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RHUM-RUM investigates La Réunion mantle plume from crust to core

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RHUM-RUM (Réunion Hotspot and Upper Mantle - Réunions Unterer Mantel) is a French-German passive seismic experiment designed to image an oceanic mantle plume – or lack of plume – from crust to core beneath La Réunion Island, and to understand these results in terms of material, heat flow and plume dynamics. La Réunion hotspot is one of the most active volcanoes in the world, and its hotspot track leads unambiguously to the Deccan Traps of India, one of the largest flood basalt provinces on Earth, which erupted 65 Ma ago. The genesis and the origin at depth of the mantle upwelling and of the hotspot are still very controversial.

In the RHUM-RUM project, 57 German and French ocean-bottom seismometers (OBS) are deployed over an area of 2000 km x 2000 km2 centered on La Réunion Island, using the “Marion Dufresne” and “Meteor” vessels. The one-year OBS deployment (Oct. 2012 – Oct. 2013) will be augmented by terrestrial deployments in the Iles Eparses in the Mozambique Channel, in Madagascar, Seychelles, Mauritius, Rodrigues and La Réunion islands. A significant number of OBS will be also distributed along the Central and South West Indian Ridges to image the lower-mantle beneath the hotspot, but also to provide independent opportunity for the study of these slow to ultra-slow ridges and of possible plume-ridge interactions.

RHUM-RUM aims to characterize the vertically ascending flow in the plume conduit, as well as any lateral flow spreading into the asthenosphere beneath the western Indian Ocean. We want to establish the origin of the heat source that has been fueling this powerful hotspot, by answering the following questions: Is there a direct, isolated conduit into the deepest mantle, which sources its heat and material
from the core-mantle boundary? Is there a plume connection to the African superswell at mid-mantle depths? Might the volcanism reflect merely an upper mantle instability? RHUM-RUM also aims at studying the hotspot’s interaction with the neighboring ridges of the Indian Ocean. There is in particular a long-standing hypothesis, not yet examined seismically, that channelized plume flow beneath the aseismic Rodrigues Ridge could feed the Central Indian Ridge at 1000 km distance.

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