In situ U-Pb zircon dating of the Meteorite Bore Member diamictites: constraints on the Paleoproterozoic glaciations and the Great Oxidation Event

T. CAQUINEAU[1*], J- L. PAQUETTE[2], P. PHILIPPOT[1]

[1]Institut de Physique du Globe de Paris, Paris, France (*correspondence: caquineau@ipgp.fr) (philippot@ipgp.fr)

[2]Laboratoire Magmas et Volcans, Clermont Ferrand Cedex, France (J.L.paquette@opgc.univ-bpclermont.fr)

The Great Oxidation Event (GOE) between 2.45 and 2.2 Ga has been linked to the onset of multiple global glaciations. The correlation of the different glacial deposits is uncertain because key sedimentary successions remain undated. The Turee Creek Group (TCG) in Western Australia shows evidence for continuous deposition across the GOE, and thus allows examining the nature, rate, and duration of the rise of atmospheric oxygen on Earth. The TCG has a total thickness of ~4 km, from BIF of the underlying Boolgeeda Iron Fm., to glacial diamictites of the Meteorite Bore Member (MBM), quartzite of the Koolbye Fm. and carbonates of the Kazput Fm. The age of deposition is loosely constrained between a 2450 ± 3 Ma age obtained for the Woongarra rhyolites at the base of the Boolgeeda Fm. and a 2209 ± 15 Ma on unconformably overlying Cheela Spring's basalts. Three drill cores have been obtained at the Boolgeeda-Kungarra transition (T1), the upper Kungarra Fm. encompassing MBM diamictites (T2) and the Kazput-Koolbye transition (T3). Here we present new *in situ* U-Pb zircon geochronological data from the second drillcore (T2) including samples from the MBM diamictites and underlying sandstone and microbialite. Over 200 detrital zircons were analyzed by means of Laser Ablation-ICP-MS and yielded four groups of ages: ca. 2.68 Ga, 2.54 Ga, 2.45 Ga and 2.34 Ga. The youngest zircons define a maximum age of 2.34 Ga for the MBM and account for the first direct age estimate of one of the Paleoproterozoic glacial event in Australia. According to correlation with the deposits in North America and South Africa and previous sulfur isotope studies the MBM diamictites must have recorded the beginning of the permanent accumulation of oxygen in the atmosphere.