Geophysical Research Abstracts
Vol. 17, EGU2015-8915, 2015
EGU General Assembly 2015

The fate of magmas rising through the crust

Luca Caricchi (1), Guy Simpson (1), and Eleonora Rivalta (2)

(1) University of Geneva, Section of Earth and Environmental sciences, rue des Maraîchers 13, 1205, Geneva, Switzerland (luca.caricchi@unige.ch), (2) Deutsches Geoforschungszentrum GFZ, Telegrafenberg 14473, Potsdam, Germany

The fluxes of magmas from the mantle strongly influence the relative proportions of magmas of different chemistries, present over time in a magmatic reservoir assembled by incremental magma supply. The probability of magma of a given composition to be sampled during a volcanic eruption is proportional to the product of its volume and the interval of time over which such magma is present within a reservoir. Moreover, the physical properties of magmas, which are directly linked to their chemical compositions, affect the probability of magma to reach the surface or may play a role on the depth at which magmas are emplaced in the crust.
Here we use thermal modelling to compute the temporal evolution of temperature, and therefore the volumetric distribution of magma chemistries, within a magmatic reservoir assembled by incremental injection of hydrous basalts in the lower crust (30 km). The results indicate that the average temperature within the reservoir decreases quasi-exponentially and tends to the surrounding rock temperature even if magma is continuously supplied to the system. The evolution of the physical properties for each magma composition present within the reservoir is computed as function of depth. These data are finally used to determine, on a probabilistic base, the chemistry and the temporal evolution of erupted magma chemistry. The comparison between our data and volcanic products in various volcanic systems can be used to retrieve information on the fluxes of magma at depth and their evolution in time.