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Modelling lateral distribution of waves, currents and bedload transport in an estuarine cross-section

H. E. de Swart (1), A. Waterhouse (2), and A. Valle-Levinson (3)

(1) University of Utrecht, Inst. of Marine and Atmospheric Research, Utrecht, Netherlands (h.e.deswart@uu.nl, +31 30 2543163), (2) Scripps Institute of Oceanography, La Jolla, CA, United States, (3) University of Florida, Gainesville, FL, United States

A new semi-analytical model is used to calculate tide- and wave-driven velocities over a cross-section of a sub-tropical estuary (weak fresh water discharge) and to determine the distribution of bedload transport across the inlet. New aspects of the model are the formulation of a partial slip condition at the bed, a simple formulation for tidally varying mixing that accounts for tidal straining, explicit account of waves and time-varying lateral density gradients and a bedload sediment transport module. Modelled tidal and residual currents are compared with field observations collected at Ponce de Leon inlet (east coast of Florida). It will be shown that the incorporation of partial slip, waves (generating wave-driven currents) and tidally varying lateral density gradients are essential to obtain fair agreement. Also, results of bedload transport, computed from the bottom stress due to the joint action of waves and currents, will be discussed.