Multiple sulfur isotope signals associated with the end-Permian mass extinction recovery

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The Early Triassic is generally portrayed as a time of high ecological stress leading to a delayed biotic recovery in the aftermath of the devastating end-Permian mass extinction. This interval is also characterized by repeated large-scale fluctuations of the global carbon, nitrogen and sulfur cycles, associated with harsh marine conditions including a combination of ocean acidification, euxinia, extreme seawater temperatures and shifting productivity. These perturbations are documented during the Dienerian, the Late Smithian and at the Spathian–Anisian boundary. Evidence from various paleolatitudes suggest that sulfidic (H_2S-rich) conditions may have developed widely during the Early Triassic, possibly up to ultra shallow environments at some places [1]. However, the spatio-temporal extent of such redox swings in the equatorial Panthalassa Ocean remains poorly constrained. In order to explore palaeoceanographic redox changes and their potential influences on the biotic recovery, we analyzed multiple sulfur isotopes (^{32}S, ^{33}S, ^{34}S, and ^{36}S) for sedimentary pyrite and CAS-$\delta^{34}S$ from sections in the Sonoma Foreland Basin (western USA). We analyzed shallow waters sediments spanning the Smithian to Spathian interval. We report a 35‰ range of variation in $\delta^{34}S_{py}$ associated with positive and steady $\Delta^{33}S_{py}$ and $\delta^{34}S_{CAS}$ signals. We discuss these results in terms of redox chemistry changes during the Early Triassic, and especially for the Smithian-Spathian transition.

[1] Wignall *et al*. (2016) Geol. Mag. **153**, 316.