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Architecture and Neogene kinematic of the Seagap fault, offshore Tanzania, West Somali Basin

David Iacopini¹, Stefano Tavani¹, Sara Pentagallo¹, Cynthia Ebinger², Marina Dottore Stagna³, Dave Reynolds³, and Vittorio Maselli³

¹Dipartimento di Scienze della Terra, dell'Ambiente e delle Risorse, University of Naples "Federico II", Napoli, Italy

²School of Science and Engineering, Tulane University, US.

³Department of Earth and Environmental Sciences, Life Sciences Centre, Dalhousie University, 1355 Oxford Street, Halifax, Nova Scotia, Canada

In the West Somali Basin, the classic plate tectonic reconstructions describe an early Cretaceous intraplate deformation of oceanic crust (Hauterivian to Aptian) followed by the activation of a major transform fault (Davie Fracture Zone) displacing Madagascar southward for more than 1000 km. In this contribution, using vintage and new high-resolution 2D, 3D seismic reflection data and exploration wells, we show the first clear images of a poorly known tectonic structure: the Seagap fault. The Seagap fault is represented by a complex fault zone of several hundred kilometres of extent, oriented parallel to the Davie Fracture Zone and defined by segment faults, relay zones and step overs structures. It appears to have continuously acted as left-lateral strike slip fault during the Paleogene and most of the Neogene. From structural and stratigraphic observations of both existing and newly interpreted 3D seismic data, the Seagap appears nucleating as a strike-slip fault by reactivating failed Jurassic oceanic spreading zones. At regional scale the main fault appears to cut the main Neogene pervasive extensional oblique rift structures and at place to re-work some of the major Cenozoic inherited structure, creating apparent restraining bend structure. The sinistral kinematic nature of the transcurrent history, suggests that the Seagap fault acted as an independent feature respect to the Davie Fracture Zone. During the Quaternary the Seagap, which also parallels the seismically active Kerimbass rift, shows reduced offsets and appears to slip with normal displacement. We discuss the tectonic significance of the Seagap fault with respect to both to the major extensional oblique rift structural trend offshore Tanzania and the Davie Fracture Zone.