

Modeling the Iberian Current System

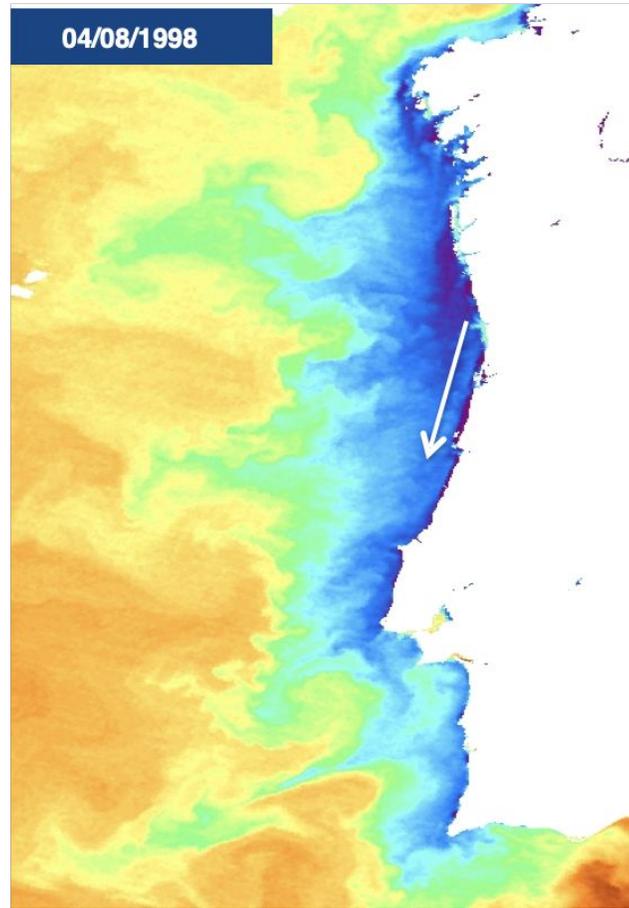
Ana Machado, Sandra Plecha, Álvaro Peliz, Emanuel Dutra, Susana Garrido

IPMA/IDL/FCUL

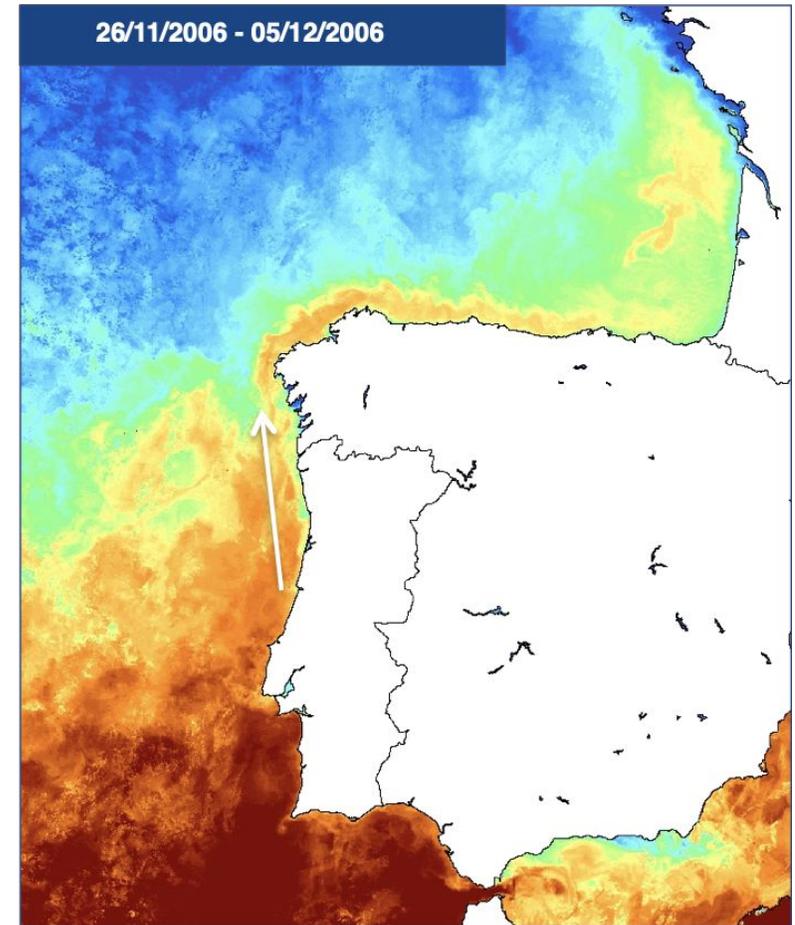


Oceanography of the Iberian Margin

Summer
Coastal Upwelling



Winter
Iberian Poleward Current (IPC)



Oceanography of the Iberian Margin

System with High Complexity:

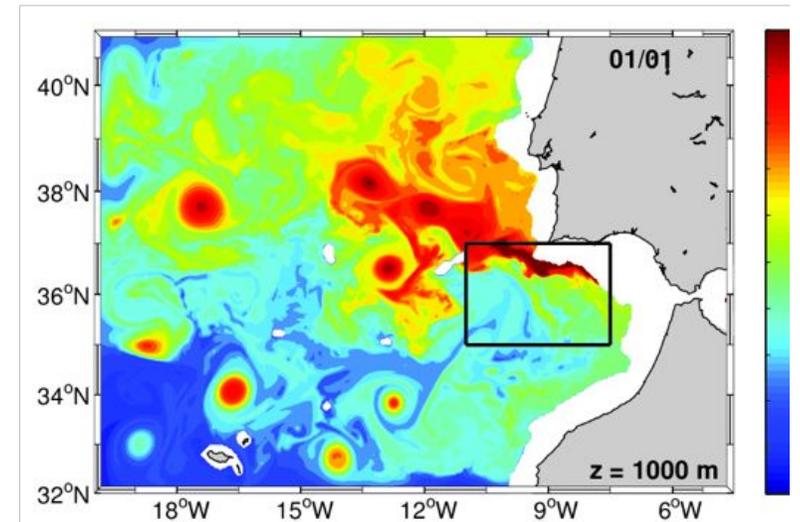
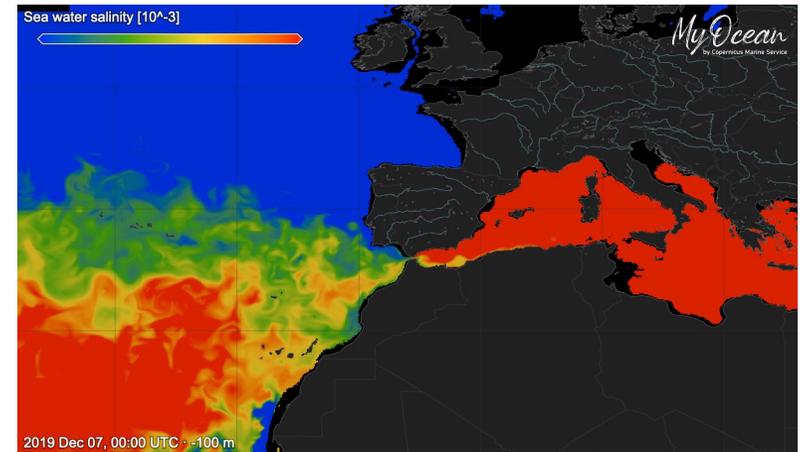
Impact of large scale circulation

Strong seasonality

Interannual variability

Variable River discharges

Mediterranean Water Outflow



Ocean Model IB.v1

1989-2008

**Ocean Model Croco (ROMS AGRIF
version)**

2 Nested Grids

Child grid: 2.2 – 2.5 km resolution

Parent grid: 6.4 – 7.8 km resolution

Open Boundaries and Initial Conditions:

