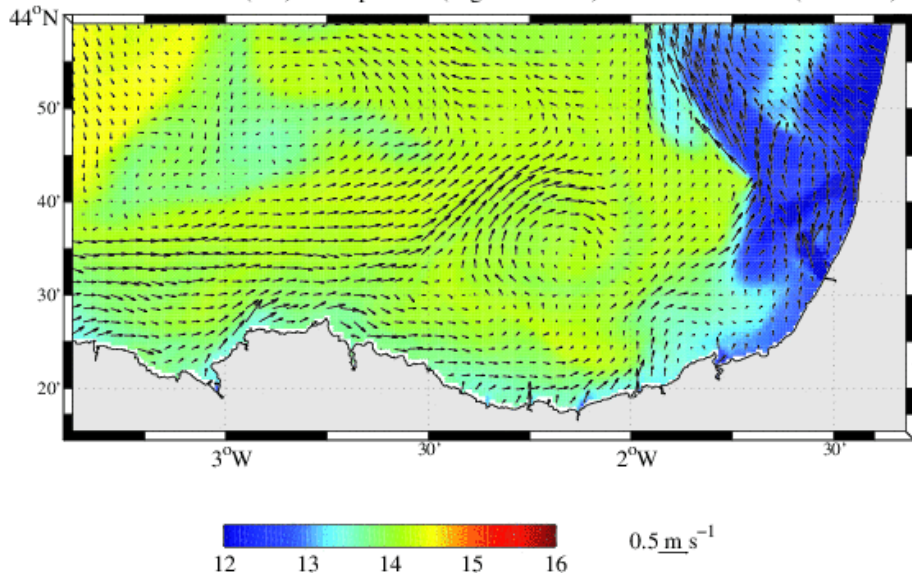
Main characteristics of the EUSCOMvu system using the CROCO model:

- Geographical region: From 43.24° N to 44° N and from 3.4° W to 1.3° W.
- Horizontal resolution and vertical levels: ~670 m and 32 sigma levels, respectively.
- Hourly atmospheric forcing: From the Weather Research and Forecasting model – WRF (outputs provided by MeteoGalicia).
- Hourly initial and boundary conditions: From the Nucleus for European Modelling of the Ocean – NEMO (**Atlantic-Iberian Biscay Irish (IBI)- Ocean Physics Analysis and Forecast product** provided by CMEMS).
- **Daily river discharges combining observations and forecasts:** Adour, Barbadun, Nerbioi, Butroe, Oka, Lea, Artibai, Deba, Urola, Oria, Urumea, Oiartzun and Bidasoa (observations provided by URA, Euskalmet and Vigicrues).
- Forecast horizon: 5 days (from -24 hours to +96 hours).

