

BioSpace25 - Biodiversity insight from Space
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A Full Map of European Intertidal Seagrass.

Bede Ffinian Rowe Davies

Simon Oiry, Mar Roca, Philippe Rosa, Maria Laura Zoffoli, Dimitris Poursanidis, Tobias Dolch,
Bárbara Ondiviela, Cristina Galván, Ana C. Brito, Richard J. Lilley, Laura L. Govers, Laurent Barillé & Pierre Gernez.

Background

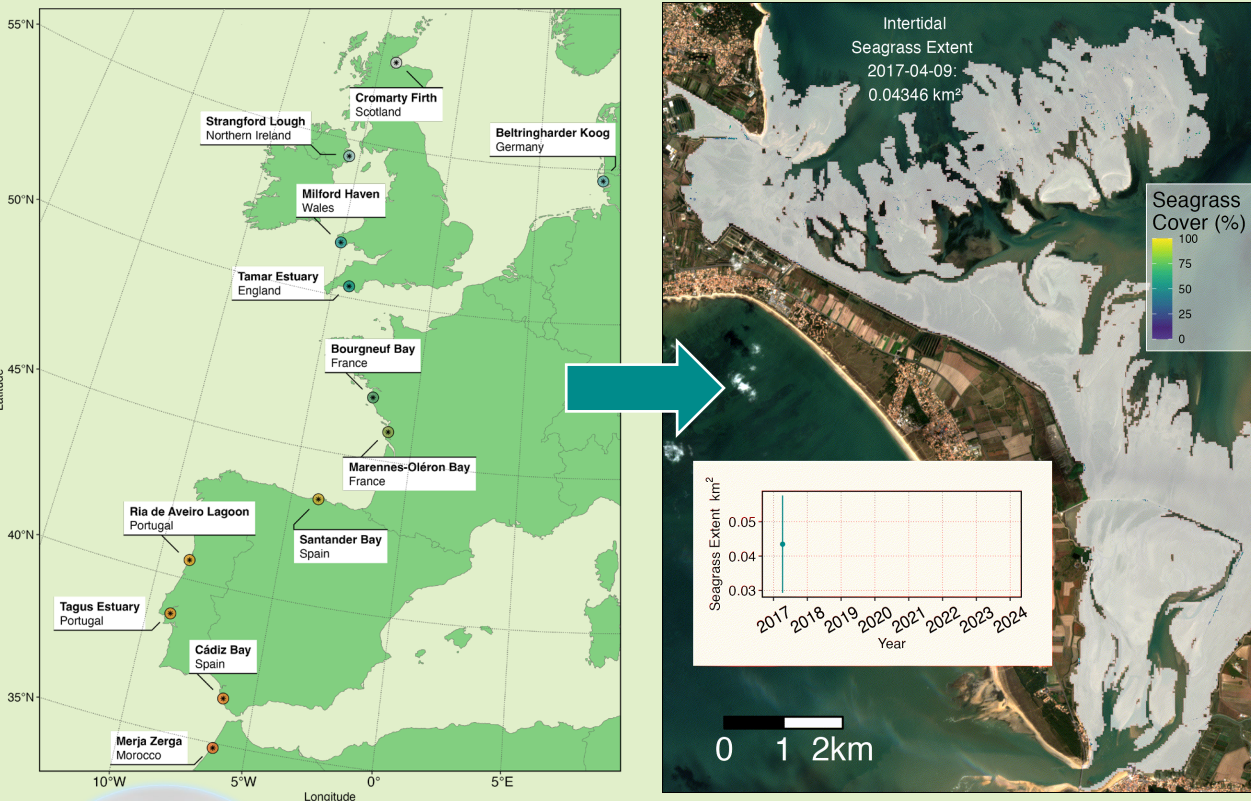
- Intertidal Seagrasses Often Overlooked
- Interface of Terrestrial and Marine
- Harbour High Biodiversity and Services
- Generally Poorly Described
- Difficult to Survey *In situ*
 - (Remote Sensing to the Rescue?)



Time for Some ICE CREAMS

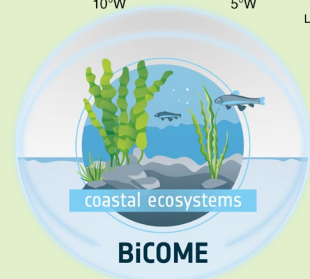


Intertidal Classification of Europe: Categorising Reflectance of Emerged Areas of Marine vegetation with Sentinel-2



- Neural Network Classifier to Identify Intertidal Seagrass from Sentinel-2 Imagery Resampled to 10 m
- Achieved 82% Accuracy from 12,000 Pixels
- Applied at Specific Sites across Europe^{1,2}
- Assessed Temporal Changes in Intertidal Seagrass

1. Davies, B. F. R., et al., (2024). A sentinel watching over inter-tidal seagrass phenology across Western Europe and North Africa. *Communications Earth & Environment*.
2. Davies, B. F. R., et al., (2024). Intertidal seagrass extent from Sentinel-2 time-series show distinct trajectories in Western Europe. *Remote Sensing of Environment*.

