Geochemistry of basaltic volcanism in and around the Bruneau-Jarbidge eruptive center, Southwest Idaho

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The Bruneau-Jarbidge eruptive center (B-J) is a large structural basin at the southwest end of the Eastern Snake River Plain (ESRP), formed by passage of the Yellowstone hot spot *circa* 12.5 Ma. Basaltic lavas (8Ma) postdate the rhyolites.

Twenty-four volcanic vents are found within the eruptive center, along with numerous vents that lie outside the structural basin. Vents within B-J are located along three distinct NW trends; vents outside the eruptive center are subparallel to the trend of the Western Snake River Plain (WSRP).

Sixty-eight samples were analyzed using XRF, microprobe, and ICP-MS. Basalts consist of plagioclase and olivine phenocrysts set in a groundmass of plagioclase, clinopyroxene, opaques, and glass. B-J eruptive center basalts have Mg# = 38.5 - 61.3, with TiO_2 = 1.2 - 2.4 wt%; FeO = 10.1 - 14.0 wt%, and P_2O_5 = .06 - .42 wt%. Trace element abundance's are: Nb = 6-16 ppm, Sr = 153-356 ppm, Zr = 67-261 ppm, La_N = 22-65, and $(La/Lu)_N$ = 2 - 3.5. Non B-J basalts have Mg# = 38-42, TiO_2 = 3.2-4.2 wt.%, FeO = 13.9-16.7 wt.%, P_2O_5 = 0.14-0.88 wt.%, Nb = 25-38 ppm, Sr = 267-373 ppm, Zr = 302-396 ppm, La_N = 125, and $(La/Lu)_N$ = 6.7. Differences in REE slopes indicate distinct source regions. B-J basalts are consistent with ESRP basalts. Non B-J basalts are similar to basalts from the WSRP. Forward modeling of the trace elements suggests distinct sources

Shevlin Park Tuff: Welding features of an intermediate composition ash-flow tuff

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The Shevlin Park Tuff is a 260,000-year-old ignimbrite deposit in central Oregon that is unusual because of its range in bulk and glass compositions. Bulk composition of Shevlin Park Tuff pumice is bimodal, ranging from 55 to 62 and 64 to 68 wt% SiO_2 (Conrey, 2001). Matrix glass shows a similar compositional range, reflecting the near aphyric nature of the Shevlin Park magma.

Lower flow units within the tuff contain only dacitic pumice clasts with porosities of 71-87% and have a limited spatial distribution. Upper flow units contain both dacitic and basaltic andesite pumice clasts, with larger average sizes, a wider porosity range (52 to 82%), abundant lithic clasts, and broader spatial distribution. Distal upper units are generally welded, whereas lower units are welded only where in contact with an overlying welded unit. However, the thickest, most proximal section is only welded in a thin portion near the base. Permeability-porosity relations of these welded rocks show that permeability decreases continuously with decreasing porosity. Similar relationships are seen in obsidian domes, whereby once a connected pathway forms, it is matained as the pore volume reduces (Rust and Cashman, 2004) and may be critical in permitting welding to occur. Quantification of pore-space using 3-D imaging and conductivity measurements will asses the role of pore tortuosity on permeability and welding progress.

Welding experiments on Shevlin Park ash were conducted to determine the relative roles of temperature and composition on welding. Although, experimental temperatures (900-950°C) were sufficiently high to induce crystallization of glass walls not seen in naturally welded samples, we find that non-crystallized dacite deforms ductily, whereas basaltic-andesite deforms brittley. Additionally, mafic pumice is more porous (less deformed) than dacitic counterparts after experimental welding.

References

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