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Organic carbon isotope changes at P-T boundary in Gujohachiman, Japan

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There was large extinction from Guadalupian- Lopingian boundary (GLB) to Permian- Triassic boundary (PTB), ca. 260- ca. 251Ma (Sepkoski, 1984; Knoll et al., 1996; Isozaki, 1997; Stanley and Yang, 1994; Kaiho et al., 2005). The extinction will have correlation with Oceanic environment (e.g. oxic level in ocean, climatic change). Black shale layer is observed in chert of accretionary complex in Japan and Canada. The layers indicate anoxic in entire Ocean (Oceanic Anoxic Events) (Isozaki, 1997). However, the correlation between extinction and environmental changes is not known. Therefore, we need to study life cycle changes and influence to oceanic environment in extinction by changes of carbon isotope ratio.

The stable isotope ratios d13Ccarb and d13Corg are believed to reflect the change in the global status of photosynthesis, since biological organisms preferentially use light carbon during photosynthesis. When the biological mass with light-carbon content becomes large, the inorganic carbon (mantle CO2) in the atmosphere and ocean become heavier. In other words, carbon isotope changes in carbonate and organic carbon will reflect carbon cycle changes by extinctions (Rothman et al., 2003; Tahata et al., 2014).

There were many previous studies of carbonate carbon isotope ratio from GLB to PDB. The carbon isotope records show over +6 permil before GLB, calling to Kamura event. The d13Ccarb after Kamura event decrease to ca. 0 permil around GLB. Moreover, the d13Ccarb decreases from ca. +3 permil to ca. -2 permil at PTB and shows large excursions from PTB to middle Triassic (Isozaki et al., 2007a,b; Korte et al., 2005a,b; Payne et al., 2008). As the carbonate carbon isotope records, there are no continuous carbon isotope records of organic carbon from GLB to PTB, because the carbonate-rich rocks have low organic contents and difficult to analyze organic carbon isotope ratio.

Accretionary complex in Gujohachiman, Gifu-ken, Japan constitute of alternation of chert and shale. The sediments show continuous depositions in deep sea from GLB to PTB. We analyze organic carbon isotope ratio from continuous shale layers in Gujohachiman, because the shale layers between shert layers have organic-rich.

The results of organic carbon ratio show coupling to carbonate carbon isotope changes, except for GLB. Organic carbon isotope records in GLB decouple carbonate carbon isotope ratio. The carbon isotope change indicate to reflect to carbon cycle changes by extinction.