



A triple junction trace beneath Reunion Island? Insight from marine magnetic anomalies

D. Bissessur (1), J. Dymant (1), C. Deplus (1), V. Yatheesh (1,2)

(1) IPGP & CNRS, Institut de Physique du Globe, Paris, France (bissessur@ipgp.jussieu.fr), (2) Now at National institute of Oceanography, Dona Paula, Goa, India

Reunion Island is the most recent expression of a hotspot which formed the Deccan Trap flood basalt, the Chagos-Laccadives Ridge, the southern part of the Mascarene Plateau, Mauritius and Reunion Islands. Both Mauritius and Reunion islands are isolated structures which have formed on the pre-existing oceanic lithosphere of the Mascarene Basin, an oceanic basin created by seafloor spreading between anomalies 34 and 27 (83-60 Ma). The location of Mauritius and Reunion islands may reflect either a preferential rise of hotspot material through pre-existing structures of the oceanic lithosphere or the discontinuous activity of a weakening hotspot. We address this question using bathymetric and magnetic data collected by R/V L'Atalante in 2006 as part of cruise FOREVER (FORmation and Evolution of the Volcanic Edifice of Reunion), complemented by other data in the area. We apply crossover error analysis to correct data from different cruises for time variations not considered by the IGRF model and build a magnetic anomaly map.

This map displays coherent magnetic anomalies over most of the area. Anomalies 28 to 20 are identified in the Madagascar Basin, east of the Mascarene Islands. Conjugate sequences of anomalies 31 to 27 (on the northern flank) and 34 to 27 (on the southern flank) are recognized west of the Mascarene Islands, on the conjugate flanks of the Mascarene fossil spreading centre. In the Mascarene Island compartment, the seafloor spreading anomalies can be deciphered under most of the Reunion Island edifice (radius 100 km) with only an inner zone of radius 50 km showing shorter wavelength anomalies related to the volcanic structures of the island. The seafloor spreading lineations show two orientations, N120°E-N140°E and N90°E-N110°E in the central and eastern part of the compartment, respectively. We interpret these different orientations as reflecting the presence of the trace of the Indian Ocean Triple Junction (IOTJ, between India, Africa, and Antarctica) in the area. Magnetic anomaly identifications in the Central Indian Basin clearly show that the IOTJ trace has been located in this basin since anomaly 29 (65 Ma). Before this time, the trace was most likely located in the Mascarene Basin. The observed chevron-shaped anomalies in the Reunion – Mauritius area are likely to be anomalies 29r, 30, and 31 on the northern flank of the Mascarene and Southeast Indian Ridges, i.e. on the Indian plate at the time of their formation. Two offset sequences of anomalies 32 and 33 are observed further north, NW of Mauritius Island. This evolving offset and a complex propagator-like structure observed SE of Reunion Island may reflect the different spreading rates on two different ridges at a triple junction. The conjugate anomalies are locally identified east of the northern Madagascar Plateau, although the data are sparse in this area. If confirmed by plate reconstructions of the Mascarene, Madagascar, Crozet and Central Indian basins, this model would imply that Reunion Island was formed on a specific location, the complex trace of the Indian Ocean Triple Junction on the Indian plate.