

## ***Interactive comment on “Astronomical calibration of the geological timescale: closing the middle Eocene gap” by T. Westerhold et al.***

**Anonymous Referee #1**

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The manuscript by Westerhold et al. presents a series of  $\delta^{13}\text{C}$  and paleomagnetic measurements from drill cores from the Atlantic Ocean that encompass the middle Eocene. These data are important and apparently of high quality and completeness, and should be reported to the scientific community. However, the interpretations and analysis offered concerning these data suffers from several fundamental flaws, inherent circularity, logical short cuts, and also completely fails to consider a wealth of existing radioisotopic data from the terrestrial realm.

Were this manuscript written in 1995 (prior to the advent of high resolution dating of terrestrial strata) rather than 20 years later, the author's approach to timescale development would be entirely justified. Since then however, the geochronologic community has provided a wealth of calibration point for the GPTS that cannot be ignored. The

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authors give reference to this by suggesting that isotopic dating is essentially unreliable (by referring to minor recent adjustments in the interpreted age of FCT), then proceeds to ignore virtually all of the existing radioisotopic chronology that does not come from the ocean (which is largely devoid of dateable materials). It is almost as if the ocean record exists on an entirely different planet.

If this paper were resubmitted, it should include a robust discussion/comparison of existing geochronologic data with their interpretations. The paper should also consider the potential effects of changes in sedimentation rate, lacunae, and the possibility that some of the observed facies variability is not the direct consequence of orbital fluctuations (i.e., stochastic variations due to local effects). A consideration of the nature radioisotopic tie points within the CK95 timescale (upon which the authors erect their chronology) should also be included. Why is it that these low resolution multi-crystal input data are considered reliable while literally tens of other newer single crystal Ar and U-Pb dates are dismissed out of hand? This sort of skepticism and interpretive caution is essential to science, and is almost completely lacking in the manuscript's current form (other than a brief consideration - and dismissal - of a missing 18th cycle after the authors have already burrowed deeply into their interpretations).

I strongly suggest that this manuscript be rejected in its current form. If resubmission is considered, the manuscript should not ignore the last two decades of geochronology and focus on the high quality magnetostrat and  $\delta^{13}\text{C}$  data contained within.

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