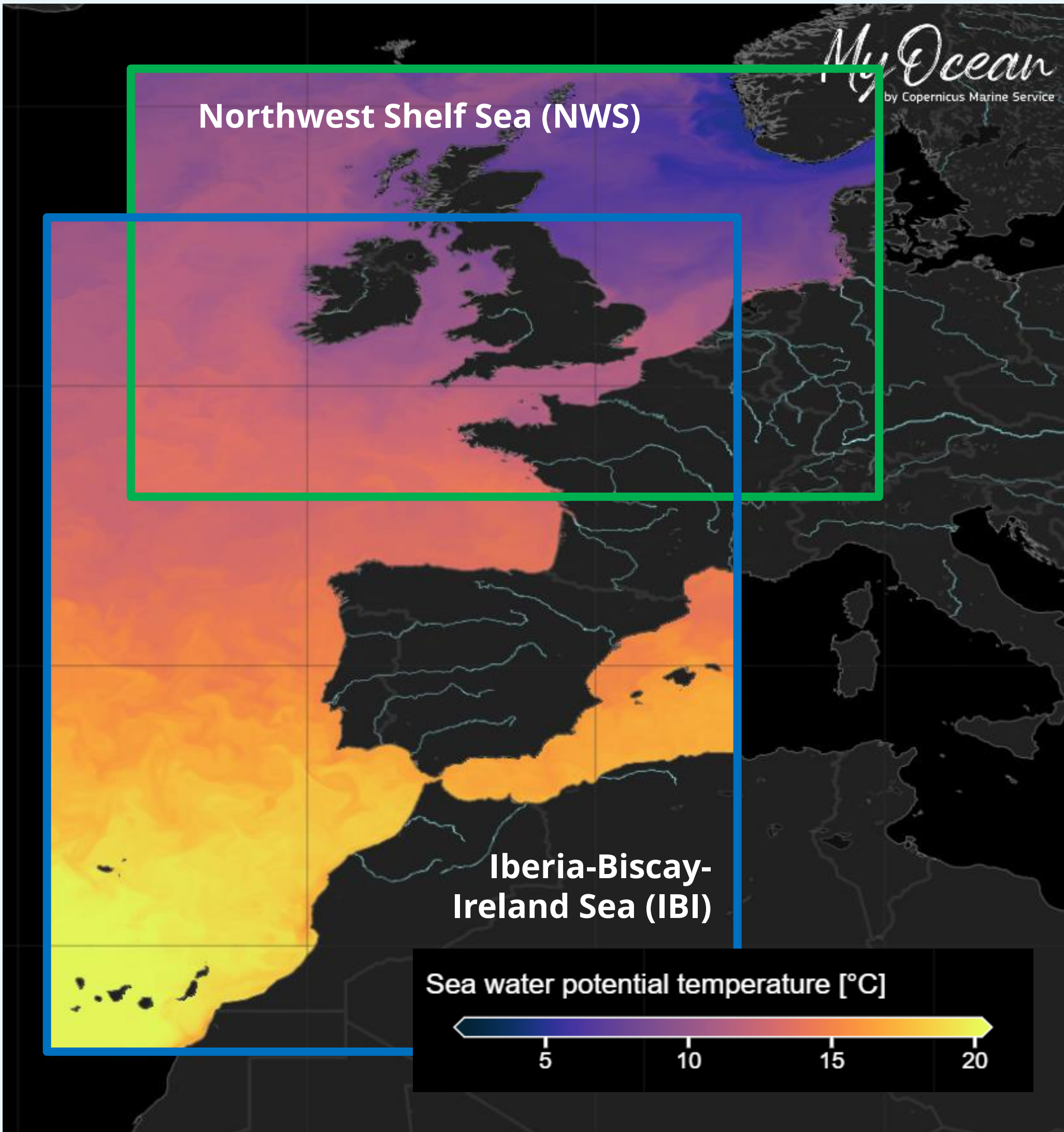


# Progresses in assessing the quality of the Copernicus Marine near real time Northeast Atlantic and Shelf Seas model applications

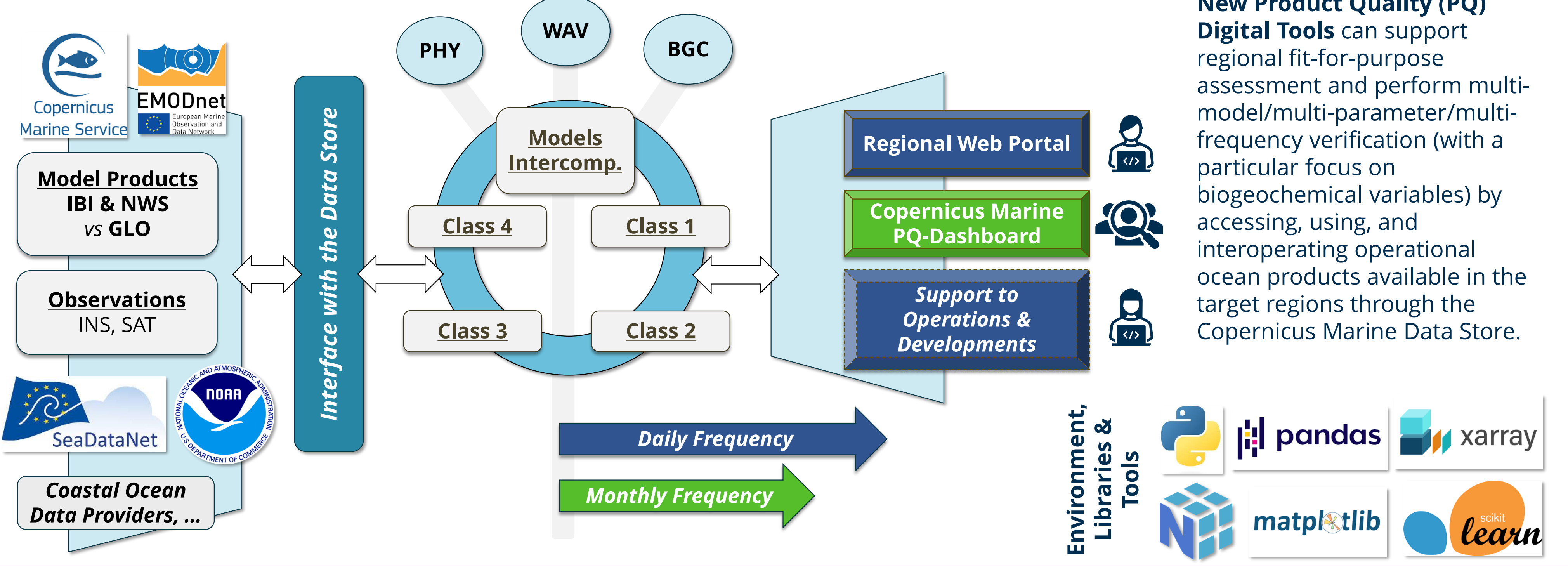
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## 1. OBJECTIVES

