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Exploring the selenium isotope record in the Archean mantle

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Selenium (Se) isotopes have arisen as a promising tool to address the Earth's volatile origin and evolution. In a recent study, we reported the selenium isotope composition of post-Archean mantle peridotites and discussed their role in providing a Bulk Silicate Earth signature [1]. To better understand the Earth's mantle volatile evolution, we explore the Se isotope record in the Archean mantle. Preliminary data of mantle peridotites from the Kaapvaal Craton (3.3–3.5 Ga) in South Africa show larger Se isotope variations than the average post-Archean mantle peridotites. Therefore, it is intriguing to envisage a scenario where the observed isotopic variability might indicate ubiquitous pre-late veneer mantle domains that escaped complete equilibration with the late accreted chondritic materials, as previously invoked in other studies (e.g., [2], [3]). However, a firm assessment of secondary, non-magmatic processes like volatile-escape during emplacement and even supergene weathering is necessary before such conclusions can be drawn. For a broader picture, we will further include komatiites from the 3.5 Ga Komati formation of the Barberton Greenstone Belt (South Africa) and the 2.7 Ga Abitibi Greenstone belt (Canada) in this investigation.

[1] Varas-Reus et al. (2019) *Nature Geoscience* **12**, 779-782; [2] Willbold et al. (2015) *EPSL* **419**, 168-177; [3] Fischer-Gödde et al. (2020) *Nature* 579, 240-244.