



Fragmentation of Magma: Controls from Porosity, Permeability and Textures

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The explosive volcanoes Colima, (Mexico), St. Augustine (USA), Bezymianny (Russia), Krakatau and Kelut (Indonesia) were selected to investigate the processes responsible for their degree of explosivity and eruptive style. In an attempt to better understand the processes controlling fragmentation at these volcanoes, we performed shock-tube experiments with natural samples from these volcanoes at overpressures between 4 and 35 MPa at room temperature. The fragmentation threshold and speeds of fragmentation were determined for each sample series studied. Previous studies have shown that porosity and permeability are first order parameters to consider in eruption models and our recent results support this statement. However, other factors such as textural variations within samples must also be considered. Trends of fragmentation speed values for two sample series of 15 and 24 % open porosity follow two very different trends. Permeability measurements confirmed a permeability of about one order of magnitude higher for the samples of 24 % open porosity. However, this discrepancy alone does not explain unusually low fragmentation speeds for given overpressures. Results of this study will improve the constraints on the factors controlling the fragmentation of magma at the 5 selected volcanoes. This work is part of the BMBF project SUNDAARC, which aims to quantify the potential risk of selected highly-explosive volcanoes by combining field and laboratory investigations.