Ocean Predict

SYMPOSIUM OP'24

In partnership with unesco Intergovernmental Oceanographic Commission

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

Assessing Operational Regional to Coastal Ocean Predictions in the framework of the Copernicus Marine and Coastal Services

Stefania A. Ciliberti[1], Axel Alonso[1], Bruno Levier[2], Elodie Gutknecht[2], Luis Ferrer[3], Mario Moros[1], Jose Maria García-Valdecasas[1], Yolanda Sagarminaga[3], Roland Aznar[1], Sylvain Cailleau[2], Marcos G. Sotillo[1]

1 Nologin Oceanic Weather Systems, Santiago de Compostela, Spain
2 Mercator Ocean International, Toulouse, France
3 AZTI Marine Research, Basque Research and Technology Alliance, Pasaia, Spain

Session 7.2 – Coastal Activities

Motivation

- The Copernicus Marine Service as *science-based pulled* and user-driven service counts on a robust **Product Quality assessment**, strongly linked to the operations performed by its Centers.

Objectives

- Results available to users
- State-of-the-art methods and international standards
- Scientific exchanges
- Quality Assurance of the Service

Strenghts & Needs

- Robust PQ policies
- Effort to validate **more EOVs** (focus on BGC)
- Regional **fit-for-purpose** assessment, especially in coastal areas
- Optimal use of **observations**
- Multi-products approach for **uncertainties**
- **New metrics** and PQ chains
- **FAIR PQ**

Propsoed solution

NARVAL evolutions & new PQ capacity for Operational Coastal Services

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The context

IBI-MFC

PHY NRT | WAV NRT | BGC NRT

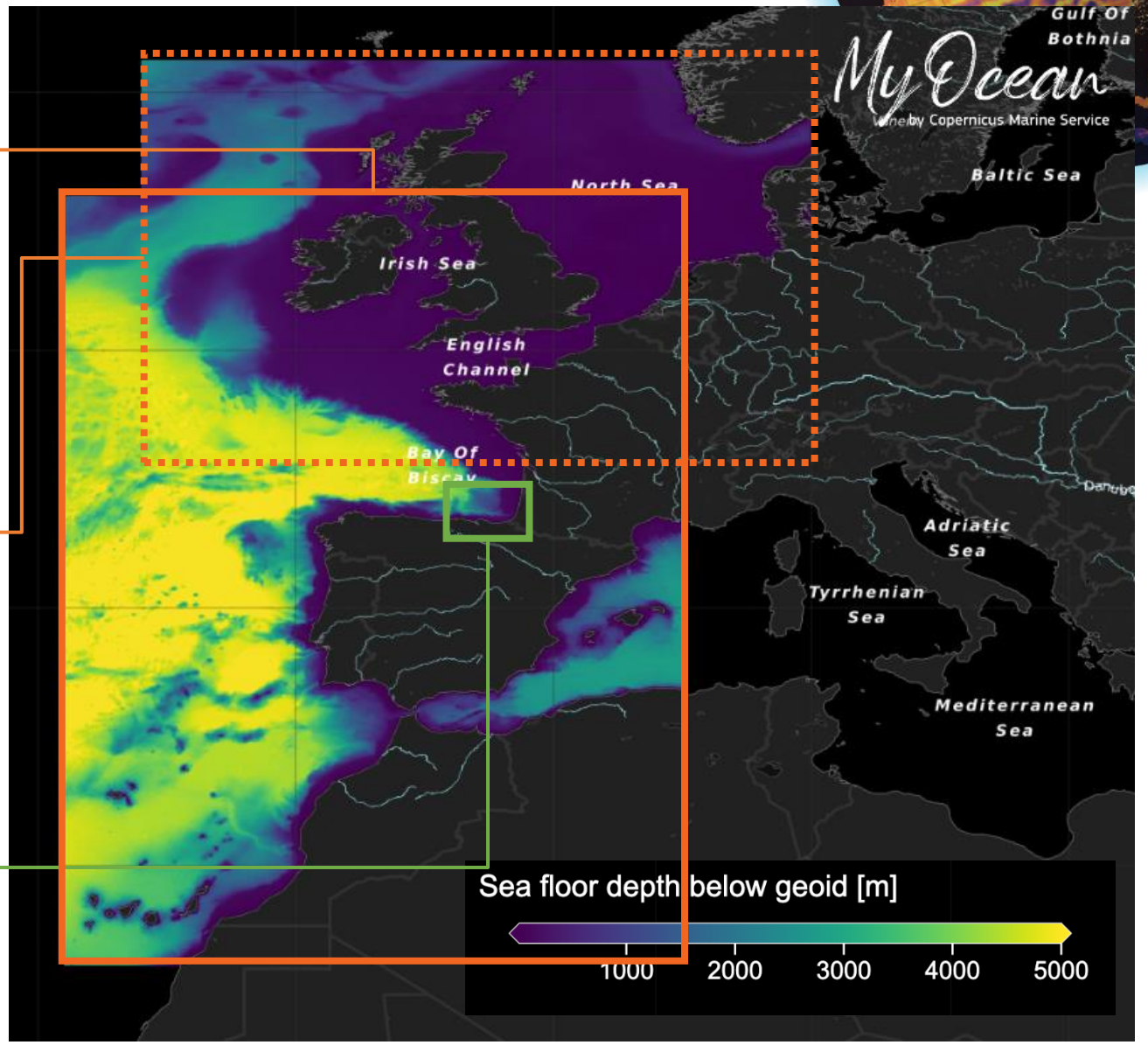
PHY MY | WAV MY | BGC MY

NWS NRT

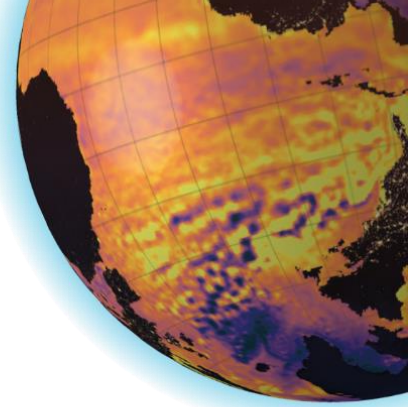
PHY NRT | WAV NRT | BGC NRT

EUSCOMvu

PHY NRT



The Value Chain



T
S
MLD
SSH
UV
VHM0
VCMX
VTM02
VMDR
CHL
O2
ZEU
WAV
PHY
BGC

Data Store

Model Products
from GLO to COA scale

Observations
INS, SAT

Interface with Data Store

Models Intercomp.

