

Phosphogenesis in the wake of the Great Oxidation Event: evidence from the Turee Creek Group, W.A.

G. G. SOARES^{1,2}, M. J. VAN KRANENDONK^{1,2}, E. BELOUSOVA² AND S. THOMSON³

¹Australian Centre for Astrobiology, and School of Biological, Earth and Environmental Sciences, University of New South Wales, Kensington, NSW, Australia (*correspondence g.soares@unsw.edu.au)

²ARC Centre of Excellence for Core to Crust Fluid Systems, Macquarie University, NSW, Australia

³Department of Geosciences, University of Arizona, Gould-Simpson Building, 1040 E. 4th St., Tucson, AZ, USA

The 2.4-2.3 Ga Turee Creek Group (TCG) in Western Australia contains a rare, well-preserved stromatolite-thrombolite reef assemblage deposited in the immediate aftermath of the Great Oxidation Event (GOE). We report here on the discovery of sand-sized peloids and pebble-sized microbial mat fragments between centimetric columnar stromatolites. Petrographic examination reveals complex internal textures that are defined by mixtures of fine-grained apatite, medium-grained dolomite, quartz crystals, fine-grained illite and carbonaceous matter. These clasts are interpreted to represent fragments of a peritidal phosphorite, redeposited in an offshore setting during a high energy event. Euhedral apatite crystals that line the insides of peloids were dated at 2104 ± 70 Ma and 2041 ± 33 Ma, using two different methods [1]. These ages are interpreted to represent the time of metamorphic fluid circulation during the regional Ophthalman Orogeny and provide a minimum age of the reef complex. Sedimentary phosphorites have previously only been recorded well after the onset of the Great Oxidation Event 2.2-2.0 Ga [2, 3]. The presence of a phosphorous-rich deposit in the TCG, confirms that the shallow waters of the stromatolite reef were oxygenated in the immediate aftermath of the GOE.

[1] Soares *et al.* (*in review*) *Precambrian Research*. [2] Pufahl & Groat (2017) *Economic Geology* **112**, 483-516. [3] Papineau (2010) *Astrobiology* **10**, 165-181.