

Figure F1. Location of Site U1490.

Figure F2. Composite lithologic log of Subunit IA, Holes U1490A–U1490C. Age equivalents, nannofossil zonations, and calcareous nannofossil events (zonal boundary markers and secondary calcareous nannofossil events) observed in this study are also shown. In Hole U1490A, Subunit IA consists of 20 cores extending from late Miocene to recent (from Rosenthal et al., 2018c). T = top, B = base, Bc = base common occurrence, Bpa = base paracme.

Figure F3. Composite lithologic log of Subunits IB and IC, Holes U1490A–U1490C. Age equivalents, nannofossil zonations, and calcareous nannofossil events (zonal boundary markers and secondary calcareous nannofossil events) observed in this study are also shown. In Hole U1490A, Subunit IB and IC consist of 23 cores extending from late Oligocene to late Miocene (from Rosenthal et al., 2018c). T = top, Tc = top common occurrence, B = base.

Figure F4. Calcareous nannofossil index markers observed, Hole U1490A. Scale bars = 5 μm . A. *Amaurolithus primus* (4H-6, 117–118 cm). B. *Calcidiscus macintyreii* (4H-5, 98–99 cm). C. *Calcidiscus premacintyreii* (23H-1, 98–99 cm). D. *Catinaster calyculus* (21H-2, 148–149 cm). E. *Catinaster coalitus* (19H-5, 98–99 cm). F. *Ceratolithus armatus* (4H-5, 98–99 cm). G. *Ceratolithus cristatus* (3H-

4, 48–49 cm). H. *Coccolithus miopelagicus* (39X-1, 98–99 cm). I. *Coronocyclus nitescens* (36X-CC). J. *Cyclicargolithus floridanus* (39X-1, 98–99 cm). K. *Discoaster bellus* (17H-6, 137–138 cm). L. *Discoaster berggrenii* (16H-CC). M. *Discoaster brouweri* (20H-1, 98–99 cm). N. *Discoaster deflandrei* (29F-2, 148–149 cm). O. *Discoaster hamatus* (20H-CC). P. *Discoaster pentaradiatus* (4H-3, 98–99 cm). Q. *Discoaster quinqueramus* (16H-5, 98–99 cm). R. *Discoaster surculus* (16H-4, 148–149 cm). S. *Discoaster tamalis* (6H-1, 98–99 cm). T. *Discoaster tri-radiatus* (19H-4, 148–149 cm). U. *Emiliania huxleyi* (1H-1, 0–1 cm). V. *Gephyrocapsa* spp. (<4 μm) (1H-1, 0–1 cm). W. *Gephyrocapsa* spp. (4–5.5 μm) (1H-2, 48–49 cm). X. *Gephyrocapsa* spp. (>5.5 μm) (2H-7, 75–76 cm). Y. *Heli-cosphaera sellii* (3H-5, 98–99 cm). Z. *Nicklithus amplificus* (13H-CC). AA. *Pseudoemiliania lacunosa* (2H-4, 148–149 cm). AB. *Reticulofenestra asanoi* (2H-6, 139–140 cm). AC. *Reticulofenestra pseudoumbilicus* (23H-CC). AD. *Sphenolithus abies* (29F-CC). AE. *Sphenolithus belemnus* (30F-2, 48–49 cm). AF. *Sphenolithus delphix* (40X-4, 48–49 cm). AG. *Sphenolithus disbelemnus* (38X-1, 98–99 cm). AH. *Sphenolithus heteromorphus* (27H-3, 98–99 cm). AI. *Triquetrorhabdulus carinatus* (31F-CC).

Figure F5. Age-depth model using all calcareous nannofossil biohorizons identified in this study, Hole U1490A. See Figures F2 and F3 for lithology key. See Tables T2 and T3 for calcareous nannofossil events corresponding to numbers.