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The age and depositional environment for the Eocene-Oligocene Boundary in Ulantatal, Nei-Mongol, China

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Continuous continental sequences are vital in understanding past environmental and climatic changes. One of the most dramatic climatic and environmental turnovers of the Cenozoic occurred ca. 34 Ma, culminating in major global cooling, a drop in atmospheric pCO_2, changes in flora and fauna, and the onset and subsequent intensification of aridification in eastern and central Asia. The associated faunal events, coined the Grande Coupure in Europe and Mongolian Remodeling in Asia, included a general trend in the replacement of perissodactyl dominant faunas to rodent and lagomorph predominance.

However, past environmental and climatic reconstructions or paleoecological relationships on the continental realm are often hampered by the lack of continuous and undated strata. For the first time, we present magnetostratigraphy and age-depth model for the small mammal rich fossil locality of Ulantatal, situated in Nei-Mongol, China. The results demonstrate this continuous sequence ranges from ca. 35 to 27 Ma thus encompassing the Eocene-Oligocene Boundary. The sequence produces abundant fossils mainly comprised of small mammals, such as rodents, lagomorphs and insectivores. The lowermost part of the sequence has similarities to the oldest biozones in the classic Hsanda Gol formation in the Valley of Lakes, Mongolia, yet being more primitive. The youngest fossils in Ulantatal resemble those from Yindirte fauna in Gansu, China. With the age-depth model, the rich fossil localities in Ulantatal can be placed in temporal context with high accuracy.

According to sedimentological characteristics and grain size distribution, the deposits show strong resemblance to younger loess deposits in the Chinese Loess Plateau, suggesting the onset of eolian deposition predating the Eocene-Oligocene Boundary within the sequence. This early loess deposition has importance in understanding the long-term aridifaction history of eastern and central Asia.