

Volcanic disturbance of C-P cycles in the Triassic Ordos lacustrine basin

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The southern Ordos basin in China preserves thick layers of black shales with TOC content larger than 35%. Interbedded with these shales, multiple layers of volcanic ash occur, likely deposited from frequent volcanic activities at the southern margin of the basin. However, the shales deposited in the northern basin contain much lower TOC content and little volcanic ash. Currently, the effect of volcanic activities on lake ecosystem and thus C burial remains elusive.

In this study, we analyzed phosphorus and iron speciation as well as mercury contents and other geochemical indexes of the shales from the southern and northern Ordos basins, respectively. Our preliminary data suggest volcanic ash likely supplied the necessary nutrients for the southern basin, especially the potentially limiting P, promoting the primary productivity in the lake. In contrast, the volcanoes had little influence on the shale deposition in the northern. Moreover, the southern and northern parts of Ordos basin had different redox states, leading to distinct phosphorus recycling efficiencies. Altogether, we posit that volcanic activity and subsequent phosphorus cycling played pivotal roles in augmenting lake productivity and facilitating the accumulation of organic-rich shale deposition in Ordos basin during the Triassic.