Subjet offered for a contract starting 2015

SUBJECT TITLE: Structure and dynamics of the Central Vanuatu Subduction Zone

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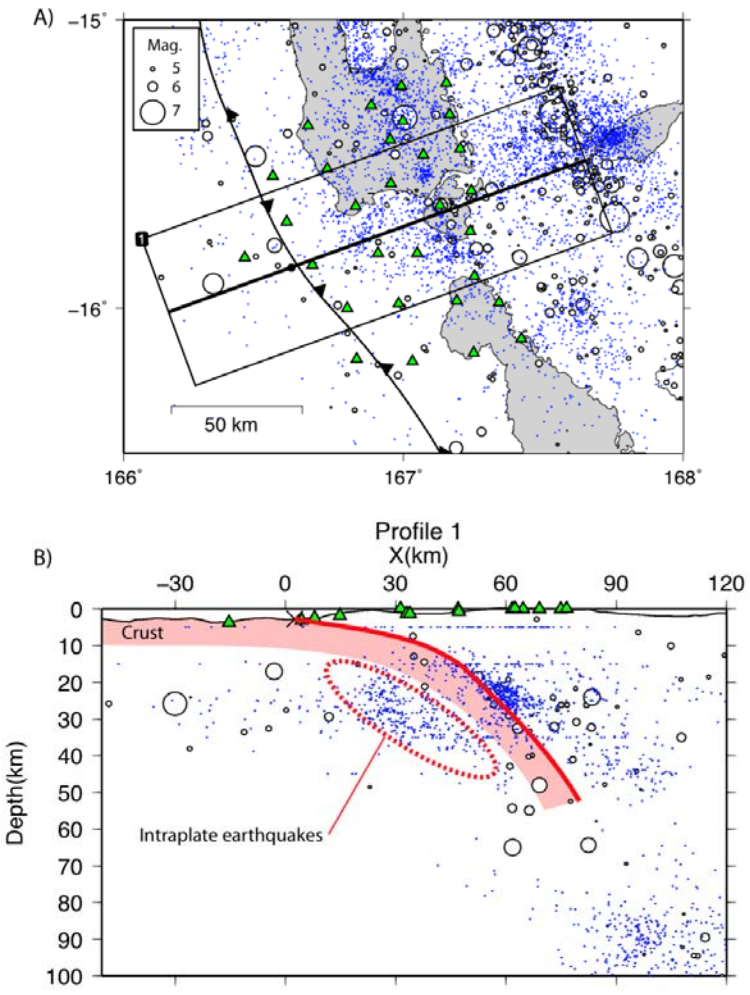
Financing : **Doctoral contrat with or without assignment**

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

Presentation of the Subject : (1 or 2 pages)

The Vanuatu subduction zone is one of the world's most seismically active regions, with approximately 1 magnitude 7+ earthquake every year. This high seismic energy is generated by the rapid (12-15 cm/yr) convergence between the North Fiji plate and the Australian plate that subducts beneath it. In the central part of the subduction zone, several large bathymetric features enter into subduction, and this collision has locally slowed the convergence rate and generated high uplift that pushed Vanuatu's two largest islands out of the ocean. These two large islands are as close as 25 km to the subduction front, making this region an ideal site for studying the seismicity and blocking of the seismogenic zone between the plates.



The Central Vanuatu seismological network. Grey bodies = islands. Triangles = seismometers, line with triangles = subduction front; Blue points = earthquakes detected by the network. Circles = moderate to large earthquakes detected by the global network. From Baillard (2014).

For ten months in 2008-2009, 20 land and 10 ocean-bottom seismometers were deployed in this region. This network detected ~30 000 local earthquakes, constraining the structure of the plate interface and identifying a double seismic zone associated with the subduction. A continuous-

time geodesy network deployed at the same time indicates that the seismogenic interface is presently blocked. We are still running 5 broadband seismological stations and 8 continuous GPS stations on and around these islands.

We propose a thesis subject to study the structure and dynamics of this region, using the seismological data from the temporary and long-term arrays. The student will use the seismology data to construct a 3D velocity map beneath the network and interpret the structures revealed by the resulting velocity and seismivity images. The student will also study the evolution of seismicity and non-volcanic tremor using the long-term seismometer array. He/she will evaluate evolutions in seismological activity since the beginning of the network and correlate them with geodynamic events such as silent slip detected by the geodesy network.

Structure et géodynamique de la partie centrale de la zone de subduction de Vanuatu