EGU25-19356, updated on 02 Jun 2025
https://doi.org/10.5194/egusphere-egu25-19356
EGU General Assembly 2025

Deciphering Orbital Frocing and Paleoclimate dynamics in the Early Carboniferous: Cyclostratigraphy of the Salet Road section, Belgium

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The Early Carboniferous successions in the Namur-Dinant Basin (NDB) in Belgium spans the transition from the Devonian Greenhouse to the Late Paleozoic Ice Age (LPIA). Sections in the basin have been extensively studied, resulting in the establishment of a stratigraphic framework. The role of orbital forcing on sedimentary cycles during the Tournaisian-Visean interval remains unclear. Although cyclic patterns have been visually identified [1], detailed cyclostratigraphic analysis has yet to be conducted.

Our primary objective is to enhance the astrochronological framework of this period, contributing to a precise geologic timescale calibration and a deeper understanding of Early Carboniferous paleoclimate variability. Additionally, this research seeks to improve our estimates of the Earth Precession and Obliquity rates. This will allow to estimate the Earth-Moon distance during a period when a critical change in the Earth-Moon system occurred [2], but still lacking cyclostratigraphic data.

To achieve this, we selected The Salet Road section in the NDB, a 30-meter-thick stratotype for the Moliniacian regional substage, characterized by alternating thick and thinly bedded black limestone facies. We sampled and measured at an unprecedented high resolution of 1 cm. Initial results are promising, showing the imprint of ~2.5 eccentricity cycles (405-kyr). The findings are expected to clarify the influence of orbital forcing on sedimentary processes and expand the global relevance of NDB stratigraphy during this period.

[1] Poty. "The Dinantian (Mississippian) succession of southern Belgium and surrounding areas: stratigraphy improvement and inferred climate reconstruction." *Geologica Belgica* 19.1-2 (2016).

[2] Farhat et al. "The resonant tidal evolution of the Earth-Moon distance." *Astronomy &*

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