Class 4

Class 1

NARVAL-EVO

Class 3

Class 2

Regional/Coastal Web Portal

PQ-D

Operations

Daily Frequency

Monthly Frequency

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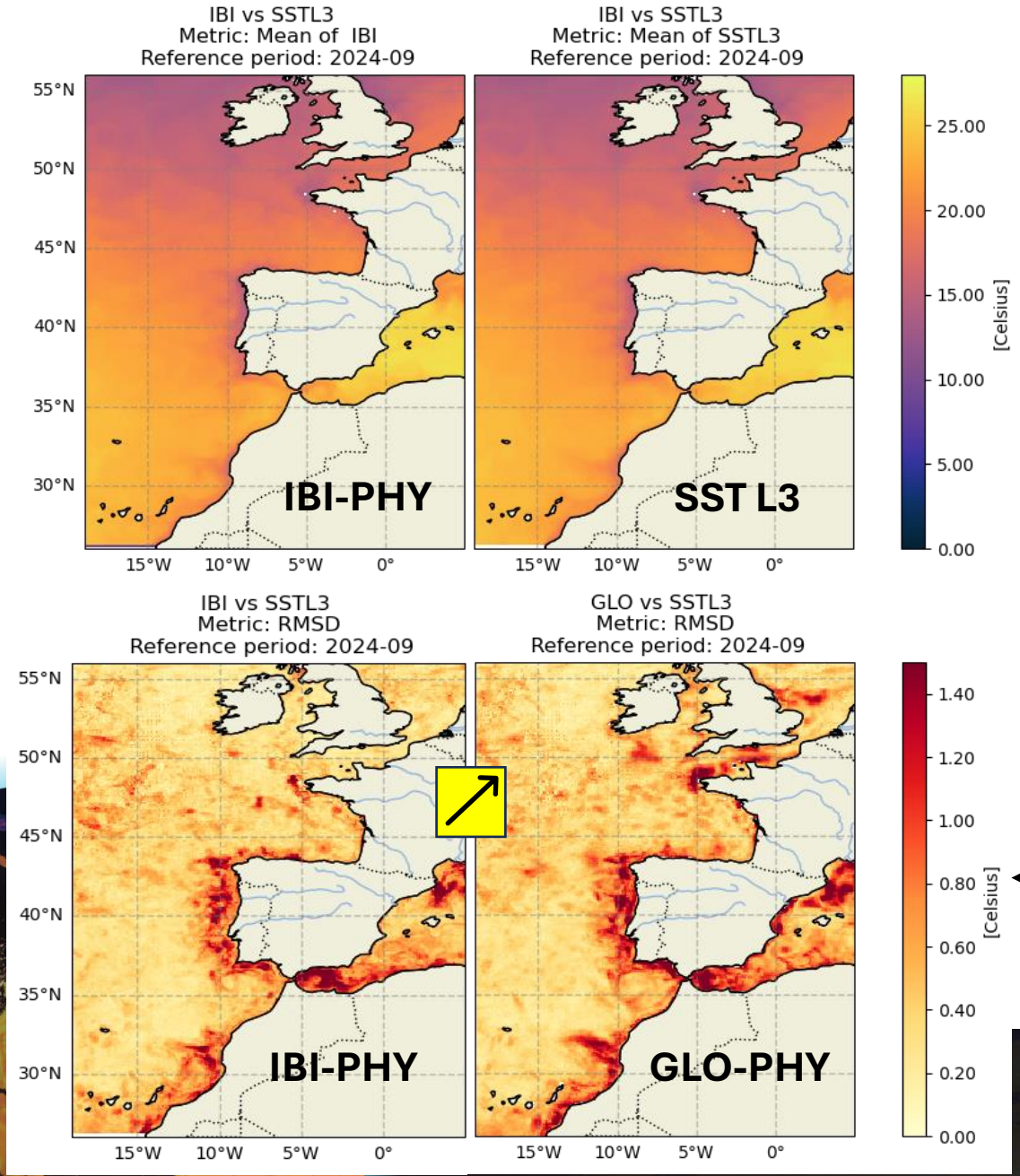
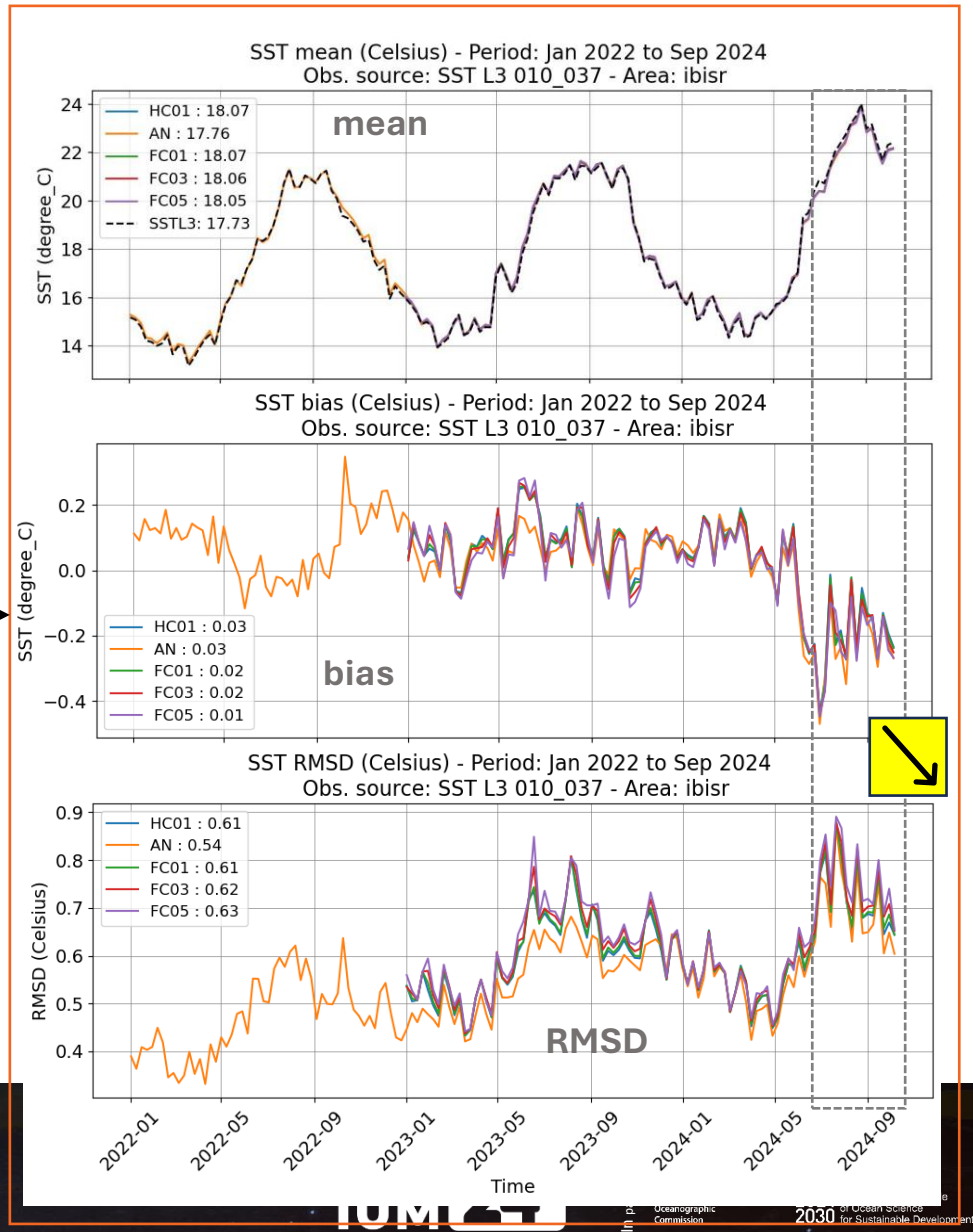
PQ assessment for operations: IBI-PHY T & S



