BioSpace25 - Biodiversity insight from Space
10 - 14 February 2025 | ESA-ESRIN | Frascati - Italy

Biodiversity in Changing Terrestrial, Aquatic, and Marine Ecosystems: Calling for a Unifying Earth Observation Perspective

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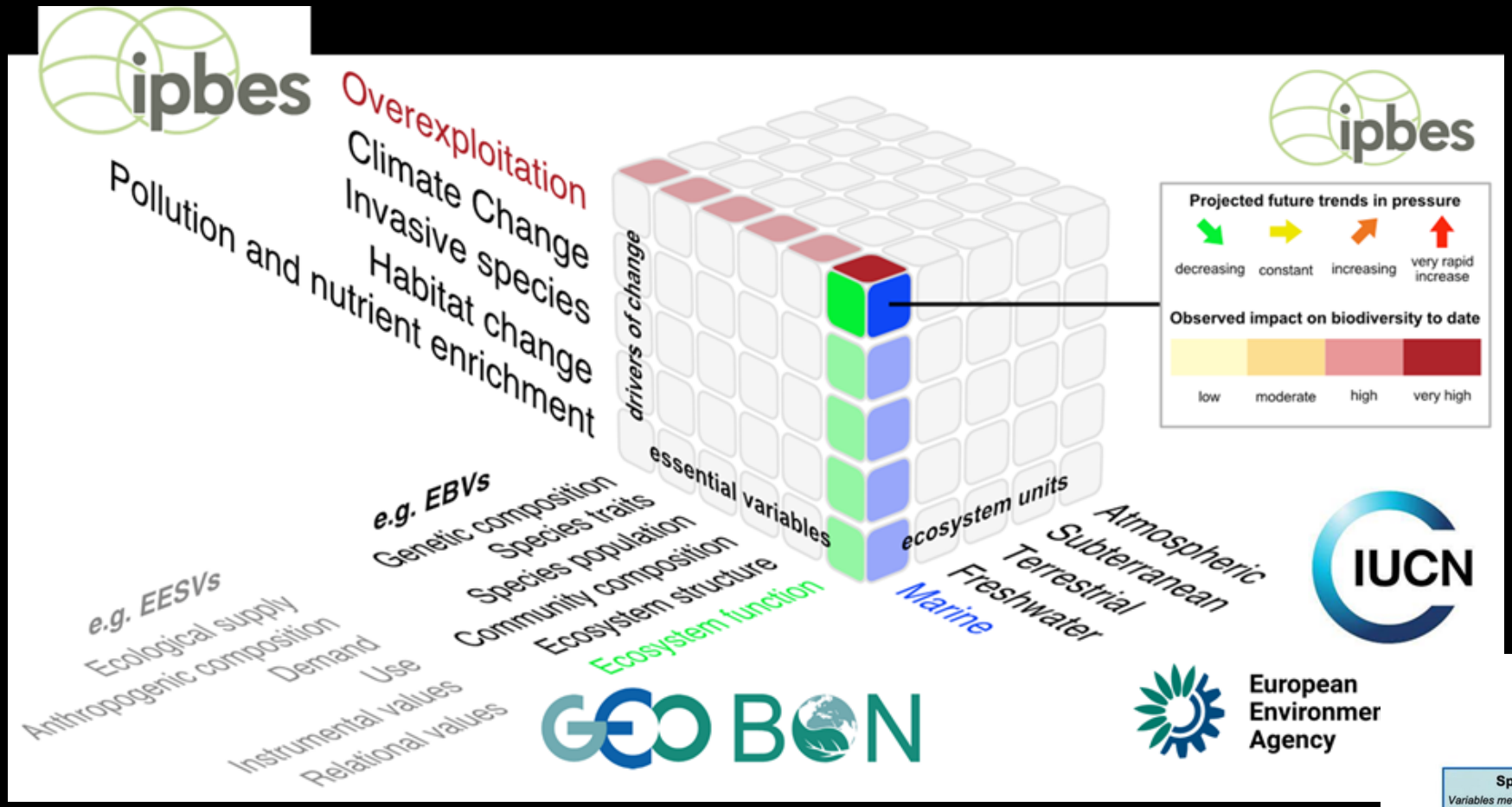
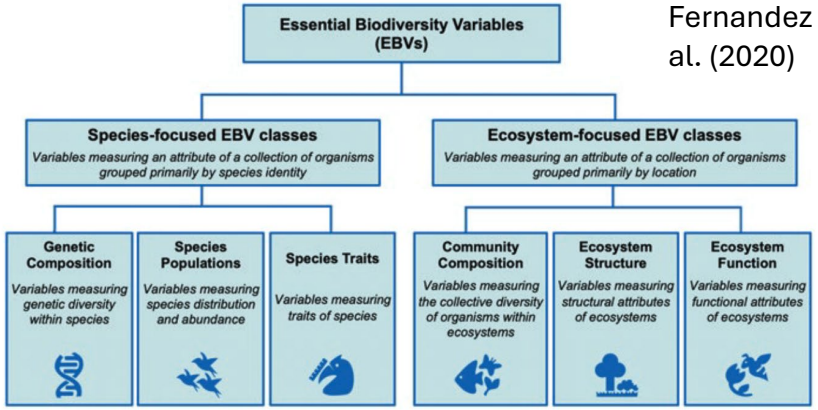
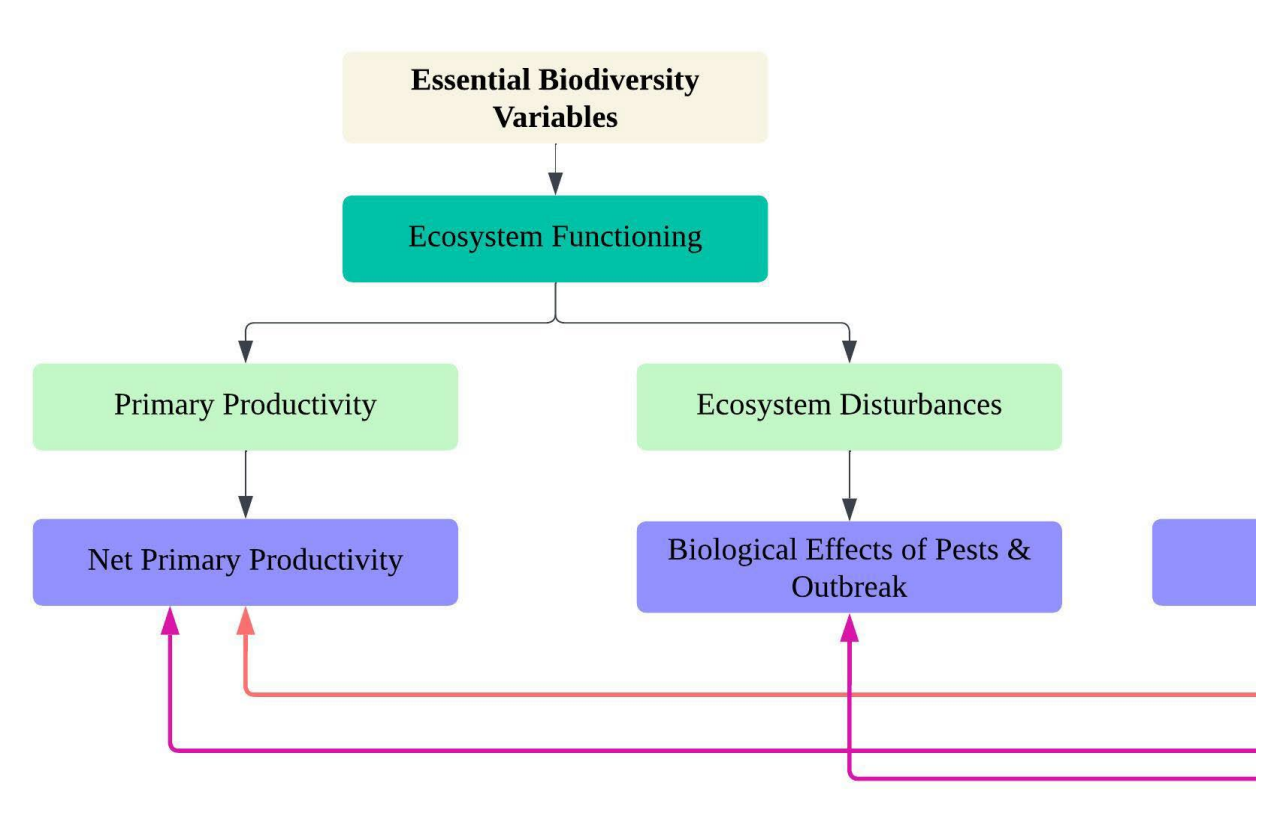
The Multi-dimensional Nature of Biodiversity Monitoring

