Use of orbital cycles to improve magnetostratigraphic dating of drill core SG-1 from the Qaidam Basin (NE Tibetan Plateau) spanning nearly the last ~2.8 Ma

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The ~940-m-long drill core SG-1 consisting of late Pliocene-Quaternary lacustrine sediments from the western Qaidam Basin (NE Tibetan Plateau) serves as a promising archive for studying past climate change. Magnetic susceptibility (χ) was identified as a well-suited proxy for reconstructing past climate of the western Qaidam Basin in a high resolution (~1 ka). The causes for the χ variation related to climate change were previously reduced to the interference of low-temperature oxidation in the catchment and a change of the sediment source regions. To bring the information of past environmental change into a meaningful time frame it is necessary to improve previous magnetostratigraphic dating (~2.8 Ma to 0.1 Ma) of drill core SG-1. Average sediment accumulation rates (SARs) estimated between geomagnetic reversals are in the order of 35 cm/ka. Time series analysis is applied for χ to establish an orbital age model. Results of spectral analysis reveal the response of χ to orbital forcing, including the transition from the dominating 41-ka cycle to the 100-ka cycle around the Mid-Pleistocene Transition (MPT; ~1 Ma). The observed cyclicity of χ is used to establish a cyclostratigraphy that results in an improved age model and depth-to-age transformation of drill core SG-1. The approach includes separation of the core into intervals with different cyclic behaviour and the analysis of sliding windows.

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