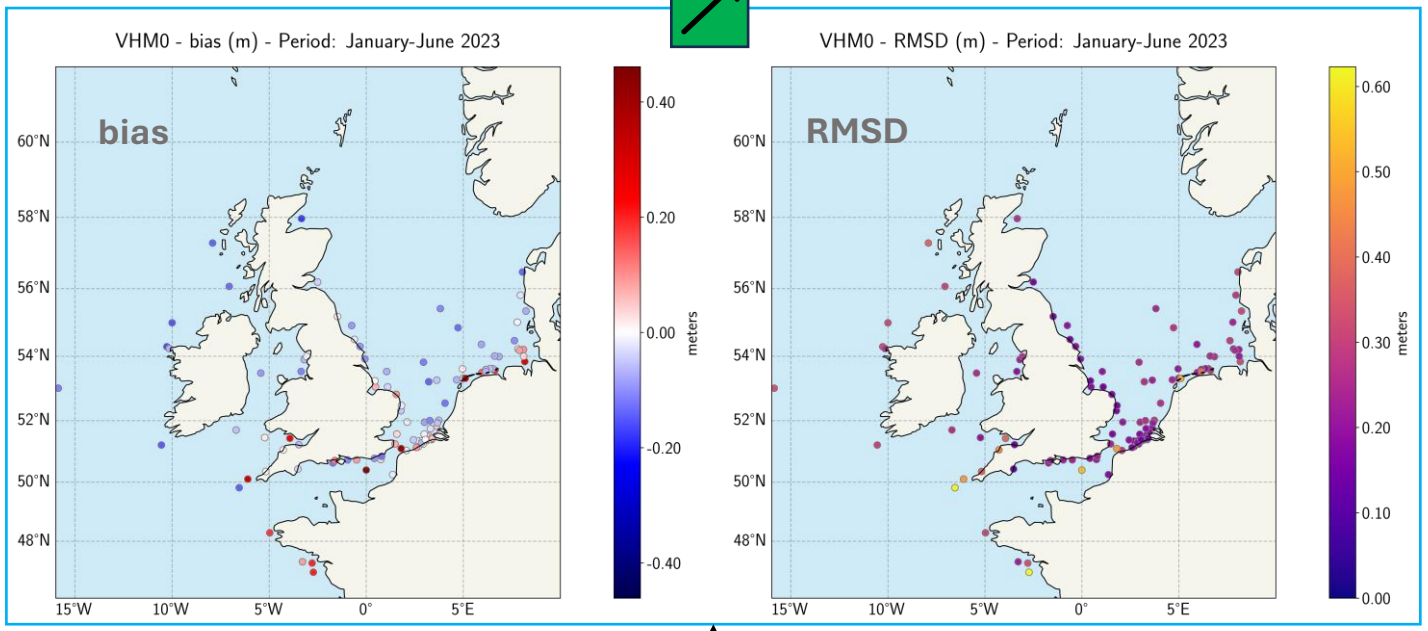
Monitoring the operational production

Monitoring the quality of the parent solution

Contributing to Copernicus Marine PQ-D

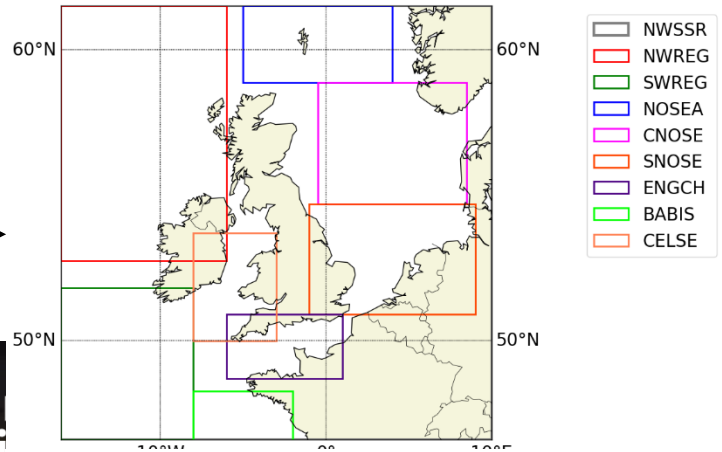


PQ assessment for candidate releases: SWH for NWS NRT product

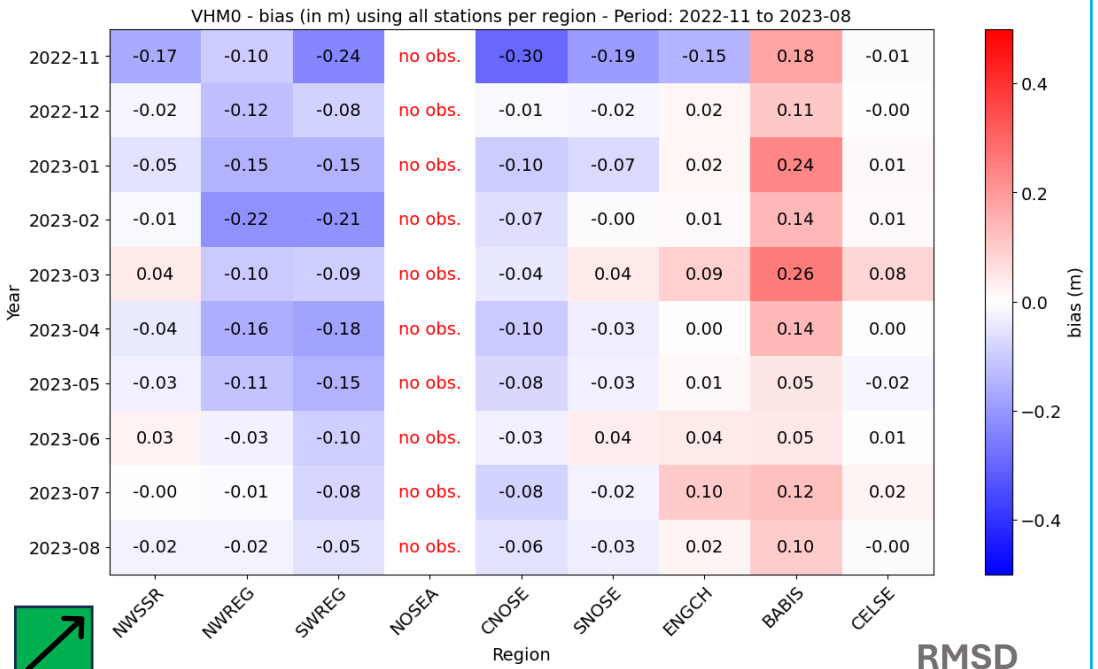


EANs at buoy location

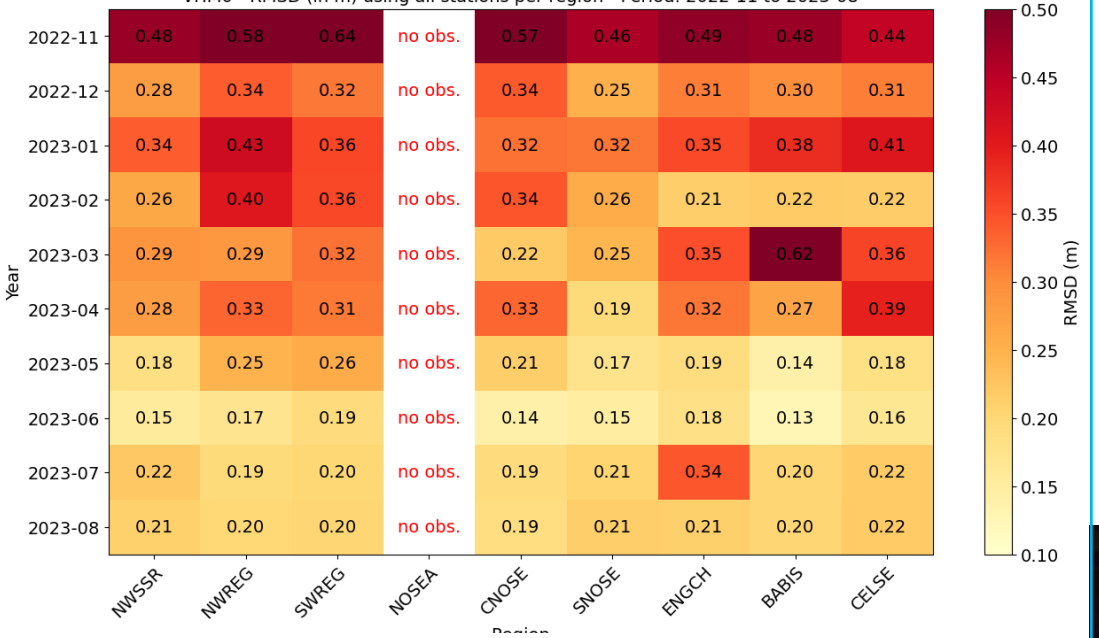
Regional and subregional EANs



bias

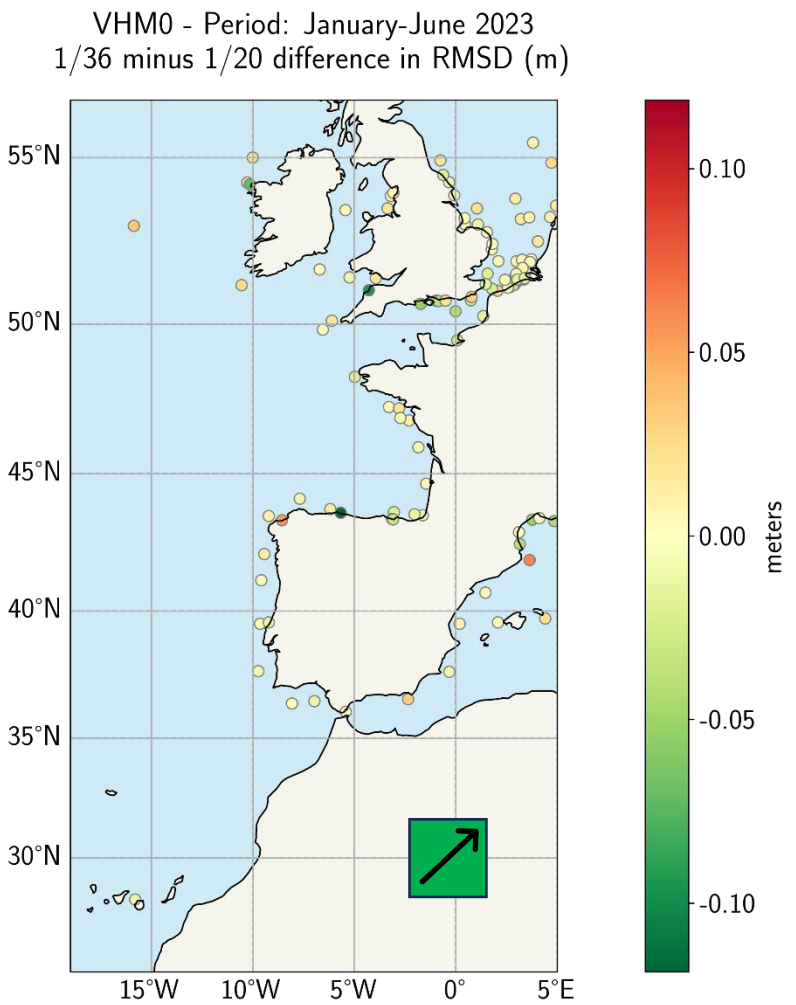


RMSD



From subregions' definition as in Saulter 2020.

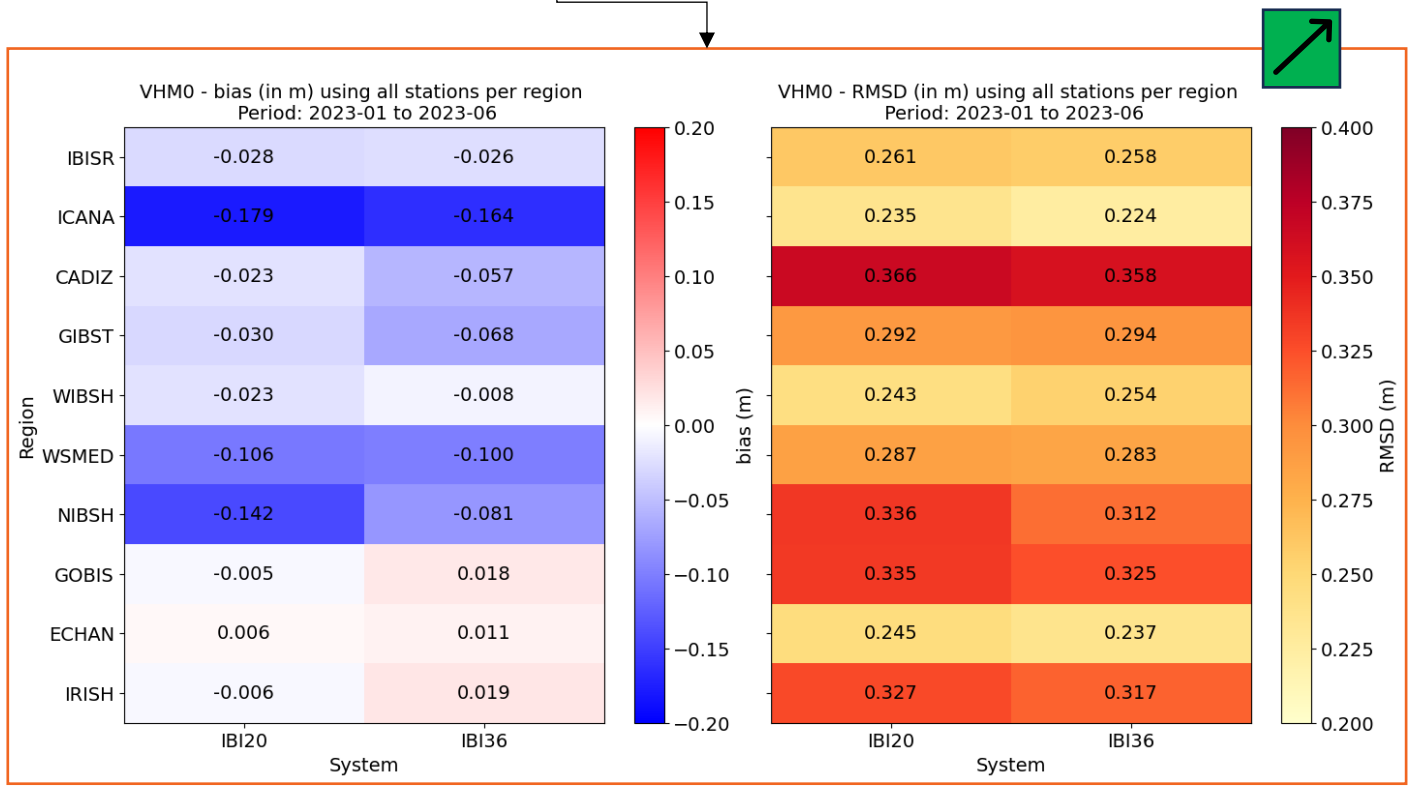
PQ assessment for candidate releases: SWH for IBI-WAV



