Geophysical Research Abstracts
Vol. 17, EGU2015-6060, 2015
EGU General Assembly 2015

Depth to Curie temperature or magnetic sources bottom in the volcanic zone of La Réunion hot spot

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We present an innovative study to generalize Curie Point Depth (CPD) determinations at the scale of oceanic volcanic islands, an approach heretofore largely focused on continental areas. In order to assert the validity of this technique in oceanic environments, we first test the Tanaka et al. (1999) approach on sets of oceanic ridges anomalies. Assuming that magnetic anomalies are concentrated within the oceanic crust and maybe part of the underlying upper mantle, the Curie depth should become deeper as the oceanic lithosphere becomes older (i.e. thicker). The calculated depths to magnetic bottom are in agreement with this general pattern. Using the growing assumption of a magnetized upper mantle, we consider that the method can be confidently used in the case of La Réunion Island and its surrounding oceanic lithosphere. We use the magnetic anomaly map computed by Gailler and Lénat (2010), completed and extended with the global Earth Magnetic Anomaly Grid (EMAG2) (Maus et al., 2007). The calculated magnetic sources bottom lies at depths between 10 and 29 km and exhibits a complex topography, presumably caused by the combination of various magmatic and tectonic crustal structures. To the first order, the magnetic bottom surface shallows beneath La Réunion and Mauritius Islands, suggesting a thermal effect of the hot spot, and deepens away from La Réunion edifice. At the scale of the Mascarene Basin, several discontinuities in CPD are well correlated with main fracture zones.