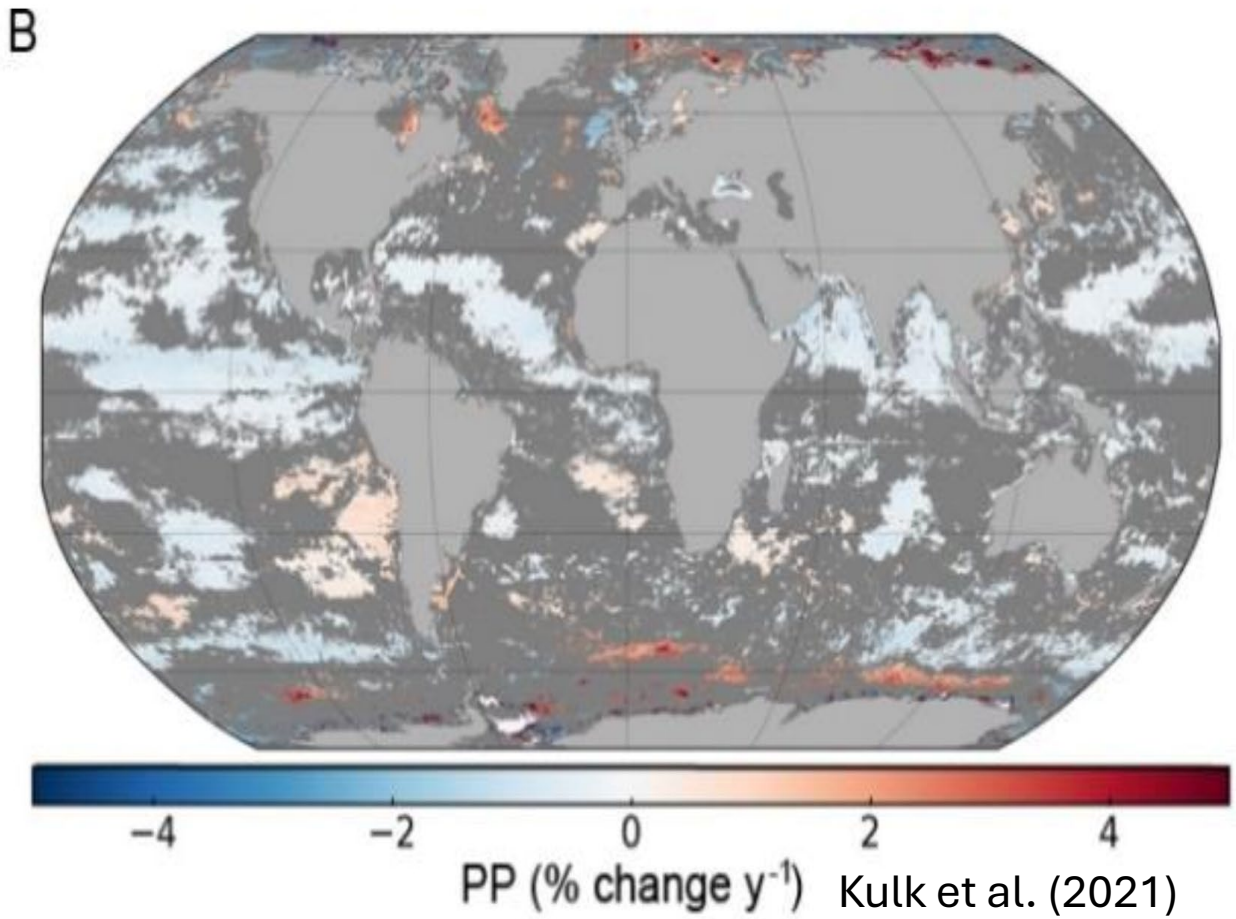




Fernandez et al. (2020)

Terrestrial - Ecosystem Functioning





Kulk et al. (2021)

Integrating Process-Based Vegetation Modelling with High-Resolution Imagery to Assess Bark Beetle Infestation and Land Surface Temperature Effects on Forest Net Primary Productivity [Under review]

Haidi Abdullah, Elnaz Neinavaz, Roshanak Darvishzadeh, Margarita Huesca Martinez, Andrew K. Skidmore, Mats Lindeskog, Benjamin Smith, Marco Heurich, Rainer Steinbrecher, & Marc Paganini

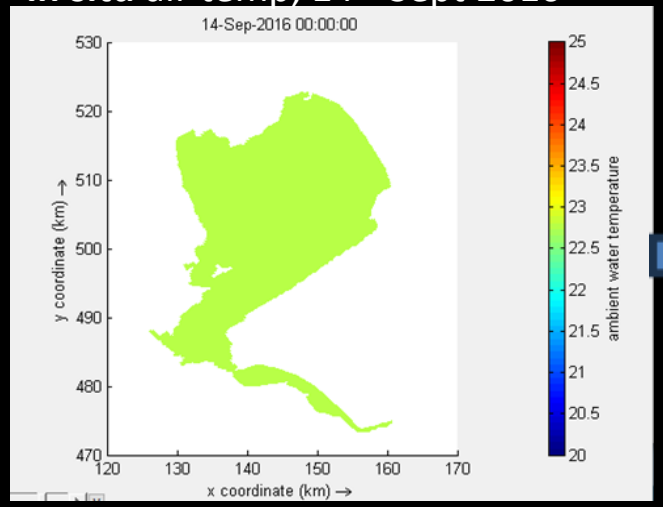
Freshwater - Ecosystem Functioning

Improved estimation of primary production (PP) by combining in situ, EO and modelling.