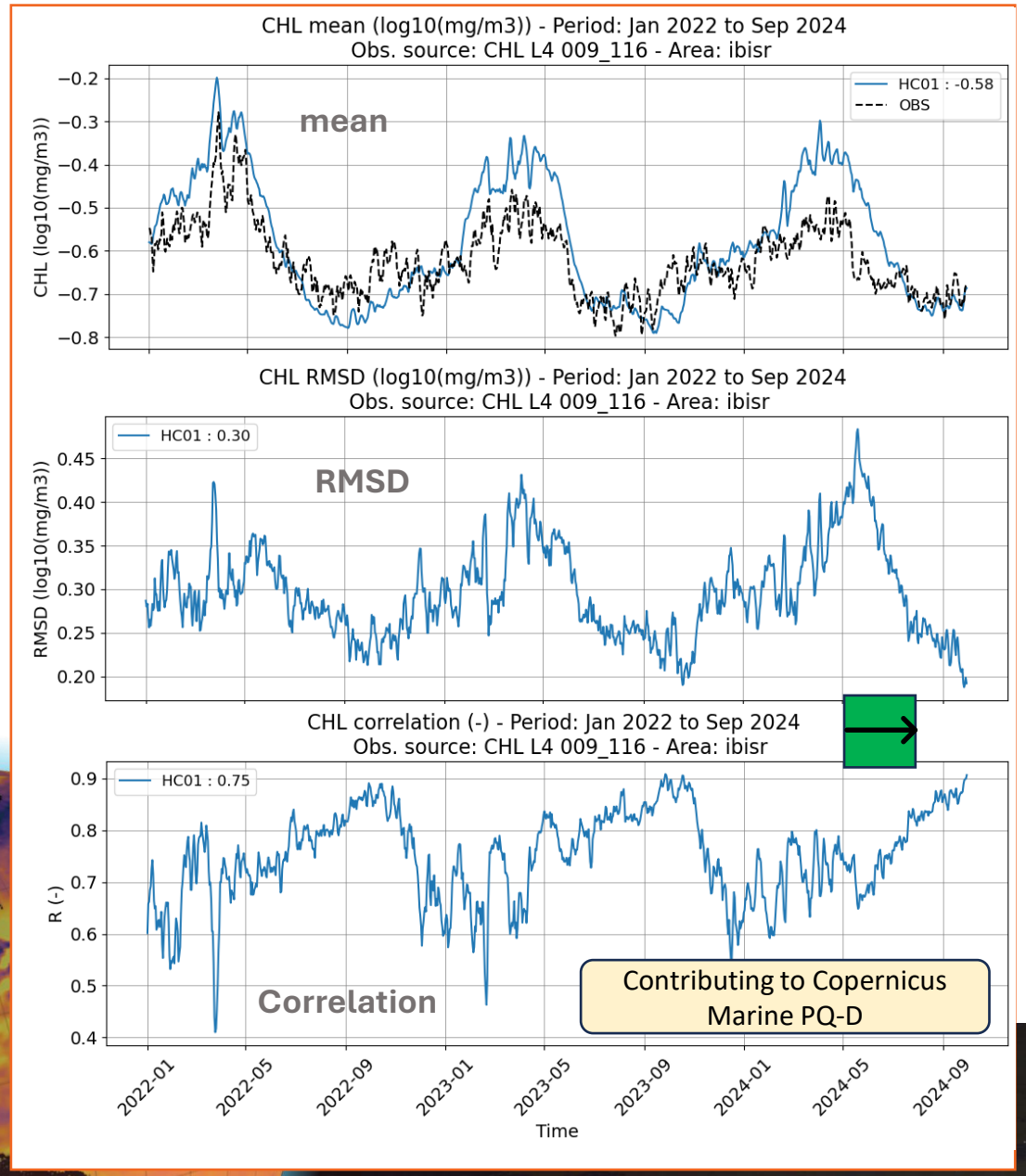
VHM0 obs. from MYNRT 013_033 product in the IBI AREA
Number of Stations: 242
Coastal: 197, Deep: 45

System evolution: increasing horizontal resolution

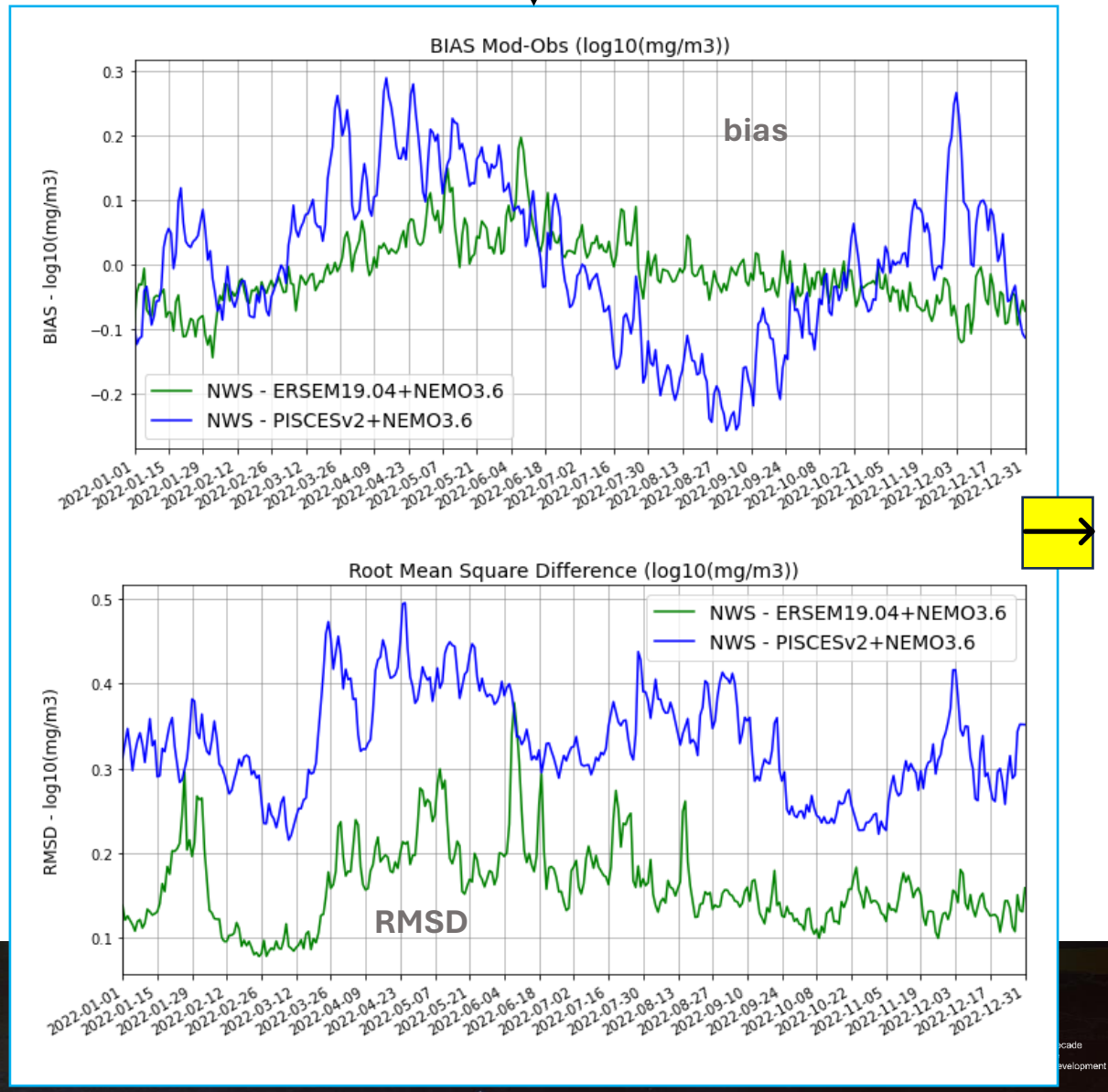
System evolution regional EANs



PQ assessment for candidate releases and monitoring: CHL for IBI-MFC and NWS NRT product



