Ocean chemistry at Archean-Proterozoic transition: Geochemical studies from the Sausar belt, India

SANGITSARITA NANDA[1, 2] AND S MOHANTY[1]

[1] Indian Institute of Technology (Indian School of Mines), Dhanbad, India 826004
[2] Geological Survey of India, Nagpur, India 440006
(*Correspondence: nanda.sangit@gmail.com)

The "Snowball Earth" model proposed for early Paleoproterozoic envisages a frozen ocean and no riverine input, resulting in the build up of reduced iron and manganese in the ocean water [1]. The relation between glaciation, "great oxidation event" (GOE), volcanism and biological processes for accumulation of large deposits of iron and manganese formations during early Paleoproterozoic time has been critically analysed using different geochemical tools [2]. The Sausar belt of Central India has an Archean basement (Tirodi Gneiss-I) [3], overlain by the meta-sediments of the Sausar Group, which was deposited prior to 2300 Ma [4]. The Sausar Group is reported to contain volcanics and glacial diamictites, a carbonate unit (cap carbonate) [5] and manganese-ore bearing metasediments. ICP-MS analysis of REE and trace elements, and XRF measurement of major element content of 12 numbers of samples of manganese-ore horizons and "cap carbonates" were carried out to understand the evolution of ocean chemistry during Archean-Proterozoic transition. Different geochemical discrimination diagrams indicate preservation of pristine geochemistry, and no effects of diagnesis and metamorphism on the geochemistry of samples. Although deposited in a shallow ocean, our REE data indicate patterns similar to stream water and different from sea water. The cap carbonate unit of the Sausar Group has a distinct positive Ce-anomaly indicating anoxic state of the ocean at the time of deposition. The lack of negative Ce-anomaly and positive Y-anomaly in the samples can be interpreted in terms of redox state of the oceanImplication of this study to understand GOE will be discussed in detail. Although Paleoproterozoic glaciogenic deposits are reported from five places in the world, the geochemical data of the cap carbonate are meagre. The data from the Sausar Group will provide important clues for understanding evolution of ocean chemistry at Archean-Proterozoic transition.

[1] Kirschvink *et al.* (2000) *Proc Nat Acad Sci* **97**, 1400-1405. [2] Bekker *et al.* (2014) *Treatise on Geochemistry* **9**, 561-628. [3] Mohanty S. (2015) *Geol Soc Mem* **43**, 151-164. [4] Stein *et al.* (2014) *Geophys Res Abst* **16**, EGU2014–EGU13209. [5] Mohanty *et al.* (2015) *PPP* **417**, 195-209.