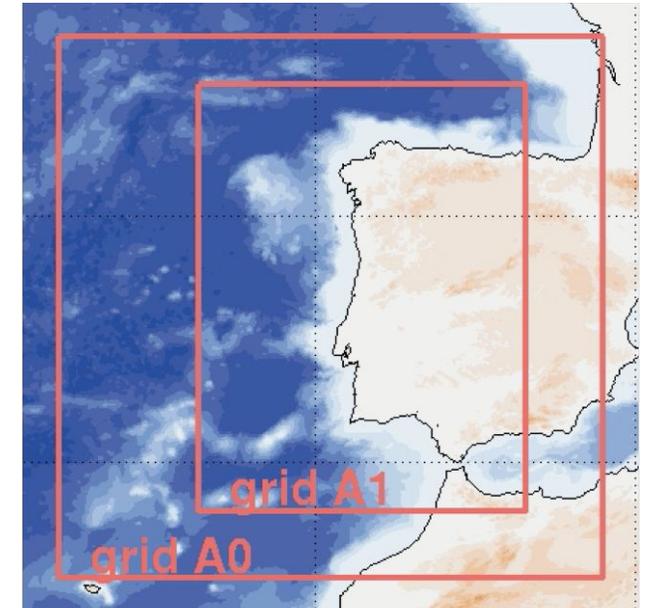
Larger Domain Downscaled from Levitus

Atmospheric Forcing: WRF 27km

Vertical Levels: 40

Rivers: climatological seasonal cycles

ROMS AGRIF (Regional Ocean Modeling System)



Atmospheric Forcing: WRF 27km
Horizontal grid: 2.2-2.5km

Ocean Model
IB.v2
New Version
2002-2008 (to
present)

Ocean Model Croco (ROMS version)

2 Nested Grids

Child grid: 1.6 – 1.9 km resolution

Parent grid: 4.7 – 5.9 km resolution

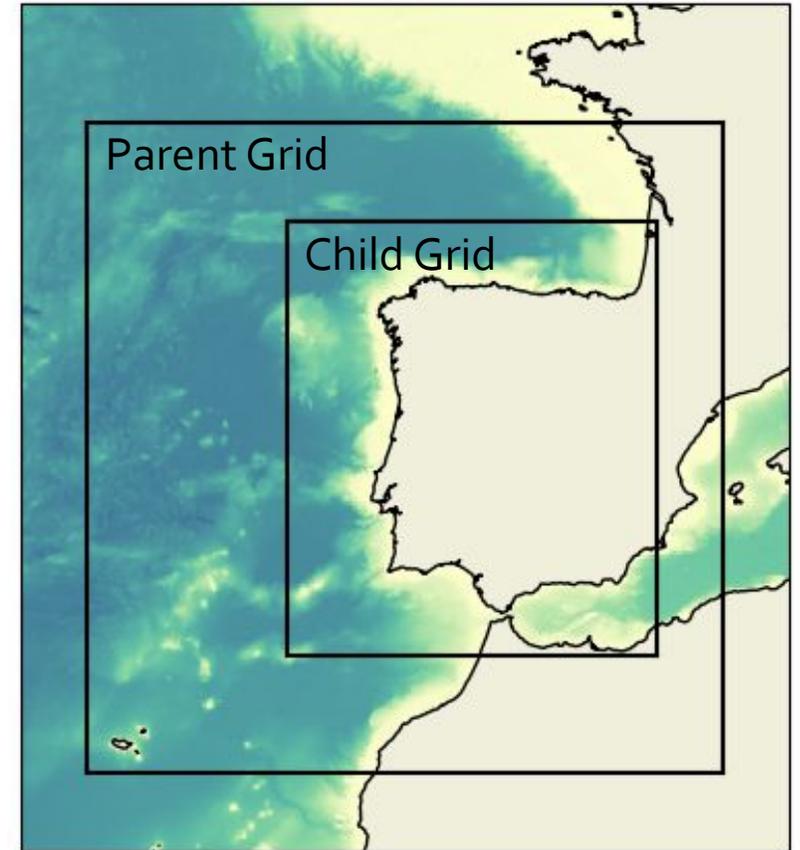
Open Boundaries and Initial

Conditions: GLORYS12V1 product
from CMEMS

Atmospheric Forcing: ERA 5 ECMWF
atmospheric reanalysis

Vertical Levels: 60

Rivers: CaMa-Flood model



Ocean Model
IB.v2
New Version
2002-2008 (to
present)

Improvements:

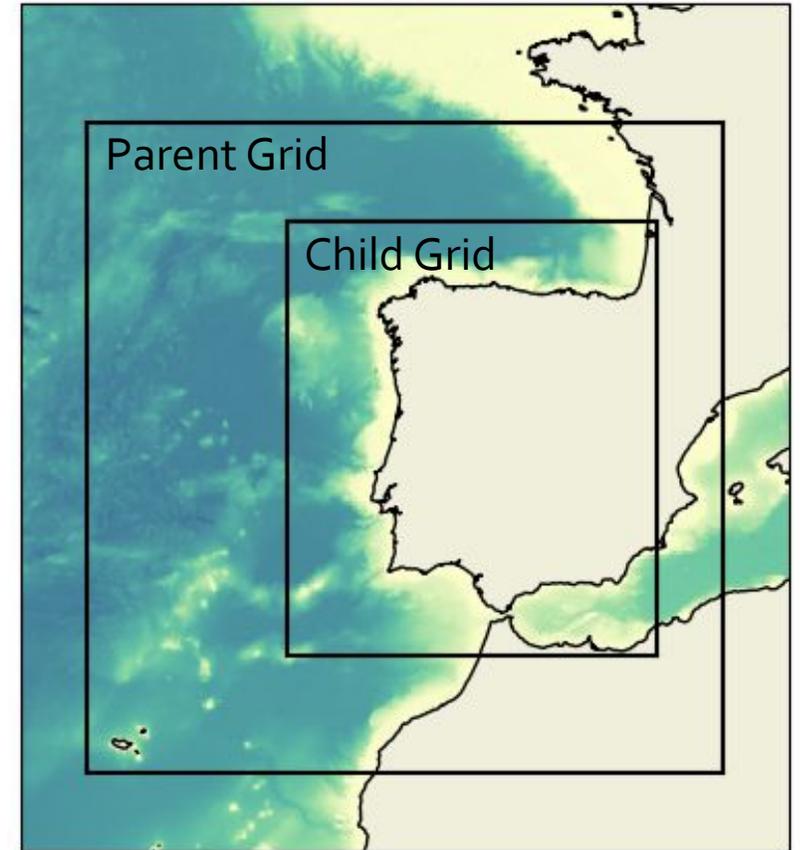
**Higher horizontal resolution
(~ 2.3 to ~1.8 km)**

**More vertical levels
(40 to 60)**

**Open Boundaries Conditions now
with interannual variability (monthly
averages)**

**Atmospheric Forcing available to
present**

**River Discharge now with
interannual variability (monthly
averages)**



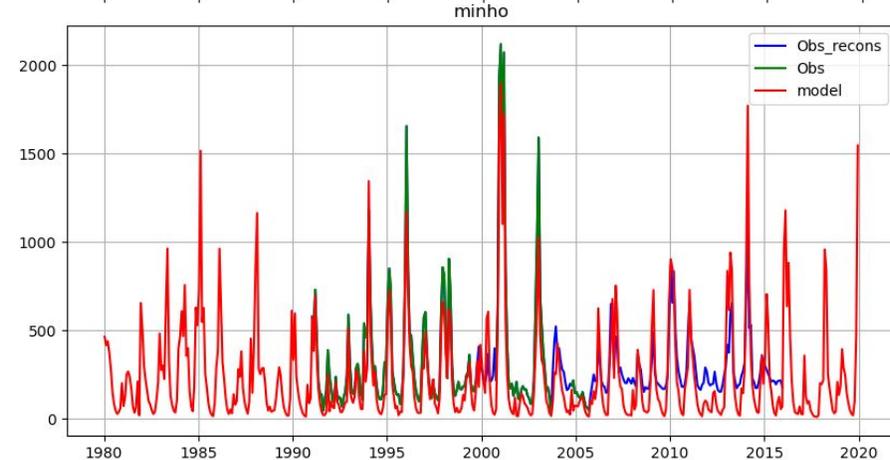
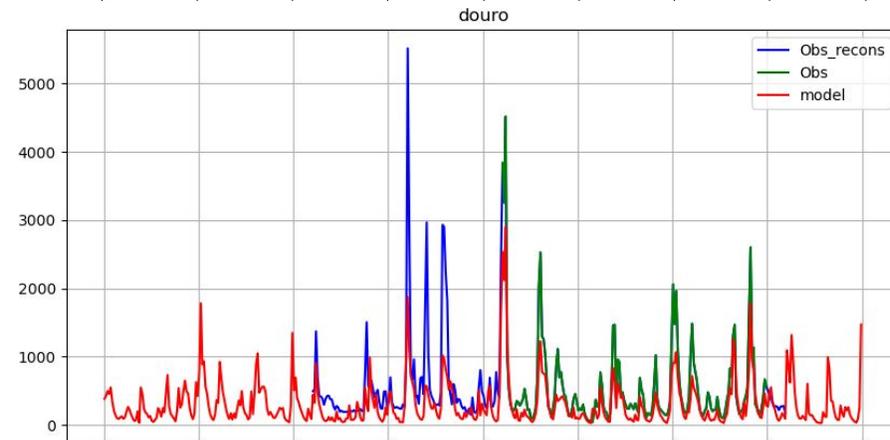
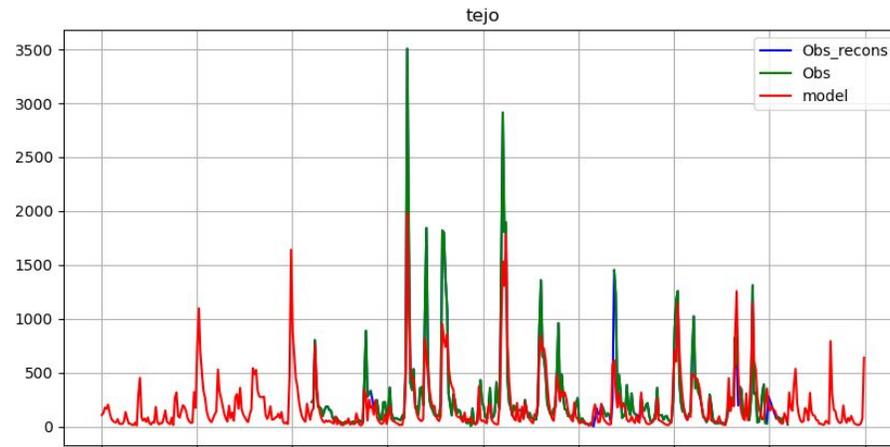
Rivers