Assessing not-assimilative system



PQ Service for the EUSCOMvu

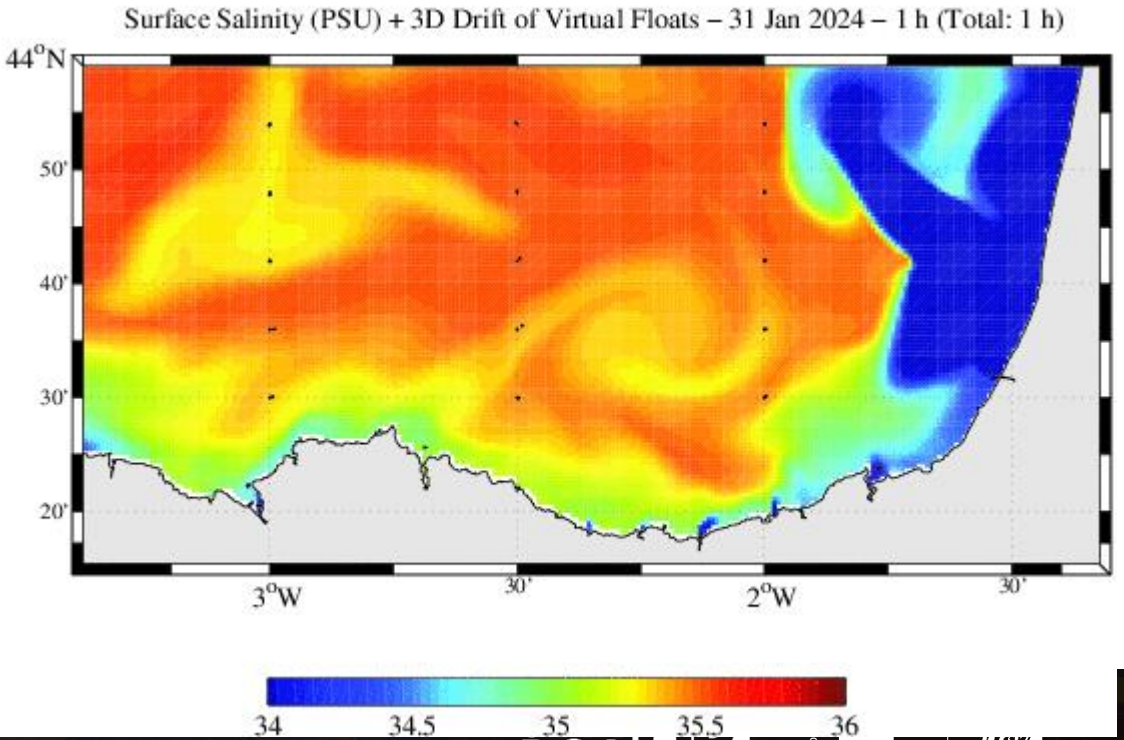
EUSkadi Coastal Operational Model Validation & User-Engagement: forecasting and monitoring physical EOV in the Southern part of the Bay of Biscay

based on CROCO — Coastal and Regional Ocean COmmunity model

by AZTI — MEMBER OF BASQUE RESEARCH & TECHNOLOGY ALLIANCE

COPERNICUS MARINE SERVICE NATIONAL COLLABORATION PROGRAMME 2022-2028

Feature	Description
Resolution	~**600m** in horizontal and 32 σ-levels
Atmospheric forcing	Hourly forcing from **MeteoGalicia** (ECMWF downscaling using WRF)
IC/LOBC	Hourly **IBI-PHY NRT system** (temperature, salinity, sea surface height, currents)
Land forcing	**Daily river discharges** combining observations and forecasts (Adour, Barbadun, Nervion, Butron, Oka, Lea, Artibai, Deba, Urola, Oria, Urumea, Oiartzun and Bidasoa)
Processing system	**4 days forecast every day for surface EOV and 3D temperature and salinity**



https://euscomvu.nowsystems.eu / (USR+PASS)

AZTI MEMBER OF BASQUE RESEARCH & TECHNOLOGY ALLIANCE | now Systems

About

EUSCOMvu Settings Board

Product
EUSCOMvu

Variable
Temperature (T)

Compare with

Observational Dataset
CTD

Model Dataset
IBI

Frequency
Instantaneous

Type of Validation

Near-Real-Time Delayed

December 2023

Compare

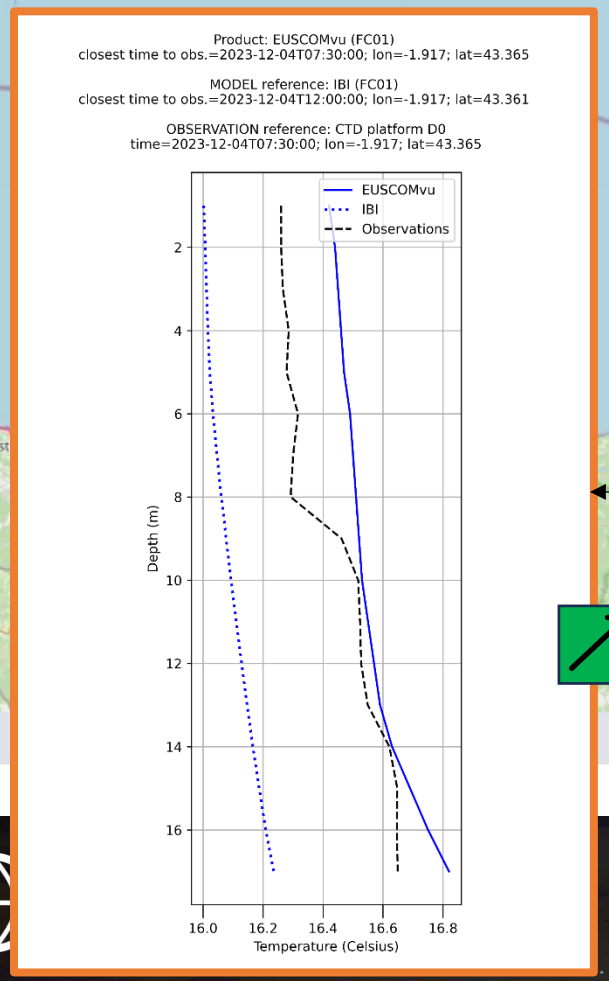
Validation of Temperature (T) using in-situ CTD observations