Qualification and validation of operational ocean products are fundamental processes and vital part of the **Copernicus Marine Service** for evaluating added value of any new or upgraded release and for monitoring forecasting systems skills in operations.

These have an important impact on both users and model developers, in providing a comprehensive understanding of forecasting systems reliability. As cross-cutting activity at production units' level, and as providers of analysis and forecast ocean products for the **Iberian-Biscay-Irish (IBI)** and **Northwest Shelf (NWS)** regions in the frame of the Copernicus Marine Service, we are continuing to incrementally evolve evaluation methods of forecasting products by improving our capacity in analyzing ocean model data using newly available in-situ and satellite observations.

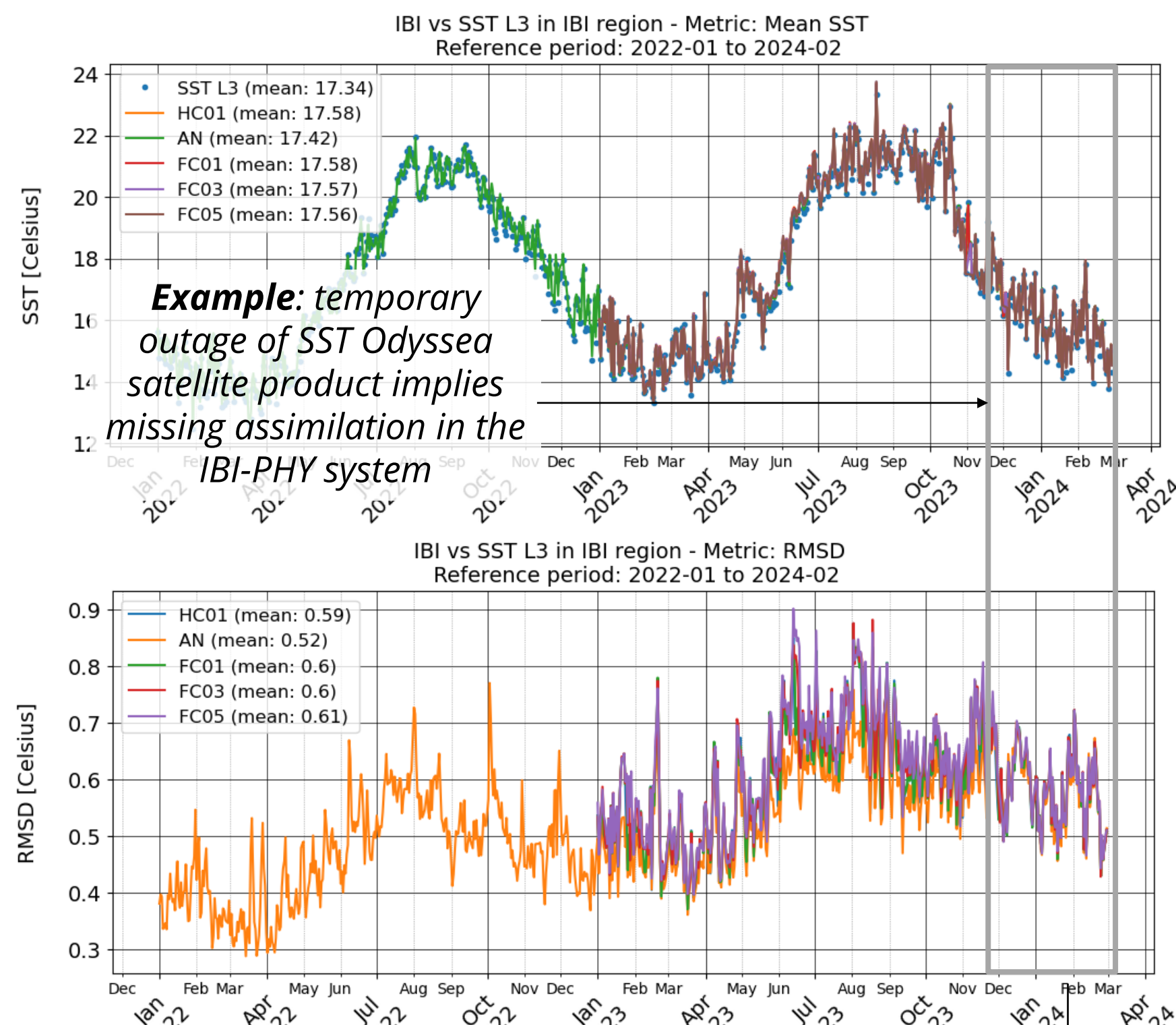


**New Product Quality (PQ) Digital Tools** can support regional fit-for-purpose assessment and perform multi-model/multi-parameter/multi-frequency verification (with a particular focus on biogeochemical variables) by accessing, using, and interoperating operational ocean products available in the target regions through the Copernicus Marine Data Store.

