



ÉCOLE DOCTORALE SCIENCES DE LA TERRE



Subject offered for a contract starting october 2014

SUBJECT TITLE: Seismicity, magmatism and hydrothermal circulation within Lucky Strike volcano (Mid-Atlantic Ridge)

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Host lab/ Team : **IPGP- Marine Geosciences Team – UMR7154**

Financing: Doctoral contract with or without assignment

For more information go to <http://ed109.ipgp.fr>, section: Offres de these (PhD offer), You must apply on the Doctoral School website

Presentation of the subject:

Lucky Strike volcano sits 1600 meters beneath sea level, on the Mid-Atlantic Ridge between the North American and European tectonic plates. High-temperature (>350°C) hydrothermal vents surround a frozen lava lake at the volcano's summit, and an ~3 km wide by 7 km long magma chamber lies 3 km beneath the volcano summit. Lucky Strike has been heavily studied over the past two decades, resulting in one of the best images of the structure of a mid-ocean ridge volcano.

Lucky Strike is now the site of a pioneering European seafloor observatory, as part of the EMSO (European Multidisciplinary Seafloor Observatory) project. The observatory includes seismological, geodetic, fluid temperature, chemical and ecological sensors. Seismometers have been deployed in a network around Lucky Strike volcano since 2007, making this the longest seismology study ever of a mid-ocean ridge volcano. Several thousand seismic events have been located and preliminary studies show events associated with hydrothermal circulation and tectonism at the volcano summit, as well as tectonic events along the spreading segment, mostly to the south of the volcano. The seventh year of data will be recovered in the summer of 2014.

We propose a doctoral thesis project to study tectonism, magmatism and hydrothermal activity on the Lucky Strike volcano and segment using these seismological data. The student will use earthquake locations and magnitudes to determine the present tectonic, magmatic and hydrothermal conditions within the volcano, based on long-term (background) activity and on discrete active spreading events. A clear understanding of plate tectonics and seismic wave propagation as well as a familiarity with numerical methods are highly recommended.

Depending on the student's interests, this project could be complemented, in collaboration with the University of Brest (Dr Julie Perrot), by a methodological study of how ground motion associated to seismic events at the ridge axis creates acoustic signals that propagate to great distances in the water column. For this, the student would use the Lucky Strike seismic monitoring dataset and a coincident set of water column hydrophone recordings, also acquired as part of the EMSO project.

