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S, CL, F AND TRACE ELEMENTS IN MELT INCLUSIONS IN OLIVINES FROM MAFIC KAMCHATKA ROCKS

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We present the results for major, trace, and volatile elements (S, Cl, F) in homogenized melt inclusions from high-Mg olivines from Kamchatka basalts. All samples are medium- to high-K calkalkaline rocks and represent a traverse covering the Eastern Volcanic Front (EVF), the Central Kamchatka Depression (CKD), and the Sredinniy Ridge (SR) of back arc. Based on these data we assess the compositional changes in volatile elements across the arc and evaluate their possible causes.

The highest sulfur concentrations occur in the melt inclusions from CKD lavas. The chlorine concentrations in melt inclusions from EVF and CKD are similar and much higher than for SR melts. In contrast, the EVF and CKD melt inclusions are depleted in fluorine, while the SR samples are twice enriched. The F/Cl ratio progressively increases from the arc front to the back arc by a factor of five. Low values of S6+/Stotal (0.07 - 0.38) suggest that sulfur is mainly dissolved in melts as S2-.

The volitile/K2O ratio in melt inclusions show that: (1) sulfur and chlorine in EVF and CKD were affected by magmatic degassing; (2) chlorine degasses with less ex-tend compared to sulfur and in some cases does not degasses and accumulates in the melt; (3) fluorine was not affected by degassing in any of the melts measured.

The enrichment of the SR mantle source in fluorine and F/Cl ratio cannot be ex-plained by mixing of mantle sources with the OIB-component because the fluo-rine/trace element ratios in melt inclusions are much higher than N-MORB and OIB mantle. From correlations of F/Ce ratio with Li/Yb, Li/Dy, Sr/Y, Ba/Y and

Nb/Yb ratios in melt inclusions such enrichment could only be the result of a deep Li-F-rich fluid, which is likely to be more enriched in incompatible elements due the higher P-T conditions and break down of high-temperature minerals at high depths (400 km).

S and Cl content in fore arc melts are mainly controlled by a distinctly different, B-rich fluid. In addition to S and Cl this fluid enriched in U, K, Ba, Th, La and Pb. Enrichment of CKD melts in S coupled with highest U/Th, 87Sr/86Sr, 18O, 11B and chalcophile elements results from a high fluid flux from the altered subducted oce-anic crust and subducted Emperor Seamount chain.

Our data provide clear evidence for two distinct fluids and the decoupling of B and Li across the Kamchatka arc. This resulted in high B/La and B/Nb values in arc front and strong increase in Li/B, Li/Yb and Be/B ratios in the back arc zone.