

## Sulfur isotopic composition of pyroxenites from the Earth's mantle

F.E. SCHMID<sup>1\*</sup>, E. IDEN<sup>1</sup>, H. BECKER<sup>1</sup>, U. WIECHERT<sup>1</sup>

<sup>1</sup>Institut für Geologische Wissenschaften, Freie Universität Berlin, Malteserstr. 74-100 12249 Berlin, Germany  
(\*franziska.schmid@fu-berlin.de)

Sulfur is moderately siderophile and volatile and thus its budget in the bulk silicate Earth (BSE) may have been affected by core formation, early degassing, and late accretion. However, the influence of these different processes is still debated. 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. On the other hand, 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. Evaluating the processes that control  $\delta^{34}\text{S}$  of the Earth's mantle will provide new constraints. The present work aims to determine the  $\delta^{34}\text{S}$  and its variation in well-characterized mantle pyroxenites. These rocks are accumulation and reaction products of primitive basic magmas.

Sulfides in whole rock powders were digested and oxidized to sulfate in reverse *aqua regia* ( $\text{HNO}_3\text{-HCl}$  2:1) at 320°C using a high-pressure asher, in which a closed system is maintained during the oxidation process. Sulfate was purified on anion exchange resin and precipitated quantitatively as  $\text{BaSO}_4$ . Isotope analyses were conducted using a continuous-flow - Elemental Analyzer - IRMS (MAT-253) setup, in which the sulfate was converted to  $\text{SO}_2$  and chromatographically separated from other combustion products.  $^{32}\text{S}$  and  $^{34}\text{S}$  were detected as masses 64 and 66. Isotopic ratios were converted into delta values relative to V-CDT using IAEA sulfate standards.

Seven analyses of IAEA-S1 yielded a mean value of  $-0.34 \pm 0.04$  ‰ (2 SE) for  $\delta^{34}\text{S}_{\text{V-CDT}}$ . Replicate uncertainties on an in-house  $\text{K}_2\text{SO}_4$  reference material and processed samples and reference materials were better than 0.20 ‰ (2 SD) for  $\delta^{34}\text{S}$ . Duplicate digestion of a pyroxenite sample resulted in reproducible  $\delta^{34}\text{S}$  within the procedural uncertainty. Initial results for spinel pyroxenites from the Balmuccia peridotite massif (n=5) yielded a limited range of +0.25 to +0.38 ‰ for  $\delta^{34}\text{S}_{\text{V-CDT}}$ . These data fall in the range of values of bulk samples of carbonaceous chondrites (-0.36 to +1.36 ‰ for  $\delta^{34}\text{S}_{\text{CDT}}$  [1]).

[1] Gao & Thiemens (1993) *GCA* **57**, 3159-3169.