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# Wet melting of subducted oceanic crust at 2.5 GPa, 750 to 950˚C: first experimental results and implications for trace element partitioning

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The geochemistry of magmas generated in subduction zones testifies to chemical transfer between the subducted slab and the mantle wedge. As a consequence arc lavas have a distinctive geochemical flavour most notably depletion in HFSE compared to REE and LILE. Traditionally this signature was ascribed to the low solubility of HFSE in hydrous fluids derived from the eclogitic portion of the slab as it dehydrates, preferentially transporting LILE over HFSE. However, there are no experimentally determined partition coefficient data appropriate for the pressure-temperature range under which slab melting/dehydration occurs. For example two datasets [1,2] widely used in modelling subduction zone processes, were obtained at temperatures of $\geq$950 ˚C, are significantly higher than likely to be found in any modern subduction zone. For this reason it is impossible to constrain the trace element budget released by the slab as a function of residual mineralogy. This issue is particularly important because in subduction zones the $P-T$ conditions of slab dehydration/melting are close to the second critical end-point where there is complete miscibility between silicate melt and $H_2O$ [3].

To investigate trace element partitioning during dehydration and/or melting of the subducted oceanic crust we have performed a series of crystallisation experiments on a synthetic MORB-like starting composition doped with ppm levels of a large number of geochemically important trace elements. $\sim$20 wt. % $H_2O$ was added to the starting materials to attain $H_2O$-saturation. $fO_2$ was buffered at NNO using the double capsule technique. The P-T conditions of 2.5 GPa and 750˚C-950˚C are representative of modern "young & slow" subducted slabs [4]. The residual mineralogy includes garnet ($Alm_{49}Gr_{25}Py_{23}And_3$), rutile and omphacite ($Jd_{30-40}$) at all temperatures. Amphibole, staurolite and epidote are present below 850 ˚C. The $H_2O$-rich melt phase has ∼60 wt. % $SiO_2$ and 8 wt. % $Na_2O$, but <1 wt. % CaO, MgO and FeO. Trace element partition coefficients for garnet have been determined by ion microprobe analysis.

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