Processes analysis from EOF analysis of SMOS salinity data in the North Atlantic Ocean

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Introduction

Sea Surface Salinity (SSS) is measured by the Soil Moisture and Ocean Salinity (SMOS) satellite mission, allowing to obtain an unprecedented spatial and temporal coverage. We use DINEOF (Data Interpolating Empirical Orthogonal Functions) to remove noise and errors from the SMOS SSS data.
The aim of this work is to analyse the SMOS SSS data from the noise and errors are detected and remove with DINEOF at the highest temporal and spatial resolution.

Materials and Methods

DINEOF [1, 2] : Calculate daily SSS fields with low noise and reduced error with an EOF-based reconstruction of the missing data in a geophysical dataset. It uses a truncated EOF basis to infer the missing data.

SMOS Level 2 Ocean Salinity User Data Product (UDP) version 5.50, (ESA for 2013) target accuracy of ∼0.2 over 100 km^2 30 days [3]. SSS is derived through the relation between brightness temperature (BT) and sea surface temperature (SST).

Chlorophyll MODIS (weekly, 4 km) (or Moderate Resolution Imaging Spectroradiometer) Aqua satellites.

Colored dissolved organic matter (CDOM) (monthly, 4 km) MODIS-Aqua 4-km monthly average data.

Net Primary Production (NPP) Vertically Generalized Production Model (VGPM) [4]: 'chlorophyll-based' model estimates NPP from chlorophyll (MODIS-Aqua) using temperature-dependent (SeaWIFS) describe chlorophyll-specific photosynthetic efficiency [5].

Conclusion

1. DINEOF allow to remove bias and error and give a full data set for SSS.
2. In future apply DINEOF for other year and include other parameter to extract more information about the processes observed.

Salinity variability

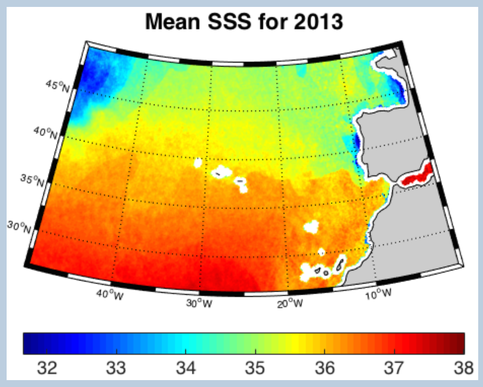

Figure 1: Mean SSS for the year 2013.

1. Bias and Error are remove and reduce from the SSS SMOS measurement with DINEOF method.
2. Estimation of the SSS in the basin : SSS pattern well represent
3. High SSS in the South, low SSS in the North West and Low salinity near the river : Douro and Garonne
4. SSS range between 32 and 38.

Rivers Impact

The goal is to understand the processes with highest temporal and spatial resolution for SSS data in correlation with other parameters.

