UNIVERSITY OF Southampton

Appropriate complexity for modelling coastal and estuarine morphological change at decadal to centennial scales

Professor Jon French

Coastal and Estuarine Unit and Environmental Modelling and Earth Observation Group, University College London

Tuesday 10th February 2015 at 6pm

Lanchester building (07 / 3027 (L/R F1)
Highfield Campus, SO17 1BJ

Coastal and estuarine landforms provide a physical template that not only accommodates diverse ecosystem functions and human activities but also mediates flood and erosion risks that are expected to increase with climate change. Quantitative prediction of coastal morphological change at decadal to centennial scales is therefore required to address most management challenges of the 21st century, and such predictions are necessarily derived from models. Determining which processes are most important at a such a mesoscale and translating this understanding into models that are computationally feasible, retain a sound physical basis and demonstrate useful predictive skill, is no trivial task. Despite an emerging consensus in geomorphology that progress is more likely to be made through models that are essentially synthesist in approach, the nature of marine forcing, especially in estuaries, means that it is frequently necessary to retain a degree of hydrodynamic complexity that can only be obtained via reductionist models. There is potential, however, to fuse these approaches rather than deploying them in isolation as end members of a modelling spectrum. This paper develops this idea with reference to a new model of mesoscale estuary morphological evolution combining physically complete 1-D simulation of tidal hydrodynamics, highly parameterised 2-D mechanistic representation of tidal flat sediment dynamics as driven by fetch-limited waves, and a more empirical representation of 2-D variation in salt marsh morphodynamics.

Jon French is Professor and Head of Geography at UCL. He has more than 25 years experience in coastal and estuarine environments and has also undertaken work in fluvial geomorphology and physical limnology. His main interests lie in the areas of hydrodynamics, sediment transport, geomorphology, system modelling and model validation. He serves on the IGU Commission on Geomorphology and Society and the on the Editorial Board of Earth Surface Processes and Landforms.