## 2. OPERATIONAL PRODUCT QUALITY FOR COPERNICUS MARINE IBI & NWS PRODUCTS: SOME EXAMPLES

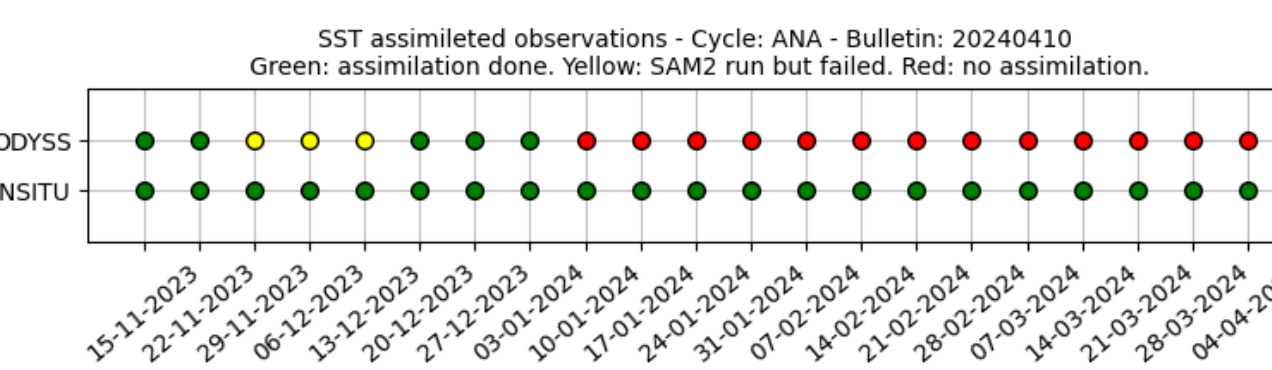
### IBI-PHY: validation of operational SST analysis (AN), hindcast (HC) and forecast (FC) datasets using SST L3 sat. data

1. Quality Control: Timeseries of daily mean SST (top) and RMSD (bottom) in Jan 2022-present:



**Mitigation:** as soon as upstream data available, recovery by re-running the impacted period using the OP suite and monitoring of the PQ evolution

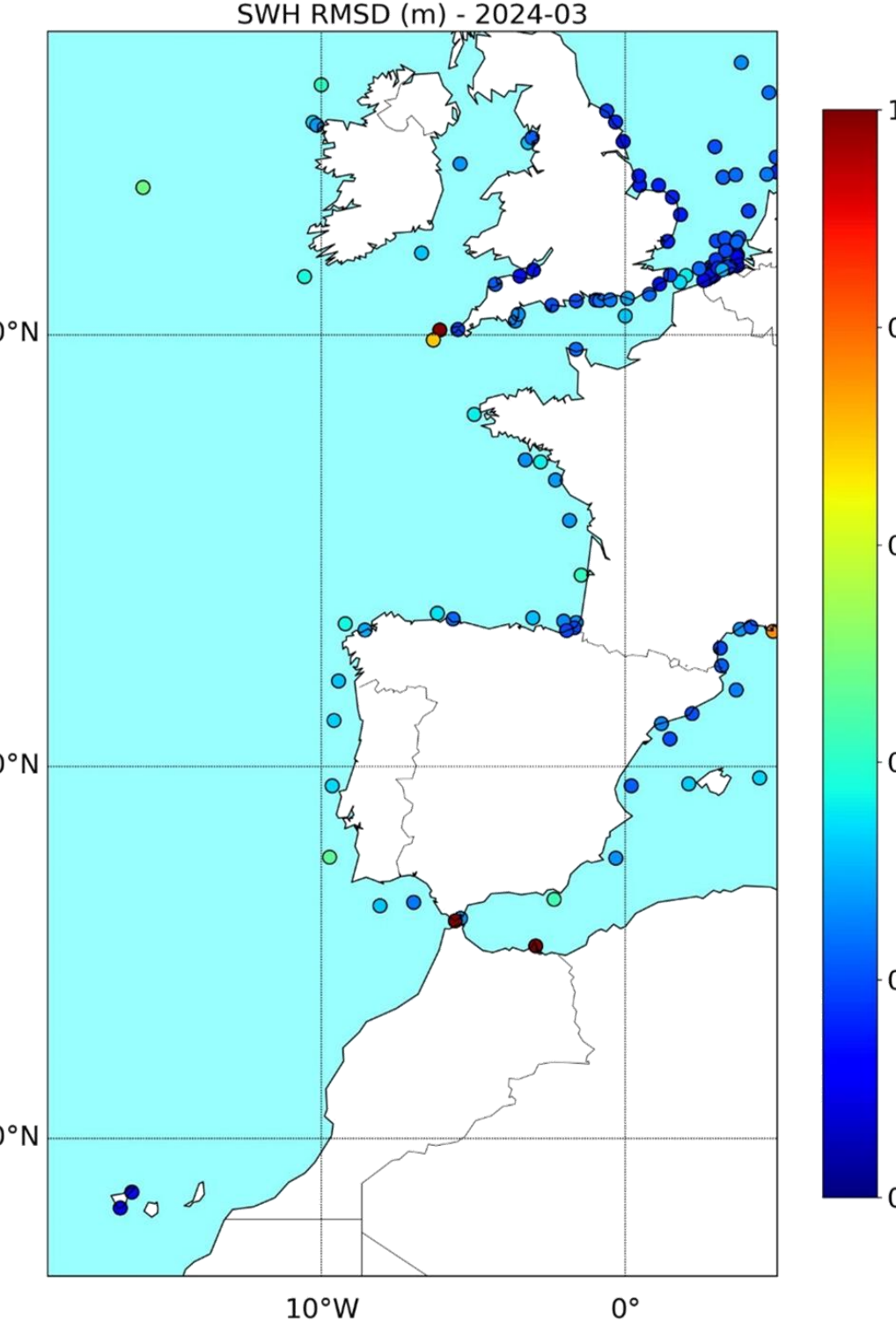
2. Quality Assurance: monitoring the weekly cycle by tracking the execution of the data assimilation scheme.



