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Chaitén volcano: a natural laboratory for learning about rhyolitic eruptions

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The Chaitén volcano eruption of 2008 ended period of almost 100 years without major silicic events and showed us the capacity of these systems to produce impacts in a world-wide scale. On 1 May 2008 Chaitén volcano (Southern Chile) erupted rhyolitic magma and gave scientists the first view of a rhyolitic eruptive cycle, start to finish. The eruption lasted for more than two years and presented explosive (~10 days) and effusive phases. By first time a transitional phase with hybrid activity was observed. Tephra was ejected to the atmosphere at the same time a degassed obsidian lava body was emplaced. Chaitén eruption produced vast amounts of glassy rhyolite with H2O contents ranging between 0.1 and 1.58 wt.% (Castro et al. 2012) . With the aim of understanding the role played by H2O in controlling the eruptive behavior of the system, we are combining field work with experiments and analytical techniques. We characterized the evolution of this volatile phase during the eruption by measuring its content in deposits of the different eruptive phases. For that purpose, we picked obsidian chips (> 0.5 mm) from time-constrained stratigraphic sections (i.e., tephra fallout deposits and transitional tephra cone) and analyzed them with Fourier transform infrared spectroscopy (FTIR). We also mapped the H2O content of the obsidian bomb field with the aid of a field-portable FTIR. Finally, we carried out heating experiments at 0.1 MPa and temperatures between 740°- 1030°C on cylindrical obsidian cores (4X10mm). The results of the experiments show different degassing behaviors and deformation timescales of the glassy material as a function of the initial H2O content of the sample (0.1 ? H2O ? 1.4 wt.%). Of particular interest is the occurrence of explosive fragmentation at H2O > 1.3 wt.% and T ? 880°C.