Time constraint on Danangou and Dongyaozitou mammalian faunas in the Nihewan Basin, North China

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Nihewan Basin is one of a series of well-developed East Asian Cenozoic basins, located in Hebei Province, North China. It has abundant gullies developed along both banks of the Sanggan River during and after the demise of Nihewan paleo-lake, creating a number of outcrops of the Nihewan Beds of fluvio-lacustrine origin, which are underlain by the Pliocene eolian Red Clay and overlain by the late Pleistocene loess. The fluvio-lacustrine sequence is rich sources of mammalian faunas and Paleolithic sites, thus providing unique insights into our understanding of land mammal biochronology and early human settlements in East Asia. Among the Nihewan Fauna (sensu lato), the Danangou (DNG) and Dongyaozitou (DZ) faunas are two of the important Pleistocene and Pliocene mammalian faunas in the Nihewan Basin. Except for a biostratigraphy, precise age control on the DNG and DZ faunas remains unavailable. Here we report a high-resolution magnetostratigraphic results that stringently constrain their ages. Rock magnetism and thermal demagnetization results show that magnetite and hematite dominate the remanence carriers in the DNG and DZ fluvio-lacustrine sequences. High-resolution magnetic polarity stratigraphy indicates that the DNG sequence recorded the Brunhes normal chron, the Matuyama reverse chron and the late Gauss normal chron, yielding the fossil-rich layers of DNG fauna with an age of ca. 1.95 Ma to 1.78 Ma during the Olduvai normal subchron. The DZ sequence was located at the late Gauss normal chron, leading an age of ca. 3.04−2.58 Ma before the termination of the Kaena reverse subchron. This result, together with previously published magnetochronology data obtained in the eastern basin, constructs a precise age constraints on the chronological framework of the Nihewan faunas and Paleolithic sites, especially during the Plio-Pleistocene transition.