SLIM: A multi-scale model of the land-sea continuum

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SLIM is an unstructured-mesh hydrodynamic model that can seamlessly simulate flows from the river to the coastal ocean. It relies on the Discontinuous Galerkin finite element method to achieve unprecedented accuracy, even for very complex coastlines and bathymetry. SLIM includes the following modules to model a range of different water environments:

- SLIM1D for flows in branching river networks
- SLIM2D for shallow barotropic flows with or without wetting and drying
- SLIM3D for more complex barotropic or baroclinic flows where the vertical structure cannot be neglected
- A Lagrangian particule tracker to simulate the transport of larvae or debris
- A Eulerian transport model to simulate the dynamics of tracers such as pollutants and sediments

In this talk, we will present several applications of SLIM in challenging environments such as the Columbia and Congo rivers estuaries and the Great Barrier Reef. In each case, we will show how the use of novel computational methods allows us to improve the prediction of the physical and biological processes at play.

Keywords: Ocean modelling; Multi-scale model; Unstructured mesh