

Ecole Doctorale des Sciences Fondamentales

Title of the thesis: Evolution of the eruptive activity of Aoba (Vanuatu)

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Summary:

The island of Aoba (Ambae), in the central part of the Vanuatu arc, is composed of a single volcano that rises to 1496 m above sea level. Volcanic activity results from subduction of the Australian plate underneath the Pacific plate. With an erupted volume of 2500 km³, most of it fluid lava flow of basaltic that can be very primitive, the island of Aoba is often considered a typical basaltic shield-volcano. The last eruptive activity in 2017-2018, however, has clearly demonstrated that this volcano is capable of producing large explosive eruptions that can reach the stratosphere. How can this basaltic volcano send ashes up to 10 km and more? Are there any other similar manifestations or more intense events in the past? The building of the large summit cone is still poorly known. Assuming the summit is exclusively constituted by tephra deposits, then why did the eruptive character change compared to the fluid lava flows that formed the base of the edifice? All these questions merit consideration, not only because of the scientific interests they enhanced but also because of the threat concerning the 11,000 inhabitants of this island-volcano. To answer these questions, the goal of the thesis is to characterize the temporal evolution of the magmatic system using a multiple methods (stratigraphy, petro-geochemical modelling, thermobarometry, trace element geochemistry, isotope geochemistry, volatile element analyses in melt inclusions...) to understand the parameters that control the style of eruptive activity, and how they change over time. To start with, a more representative sampling of volcanic products will be carried out, supplemented whenever possible by geochronological data.

This PhD project is supported by the ARTS (IRD) program and is targeting a candidate from Vanuatu.