

Figure F1. Visual core description, Hole U1535A. CSF-A = core depth below seafloor, Method A.

Figure F2. Graded glauconite sand (382-U1535A-14F-1, 69–85 cm; 98.79–98.95 mbsf).

Figure F3. Examples of X-radiographs, Hole U1535A.

Figure F4. Biostratigraphic age-depth plot, Hole U1535A. FO datums are plotted using the median depth between the upper sample where the fossil was observed and the lower sample where it was not observed (Table T3). LO datums are plotted using the median depth between the upper sample where a species was not seen and the lower sample where it was seen.

Figure F5. Histogram of archive-half inclination measurements following 15 mT AF demagnetization and after removing core and section edges and disturbed intervals, Hole U1535A.

Figure F6. Example comparison of X-radiograph to archive-half inclination measurements (382-U1535A-10H-6). Core 10H experienced significant gas expansion while equilibrating to room temperature, and holes were drilled into the side of the core barrel to relieve pressure and prevent the end caps from exploding. Sediments were deformed in these regions. In at least this core, we suspect that shallow inclinations measured are a reflection of this sediment deformation, whereas less deformed sediments between these intervals have steeper inclinations that are more consistent with what would be expected at the site location during times of stable polarity.

Figure F7. MS, remanence intensity, inclination, declination, interpreted polarity, and geomagnetic polarity timescale (GPTS2012; Gradstein et al., 2012), Hole U1535A. Yellow dashed lines = core breaks, black dashed lines = tentative correlation from our interpreted polarity to GPTS2012, red shading = two cores heavily disturbed during recovery and archiving (data in this region are difficult to use for magnetostratigraphic interpretation). Polarity: black = normal, white = reversed, gray = undetermined.

Figure F8. Archive-half inclination and declination measurements after 15 mT peak AF demagnetization (382-U1535A-8H). Green shading = distinct lithologic unit with sharp boundaries, yellow dashed lines = section breaks, vertical lines = expected geocentric axial dipole values. Declinations are arbitrarily rotated so that steep negative inclinations interpreted to reflect normal polarity have  $\sim 0^\circ$  declinations.

Figure F9. Methane, ethane, and methane/ethane ratio, Hole U1535A.

Figure F10. IW properties ( $\text{SO}_4$ , P, Ca, Ba, carbonate, methane, ammonium, alkalinity, salinity, pH, Na, Cl, K, Br, Na/K, and Br/Cl), Hole U1535A. Blue

squares = seawater concentrations or elemental ratios for reference (where applicable).

Figure F11. IW properties (Ca, Si, B, Sr, Mg, Fe, Mn, B/Ca, Mg/Ca, Si/Ca, Ba/Ca, Sr/Ca, Mg/Si, Mg/K, K/Ca, and Na/Cl), Hole U1535A. Blue squares = seawater concentrations or elemental ratios for reference (where applicable).

Figure F12. Bulk sediment TOC, TOC/TN ratio, and  $\text{CaCO}_3$ , Hole U1535A.

Figure F13. Bulk sediment major element compositions, Hole U1535A.

Figure F14. Selected sediment trace element compositions and elemental ratios. La is a rare earth element, and Zr is a high field strength element. Note that elemental ratios shown here are not molar ratios.

Figure F15. Physical property data, Hole U1535A. MS: red = WRMSL, gray = SHMSL (MSP). *P*-wave velocity: dots = WRMSL, squares = PWC. Wet bulk density: line = WRMSL, diamonds = discrete. cps = counts per second.

Figure F16. Crossplots and linear relationships of GRA, NGR, and MS, Sites U1534 and U1535.

Figure F17. MAD results, Hole U1535A. *P*-wave velocity = caliper velocity measurements with automatic and manually picked first arrival times.

Figure F18. SHMSL color reflectance  $L^*$ ,  $a^*$ , and  $b^*$  and color component R, Hole U1535A.

Figure F19. Comparison of NGR intensity data, Sites U1534 and U1535. All data are plotted on Site U1534 core composite depth below seafloor, Method D (CCSF-D), depths following correlation of Hole U1535A NGR data.

Figure F20. APCT-3 temperature-time series, Hole U1535A.

Figure F21. Heat flow calculation, Hole U1535A. Right panel shows Bullard plot of heat flow calculated from linear fit of temperature data.

Figure F22. Physical property measurements and comparison with seismic reflectors and identified lithology, Hole U1535A. MD = measured depth, TWT = two-way traveltime.

Figure F23. Seismic profile and relative changes to physical properties, Holes U1534A and U1535A. Green dots = PWL, diamonds linked with black line = PWC, magenta line = GRA, open dots = discrete wet bulk density (MAD), black line = MSL, yellow line = NGR. CDP = common depth point, SP = shot-point.