Modeling asymmetric sediment transport caused by slope induced tidal straining

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Resuspension and advection of particulate sediment matter induced by tidal cycles play very important role to determin the chracteristic of sediment bed at coastal regions. It has been known that tidal cycles over horizontal density gradient may result in effective transport of suspended sediment matter (SSM) through the "tidal straining" process.
Recently Endoh et al (2016) found evidences of the simmilar straining process over gentley sloping seabed without notable horizontal deinsity gradient. In the slope induced tidal straining, stratification becomes unstable and resuspension is enhanced for the upslope phase and hence net SSM transport is expected to be upslope direction. On the other hand, settling velocity of SSM particles has downslope bias and net transport of SSM may also have donwslope bias, in particular for large-size particles with greater settling velocity. Therefore, the net direction and distance of tide-indcued SSM transort over sloping topography are not universal and should depend on many factors such as slope angle, background stratification, tidal amplitude, roughness of seabed and the size spectrum of particles.
In the present study, net direction and travel distance of SSM trasnport caused by slope induced tidal strainging was qunatitatively investigated thruough idealized numerical experiments using a high resolution non-hydrostatic ocean model with along-slope coordinate system and coupled online Lagrangian particle tracking system.

Keywords: suspended sediment transport, tidal straining, lagrangian particle tracking, non-hydrostatic model