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Degassing and crystallization of Kulanaokuaiki 3 Tephra at Kilauea volcano, Hawaii: Insights from volatile contents and textural measurements

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We are currently studying the physical and chemical aspects of basaltic magma that erupted in the most powerful of all known explosive Kilauea eruptions, the Kulanokuaiki-3 eruption. This event occurred sometime between 1000 and 1400 years ago, and blanketed a huge swath of the volcano with scoria, ash, and lithic fragments. Juvenile products of this eruption comprise a volumetrically dominant, microlite-choked basaltic scoria, a glassy "pumice" member characterized by low number density of pyroxene and plagioclase microlites, and a hybrid scoria consisting of intermixed microlite-rich and glassy pumice. Groundmass microlite and vesicle textures and volatile contents have been measured to elucidate the degassing paths and relationships among the different scoria types. All scoria components contain euhedral olivine microphencrysts with well-preserved glass inclusions. We have measured volatile contents on a subset of these glass inclusions using FTIR, ion microprobe, and EPMA. Preliminary analyses indicate that inclusions contain between 30 and 70 ppm CO_2, 75 to 140 ppm Cl, 170 to 1200 ppm S, and 0.10 to 0.55 wt.% H_2O. We interpret low H_2O contents to reflect vesiculation of melt within inclusions in addition to possible leakage from the olivine host crystals. Volatile component analyses on broader set of inclusions are currently underway and these measurements will be related to changes

in groundmass texture within the deposit.