December 2023

Visualization of vertical profiles at CTD location

Visualization of T & S profiles including CTD observations as provided by AZTI

Standardization process of CTD obs. from raw to Copernicus Marine-like format



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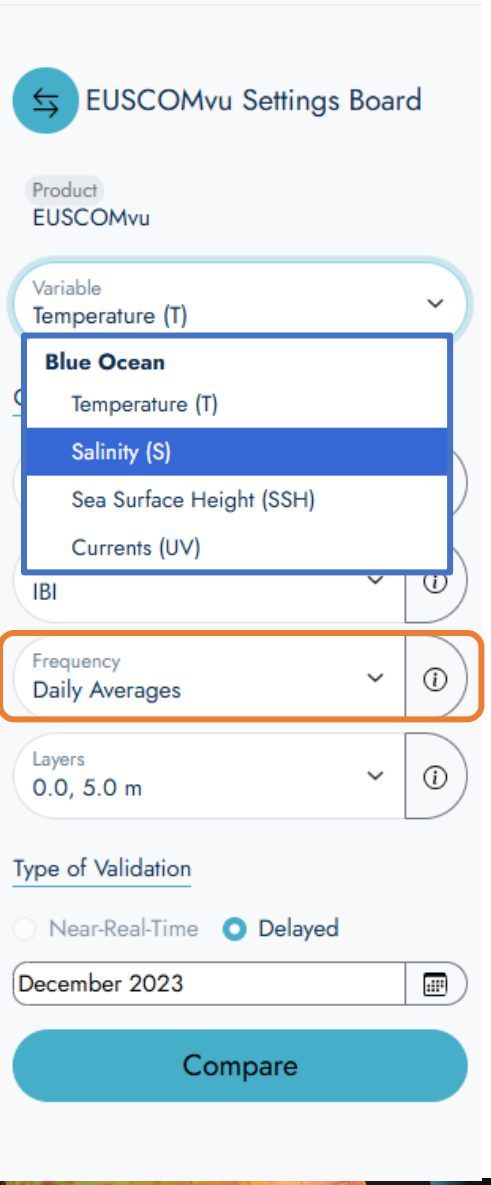
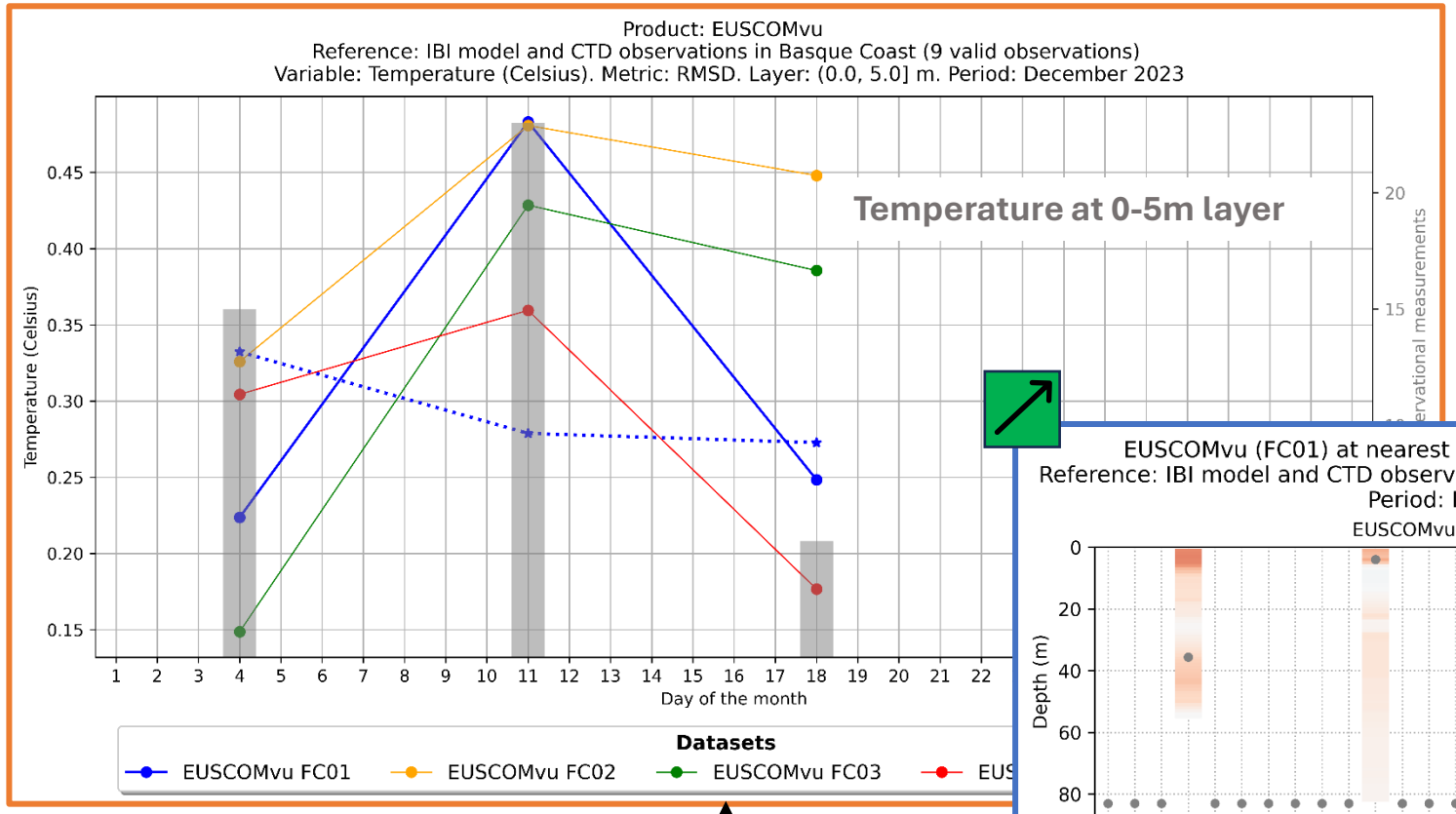
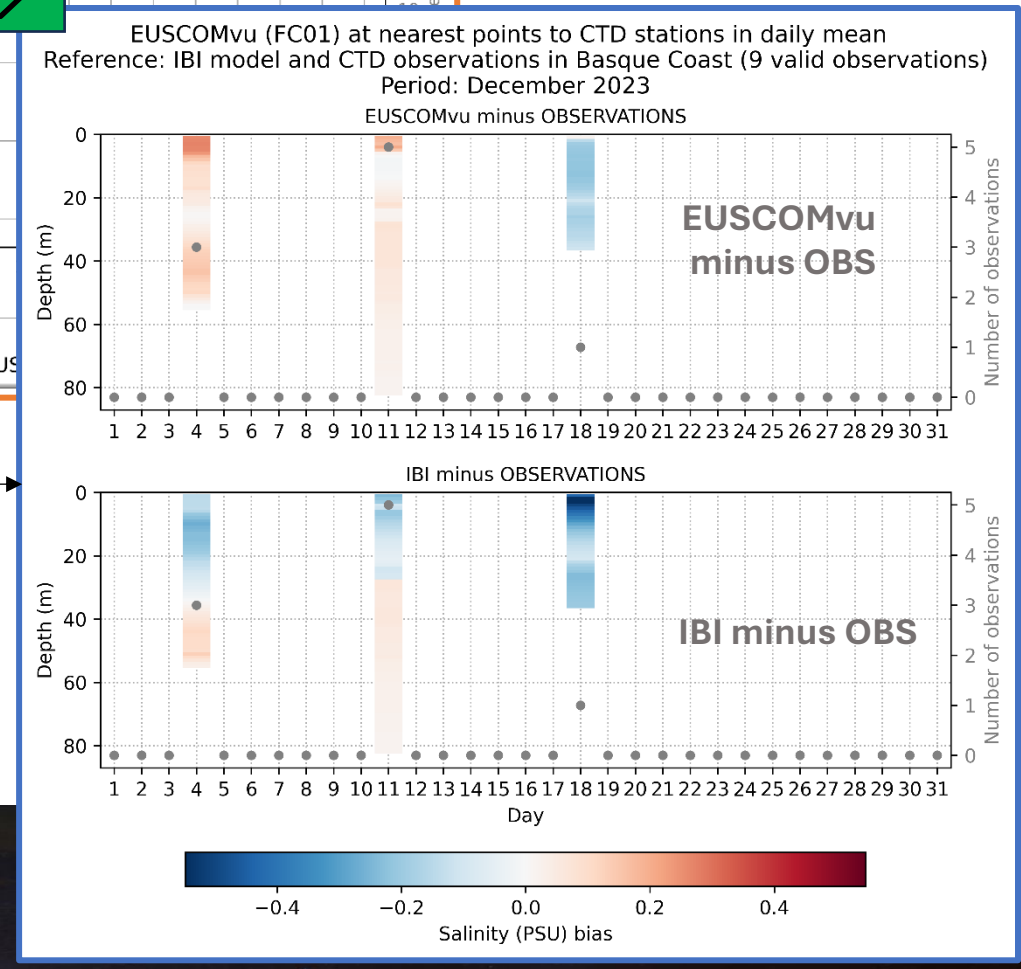






Monitoring the CTD availability on monthly basis

EUSCOMvu operational system's performances

EUSCOMvu Settings Board

Product
EUSCOMvu

Variable
Salinity (S)

