COOL

CARBON FROM EARTH OBSERVATION BETWEEN OCEAN AND LAND

WWW.COASTALCARBON-COOL.ORG

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COOL aims to address limitations in satellite observations of coastal ocean by further developing satellite retrieval algorithms for different carbon pools and fluxes at high spatial and temporal resolution to improve understanding of highly dynamic coastal processes. **COOL** will deliver a harmonised coastal carbon EO dataset for DOC, POC, Primary production and PIC **daily at 300 m from OLCI and 60 m from MSI** in selected areas.

Coastal carbon processes

Bauer et al. (2013)
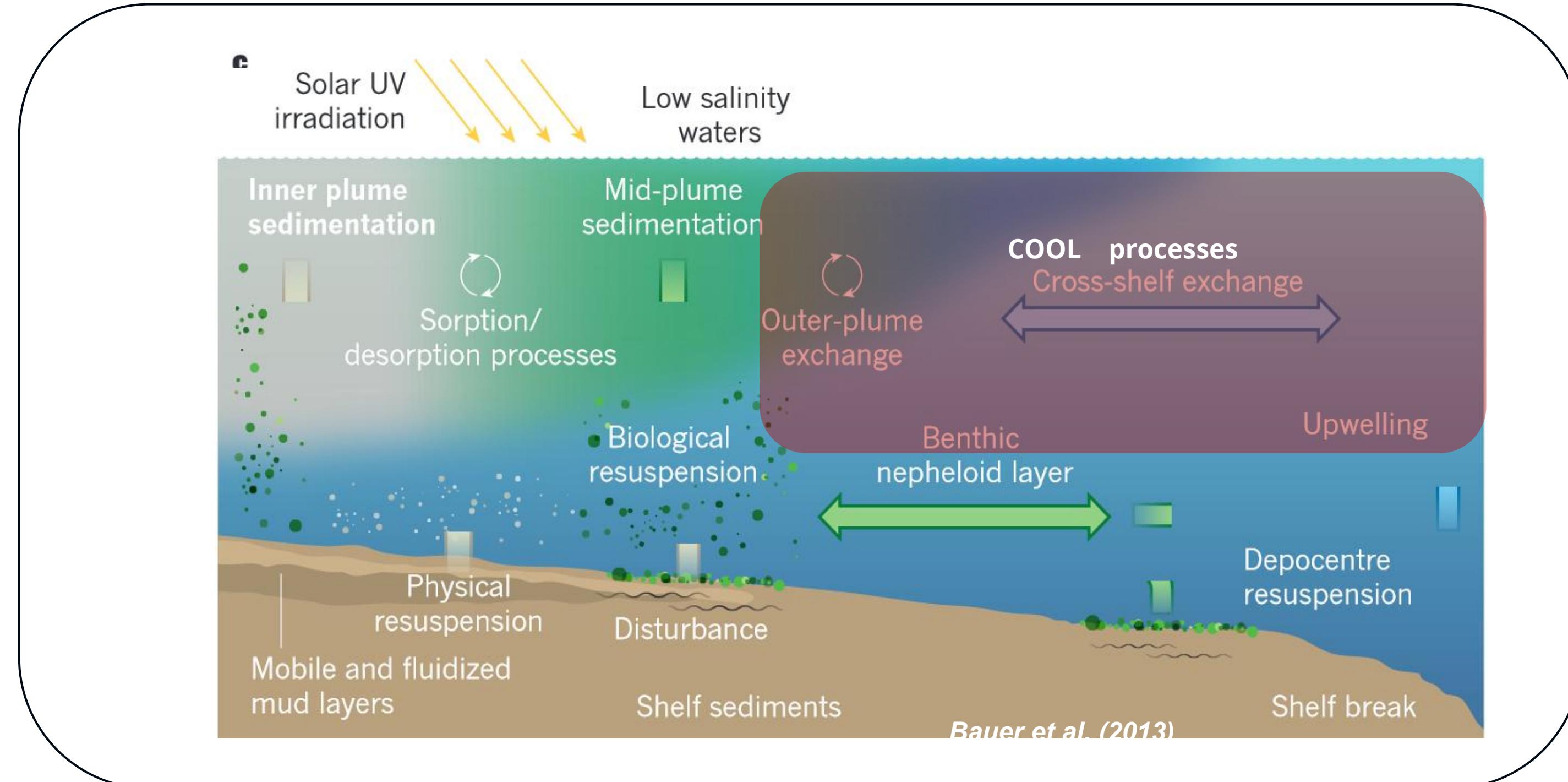
Case studies
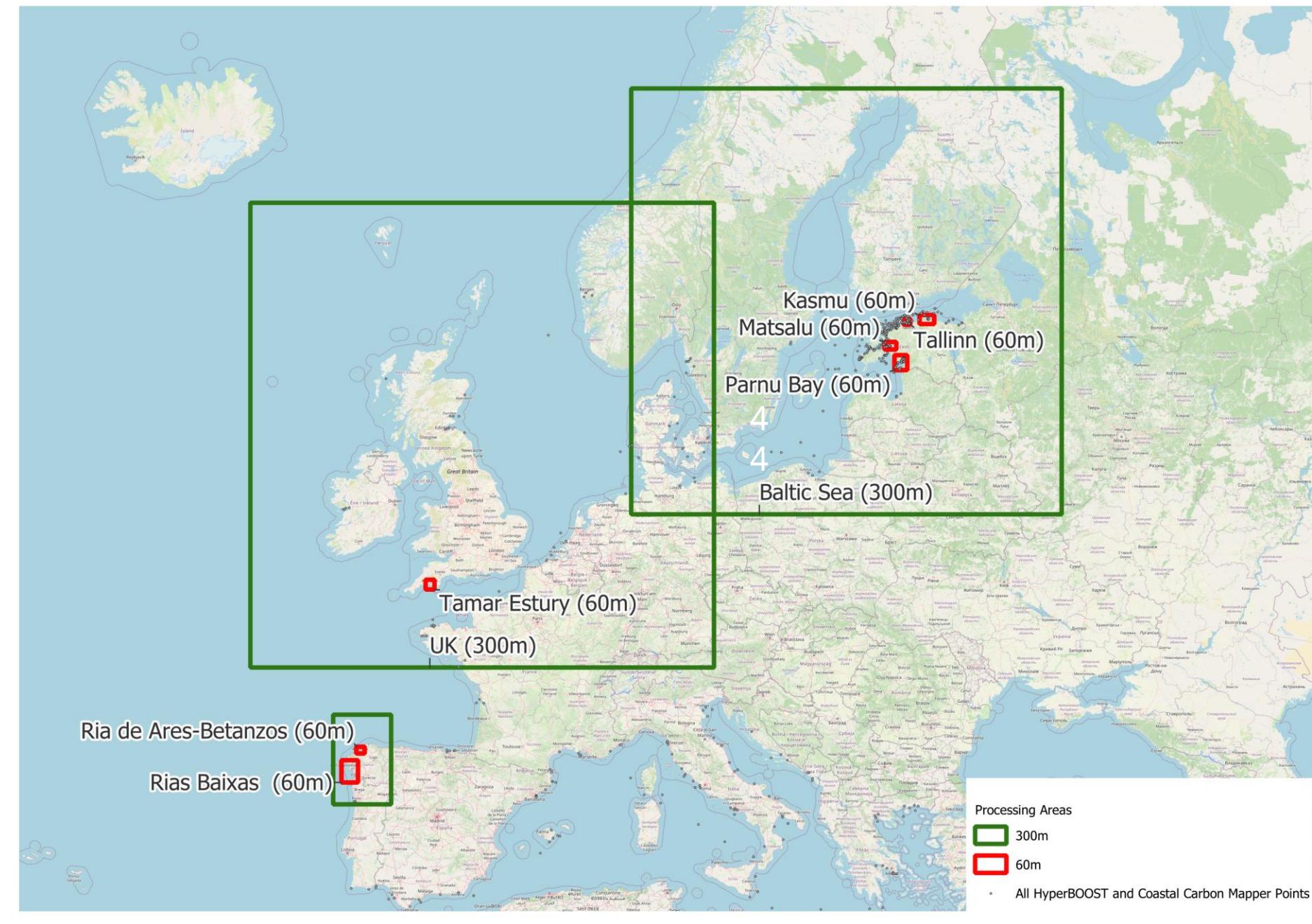
Carbon algorithms

