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^{182}W isotope patterns preserved in Paleoarchean TTGs from the Ancient Gneiss Complex

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The origin of ^{182}W deficits in terrestrial rocks is currently strongly debated since their origin can be attributed to different processes. These include (1) core-mantle interaction, (2) grainy late accretion, and (3) early silicate differentiation. Mantle-derived rocks from the eastern Kaapvaal Craton show variably negative μ^{182}W values that are systematically correlated with initial values of the long-lived Hf-Nd-Ce isotope systems [1]. These have been interpreted to reflect incorporation of an early Hadean crustal restite either in the deep mantle sources of Archean mantle plumes or within the upper mantle or lower lithosphere of the Kaapvaal Craton. Ru isotope compositions in 3.46 Ga komatiites that exhibit strongly negative ^{182}W values were found to be indistinguishable from the modern mantle, excluding a grainy late accretion scenario [1,2]. Interestingly, granitoids from the Kaapvaal Craton are either overlapping with the modern ^{182}W isotope composition or carry a strongly negative μ^{182}W of down to -10, overlapping with Mesoarchean diamictites from the Kaapvaal Craton [3]. Deviation of some granitoids from the Kaapvaal ^{182}W-^{176}Hf and ^{182}W-^{143}Nd array are likely caused by disturbance of the whole-rock Hf-Nd data or by fluid mobility of W. Here we will further explore the ^{182}W isotope composition of the Paleoarchean Ngwane Gneiss suite from the Ancient Gneiss Complex (Eswatini), that reveal a time-integrated increase of initial eHf values in magmatic zircon [4]. Our results provide further constraints on the origin of granitoids that plot at the upper end of the μ^{182}W-eHf array. Our contribution also introduces the setup of high-precision W isotope analysis at Freie Universität Berlin using a Neoma MC-ICPMS and considering previously published protocols [1]. Replicate analysis of samples that were previously analyzed at University of Cologne, using a Neptune Plus MC-ICPMS, validate our analytical approach and certify a high level of accuracy.

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