A felsic basement beneath the Barberton Greenstone Belt? – Constraints from Hf-Nd isotope and trace element data

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The combination of trace element analyses with Hf-Nd isotope compositions of mafic and ultramafic rocks is a powerful tool to constrain the formation history of Archaean greenstone belts. Mafic to ultramafic rocks in the lower Onverwacht Group of the Barberton Greenstone Belt (BGB, South Africa) have been considered to be representative of typical early Archaean oceanic crust. Based on heterogeneous Hf-in-zircon isotopic compositions in felsic volcanic rocks interlayered with mafic units of the Onverwacht Group, it is proposed that older felsic crustal material was involved in their petrogenesis [1]. Likewise, the Hf-in-zircon isotopic compositions of some adjacent Eoarchean rocks of the Ancient Gneiss Complex (Swaziland), possibly representing a basement to the lower Onverwacht Group, also show significant input of older crustal components in their genesis [2]. We investigated whether the mafic and ultramafic rocks of the Onverwacht Group interacted with older crustal material. Isotope and trace element analyses were performed on the oldest rocks of the lower Onverwacht Group, namely the Theespruit, Sandspruit and Komati Formations (3.46 to 3.53 Ga; [3]). Our first results show that initial Hf isotope compositions are near chondritic to slightly depleted ($\varepsilon Hf(t)$ = 0 to +3.4), and only small variations in epsilon values are observed. The same is the case for the Sm-Nd isotope system, in agreement with previous studies. It is not fully resolved yet, wheather the small heterogeneity observed in the initial values may reflect isotopic disturbance. Our results either imply that (1) the oldest mafic rocks of the BGB were generated from a near-primitive mantle source without crustal contamination, (2) melts from a depleted mantle source were homogeneously mixed with older crust of unradiogenic Hf-Nd composition, or (3) the assimilated crust was juvenile and also had a near-chondritic Hf-Nd isotopic composition.

[1] Kröner et al. (2013), *EPSL* **381**, 188-197. [2] Kröner et al. (2014), *PrecambrianRes* **258**, 823-846. [3] Armstrong et al. (1990), *EPSL* **101**, 90-106.