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Seminar on Simulation of Coastal Processes

Tricea I 2F Seminar Room 1 (Just facing elevator) Tuesday Nov 24, 2015
Ritsumeikan Univ., BKC Campus, Kusatsu 10:00 -12:20

10:00 – 10:45 Eiji Masunaga (Tokyo University of Marine Science and Technology)
"Internal tidal dynamics in the vicinity of Izu-Oshima Island investigated by numerical simulations."

Abstract: Internal waves significantly contribute to transport e.g. heat, salt, energy, sediment and organic materials in the ocean. Continental shelves and shallow coastal areas are known as “hot spot” of internal tide generation site. However, generation processes and dynamics of internal tides have not been understood well. This study presents physical processes associated with internal tides around Izu-Oshima Island investigated by a numerical ocean model, SUNTANS. Although semidiurnal surface tides dominate in sea-surface tidal elevations, diurnal internal tidal energy would be much stronger than semidiurnal tide when the topography tends to enhance Kelvin trapped internal waves.

10:45–11:30 Matt Rayson (University of Western Australia)
"Challenges in three-dimensional hydrodynamic modelling of the shallow bays and estuaries along the Gulf of Mexico coast"

Abstract: The Gulf of Mexico coast is characterized by wide, shallow bays and estuaries with narrow openings to the Gulf and geometrically complex shorelines. Tidal forcing is small (< 0.5 m range) yet strong tidal currents (>1.0 m s-1) with large spatial variability exist at narrow constrictions and shipping channels. I will first present validation of hydrodynamic modeling results from Galveston Bay, Texas, using the 3D finite-volume SUNTANS model with hybrid quadrilateral/triangular grids. I will then apply the validated hydrodynamic model to understand the transport time scales and salinity variability within this unsteady estuarine system, notably those associated with transient flooding and storm events.

11:35-12:20 Yusuke Uchiyama (Kobe University)
"Three-dimensional modeling of time-dependent wave-driven currents on a sandy beach "

Abstract: Alongshore shear instability associated with longshore currents driven by obliquely incident waves, and offshore-directed rip currents under a near-normal incident wave condition are analyzed with the ROMS-WEC model (Uchiyama et al., 2010). The coupled wave-current model successfully reproduces 3-D shear waves during the Sandy Duck field measurement. Rip current-induced coherent eddies (surf eddies) are generated ubiquitously on a surveyed beach topography, having significant depth-dependency that leads to faster decay of enstrophy and kinetic energy than 2-D surf eddies. VLFs (very low frequency motions) are excited with a steady wave forcing either with the 3-D or 2-D models. The feedback mechanism of current effects on wave (CEW) is found to be essential to impel the VLF-EKE (eddy kinetic energy) shoreward. Alongshore irregularity in the beach topography is responsible for enhancing the shore-confined VLF-EKE substantially.

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