River Discharge

Data obtained from SNIRH website

Missing data

Model values from simulations with the hydrodynamic model CaMa-Flood driven by runoff generated by the land surface model CHTESSEL



Discharge Properties:

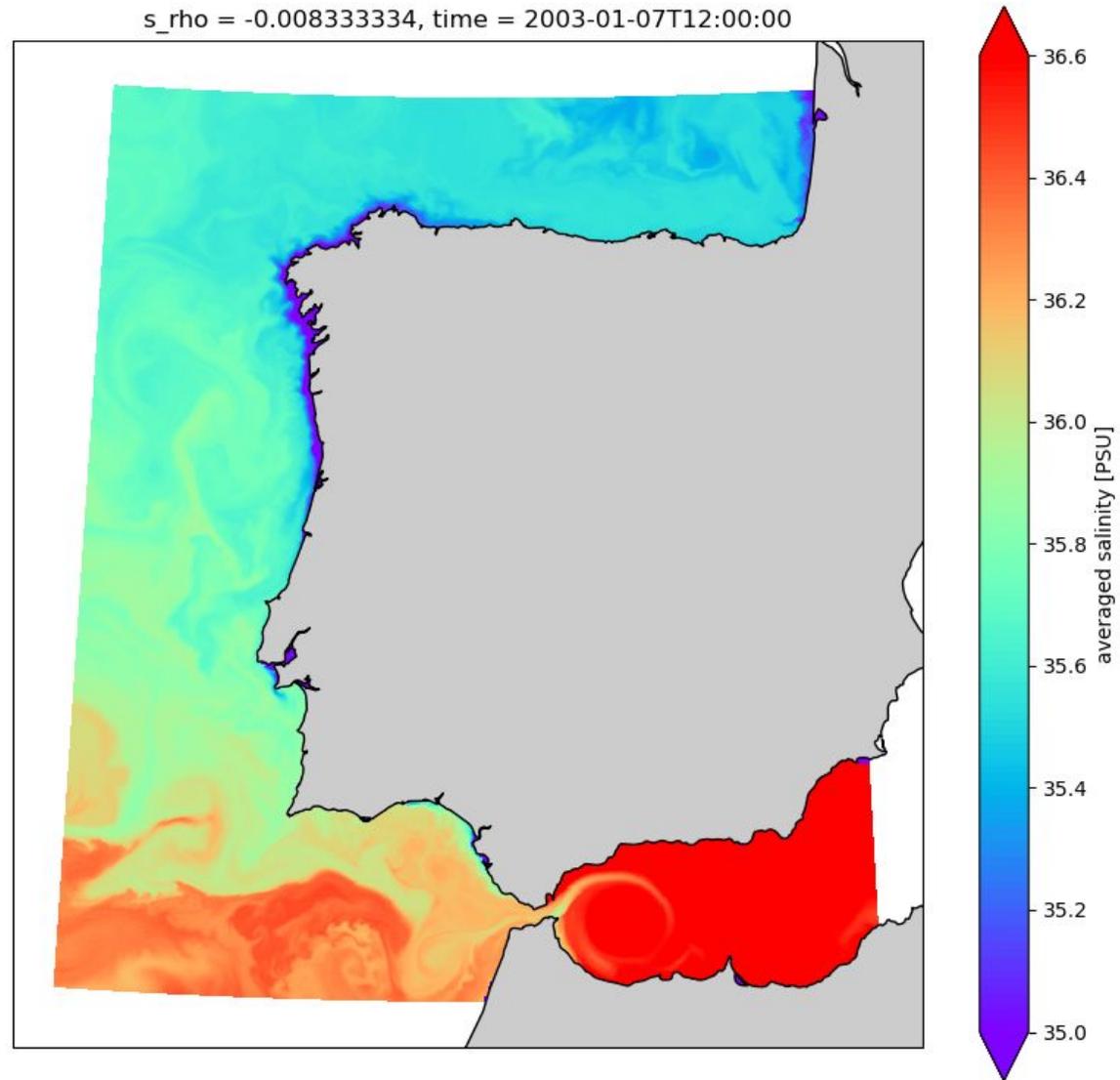
Temperature: SST value obtained from satellite images, in the pixel just outside of the estuary mouth

Salinity: average value characteristic of river plumes

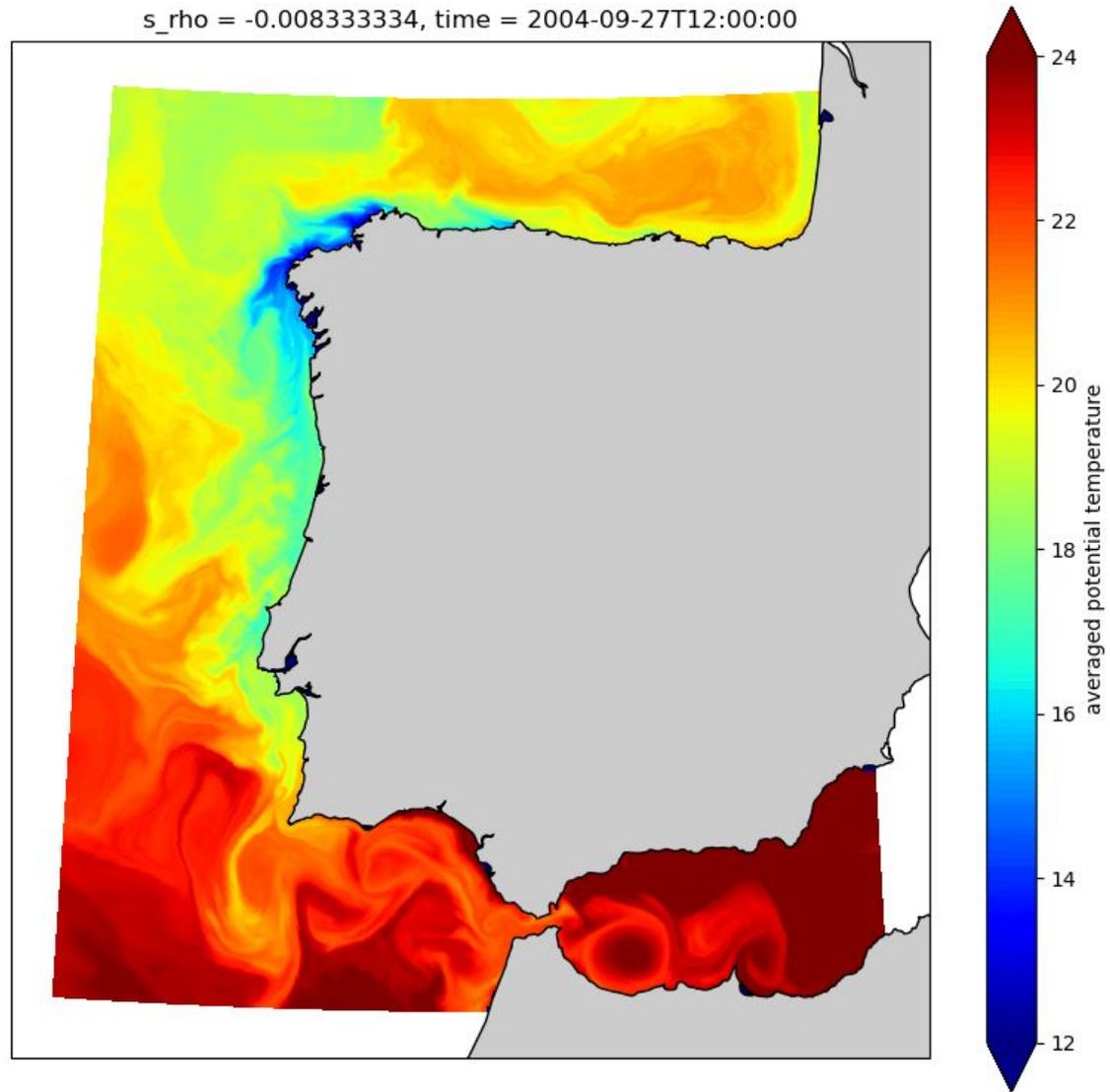
Impact of these properties will be analysed

