Geophysical Research Abstracts
Vol. 14, EGU2012-11081, 2012
EGU General Assembly 2012

Crystallization kinetics of silicate melts

C. Agostini, F. Arzilli, and M.R. Carroll
University of Camerino, Camerino (MC), Italy (claudia.agostini@unicam.it)

The aim of this work is to estimate growth rates and nucleation rates of crystalline phases in silicate melts through cooling (at constant P) and decompression (at constant T) experiments, to determine magma evolution, in sin-eruptive processes during eruptions, of Stromboli, Pantelleria and Campi Flegrei volcanoes.
The thermodynamic and physical properties of magmas have been extensively investigated as a function of temperature (T), pressure (P), oxygen fugacity fO_2, and composition1; this allows estimation of the stability of equilibrium phases, the chemical transport and physical parameters (e.g. density, viscosity). However, there are no suitable theoretical models capable of calculating nucleation and growth rates without experimental constraints. This work consists of reproducing the sin-eruptive conditions in the laboratory and combining study of textural and mineralogical features of synthetic and natural samples, trying to define magma behaviour during the ascent towards the surface. Textural determination can be used to evaluate time scales of magmatic processes, as magma residence time in a reservoir and into a conduit during the eruption. Textures are traditionally studied through 2D sections of 3D objects. An important goal of geologist and others scientists is to analyse texture and compositions, of rocks and/or materials like metals, alloy, ceramics, glass-ceramics, cements, in three dimension view, and thus fully quantify their physical properties.
This study is useful to improve the knowledge crystallization kinetics of silicate melts through textural analysis of volcanic rocks: the preliminary results for the time scales of eruptions estimated through this work, for Stromboli and Campi Flegrei volcanoes, change between few hours to 2 days.