RHUM-RUM experiment
« Réunion Hotspot and Upper Mantle »

Imaging a mantle plume from head to tail and its surrounding

PI's : Guilhem Barruol, IPGP, Géosciences Réunion
Karin Sigloch, Univ. of Munich

Participants from the LGM team :

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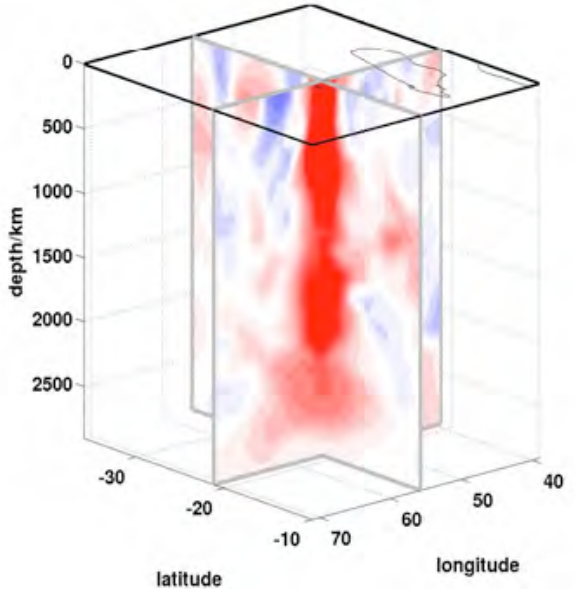
Dass Bissessur, MOI

Other participants from IPGP :

Fabrice Fontaine
Jean-Paul Montagner
Geneviève Roult
Eléonore Stutzmann
Valérie Ferrazzini
Cinzia Farnetani

Large-scale international seismology experiment RHUM-RUM

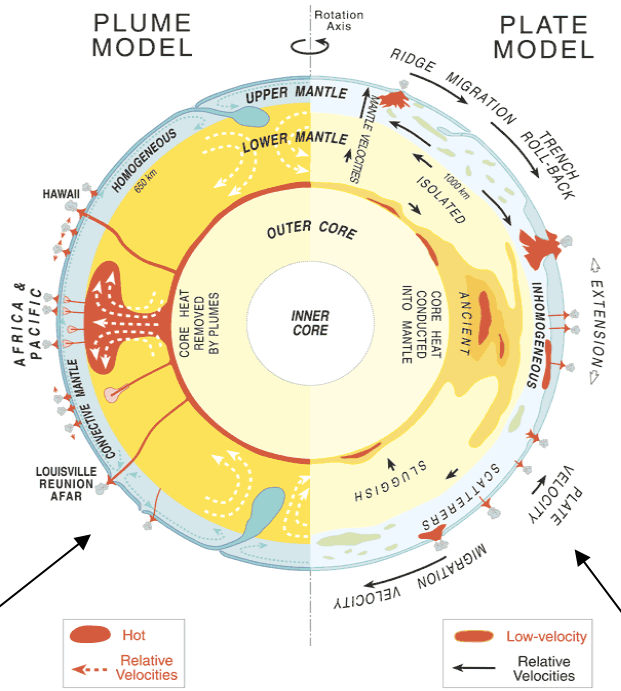
Main objective:
Imaging of whole plume down to the base of the mantle



Main scientific objectives :

- to image the whole mantle structure beneath La Réunion, in order to confirm or reject the presence of a deep, continuous plume from surface to lowermost mantle

