



Subject offered for a contract starting october 2015

SUBJECT TITLE:

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Second Advisor/ Supervisor:
SURNAME, Firtsname, position (Pr, CR, MCF, DR), email address

Host lab/ Team : *please fill in and leave out meaningless information*
IPGP- Dynamique des Fluides Geologiques

Financing: Doctoral contract with or without assignment

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Presentation of the subject: (1 or 2 pages)

Eruptions are characterised by a significant degassing, in which strongly to weakly overpressurised gas is expelled at the vent. This intense degassing is the source of infrasound and acoustic waves which can be recorded at a safe distance.

The goal of this PhD is to characterise the various infrasonic-acoustic waveforms recorded relatively close to the vent. Models for the source of the sound will be developed and used to quantify pressure, volume and gas flux at the vent. The analysis of long time series in acoustic records will be used to characterise the variations in eruptive activity and distinguish between various patterns. Simplified models will be developed to understand the physical mechanisms existing in the conduit and in the reservoir using the constraints brought by the interpretation of acoustic records. This study will also discuss the potential of using acoustic measurements as a monitoring technique. Infrasonic-acoustic measurements will be compared to other techniques, such as seismic and thermal records.

The target volcanoes are Yasur (Vanuatu), located in a subduction zone expelling relatively fluid magma, and Soufriere of Guadeloupe, which currently undergoes a strong fumarollic activity.

Yasur, which is in permanent Strombolian activity, has an eruptive activity whose intensity can vary by one order of magnitude. Its surface activity is related to the expulsion of a weakly to strongly overpressurised gas at the vent, whose expansion propels magma fragments. The potential cyclicity between periods of vigourous activity and moderate activity, still to be

analysed, is a characteristic of the eruptive behaviour of Yasur. This specific pattern can provide constraints on the physical mechanisms in the magma reservoir and shed light on the mechanisms of gas accumulation at depth.

Soufriere of Guadeloupe is an explosive volcano, which can classically produce phreatic eruptions such as in 1976. Its last magmatic eruption, a few century ago, suggests that a phreatic eruption might trigger a magmatic eruption such as at the nearby volcano of Soufriere Hills (Montserrat). The fumarollic activity at the summit of Soufriere of Guadeloupe is in constant increase since 1992 making it worthwhile to develop an instrumentation useful for both monitoring and understanding the physical mechanisms at the origin of phreatic and magmatic eruptions.