Dissolved organic Carbon (DOC)

Sentinel-3 OLCI — Model: Linear Regression, Regressor: S3_665/(S3_490+S3_620); R^2: 0.67, RMSE: 1.61, MAPE: 17.5%, Bias: -0.0004, N: 103

Sentinel-2 MSI — Model: Random Forest, Regressor: S2_665/S2_560; R^2: 0.62, RMSE: 1.73, MAPE: 18.4%, Bias: 0.0455, N: 103

Particulate Organic Carbon (POC)

Stramski et al. (2023)

Primary production (PP)

S2-MSI; S3-OLCI

Primary Production

Smyth, Tilstone, Groom (2005)
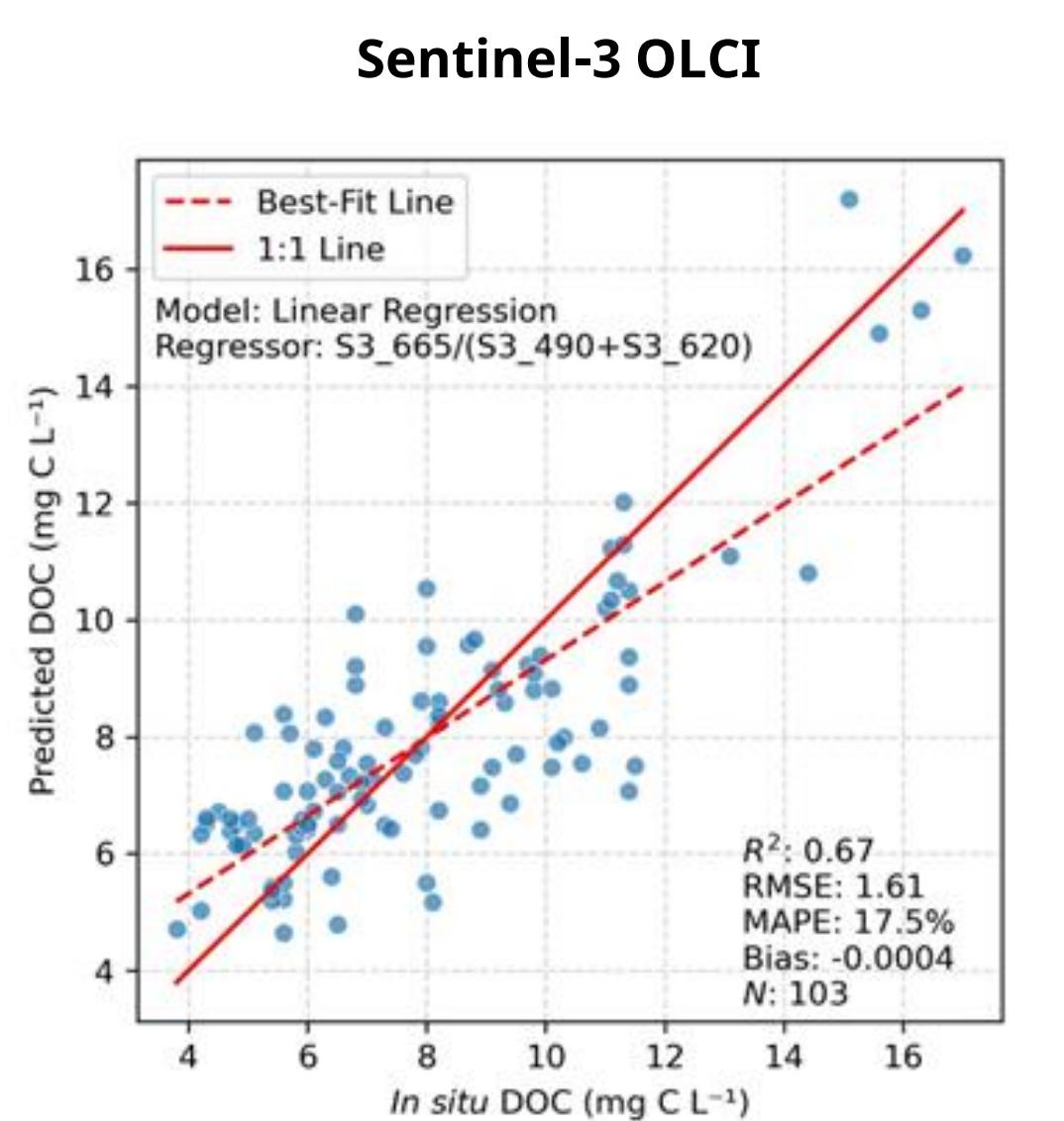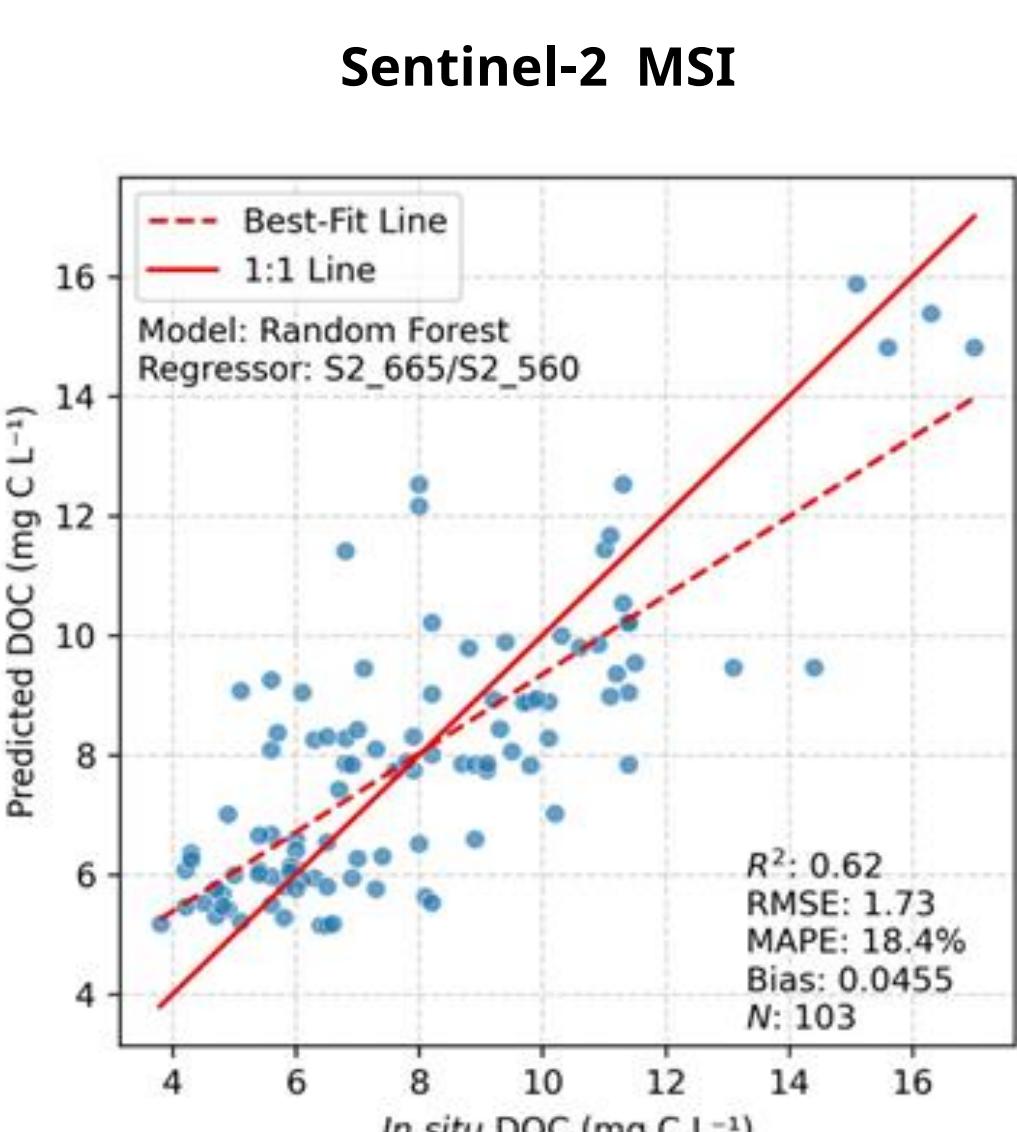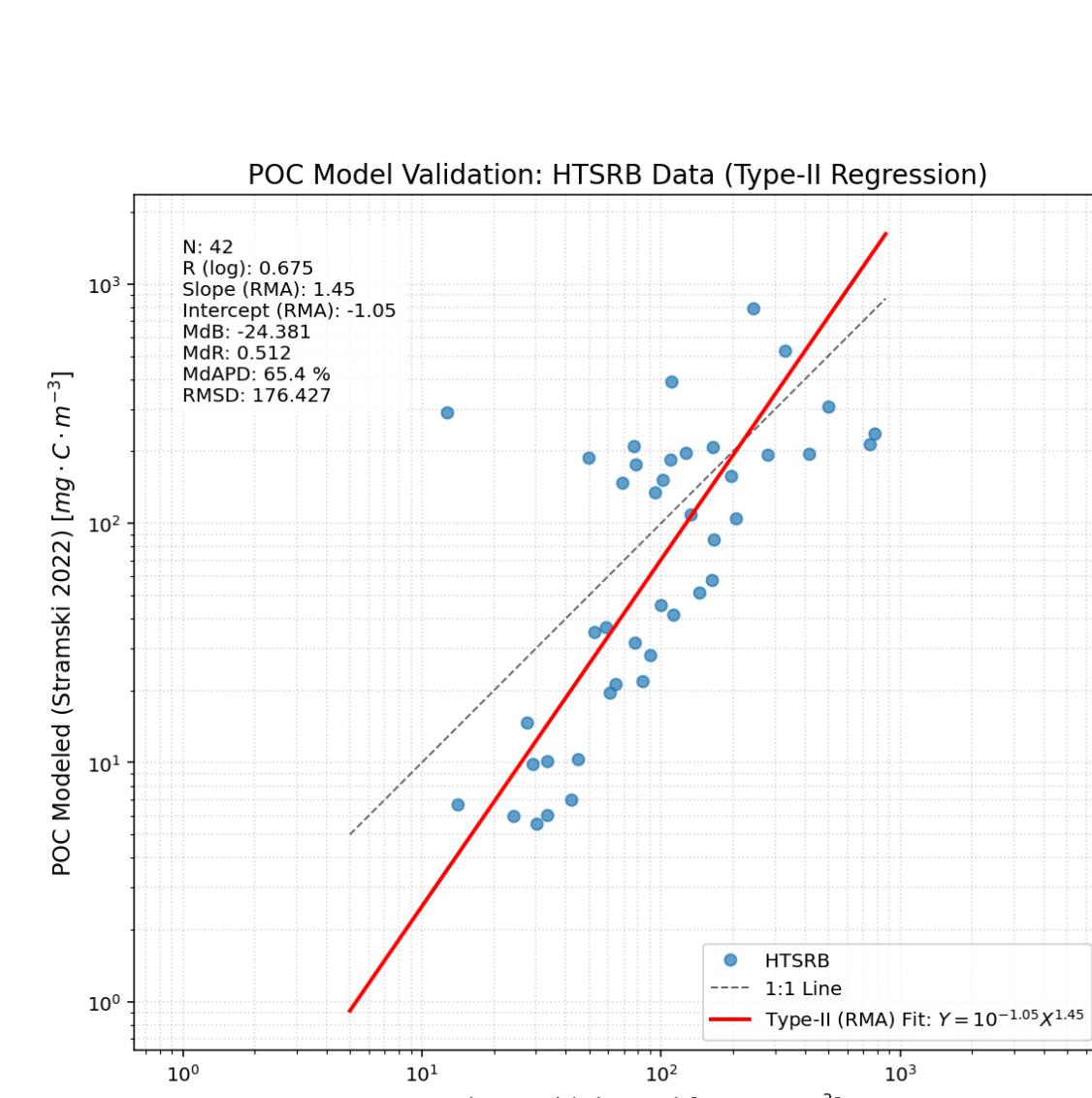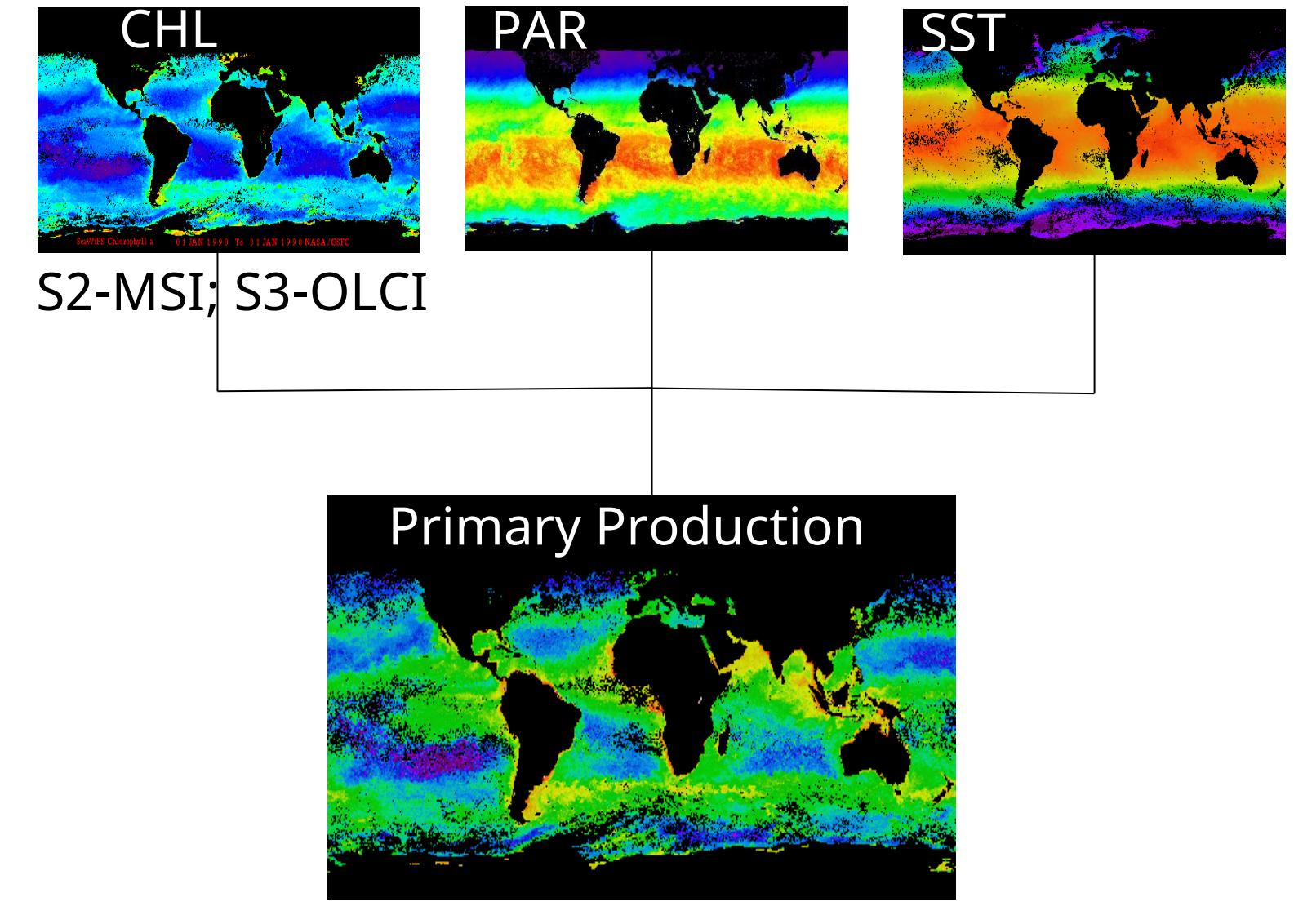
Carbon products

