



The abnormal marine ecosystems after the Permian-Triassic mass extinction

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The Permian-Triassic boundary (PTB) crisis, representing the largest mass extinction of the Phanerozoic, was linked to major perturbations of the ocean-atmosphere system. Recently, we found some new interesting phenomenon from fossil and sedimentary records in the Early Triassic. Our results show that the PTB mass extinction resulted in the appearance of an abnormal marine ecosystem. Normally, marine ecosystem was dominated by non-motile animals with normal body sizes in the Paleozoic. However, following the PTB mass extinction, the Early Triassic marine ecosystem was dominated by nektons, small and opportunistic taxa.

We found two new “anachronistic” sedimentary events associated with the changes in the seawater system during/after the PTB crisis, i.e. ‘dolomitization event’ and ‘marine red beds event’. Ten of twenty-two sections show high Mg/(Mg + Ca) ratios bracketing the PTB, indicating a global dolomitization event during the PTB crisis. We hypothesize that dolomitization event was triggered by enhanced microbial sulfate reduction within the oceanic chemocline. We found dozens of Early Triassic sections containing red carbonates (called marine red beds event). These red beds coincide closely with intervals immediately following periods of ocean anoxia as well as negative $\delta^{13}\text{C}$ excursion. We propose that displacement of Fe^{2+} -rich anoxic deeper waters into oxic shallower waters during the termination of oceanic anoxic events led to precipitation of hematite, coloring the red carbonates.