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堆積場の異なる南中国エディアカラ紀の炭素同位体比負異常
Ediacaran carbon isotope anomaly of different setting in South China

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The Ediacaran is one of the most important periods in the history of life when multicellular animals first appeared on the earth. However, we still poorly understand the relationship between the abrupt biological evolution and environmental change. Many of the Ediacaran sections record the largest d13C anomaly through the Earth's history, named as Shuram excursion (Calver et al., 2000; Fike et al., 2006). The observed excursion may reflect extensive remineralization of large amounts of organic matters in the Ediacaran ocean (Fike et al., 2006; Rothman et al., 2003) or extensive, global diagenetic alteration (Knauth & Kennedy, 2009). However, it is difficult that the negative excursion of similar magnitude around the world is caused by local alteration (Grotzinger et al., 1995). We analyzed carbon and nitrogen isotopes by using drill core samples from four different depositional settings in South China: Three Gorges and Weng'an sections for shallow marine setting, and Tianping and Shiduping sections for relatively pelagic, deeper slope setting, respectively.

We comprehensively analyzed the drill core samples through the sections, but the deeper, relatively pelagic, sections show high carbon isotope ratios through the sections, and apparently no negative excursion. The result is contrast to presence of continuous negative d13C values through the Ediacaran in deeper facies, proposed by Jiang et al., (2007) The Weng'an section, characterized by the oldest extensive phosphorite deposit, in shallow shelf setting also displays smaller negative excursion (>-4 per mil), compared with Three Gorges section in another shallow marine setting.

Our results show the d13C values are highly variable depending on the depositional environment. The restriction of appearance of the negative d13C excursions to shallow marine settings suggests that extensive remineralization took place only in shallow marine environments, enriched in organic carbon and sulfate, due to extensive supply of sulfate from continents. On the other hand, extensive phosphorus supply promotes prosperity of photosynthetic activity, namely primary production, thus increases d13C of the area of the sea, as well as inhibits remineralization due to sulfate reduction. Alternatively, the shallow sections preferentially suffered from diagenetic alteration possibly in response to eustatic sea-level fall, analogous to d13C negative anomalies before the Snowball Earth events, as recently proposed by Swart & Kennedy (2012). But, as far there is no evidence for a glacial event, associated with the Shuram excursion.
Keywords: Ediacaran, carbon isotope ratio, Shuram excursion, deeper sediment