

Clim. Past Discuss., referee comment RC1
<https://doi.org/10.5194/cp-2021-46-RC1>, 2021
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Comment on cp-2021-46

Anonymous Referee #1

Referee comment on "Age and driving mechanisms of the Eocene–Oligocene transition from astronomical tuning of a lacustrine record (Rennes Basin, France)" by Slah Boulila et al., Clim. Past Discuss., <https://doi.org/10.5194/cp-2021-46-RC1>, 2021

General comments

The geochronology of the Eocene-Oligocene transition remains controversial due to the lack of stratigraphic records. This study presents an astronomically calibrated magnetostratigraphy for this transition. Well-defined magneto-zones help high-resolution correlation between the studied lacustrine record to the deep-sea cores. Time series analysis further refines the geochronology of this study. This paper worth publication after addressing the following major comments:

Specific comments

- This paper aims to investigate whether the cyclic lacustrine deposits are orbitally driven. The analysis, aided with magnetostratigraphic correlation does answer this critical question. However, I would highly recommend the authors considering running statistical tuning methods, either ASM, COCO, or TimeOpt analysis of the gamma-ray data to test the significance level of the null hypothesis of no orbital forcing because the traditional cycle ratio method can generate misleading cycle ratios which lead to misinterpretation. Moreover, the sedimentation rate map is also expected to prove the assumed steady sedimentation rate is robust. The only figure S8 of the evolutive harmonic analysis shows fair results and very unclear implications of sedimentation rate. Therefore, an evolutionary version of ASM, COCO, or TimeOpt would help

eliminate this question. Because the original data is unavailable now, so I wouldn't be able to reproduce the results, although the figures provided looks fine.

- This paper also aims to refine the Paleogene time scale. It is a great pity that recent advances in the Eocene geochronology were not cited and discussed. Key publications include the GTS2020, Westerhold et al. (2020 Science), and Berggren et al., 2018 (http://orca.cf.ac.uk/117311/1/Chapter_2.pdf). These publications presented the latest ages for the studied magneto-zones. And the GTS suggested a 33.9 Ma EOT, which contradicts the 33.7 or 34.1 Ma EOT age in this paper.
- Lacustrine records usually suffer from missing high-frequency astronomical cycles (obliquity and precession) and pollution from autogenic sedimentary cycles (Hajek and Straub, 2017). Therefore, the claimed 1 m scale precession cycles may be suspicious. I would like to see the argument against this comment.
- All citations in blue are listed, however, citations in black are missed. Make sure all cited publications are listed at the end of the paper.