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# Source variations in volatile contents between Bransfield Strait and Phoenix Ridge, Antarctica

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We report volatile contents ($H_2O$, $CO_2$, F, Cl, S) of 102 fresh submarine glasses from across the Bransfield Strait (BS) back-arc extensional feature and the nearby Phoenix Ridge (PR) spreading center in the Antarctic Peninsula (AP). New major element, trace element, and isotope (Sr, Nd, Pb, Hf) data have been used to identify geochemical end-members in the BS and PR upper mantles and estimate their volatile contents and $CO_2$-$H_2O$ melt saturation pressures.

Phoenix samples form a spectrum from N-MORB to E-MORB, with volatile/refractory element of similar incompatibility values that correlate with enrichment Phoenix N-MORB and E-MORB span similar ranges in Cl/K and S/Dy, and only the most enriched alkali basalts extend to lower S/Dy. Our data support a model of slowdown at the PR resulting in increasingly tapping more enriched, volatile-rich portions of upper mantle over time.

Bransfield samples form three groups: 1) Weak arc lavas with LILE/HFSE ratios higher than PR MORB and slightly more enriched isotope ratios, 2) Strong arc lavas with very high LILE/HFES ratios and a clear isotopic enrichment towards a subduction end-member, 3) Enriched alkali lavas with high concentrations of incompatible trace elements and distinct isotope ratios. The strongest arc lavas in the BS have the highest F/Nd and $H_2O$/CeWeak arc lavas have intermediate values of these ratios, extending between strong arc samples and PR N-MORB. Previously reported spatial geochemical trends with subduction signature (e.g., U/Nb) are also present in volatile/refractory element ratios (e.g., $H_2O$/Ce, S/Dy, F/Nd) along the strait. Degassing at shallow levels makes interpretation difficult for the only BS enriched alkali lava analyzed for volatiles. It has some of the lowest F/Nd, $H_2O$/Ce, $CO_2$/Ba, and Cl/K, with relatively high F/Cl similar to intermediate PR MORB values.