Geophysical Research Abstracts
Vol. 12, EGU2010-6781, 2010
EGU General Assembly 2010

Probing the magma plumbing of Ambrym volcano, by a triangular acoustic network

Philpson Bani (2), Sylvie Vergniolle (1), Christelle Zielinski (1), Michel Lardy (2), Alexis Le Pichon (3), Damien Ponceau (3), Francis Gallois (2), Pascal Herry (3), Sylvain Todman (4), and Esline Garaebiti (4)

(1) Institut de Physique du Globe, Laboratoire de Mécanique des Fluides Geologiques, Paris, France (vergniolle@ipgp.jussieu.fr, +33-(0)1-44272481), (2) IRD, B.P.A5, 98848 Nouméa Cedex, Nouvelle Calédonie, (3) CEA, DASE, F-91297 Arpajon Cedex, France, (4) Geo-Hazards, DGMWR, PMB 001, Port Vila, Vanuatu

Ambrym volcano is presenting one of the rare examples for which 2 volcanic edifices, build at a few kilometers from one another, are simultaneously erupting. Their volcanic activity, quasi permanent, vary between exhibiting weak to strong strombolian explosions. Both volcanoes may also produce eruptive columns reaching a few kilometers in the atmosphere. We initially installed, in 2008, an acoustic triangular network on Ambrym volcano to detect strong volcanic explosions, relativeley close to the vents, at 2 km. The lack of strong explosions during our 6 months of recordings, with recorded acoustic pressure < 10 Pa, prevented us to use these explosions as natural sources for tracing the propagation path in the atmosphere towards the station installed at Noumea, 650 km away. Our acoustic network on Ambrym could also have been very useful to monitor an eruption on a nearby volcano, Lopevi, distant by 10 km, and compare the signals close to the volcano, 1 km, with those recorded at a intermediate distance from the source, 10 km. Unfortunately Lopevi did not produce any significant eruptive column during the recording period.

However our acoustic triangular network installed in 2008 on Ambrym volcano have been proven suitable to distinguish the volcanic activity in Benbow and Marum. More than hundred thousand acoustic events have been recorded within a 6 month period (longest data series ever obtained on Ambrym) indicating a quasi continuous magmatic activity in both Benbow and Marum craters. 60 % of the acoustic events occurred in Marum with several periods marked by significant bursts and some periods of quiescence, while Benbow exhibits minor explosions continuously. The first period with strong explosions at Marum is preceded by an increase in number and duration of acoustic events in both craters as well as a shift in frequency. This suggests that either both volcanic edifices share the same magma reservoir or that an efficient connection exists in their magma plumbing systems. The rapid return of Benbow to its normal activity after a period of strong explosions at Marum compared to that of Marum may indicate that Benbow crater is the closest to the magmatic source, hence probably directly above it. This is also compatible with the existence of periods of quiescence solely at Marum and not at Benbow. This new approach in volcanic studies and monitoring has revealed valuable information of the edifice plumbing system of Ambrym, which is of a key to understand its eruptive behaviour. It is also a promising tool for volcanic monitoring as our acoustic network detects precursory events 1-2 days prior to major explosions.