A MODEL STUDY OF NEAR-SEABOTTOM FLOW AND ITS EFFECT ON SEDIMENT RESUSPENSION

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Sediment resuspension occurs when sediment that has been deposited at the seafloor is moved back into the benthic boundary layer, resulting in lateral transport of particulate and dissolved matter. Resuspension can be caused by strong flow fields, hurricanes, storms, etc. Here, we focus on an area in the northern Gulf of Mexico at a water depth of ~1250m. In order to assess whether sediments get resuspended, we quantify near-sediment flow, and then compare the flow velocity with experimental critical shear velocity. Thus, in situ ADCP data (measuring near-seabottom flow velocity) and bathymetry data are combined to simulate a near bottom flow field across a larger spatial domain (about 400m * 500m * 50m). Based on the ADCP time series data characterizing the flow 15 – 30m above the bottom, we simulate the near seafloor flow field in the study domain over time. The equations solved in the model are the Navier-Stokes equations for conservation of momentum and the continuity equation for conservation of mass. Turbulence effects are modeled using standard two-equation k-ε model. To estimate resuspension, we extract the simulated flow velocities of the lowest layer in the mesh. We then analyze these velocities and calculate the percentage of time when the simulated flow velocity is higher than an experimentally determined critical shear velocity, to assess the probability of resuspension for each point in the model mesh. Comparing modeled velocities at the ocean bottom with this threshold indicates zones where resuspension is likely to happen.

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