Tracing fluid variations across the Kamchatka arc: melt inclusion volatile contents and B isotopes

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We present a new suite of volatile and trace element contents (e.g. H_2O, CO_2, S, Cl, F, Li, Be, B, Nb, REEs), and $\delta^{11}B$ signatures of primitive olivine-hosted melt inclusions from 10 volcanoes of the Kamchatka arc. The volcanic centres investigated span the total length and width of the arc, and encompass the Eastern Volcanic Front (EVF), Central Kamchatka Depression (CKD), and the extreme back-arc Sredinny Ridge (SR) [1]. We also present the first primitive melt inclusion data for Bakening and Shiveluch volcanoes, and in combination these samples provide us with robust spatial constraints to track variations in subduction zone fluid chemistry and fluxes between the distinct tectonic locations. The large, naturally glassy melt inclusions are primarily derived from euhedral Fo_{90-75} olivine crystals extracted from rapidly quenched mafic scoria, minimsing the potential for post-entrapment modification.

Geochemical data obtained through a combination of EPMA, SIMS, Raman, and LA-ICP-MS techniques has been integrated with other relevant literature data for the arc. Melt inclusions from Bakening preserve up to 4 wt.% H_2O, >2000 ppm CO_2, >2500 ppm S, and 1300 ppm Cl, indicating volatile-rich magmas are produced in this back-arc region of the EVF. Overall, we anticipate the full dataset will record the preferential devolatilisation of ^{11}B as dehydration of the downgoing slab progresses [2], accompanied by concurrent changes in fluid mobile and trace element ratios e.g. B/Be and Cl/K_2O. Further complexity within the CKD group volcanoes Kamen, Tolbachik, and Klyuchevskoy [3] also shows that the magmatic plumbing systems beneath these centres preserve evidence of repeated fractionation, storage, mixing, and assimilation of magma batches prior to eruption.

[1] Churikova *et al*. (2007) *Contrib. Min. Pet*. **154**, 217–239. [2] De Hoog & Savov (2017) Boron Isotopes – the Fifth Element, **Springer International Publishing**. [3] Churikova *et al*. (2013) *J.V.G.R.* **263**, 3–21.