Eoarchean crust in the Napier Complex of East Antarctica: isotopic insights from U-Pb-Hf in zircon

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The extent and development of Eoarchean crust is a hotly debated subject, due to the limited amount found in small fragments around the world, but also due to the strong tectonic and metamorphic reworking of such relics that are preserved. These include gneisses in the Napier Complex of East Antarctica [1,2,3]. Despite the pervasive metamorphism that affected lithologies across the Napier Complex at ca. 2.5Ga, information about magmatic protoliths and crustal evolution can still be derived from sub-grain isotopic analysis of zircon. Magmatic zircon in mafic to felsic orthogneisses from Aker Peaks in Kemp Land were analysed by Sensitive High-Resolution Ion MicroProbe (SHRIMP) and split-stream Laser Ablation Ion Coupled Plasma Mass Spectrometry (SS-LA-ICPMS) to determine U-Pb ages and Hf isotopic signatures. Zircon from samples of mafic two-pyroxene orthogneiss yields magmatic upper intercept ages of *ca.* 3.70Ga, whereas zircon from tonalitic orthogneiss reveals greater complexity, with ages between 3.81 and 3.78Ga that can be attributed to xenocrysts and crystallisation of the magmatic protolith. There is also minor low Th/U zircon growth at ca. 3.7Ga, possibly in response to high-T metamorphism concurrent with mafic magmatism. A comparison of Hf isotopes with similtaneously collected Pb-Pb ages from tonalitic orthogneiss yields an array consistent with zircon derivation from melts produced by the reworking of Eoarchean mafic crust. Indications of a complicated crustal evolution are found in relics of Eoarchean crust from Aker Peaks [3] and elsewhere [4] in the Napier Complex.

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