

4.1 Global and basin scale ocean forecasting and reanalysis

IBIRYS: a Regional High-Resolution Reanalysis (physical and biogeochemical) of the last 30 years (1993-2023) over the European Northeast Shelf

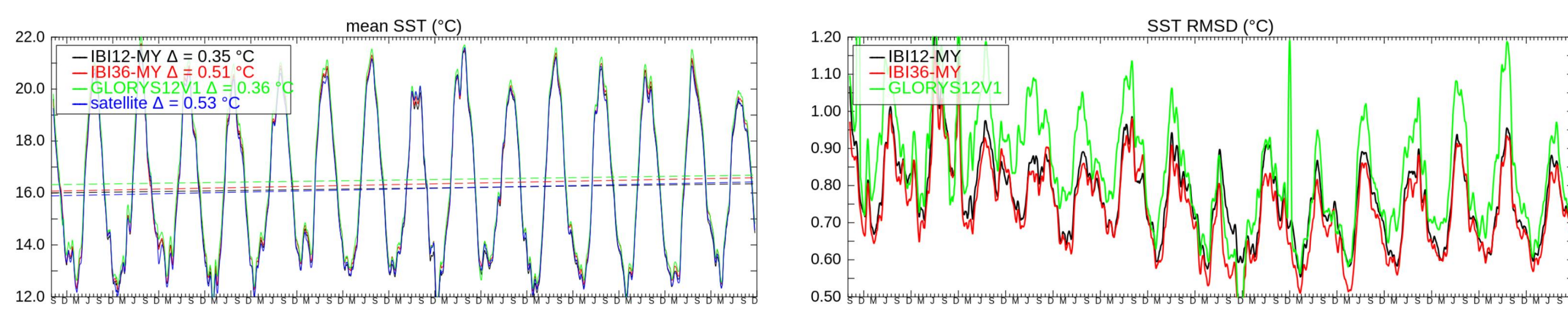
Introduction

Mercator-Ocean has developed a regional reanalysis over the Northeast Atlantic (IBI: Iberia-Biscay-Ireland). The reanalysis was first delivered in 2015 in the framework of the MyOcean project. It is since regularly updated and is now delivered on the Copernicus Marine Service (<https://marine.copernicus.eu/>) by the IBI Monitoring and Forecasting Centre (MFC), involving partners from France and Spain.

The new version of the IBI reanalysis is currently in production and benefits from new data assimilation system (Mercator SAM2V2) and increased horizontal resolution ($1/36^\circ$) among others features. It is planned to be delivered in Nov 2025.