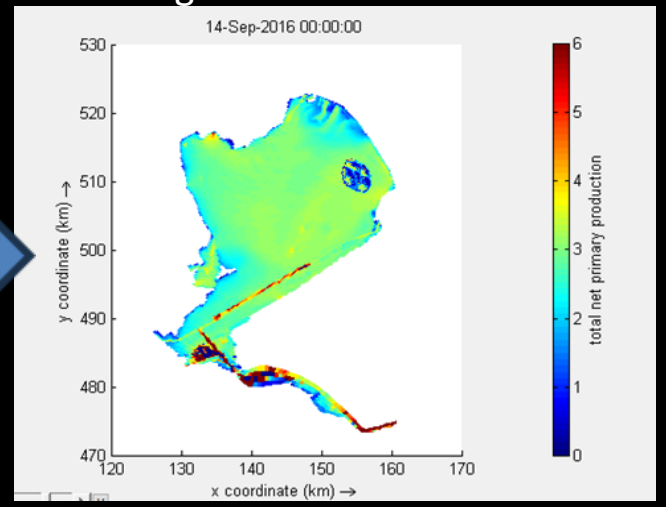
Replacing in situ measured air temperature with EO based Lake Surface Water Temperature (LSWT) to force the Deltares Delft3D model, contributing to analysis of effects of climate change.

Resulting in different levels, spatial patterns and temporal trends, i.e. PP phenology.

