Guadalupian (Middle Permian) Sr isotope profile and reef collapse in low/mid-lattitude shelf carbonates in NE Japan and Primorye (Russia)

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We report the 87Sr/86Sr of the Capitanian (Middle Permian) limestones from the Iwaizaki limestone in NE Japan and the Chandalez limestone in Primorye, Russia. Both limestones represent shallow-marine shelf carbonates deposited along the Pacific margin of South China at the low/mid-latitude. Both abundantly yield Capitanian index fusulines of genus Lepidolina.

The Iwaizaki limestone, analyzed more in detail on litho- and biostratigraphy, is composed mainly of massive (ca. 100 m) reef complex with overlying (ca. 40 m thick) interbedded limestone/mudstone. The latter represent the collapsing stage of reef on the continental shelf. The present results confirmed that extremely low 87Sr/86Sr values of ~0.7069 characterize the topmost limestone/mudstone interbeds. The values are equivalent to those of the "Permian minimum" interval, thus, suggesting that the Iwaizaki reef collapsed during the Capitanian. In the Chandalez limestone, extremely low 87Sr/86Sr values of ~0.70690 occur not only from the Capitanian Lepidolina–horizon but also from the underlying Wordian Parafusulina–horizon. This suggests that the "Permian minimum" had started sometime in the Wordian.

The Phanerozoic lowest sea-level occurred in the late Capitanian. The suggested appearance of global cooling is concordant with the Capitanian collapse of reef complex in the Iwaizaki limestone. The "Permian minimum" appears also consistent with the putative cooling because the proportion of glacier-covered area regulate erosion/weathering rate of time-integrated highly radiogenic continental silicate. The onset of the Guadalupian-Lopingian boundary extinction was possibly related with this global cooling.