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Integrated stratigraphy of Paleocene lignite seams of the fluvial Tullock Formation, Montana (USA).

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Coal-bearing fluvial sedimentation is generally thought to be dominated by autogenic processes that are processes intrinsic to the sedimentary system. Ongoing research however suggests that several fluvial processes such as floodplain inundation and avulsion, can also be controlled by external forcing such as orbital climate change. Still, the exact role of orbital climate forcing in fluvial sediments is difficult to decipher since riverine deposits are complicated by variable sedimentation rates including erosion of previously deposited material, by lateral heterogeneity of sedimentation, and by scarcity of independent dating methods.
The early Paleocene lignite-bearing Tullock Formation of the Williston Basin in eastern Montana represents a record of fluvial sedimentation that is perfectly exposed and, displays a seemingly regular alternation of sandstones and lignite seams. These coal beds contain multiple volcanic ash layers. Here, we use an integrated stratigraphic approach (litho- and magnetostratigraphy, geochemical fingerprinting and radio-isotope dating of volcanic ash layers) to establish a high-resolution time frame for the early Paleocene fluvial sediments. First age estimations indicate that the Tullock Formation in Eastern Montana was deposited over a time span of $\sim$ 1000 kyr subsequent to the Cretaceous – Paleogene boundary, dated at $\sim$ 65.95 Ma [1]. Initial high-resolution magnetostratigraphy revealed the occurrence of the C29r/C29n polarity reversal which was stratigraphic consistent at different field locations. We investigate the regional significance of sedimentary change at multiple sites of the same age in order to provide improved insight on the role of orbital forcing in fluvial coal formation.

References:

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