

Abstract

The scientific thoughts on magma circulation in the earth's crust have changed a lot these last years. In addition to the dike models of a perfectly elastic crust, other theories have been developed to better suit the data collected on specific geological locations. In this study, we investigate the potential behavior of melt pockets inside a highly crystallized mush using analogue and numerical modeling. Our main objective is to construct appropriate models for this task and to gather interesting insights from them. The main subjects addressed are the shear heating and shear viscosity parameters, the initial shape of the melt intrusion, the difference in density between the melt and the highly crystallized magma around, the viscosity changes, the petrological changes and the acceleration of the rising velocity between successive intrusions. A single phase and a two-phases numerical models are developed with their closed system of equations using the Finite difference method on the software Matlab. In parallel, analogue experiments are led using water and glycerin as analogue of the melt and glucose sirup as analogue for the magmatic mush.

Keywords: modeling, numerical, analogue, magmatic mush, shear heating