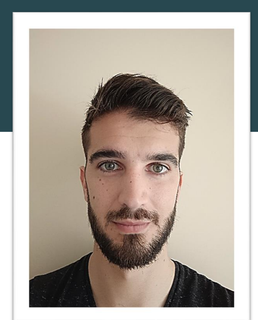
Is biodiversity associated with eelgrass more strongly affected by the environment or by its foundation species?



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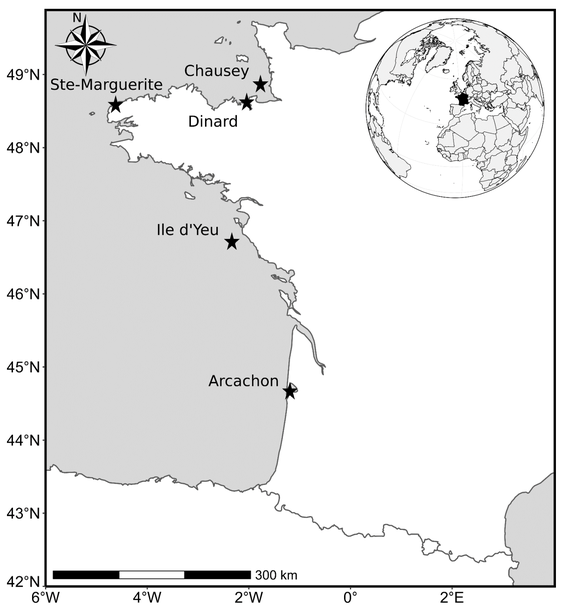
In a nutshell

- Study location : five meadows located over a distance of 800 km along the French coast in the NE Atlantic.
- Approach : Combining taxonomic and trait-based approaches with Structural Equation Modeling (SEM).
- First objective : Effect of environmental parameters or eelgrass morphological traits on eelgrass-associated invertebrate communities at local and regional scales.
- Second objective : Quantification of direct and indirect effects of environmental factors on macrofaunal structure and composition.

Materials & Methods



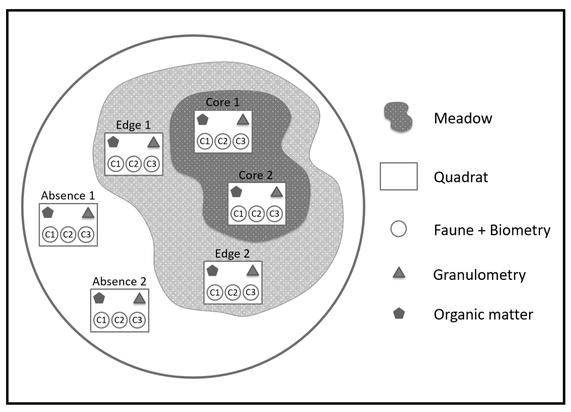


Fig.1 Map indicating the locations of the five study sites of *Zostera marina* meadows in France: three in the English Channel, two in the Bay of Biscay, with standardized sampling protocol used in all sites.

Results and Discussion

Fig.2 Abundance relative percentage of the different taxonomic groups present in each site : Chausey (CHY), Dinard (DND), Sainte-Marguerite (SMA), Ile d'Yeu (IDY), Arcachon (ARC).

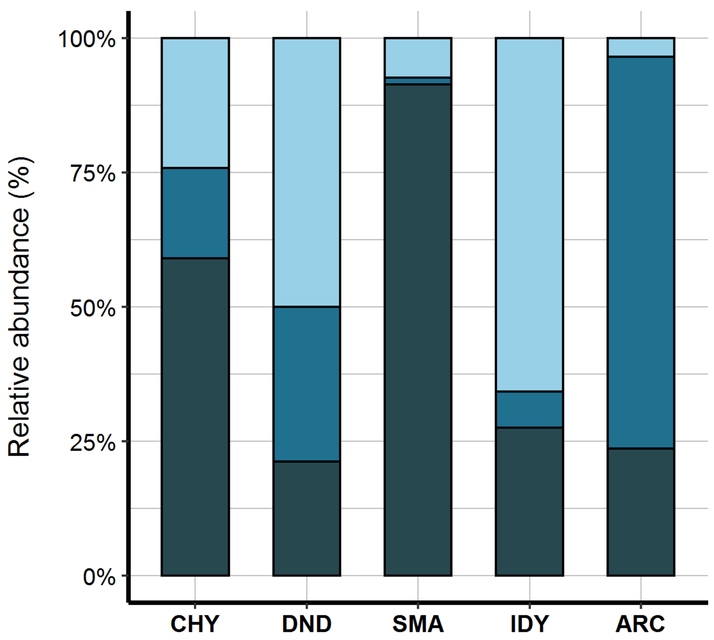


Fig.3 PCA of the Hellinger-transformed abundances. Positions of the species for which the two first axes represented at least 40% (cumulative R^2) of their variance are featured.