Some outputs

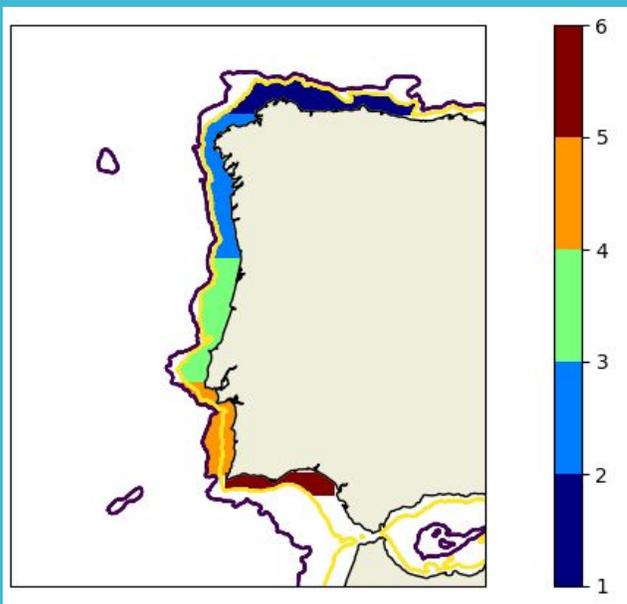
Some outputs



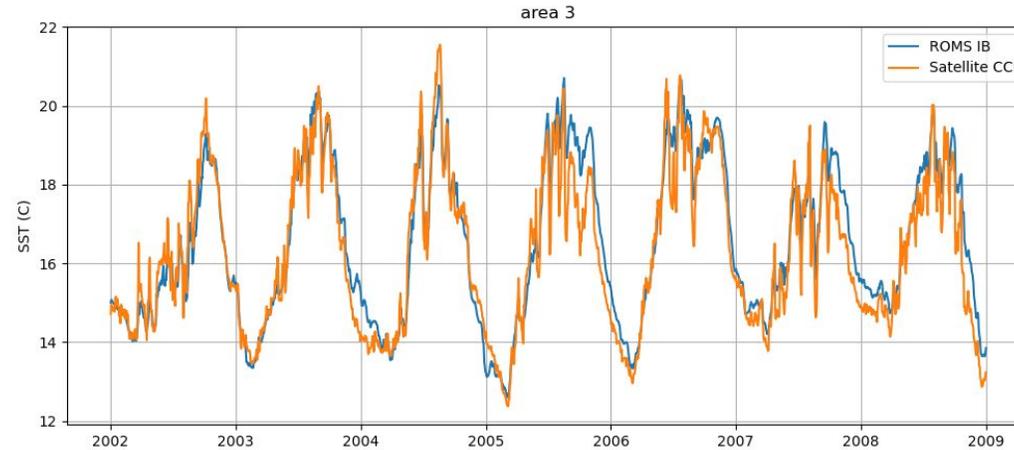
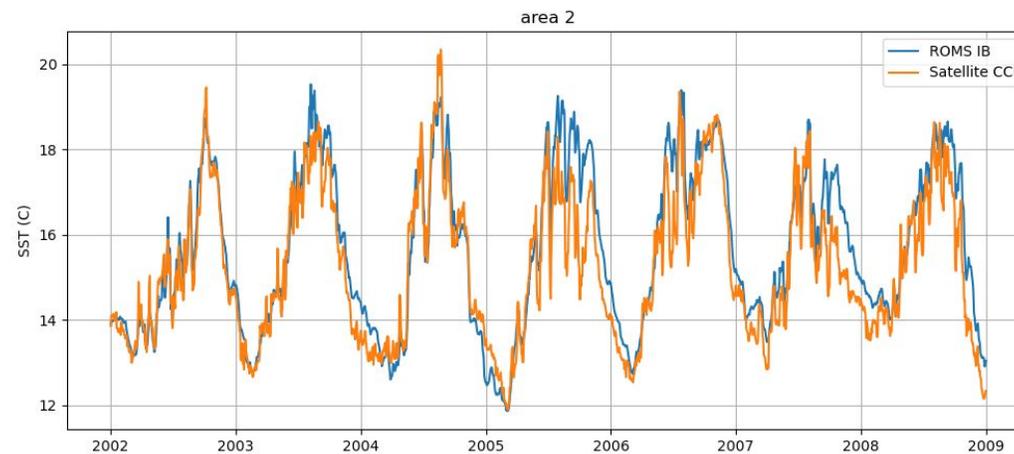
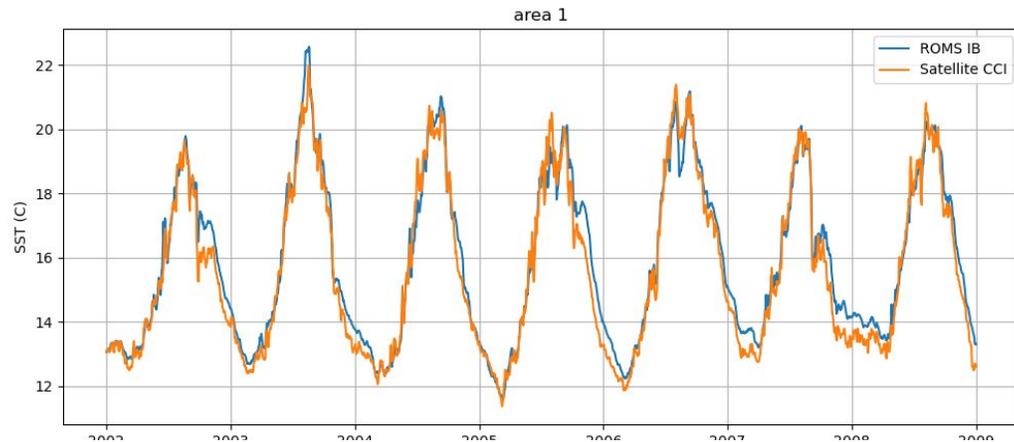
Some outputs



Comparison with Satellite SST

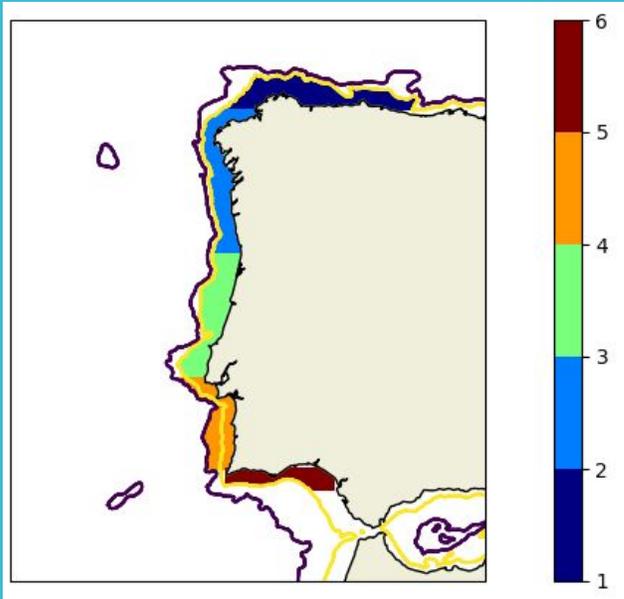


hBat (300, 1200m)

