



Subject offered for a contract starting October 2017

SUBJECT TITLE: *Tomography study of Oceanic Lithosphere across the Equatorial Fracture Zones in the Atlantic Ocean*

Advisor: **Singh, Satish, position (Pr), singh@ipgp.fr**

Second Advisor/ Supervisor:

Host lab/ Team : *please fill in and leave out meaningless information*
IPGP- Team Marine Geoscience – UMR7154

Financing: IPGP (European Research Council)

For more information go to <http://ed560.ipgp.fr>, section: Offres de these (PhD offer), You must apply on the Doctoral School website

The Equatorial Fracture zones in Atlantic Ocean have played fundamental role in the break-up of Africa and Brazil, and define the 2,000 km E-W coastline along the Equatorial Africa. The age contrast across the Chain Fracture Zone is about 15 Ma, i.e. an offset 300 km; across the Romanche Transform Fault the age contrast is 45 Ma, with an offset of 900 km, and across St. Paul it is 35 Ma with an offset of 700 km. The Romanche transform fault is the largest transform fault on Earth and has hosted a series of large earthquakes, including the 1994 Mw=7.1 earthquake. It has been suggested that the lithosphere beneath these fracture zones is cold. These fracture zones have also been responsible for the un-mixing of the water between the southern and northern oceans, and hindering the migration of ecosystem from south to north across the Equator. However, the nature of these fracture zones remains unknown.

A 600 km long ultra-deep seismic reflection data using a 12 km long multi-component streamer were acquired and in 2018 we plan to acquire refraction data using ocean bottom seismometers. The initial reflection seismic image shows the presence of reflections from 70-100 km depth across the St Paul Fracture zone. In this project, we propose to analyse the OBS data to determine velocity structure of the oceanic lithosphere and of the fracture zones down 30-40 km depth and interpret these results along with deep seismic reflection data. To analyse these unique data, we propose to use state of the art analysis techniques, such as downward continuation, tomography and full waveform inversion. The question we wish to address are, but not limited to: (1) How deep the fracture zone faults penetrate in the lithosphere, (2) how deep fluid penetrates within these fracture zones, (3) how the thickness of lithosphere changes across the fracture zones?

A student with background geophysics, physics with interest in understanding fundamental geophysical processes is encouraged to apply. The student will be a member of the Paris Exploration Geophysics Group (GPX) and will benefit from its wide-ranging projects and interaction with industry partners.

More information about the project could be found on:

[http://erc.europa.eu/projects-and-results/erc-fundedprojects?f\[0\]=sm_field_cordis_project_funding%3AAdvanced%20Grant%20%28AdG%29&f\[1\]=sm_field_cordis_project_subpanel%3APE10&f\[2\]=sm_field_cordis_project_hi_count%3AFrance&page=1](http://erc.europa.eu/projects-and-results/erc-fundedprojects?f[0]=sm_field_cordis_project_funding%3AAdvanced%20Grant%20%28AdG%29&f[1]=sm_field_cordis_project_subpanel%3APE10&f[2]=sm_field_cordis_project_hi_count%3AFrance&page=1)

