Geophysical Research Abstracts
Vol. 17, EGU2015-13187-1, 2015
EGU General Assembly 2015

Influence of starting material on the degassing behavior of trachytic and phonolitic melts

Oliver Preuss (1), Holger Marxer (2), and Marcus Nowak (2)

(1) Eberhard Karls Universität Tübingen, Germany (oliver.preuss@uni-tuebingen.de), (2) Eberhard Karls Universität Tübingen, Germany

The dynamic magmatic processes beneath volcanic systems, occurring during magma ascent, cannot be observed directly in nature. Simulation of magma ascent in the lab realized by continuous decompression (CD) of a volatile containing melt is essential to understand these processes that may lead to potentially catastrophic eruptions threatening millions of people in highly populated areas like Naples located between the Campi Flegrei Volcanic Field and the Monte Somma-Vesuvio strato-volcano. In this project, experimental simulations of Campanian Ignimbrite (CI) magma ascent will give insight to the mechanisms of the CI super eruption, thus providing tools for volcanic hazard assessment at the high risk Campanian Volcanic District and other comparable volcanic systems. Additionally, comparable experiments with the same conditions using the "white pumice" composition of the catastrophic Vesuvius AD 79 (VAD79) eruption, have been conducted.

So far, the experiments were performed in an internally heated argon pressure vessel coupled with a high-pressure low-flow metering valve and a piezoelectric nano-positioning system using a starting pressure of 200 MPa, H_2O content of about 5 wt% and two different decompression rates (0.024 and 0.17 MPa/s) at a superliquidus temperature of 1050 ˚C to ensure a crystal free melt and a homogeneous bubble nucleation. Experiments were conducted with both, glass powder and cylinders, subsequently decompressed to 75 and 100 MPa and rapidly quenched.

Beside the results that e.g. decompression rate, volatile content, fluid solubility and target pressure affect the degassing behavior of the melt, the influence of the starting material on the degassing processes is significant. Analyses of BSE- and transmitted light microscopy images revealed a different degassing behavior of glass cylinder experiments compared to powders. Nitrogen has a very low solubility in hydrous silicate melts, supporting our suggestion that preexisting nitrogen rich bubbles (from trapped air between the single glass grains) in the melt lead to growth of these preexisting bubbles resulting in near equilibrium degassing where no further nucleation is needed. This results in much higher porosities of the degassed samples compared to those where pure dissolved H_2O is present. The same effect was observed by repeating these experiments with a phonolitic VAD79 composition.

In ongoing experiments using glass cylinders as starting material, approximately 0.4 wt% chlorine (average Campanian Ignimbrite melt inclusion data [1]) will be added as a volatile component to study the influence on the degassing behavior of hydrous CI melt.

[1] Marianelli et al. (2006) Geology **34(11)**, 937