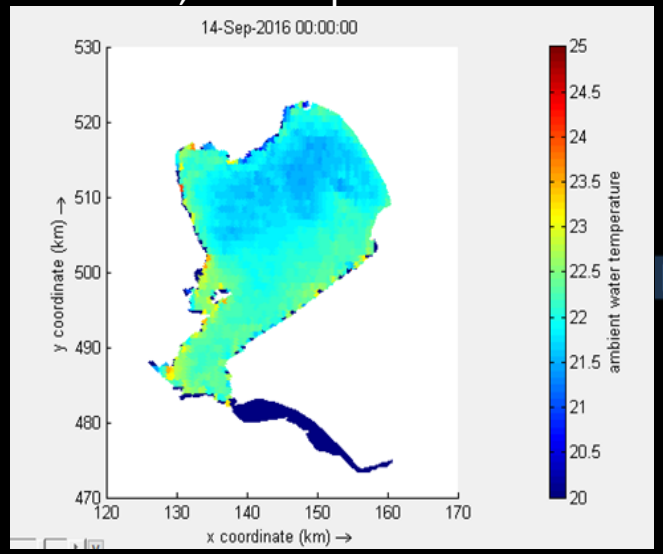
In situ air temp, 14th Sept 2016



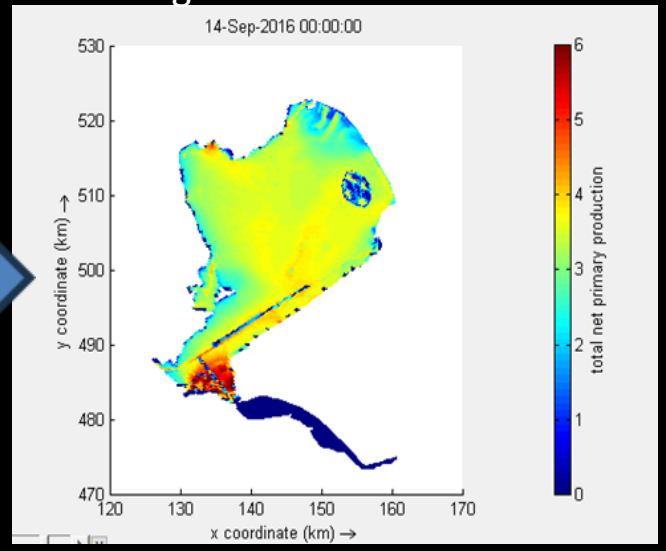
Resulting modelled PP



EO LSWT, 14th Sept 2016



Resulting modelled PP



Coastal – Ecosystem functioning

Phenology at intertidal areas

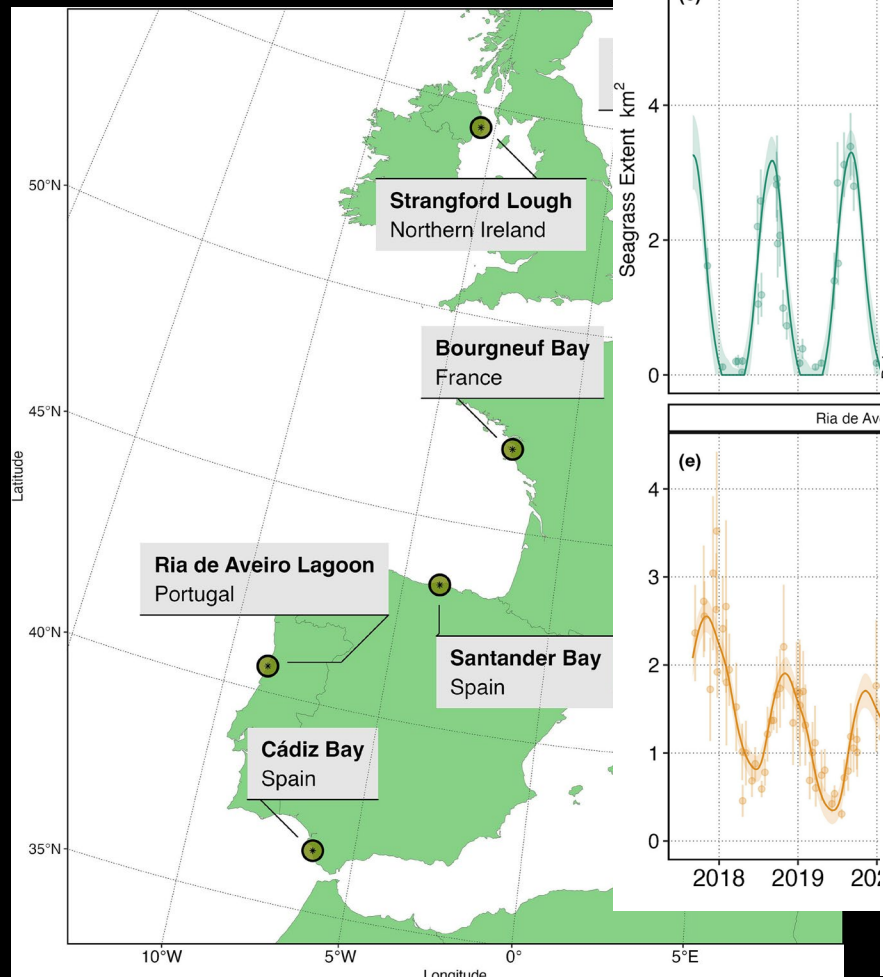
Summer

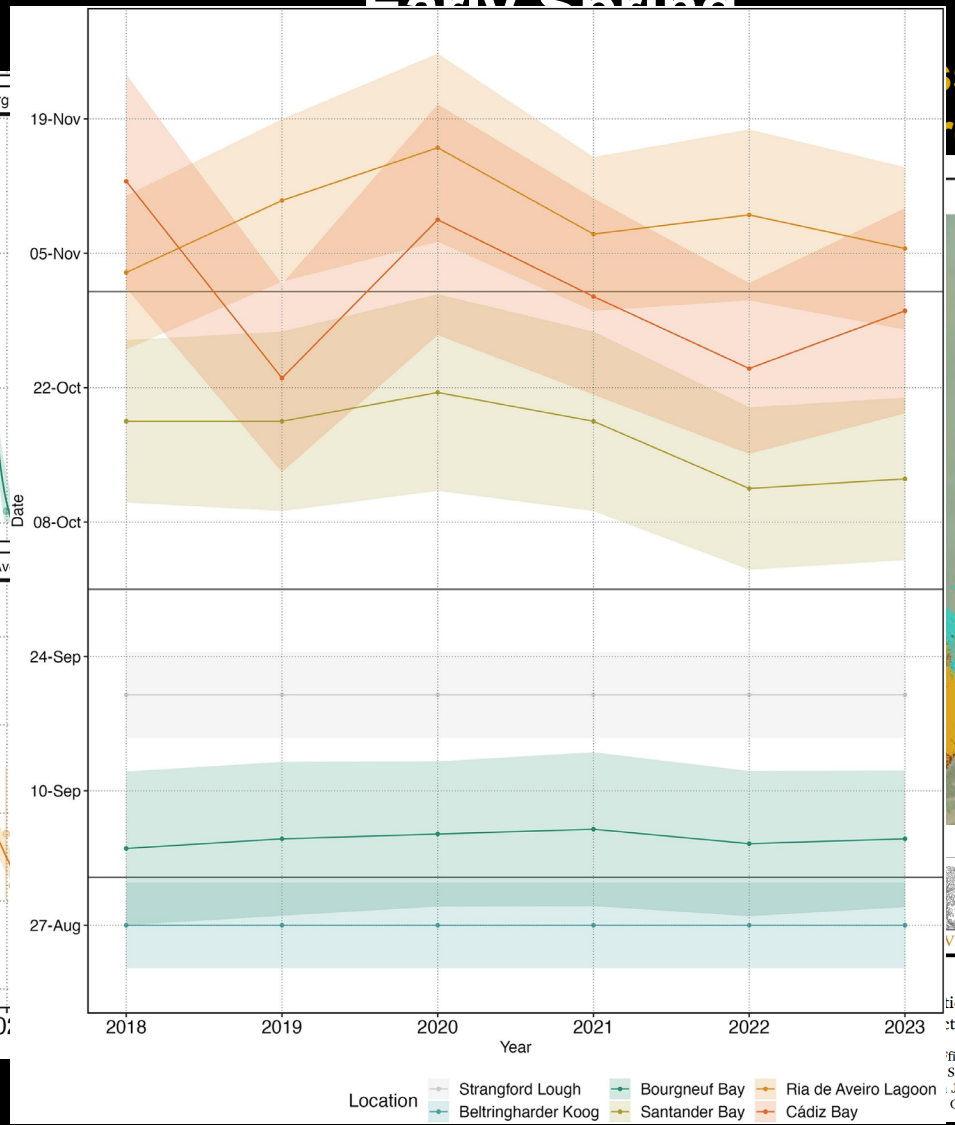
Seagrass mead

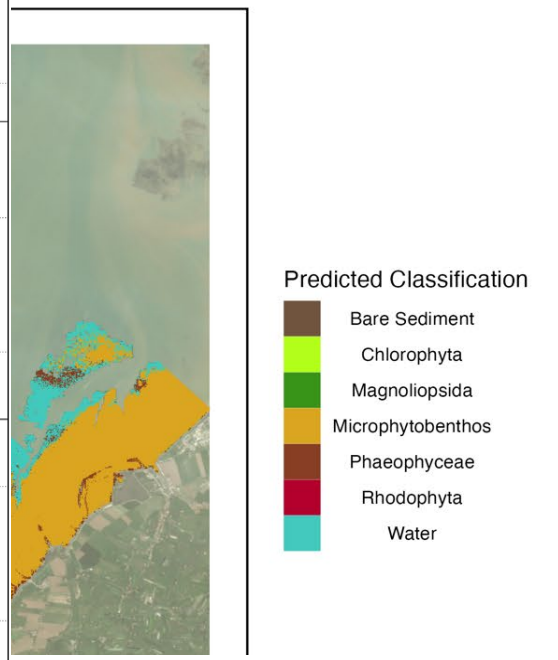
Early Spring

s leaves,

rophytobenthos







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A sentinel watching over inter-tidal seagrass phenology across Western Europe and North Africa

