



The depositional environment of the Sturtian Fulu Iron Formation (China)

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Iron Formations (IF) are marine chemical sediments which directly precipitated from the water column. They almost exclusively occur in the Precambrian record and, thus, yield fundamental insights into the oxygenation history and paleo-environmental conditions during early Earth evolution. We report major and trace element data of individual micro-, meso- and macrobands of the Neoproterozoic Fulu IF (Hunan Province, South China) obtained by ICP-OES and quadrupole ICP-MS, respectively. The data provide new insights into the depositional environment in the Nanhua Basin on the Yangtze Platform at the time of the Sturtian glaciation.

Enrichment of poorly mobile elements such as Th, Ti or Al are used to clearly distinguish laminae of detritus-contaminated samples from pure authigenic Fe-rich cherts, with the latter providing reliable geochemical archives for the ambient fluids from which the IF precipitated. High variation of detrital contribution between single laminae suggests an episodic input of detrital sediments from the continent during IF deposition.

Pure and detritus-contaminated Fulu IF sample show non-seawater-like shale-normalized rare earth element (including yttrium; REYSN) patterns: The authigenic Fe-cherts devoid of detrital contamination show strong heavy REYSN enrichment relative to light REYSN and lack positive YSN, LaSN, and GdSN anomalies, indicating that the Fulu IF was not precipitated from open seawater. Hence, the depositional milieu of the Fulu IF was most likely a low-saline sub-basin with episodic starved siliciclastic input during ice-free periods and was completely cut off from water masses from the open ocean. The dissolved elemental budget of waters precipitating the Fulu IF were derived from chemical weathering of the continent. The lack of positive EuSN anomalies excludes high-temperature hydrothermal fluids (>250°C) as REY contributor to the depositional environment of the Fulu IF which is similar to other Neoproterozoic IFs [1]. Reducing atmospheric conditions are indicated by the lack of negative CeSN anomalies with respect to the oxidation process of Ce³⁺ to Ce⁴⁺.

[1] Viehmann et al. (2015) *Precamb Res.* 165-180.