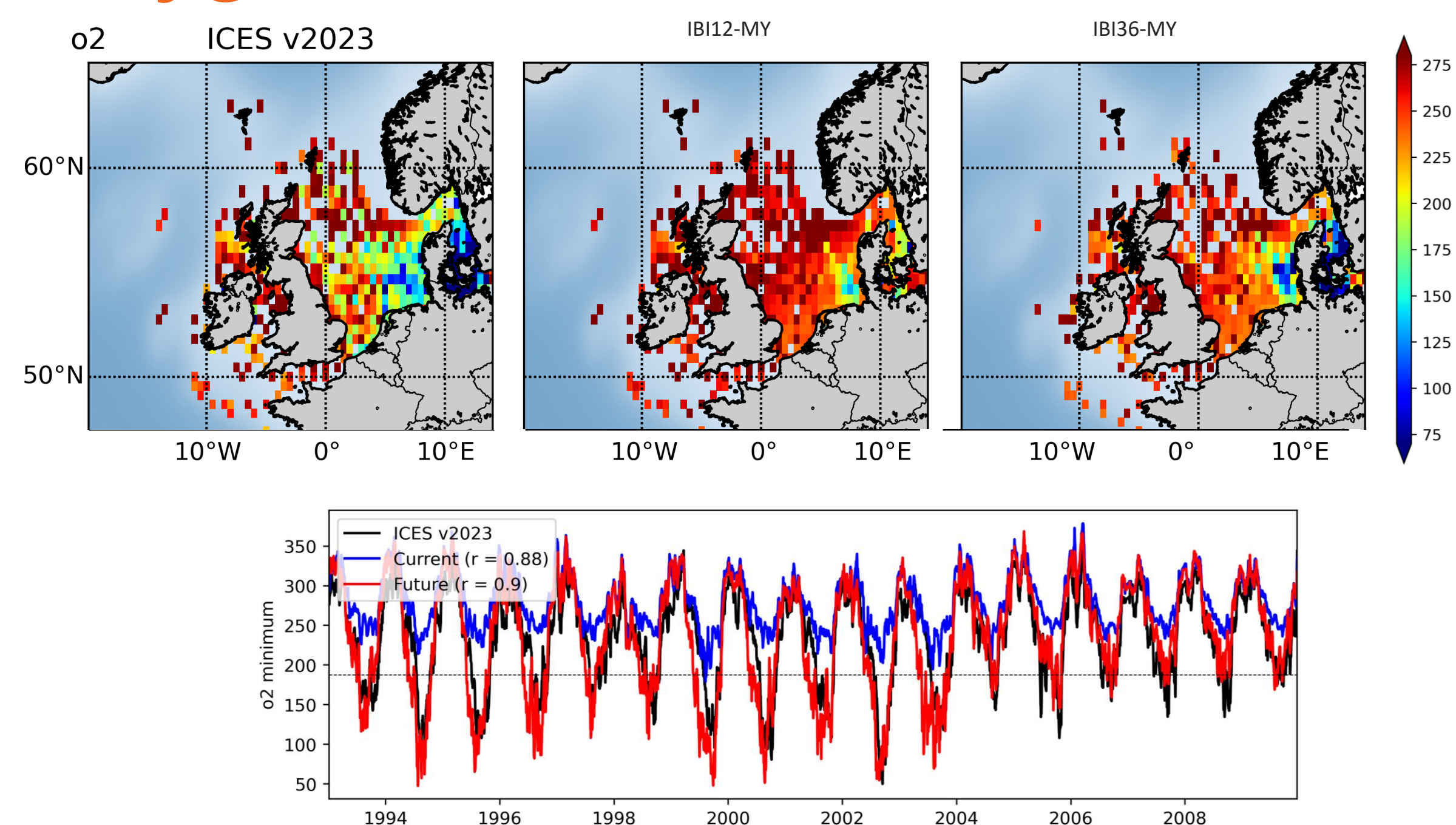
We present here preliminary results, comparing the new reanalysis (hereafter IBI36-MY) with the former one (IBI12-MY, Copernicus product IBI_MULTIYEAR_PHY_005_002), and to global reanalysis GLORYS12V1 (Copernicus product GLOBAL_MULTIYEAR_PHY_001_030).

Sea Surface Temperature



Left figure shows the domain averaged Sea Surface Temperature (filtered) for actual IBI reanalysis (IBI12-MY in black), the new IBI reanalysis (IBI36-MY in red) and the global reanalysis (GLORYS12V1 in green) compared to satellite L3 SST (Copernicus SST_ATL_PHY_L3S_MY_010_038 product). Dash lines represent the trend. The increase in temperature between the start and the end of the time series is displayed. The right figure shows also the RMS differences compared to the satellite data. IBI36-MY is closest to the satellite data than IBI12-MY and GLO RYS12V1 reanalyses.

Oxygen



Figures above show Oxygen minimum on the seafloor of the continental shelf (match-ups between IBI-MY and ICES database from 1993 to 2009). IBI36-MY is consistent with in-situ ICES data and reproduces the spatial distribution and seasonal evolution of Oxygen minimum.

