Comparison Of Recent Cinder Cone Eruptions Between The Central Oregon High Cascades And The Trans-Mexican Volcanic Belt

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Volcanic explosivity is primarily controlled by magma composition and dissolved volatile concentrations (primarily H_2O). During degassing, ascending magma undergoes partial crystallization and developing crystals may trap small amounts of parent liquid within their structure as melt inclusions. Certain crystals (particularly olivine) are ideal vessels for preserving these volatile-rich compositions. My research focuses on the pre-eruptive volatile contents (H_2O, CO_2, S, Cl) of magmas and their relationships to melt evolution and eruptive activity, primarily in the Central Oregon segment of the High Cascades, USA. The Cascades volcanic arc has historically been viewed as dry magmatic arc, and therefore weak in terms of volumetric output, eruption frequency, and explosivity when compared to other arcs (e.g., Marianas, Central America). High dissolved volatile contents (>5 wt% H_2O) coupled with new field observations, however, suggest that this view of the Cascades may be erroneous.

Pre-eruptive volatile contents and tephra deposits from Collier cone, the most recent (~1600 yr b.p.) cinder cone eruption in the Central Oregon High Cascades, suggest that this eruption may have been comparable to two welldocumented, historic eruptions in Mexico: Jorullo (1759-1774) and Paricutin (1943-1952). These eruptions are classified as ‘violent strombolian’ and are characterized by the production of 2-6 km high eruption columns and the simultaneous effusion of lava. Although generally not life-threatening, these eruptions may result in significant economic disruption to the local area for up to a decade. A major goal of this work is to contribute towards future hazard assessments in the High Cascades, USA.