

## **Hotspots trails below Arabia and the Horn of Africa: new insight about the initiation of the Red Sea rift**

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The past trajectories followed by three present-day hotspots, Afar, East-Africa and Lake-Victoria were computed using a hotspot reference frame. The tracks are most of time situated under continental crust, which is known to strongly filter surface plume activity. We thus look for surface markers of their ancient existence, such as volcanism, doming, geochemistry and finally by a compilation of heat flow data issued from petroleum wells. Hence, the East-Africa hotspot is episodically warranted up to at least 110 Ma, the Afar one to about 90 Ma and the Lake-Victoria hotspot activity appears more recent and is attested until the Cenozoic. According to the hotspot trajectories, two important issues are addressed. Firstly, the Afar hotspot was situated 1000 km on the north-east of the Ethiopian-Yemen traps at 32 Ma, too far to be responsible for it. The trigger was most probably the East-Africa hotspot situated at the right location at that time. Secondly, we address the question of the Arabian Plate formation as the result of the coeval opening of both the Gulf of Aden and the Red Sea in a context characterized by extensional forces linked to the Neo-Tethys slab-pull: (1) the Gulf of Aden overlaps on inherited Mesozoic extensional basin between two weak zones, the Carlsberg ridge's end and a hotspot heated area; while (2) the Red Sea develops on the previous hotspot track location suggesting a causal relationship between a thermal weakening of the lithosphere and the rift initiation. To test this idea, we performed a numerical simulation in order to describe the lithosphere strength evolution when exposed to a hotspot heating combined with tectonic forces along the East-Africa hotspot track from 110 Ma until the beginning of the rifting at early Oligocene time. Preliminary results suggest that the Red Sea rift was compelled to evolve in a specific area pre-weakened by a hotspot impact.