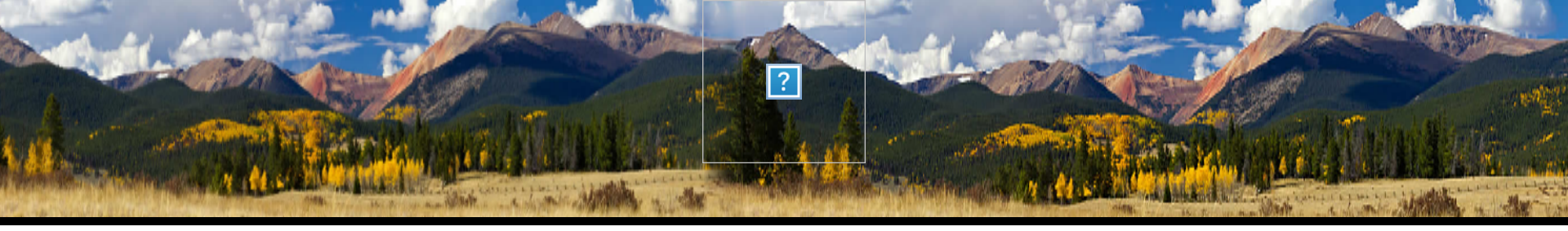

Booth No. 11 CRYSTALLIZATION CONDITIONS OF THE TUMALO TUFF, BEND PUMICE, AND SHEVLIN PARK TUFF NEAR SOUTH SISTER, OR

Tuesday, March 19, 2019
08:00 AM - 12:00 PM
Holiday Inn - Portland by the Bay - Casco Bay Hall

±opx + cpx + Fe-Ti ox + zr + ap. The Tumalo samples were notable for the paucity of ilmenite. Samples (25) ranged in $SiO_2$from 63.8-74.1 wt%, with Tumalo Tuff samples plotting in a very restricted compositional range.

All three units are exposed in the Columbia Canal, a 7.5 m thick deposit located 10 km northwest of Bend. The basal Tumalo Tuff contains a light pink pumice with 70-73.4 wt% SiO_2. The overlying Shevlin Park Tuff is composed of dark gray to black pumice clasts with 63.8-65.0 wt% SiO_2. The Bend Pumice is a white airfall unit with an intermediate composition of 67.6 wt% SiO_2. For all samples, the REE display a broadly linear pattern, with a La/Lu of 4-5 and a slight upward concavity in MREE. The Tumalo Tuff samples have a much more pronounced negative Eu anomaly, suggestive of plagioclase retention in the source.

Using SEM quantitative analyses of ilmenites and magnetites and the thermometer of Ghiorso and Evans (2008), we calculated crystallization temperatures for the Shevlin Park Tuff, yielding temperatures of 966 ± 59°C and 934 ± 33°C, and $fO_2$of -0.1 and 0.2ΔNNO, respectively. Preliminary data suggests that the rhyolitic Tumalo Tuff is much colder (<700°C) with an $fO_2$of -2 ΔNNO. This contrasts with the nearby rhyolitic domes of the South Sister volcanic field, which recorded Fe-Ti oxide temperatures ~850˚C and fO_2 ~0.7ΔNNO (Stelten and Cooper, 2012). These stark differences between the Tumalo Tuff and the South Sister rhyolites suggest that the magmas do not share a common source. Unlike the South Sister complex and the Shevlin Park Tuff, which display a classic subduction zone chemistry and fugacity, the reducing conditions suggest the Tumalo Tuff may be related to extension.

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