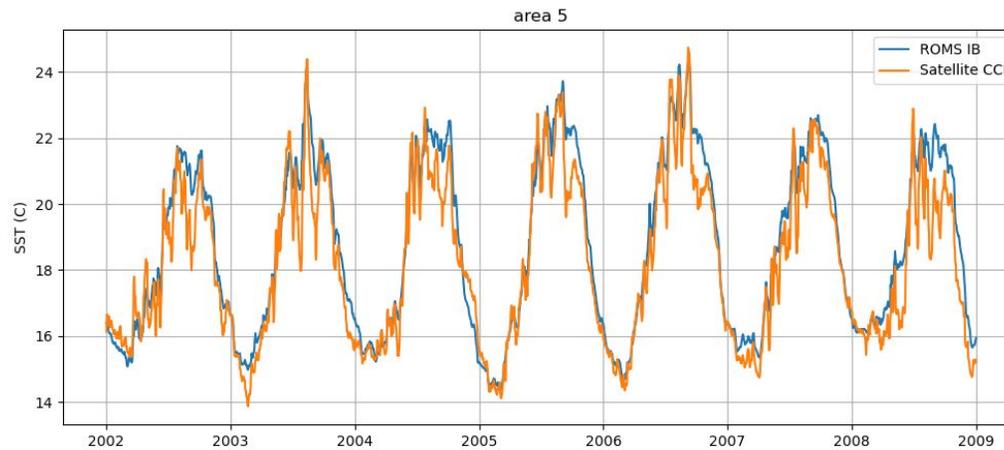
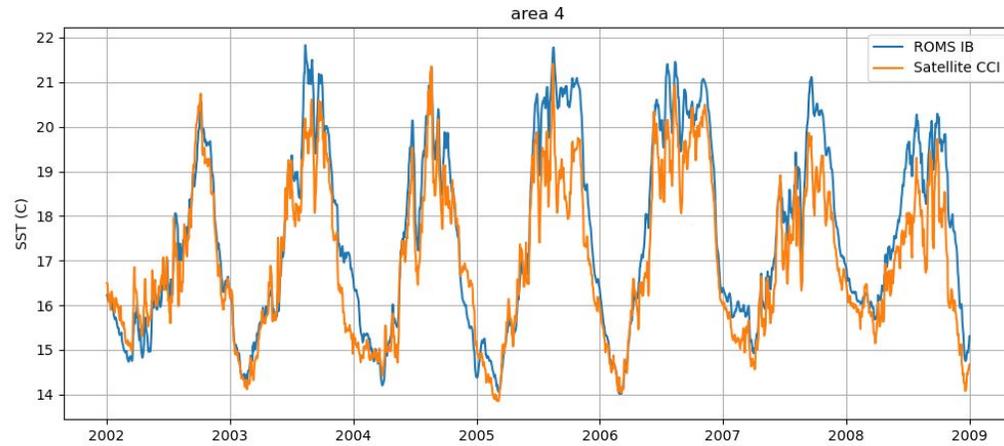


SST Satellite Data:
ESACCI-GLO-SST-L4 (CMEMS)

Comparison with Satellite SST



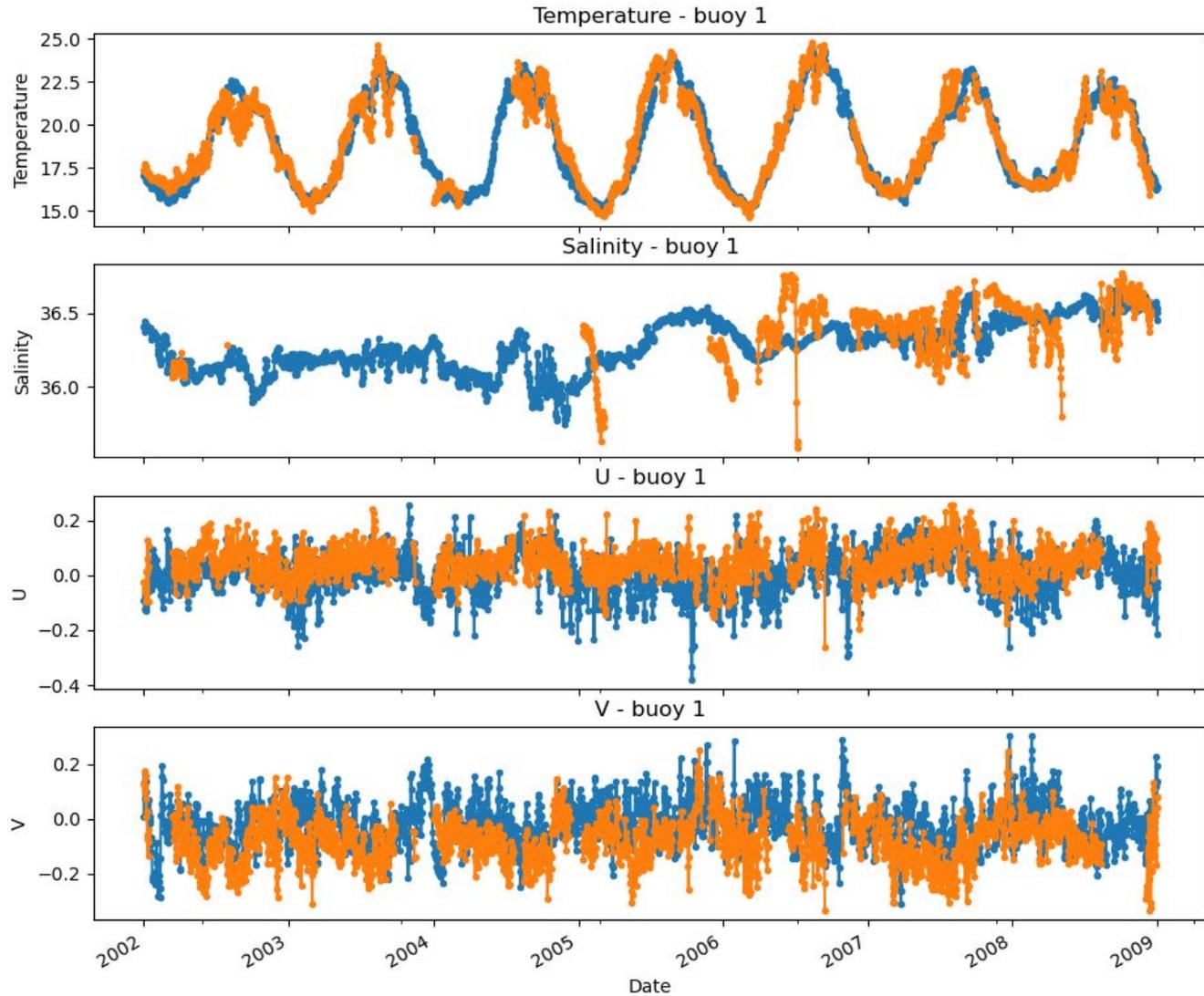
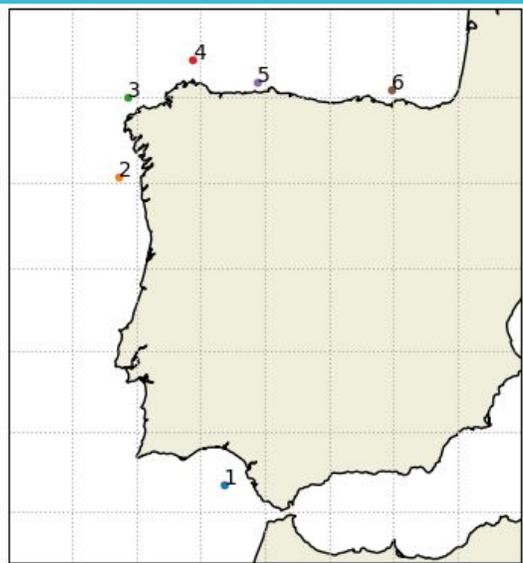
hBat (300, 1200m)



SST Satellite Data: ESACCI-GLO-SST-L₄ (CMEMS)

