**Chaotic Mixing Device**

Deliverable 4.2 within the VUELCO-Project

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The chaotic mixing device installed at the Department for Earth and Environmental Sciences (LMU, Germany) enables the study of magma mixing under careful control of the flow fields via defining mixing protocols. It consists of an outer and an inner cylinder, which is located off-center. The outer cylinder hosts the magma A. Both cylinders are constituted by a Pt80-Rh20 alloy to resist at high-temperatures without contamination of natural compositions. The motions of the two cylinders are independent and their rotation with given angular velocities generates chaotic streamlines (De Campos et al., 2011; Perugini et al., 2012 and references therein). The outer cylinder is filled by the desired magmatic composition (Magma A) and cooled down to room temperature to produce a glass. From this glass two cylinders are drilled out, one at the position of the inner cylinder, and a second one at the initial position of the other magmatic composition (Magma B). The experimental protocol (i.e. relative number of rotation of the two cylinders) is chosen to ensure the occurrence of chaotic dynamics within the entire experimental sample. The protocol consists of alternating rotations of the outer and inner cylinders in the following sequence:

(1) two complete rotations of the outer cylinder in 35 min;

(2) six complete rotations of the inner cylinder in 18 min.

Such experimental protocol, in conjunction with the tested viscosities, provided flow conditions with Reynolds’ numbers on the order of 10-7 (see De Campos et al., 2011 and Perugini et al., 2012).

De Campos, C. P., Perugini, D., Ertel-Ingrisch, W., Dingwell, D. B., Poli, G., 2011. Enhancement of Magma Mixing Efficiency by Chaotic Dynamics: an Experimental Study. Contrib. Mineral. Petrol. 161, 863-881.

Perugini, D., Poli, G., 2012. The mixing of magmas in plutonic and volcanic environments: analogies and differences, Lithos, http://dx.doi.org/10.1016/j.lithos.2012.02.002.