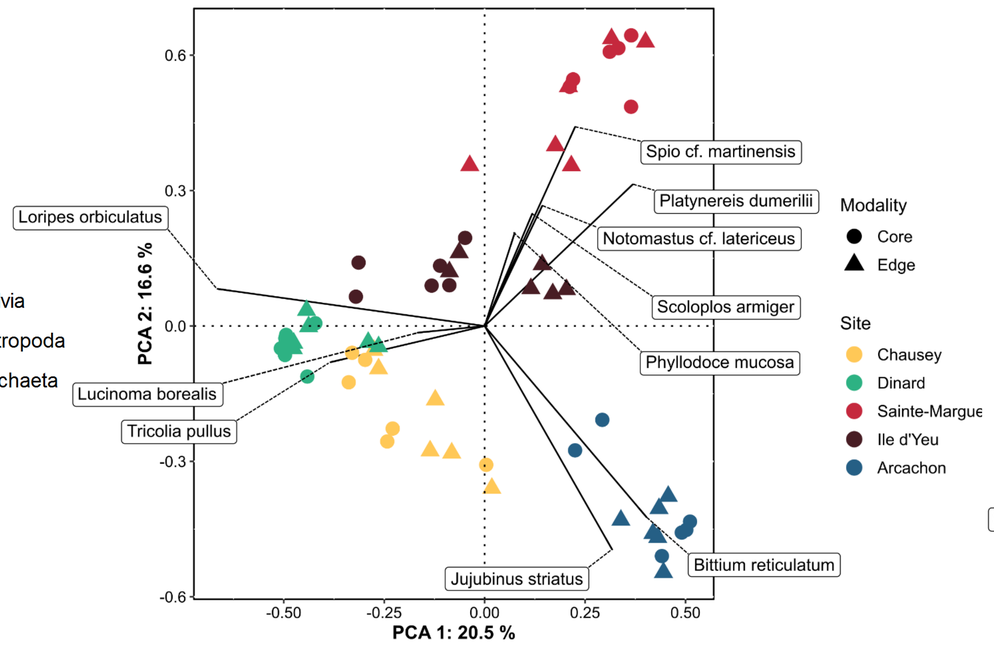


Fig.4 PCA of Hellinger-transformed trait modality abundances. Positions of the species for which the two first axes represented at least 40% (cumulative R^2) of their variance are featured.