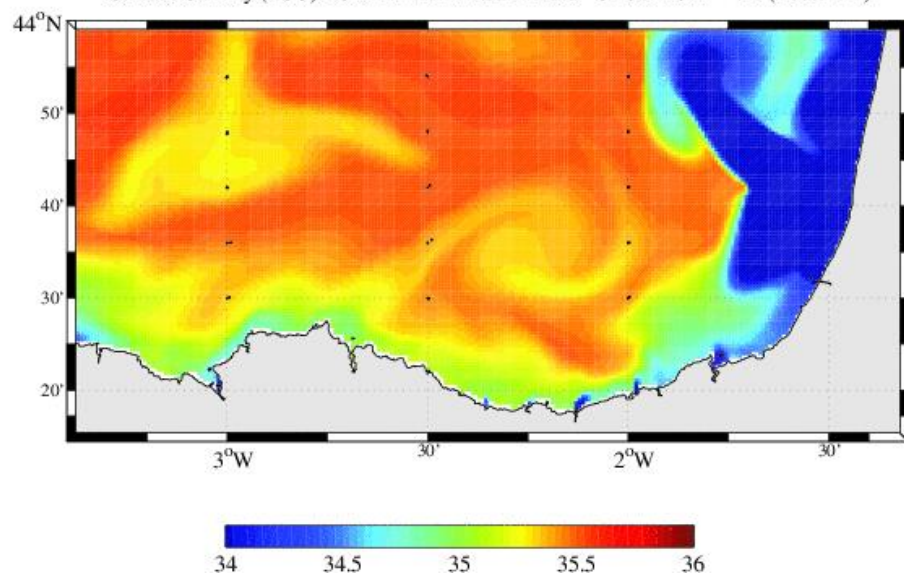


Forecasts of surface currents (m/s), temperature ($^{\circ}\text{C}$), salinity (PSU) and 3D drift of virtual floats from 31 January to 4 February 2024:

Surface Currents (m/s) + Temperature (degrees Celsius) – 31 Jan 2024 – 1 h (Total: 1 h)

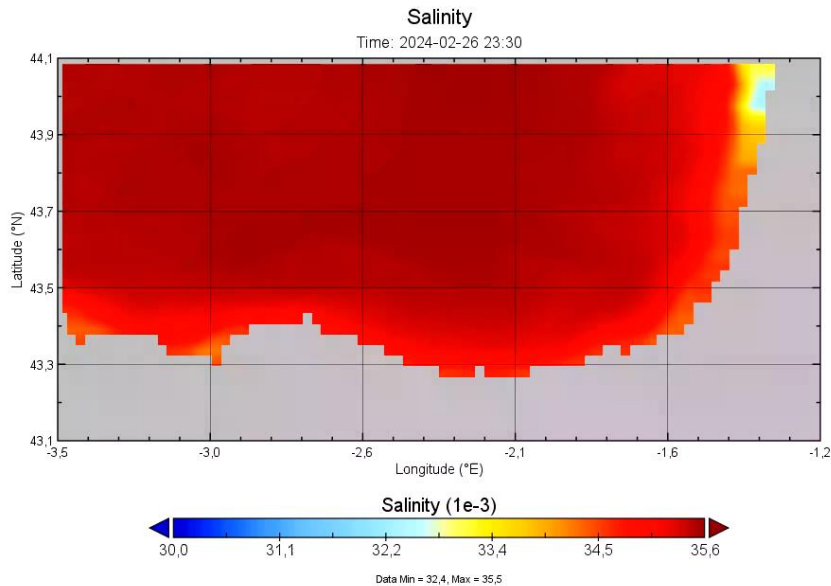


Surface Salinity (PSU) + 3D Drift of Virtual Floats – 31 Jan 2024 – 1 h (Total: 1 h)

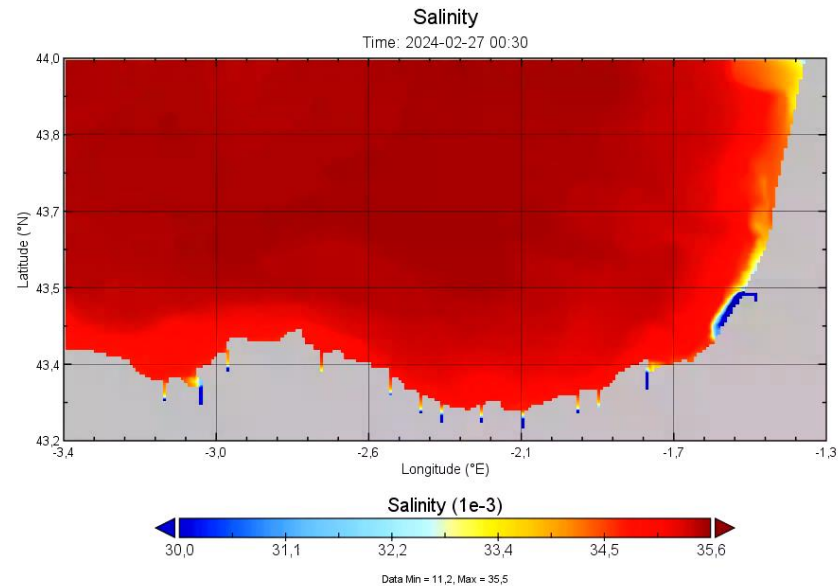


Forecasts of surface salinity (PSU) from 27 February to 2 March 2024:

IBI system

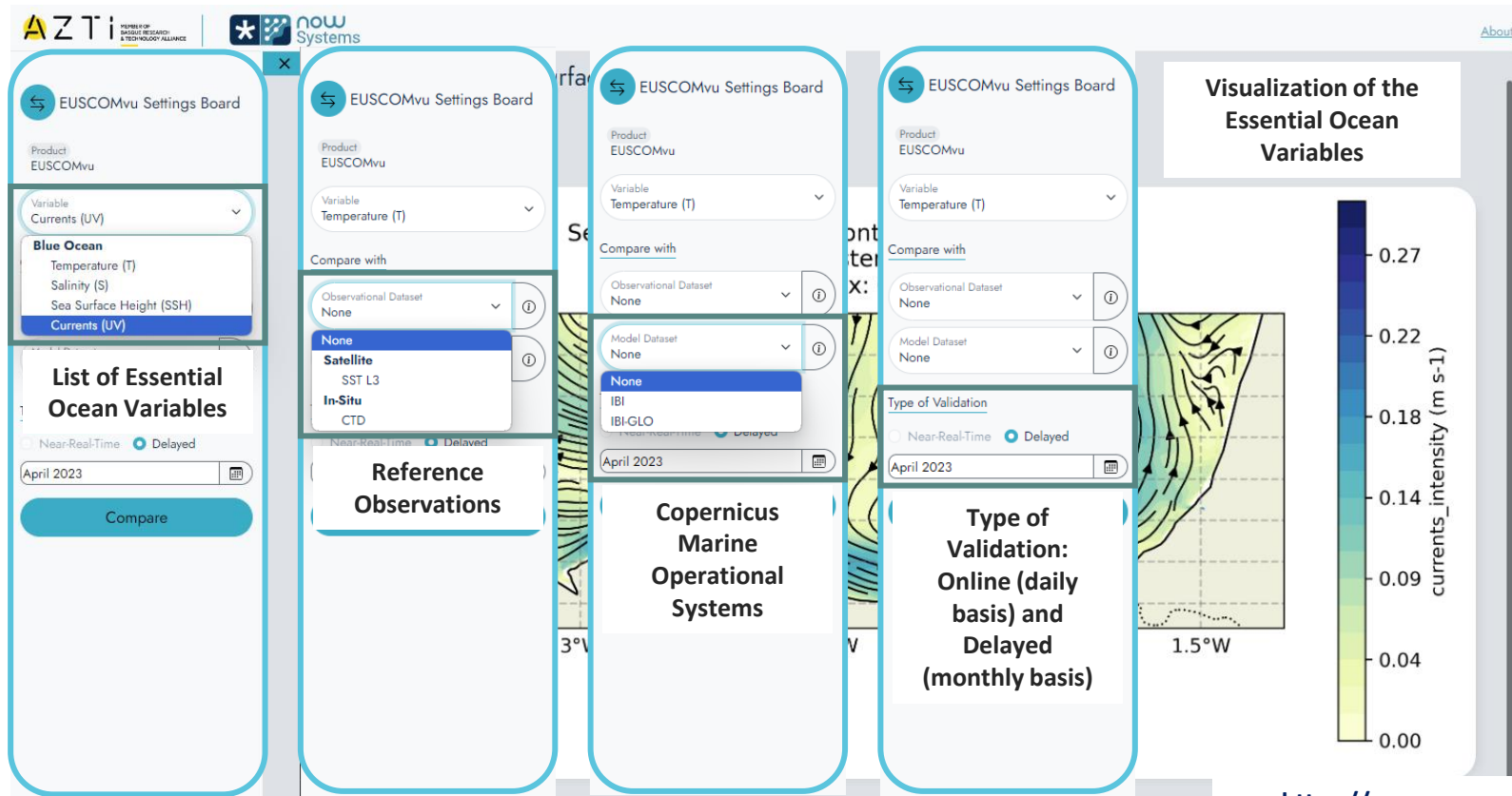


EUSCOMvu system



The second objective of the project is the design and implementation of a validation module for high-resolution model products assessment.

