Carbon and sulfur isotope records of Ediacaran carbonates of Lesser Himalayas: implications on oxidative state of the contemporary oceans

DM Banerjee

Department of Geology, University of Delhi, Delhi-110007, INDIA
E-mail: dhiraj1942@yahoo.co.in

High resolution geochemical data from fossil-poor Blaini-Krol and fossiliferous Lower Tal succession in the Lesser Himalayas closely conform to the geochemical trends demonstrated by the rock sequences at Oman, Newfoundland, South China and Western United States. Geochemistry of all these known Ediacaran sections suggest long term oxidation of the terminal Proterozoic oceans which led to gradual depletion of dissolved organic carbon reservoir. It is interpreted that the increase in the dissolved organic carbon was responsible for the radiation of acritarchs and algal population (McFadden et al 2008). Such coupling of oceanic oxidation event and the evolution of organisms can be suggested only when chemostratigraphy is adequately supported by biostratigraphy. Lower Himalayan sections do not offer such an opportunity due to low suphate but high sulfide contents in the Krol carbonates and the consequent paucity of preserved organic life in these strata. The Krol basin carbonates show fairly stable organic carbon isotopes, but three profound negative carbonate carbon excursions and a positive excursion close to the rock junction of Lower Tal phosphorite. Two of these excursions are associated with facies changes, hence suspected to be artifacts, while one negative excursion in the transgressive facies represent biogeochemical anomaly co relatable through different continents (Kaufmann et al. 2006). On the other hand, sulfate sulfur isotopes associated with the carbonates are compatible with large buffered dissolved organic carbon reservoir and low sulfate concentrations but high sulfide sulfur. Sharp negative isotopic shift in the upper part of the Krol succession therefore records pulsed oxidation of the deep oceanic dissolved organic carbon reservoir, leading to sudden proliferation of small Shelly Fossils and associated eukaryotic diversity in the Lower Tal phosphate/Chert which follow the sharp negative carbonate carbon excursion. Two negative excursions in the lower Cambrian Tal succession reflect changes in the oceanic chemistry while one small excursion is an artifact and influenced by the facies. On the other hand, at the bottom of the whole succession, representing the end phase of the Blaini Formation, a prominent negative carbonate carbon excursion has matching trends in most of the continents and reflects last phase of the glacial activity in the terminal Proterozoic time.

References

McFadden KA,J Huang, X Chu,G Jiang,AJ Kaufman and C Zhou. 2008. Pulsed oxidation and biological evolution in the Ediacaran Doushantuo Formation. *Proceedings National Academy of Sciences USA,* 105(9): 3197-3202

Kaufman AJ,G Jiang,N Christie-Blick,DM Banerjee,V Rai. 2006. Stable isotope record of the terminal Neoproterozoic Krol platform in the Lesser Himalayas of northern India. *Precambrian Research* 147: 156-185