Tectonic Controls on Cenozoic Submarine Channel Evolution on the West African Margin

Oluboyo, Ayodeji P.[1]; Gawthorpe, Robert [1]; Hadler-Jacobsen, Frode [2] (1) School of Earth Atmospheric & Environmental Sciences, University of Manchester, Manchester, United Kingdom. (2) Research Centre, StatoilHydro ASA, Trondheim, Norway.

The temporal and spatial evolution of salt-cored fault and fold arrays generates complex dip- and strike-variability through the depositional history of passive margins. Deformation of the mobile substrate creates a continually evolving slope topography roughness that exerts strong control on gravity flows, and thus, submarine slope channel routing, geometry and architecture. We present an integrated approach to the tectono-sedimentary evolution of deepwater turbidite channels and lobes within this stratigraphic record, utilizing a merged 8,000 km2 3D seismic dataset from the deepwater region offshore West Africa.

The evolution of salt related faults and folds configures the main sediment transport fairways and the morphology of intervening minibasins. A series of NE-SW trending, structural dip parallel channel fairways, are initially positioned by elongate pre-Paleogene salt structures and extensional faults. Subsequent channel distribution is progressively influenced by later “growth” of these structures. Initiation of mass transport complexes is also triggered by failure of successive salt cored thrust crests. Such erosional/depositional processes have a modifying effect on the evolving slope topography.

Within one of the intra-slope basins, an elongate tongue-shaped distributary channelized lobe complex c. 40km long by 11km wide developed, contemporaneously with an adjacent sub-basin representing a shadow-zone passive in-fill record. These contrasting sedimentary records are controlled by structurally driven slope topography confinement and deflection of gravity flows.