

Supplementary Information:

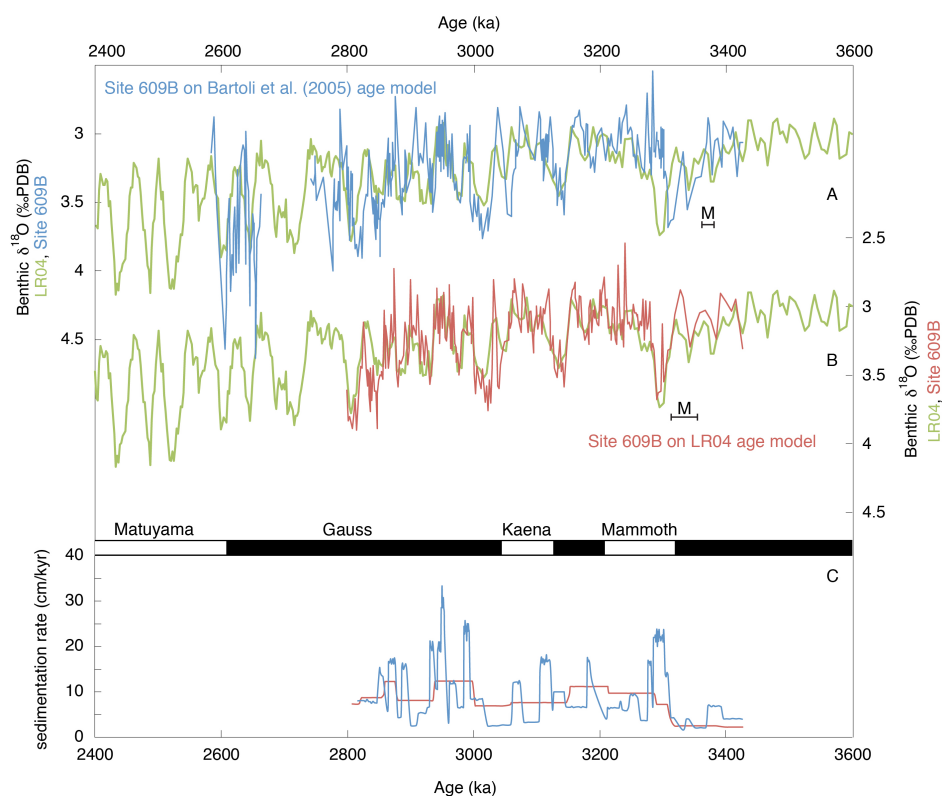


Figure S1. Benthic $\delta^{18}\text{O}$ data for Deep Sea Drilling Program Site 609B (50°N , 24°W ; Bartoli et al., 2005) on age models based on original tuning of this record (**A**) to the benthic $\delta^{18}\text{O}$ stratigraphy of Pacific Ocean Drilling Program Site 846 (Shackleton et al., 1995) and retuning (**B**) to the LR04 age model (global benthic $\delta^{18}\text{O}$ stack, Lisiecki et al., 2005). Sedimentation-rates for respective age models (LR04, red; Bartoli, blue) are shown in (**C**). Tie-points between Site 609B stratigraphy and LR04 stack shown in Table S1. The black/white bars at the base of (B) denote age of polarity (sub)chronozones boundaries according to Lisiecki and Raymo, 2005). Uncertainty on Mammoth subchronozones in Site 609B stratigraphy (between Site 609B 26h 5w-11-111 cm, 236.01-237.01 meters below sea floor) illustrated by horizontal black bars labeled 'M' (Raymo et al., 1989).

Table S1. LR04-based Age-depth model for Site 609B

Depth (mbsf)	Age (ka, LR04)
189.17	2798.7
190.66	2819
193.98	2856.9
196.36	2876.4
201.22	2936.3
208.99	2999.2
212.78	3053.9
220.09	3149.3
227.09	3212.0
234.35	3286.8
235.91	3308.3
237.90	3387
238.64	3419.8

*mbsf = meters below sea floor

References cited (not in main text)

Raymo, M.E., Ruddiman, W.F., Backman, J., Clement, B.M., Martinson, D.G., 1989. Late Pliocene variation in Northern Hemisphere ice sheets and North Atlantic deep circulation. *Paleoceanography* 4, 413-446.

Shackleton, N.J., Hall, M.A., Pate, D., 1995. Pliocene stable isotope stratigraphy of ODP Site 846. In: Pias, N.G., Mayer, L.A., Janecek, T.R., Palmer-Julson, A., Van Andel, T.H. (Eds.), *Proc. ODP, Sci. Results*.