The Biogeochemical Cycling of Sulfur, Carbon and Nitrogen across the Permian-Triassic (P-Tr) Hovea-3 borehole (Western Australia) and Schuchert Dal Section (Eastern Greenland)

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Abstract

The most pronounced mass extinction of the past 500 million years occurred towards the end of the Permian Period (ca. 250 My). Volcanism, methane release from melting of gas hydrates, global anoxia and outcropping of hydrogen sulfide are some of the mechanisms that have been continually invoked to account for the extinction. Recent green sulfur bacterial biomarker findings in the Hovea-3 borehole (Western Australian) strongly support photic zone euxinic conditions. Such conditions appear to have been a major factor in the extinction and the protracted recovery [1]. Further supporting evidence for widespread euxinia comes from $\delta^{34}S$ isotope excursions of sulfate and sulfide minerals at P-Tr sections from numerous P-Tr sections worldwide. Similar shifts in $\delta^{34}S$ of sulfide minerals have been observed in Hovea-3 [1] and the Schuchert Dal section from Eastern Greenland. The Schuchert Dal section preserves a complete and expanded record covering over 40 m. It also contains terrestrial and marine biomarkers. Preliminary isotopic results show evidence of secular change i.e. changes in $\delta^{13}C$ of dissolved CO_2 in the ocean and in $\delta^{13}C$ of CO_2 in the atmosphere at the one locality. Also a sudden increase in the abundances of dibenzothiophene (DBT), dibenzofuran (DBF) and biphenyl and an increase in TOC % occurs at the start of the extinction interval. These data are consistent with DBF and TOC (%) data reported in another section from northern Italy attributed to enhanced soil erosion and rapid burial [2].

References

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