- It is a Python-based tool that allows **multi-observations/multi-models assessment and intercomparison** based on Copernicus Marine products from observations and models.
- It is fully interfaced with **CTD observations operationally obtained by AZTI** for the validation of the model products in the Basque coastal area.
- It runs on **monthly and daily frequency** to provide visualization of surface ocean variables and relevant metrics of some target EOv from the EUSCOMvu operational products.

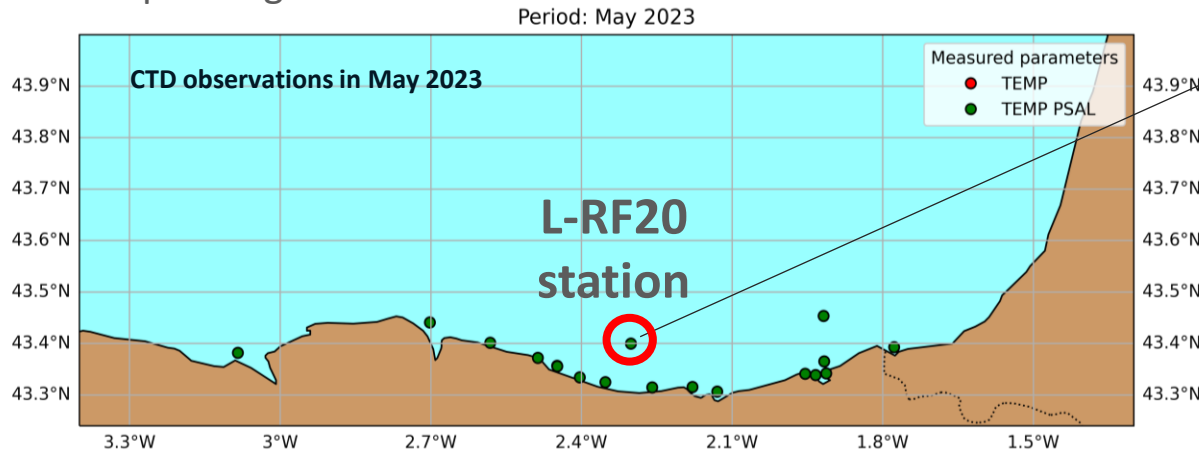


The image displays a screenshot of the EUSCOMvu Validation Tool interface, showing various settings and a visualization of ocean current intensity. The interface is divided into several panels:

- EUSCOMvu Settings Board:** This panel allows users to select the product (EUSCOMvu), variable (Currents (UV)), and compare with options (Observational Dataset, Model Dataset, and Type of Validation). The variable is set to "Currents (UV)" and the type of validation is set to "Delayed".
- List of Essential Ocean Variables:** This panel lists essential ocean variables: Temperature (T), Salinity (S), Sea Surface Height (SSH), and Currents (UV). The "Blue Ocean" category is selected.
- Reference Observations:** This panel lists reference observation systems: None, Satellite (SST L3), In-Situ (CTD), and Delayed.
- Copernicus Marine Operational Systems:** This panel lists operational systems: None, IBI, and IBI-GLO.
- Type of Validation:** This panel allows users to select the type of validation: Near-Real-Time or Delayed. The "Delayed" option is selected.
- Visualization of the Essential Ocean Variables:** This panel displays a map of ocean current intensity (m s⁻¹) for April 2023. The map shows a color scale from 0.00 to 0.27 m s⁻¹ and a vector field of current directions. The map is titled "Visualization of the Essential Ocean Variables".

EUSCOMvu vs CTD observations from the Water Quality Network (URA-Basque Water Agency).