Status of the assimilation of SAT and INS data.

### IBI-WAV: validation of SWH analysis (AN)

1. Map of monthly RMSD in March 2023 using wave mooring observations (> 50)



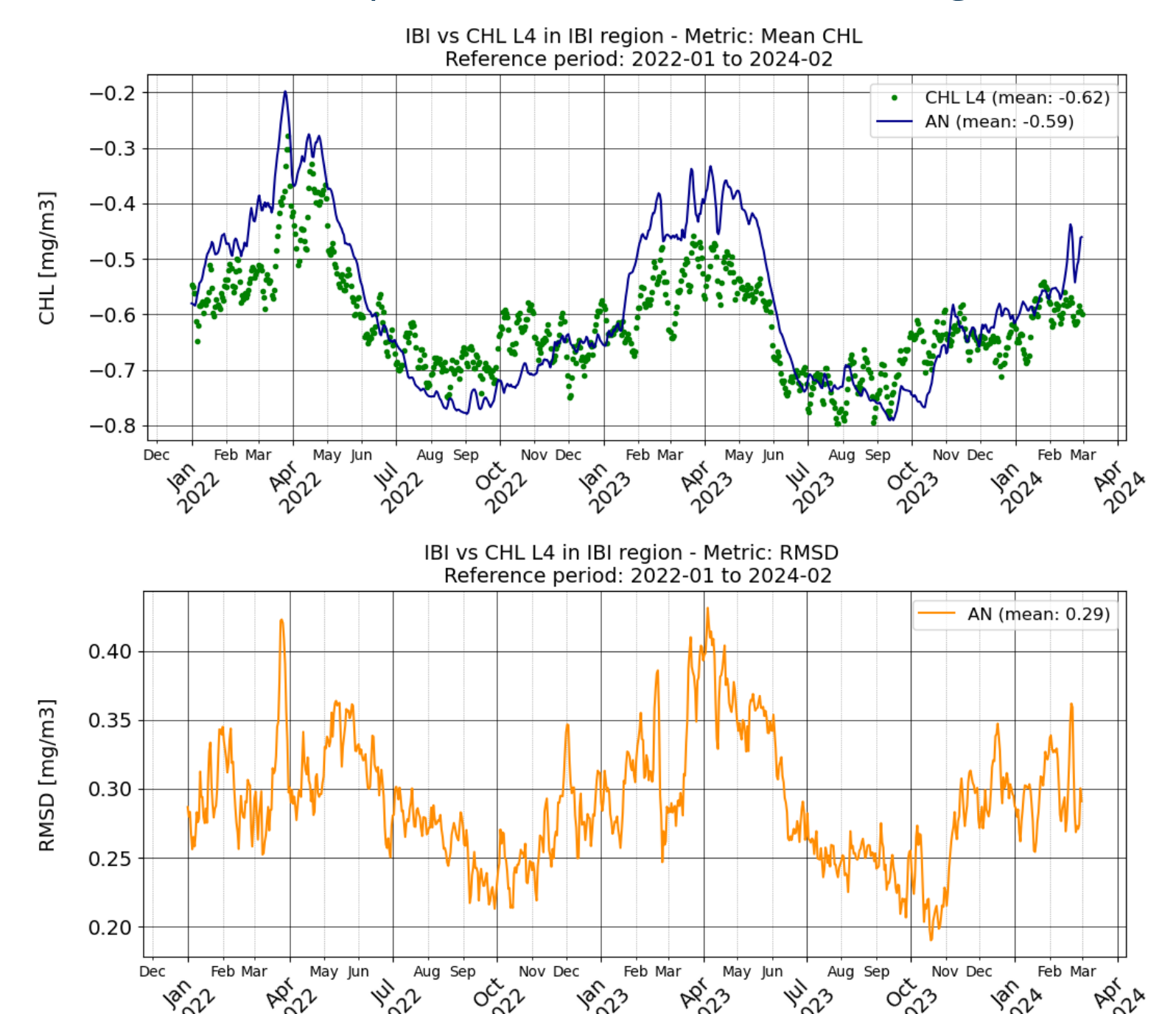
2. Estimated Accuracy Numbers for SWH computed by using SWH satellite L3 observations

Year	RMSD	CORR
2022	19 cm	0.96
2023	12 cm	0.96

3. 2021 Estimated Accuracy Numbers for Hmax as provided by MY system computed by using wave mooring observations

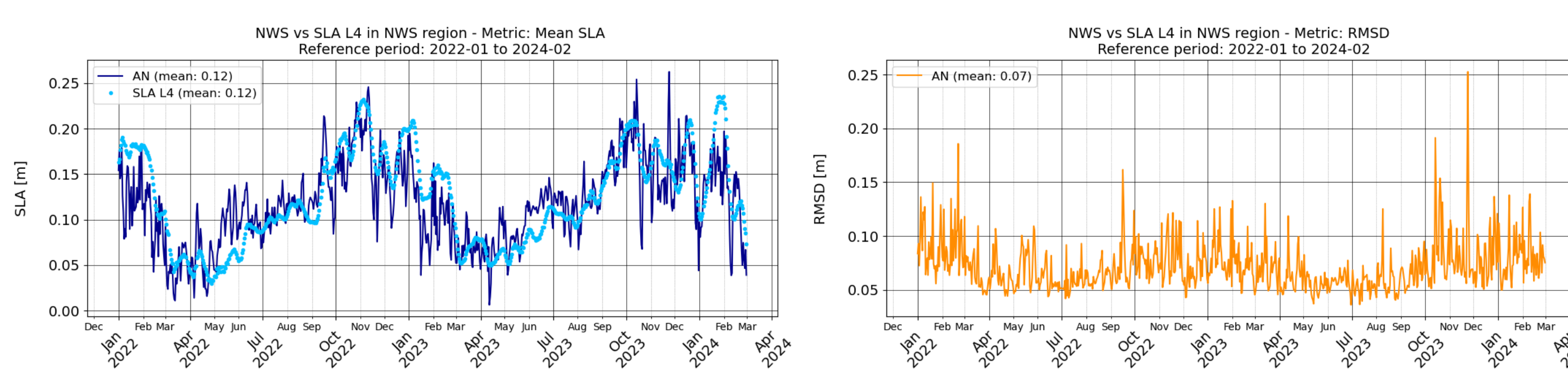
Year	Coastal Waters	Deep Waters
RMSD	48 cm	67 cm
CORR	0.84	0.87

