



Climatic precession control of Miocene metre-scale mudflat-lacustrine cycles in the Teruel Basin (NE Spain)

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High-resolution age control of a sediment archive is crucial to define mechanisms of formation of sedimentary cycles at different stratigraphic scales. Here, we apply a detailed magnetostratigraphy on continental mudflat to marginal lacustrine deposits, that are characterised by metre-scale sedimentary cycles (Prado area, southern Teruel Basin, NE Spain). The cycles consist of red to yellow orange floodplain mudstones and pedogenic calcretes to marginal lacustrine limestones. The age control reveals a duration of 19-23 kyr for these repetitive base level variations suggesting that they are primarily controlled by the climatic precession cycle. Correlation of individual sedimentary cycles to successive precession minima and insolation maxima results in an astronomical tuning for the succession. This astronomical calibration is confirmed from comparison of the resulting astronomical ages for reversal boundaries with astronomically tuned ages from a deep marine setting. All reversal ages except one fall within the uncertainty ranges that are confined between samples with good quality resolved polarity both in this study area as well as in the marine realm. Three intervals with twice the average sedimentary cycle thickness are related to obliquity during long eccentricity minima (405-kyr) and additionally confirm our tuning. Our astrochronology provides a perfect time-framework for further sedimentological, paleoenvironmental, and paleontological studies.