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THE COLORADO PLATEAU CORING PROJECT (CPCP): PROVIDING A PRECISE NUMERICAL TIMESCALE FOR TRIASSIC EARTH SYSTEM EVENTS AND PROCESSES

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The CPCP seeks to provide a rigorous geochronologic framework for the rich tetrapod assemblages of early Mesozoic strata of the American West, allowing time to be assessed at problem-appropriate resolution, and events, fossil occurrences, and environmental records to be temporally linked across geography and facies.

A major result of Phase 1 of the project is the drilling of three cores completed during December 2013 in Petrified Forest National Park, AZ with the goal of obtaining a complete Triassic section where superposition is unambiguous and the section is tied to a globally-exportable time scale using paleomagnetic polarity stratigraphy and high-resolution U-Pb zircon dates. Although zircon populations from sandstones analyzed thus far are complex because of redeposition, the Park is one of the few places in the world where there is a rich Triassic non-marine tetrapod record with an abundance of datable horizons.

Core 1A (520 m) from the northern part of the park recovered the lower Owl Rock Member (Mb) of the Chinle Formation (Fm) to the base of the formation (Late Triassic), and all of the Moenkopi Fm (nominally Early and early Middle Triassic), terminating in the Permian Coconino Fm. Core 2A (80 m) and 2B (240 m) are from the southern part of the park and recovered the lower Sonsela Mb of the Chinle through to the top of the Coconino. The 2.5 in diameter cores sample the stratigraphy at a minimum average rate of 12 m/Ma and were drilled inclined from the vertical to maximize expression of the paleomagnetic reversal pattern.

The integrated Petrified Forest timescale, based on these cores, will make possible the registry of the massive amounts of surface data in the park and surrounding areas to regional and global processes and events. Specific questions these cores address include the following: (1) Was the largest identified medial Late Triassic biotic turnover synchronous with the giant Manicouagan impact? (2) Does the Newark Basin (eastern US) astronomically-calibrated record show a signal of the chaotic diffusion of the Solar System when tested by independent radioisotopic dates? (3) Are the cyclical climate cycles seen in Newark lake strata discernable in the predominantly fluvial Chinle, and did these cycles effect CO_2 by modulating weathering rates? 4) Were continental biotas of tropical Pangea radically different than those from higher latitudes despite the geographic contiguity and how does the new exportable timescale inform our understanding of existing biostratigraphic correlations?

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