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TITLE: Filling the Triassic Geochronologic Gap: A Continuous Cored Record of Continental Environmental Change in Western North America

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ABSTRACT BODY: The Triassic Period (252.2-201.6 Ma) is bracketed by two mass extinctions, witnessed the evolution of the major groups of modern tetrapods, saw giant bolide impacts, and was typified by generally high atmospheric CO2 and a lack of ice at the poles. Testing hypotheses relevant to these major features of the Triassic, as well as problems related to the Earth system in general, requires temporally well-defined records of environmental and biotic change, especially in terrestrial environments, which until recently were lacking. The NSF and ICDP funded ~500 m long core at Petrified Forest National Park, scheduled to be drilled in Fall, 2013, is part of an interdisciplinary, multi-institutional, Colorado Plateau Coring Project, and is a major step towards providing a network of such records. The core will recover virtually the entire pre-Owl-Rock-Member Late Triassic age Chinle and underlying Early-Middle Triassic age Moenkopi formations. A core is required despite excellent outcrop and a long and distinguished history of study because of ambiguities in local correlation, a lack of constraints on the temporal duration and resolution of biotic events, and an inability to make clear global correlations. Specifically, by integrating a densely sampled paleomagnetic record with high-resolution radioisotopic ages in unquestioned superposition, the new core will allow us to test at least five sets of hypotheses: (1) were marine and continental biotic turnover events in the Late Triassic coupled? (2) was there high faunal provinciality during the existence of the supercontinent of Pangea?; (3) is the time scale of the Newark basin astronomically calibrated GPTS for the Triassic accurate, particularly for the Norian age part that is relevant for mapping the chaotic evolution of the Solar System, as well as global correlations?; (4) is the supposed Carnian-Norian boundary in the Chinle actually a late middle Norian extinction coinciding with the 215.5 Ma Manicouagan impact?; (5) is the stratigraphic record in the Triassic a reflection of changes in local climate due to plate motion through climate belts or changes in global climate driven by other processes, such as CO2 fluctuations? The Petrified Forest core will thus be key to unambiguous testing of these ideas, and observations from it promise to fundamentally change the certainty and specificity of the questions that relate the rich surface record from the Chinle and Moenkopi to Earth system processes.

KEYWORDS: 0444 BIOGEOSCIENCES Evolutionary geobiology, 1115 GEOCHRONOLOGY Radioisotope geochronology, 1520 GEOMAGNETISM AND PALEOMAGNETISM Magnetostratigraphy, 9612 INFORMATION RELATED TO GEOLOGIC TIME Triassic.