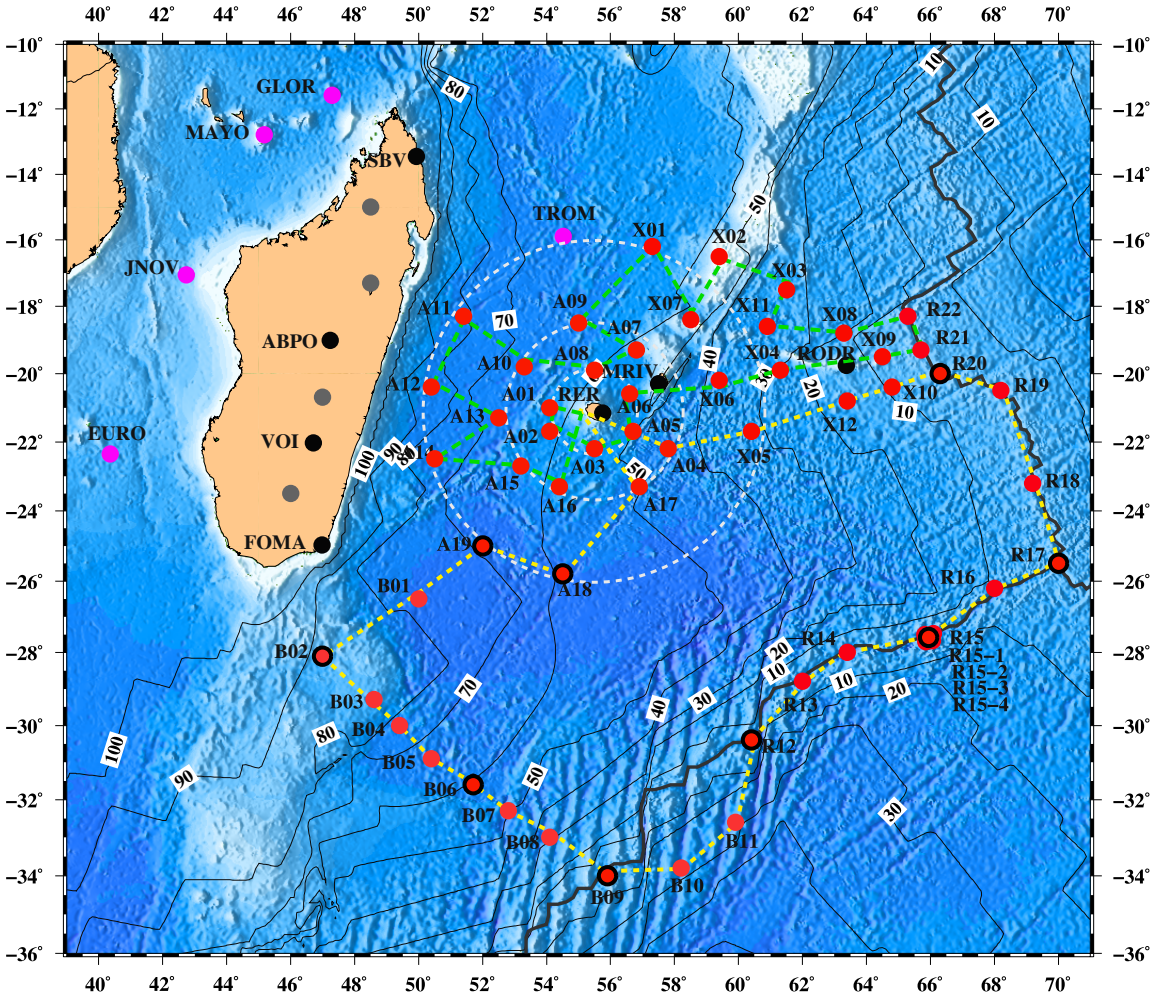
- to characterize horizontal mantle flow near the surface and hotspot-ridge interactions



Different hotspot origins as described by Courtillot et al. (2003) showing a possible deep source for La Réunion hotspot

The « plate model » proposing alternative view for the origin of hotspots (Anderson, 2004).

RHUM-RUM project proposes to instrument an area of about 2000 x 2000 km^2 of the Indian Ocean, centered on La Réunion hotspot and extending to the South-West and Central Indian ridges, with ~ 60 ocean-bottom seismometers (OBS) for approximately one year.



Red dots :
9 broadband OBS from INSU
48 wideband OBS from DFG

Pink, black and grey dots :
on-land stations

➡ a french – german collaboration

ANR project funded - 2012-2015

PI : Guilhem Barruol, IPGP, Géosciences Réunion

Partners :
- IPG Paris (+ IPG Strasbourg, Univ Brest, Géosciences Azur)
- Géosciences Montpellier + FAST, Paris Sud
- Univ. of Munich + Geomar Kiel

792 k€ including 334 k€ for the cruise aboard N/O Marion Dufresne (OBS deployment)

DFG project funded

PI : Karin Sigloch, Univ. Of Munich

567 k€ + the cruise aboard a german research vessel (OBS recovery)

Project structure of RHUM-RUM

French-German Collaboration
Coordinators: Guilhem Barruol (Univ. Reunion) and Karin Sigloch (LMU Munich)

Involved scientists include: G. Barruol, E. Stutzmann, J.P. Montagner, S. Singh, F. Fontaine, C. Deplus, ..., K. Sigloch, H. Igel, G. Rümpker, C. Thomas, V. Schlindwein, M. Jegen,....

