



Bio-irrigation impacts on benthic-pelagic coupling in the Northern Adriatic

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In the process of setting up a 3D benthic-pelagic coupled model for the northern Adriatic Sea, the 1D diagenetic OMEXDIA model was used to analyze pore-water profiles and in-situ flux data through model calibration. We tested two approaches to represent bioirrigation in the model: the enhanced-biodiffusive formalism (initially used in OMEXDIA) and the non-local exchange formalism. Solute profiles depicted shapes that could not be rendered by the biodiffusive formalism. Furthermore, calibration procedures stressed that only the non-local exchange formalism allows to render simultaneously the pore water solute profiles and the fluxes measured at the sediment water interface when carbon, oxygen, nitrogen and phosphate dynamics are considered jointly. While the enhanced-biodiffusive formalism is convenient in empirical studies comparing diffusive and total benthic fluxes for a single variable (derived from solutes profiles and incubation chambers respectively), it is not suited for multivariate modelling purposes. We evidence that the modeled impact of bioirrigation on benthic-pelagic coupling strongly differ following the adopted formalism, in particular in terms of the N:P ratio of remineralized fluxes. Calibrated parameters obtained for various stations are used to assess how bioirrigation impacts on benthic-pelagic coupling in the northern Adriatic.