Bede Ffinian Rowe Davies, Simon Oiry, Philippe Rosa, Maria Laura Zoffoli, Ana I. Sousa, Oliver R. Thomas, Dan A. Smale, Melanie C. Austen, Lauren Biermann, Martin J. Attrill, Alejandro Roman, Gabriel Navarro, Anne-Laure Barillé, Nicolas Harin, Daniel Clewley, Victor Martinez-Vicente, Pierre Gernez & Laurent Barillé

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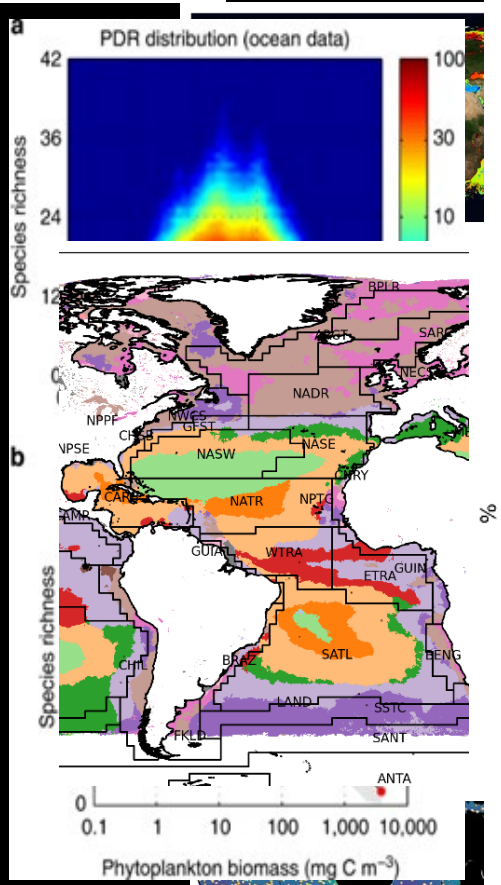
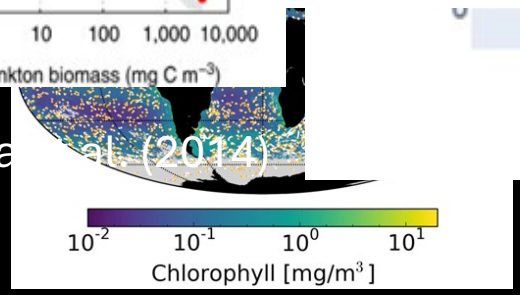
Open ocean- Ecosystem structure