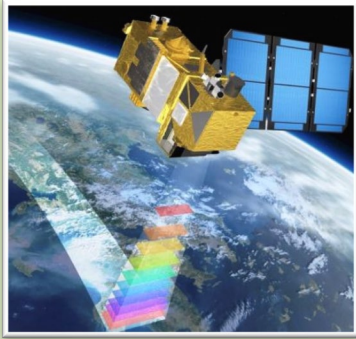


REWRITE

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Workflow



Sentinel-2 Image Collection 2017-2023
~ 20 Trillion Pixels over 6,150 km² of Intertidal Area

Mask

Intertidal Mask¹

Cloud Masking²



Quality Mosaic

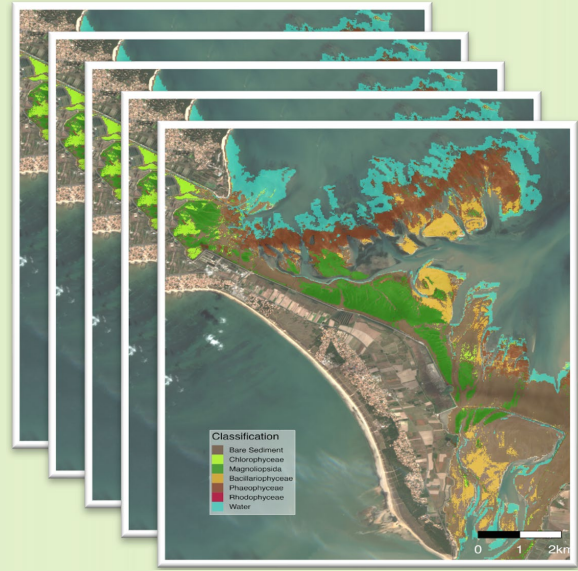
Composites Maximising Vegetation.
Top 5 Sentinel-2 Vegetation Composites of Europe Created



Apply ICE CREAMS

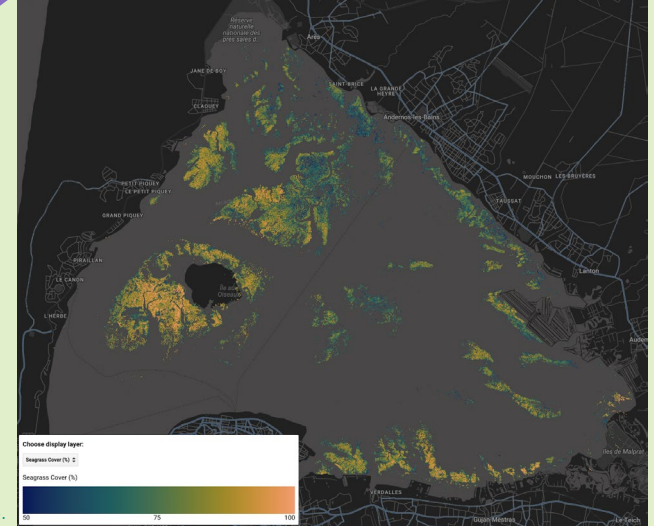


Classification of Top 5 Vegetation Maps of Europe.



Mode Class and Calculate Seagrass Cover

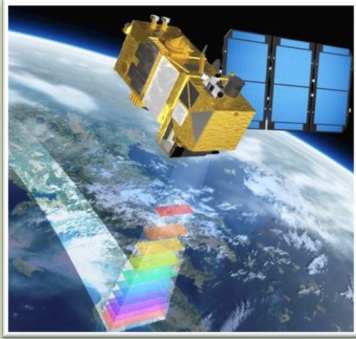
Maximum Potential Intertidal Seagrass Cover Map of Europe.



1. Murray, N. J., et al., (2019). The global distribution and trajectory of tidal flats. Nature, 565.
2. Roca, M., et al., (2022). Monitoring sand spit variability using Sentinel-2 and Google Earth Engine in a Mediterranean estuary. Remote Sensing, 14.