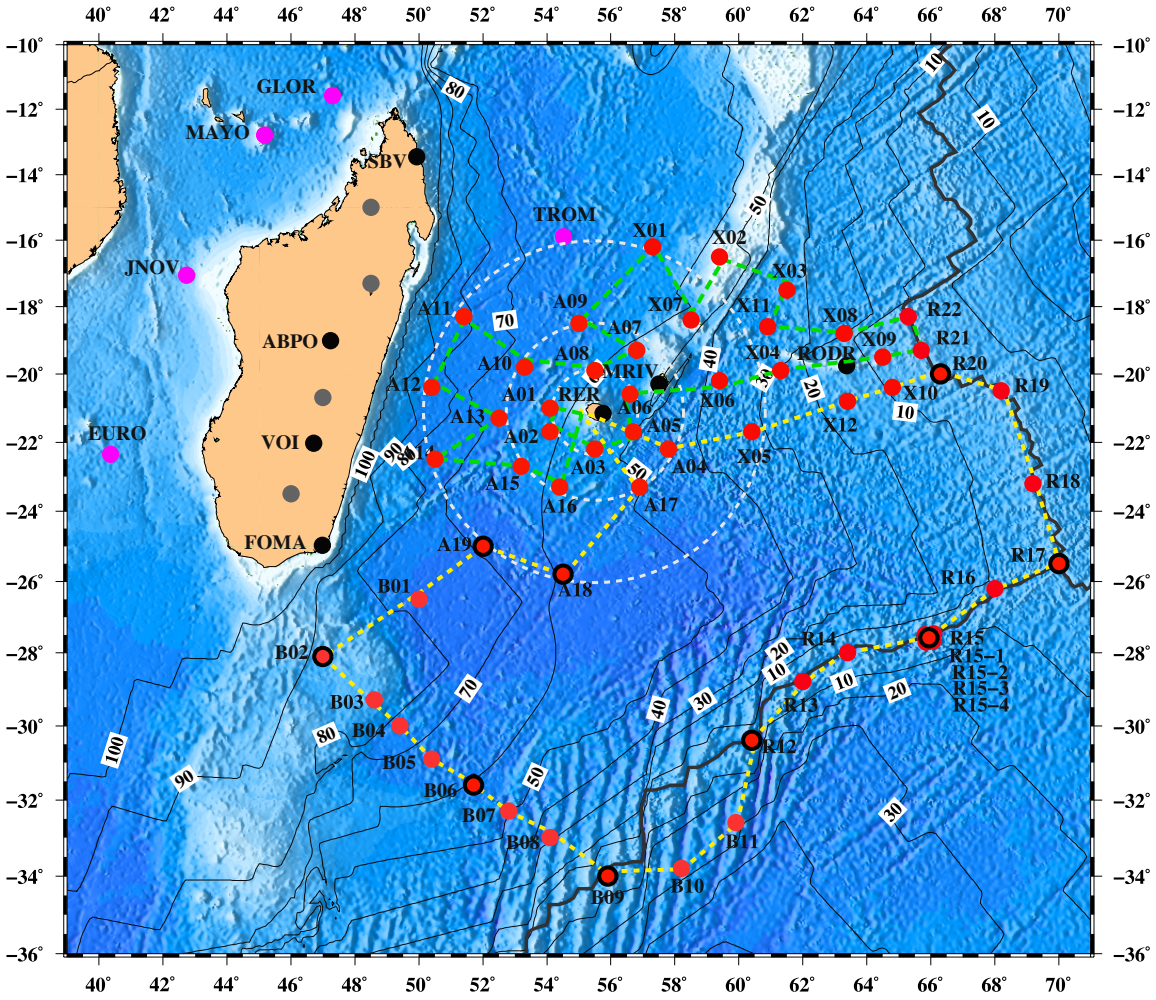
Funding through 4 coordinated proposals:

- Ship time Marion Dufresne ☑
- ANR: Pay for ship time, travel, french OBS, etc. ☑ 792 kEuro
- Ship time Meteor (recovery cruise) ☑ 67 kEuro
- DFG: 48 DEPAS OBSs costs, salary, land stations ☑ (inoffical) 550 kEuro

Two oceanographic cruises,
the first one aboard N/O Marion Dufresne, sept-oct. 2012 :

