



Refining the Early Paleogene Time Scale

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Astronomical tuning resulted in a new generation of geological time scales with an unprecedented accuracy, resolution, and stability. In 2004 the Geological Time Scale 2004 (GTS2004) was published containing an Astronomically Tuned Neogene Time Scale (ATNTS) for the first time. In contrast, astronomical calibration of the Geological Time Scale in its older Cenozoic parts is much more challenging. With the availability of correct astronomical solutions back to 40 Ma tuning of the geological time scale has been pushed to the Eocene/Oligocene boundary. Although strong orbital influence in early Paleogene records has been documented, only floating orbital time scales have been established for early Eocene and Paleocene intervals up to today. A complete orbital tuned early Paleogene time scale connected to the ATNTS and the late Paleogene is still pending.

The fundamental problems in extending the tuned time scale into the early Paleogene are related to (1) the early to late Eocene “cyclostratigraphic gap”, a period in the Paleogene section of the GTS2004 which has not yet been completely covered by cyclostratigraphic studies in pelagic sediments, (2) uncertainties and limits of astronomical calculations, and (3) large uncertainties in radiometric age constraints for this time interval. Recently, the overwhelming cyclic sediments recovered during ODP Legs 198, 207 and 208 have been used to construct a floating stratigraphic framework calibrated to the stable long eccentricity cycle (405-kyr) covering the Paleocene and early Eocene (65 to 47 Ma).

Here we present recent developments for refining the early Paleogene Time Scale by orbital tuning of sediments derived from numerous Ocean Drilling Program (DSDP, ODP, IODP) records. We will focus on the discrepancy of radiometric dating and astronomical tuning.