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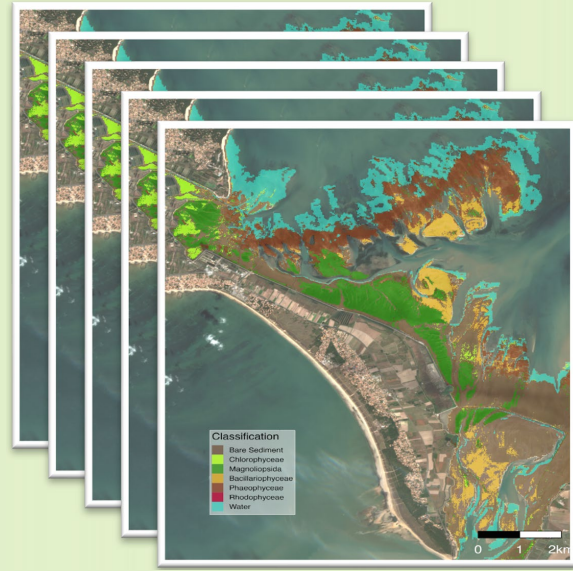
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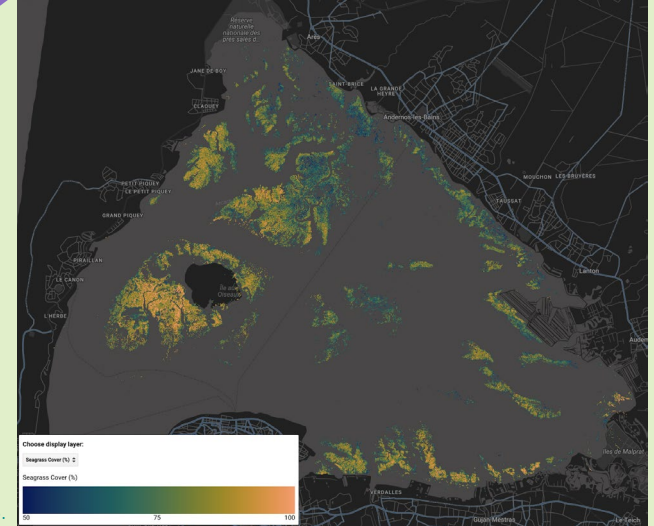


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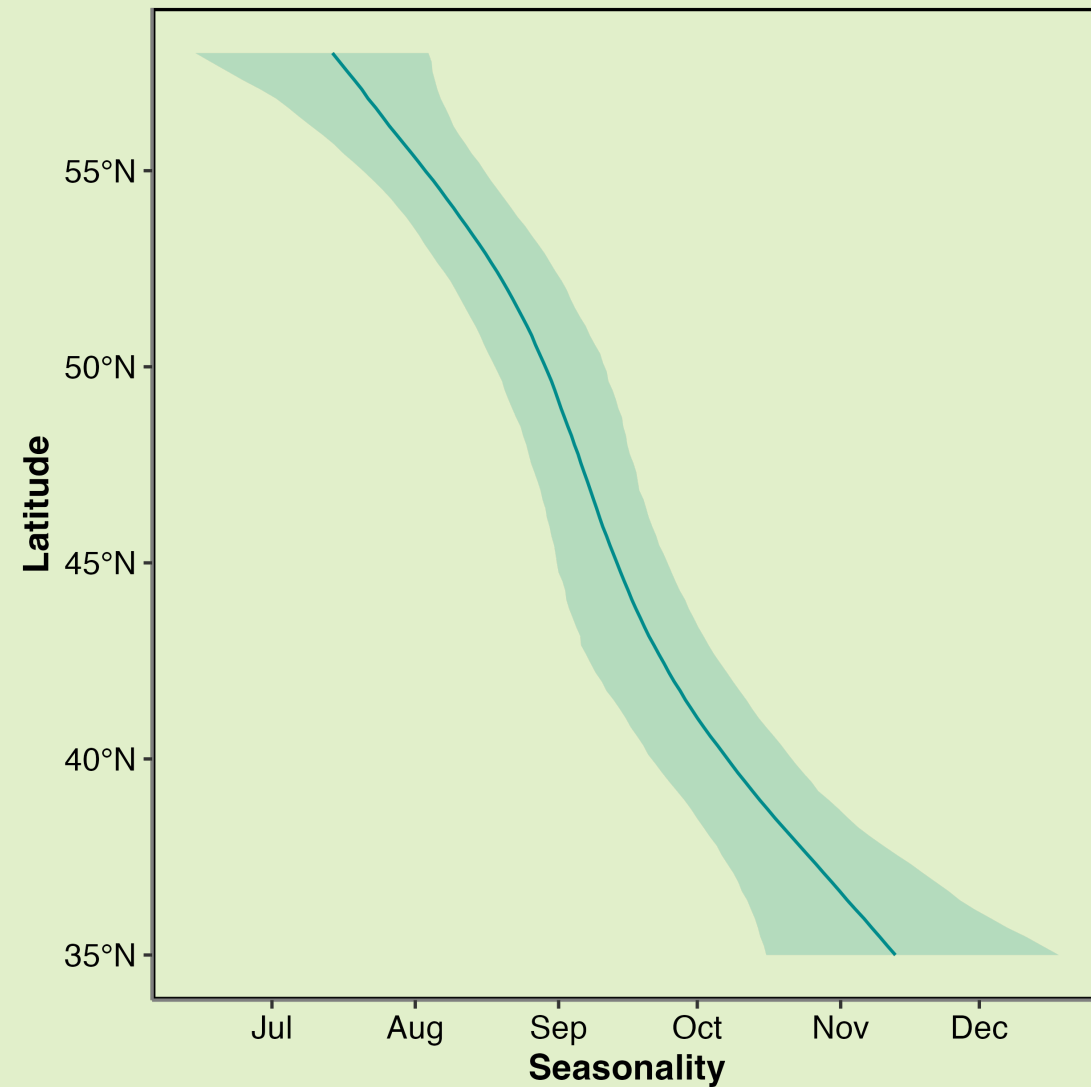