Compare with

Observational Dataset
CTD

Model Dataset
IBI

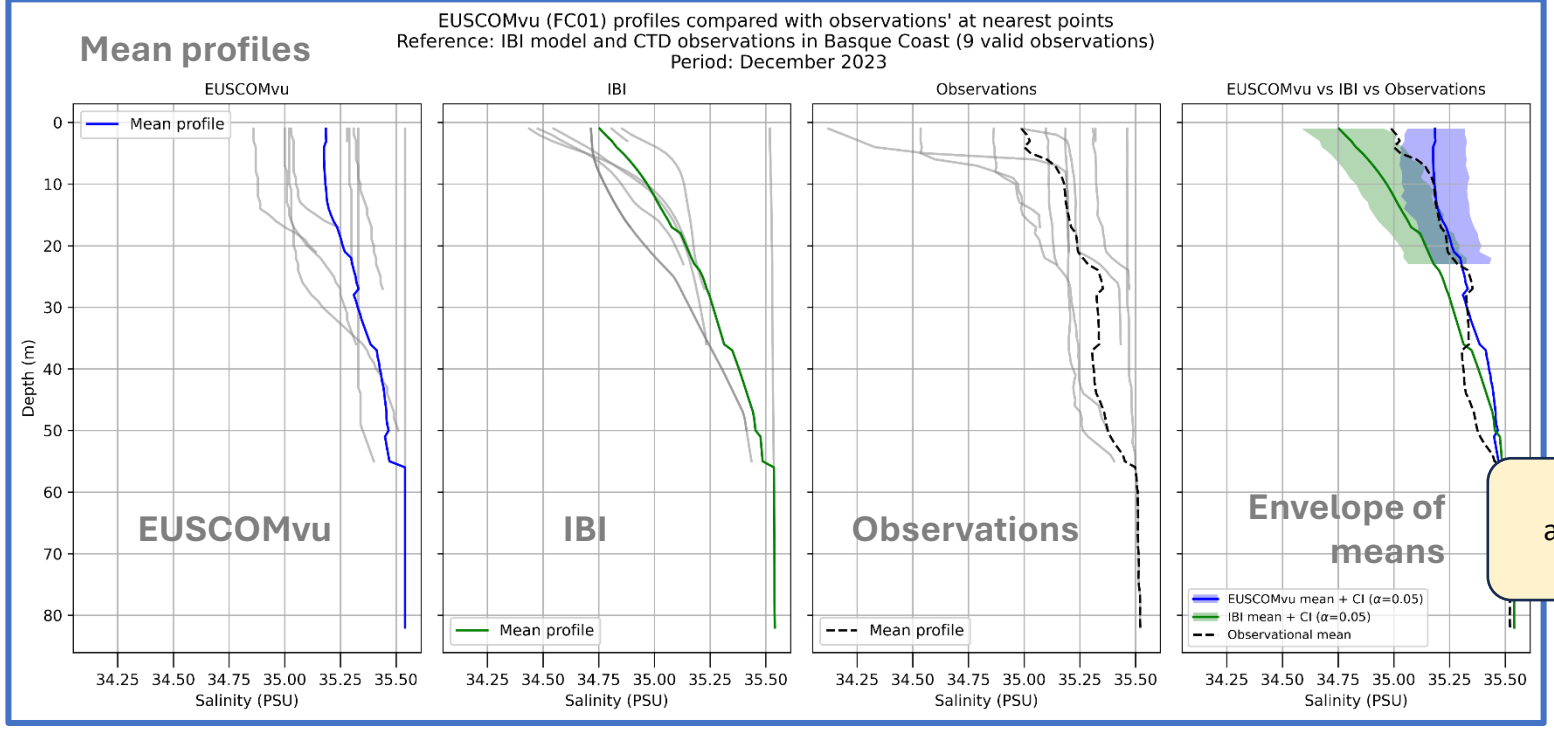
Frequency
Monthly Averages

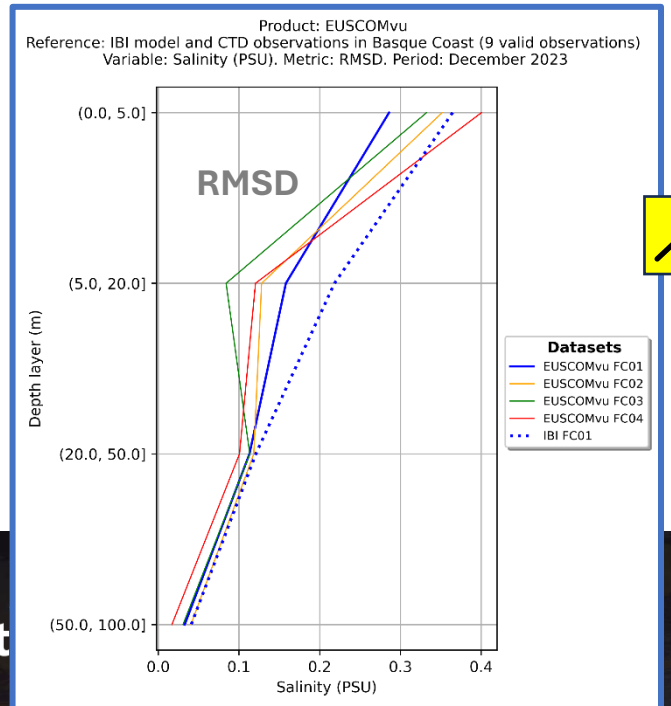
Type of Validation

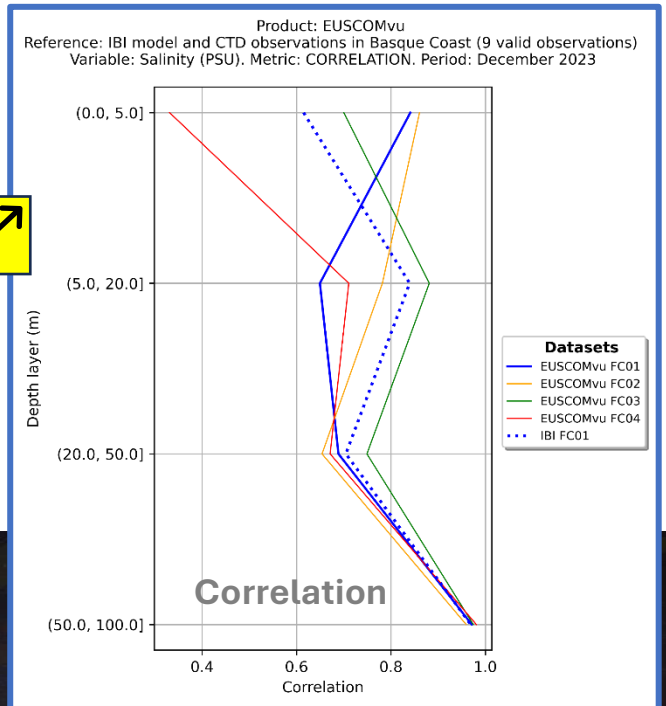
Near-Real-Time Delayed

December 2023

Compare







Monitoring the CTD availability on monthly basis

EUSCOMvu EANs

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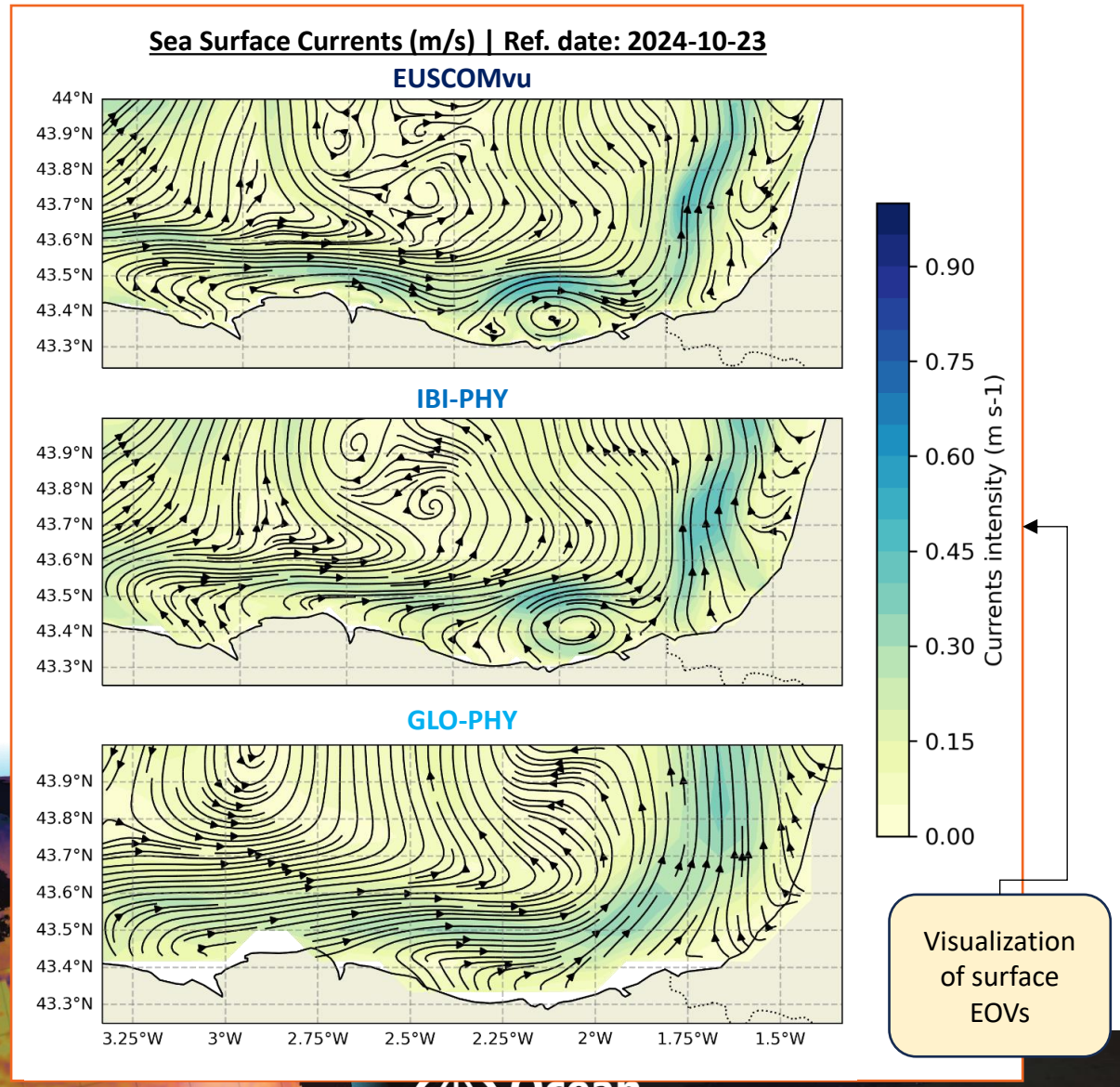
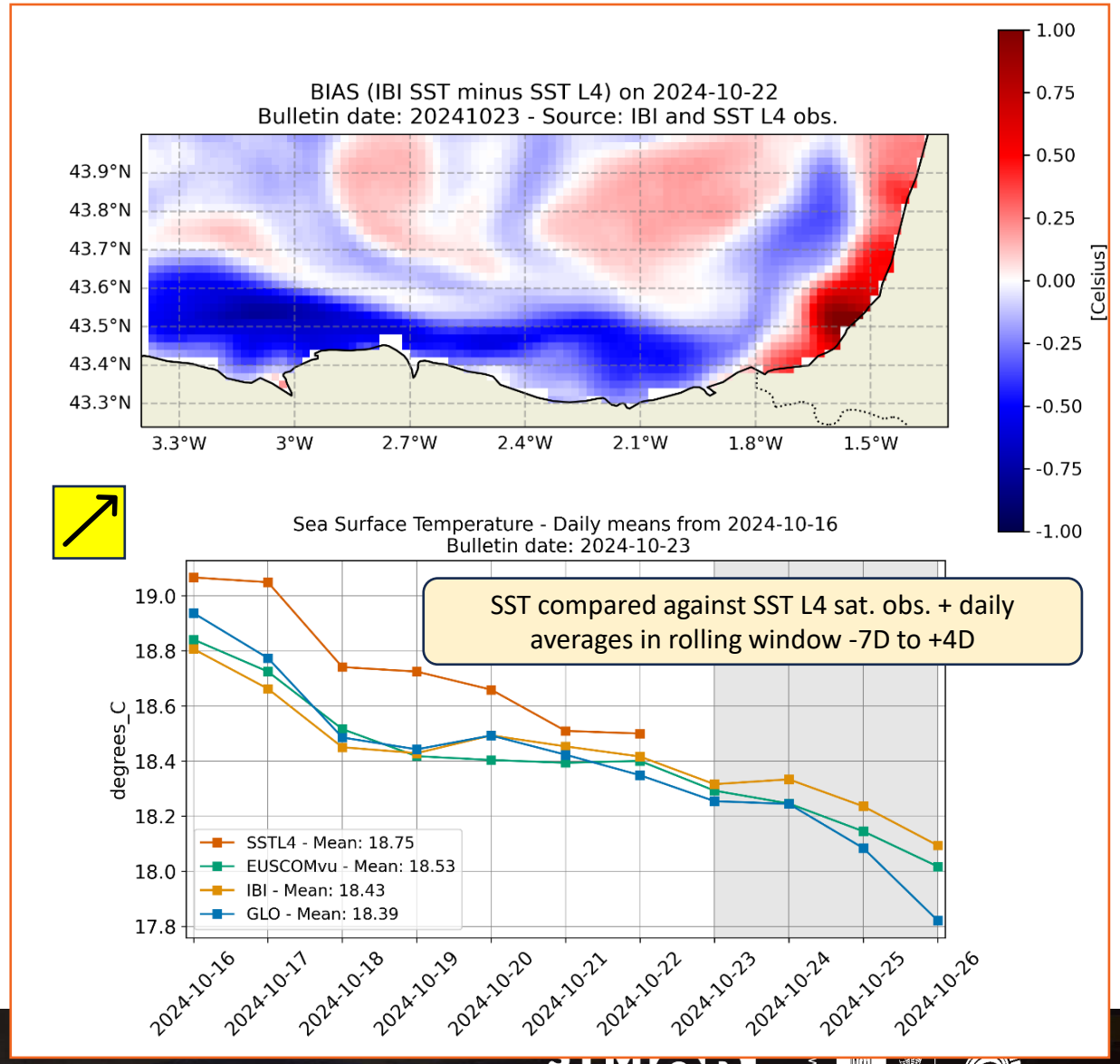
EUSCOMvu Online Module (bulletin: 2024-10-23)

