EXPERIMENTAL FRAGMENTATION OF MAGMA: TEN YEARS ON

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Magma fragmentation is the decisive factor in explosive volcanism. To understand the behaviour of volcanoes, direct observation and modelling are the predominant tools. But since the physical constraints of the models are based on observations the proof was field derived. Experiments on the fragmentation behaviour are a link between field observation and modelling since the region of fragmentation is beyond direct access. The idea to establish a volcanological shock tube type experiment is based on Bennett (1974) and was the beginning of what is now a decade of work started by Alidibirov and Dingwell. The analysis of the fragmentation threshold was the starting point in the systematic investigation of parameters governing the eruption behaviour. Granulometric analysis of experimental pyroclasts enabled comparison of physical situation, educt and product. Investigating the velocity of the fragmentation front passing into a magma dome or column was the logical step to follow. From field study we know the broad variety of materials involved in a single eruption and experiments are the only way to analyse their physical constraints and to understand the dynamic situation during an eruption. Further measurements like the gas flow rate and thus permeability under turbulent flow regime were the latest development in close cooperation to modellers. But still only the detailed analysis of the materials in the field allows to merge the information form the lab and link the data to existing models. The results of the experiments influence our idea of explosive eruptions from the fragmentation front to the pyroclastic deposits.