Chief scientist : Guilhem Barruol

Co-chief scientists : Christine Deplus, leg 1 – Satish Singh, leg 2

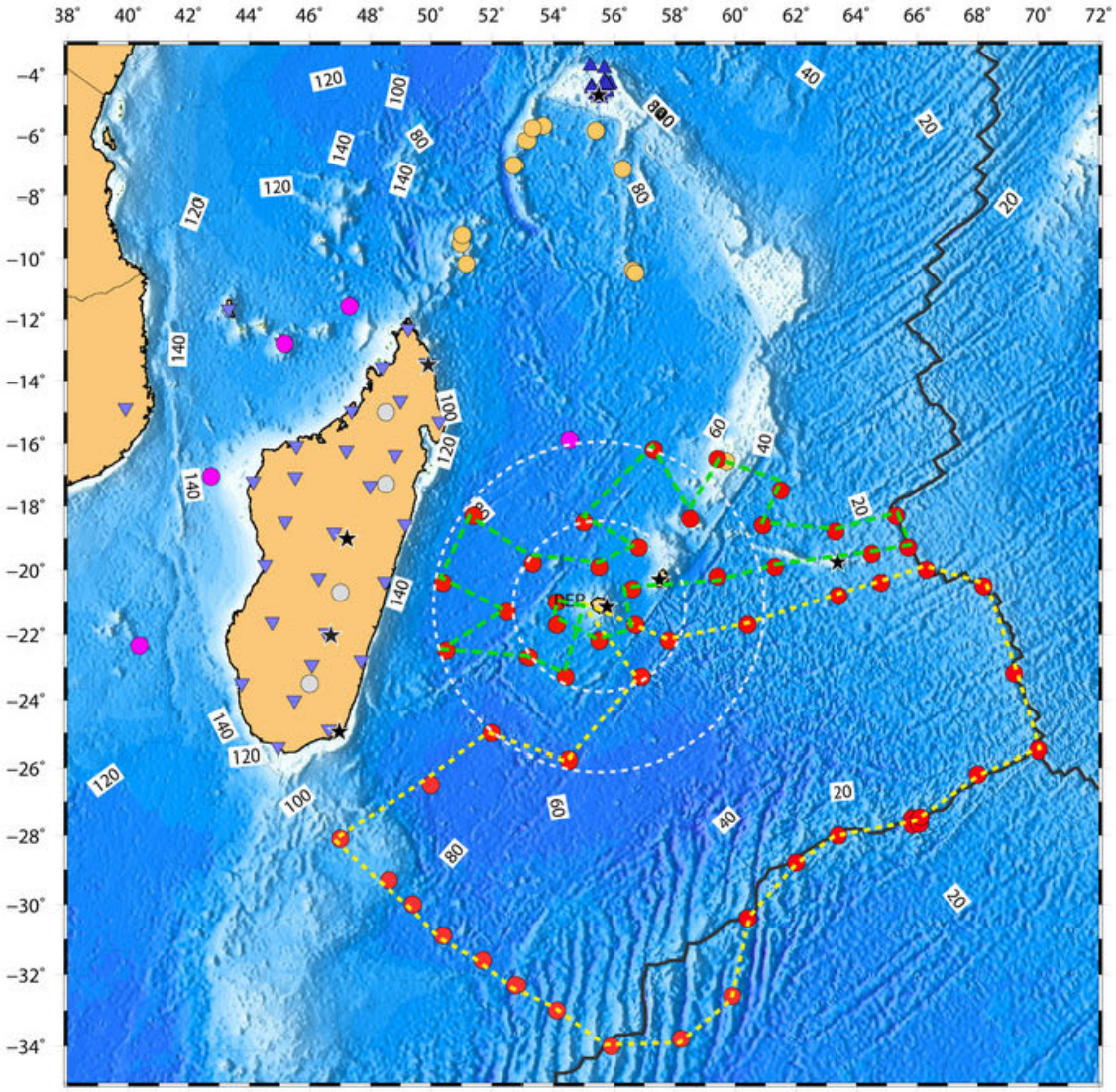


In addition to OBS deployment :

Swath bathymetry, gravity and magnetic data will be collected along the transits between OBS location in order to increase the regional mapping of the area.

Leg 1 : green dashed lines
Leg 2 : yellow dashed lines

OBS and land stations during RHUM-RUM



Geometry of the proposed RHUM-RUM broadband array. Colored dots mark RHUM-RHUM instrument sites.

Red dots: 48 German DEPAS OBS and 9 French INSU OBS, connected by the planned ship route (dashed lines). Dashed white circles mark distances of 250 and 500 km from La Réunion.

Yellow dots: 12 DEPAS island stations in the southern Seychelles and northern Mauritius.

Grey dots: 5 Madagascar stations (Barruol).

Magenta dots: 5 French-German stations in the Iles Eparses (Barruol, Schlindwein).

Five more stations will be deployed on La Réunion itself (Barruol).

Affiliated projects:

Blue triangles: SEISM array 2003 (co-PI Rümpker).

Inverted triangles: MACOMO array 2011-2013

Black stars: international permanent stations