



MWI (MAGMA-WATER INTERACTION) EXPERIMENTS ON 2002 MOUNT ETNA ERUPTION: INFERENCES ON THE ERUPTION EXPLOSIVE BEHAVIOUR

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Ash and lava samples from 2002 Mt.Etna (Italy) eruption have been treated experimentally in the MAQUA equipment (magma-water interaction internally heated pressure vessel) installed at the HP-HT Lab of Università di Roma "La Sapienza". This equipment allows the control of experimental T and P, the water injection P, the water/melt ratio, and the measurement of the sample V variations. Within the vessel, it is also installed an ultrasonic probe acting both as passive and active transducer located just below the sample holder, via a silica buffer road. In the passive mode this probe is able to analyze the MWI shock waves or the pressure waves due to the gas exolution, in the active one it monitors Vp variations due to changes of the waves propagation velocity through the sample.

The experiments have been performed at an average eruptive T (1050°C) and a confining P=10MPa. The Pinj (water injection pressure) was set at 100MPa with a water/melt ranging between 0.1 and 0.5. These experiments show that variations in the multiphase system viscosity due to variable amounts of the mixture components: melt+crystals+bubbles at comparable water injection modes, can produce strongly different distributions of the produced mechanical energy in terms of volume expansion, fragmentation and mass transport.

The powdered lava samples or the ash grains used as starting material give an interaction behaviour and experimental products significantly different. In particular, the homogeneous melt (powdered starting material) compared to an inhomogeneous

melt mixture (ash grains) give a lower amount of fragmentation with a modal distribution around the finest fractions and a minimal transported mass. On the contrary, inhomogenous melts mixtures give a very well developed fragmentation with a unimodal distribution around coarser grain sizes and transported masses reaching more than 20% of the initial mass.