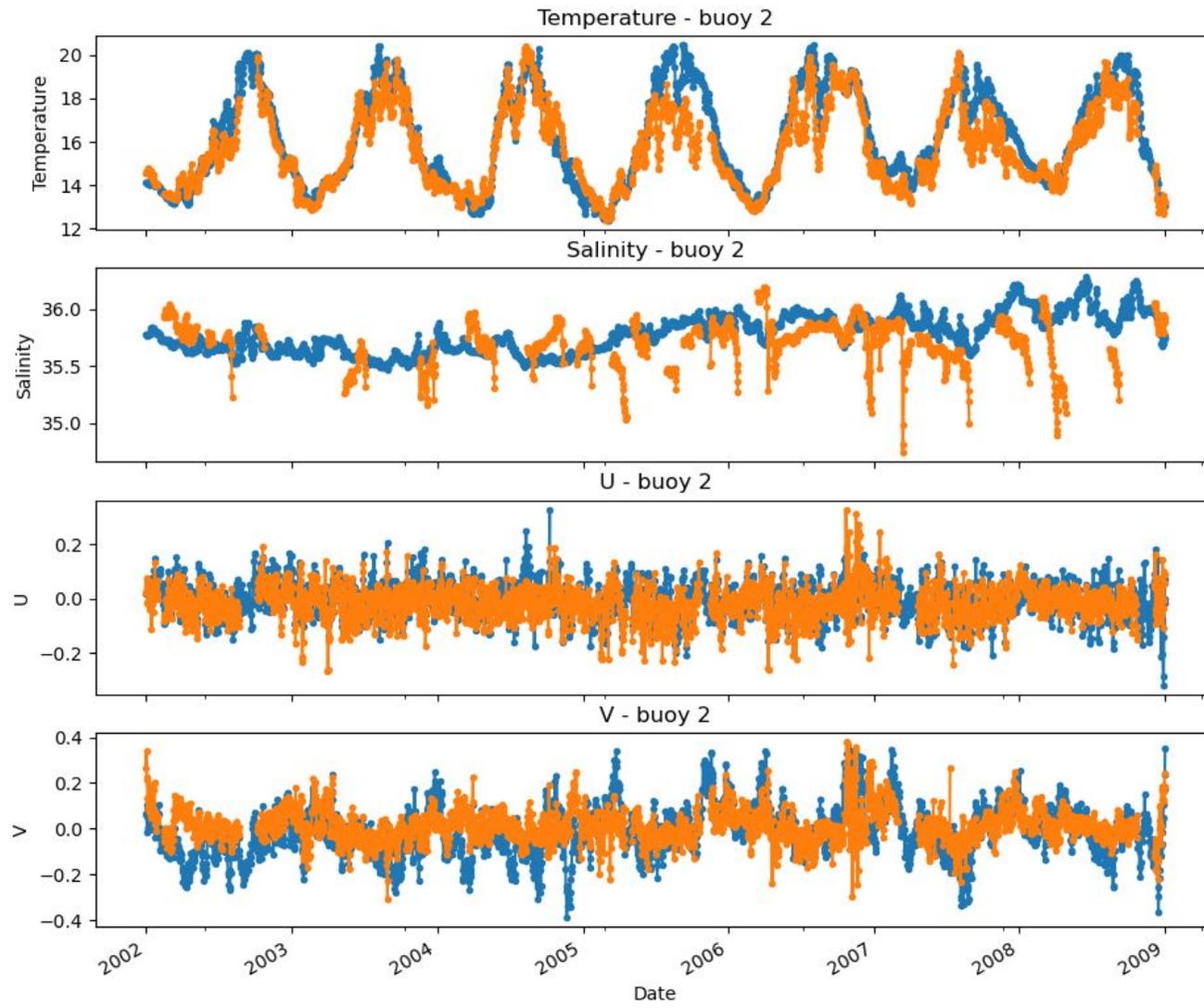
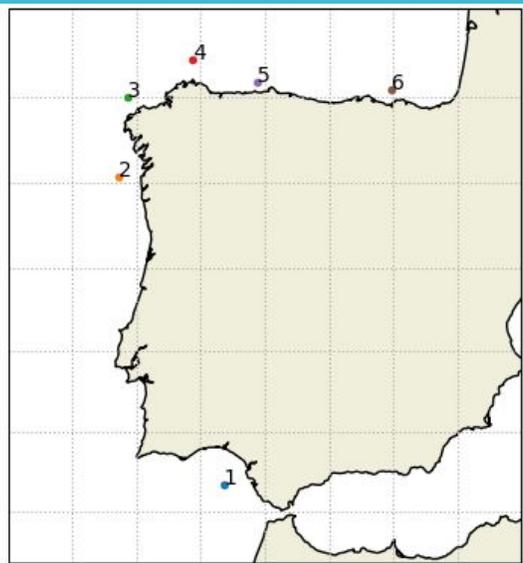
Significant discrepancy in the summer of 2005 (ERA5? Satellite data?)

Comparison with Multiparametric Buoys (3m depth)

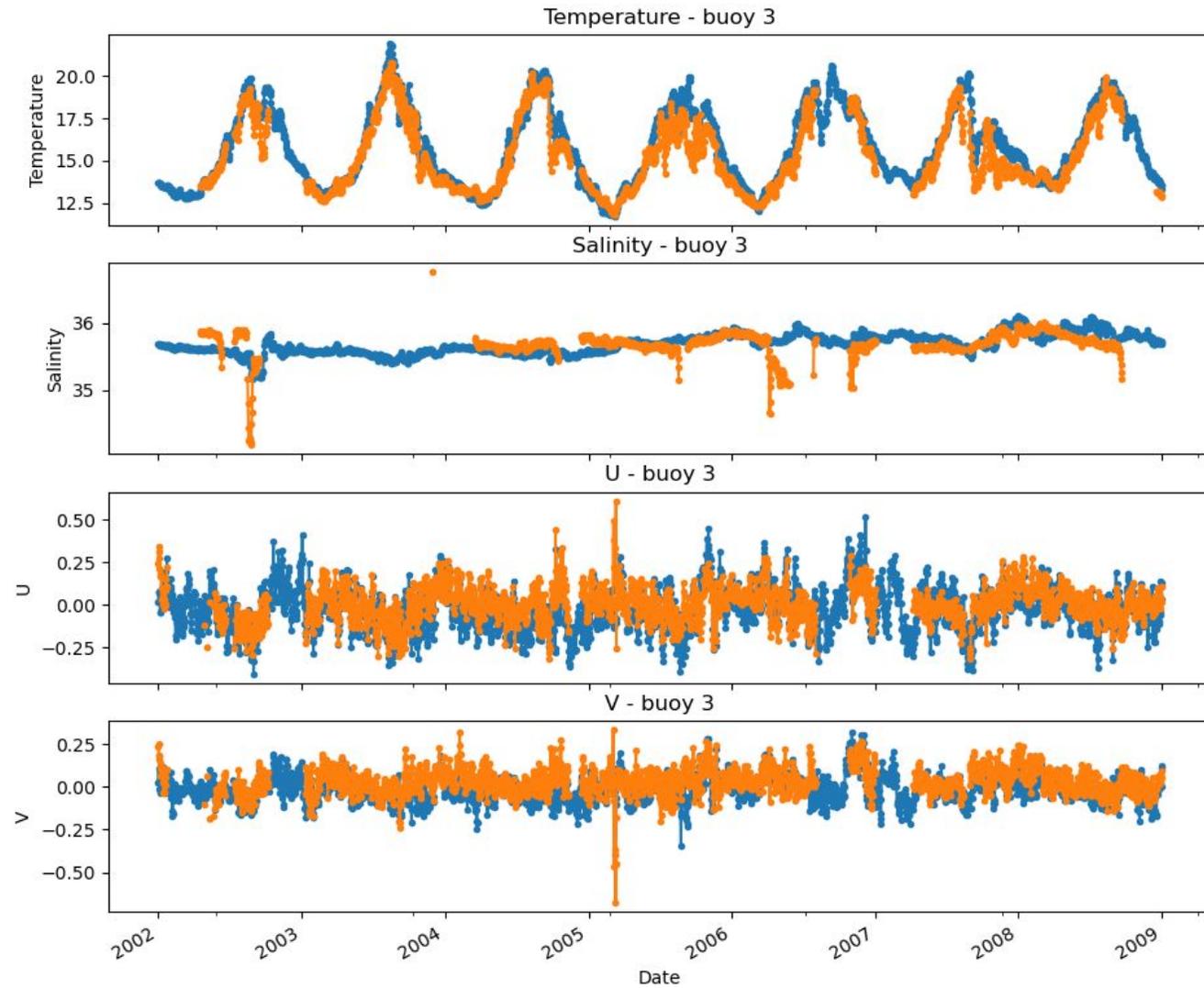
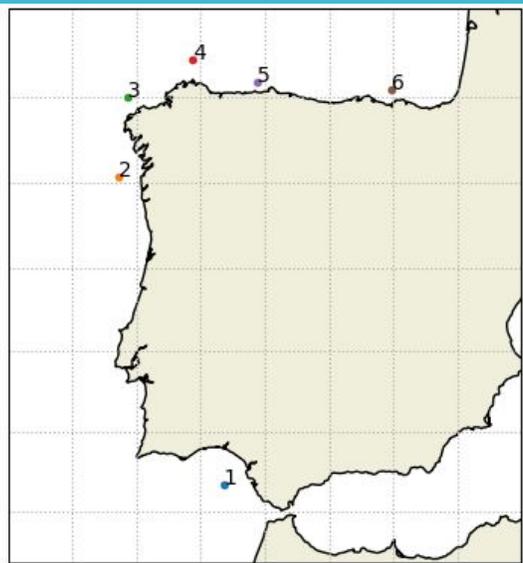


