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Abrupt surface-water reduction accompanied with massive soil inflow during the end-Permian mass extinction

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The largest mass extinction of biota in Earth history occurred at the end of the Permian Period, which led to a turnover of biosphere from Paleozoic Fauna to Modern Fauna. Siberian volcanism is the most possible cause, however, the direct causal mechanism for the mass extinction is unclear. We report that the worst redox condition in the shallow sea appeared during the mass extinction on the way to a gradual reduction of deep sea. An abrupt decrease in oxygen in the shallow sea is thought to be a direct cause of the marine mass extinction. A significant decrease in atmospheric oxygen should also have occurred during the mass extinction to explain the shallow surface water reduction and land mass extinction.

A soil erosion event occurring at the end-Permian mass extinction has already been reported. However, those records are restricted in a few near-shore sequences. We demonstrate that a organic-molecule soil-erosion proxies have peaks during the end-Permian mass extinction throughout the inner continental shelf to the upper continental slope in Paleotethys and a sea mount in the central Panthalassic ocean, and in contrast to this, no peaks at isolated platform area in Paleotethys and deep Panthalassic ocean. Furthermore, we found high DBF/Phe ratio values throughout the inner continental shelf to the upper slope and a sea mount, and low values at isolated platform, its slope, and in central deep ocean during the mass extinction. This phenomenon is supported by other organic molecule proxies sourced from land. The distribution of soil erosion proxies in the end-Permian sea clarifies that massive soil erosion event surly occurred during the end-Permian mass extinction.

In summary, abrupt surface-water reduction accompanied with massive soil inflow occurred during the end-Permian mass extinction.

Keywords: oceanic reduction, soil, Permian, Triassic, mass extinction