

Decadal timescales of magma chamber dynamics at a steady-state volcano: The case of Stromboli volcano, Italy

C. M. PETRONE¹, E. BRASCHI², L. FRANCALANCI^{2,3} AND S. TOMMASINI³

¹The Natural History Museum, Department of Earth Sciences, Cromwell Road, SW7 5BD, London, UK; email: C.Petrone@nhm.ac.uk

²CNR-IGG Sezione Firenze, Via G. La Pira, 4, Firenze, Italy

³Dipartimenti di Scienze della Terra, Università degli studi di Firenze, Vial G. La Pira 4, Firenze, Italy

Stromboli is presently characterized by persistent moderate explosive activity ejecting black scoriaceous bombs, lapilli and ash. It is interrupted by effusive eruptions and paroxysms, the latter also discharging a few amount of pumices formed by a magma sited in a deeper reservoir. The entire system is in steady-state conditions whose driving forces are still not completely understood. Understanding the evolution of the plumbing system toward the present-day condition is crucial to better constrain the dynamics of the Stromboli volcano.

We studied in detail four selected samples representative of the transitional eruptive phase from the pre-Sciara period to the present-day: (i) three older spatter lava samples from the pyroclastic succession of Chiappe Lisce (Post-Pizzo activity) emplaced prior to the beginning of the present-day activity; (ii) a scoriaceous spatter ejected during one of the early paroxysms of the present-day activity. All samples have similar paragenesis (phenocrysts of olivine, clinopyroxene and plagioclase) but different types of clinopyroxene textures with different recurrence among the samples. Multiple banded clinopyroxene with evident resorption features characterizes the older Post-Pizzo products, recording several pulsatory intrusions of new mafic magmas into the system and pointing to the establishment of steady-state condition. Contrarily, single diffused band and/or patchy cores are found in the present-day spatter. We applied the new NIDIS (Non-Isothermal Diffusion Incremental Step model, Petrone et al., this session) chronometry to suitable clinopyroxene crystals to constrain the timescales of these refilling events. Decadal timescales (up to 40 yrs) characterise the shallow magma reservoir from the post-Pizzo period, whilst the present-day activity is characterized by shorter residence time (20-3 yrs). Our results point to a progressive transition from the Post-Pizzo toward the present-day conditions and to consider the dynamics of the present-day activity as linked to very short timescales of magma interaction.