Towards a Mechanistic Understanding of the Linkages between PETM Climate Modulation and Stratigraphy, as Discerned from the Piceance Basin, CO, USA

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ABSTRACT

Climate is a key control on the rate of sediment supply to depositional systems, and therefore exerts a strong influence on channel stacking in sedimentary basins. A clear understanding of basin architecture is critical to successful reservoir engineering and hydrocarbon exploration, and yet the mechanisms that connect climate to sediment supply remain largely unexplored. This field study will address this research need by estimating paleohydrology throughout a stratigraphic sequence spanning the Paleocene–Eocene Thermal Maximum (PETM) in the Piceance Basin of western Colorado. The PETM was a period of rapid climate warming, and it has been hypothesized that the increase in temperature drastically enhanced the hydrologic cycle. As a result, changing rainfall patterns significantly perturbed landscape dynamics in the Piceance Basin, and increased sediment supply. The goal of this study is to understand the precise nature of this fluvial response to the PETM by interpreting paleo-depth, paleo-slope, and paleo-velocity from deposits in the Piceance Basin bracketing the PETM. I will conduct a field campaign to collect measurements and samples of sedimentary structures that contain indicators of paleohydrology. Based on previous studies, I will also construct a suite of hypothetical depositional histories for the Piceance Basin. Guided by my new estimates of paleohydrology, I will identify the most plausible sediment flux scenarios during the PETM, thus placing strong constraints on the depositional history of the Piceance Basin and its connection to changing climate. Based on this work, studies of other depositional basins could more accurately account for climatic factors in basin analysis, leading to more efficient exploration and exploitation of fluvial sand reservoirs.

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