

The collapse of a Capitanian (Middle Permian) reef: Sr-isotope profile at Iwaizaki, NE Japan

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The Iwaizaki Limestone in the South Kitakami Belt, NE Japan, represents shallow-marine shelf carbonates deposited along the Guadalupian (Middle Permian) South China margin. The main part of the limestone is composed of massive fossiliferous limestone (ca. 100 m) of reef complex, while the upper part (ca. 35 m thick) consists of interbedded limestone and mudstone. This facies transition corresponds to the onset of reef collapse, and the disappearance of tropical fauna. The main part and the lowermost upper part yielded Capitanian (Upper Guadalupian) fusulines but the rest of the upper limestone is barren of index fossils. As the overlying black mudstone yields Late Permian (Lopingian) ammonoids, the extinction-related G-L boundary exists somewhere within the uppermost limestone or in much higher mudstones. In order to constrain the age of the fossil-free uppermost limestone, we analyzed ⁸⁷Sr/⁸⁶Sr stratigraphy of the Iwaizaki Limestone, and correlated with the global secular trend. The present results confirmed that the topmost Iwaizaki limestone, as well as the main part, has the same low ⁸⁷Sr/⁸⁶Sr ratio of 0.7068-0.7069. The extremely low ⁸⁷Sr/⁸⁶Sr ratio (<0.7069; the lowest values of the Phanerozoic) continued to the topmost bedded limestone in the section. The coeval limestones in the world, including those at Akasaka and Kamura in Japan, recorded a unique interval of extremely low ⁸⁷Sr/⁸⁶Sr ratio (0.7068-0.7070) as called the "Capitanian minimum". Therefore, the topmost Iwaizaki Limestone no doubt belongs to Capitanian, suggesting that the collapse of reef started clearly before the G-L boundary, probably by the onset of the putative Capitanian cooling.

Keywords: Permian, Sr isotope, shelf, South Kitakami belt, reef