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Boron Isotopes in Italian melt inclusions

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The composition of $\delta^{11}B$ can be used to study the cycling of volatile elements within Earth's interior. Due to its incompatibility and high mobility in aqueous fluids boron provides a powerful tool to better understand fluid-related crustal recycling processes in subduction zones. Across-arc profiles in arc lavas show that the concentration of B decreases with increasing slab depth and decreasing amount of slab-derived fluids. The two stable isotopes ^{10}B and ^{11}B fractionate in the fluids, leading the heavier ^{11}B to concentrate in the fluid itself [1].

Melt inclusions (MIs) in high-forsterite olivine potentially preserve primary mantle-derived elemental concentrations and isotopic signatures and can record the B isotopic composition of the surrounding melt at the time of trapping. The complex Italian post-collisional subduction setting represents an excellent natural laboratory to study subduction recycling. The magmatic products vary from potassic and ultrapotassic along the Tyrrhenian side in the north to calc-alkaline and Na-alkaline in the south. This diversity reflects the changing geodynamic setting and related major crustal recycling creating a heterogeneous mantle source along the subduction zone. Olivine-hosted MIs from across Italy reveal that primary melts tap this heterogeneous mantle including subducted oceanic and continental components that were introduced during the Alpine, and/or Adriatic and Ionian subduction phases [2-4].

We present boron isotope compositions in 100 selected melt inclusions from a wide range of Italian lavas. The MIs are characterised for major and trace elements and include primary melts representing the different end-members for each of the magmatic Italian provinces as well as within single magmatic series. We will focus on the relation between major- and trace elements and boron isotope compositions to reveal the diversity of subduction-derived metasomatic agents in the Italian mantle that are the sources of the variable K-rich and Na-Ca alkaline melts.

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