

Hydrological cycling in a long-lived Eocene Lake Uinta, Green River Formation, Utah

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The Lower Eocene Green River Formation of Utah and Colorado documents a ~15 million-year record of unusually large lakes that spans the Early Eocene Climatic Optimum (EECO), a time when global temperatures were ~5-10°C warmer than present. Multiple drill cores and outcrop samples forming a transect through the basin margin and centre of the Parachute Creek Member offer an excellent opportunity to construct high-resolution records of terrestrial conditions during the EECO and explore their influence on organic matter deposition and preservation. These records preserve several negative excursions in the carbon isotopic composition of bulk organic carbon that could be correlative with the marine record of hyperthermals using a radiotopically anchored astrochronology.

In this study, the isotopic expression of mid-latitude hydrological change during rapid warming is investigated through compound-specific hydrogen isotopic analyses of n-alkanes extracted from the Mahogany Oil Shale Zone of the Uinta basin, Utah. Comparison of this novel record with high-resolution sedimentary logs and to other biomarkers such as steranes and hopanes allows the differentiation of hydrological change from broader ecosystem change during the EECO.