



The 2011 eruption of Grímsvötn volcano, Iceland

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The 2011 eruption of Grímsvötn volcano, Iceland, was much more explosive than previous eruptions, specifically its 2004 eruption. This research examines the degassing processes of the 2011 eruption, through density and vesicle analyses, to help uncover the reasons for the more vigorous eruption. Over 1200 collected tephra samples from the 2011 sequences are measured for density and vesicularity. Several samples are chosen to be representative of eruptive phases; samples from the beginning of the eruption, the mid-eruption and the end phases are chosen. These pumice samples are impregnated with epoxy and made into plugs for use in a Scanning Electron Microscope with which, a nested image approach is taken to image the vesicles of the samples at different magnifications. Each backscatter image is converted to binary and corrected using GIMP. Using ImageJ software, quantitative vesicularity analysis of the images is performed and results are converted to volume. The density, quantitative vesicularity, and volume results are assessed for patterns and the processes of the magma during the ascent in the conduit and eruptive phases are inferred. The objective of this research is to use the microscopic vesicularity analyses of the eruptive products to theorize the larger scale magmatic and degassing processes and to understand why the 2011 Grímsvötn eruption was uncharacteristically explosive. Currently, the results are being examined and have not been included in this abstract, however the research will be finalized in time for presentation at the EGU 2015 conference.

Keywords: Grímsvötn volcano, quantitative vesicularity analysis, bubble size distribution, volcanic degassing, conduit processes