Buoy data were provided by the Spanish Public Agency of Marine Affairs, Puertos del Estado, downloaded from EMODNet

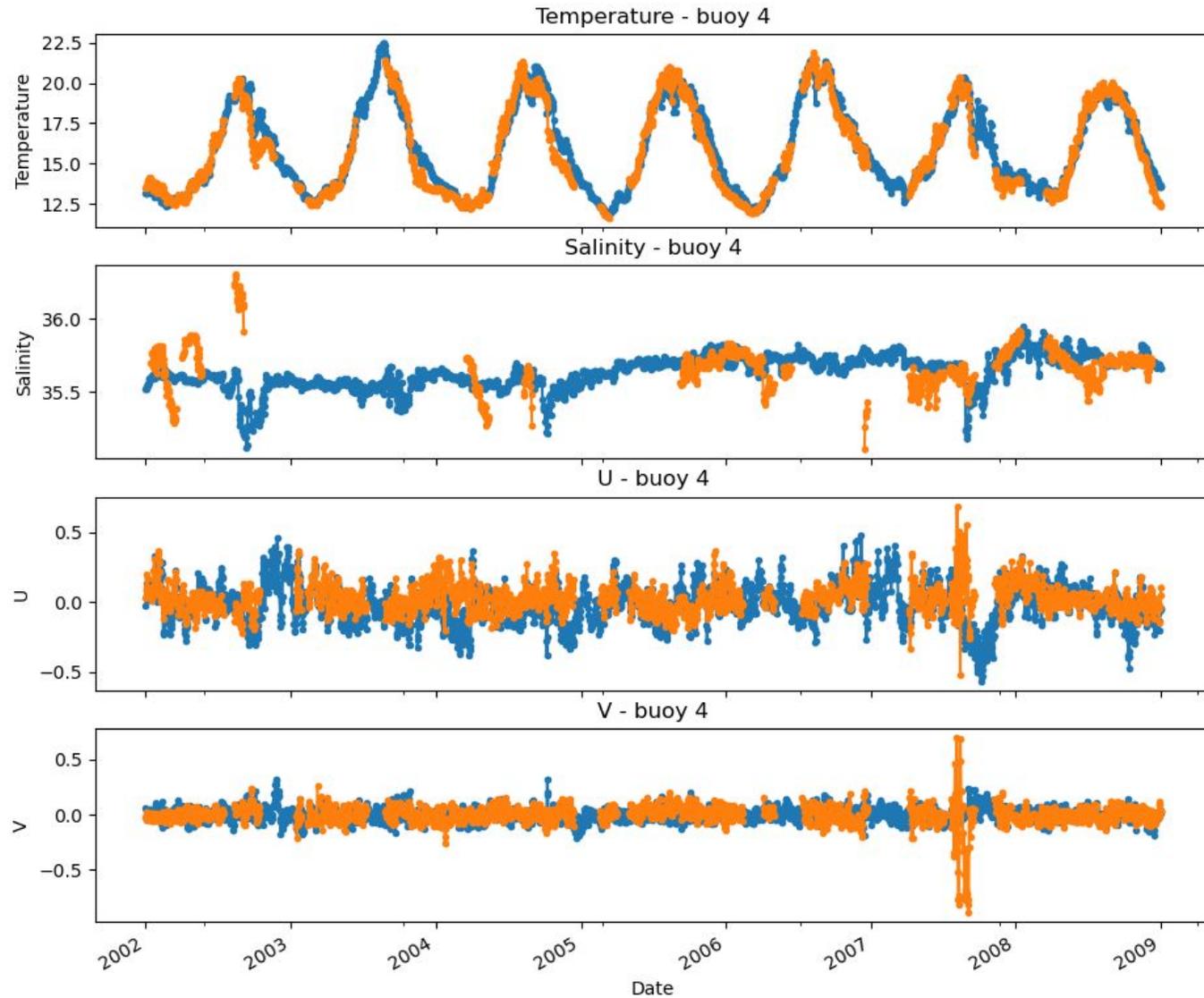
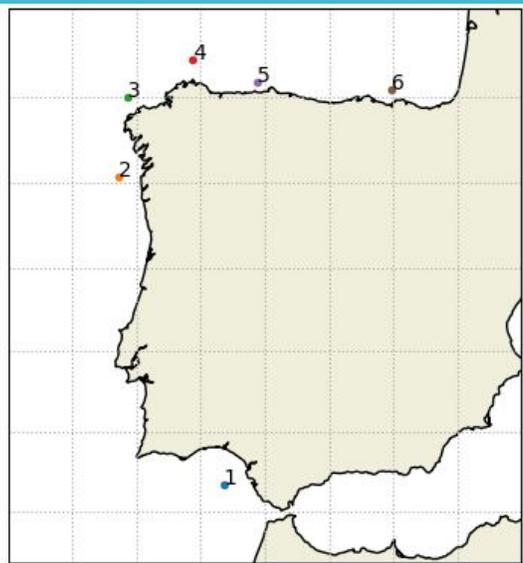
Comparison with Multiparametric Buoys (3m depth)