Time varying - climate quality stable datasets

Optical water types

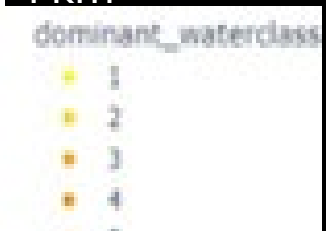


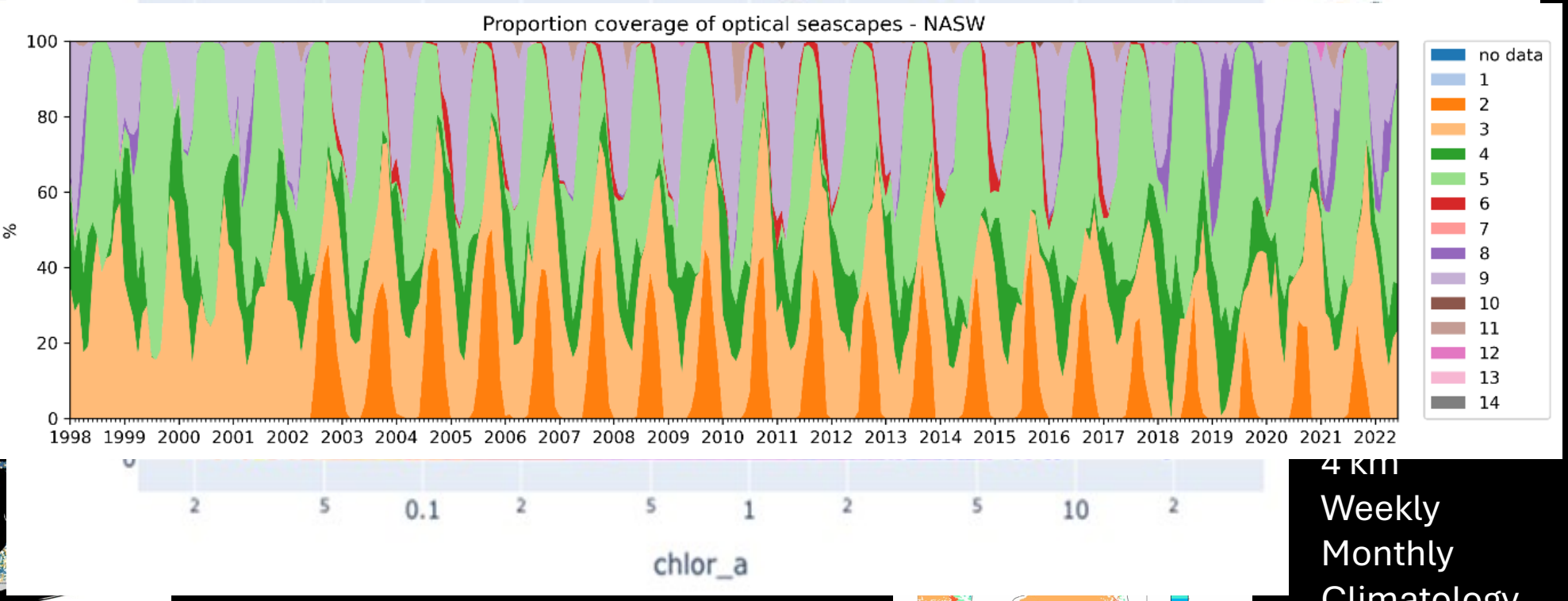
Vallina et al. (2014)



