



## **Structure and volcanism along Tendaho and Manda Hararo Rifts: implications for the evolution of the southern Red Sea propagator in Central Afar**

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The Red Sea and Aden rifts (or propagators) meet in Afar. Here we use remote sensing and field analyses to define the geology and structure of the southern part of the Red Sea propagator, in Central Afar. This consists of the NW-SE trending Tendaho Graben (TG) and the younger and active NW-SE trending Manda Hararo Rift (MHR), partly within TG. Tectonic and volcanic activity within TG developed mostly between  $\sim 1.8$  to  $\sim 0.6$  Ma, with a stretching factor  $b \sim 1.1$ , an extension rate  $\sim 3.6$  mm/yr and the fissural eruption of part ( $\sim 7000$  km<sup>3</sup>/Ma) of the Afar Stratoid sequence (mainly basaltic lava flows and ignimbrites). MHR, before fading southward, shows  $b \sim 1.04$  and extension rate  $\sim 1.2$  mm/yr, and is associated with the emission of  $\sim 600$  km<sup>3</sup>/Ma of basalts in the last  $\sim 0.2$  Ma. While MHR undergoes almost pure extension, with minor left-lateral slip, the TG sides currently show significant left-lateral motion. The collected data suggest the following points. 1) An exceptional amount of magma extruded from a moderately extending crust along the southern part of the Red Sea propagator between  $\sim 1.8$  to  $\sim 0.6$  Ma; however, in the last  $\sim 0.2$  Ma, magmatic and tectonic activity, confined to MHR, significantly decreased. 2) The decrease in activity of the southern Red Sea propagator coincides with the on-land development and migration of the more active (inferred extension rate in the order of  $\sim 10$  mm/yr) Aden propagator, suggesting that spreading in Central Afar mainly occurred along an active propagator at time.