



Paleocene timescale miscalibration: fact or fiction?

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In the absence of an accepted global boundary stratotype section, the Paleocene/Eocene (P/E) boundary is effectively a 1 m.y. interval within magnetic polarity chron C24r which includes the NP9/NP10 nannofossil boundary, the P5/P6a planktonic foraminifera boundary, a seawater carbon isotope excursion, and the -17 through +19 Danish ash layers. Early, unpublished Ar/Ar ages suggested that the -17 ash was c. 55 Ma. The late Paleocene thermal maximum [LPTM] is older than the -17 ash but younger than the base of C24r.

Based on a correlation of the LPTM with the palynoflora found within the base of the Mull Plateau Group lavas, Scotland, Jolley et al [1,2] suggested that there is a previously undetected problem with the Paleogene time scale, concluded that the LPTM is older than the Mull lavas, placed the LPTM within the early phase of widespread North Atlantic igneous province volcanism, and even suggested onset of this volcanism at 60 Ma was the cause of ocean-floor methane hydrate release thought responsible for the LPTM.

Below we present new Ar/Ar ages on the +19 and -17 ashes which conclusively show that the Danish ashes and P/E boundary are indeed 55-56 Ma, there is no general problem with P/E time as previously calibrated, and the LPTM is no older than 56-57 Ma. Combined with our previous results constraining British Tertiary volcanism to within Chron 26r (complete by 59 Ma), the thermophillic palynoflora found within the base of the Mull lava pile simply cannot be correlated with late Paleocene thermal maximum time.

Paleocene/Eocene Ashes:

Denmark, +19 [this study]	55.26 \pm 0.24 Ma ¹
Denmark, -17 [this study]	55.44 \pm 0.08 Ma ¹

Late Stage British Tertiary Volcanism:

Mull, Late Stage dikes [3]	58.99 \pm 0.26 Ma ²
Mull, Loch Ba Ring dike [3]	59.35 \pm 0.36 Ma ²
Skye, Loch Ainort granite [3]	59.45 \pm 0.26 Ma ²
Eigg, Sgurr of Eigg rhyolite [4]	59.61 \pm 0.16 Ma ²

Early Stage British Tertiary Volcanism:

Mull, basal lava [1]	61.46 \pm 0.58 Ma ²
Muck, basal tuff, zircon U-Pb [4]	61.15 \pm 0.26 Ma
Muck, basal tuff, sanidine [4]	61.55 \pm 0.14 Ma ²

Cretaceous/Tertiary Boundary

Beloc Haiti, tektite [this study]	65.78 \pm 0.06 Ma ¹
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Ages $\pm 2\sigma$ relative to FCs @ 28.02 Ma¹ or TCs @ 28.34 Ma²

References:

[1] Jolley et al, 2002. *Geology*, 7-10, [2] Jolley et al, 2003, *Geology*, 469-472, [3] Chambers and Pringle, 2001. *EPSL*, 193, 333-345, [4] Chambers et al, 2005. *Lithos*, 79, 367-384.