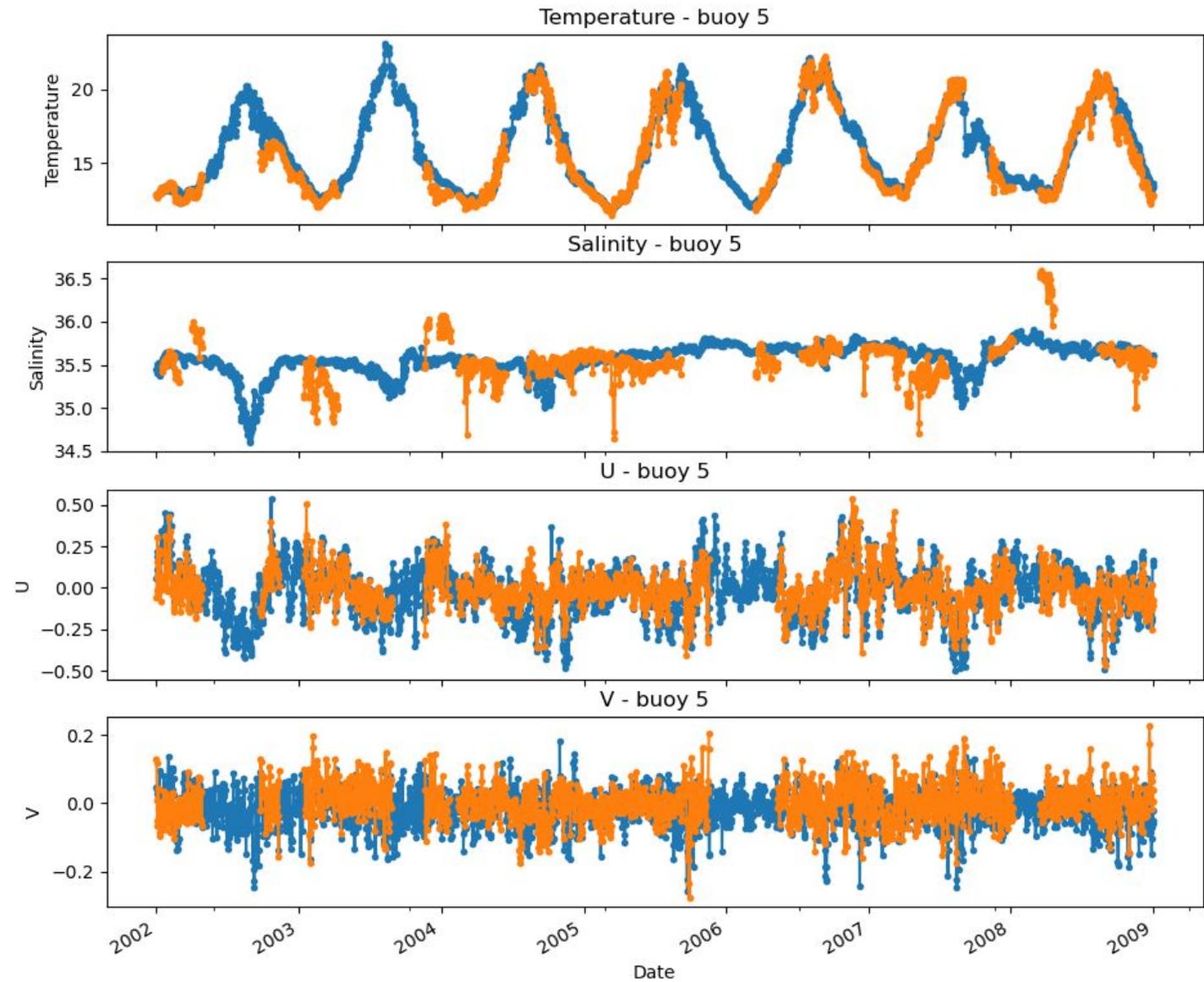
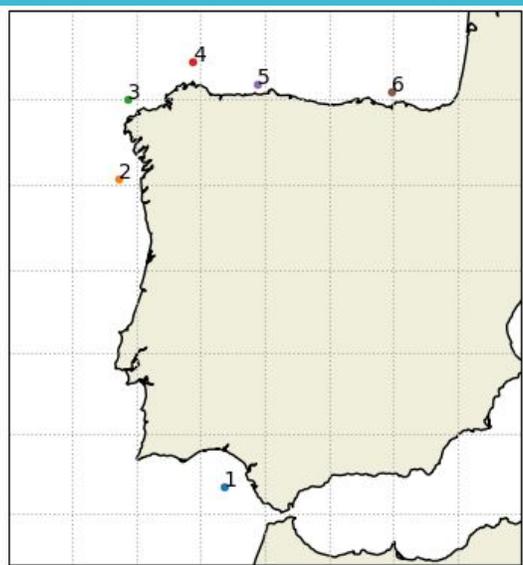
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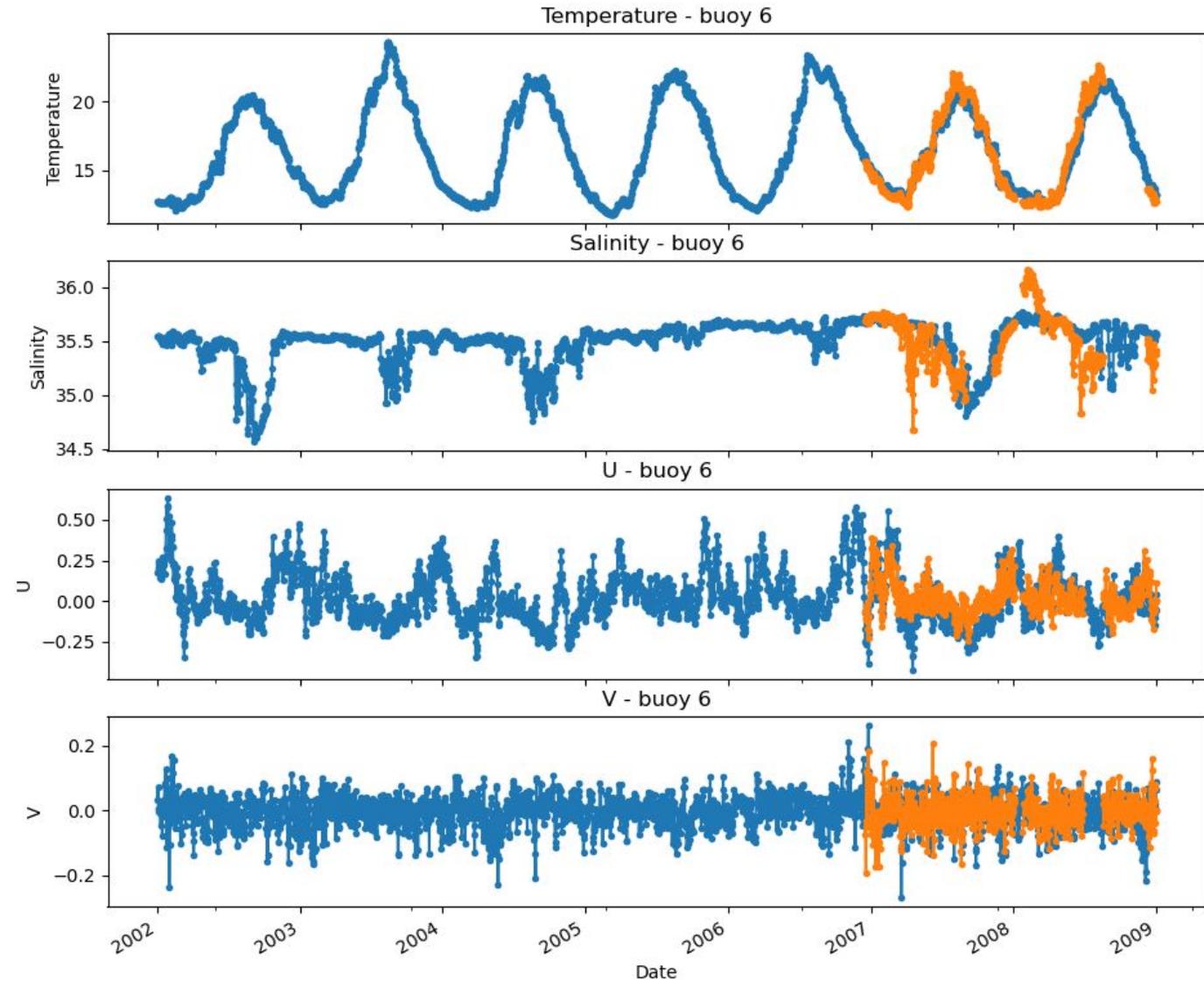
Comparison with Multiparametric Buoys (3m depth)



Comparison with Multiparametric Buoys (3m depth)



Comparison with Multiparametric Buoys (3m depth)

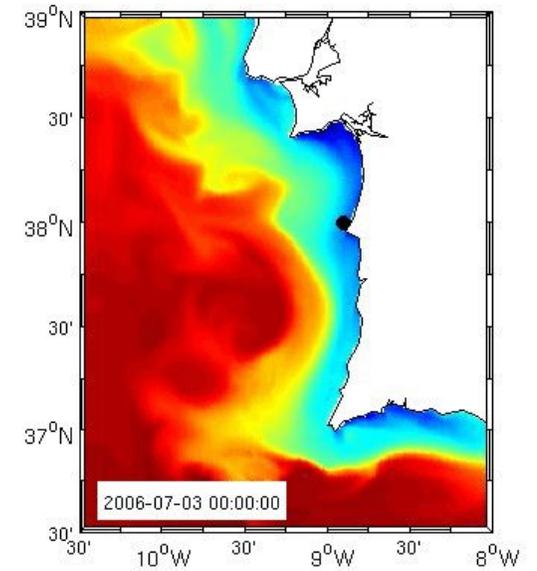


Applications

- Studying the interannual variability of the Iberian Current System and its forcing mechanisms
- Identification and analysis of extreme events
- Dispersal studies, of fish larvae, pollutants, water masses, etc



Sardine (*Sardina pilchardus*) larval – Coupling Individual Based Model of Sardine Eggs and Larvae to ROMS model outputs



Acknowledgements

- We acknowledge SARDINHA2020 (MAR2020) and ROADMAP (JPIOCEANS/0001/2019)