Expression of East African Rift Through Mass Transport Systems in the Angoche Basin, Mozambique

Katharine Broadbent[1], David Barlass[1], Deepak Rathee[1], and Sugandha Tewari[1]

[1]Multiclient, WesternGeco, Gatwick Airport, West Sussex , United Kingdom.

ABSTRACT

After the breakup of Gondwana and the drift of India, Antarctica and Australia away from East Africa in the Mesozoic, the Mozambique margin was typified by post-rift tectonics and sedimentation. During this period of tectonic quiescence, clastic sedimentation and slope tectonics controlled the geology of offshore Mozambique. The onset of the East African Rift during the Cenozoic interrupted this structurally quiescent period. This activation of the East African Rift was not only expressed structurally throughout Mozambique, but the structural controls caused significant changes in the sedimentation along the margin. Herein, we analyse the sedimentation patterns of the Angoche margin throughout the Cenozoic using a 15,000km2, 3D survey and present a model of the relationship between this renewed structural influence and the effect on the margin's sedimentation. A distinct shift in sediment character is observed during the Oligocene. The submarine channel geometries that dominate the margin throughout the Paleogene subside, and there is an onset of mass transport systems on the shelf and continuing into the Angoche basin. Mapping the Cenozoic mass transport systems is complete and the interaction between discrete bodies was analysed to produce a depositional model of mass transport on the Angoche shelf after the Oligocene. This mapping was supported by structural attribute analysis including RGB edge delineation methods to fully utilise the broadband nature of the seismic data set for accurate mapping. The imaging also illuminated the varied, internal structural architecture of a number of these mass transport complexes. A model of Cenozoic sedimentation is presented, focusing on the mass transport complexes, individual lenses and pulses, and the internal architecture variation. From an exploration standpoint, understanding these systems is imperative for de-risking the prospective Cretaceous and Paleogene target intervals below. Mass transport systems notoriously act as poor sealing layers within a petroleum system. Although these complexes do not account for the entire post-Oligocene overburden within the area, the influence they have on regional sealing capacity is crucial. Our understanding of the post-Oligocene sedimentation is considered in terms of sealing capacity so that we may validate the prospective plays within the region. We thank INP, Instituto Nacional de Petróleo of Mozambique, for their permission to show and the use of the seismic data.