1. Murray, N. J., et al., (2019). The global distribution and trajectory of tidal flats. Nature, 565.
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Latitudinal Patterns: Phenology

- Previous Site by Site Patterns Described
- Concur with Previous Work:
Further South -> Later 'Peak'
- Almost Linear Pattern



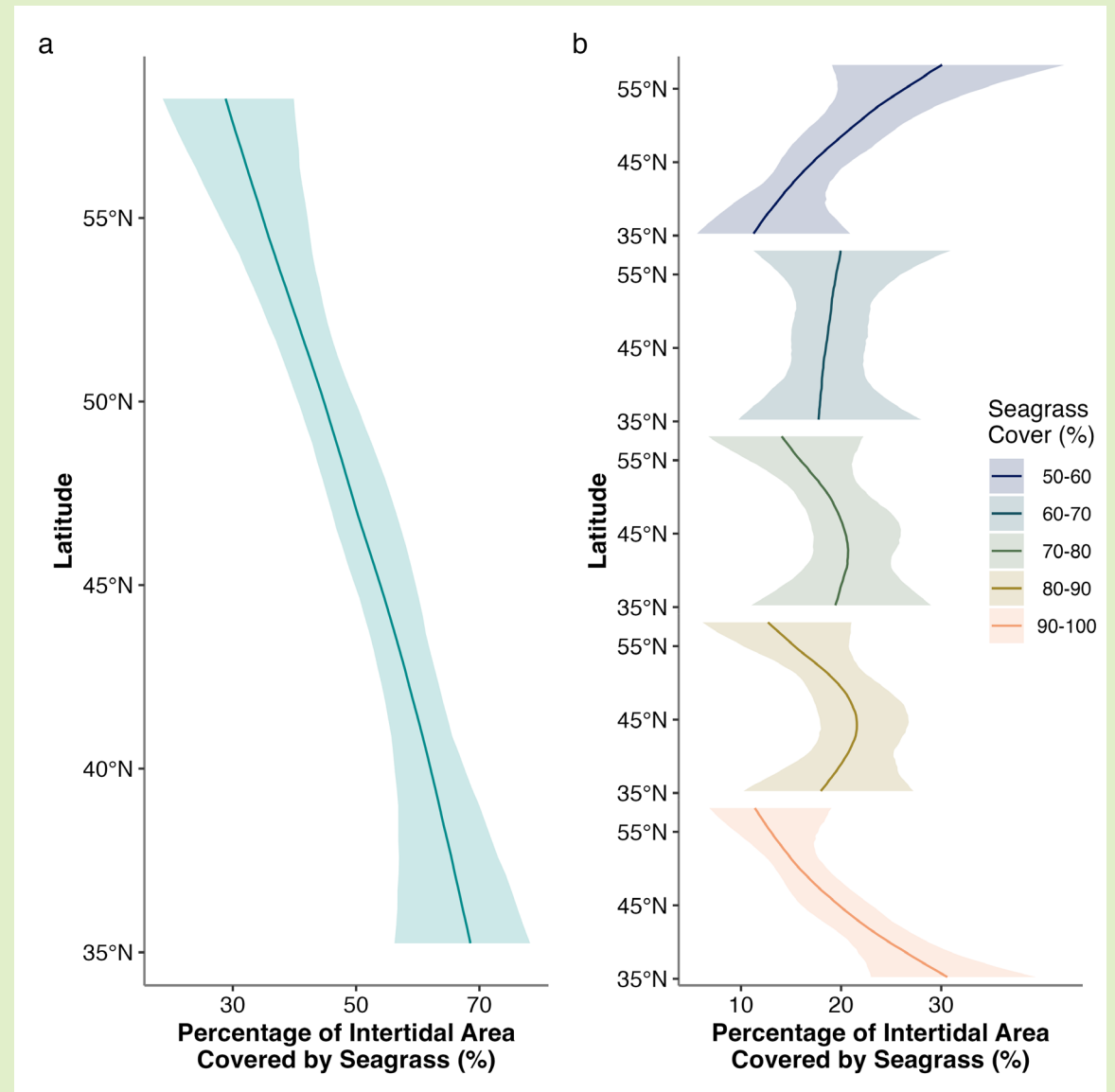
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Latitudinal Patterns: Seagrass Cover