Dissolved organic Carbon (DOC)

OCCCI 4Km Galician Rias (NW Spain) — 09.2019

S2-MSI 60 m — 21 May 2024 — Matsalu Bay (Baltic Sea)

Particulate organic Carbon (POC)

OCCCI 4Km Galician Rias (NW Spain) — 09.2019

S3-OLCI 300m — 01.09.2019-30.09.2019 — Galician Rias (NW Spain)

Primary production (PP)

S3-OLCI 300m — Primary production, 300m res., 18 Oct. 2016 — Galician Rias (NW Spain)

S2-MSI 60 m — pp_S05 - Date: 08.18.2016 Time: 00:00:00 — Galician Rias (NW Spain)
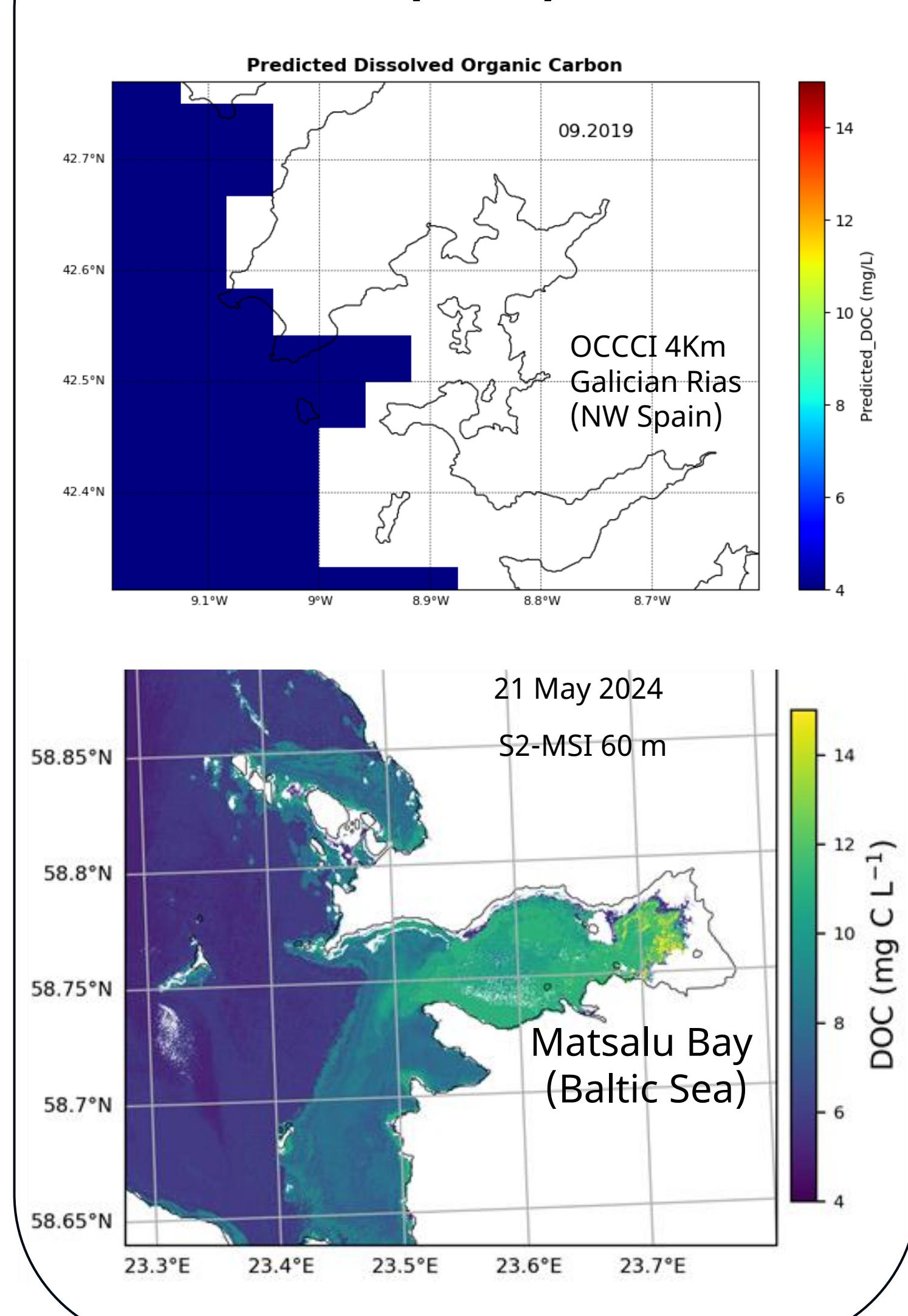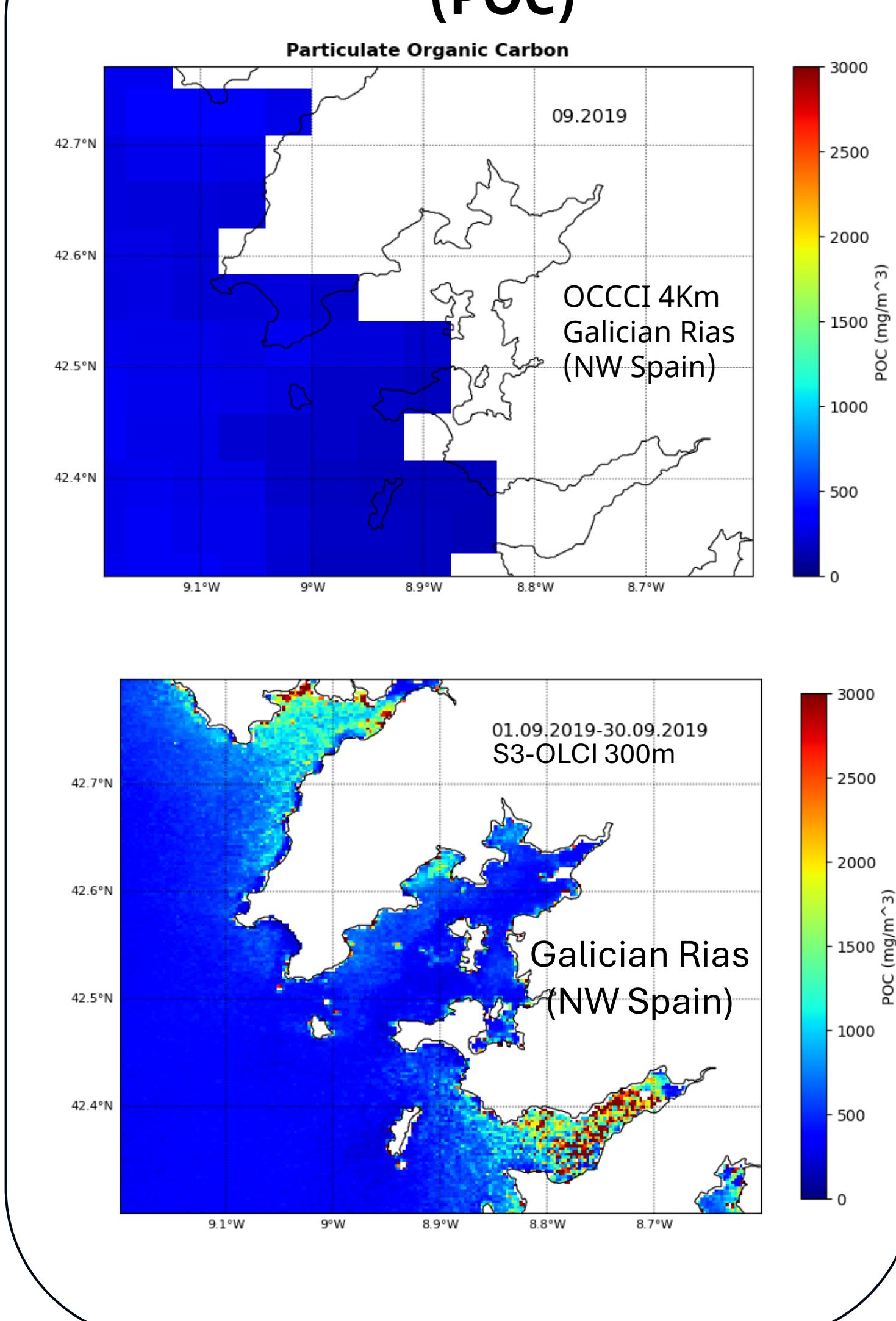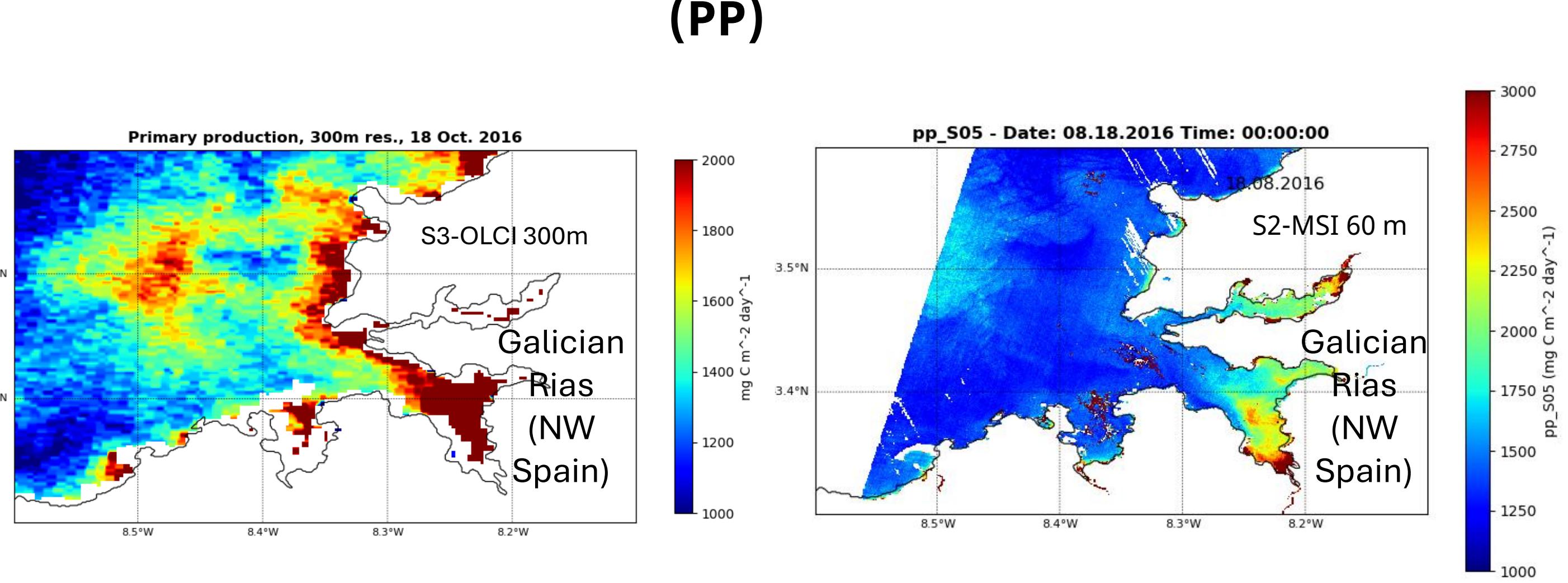
Recommendations

1-2 year:
• Assess uncertainties in EO-based coastal carbon products
• Investigate computation of C budgets in selected coastal areas.

5-year:
• Develop and deploy algorithms at global coastal ocean
• Investigate the contribution of plankton to coastal C

10-year:
• Investigate impacts of climate change through climate-quality datasets for the coastal ocean.

Next steps
• Production and validation of coastal carbon datasets for all regions
• Science case studies to improve understanding of carbon cycling in regions under river influence and regions with seasonal coastal upwelling

REFERENCES
Smyth, T. J., Tilstone, G. H., and Groom, S. B.: Journal of Geophysical Research: Oceans, 110, https://doi.org/10.1029/2004JC002784, 2005.
Stramski, D., Constantin, S., and Reynolds, R. A.: Remote Sensing of Environment, 286, 113360, https://doi.org/10.1016/j.rse.2022.113360, 2023.