



Eruptive History Of The 1563 Eruption Of Fogo Volcano (S. Miguel, Azores)

Simone Aguiar (1,2), José Pacheco (1,2), Adriano Pimentel (1,2)

(1) Instituto de Investigação em Vulcanologia e Avaliação de Riscos (IVAR), Universidade dos Açores, Ponta Delgada, Portugal (simone.c.aguiar@azores.gov.pt), (2) Centro de Informação e Vigilância Sismovulcânica dos Açores (CIVISA), Ponta Delgada, Portugal

Fogo volcano is located in the central part of S. Miguel Island (Azores) and is an active central volcano with summit caldera partly occupied by a lake. Similarly to the other two active central volcanoes on the island, also with summit calderas and lakes, the recent eruptive history of Fogo volcano (last 5 ky) is dominated by explosive eruptions of Subplinian style, frequently with hydromagmatic character, yet Fogo was the only that produced a Plinian eruption.

The 1563 explosive eruption of Fogo volcano was the last inside the caldera and was shortly followed (4 days after) by a basaltic eruption on the north flank of the volcano. The eruption had a total volume of 0.99 km³ and a column height of 18 km. The products from this explosive eruption were dispersed to the eastern side of the island as result of the predominant wind direction at the time.

To determine the eruptive history of the Fogo 1563 eruption a set of more than 70 stratigraphic sections were documented, allowing to establish stratigraphic correlations and to understand the internal structure of the deposit. The Fogo 1563 deposit is characterized by alternating ash and pumice lapilli layers and it was possible to discriminate two members defined by their dominant lithofacies and stratigraphic position, which are representative of two phases of the eruption.

The Lower Member is mostly composed of ash layers. It includes a basal ash bed (C1), a pumice bed containing ash layers (L1) and a fine-grained ash bed with internal stratifications of fine-grained pumice lapilli, with abundant accretionary lapilli (C2). The Upper Member is mostly comprised of pumice layers. It includes a pumice bed with ash layers (L2), a stratified fine-grained ash bed containing fine-grained pumice layers, accretionary lapilli and some vesicles (C3), a pumice bed with ash layers (L3), a fine-grained ash bed with a coarse-grained pumice layer (C4) and a top pumice bed with some intercalated ash layers (L4). The distribution of the two members is not homogenous throughout the eastern side of the island. The Lower Member is best represented to the south of the dispersal axis, while the Upper Member outcrops more expressively on the north sector, suggesting a slight shift of the wind direction during the eruption.

The stratified nature of the Fogo 1563 deposit indicates that the eruption column experienced significant unsteadiness. The first phase of the eruption was characterized by higher magma fragmentation efficiency, suggesting an important hydromagmatic character, that gradually decreased with time. This led to the formation of a pulsating eruption column that deposited widespread ash layers. The second phase was dominated by a more magmatic nature, producing an oscillating eruption column that mostly showered pumice layers. Overall, the characteristics of the Fogo 1563 deposit are similar to the other recent Subplinian eruptions of the active central volcanoes of S. Miguel (alternating hydromagmatic and magmatic phases), which suggests that the eruptive processes are recurrent in these explosive central volcanoes with important hydrologic systems.