### IBI-BGC: validation of operational hindcast (HC) using CHL L4 sat. data



The system can catch the seasonal cycle as the shown by the satellite data. Average error along the period is of about 0.3 mg/m<sup>3</sup>. Correlation (not shown) is quite good, with some drops due to events not fully captured by the model especially in springtime (but this model is not assimilating satellite CHL).

### NWS-PHY: validation of operational SLA analysis (AN) dataset using SLA L4 satellite data.



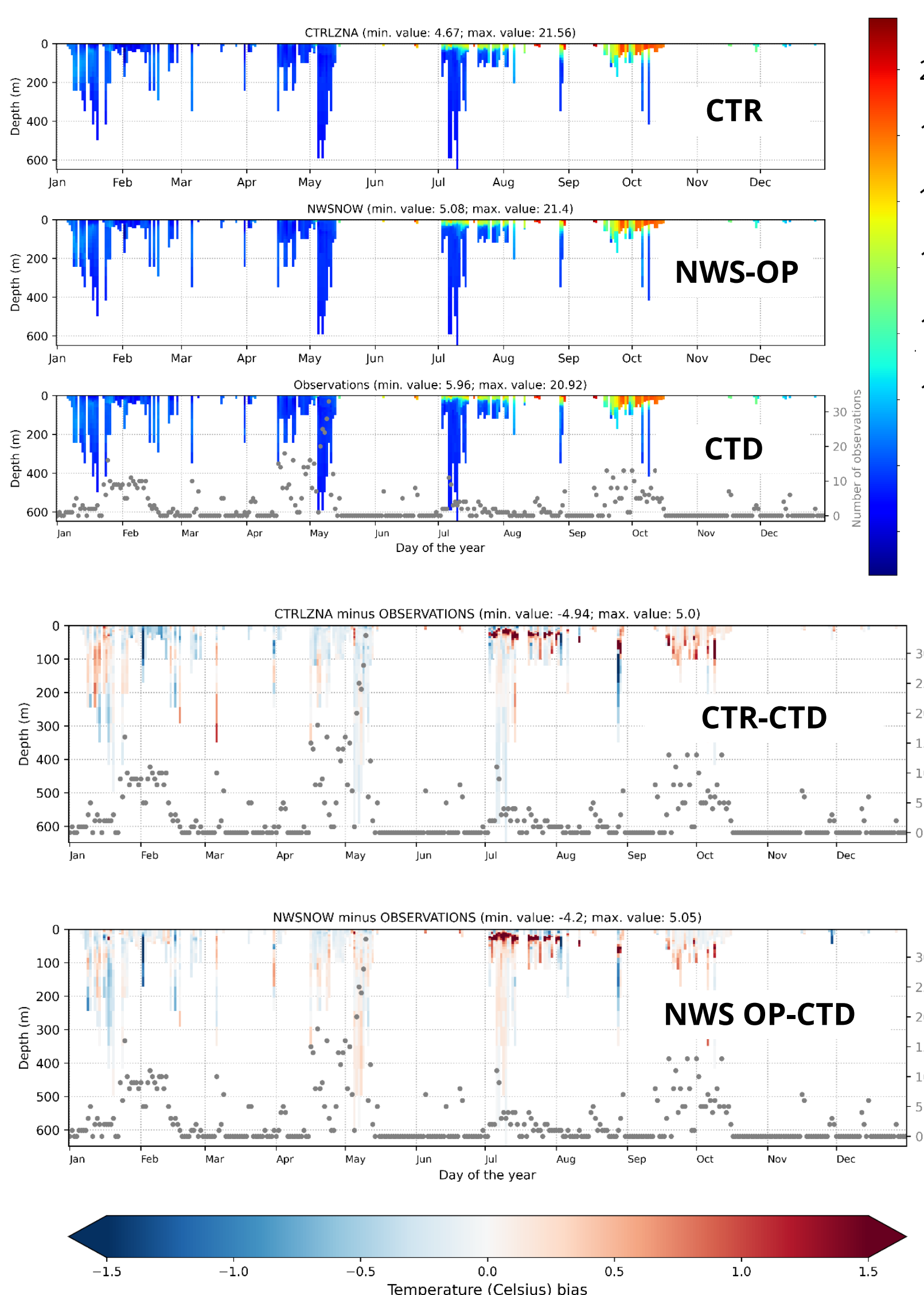
### Estimated Accuracy Numbers

Year	RMSD	CORR
2021	7 cm	0.4
2022	7 cm	0.4
2023	8 cm	0.6

## 3. EVOLUTION OF THE PHYSICAL CORE MODEL

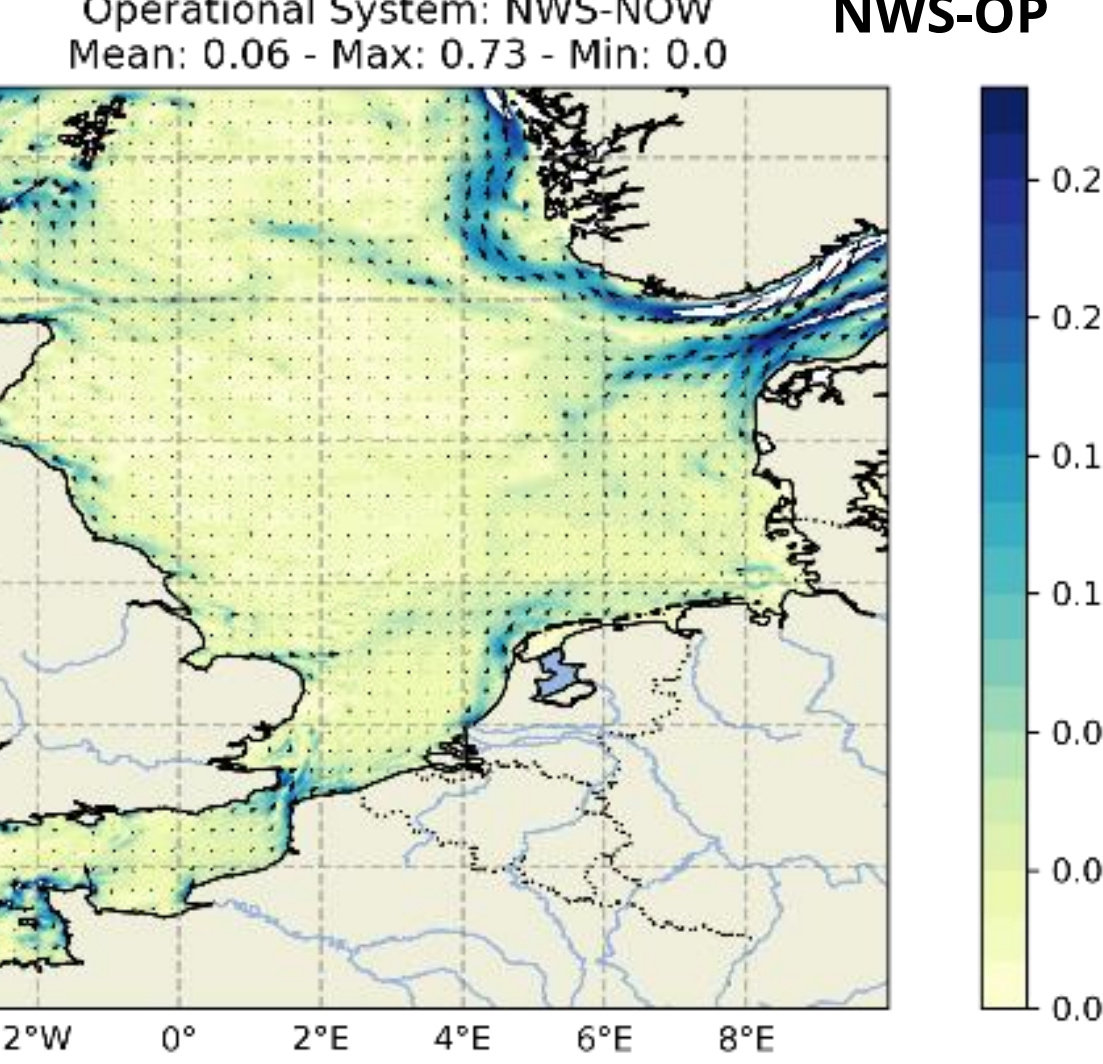
### Validation and Multi-Models Intercomparison in the NE Atlantic Shelf Seas

1. Assessment of the 3D temperature by comparing NEATL control run and NWS operational system products against CTD observations in 2023 (in Celsius)