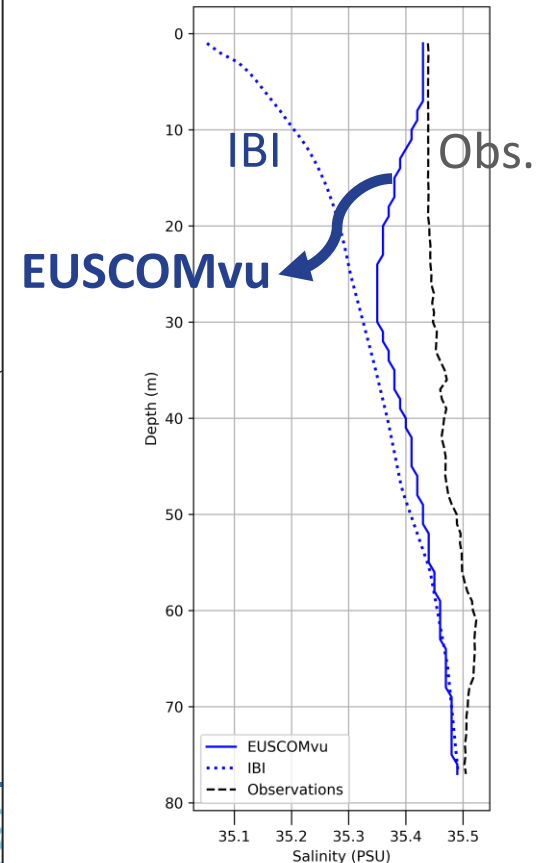
For example, the EUSCOMvu daily FC01 solution for the salinity profile at L-RF20 station is **closer to observation** than the corresponding IBI one.



Product: EUSCOMvu (FC01)
closest time to obs.=2023-05-04T07:00:00; lon=-2.301; lat=43.4

MODEL reference: IBI (FC01)
closest time to obs.=2023-05-04T12:00:00; lon=-2.306; lat=43.389

OBSERVATION reference: CTD platform L-RF20
time=2023-05-04T07:00:00; lon=-2.301; lat=43.4



- **SEAMLESS COASTAL MARINE SERVICE**



The third objective is to promote close cooperation for the operational exchange of data on surface ocean currents with the **Spanish Maritime Safety and Rescue Society (SASEMAR)** and the definition of new hydrological indicators with the **Basque Water Agency (URA)**.

USE CASE 1 (SASEMAR, <http://www.salvamentomaritimo.es>):
<https://marine.copernicus.eu/services/use-cases/surface-currents-search-and-rescue-se-bay-biscay>

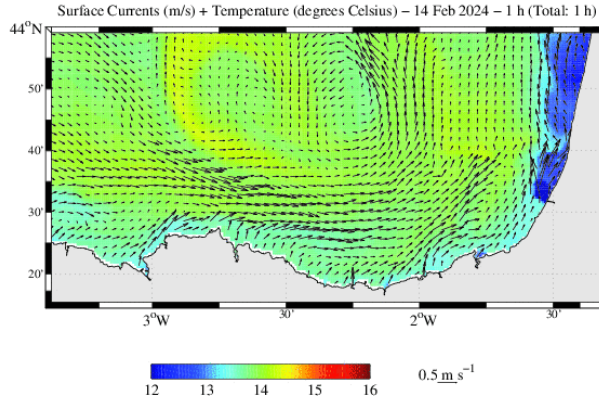


USE CASE 2 (URA, <https://www.uragentzia.euskadi.eus/inicio/>):
<https://marine.copernicus.eu/services/use-cases/oceanographic-modelling-coastal-management-se-bay-biscay>

