Eu and Ce anomaly and REE patterns in cap carbonates of Neoproterozoic Duoshantou Formation in South China

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The Neoproterozoic Ediacaran period witnesses dramatic diversification of multicellular life as well as a remarkable change of global climate and geochemical cycle. Cap carbonates deposited immediately after the Marinoan glaciation, which commonly preserve striking features of the climate and environment shifts at the termination of the glaciation. The cap carbonates exhibit negative $\delta^{13}C$ anomaly and sedimentary textures of pseudo-tepee, tube structure, and aragonite fan.

Eu and Ce anomaly and rare earth elements (REE) patterns are useful proxies for seawater chemistry. Studies of trace and rare earth elements on cap carbonates can reflect temporal seawater signals, depositional environments and material sources. The Duoshantuo cap carbonates in the Yangtze Platform of South China can be sudivided into three units (C1, C2 and C3). In general, no significant Ce anomalies are observed in the cap carbonate units but negative Ce anomalies occur in the overlying carbonate rocks of Member II of Doushantuo Formation. Positive Ce anomalies are observed in the upper C3 cap carbonates in all studied sections from the Yangtze Platform together with high Mn/Fe ratios and small MREE anomalies. We suggest that this positive Ce anomaly may result from the reductive dissolution of Ce enriched Mn- (oxyhydro) oxides across a Mn(IV)/Mn(II) redoxcline, in a distinct manganous wedge sandwiched between well oxygenated and anoxic ferruginous deep water column in the demise of cap carbonate deposition. Both the positive Eu anomaly and redox-sensitive trace metals of the cap carbonates indicate an input of hydrothermal materials during the deposition of cap carbonates. It is also suggested that locally derived deglacial meltwater interfused with seawater was responsible for the precipitation of cap carbonates in a weakly oxic condition.