

The Late Guadalupian (Permian) Kamura event revisited: carbon isotope stratigraphy of the topmost Iwaizaki limestone in NE Japan and the expansion of oceanic OMZ

*Tomoyo Tobita¹, Yukio Isozaki¹, Miyuki Tahata¹, Yohei Matsui², Saburo Sakai², Manabu Nishizawa², Tomoyo Okumura², Naohiro Yoshida³

1. Department of General Systems Studies Graduate School of Arts and Sciences The University of Tokyo, 2. JAMSTEC, 3. Tokyo Institute of Technology

The major extinction of marine animals occurred in the Capitanian immediately before the Guadalupian-Lopingian boundary (Permian), of which detailed stratigraphy has been analyzed in low-latitude sections, e.g. in Texas, South China, and also in Japan. The sea-level drop and the coeval selective extinction of tropical fauna during the Capitanian suggest the appearance of global cooling. The Permian Iwaizaki limestone in the South Kitakami belt in NE Japan represents a shallow marine shelf carbonate sequence that record the development of a patch reef and subsequent collapse in the high-latitude side of subtropical zone. The occurrence of large-tested fusuline *Lepidolina* and extremely low Sr isotope ratios guarantee the Capitanian age of the uppermost part of the limestone. We analyzed the secular change in inorganic and organic carbon isotope ratios for drilled core from the topmost 40 m-thick interval of the limestone. We found out that $\delta^{13}\text{C}_{\text{carb}}$ values of the Capitanian seawater reached up to +5.8 ‰ during the extinction, and that organic matter had $\delta^{13}\text{C}_{\text{org}}$ value as high as -22.5 ‰. The results confirm that the "Kamura event", originally proposed solely on inorganic carbon isotopic ratio, indeed implies the high primary productivity coupled with the efficient burial of organic matter. In order to drive $\Delta^{13}\text{C}$ up to 30 ‰, additional contribution by methane-bacteria is necessary in carbon fixation, which can be best performed under reducing conditions. Similar high $\Delta^{13}\text{C}$ values detected in coeval shallow marine limestones in the Brusane section in Croatia and the Senkina Shapka section in Far East Russia suggest the global nature of the Kamura event. This unique isotopic episode likely reflected the expansion of the oxygen minimum zone (OMZ) in the superocean, which may have caused the significant extinction at the end of the Guadalupian.

Keywords: mass extinction, Permian, Capitanian, C isotope ratio