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Sulfur stable isotopic composition of material derived from the Earth's mantle

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It is debated, to what extent the moderately siderophile and volatile element sulfur in the bulk silicate Earth (BSE) has been affected by core formation, early degassing, and late accretion. Ratios of S, Se and Te in the BSE are similar to values in carbonaceous chondrites, and thus support a late addition of these elements. In contrast, non-chondritic $\delta^{34}\text{S}$ in MORBs were used to argue that a larger fraction of S may have been retained in the silicate Earth during core formation.

To evaluate processes that fractionated S isotopes in the silicate Earth, the present work aims to determine the $\delta^{34}\text{S}$ and its variation in well-characterized mantle derived rocks. Sulfides in bulk rock powders were dissolved and oxidized in reverse *Aqua Regia* using a High-Pressure Asher system. Sulfate is purified, precipitated as BaSO_4 and analyzed as SO_2 by EA - IRMS. Repeated processing of a pyroxenite sample showed, that digestion, processing and analysis do not cause resolvable isotope fractionation (± 0.10 ‰, 2SD). Analysis of pyroxenites from the Balmuccia peridotite massif yielded a limited range of slightly positive $\delta^{34}\text{S}$ with a mean of $+ 0.36 \pm 0.12$ ‰ (2SD, V-CDT), similar to chondrites.

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