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Long-period astronomically forced peat deposits

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Organic matter sequestration by peat accumulation constitutes a primary sink for carbon in the global carbon cycle. Disclosing the processes that control the formation and storage of peat at time scales ranging from 103-106 years is a non-solved issue important for understanding the global climate system. We analyzed a 7 million years long terrestrial record of Late Oligocene age from the coal-bearing As Pontes Basin in Northwestern Spain. Biochronological constraints were included in order to refine a former magnetostratigraphy, giving rise a robust age model. This data was used to perform a cyclostratigraphic analysis. The obtained results show that minima in the 405-kyr and 2.4-Myr eccentricity cycles play a key role in peat formation. Such nodes exhibit reduced precession amplitudes, thus avoiding extremes in seasons and seasonal contrast for a prolonged period of time. In the As Pontes Basin, this orbital configuration is associated with a decrease in siliciclastic sedimentation and enhanced peat formation. Feedbacks between equilibrium landscapes and ecosystem stability will lead to a deceleration of weathering and erosion rates in catchment areas and to minimize and stabilize the sediment flux along the sediment routing system. Mid-latitude peat burial could contribute to disturb the carbon cycle by removing (atmospheric) carbon at times of minimum eccentricity.