Radiogenic Sr isotope chemostratigraphy of the Ediacaran Doushantuo Formation in the Yangtze Craton, South China

*Yusuke Sawaki[1]

1. The University of Tokyo

The Ediacaran period records one of the most dramatic biological episodes in Earth's history. To decipher surface environmental changes occurring in the Ediacaran, a variety of geochemical proxies have been reported by a number of studies. Ediacaran sedimentary rocks in South China figure prominently in such studies, because they are fossiliferous and accumulated at various depositional settings from shallow marine to deep basin. Recent extensive geochemical works for the Doushantuo Formation in South China demonstrate that $\delta^{13}C$ values of carbonate were variable depending on the depositional settings. In order to test whether the difference reflect spacial or temporal variation, I focus on $^{87}Sr/^{86}Sr$ ratio as a chemostratigraphic tool. However, the existing $^{87}Sr/^{86}Sr$ values are limited to shallow marine deposits, which leaves ambiguity in a variation of $^{87}Sr/^{86}Sr$ ratios in outer ocean. Our group conducted on-land drilling at Siduping and Tianping sections in South China to obtain completely continuous sedimentary rocks deposited at slope facies. We newly report stratigraphic profiles of the $^{87}Sr/^{86}Sr$ ratios at the sections. $^{87}Sr/^{86}Sr$ chemostratigraphy demonstrated some diachronous natures of $\delta^{13}C$ within the Doushantuo Formation. The enhanced continental weathering during Gaskiers glaciation likely promoted bacterial sulfate reduction and aerobic respiration of organic matter. These resulted in low $\delta^{13}C$ values of dissolved inorganic carbon and accumulations of phosphate and dissolved CO_2 species in seawater, and eventually induced the deposition of phosphorites at the shelf margin. High $^{87}Sr/^{86}Sr$ ratios during the largest negative $\delta^{13}C$ anomaly in the Ediacaran can be also recognized in the continental slope sediment. This fact supports that globally high continental weathering rate led to massive remineralization of organic matter and a consequent significant negative $\delta^{13}C_{carb}$ excursion.

