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Upscaling small-scale environmental studies of the Southern Bight of the North Sea by biogeochemical modelling.

The FaCE-It project (Functional biodiversity in a Changing sedimentary Environment: Implications for biogeochemistry and food webs in a managerial setting) aims at understanding the impact of sediment fining and artificial hard substrates on the benthic biogeochemical cycle and food webs in the Southern Bight of the North Sea (SBNS). We will develop mechanistic model descriptions of sediment biogeochemistry and food webs to help upscaling experimental results, performed at the local scale (see poster by Toussaint et al., and Mavraki et al.), to the entire area, by providing descriptions that can be coupled to the hydrodynamic model developed for this area (see poster by Ivanov et al.). Here we present initial results of an early diagenetic model, implemented to investigate the impact of bio-irrigating benthic animals on the nitrogen and phosphorus cycle. The model is applied in muddy and porous sandy sediments, showing the different effects of animal activity in these sediment environments. Bio-irrigation is a crucial but understudied activity of benthic organisms. It will change if benthic communities are altered due to fining of the sediment, which is what we observe in the SBNS. Via our models, we want to relate density of bio-irrigating animals to the effect of sediment biogeochemistry, so as to ultimately predict how biotic changes will affect ecosystem functioning.

Keywords: SBNS, sediment biogeochemistry, diagenetic modelling, bio-irrigation,