- Increasing Cover of the Intertidal Area by Seagrass:
 - Further South -> More Seagrass Dominance
- The Seagrass Generally Tends to be High Density:
 - Further South -> Greater Seagrass Density



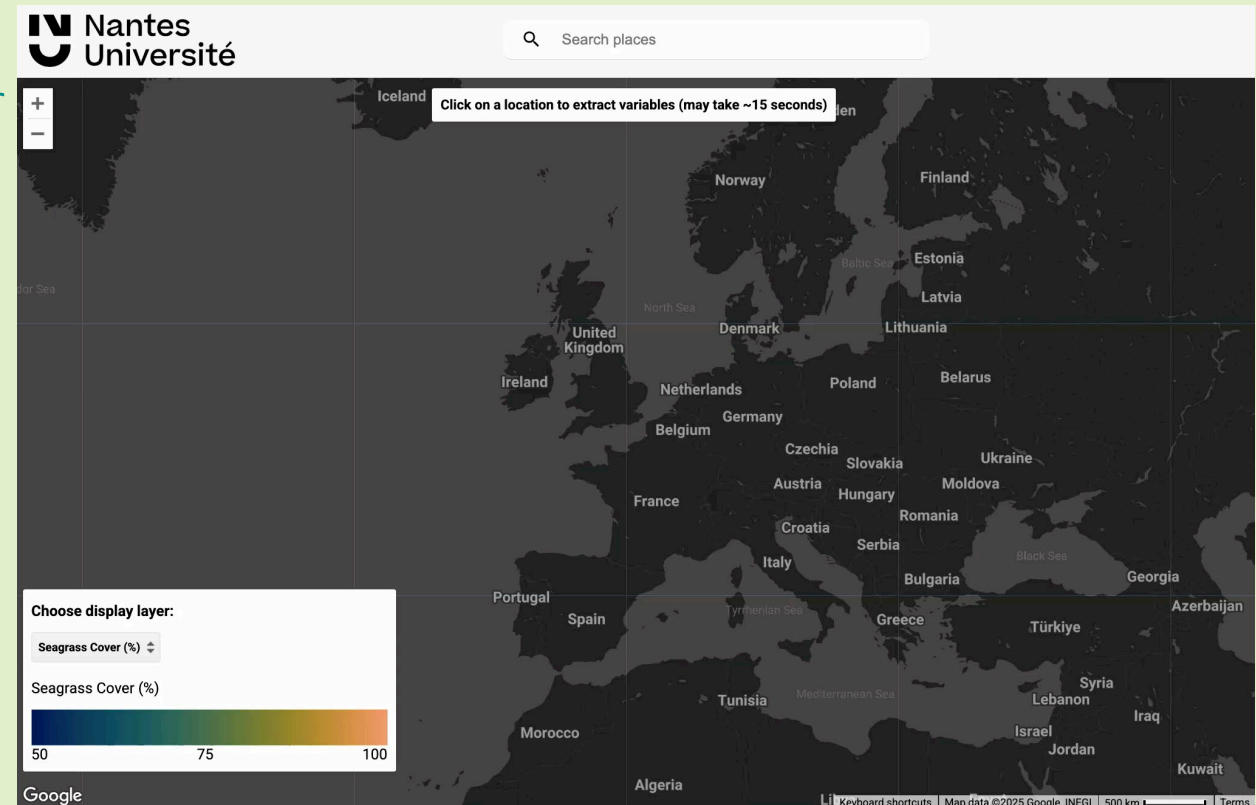
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Summary and Next Steps

- Provide as Open-Access Data and Online User Friendly Tool (Under Review)
- Improve ICE CREAMS model with further Training Data
- Apply to Elsewhere in the Global, but needs further Validation.



Thank You



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