Volatiles in large crystal-rich dacitic magma chambers: insights from the Cebolla Creek Ignimbrite, San Juan Volcanic Field, Colorado

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The San Juan Volcanic Field in SW Colorado consists of ~30 voluminous intermediate to silicic mid-Tertiary ignimbrites related to the “ignimbrite flare-up” event that erupted widespread volcanic deposits across much of the western United States. Individual eruptions involved thousands of cubic kilometers of crystal-rich dacitic magma that represented remobilized granodiorite plutons. Current models (Bachmann & Bergantz 2003, Burgisser & Bergantz 2011) require rapid influx of hot fluids into the magma chamber, where fluids percolate upward through the ‘crystal mush’ to trigger the eruption of homogeneous batches of crystal-rich magma. The goal of this study is to measure the compositions and volatile contents of melt inclusions trapped in quartz from these large ignimbrites to better understand magmatic conditions present before and after remobilization. For this initial study, we analyzed melt inclusions from quartz crystals in the Cebolla Creek Tuff for H_2O and CO_2 concentrations using FTIR. The Cebolla Creek Tuff (26.9 Ma) is one of three compositionally diverse ignimbrites that make up the San Luis Complex. These three ignimbrites were erupted within ~40,000 years of each other, suggesting a shorter recurrence rate for large explosive eruptions than has been previously documented (Lipman & McIntosh 2008). Preliminary results for quartz-hosted melt inclusions from the Cebolla Creek Tuff show values of 2.3-4.0 wt.% H_2O and CO_2 up to 300 ppm, where lower values of H_2O might be the result of post-entrapment H_2O loss. This yields minimum pressures of entrapment of ~1.4 kb, consistent with models for large shallow silicic magma storage regions. We will compare major and trace element analyses of the melt inclusions with those of reentrant and hourglass inclusions that are not fully sealed in the quartz host to gain insight into the remobilization process.