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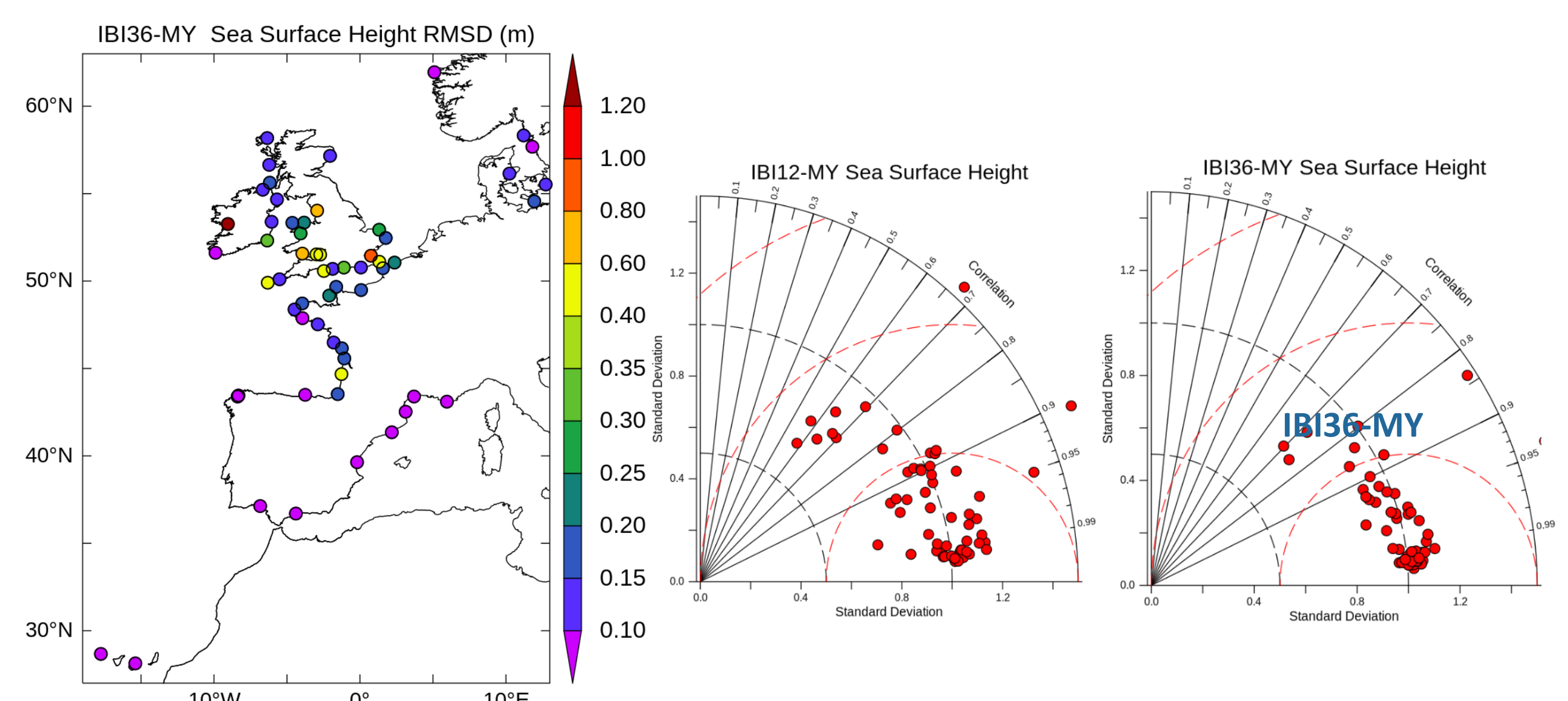
1/36° PHY reanalysis

- Horizontal resolution of $1/36^\circ$ and 50 vertical levels
- NEMO3.6 ocean model
- GLORYS12V1 global reanalysis at boundaries
- ERA5 atmospheric forcing
- Data assimilation of along track SLA, SST L3S and salinity and temperature in-situ profiles, plus a large scale bias correction

1/36° BGC hindcast

- Horizontal resolution of $1/36^\circ$ and 50 vertical levels
- PISCESv2 ocean model
- Online coupling with physical model
- BIOMER4 global forecast model at boundaries (climatology before 2008) and correction of carbon trends
- River discharges: Global News 2 + additional NO_3 , PO_4 , Si modulated by river flow
- Permanent burial: OM deposition to the sediment is function of a bottom shear stress Critical value

Sea Level



Left figure shows the RMS differences (m) of Sea Surface Height (SSH) between the new IBI36-MY reanalysis and tide gauges (Copernicus product INSITU_GLO_PHY_SSH_DISCRETE_MY_013_053) over the period 1993-2007. Middle and right figures are normalized Taylor diagrams showing comparisons of Sea Surface Height between IBI12-MY and tide gauges, and between IBI36-MY and tide gauges. IBI36-MY performs better than previous reanalysis IBI12-MY, with lower RMSD and higher correlation compared to the tide gauges measurements. The standard deviation of IBI36-MY is also closer to the observations.

Conclusions

- A new regional reanalysis covering IBI region at $1/36^\circ$ horizontal resolution, with coupled physics and biogeochemical model is in production
- First results show an improvement in various variables such as SST, sea level or oxygen.