# Clinopyroxene growth and dissolution rates: high-pressure investigation on a primitive alkaline basalt from the Campi Flegrei Volcanic District (south Italy)

BONECHI, B.[1]*, PERINELLI, C.[1], GAETA, M.[1]

[1] Dipartimento di Scienze della Terra, Sapienza Università di Roma, P.le Aldo Moro 5, 00185, Rome, Italy
(*correspondence: barbara.bonechi@uniroma1.it)

With the aim to investigate the influence of time, temperature, water content and pressure on clinopyroxene growth and dissolution rate, we performed crystallization and dissolution experiments on a K-basaltic rock from Procida island (Campi Flegrei Volcanic District, south Italy). Crystallization experiments were performed at anhydrous and hydrous ($1 \leq H_2O \leq 4$ wt.%) conditions, pressure of 0.8 GPa, temperature between 1030 °C and 1250 °C and dwell time between 0.25 and 9 hours. Crystallization experiments show that time is the factor that most affects the growth rate compared to temperature and water content. Clinopyroxene growth rate, indeed, varies from $10^{-7}$ to $10^{-8}$ cm/s and it reaches the maximum value in the shortest experiments (0.25 h) while it decreases increasing time (9 h). Comparing our high-pressure growth rates with the low-pressure ones available in literature related to clinopyroxene, it was possible to note that pressure does no affect the growth rate. Indeed, all the considered growth rates show similar values that vary from $10^{-5}$ to $10^{-9}$ cm/s regardless of pressure but as a function of time. Moreover, partition coefficients based on the crystal-liquid exchange demonstrate that the chemistry of minerals progressively approaches to equilibrium from the shortest to long-lasting experiments, putting forward the latter as representative of the ideal condition of crystallization in a deep magmatic reservoir. Short experiments, instead, could be representative of ascent mechanisms in disequilibrium conditions and quick times. Dissolution experiments, instead, were carried out at high pressure (0.8-2 GPa), superliquidus temperatures and different dwell times by using the seeding technique. Preliminary results show that clinopyroxene dissolution rate varies from $10^{-2}$ to $10^{-7}$ cm/s, highlighting an influence of temperature and time with respect to pressure.