^{182}W isotope systematics in crustal and mantle-derived rocks from the Kaapvaal Craton, Southern Africa

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The presence of anomalous ^{182}W isotope compositions in Archean rocks can either be ascribed to early silicate crystal-liquid fractionation, or missing late accretionary components in their mantle sources. Isotope anomalies of ^{142}Nd (decay product of the short lived ^{146}Sm) in Archean rocks that are copuled with ^{182}W anomalies can clearly provide evidence that early silicate differentiation operated during the first 100 Ma [1]. However, pristine coupled ^{142}Nd – ^{182}W records are often obscured by metasomatic redistribution of W during metasomatism [2]. Rocks from the Kaapvaal Craton, South Africa are well suited to search vor vestiges of early silicate differentiation, because they were shown to display both heterogeneous ^{142}Nd and ^{182}W compositions [3-5]. A bimodal distribution of ^{142}Nd compositions has been taken as evidence that different mantle domains were involved in the formation of rocks from the Kaapvaal Craton [5]. Here we report high-precision ^{182}W isotope data for a selection of crustal and mantle-derived rocks from the Ancient Gneiss Complex (AGC; Swaziland) and the Barberton Greenstone Belt (BGB; South Africa) of the Kaapvaal Craton. Many of these samples have previously been analysed for their ^{142}Nd compositions [5]. Our ^{182}W isotope data, in combination with the ^{142}Nd data and initial $\varepsilon Nd_{(t)}$ and $\varepsilon Hf_{(t)}$ values, confirm that at least two distinct mantle domains were involved in the formation of the crustal rocks from the AGC and mafic volcanic units from the BGB. Moreover, by combining ^{182}W isotope analyses with high-precision isotope dilution measurements for HFSE, U, and Th, we demonstrate that many rocks were affected by a widespread metasomatic event that obscured pristine ^{182}W isotope signatures.

[1] Bennett et al. (2007) *Science* **318**, 1907-1910. [2] Tusch et al. (2019) *GCA* **257**, 284-310. [3] Touboul et al. (2012) *Science* **335**, 1065-1069. [4] Puchtel et al. (2016) *G3* **17**, 2168-2193. [5] Schneider et al. (2018) *EPSL* **487**, 54-66