Geophysical Research Abstracts
Vol. 19, EGU2017-14504, 2017
EGU General Assembly 2017

The morphodynamics and sedimentology of large river confluences

Andrew Nicholas (1), Greg Sambrook Smith (2), James Best (3), Jon Bull (4), Simon Dixon (2), Steven Goodbred (5), Mamin Sarker (6), and Mark Vardy (4)

(1) University of Exeter, College of Life and Environmental Sciences, Geography, United Kingdom (a.p.nicholas@exeter.ac.uk), (2) University of Birmingham, School of Geography, Earth and Environmental Sciences, United Kingdom, (3) University of Illinois at Urbana-Champaign, Departments of Geology, Geography and Geographic Information Science, Mechanical Science and Engineering, and Ven Te Chow Hydrosystems Laboratory, USA, (4) University of Southampton, National Oceanographic Centre, United Kingdom, (5) Vanderbilt University, Department of Earth and Environmental Sciences, USA, (6) Center for Environmental and Geographical Information Systems, Bangladesh

Confluences are key locations within large river networks, yet surprisingly little is known about how they migrate and evolve through time. Moreover, because confluence sites are associated with scour pools that are typically several times the mean channel depth, the deposits associated with such scours should have a high potential for preservation within the rock record. However, paradoxically, such scours are rarely observed, and the sedimentological characteristics of such deposits are poorly understood. This study reports results from a physically-based morphodynamic model, which is applied to simulate the evolution and resulting alluvial architecture associated with large river junctions. Boundary conditions within the model simulation are defined to approximate the junction of the Ganges and Jamuna rivers, in Bangladesh. Model results are supplemented by geophysical datasets collected during boat-based surveys at this junction. Simulated deposit characteristics and geophysical datasets are compared with three existing and contrasting conceptual models that have been proposed to represent the sedimentary architecture of confluence scours. Results illustrate that existing conceptual models may be overly simplistic, although elements of each of the three conceptual models are evident in the deposits generated by the numerical simulation. The latter are characterised by several distinct styles of sedimentary fill, which can be linked to particular morphodynamic behaviours. However, the preserved characteristics of simulated confluence deposits vary substantial according to the degree of reworking by channel migration. This may go some way towards explaining the confluence scour paradox; while abundant large scours might be expected in the rock record, they are rarely reported.