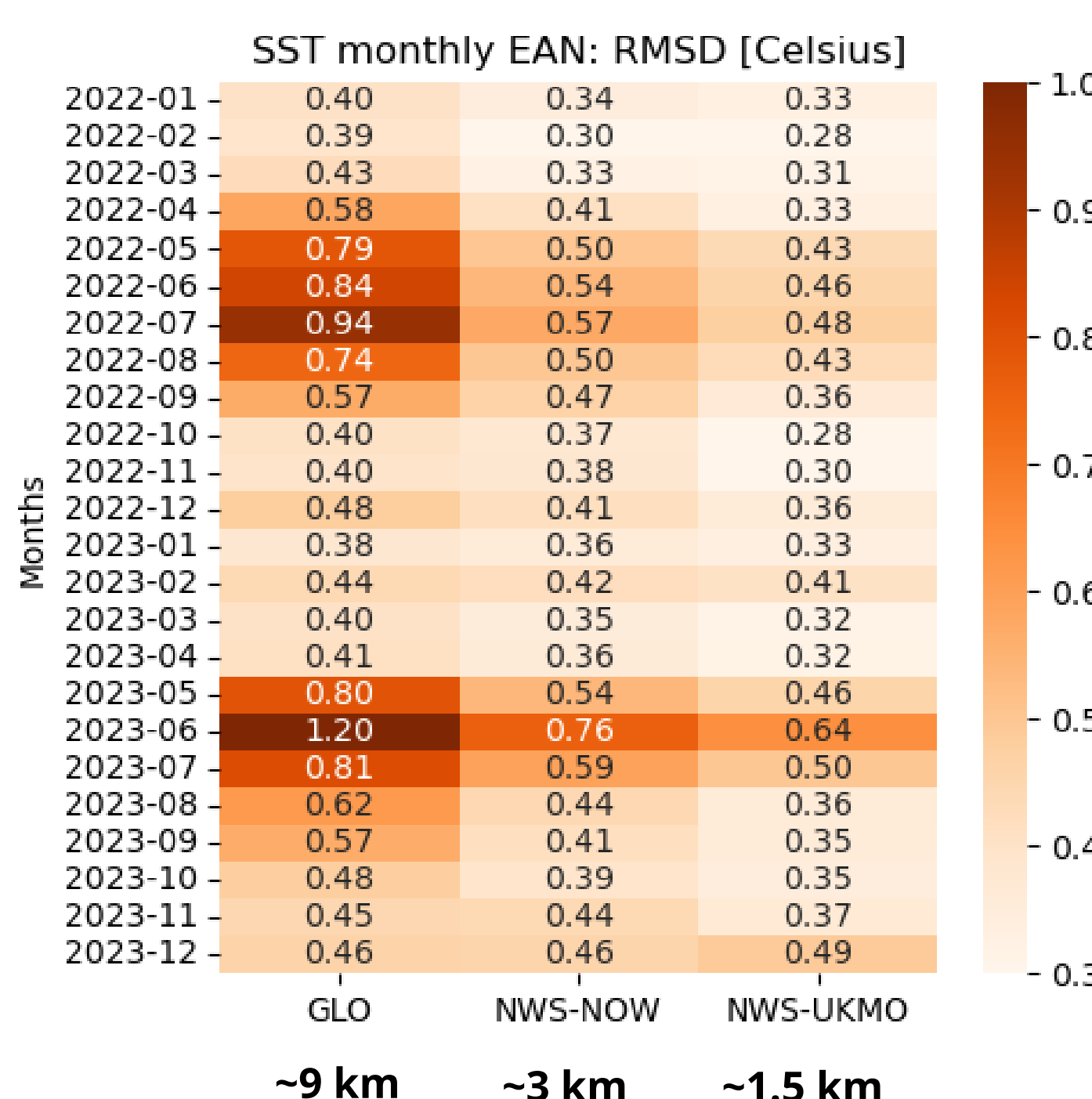


The Control Run (CTR) and the NWS operational system (NWS-OP) capture T gradients along the water column, in quite agreement with daily averaged CTD observations (around 950 quality controlled valid observations have been accounted for this analysis).

