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Advancing Benthic Biogeochemical Modeling: The SedMIP Initiative

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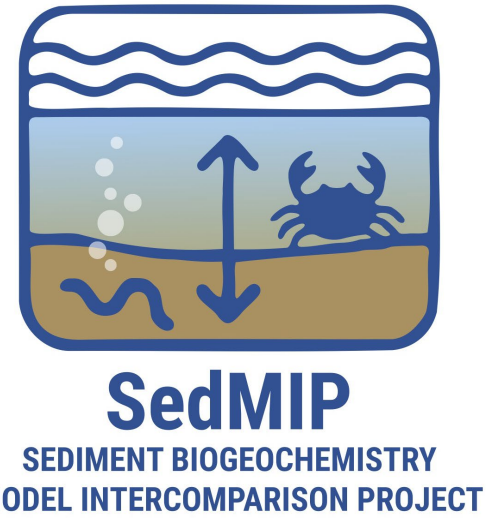

Benthic biogeochemical models are essential for predicting seafloor processes that influence ocean chemistry, carbon storage, habitat conditions, and climate feedbacks. Despite numerous models developed over the past two decades, they vary widely in complexity, structure, and assumptions, leading to unquantified structural uncertainty that may hinder accurate predictions of both long-term climate projections and near-term ecosystem responses. A new OCB sponsored working group is seeking to organize the Sediment Biogeochemistry Model Intercomparison Project (SedMIP) to better understand carbon sequestration and reduce modeling uncertainty. The initiative aims to assess model sensitivity to complexity, identify essential mechanisms, and guide parameterization. SedMIP is a community-driven initiative aimed at systematically comparing existing and new benthic models against an agreed upon set of observational constraints to refine key parameterizations and assess structural uncertainties. The objectives of a SedMIP include to develop standardized benchmarking, gather observational datasets, and develop cross-disciplinary collaboration to improve model skill and integration into ESMs. To maximize involvement across a wide range of sediment models, SedMIP is pursuing four activities: (1) an online survey, (2) town hall discussion, (3) webinar series, and (4) development, and consecutive publication, of a MIP protocol through a workshop. The outcome of all of this would be a final protocol for the MIP, that will be submitted for publication in Geoscientific Model Development for publication. It is then our hope that SedMIP would join the Intersectoral Impact Model Intercomparison Project (ISIMIP) as one of the impact MIPs. ISIMIP would then provide support for hosting the files needed to execute the protocol. Our initial activities have included surveys and town halls to identify priorities for the MIP experiments. The status and initial results of these activities will be presented and opportunities to further engage discussed.