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Mass extinctions, recovery and resilience

Potential impact of the end-Permian pelagic deep-sea anoxia

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Sedimentary rocks in the Japanese accretionary complexes are rare and important material which record the pelagic oceanic region at least several thousands of kilometres far from the main continents. Using these materials, we have reported the pelagic deep-sea environmental records of the palaeo-superocean Panthalassa during this mass extinction event and its aftermath. In this presentation, we will present some latest findings based on one of the best deep-sea Permian-Triassic boundary sections (Akkamori section; Takahashi et al., 2009; 2014; 2019).
The strong sulphidic condition was estimated by the highest peaks of Mo coinciding with the onset of the black organic matter enriched claystone, in accordance with the end-Permian mass extinction event which associated with a significant decrease in silicic microfossils. The reactive Fe hosted in pyrite mineral decreased toward this horizon suggesting a decrease in reactive Fe in the sediments and contemporaneous seawaters under sulphidic conditions. After that, Mo decreased despite high total organic carbon contents and temporal increases in pyrite. This trend implies drawdown of seawater Mo after the massive Mo deposition during sulphidic water condition. Therefore, it was revealed that the redox changes in the pelagic Panthalassa at the end-Permian mass extinction have a great impact on the seawater composition. The decrease in reactive Fe from pelagic seawater would promote sustainable anoxic water development, because of the limited H2S consumption by pyrite formation. Depletion of Mo as a bio-essential nutrient could have had a considerable effect on primary producer turnover and marine animals.