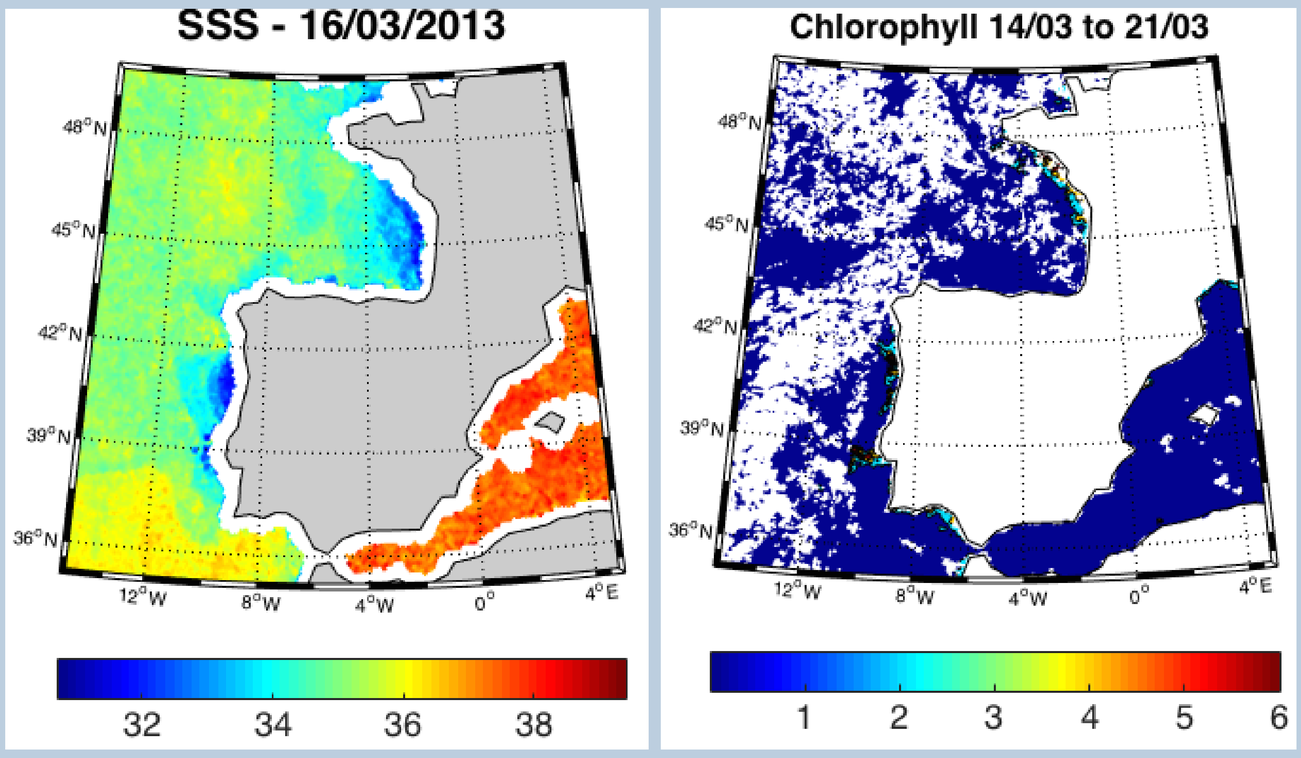

Figure 2: Daily SSS ; Mean weekly Chlorophyll

Lower salinity and higher chlorophyll are observed at the mouth of the two rivers : Garonne and Douro. The river flow are maximum between December to June for the Garonne and between December to March for the Douro. Lower salinity correlate with higher chlorophyll and NPP during this period (Figure 3a and b), and the CDOM decrease during this period.

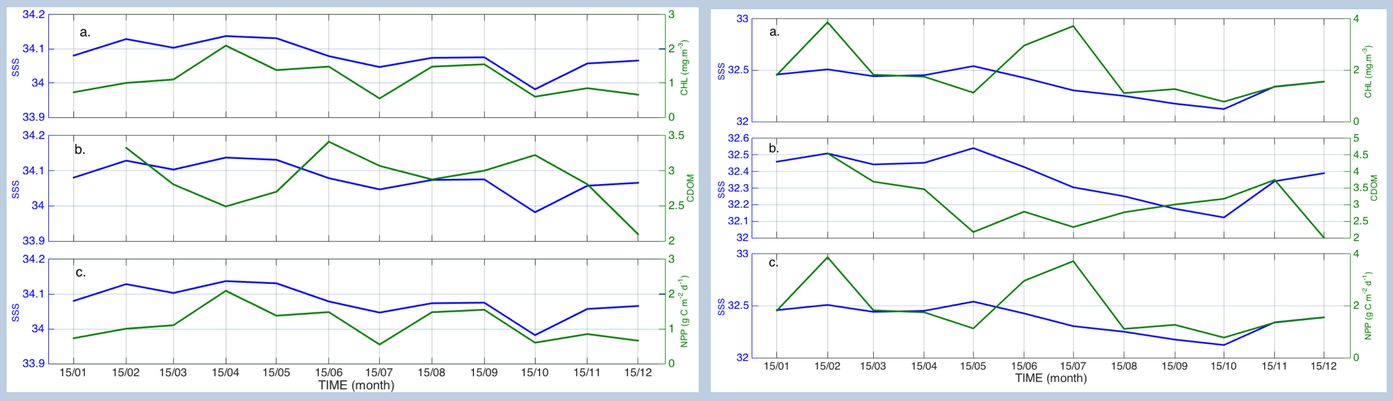

Figure 3: Evolution of SSS, Chlorophyll, CDOM, NPP at the mouth of the DOURO river (left); GARONNE (right)

References

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Acknowledgements

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