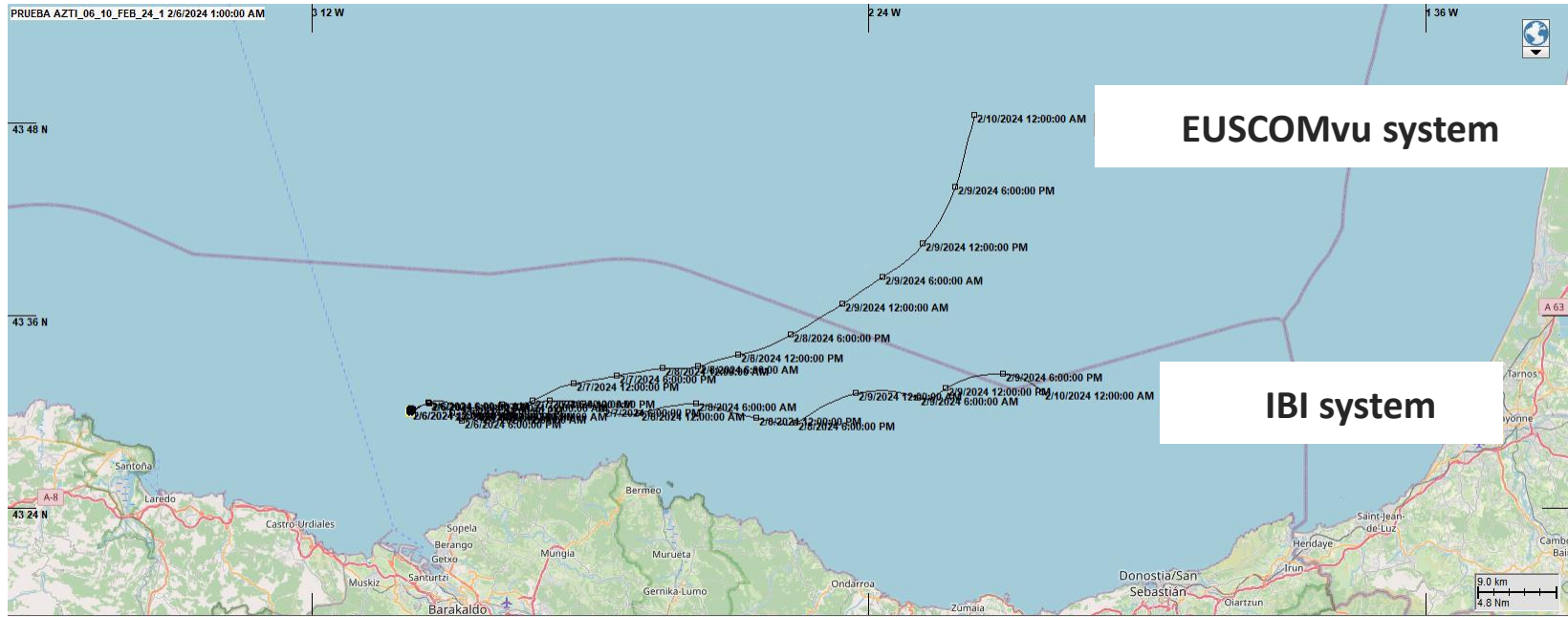


The operational hourly surface ocean currents obtained with the EUSCOMvu system are used by **SASEMAR**, together with other regional and global products (for example, the Atlantic-Iberian Biscay Irish- Ocean Physics Analysis and Forecast product from CMEMS). This information is used in modelling to estimate the drift of people, vessels, dangerous objects, marine litter and pollutants.

Hourly surface currents from the EUSCOMvu project and the Copernicus Marine Environment Monitoring Service (specific netcdf format for SASEMAR). → Environmental Data Server (SASEMAR). → Use of drift models (SASEMAR). → Results of drift models and search and rescue strategy (SASEMAR).



Particle tracking modelling from 6 to 10 February 2024 using the OILMAP model and the hourly surface ocean currents obtained with the EUSCOMvu and IBI systems (source: SASEMAR).



URA depends on the Basque Government and has authority and competence on implementing European legislation on aquatic systems, management of water resources and hydrologic planning. URA is interested in the provision of hydrographic data and the definition of indicators to support the assessment of water quality in Basque coastal water bodies in the framework of the WFD (European Water Framework Directive) and the MSFD (Marine Strategy Framework Directive) reports.



STATION NEAR PLENTZIA BEACH