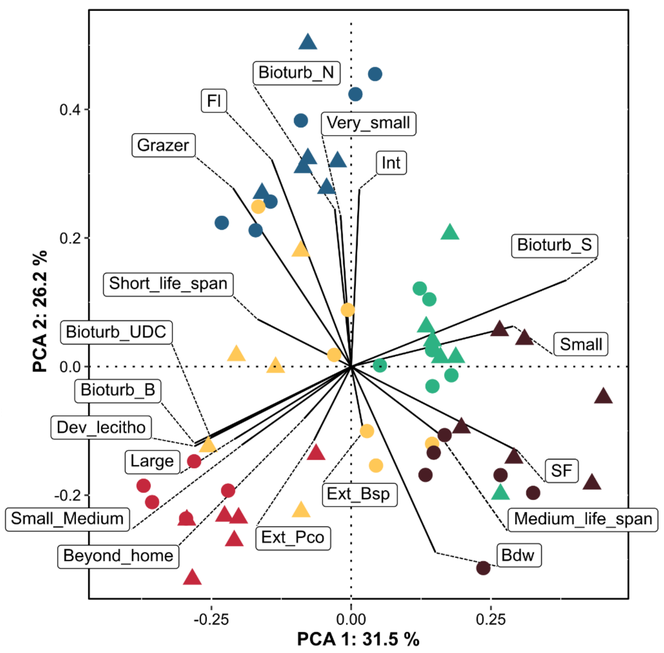
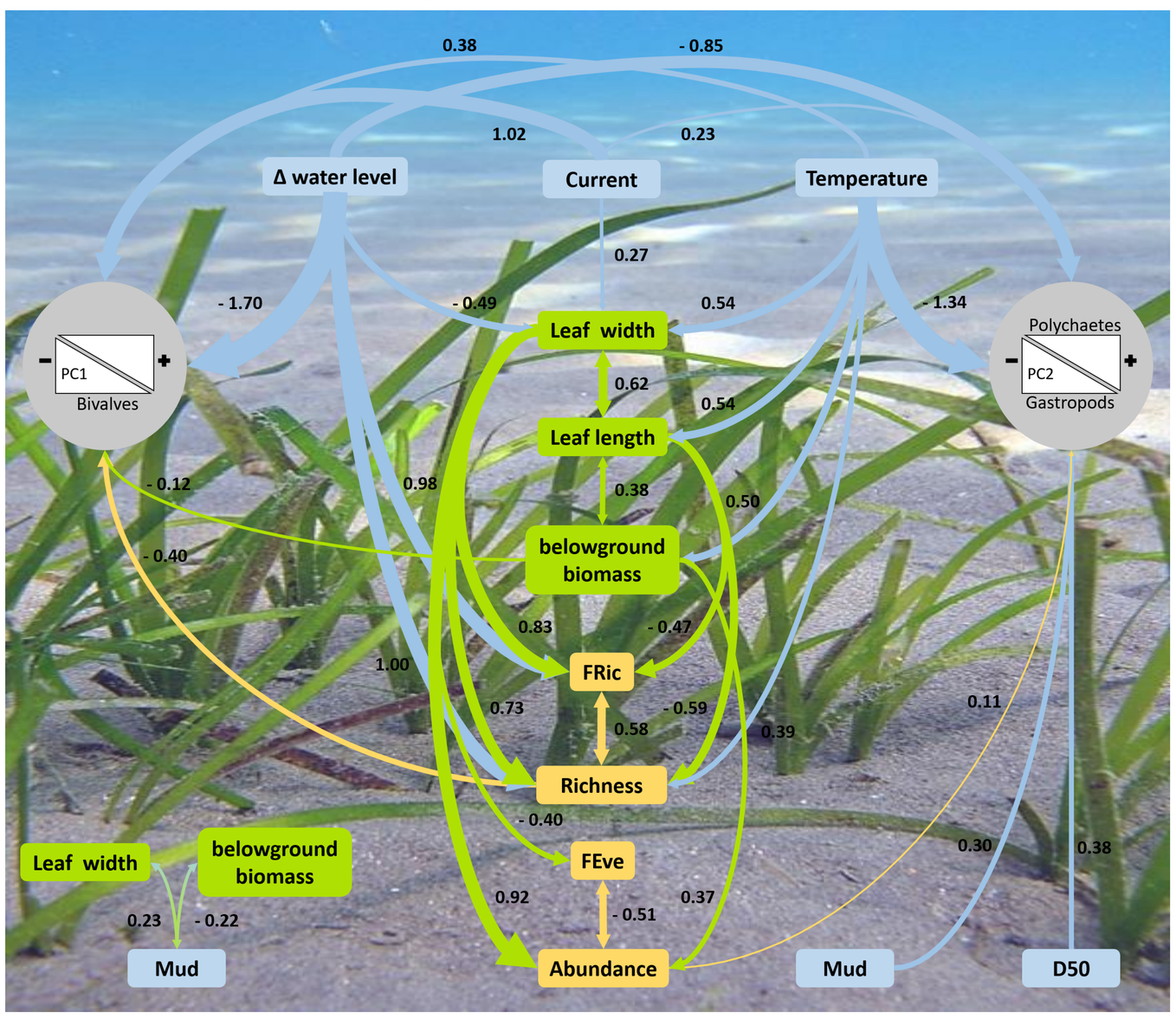


Fig.5 Best model fitted with piecewise SEM describing the relationships among *Zostera marina* traits (in green) and environmental variables (in blue) on the principal component analyses of the Hellinger-transformed abundance (in gray) and different diversity metric (in yellow). Arrows and dotted lines indicate positive and negative relationships, respectively. Values over the lines denote the standardized effect size (regression coefficient) of each relationship. (FRic : Functional richness; FEve : Functional evenness; D50 : Mean sediment coarseness).



Conservation and management action :

- Presence of eelgrass significantly increases abundance, taxonomic and functional diversity.
- Density and above-ground biomass are not necessarily good indicators of faunal diversity associated with eelgrass.
- No biological filtering of the regional species pool by eelgrass, as opposed to other species (i.e. honeycomb worm reefs).
- Eelgrass appears to concentrate or enhance the abundance of species from surrounding habitats.
- Processes that maintain diversity in seagrass beds may reflect a seascape composed of many habitats connected by source sink dynamics, otherwise known as **Metacommunity System**.

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