Oxygenation: global tipping point, local records

PHILIPPOT P.*[1,2], AVILA J.[3], BOUYON A.[2], KILLINGSWORTH, B.[2], REGO E.[4], ROSSIGNOL C.[4], ADER, M.[2], BUSIGNY V.[2], CARTIGNY P.[2], LALONDE, S.[6], TESSALINA S.[5], BABINSKI M.[4], IRELAND T.[3], ZAPPORELI A.[7], BACELAR HÜNH S.[7], TRINDADE R.[4]

[1]Géosciences Montpellier, CNRS, France (*pascal.philippot@umontpellier.fr)
[2]Institut de Physique du Globe de Paris, CNRS, France
[3]Research School Earth Science, ANU, Canberra, Australia
[4]IGc - IAG, Universidade de São Paulo, Brazil
[5] John de Laeter Centre, Curtin University, Perth, Australia
[6]European Institute for Marine Studies, Plouzané, France
[7]VALE S.A., CTF, Nova Lima, Brazil

The Great Oxidation Event (GOE) has been defined as the time interval when sufficient atmospheric oxygen accumulated to prevent the generation and preservation of mass-independent fractionation of sulfur isotopes (MIF-S ; $\Delta^{33}S$) in sedimentary rocks. However, the timing and significance of the loss of $\Delta^{33}S$ signals in the sedimentary record remains unclear. Existing correlations in S. Africa suggest that the GOE was rapid and globally synchronous at ~2.32 Ga. In contrast, after 2.45 Ga to beyond 2.31 Ga, the slow disappearance of anomalous $\Delta^{33}S$ signals in W. Australia was attributed to the progressive exhaustion, via oxidative weathering, of an older anomalous sulfide reservoir on land. Although there is compelling geochemical evidence for the presence of O_2 during weathering as early as 3.0 Ga ago, and for episodic and regional-scale accumulation of O_2 in oceanic waters since at least 2.5 Ga ago, global correlations between basins remain poorly constrained.

Here, we present an overview of available data and new results obtained on the Paleoproterozoic Carajás basin to provide a new perspective from the Amazonian craton (Brazil). In contrast with other Paleoproterozoic sedimentary sequences from North America (Huronian Supergroup), South Africa (Transvaal Supergroup) and Western Australia (Turee Creek Group), no glaciogenic deposits have been reported in this basin, which hampers paleoenvironmental reconstructions and global correlations. We investigate a variety of diamond drill cores from the Grão Pará, Igarapé Bahia and Águas Claras groups for their stratigraphy, major and trace elements, zircon U-Pb and sulfide Re-Os dating, as well as C, S and Fe isotope systematics. Preliminary results will be presented and possible correlations with other Paleoproterozoic basins discussed.