

Figure F1. Location of Site U1338 (star) in eastern equatorial Pacific with backtracked positions from 15 to 11 Ma (crosses) calculated using the pole from Koppers et al. (2001). Background map shows modern annual mean sea-surface temperature (SST) generated by World Ocean Atlas 2013 data set (<https://www.nodc.noaa.gov/OC5/woa13>).

Figure F2. Age-depth model for Site U1338 studied interval based on astronomically tuned age model of Holbourn et al. (2014) before 12.72 Ma and shipboard biomagnetostratigraphic age model of Backman et al. (2016) after 12.72 Ma.

Figure F3. Relative abundance of top four planktonic foraminifer species through middle Miocene at Site U1338 with planktonic foraminiferal flux. Relative abundance of each species is presented for containing >50 individuals. Squiggly line = scale gap between 25,000 and 60,000.

Figure F4. Species belonging to *Fohsella* lineages identified during this study. Scale bars = 100 μm . 1a–1c. *F. peripheroronda* (321-U1338B-38H-6, 38–40 cm). 2a–2c. *F. peripheroacuta* (37H-3, 38–40 cm). 3a–3c. *F. praefohsi* (34H-1, 38–40 cm). 4a–4c. *F. lobata* (33H-7, 38–40 cm). 5a–5c. *F. "praefohsi"* (34H-4, 38–40 cm). 6a–6c. *F. fohsi* (32H-1, 38–40 cm). 7a–7c. *F. robusta* (28H-7, 38–40 cm).

Figure F5. Temporal distribution of 10 biohorizons in Hole U1338B sediments related to *Fohsella* lineages based on new classification criteria proposed by Si and Berggren (2017). Numerical age of each biohorizon is recalculated by age-depth model (Figure F2). B = base occurrence, T = top occurrence, TC = top common occurrence, RtoS = dominant coiling direction change from random to sinistral.