

Cerium stables isotopes as a redox tracer in early Earth environments

NINA BELLOT^{1*}, VINCIANE DEBAILLE¹, AXEL HOFMANN²

¹ *Laboratoire G-Time, Université Libre de Bruxelles, Brussels, Belgium.*

² *Department of Geology, University of the Johannesburg, Johannesburg, South Africa,*

**corresponding author: nbelot@ulb.ac.be*

Cerium (Ce) isotopes have the potential to give new clues regarding the redox state of sedimentary environments [1]. Cerium is a unique rare earth element (REE) as it forms tetravalent cations (Ce⁴⁺) in oxidative environments, in contrast to other REEs that occur in the trivalent state. Chemical sediments deposited in different redox environments may thus show Ce depletion or enrichment relative to neighbouring REE.

The aim of this study will be to measure ¹³⁶Ce/¹⁴²Ce isotopes in samples from sedimentary successions deposited between 3.4 to 2.2 Ga in order to investigate potential isotopic fractionations linked to changes in redox conditions on the Earth's surface.

In order to do so, the following sedimentary samples will be studied: (1) Different facies of Palaeoarchaeon chert from the 3.4 Ga Buck Reef Chert, Barberton greenstone belt, obtained from the BARB-3 drill core. Chert facies reflect variations in physico-chemical conditions in the shallow marine environment of their formation; (2) Mesoarchaeon carbonate samples from the Chobeni Formation (Nsuzze Group, Pongola Supergroup). The carbonates formed in sub- to supratidal environments and contain a diverse assemblage of microbialites [2]; (3) Paleoproterozoic carbonates from drill core of the Francevillian Group of Gabon deposited 2.2 Ga ago. The carbonates were deposited after the Great Oxidation Event during the waning stage of the Lomagundi C isotope excursion in a shallow-water intracontinental setting [3].

[1] Nakada et al., 2016, *Geochem. Cosmo. Acta.*

[2] Siah et al., 2016, *Precam. Res.*

[3] Pr at et al., 2011, *Precam. Res.*