



## **Benthic-pelagic coupling in the bay of Brest (France): New insights from a coupled physical-biological model**

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Functioning of the ecosystem of the Bay of Brest (France) is controlled both, by hydrodynamical processes as the bay is a macrotidal system, and by biological processes which are dominated by the activity of an invasive benthic filter feeder, a slipper limpet (*Crepidula fornicata*).

A coupled physical-biological model is used to represent the influence of these interactions on the phytoplankton dynamics, with a focus on benthic-pelagic coupling.

The selected spatial resolution allows resolving the heterogeneous density distribution of the slipper limpet in the Bay and its implication for spatial variations of benthic fluxes. This heterogeneity is not reflected in the pelagic dynamics because transport and mixing homogenize the distributions of nutrients and biomasses. Validation of the model is done on stocks and, in an original way, on rates (benthic recycling, carbon and silicon uptake).

In a prognostic scenario which forecasts the impact of removing the invasive benthic filter feeders, the silicic acid efflux at the sediment-water interface is reduced by 63% and a pronounced algal bloom of dinoflagellates, potentially harmful, develops in late summer.