

## 3D Seismic Geomorphology of Plio-Pleistocene Submarine Channel Systems: Nile Delta slope

**Catterall, V<sup>1</sup>., Redfern, J<sup>1</sup>., Moeller Hansen, D<sup>1</sup>., Gawthorpe, R<sup>1</sup>., Badalini, G<sup>2</sup>.**

1. *Basin Studies and Petroleum Geoscience, University of Manchester, School of Earth, Atmospheric and Environmental Sciences. Williamson Building, Oxford Road, Manchester, M13 9PL.*
2. *BG-Group, Rio de Janeiro, Brazil.*

A range of architectural elements exist in the Plio-Pleistocene Nile Delta slope, including: submarine channel systems (SCSs), mass-transport deposits, sediment waves, gas- and mud-escape features and channel levees. SCSs are abundant in the study area and played a key role in the transport of sediment downslope from the Nile shelf to the deep-sea. Our analysis reveals a local structural control on the location, orientation and architecture of individual SCSs.

3D seismic data, located on the upper slope of the Nile Delta is ideally situated to study the geomorphology of Plio-Pleistocene SCSs. The SCSs are imaged using volume based maximum amplitude extractions between the basal erosion surface and top surface of the SCSs.

The size and geomorphology of the SCSs changes throughout the Plio-Pleistocene succession. Pliocene SCSs incise less and are narrower than Pleistocene SCSs and levees are minor features. The larger, Pleistocene systems are up to 4 km wide and 500 m deep and are commonly associated with levees up to ~250 m thick. In planform, the Pleistocene SCS thalwegs are tens of kilometres long and commonly bifurcate. The Pleistocene SCSs are bound by linear, negative relief, basal erosion surfaces which form erosional containers. Channel-forms stack both vertically and laterally within the erosional containers. As well as an increase in channel size throughout the Plio-Pleistocene, the spatial and temporal locations of the SCSs change. In the Pleistocene, there is an initial eastward migration followed by a prominent westward shift of the channel belt.

The complex geomorphology of SCSs is illustrated using one well-imaged example from the Pleistocene. The SCS, located in the central part of the study area is >50 km long. It has been subdivided into proximal, middle, and distal reaches based on downstream changes in shape and orientation of the basal erosion surface, its longitudinal thalweg profile and the downstream organisation of architectural elements. In the proximal reach, the erosional container is characterised by a ~1.5 km wide flat base and inclined side-walls. The erosional container is filled with low to high amplitude, chaotic seismic reflections. In the middle reach, the erosional container is U-shaped and the high amplitude, channel-forms within the erosional container stack vertically. The lower reach is characterised by two channel-levee systems which are recognised downslope of a bifurcation and both show vertical stacking of channel-forms contemporaneous with lateral migration. The geomorphological change downslope and location of the channel system is clearly influenced by faulting and folding on the slope.