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SENSITIVITY OF A 1-D COUPLED COHESIVE SEDIMENT ENTRAINMENT AND BIOTURBATION MODEL TO ENVIRONMENTAL FORCING

The entrainment of cohesive sediments involves coupled sediment-bottom boundary layer processes forced by waves and currents and complex physical, biological, and chemical processes (e.g. consolidation, bioturbation, geochemistry) that occur within the seafloor sediments. This study uses a system of coupled models to simulate the physical and biological processes that affect entrainment and, through various parameterizations, determine the entrainment rate under a range of wave, current, and biogeochemical forcing. An active layer approach is used to examine the erosion and deposition of fluid mud at the seafloor. The fluid mud layer determines bottom boundary layer dynamics, geochemical fluxes, and sediment transport at the water-seafloor interface. The sensitivity of the entrainment rate and suspended sediment profile to changes in seafloor bed elevation, bed density, bioturbation and biogeochemistry are investigated. In addition, the time-dependent response of feedback loops existing between biological production, bioturbation, and entrainment rate parameters are examined. The temporal and spatial distributions of dissolved oxygen and reaction rates of primary and secondary chemical reactions in the seafloor sediments are evaluated as well.

SS2.01 SS2.04 SS2.05: The Role of Hydrodynamic and Biogeochemical Processes in the Entrainment of Cohesive Sediments
Oral
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