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In-situ single spot analysis of B isotope ratios by laser ablation multiple ion counting ICPMS

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We have developed a method for the in-situ single spot B isotopic analysis of geological materials using laser ablation multicollector ICPMS. A New Wave UP213 laser was coupled to a Finnigan Neptune equipped with both Faraday and ion counting detectors. Samples with different B contents and isotopic compositions have been analysed, including B4 tourmaline and three MPI-DING glasses (StHs6/80-G, GOR132-G and GOR128-G).

Before firing the laser, the mass spectrometer was tuned and the ion counters were cross-calibrated by a peak jumping routine, using a very diluted B solution. Spot sizes varied between 60 and 80 μm and the laser energy ranged between 5 to 20 J/cm^2. The analysis run consisted of 30-40 cycles (each 1 s). The B signals were corrected for the B background (typically $\sim$900 cps ^{11}B), measured before the start of laser firing. To correct for fractionation effects the standard-sample bracketing approach was applied using NIST SRM610 as external standard. The corrected ^{11}B/^{10}B is finally referenced to NIST SRM951 in order to obtain the delta notation.

The B4 tourmaline (up to 31400 ppm B) was measured using Faraday detectors, with internal precisions (on single spot analyses) better than 0.1 permil (1σ). The weighted average δ^{11}B is -8.3$\pm$0.15 permil. The MPI-DING glasses (B contents between 11 and 23 ppm) were measured on multiple ion counters. They have δ^{11}B values of -4.3$\pm$2.4 permil (StHs6/80-G), +6.8$\pm$3.0 permil (GOR132-G) and +13.5$\pm$1.6 permil (GOR128-G). Within-run precisions are 1.6 to 3.2 permil, which are very close to the theoretically expected uncertainties based on counting statistics ($\sim$2 permil).