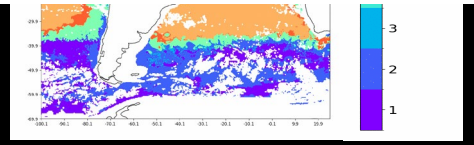
Bio-optical seascapes

4 km





4 km
Weekly
Monthly
Climatology
In Depth

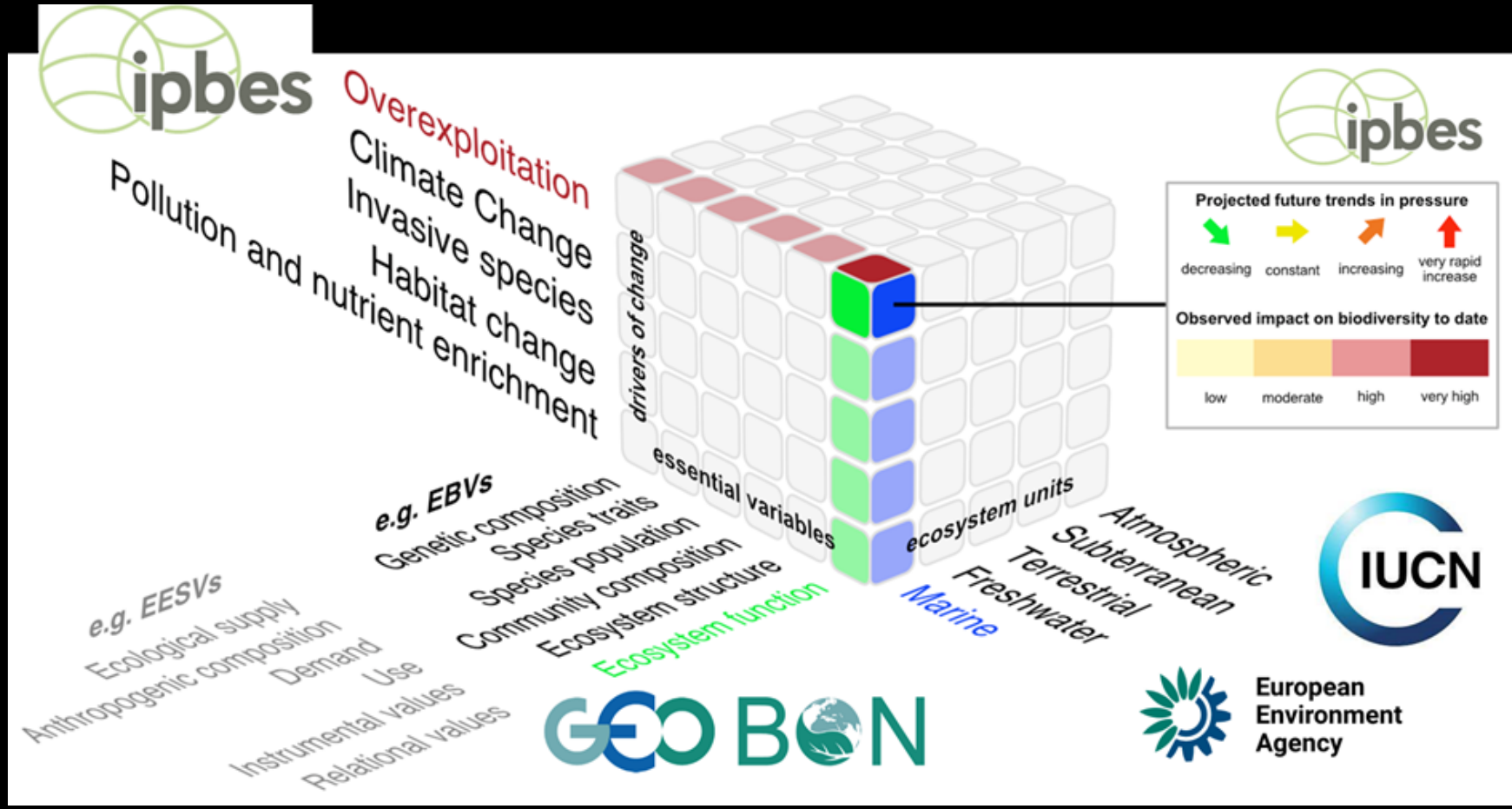


Martinez-Vicente et al (in prep)

Conclusions

Common and connecting drivers

- Climate change through temperature
- Habitat change
- Overexploitation



Common Responses of the ecosystems across domains (EBV Ecosystem Function and Structure classes)

- Primary production
- Phenology
- Seascapes/landscapes

Recommendations to ESA

First time three communities come into close contact

- **R1:** Need to learn more from one-another: **ESA to incorporate cross domain interactions in future calls**

There are areas of intersection between the realms (e.g. intertidal)

- **R2:** Find new areas of intersection: **ESA to support calls where habitats (e.g. subtidal seagrass, coral) and/or EBV (e.g. DNA) intersect among realms**

Pursue the construction of Climate relevant EBV

- **R3:** Common EBV emerge from different domains: **ESA to align research calls on those EBV towards constructing common datasets/harmonized methodologies**