Geophysical Research Abstracts
Vol. 17, EGU2015-12388, 2015
EGU General Assembly 2015

Crevasse-splay sedimentation processes revealed through high resolution modelling

Christopher Hackney (1), Stephen Darby (1), Daniel Parsons (2), Julian Leyland (1), Rolf Aalto (3), Andrew Nicholas (3), and Jim Best (4)

(1) University of Southampton, Geography and Environment, Southampton, United Kingdom (c.r.hackney@soton.ac.uk), (2) Geography Environment and Earth Sciences, University of Hull, Hull, United Kingdom, (3) Department of Geography, University of Exeter, Exeter, United Kingdom, (4) University of Illinois at Urbana Champaign, Urbana, IL, United States.

During rapid rise flood events, crevasse-splay complexes are a dominant conduit through which sediment and water are passed from the main channel onto the floodplain, particularly for large rivers. These crevasse-splay systems are, therefore, key in controlling rates of floodplain sedimentation, as well as conditioning the location of avulsions. Despite recent advances in our capabilities to model the development and evolution of these systems, our understanding of the passage, storage and reworking of water and sediment across them remains relatively poor. A key limitation concerns the point that, since floodplain topography is a first-order control on the hydrodynamics of crevasse-splays, publicly available topographic data sets (e.g. SRTM) are currently unable to resolve key processes at the necessary spatial resolution.

Here we employ Structure-from-Motion (SfM) on low-level aerial photography to obtain high-resolution (3m grid cell) georectified topographic data (horizontal error = 0.02 m; vertical error = 0.5 m) for a series of three representative crevasse-splay complexes located along the Mekong River, Cambodia. We use the coupled hydrodynamic and morphodynamic model, Delft-3D to simulate sedimentation patterns for a series of flood events. We model floodplain deposition and erosion and validate simulated spatial and temporal variations against observed patterns. We show how the spatial and temporal patterns of floodplain development via crevasse-splays are conditioned by key hydrological characteristics.