



## **Architecture of the oceanic crust in the eastern Gulf of Aden: different modes of seafloor spreading**

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The Gulf of Aden represents a young and narrow oceanic basin, currently marked by a slow spreading axis (20-22 mm/yr.). The presence of the Afar plume to the West and the intense segmentation make that this basin represents an interesting case to study the influence of such regional constraints on the seafloor spreading process. In 2012 were acquired several seismic transects across the eastern Gulf of Aden east of the Socotra-Hadbeen Fracture Zone (Socotra-Sharbithat segment). These seismic lines image the whole basin from the Oman margin to the Socotra margin, through the Sheba mid-oceanic ridge, and allow to reconstruct the oceanic spreading history of this basin, from the margin development to the present-day seafloor spreading. Observations along the seismic reflection profiles show that the oceanic crust is characterized by two distinct domains displaying different structural and magmatic characteristics. The combination of seismic, bathymetric, gravity and magnetic data suggests that seafloor spreading was at first rather controlled by a complex interaction of tectonic and magmatic processes, with perhaps phases of mantle exhumation. This state seems to have changed abruptly around the magnetic anomaly A5 time (10 Ma) for a more magmatic spreading mode. The age of this transition in the spreading mode correlates with a ridge jump in the segment west of the Socotra-Hadbeen Fracture Zone (Encens-Sheba segment), itself associated with the onset at the same time of large off-axis magmatism. These events in the Encens-Sheba segment are interpreted as linked to the Afar plume. The seismic transects allow following the lateral evolution of the oceanic domains but also of the Sheba ridge architecture and to correlate them to the ridge segmentation. The questions behind these observations are: what are the spreading processes associated with the onset of the two different oceanic domains and what drives the change of spreading mode at 10 Ma? Could it be an indirect influence of the Afar plume?