

南インドダールワークラトン中の縞状鉄鉱層を用いた地球化学的研究 Geochemistry of Archaean Banded Iron Formations in the Chitradurga Schist Belt, Dharwar Craton, Southern India

鯉沼 健太郎^{1*}; Madhusoodhan Satish-Kumar¹; 三島 郁²; 上野 雄一郎²; 外田 智千³

KOINUMA, Kentaro^{1*}; MADHUSOODHAN, Satish-kumar¹; MISHIMA, Kaoru²; UENO, Yuichiro²; HOKADA, Tomokazu³

¹新潟大学, ²東京工業大学, ³国立極地研究所

¹Niigata University, ²Tokyo Institute of Technology, ³National Institute of Polar Research

Banded iron formations (BIF) are marine chemical sediment rocks precipitated mostly in Archaean and early Paleoproterozoic between 2.7Ga and 2.3Ga. This time interval record profound changes in the redox state of the oceans and atmosphere, such as the Great Oxidation Event (GOE). We present here the geochemical data obtained from 3.0 Ga banded iron formation (BIF) in the Chitradurga Schist Belt, Dharwar Craton, Southern India. This region exposes the Archaean strata predominated by supracrustal greenstone belts, stratigraphically overlying the Peninsular gneiss. Chitradurga schist belt comprises of three important BIF layers distributed in the Bababudan and Chitradurga groups. We present here the salient geochemical characteristics and strontium and neodymium isotope results of the BIFs and discuss the depositional environment.

BIF contain very low content of Al₂O₃ (<1wt.% except 1 sample) indicating less detrital components. The PAAS-normalized REY patterns shows positive La and Eu anomaly, low concentration of rare earth element, depletion of light rare earth elements (LREEs) relative to heavy rare earth elements (HREEs). These features differ with other Archaean BIFs in terms of lack of positive Y anomaly. The large positive Eu anomalies in Archean BIF of Chitradurga schist belt attribute to high-T hydrothermal fluid fluxes (>250 °C), while the negative Ce anomaly reflects the lack of significant oxidizing agents.

Sr isotopic composition of BIF shows large variations suggesting post depositional alterations, whereas Nd isotope ratios gave consistent information. Most of the samples show $\epsilon\text{Nd}(3000\text{Ma})$ in the range of +2 to +4 and T_{DM} model age in accordance with sedimentation age. The $\epsilon\text{Nd}(3000\text{Ma})$ of depleted mantle is about +4, which suggests that most of the Chitradurga BIFs were deposited in an environment strongly affected by input from a depleted mantle. However samples with different REY pattern show higher $\epsilon\text{Nd}(3000\text{Ma})$ between +6 and +14 and their T_{DM} model age are not equal to the sedimentation age. The geochemical results thus suggest that the BIFs in the Chitradurga schist belt were deposited near possible ridges affected by hydrothermal activities.

キーワード: 縞状鉄鉱層, ダールワークラトン, 太古台, Nd 同位体

Keywords: Banded Iron Formations, Dharwar Craton, Archaean, Nd isotope