Crustal evolution in the Yilgarn Craton: detrital chromite from Jack Hills

L. G. STADDON[1,2*], I. J. PARKINSON[1], M. S. A. HORSTWOOD[2], AND T. ELLIOTT[1]

[1]School of Earth Sciences, University of Bristol, Bristol, UK, BS8 1RJ. (*leanne.staddon@bristol.ac.uk)
[2]British Geological Survey, Keyworth, Nottingham, NG12 5GG, UK.

Detrital chromite is ubiquitous in metaconglomerate from Jack Hills, a greenstone belt in the Narryer Terrane, Yilgarn Craton [1]. Chromite has not been as intensly studied as zircon from this site [2,3 and references therein], but should provide valuable insights into the evolution of mafic and ultramafic sources during the Archean. Here we present EPMA and Re-Os isotopic systematics of four chromite-bearing metaconglomerate samples from the W74 locality.

Chromite is present as three distinct shapes; rounded grains, rounded octahedra, and euhedral octahedra. Though chromite morphologies require variable sedimentary transport and therefore multiple sources, the only variation in chromite chemistry observed is sample location. Chromite major element chemistry has been modified during high grade metamorphism [4], with lowered Mg# (all <25), and elevated ZnO and MnO. The lower diffusivity of Cr_2O_3 and Al_2O_3 has led to the retention of high Cr#s of 51-85. Analysis of one sample that contains low (<2%) ZnO chromite also yields decreasing ZnO and Mg# with increasing Cr#, interpreted to represent the remnants of a re-equilibriation trend between olivine and chromite within their igneous protolith. This suggests chromite from this sample formed in one, large scale igneous event.

Chromite contains high concentrations of Os (>20ppb), and low Re (<1ppb). Therefore, although Os is likely robust, chromite are susceptible to Re mobility during metamorphism. Re or Os mobility is apparent from preliminary TMAs and TRDs, which range from 3606-2403 Ma and 3149-2403 Ma, respectively. New analyses yield one sample with a $^{187}Os/^{188}Os$ ratio of 0.1041 (TRD of 3323 Ma), and suggest chromite may be older than previously reported. Comparison with zircon coupled Pb-Hf and age distributions in the same sample may also reveal further information on Archean crustal evolution in the Yilgarn Craton.

[1] Spaggiari, (2007), GSWA, Record 2007/3, 49p. [2] Nebel, et al., (2014). *Lithos* 190: 313-327. [3] Dare, et al., (2016), *EPSL* 451, 298-314. [4] Barnes, (2000), *Journal of Petrology* 41, 387-409.