Boron isotopes in hydrothermally altered crust of the Brothers Volcano (Kermadec Arc, New Zealand)

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We present contents and isotopic compositions of boron in hydrothermally altered basement of the Brothers volcano (Kermadec Arc) cored during IODP Exp. 376 to depths of up to 453 mbsf. Brothers is an active submarine arc volcano, hosting two contrasting hydrothermal systems; (1) the Northwest Caldera is seawater influenced, (2) at the Upper Cone, discharge of acid-sulfate fluids leads to advanced argillic alteration indicative of magma degassing.

Boron is highly soluble in aqueous fluids and has a volatile character. Therefore, B and B isotopes are powerful tracers of fluid-rock exchange and potential indicators of magma degassing, phase separation and segregation, common processes in subseafloor magma-hydrothermal systems. Boron data of fluids of subduction related crust of the Western Pacific indicate that B partitioning depends on residence time of fluids in the basement [1]. Arc- and back-arc crust commonly displays higher B contents and heavier isotope values compared to mid-ocean ridge basalts due to the impact of B-enriched recycled crust [2]. How hydrothermal alteration affects B and B isotopes of arc- and back-arc crust is not well constrained, but in recent years the significant impact of subduction systems on chemical fluxes between oceanic basement and seawater became apparent [3].

We use boron systematics, combined with a detailed petrographic study to trace fluid-rock interaction, mass mobilization and isotope fractionation in the two contrasting hydrothermal systems at Brothers volcano. The aim is to get deeper insights of magma degassing and phase separation processes of hydrothermal systems in subduction related crust and how they affect mass transfer.

[1] Wilckens et al. (2018) *GCA* **232**, 140-162. [2] Leemann et al. (2017) *Geochem. Geophys. Geosyst.* **18**, 1126–1162. [3] Baker et al. (2008) *JGR: Solid Earth* **113**, B08S09.