

MULTI-PROXY INVESTIGATION OF THE WILKINS PEAK MEMBER, GREEN RIVER FORMATION VIA XRF CORE SCANNING: DEVELOPMENT OF A NEW HIGH-RESOLUTION ASTROCHRONOLOGY TO EVALUATE LAKE EXPANSION-CONTRACTION CYCLES AND IMPROVE TERRESTRIAL-MARINE CORRELATION IN THE EOCENE

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ABSTRACT

The Eocene Green River Formation of Wyoming, Utah, and Colorado is one of the world's premier lacustrine records, holding vast oil shale and mineral deposits and a particularly rich terrestrial archive of climate dynamics, tectonics, biology, and geomorphology for the most recent period of prolonged global warming, the Early Eocene Climatic Optimum (~53-50 Ma). These strata have been the focus of more than a century of study, however an extensive, high-resolution, multi-proxy record of this formation is currently lacking. X-ray fluorescence core scanning methods can offer significant strides forward in this regard, with continuous measurement of over 16 elements at sub-millimeter to centimeter scale resolution. Application of this tool to the Wilkins Peak Member of the Green River Formation, in combination with a suite of statistical testing approaches, will produce both a new multi-proxy elemental record and an astrochronologic model for the Wilkins Peak Member of the Green River Formation, enabling (1) a characterization of Green River Formation chemo-lithofacies with unparalleled detail and scope, (2) a rigorous evaluation of the potential astronomical influences on depositional variability in this formation, including observed lake expansion-contraction cycles, and (3) an improvement of global stratigraphic correlation for the early Eocene through application of a new radioisotopically anchored astrochronology to the Eocene time scale. This information will improve our understanding of the Green River Formation lithofacies composition, distribution, and depositional controls, critical to understanding this lacustrine system and other analogs around the globe.