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Magnetostratigraphic evidence for the Late Miocene uplift of the northern Tibetan plateau

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In response to the collision of India with Asia, thick molasse deposits were shed off the high evolving edge of the northern Tibetan Plateau, providing great potential for understanding the relationships between mountain building, rock denudation, and sediment deposition. A precise knowledge of the initial accumulation of the molasse deposits is important for understanding uplift history along the northern margin of Tibet. We have carried out a detailed magnetostratigraphic study of Neogene redbeds sediments at Jianglisai section in the southern margin of the Tarim basin. A total of 700 paleomagnetic samples (with an interval of about 2m) were collected from the Wuqia Formation, Artux Formation and Xiyu Formation in the Jianglisai section. Stepwise thermal demagnetization was used to isolate the magnetic components in these samples. A higher temperature component (HTC) was separated between 300°C and 680°C from most of samples. Positive fold and reversal tests suggest a primary origin for the HTC. A magnetic polarity sequence is established and then compared with the geomagnetic polarity timescale. Detailed magnetostratigraphic studies of the molasse deposits constrain the base of the Xiyu conglomerate here at ∼2.15 Ma. Together with other magnetostratigraphic studies carried out around the Tianshan and the southern Tarim basin, our study unambiguously demonstrates that the onset of deposition of the Xiyu conglomerates is diachronous, and the Xiyu Formation should not be considered as a chronostratigraphic marker related to any particular tectonic or climatic event. Detailed magnetostratigraphic studies also show that the abrupt increase in sedimentation rate in the studied section began at about 8Ma. Together with the synthesis of chronologic and structural results, we attribute the accumulation of the sediments to the tectonic uplift along the northern edge of the Tibetan Plateau due to the collision of the Indo-Asia.