

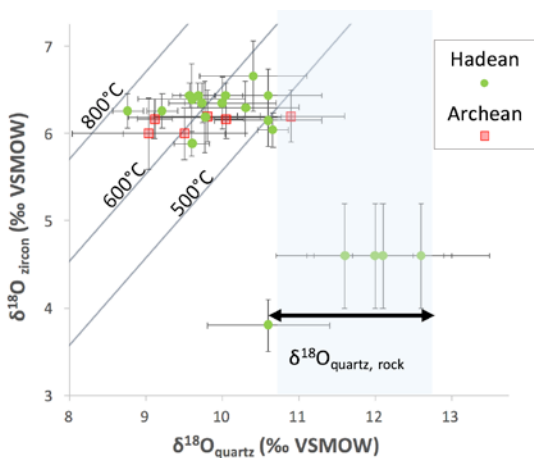
Detrital Jack Hills zircon-quartz $\delta^{18}\text{O}$ analysis tests alteration of zircon and zircon inclusions

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Detrital zircons are the only preserved Hadean materials. Mildly elevated $\delta^{18}\text{O}_{\text{zrc}}$ from Jack Hills zircons are interpreted to be primary igneous values, and have been used to identify protolith alteration, oceans, and proto-continental crust before 4.3 Ga. Alternatively, thermometry and U-Pb dating of phosphate inclusions in detrital Jack Hills zircons have been used to suggest that most inclusions are secondary [1]. In this study of quartz inclusions, we found high-T $\Delta^{18}\text{O}_{\text{qz-zrc}}$ fractionations (upper left in figure). SIMS analysis shows that 22 quartz inclusions in 11 zircons ($\delta^{18}\text{O}_{\text{qz}} = 8.8\text{-}10.7\text{‰}$ VSMOW) did not exchange with the host quartzite ($\delta^{18}\text{O}_{\text{qz}} = 10.8\text{-}12.7\text{‰}$; $\Delta^{18}\text{O}_{\text{qz-qz inclusion}} = 0.5$ to 1.7‰ VSMOW). The Qz-Zrc fractionations are either magmatic or from closed system metamorphism (see also [2]), and overlap values for Archean zircons from known rocks. Inclusions in 3 of 14 zircons likely exchanged $\delta^{18}\text{O}_{\text{qz}}$ ($10.6\text{-}12.6\text{‰}$ VSMOW) with surrounding host quartz. These results show that zircons and quartz inclusions in zircon can preserve primary magmatic values, but need to be tested for fidelity. Primary inclusions can be used to infer properties of Hadean parent magmas at the time zircon crystallized.



- [1] Rasmussen *et al.* (2011) *Geology* **39**, 1143-1146.
 [2] Ortiz-Cordero (2010) *M.S. Thesis, UW – Madison*.