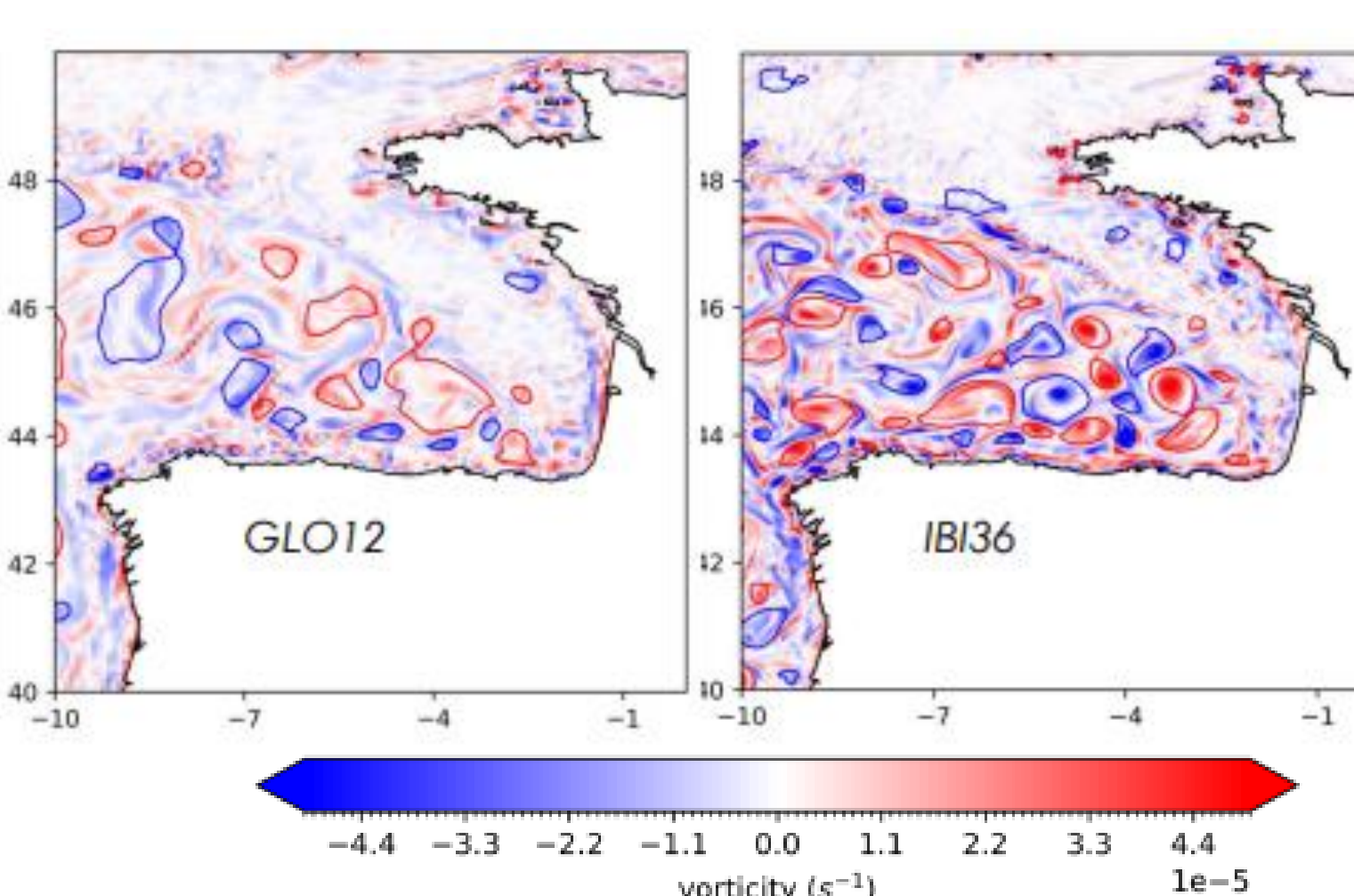
### Sea Surface Currents Mean for 2023



2. Performances of Copernicus Marine products in the NEATL domain: GLO vs NWS-OP vs NWS-UKMO

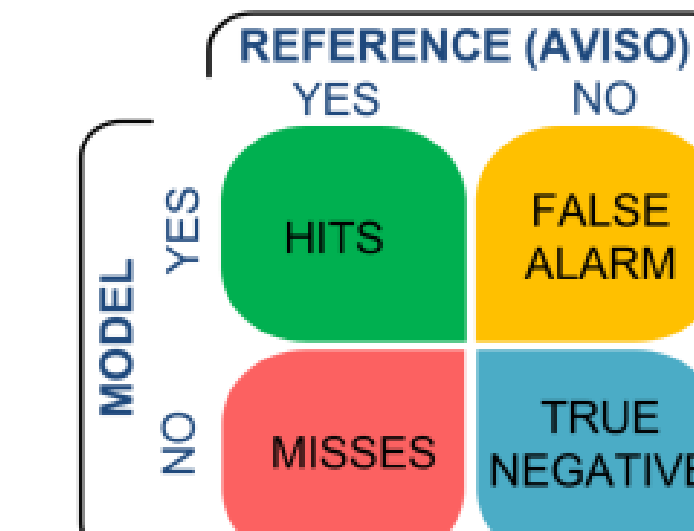


### 1. Validation fitted to downscaled systems: IBI vs GLO



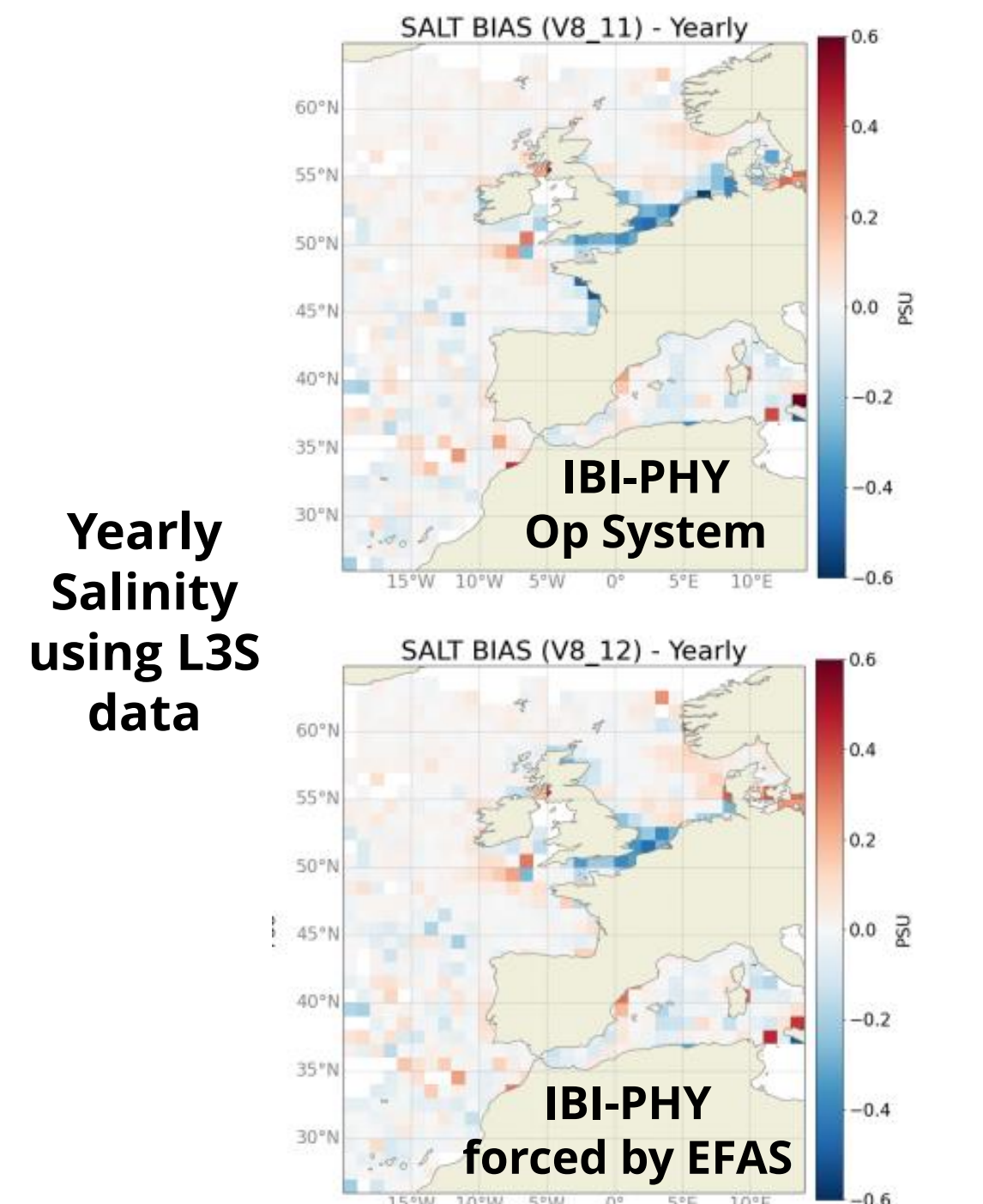
### Eddy Scores

Detected structures are validated using metrics that categorize structures relative to a reference - here AVISO. Structures are associated with a cost function.



Credits: MOI Dev Team

### 2. GLOFAS-EFAS downscaled runoff forcing



Yearly Salinity using L3S data

Decrease in BIAS:  
• In NWS area.  
• Along the French Coast and in the Bay of Biscay.

## 4. FUTURE OUTLOOK

Evolutions of product quality tools will include integration of new product types - like interim and multi-year regional datasets - with implementation of new metrics, and development of a new digital validation service where users (e.g., end users and intermediate users, including operational teams) will have access to NWS operational systems skills.