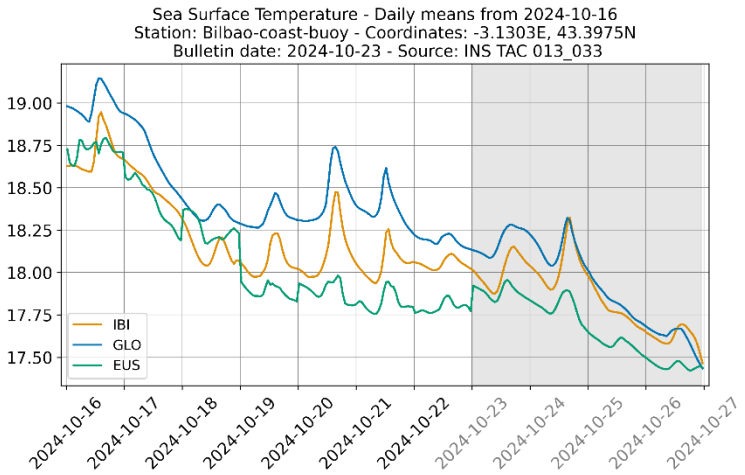


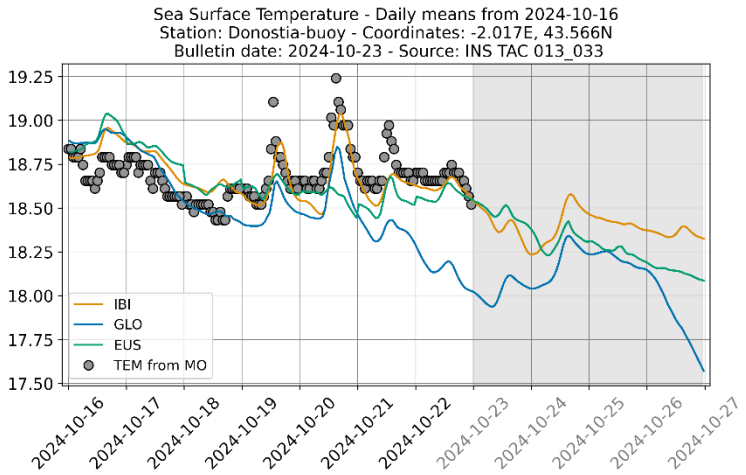
Visualization of surface EOVs

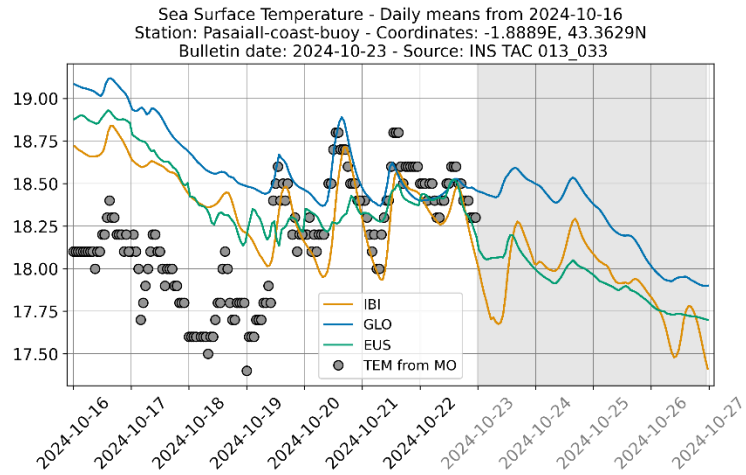


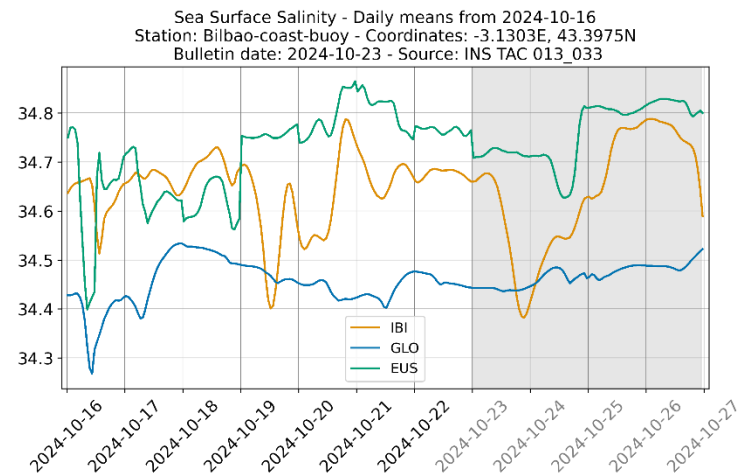
SST compared against SST L4 sat. obs. + daily averages in rolling window -7D to +4D

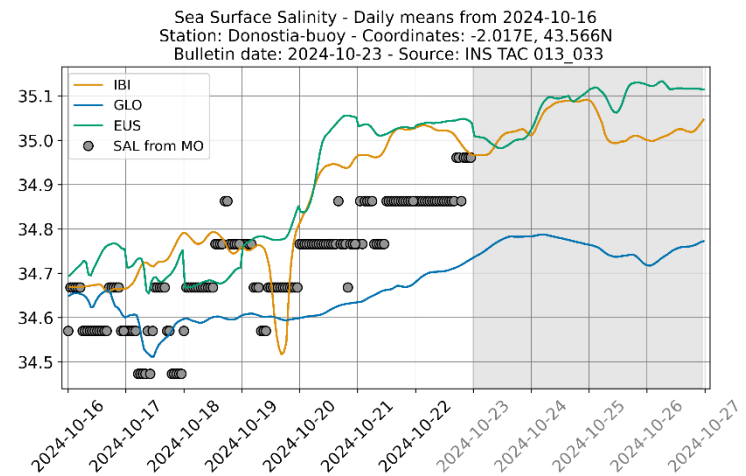
EUSCOMvu Online Module (bulletin: 2024-10-23)

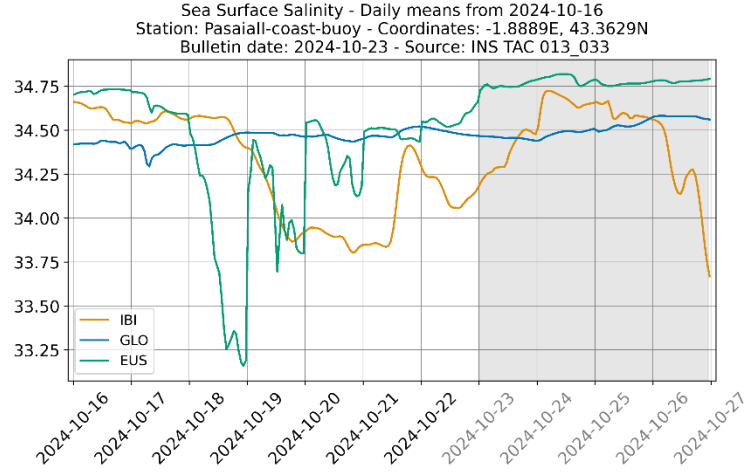












SST and SSS compared against INS obs. + daily averages in rolling window -7D to +4D

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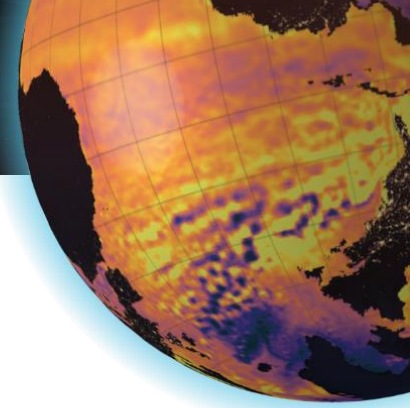

Summary & Future Outlook

- PQ capabilities by NARVAL-DEV able to support Copernicus Marine regional IBI & NWS up to coastal scale:
  - Contributing to monitor forecasts skills of IBI and NWS NRT product catalogue and preparing candidate releases.
  - Supporting users-engagement in coastal areas by providing tailored metrics.
- New web applications for multi-products assessment.
- Implementing the next generation of Validation Tools for operating in the Digital Twin of the Ocean framework.
- Contributing to multi-model intercomparison exercises.
- Towards interoperable PQ metrics and Validation Services following OceanPrediction DCC paths:
  - Contributing to definition of standards & tools for metrics calculation.
  - Adopting the Operational Readiness Level for improving the overall regional and coastal services.

European Commission

Copernicus Marine Service

EU4oceanobs
INTERNATIONAL OCEAN GOVERNANCE
EU COMPONENT TO GLOBAL OCEAN OBSERVATIONS

MERCATOR OCEAN INTERNATIONAL

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cnes
CENTRE NATIONAL D'ÉTUDES SPATIALES

Met Office

NERSC

Australian Government
Bureau of Meteorology

Canada