

Rhenium-Osmium (Re-Os) geochronology of the Eocene Green River Petroleum System: Establishing the systematics of Re-Os isotopes in lacustrine source rocks and generated hydrocarbons.

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The Re-Os organic-rich sediment (common source rocks) geochronometer is well established and permits accurate and precise geochronology in marine basins. Recently it has been shown that the Re-Os enrichment of source rocks is also seen in hydrocarbons and that the age of oil generation can be determined using Re-Os isotopes. Establishing the fundamental behaviour of the Re-Os system in source rocks and generated hydrocarbons is crucial to the Re-Os geochronometer's widespread application and development as a tool for precise oil geochronology and oil-source fingerprinting. Previous Re-Os studies have focussed on widespread marine petroleum systems with lacustrine petroleum systems yet to be studied. Lacustrine sediments respond to tectonic, climatic and magmatic influences and therefore provide an invaluable record of continental geological processes. In addition organic-rich lacustrine sediments have been shown to be significant petroleum source rocks and so accurate and precise geochronology is essential for an improved understanding of these petroleum systems.

The Eocene Green River Formation (GRF) is the world's largest deposit of lacustrine organic rich sedimentary rocks. It is ideal for this study as it is enriched in Re-Os (20-60 ppb Re, 100-500 ppt Os), allowing the development of the Re-Os geochronometer as a tool to further understand lacustrine settings, geochronology of which is complex due to lack of marine biostratigraphic constraints. In addition, the variety of hydrocarbons (oil, tar sands, gilsonite) generated from the GRF in the Uinta Basin show similar Re-Os enrichment and allow for improved understanding of Re-Os systematics in source rocks and their associated hydrocarbons.