

PGE-Re in carbonaceous siltstone from Barberton Drill core: Sources and palaeo-environment

PHILIPP RAMMENSEE^{1*}, ALICE MONTINARO²,
HARALD STRAUSS² AND SONJA AULBACH¹

¹Institut für Geowissenschaften, Goethe University Frankfurt,
Germany (* correspondence: rammensee@em.uni-
frankfurt.de)

²Institut für Geologie und Paläontologie, Westfälische
Wilhelms-Universität Münster, Germany

The complex redox evolution of the oceans prior to the great oxidation event ca. 2.45 Ga is still a matter of debate. Rhenium and platinum-group elements (PGE) are variably redox-sensitive and have been successfully exploited to identify detrital vs. hydrogenous sources and the presence of oxic, suboxic or euxinic conditions in marine sediments [1]. As ¹⁸⁷Re decays to ¹⁸⁷Os, the Re-Os isotope system can additionally be used to date the deposition of sediments, and to obtain the initial Os isotope composition, which is a tracer for continental input of radiogenic Os [2].

The Drilling Project “Peering into the Cradle of Life” [3] in the Barberton Greenstone Belt (BGB) was conceived to investigate the oxygenation history of the atmosphere and oceans on early Earth that led to the emergence and evolution of life. Deep to shallow marine sedimentary successions were retrieved at two of project’s sites, spanning ca 300 Ma of Palaeo-Archaeon deposition (BARB3/Buck Reef Chert and BARB5/Fig Tree Group). Prior work predominantly on outcrop samples from the BGB had shown that PGE deposition occurred mostly in particulate form from largely komatiitic sources, but fractionated Mo isotopes in one of the samples [4] demand further investigation.

We are in the process of acquiring PGE-Re-Os isotope data for 8+ samples from narrow intervals (~1 m, to avoid initial Os isotope heterogeneity) of carbonaceous siltstone from BARB3 (one interval) and BARB5 (two intervals), enhanced by information on carbon and sulphur contents, Fe speciation and multiple S isotope compositions. Our aim is to determine whether any short-scale changes occur in the sources and processes of incorporation of these various elements into the sediments that will allow constraints to be placed on the palaeo-depositional environment.

[1] Siebert *et al* (2005) *Geochim. Cosmochim. Acta* **69** 1787–1801 [2] Kendall *et al* (2009) *Geol. Soc. London Spec. Publ.* **326** 85-107 [3] Arndt *et al* (2013) EGU Abstr. EGU2013-3909 [4] Wille *et al* (2007) *Geochim. Cosmochim. Acta* **71** 2417-2435