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The middle Eocene Oyambre section (northern Spain): an example of the need for pairing cyclic deep-sea records and outcrop successions in astrochronology

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Undoubtedly, the legacy of DSSP/ODP/IODP programs that have targeted deep-sea records around world oceans to paleoceanography and chronostratigraphy is invaluable. The advent in the early 90's of the strategy to drill multiple holes at a single site for construction of complete composite sections, thus overcoming one major drawback for high-resolution studies, is remarkable. Yet, depths for shipboard splice records often require revision/amendments as higher resolution and better signal to noise ratio proxy data become available (e.g. Westerhold and Röhl, 2013). Additionally, shifting moderate to low sedimentation rates and condensed intervals are common in the deep-sea records hampering the use of standard filtering techniques in cyclostratigraphy as shown for the Danian stage (Dinarès-Turell et al., 2014). It thus becomes clear that combining deep-sea records and expanded marine sections outcropping on land potentially allows more consolidated outcomes in cyclostratigraphy.

The Eocene period is critical for paleoclimate research because it offers great potential to gain insight into the carbon cycle dynamics and Earth's climate evolution. In particular, the middle Eocene portrays the beginning of the transition from the warm, high-diversity greenhouse of the early Eocene to the icehouse conditions of the early Oligocene and has been recently orbitally tuned from deep-sea sequences in the South Atlantic Ocean, closing a gap in the Paleogene astronomical time scale (Westerhold et al., 2015).

The Eocene Oyambre section, exposed on the eastern side of the Cape of Oyambre in San Vicente de la Barquera (Cantabria province, Basque-Cantabrian region, western Pyrenees), is composed of limestone-marl alternations with interbedded turbidites. The Lutetian/Bartonian transition interval has recently been the focus of an integrated stratigraphic study (Payros et al., 2015) in the evaluation of a prospective Bartonian GSSP. Here, a high-resolution bulk low-field magnetic susceptibility record is employed as the basis for erecting a cyclostratigraphy amenable to spectral analysis. The expanded nature of the succession and the use of the 405 ky "tuning-fork" or metronome of stratigraphic time allows a solid astrochronology to be resolved at precession resolution (∼21 ky). We ultimately scrutinize and correlate the Oyambre outcrop cyclic pattern to published deep-sea astronomically tuned stratigraphies, emphasizing the need for integration.

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Dinarès-Turell, J., et al. (2014). Astronomical calibration of the Danian stage (early Paleocene) revisited: settling chronologies of sedimentary records across the Atlantic and Pacific Oceans. Earth Planet. Sci. Lett. 405, 119–131.

Payros, A., et al. (2015). The Lutetian/Bartonian transition (middle Eocene) at the Oyambre section (northern Spain): implications for standard chronostratigraphy. Palaeogeogr. Palaeoclimatol. Palaeoecol. 440, 234–248.

Westerhold, T. and Röhl, U. (2013). Orbital pacing of Eocene climate during the Middle Eocene Climate Optimum and the Chron C19r event: Missing link found in the tropical western Atlantic, Geochem. Geophys. Geosys., 14, 4811–4825.

Westerhold, T., et al. (2015). Astronomical Calibration of the Geological Timescale: Closing the Middle Eocene Gap. Climate of the Past 11, 1181–1195.