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Towards a stable astronomical time scale for the Paleocene: Aligning Shatsky Rise with the Zumaia – Walvis Ridge ODP Site 1262 composite

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With 7 figures and 2 tables

Abstract. The construction of a permanent astronomical time scale for the Paleocene tuned to stable 405-kyr eccentricity is hampered by uncertainties in the number of eccentricity-related cycles between the Cretaceous-Paleogene (K/Pg) boundary and the Early Late Paleocene Event (ELPE) situated just below the Selandian-Thanetian boundary. Here we re-examine available stratigraphic information to align the Zumaia section (Spain), and Shatsky Rise (northern Pacific) and Walvis Ridge (southern Atlantic) ODP Leg 198 and 208 sites. Our review indicates that the composite of the Zumaia section and ODP Leg 208 Site 1262 is most suitable for establishing an integrated (cyclo-)stratigraphic framework and astronomical tuning for the entire Paleocene. This composite contains 25 × 405-kyr eccentricity-related cycles and is identical to the composite used to construct the early Paleogene time scale in GTS2012.

ODP Leg 198 sites are incorporated in this framework by using the carbon isotope excursion (CIE) associated with the Latest Danian Event (LDE) at the top of C27n as tie-point. Eccentricity-related variations in Fe-counts and associated reddish and dark color bands visible on core photographs of ODP Site 1209 and 1210 are correlated to the Zumaia-ODP Site 1262 composite down to the K/Pg boundary. This procedure constrains the duration of an aberrant interval above the K/Pg boundary at Site 1209, previously labeled "Strange Interval", to approximately two × 405-kyr cycles. This duration for the Strange Interval is in line with sedimentation rates calculated on the basis of the observed precession-related cyclicity. The correlations to Zumaia indicate that the interval above the K/Pg boundary is continuous at all Shatsky Rise sites, including DSDP Site 577, and, hence, that Site 1209 does not contain a hiatus as inferred from Os-isotope data. The correlations further substantiate the presence of 25 × 405-kyr cycles in the Paleocene and an age of ~66.0 Ma for the K/Pg boundary.

Key words. Paleocene, K/Pg boundary, cyclostratigraphy, astronomical time scale

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