

# **MAGNETOSTRATIGRAPHY OF THE LOWER PALEOCENE IN THE WILLISTON BASIN OF NORTH DAKOTA, USA: IMPLICATIONS FOR PLANT AND MAMMAL BIOSTRATIGRAPHY AND BIOCHRONOLOGY**

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A continuous succession of Cretaceous through lowermost Eocene terrestrial sediments contains a nearly complete terrestrial Paleocene record, in the Little Missouri River Valley of North Dakota, USA. We aim to calibrate the rates of post-Cretaceous ecological recovery from mass extinction, by determining detailed geochronological calibrations of plant and mammal fossils in these strata. Using the Cretaceous-Paleogene (K-T) boundary as the basal datum, a ca. 225 meter composite section of the Lower Paleocene Ludlow and Tongue River Members of the Fort Union Formation has been constructed. Paleomagnetic samples analyzed from this section demonstrate a series of geomagnetic reversals that can be correlated to the part of the Geomagnetic Polarity Time Scale that extends from C29r to C27r. Using these tie points, the mean sedimentation rates during this interval are estimated to be ca. 100 m/Myr. These data have allowed us to calibrate the two marine transgressions of the early Paleocene Cannonball Seaway to within C29n and C28r respectively, and correlate the Western Interior of North America palynostratigraphic biozone P1 to C29r-C29n, biozone P2 to C29n-C28r, and biozone P3 to C28n and likely C27r.

Census collections of megafloral localities through this interval document a major transition in the megafloral record from the Fort Union I (FU I) megafloral assemblage to a flora that is markedly different in composition and dominant taxa near the end of C28r. These megafloral and paleomagnetic data imply that the FU I megafloral biostratigraphic zone persisted until ~64 Ma, the change in the megafloral record corresponds to a transition in the palynostratigraphic zonation from biozone P2 to P3 near the end C28r/beginning of C28n, and that the change in the megafloral and pollen records relate to the regression of the Cannonball Seaway during C28r.

The paleomagnetic data also imply a temporal restriction of the Puercan-early Torrejonian North American land mammal ages (NALMAs) in the Williston Basin from ~1.5-2 Myr, as previously considered, to ~1 Myr. Mammals indicative of early Torrejonian age (To1 or To2) have been identified from localities between the two marine transgressions of the Cannonball Sea, which occur within C29n and C28r respectively. Thus, the early Torrejonian mammalian zones To1 or To2 must occur within C29n in the Williston Basin rather than C28n as previously estimated. This in turn suggests that post-extinction mammal speciation occurred more rapidly than previously supposed.

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