Environmental change from Sr isotope ratio of carbonate rocks in Three Gorge, South China.

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[1] Earth and Planetary Sci., Tokyo titech

Some palaeontological evidences suggest diversity of macrofossils and appearance of skeletal fossils in Neoproterozoic, especially after the Marinoan glaciation. It is thought that change of oceanic composition caused the evolution of life. Therefore, it is very important to resolve change of oceanic composition through Neoproterozoic age. In this study, we estimated change of oceanic composition from perspective of isotopic geochemistry of carbonate rocks in Neoproterozoic.

There are mainly two factors to change oceanic composition. The one is inflow of materials from continental crust by erosion and weathering. Another is submarine hydrothermal activity. Oceanic composition is dependent on balance between this two factors, and we can monitor this balance from measuring radiogenic Sr isotope ratio of carbonate rocks.

In this study, we measured radiogenic Sr isotope ratio of carbonate and phosphorite in Neoproterozoic age. We analyzed drill core samples in Three Gorge area and rock samples in Weng'an area, south China. Drill core samples were insignificantly affected by secound alteration on the ground. Moreover, we can obtain almost complete geochemical profile because the drill core is actually a complete sequence from the Marinoan glaciation. We obtained three results. Firstly, radiogenic Sr isotope ratio ranges from 0.708 to 0.709 in Doushantuo Formation of Three Gorge area and Weng'an area. Secondly, we found a large positive anomaly of radiogenic Sr isotope ratio between upper part of Baimatuo Member and lower part of Yanjahe Formation in Three Gorge area, which corresponded to the just below the boundary between the Precambrian and Cambrian. Finally, the values of radiogenic Sr isotope ratio form a smooth excursion curve.

We investigated whether the isotopic excursion was original by microscopic observations and analysis of other element and isotope ratio, such as Mn/Sr ratio. Preliminarily, these elemental data do not conflict with interpretation that the excursion of radiogenic Sr isotope ratio is primary. Therefore, our data suggest environmental change was caused by mass inflow of continental materials beore Cambrian period. The results imply that this extensive environmental change influenced life evolution.