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An eddy resolving tidal-driven ocean model of the South China Sea using an unstructured mesh

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The upper ocean circulation in the South China Sea (SCS) is driven by strong tidal currents, the Asian monsoon, the Kuroshio intrusion through the Luzon Strait(LS), and a complex topography. Here, tidal currents and their dynamic processes in the SCS are studied using an unstructured mesh ocean model (ICOM) for the four major constituents (M2 S2 K1 O1). High resolution non-uniform mesh and large model domain are adopted to better resolve the tidal dynamics involved and to minimize the uncertainty from the open boundary conditions. The free surface variation is included by combining the free surface height with the pressure at the top surface in the ocean model. A mixed continuous and discontinuous finite element method is applied to the pressure and velocity components. The amplitude variations and energy dissipation of the semi-diurnal tides M2, S2 and the diurnal tides K1, O1 as well as the mesoscale eddies inside the SCS were analyzed. The tidal dynamics in the LS and the Taiwan Strait(TS) involving the Kuroshio current intrusion was particularly demonstrated. Mesh adaptivity and non-hydrostacy will be included in the baroclinic ocean model in future work.