Figure F1. Representative examples of main lithologies, Site U1536. Smear slide field of view = ~0.5 mm.

Figure F2. Lithostratigraphic summary, Site U1536. CSF-A = core depth below seafloor, Method A. NA = not available. Pebble abundance >2 mm is semiquantitative visual assessment of concentration from 1 (no gravel or pebbles) to 5 (many gravel and pebble pieces) per core; pebble abundance >2 cm is semiquantitative count of >2 cm pebbles per core.

Figure F3. Olivine-bearing dropstone (382-U1536A-23H-3, 106–109 cm).

Figure F4. Example of color banding at diatom ooze–silty clay transition, Unit I (382-U1536A-19H-7, 108–124 cm). Green layer contains minor amounts of glauconite.

Figure F5. Carbonate-rich layer (382-U1536C-12H-5, 14–39 cm).

Figure F6. Diagenetic carbonate minerals interpreted to be devitrified tephra (382-U1536B-9H-2, 114 cm).

Figure F7. Slump (382-U1536C-29F-2, 39–71 cm). Dashed lines = assumed shape of original slump structure surrounding the hole.

Figure F8. Part of 34 cm long greenish gray, graded glauconite containing quartz sandstone with silt laminations (382-U1536E-18R-1, 81–101 cm).

Figure F9. Top of 34 cm long greenish gray, graded glauconite containing quartz sandstone (382-U1536E-18R-1; cross-polarized light) (see Figure F8). Arrow = 1 cm.

Figure F10. Example of dropstone-rich interval containing three types of igneous rocks (382-U1536E-21R-1, 19–37 cm). Interval is near top of first section, so dropstones are not in place (fall-in).

Figure F11. Two drilling biscuits (382-U1536E-32R-1, 117–130 cm). Lowermost biscuit is laminated, quartz-rich mudstone; upper biscuit contains quartz-rich siltstone overlain by finer grained mudstone. Lower portion of upper biscuit is heavily bioturbated.

Figure F12. Examples of silt-rimmed and silty clay–filled burrows (~1 mm wide) commonly seen in Unit III, Hole U1536E. A. 32R-1, 121–124 cm. B. 29R-2, 2.5–6 cm.

Figure F13. Mudstone showing rutile and apatite in large sand grain (382-U1536E-29R-2). A. Plane light. B. Polarized light.

Figure F14. Miocene limestone containing (A) foraminifer and (B) radiolarians (382-U1536E-29R-2, 2.5–6 cm).

Figure F15. A–D. Radiolarians in Miocene limestone (382-U1536E-29R-2, 2.5–6 cm).

Figure F16. Example of sharp lithologic boundary between different types of mudstone with abundant silt-filled and rimmed burrows (382-U1536E-33R-2, 86–97 cm). Note that minor wipe marks on image are the result of the cleaning process.

Figure F17. Examples of X-ray images showing main characteristics, Holes U1536A and U1536E. Only the right image in C is from Hole U1536E. Dark colors correspond to higher density material.

Figure F18. Biostratigraphic age-depth plot, Holes U1536A and U1536E. 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 T4). 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. N/A = not available. Paly = palynomorphs.

Figure F19. *Rhizosolenia harwoodii* (382-U1536A-4H-CC). Specimen displays exceptional preservation, is biostratigraphically out of place, and is likely reworked.

Figure F20. Unidentified reworked radiolarians, Hole U1536E. A. 27R-CC. B. 33R-CC.

Figure F21. *Reticulofenestra perplexa* specimens (382-U1536E-29R-1, 21 cm).

Figure F22. Palynomorphs, Hole U1536A. All scale bars = 20 µm. 1. *Nucicla umbiliphora* (4H-CC). 2. *Cymatiosphaera* (48F-CC). 3. *Selenopemphix antarctica* (5H-CC). 4. *Brigantedinium simplex* (1F-CC). 5. *Selenopemphix* sp. 1 sensu Esper and Zonneveld (2007) (3H-CC). 6. *Islandinium minutum* (5H-CC).

Figure F23. Palynomorphs (382-U1536E-16R-CC). 1. *Lejeunecysta acuminata*. 2. *Selenopemphix antarctica*. 3. *Brigantedinium* spp. 4. *Operculodinium*? *eirikianum*. 5. Foraminifer lining. 6. Lycopodium spore. 7. Miospore (reworked). 8. Prasinophyte alga.

Figure F24. Intensity of remanence, declination, and inclination at 15 mT AF demagnetization level, Hole U1536A. Horizontal dashed lines = section breaks, black dots = original (unedited) data, large cyan dots = edited and adjusted values as described in text, red stars = discrete samples, vertical dashed lines in inclination = GAD predicted values for site latitude. (Continued on next page.)

Figure F24 (continued).

Figure F25. Intensity of remanence, declination, and inclination at 15 mT AF demagnetization level, Hole U1536B. Horizontal dashed lines = section breaks, black dots = original (unedited) data, large cyan dots = edited and adjusted values as described in text, vertical dashed lines in inclination = GAD predicted values for site latitude. (Continued on next page.)

Figure F25 (continued).

Figure F26. Intensity of remanence, declination, and inclination at 15 mT AF demagnetization level, Hole U1536C. Horizontal dashed lines = section breaks, black dots = original (unedited) data, large cyan dots = edited and adjusted values as described in text, vertical dashed lines in inclination = GAD predicted values for site latitude.

Figure F27. Intensity of remanence, declination, and inclination at 15 mT AF demagnetization level, Hole U1536E. Horizontal dashed lines = section breaks, black dots = original (unedited) data, large cyan dots = edited and adjusted values as described in text, red stars = discrete samples, vertical dashed lines in inclination = GAD predicted values for site latitude.

Figure F28. A–H. Representative vector endpoint diagrams showing progressive AF demagnetization behavior, Hole U1536A. Demagnetization steps: 1 = NRM, 2 = 5 mT, 3 = 10 mT, 4 = 15 mT, 5 = 20 mT, 6 = 30 mT, 7 = 35 mT, 8 = 40 mT, 9 = 50 mT. Drilling overprint is mostly removed by 10 mT, and apart from a few very weak specimens the data converge on the origin.

Figure F29. Stepwise AF demagnetization of 23 discrete samples, Site U1536. (A) NRM, (B) ARM, and (C) IRM imparted at 300 mT. D. Color scale reflects MS (χ) of each sample (blues = low MS, reds = high MS). E. IRM_{800mT} vs. susceptibility. Black lines = linear regressions for each group showing different best-fit lines for the two groups.

Figure F30. Inclination values (after editing) at 15 mT AF demagnetization step for (A, B) APC, (C, D) HLAPC, and (E, F) RCB cores, Site U1536. Left panels have numbers of measurements in each bin. Right panel is in terms of frequency. Blue curves = kernel density estimates (KDEs).

Figure F31. Declination values (after editing) at 15 mT AF demagnetization step for (A) APC, (B) HLAPC, and (C) RCB cores, Site U1536. D–F. Quantile-

quantile plots of declinations with Kolmogorov-Smirnov test results showing that a uniform distribution cannot be rejected at 95% level of confidence (Tauxe, 2010).

Figure F32. A, B. Equal-area projections of normal core mean directions before (red) and after (blue) adjustment using Icefield MI-5 tools as described in text, Holes U1536A and U1536B. All directions are in upper hemisphere.

Figure F33. Magnetostratigraphic correlation, Holes U1536A–U1536C. A–C. Inclination after 15 mT peak AF (mbsf). D. Inclination converted to CCSF-A depth using affine in Table T21. E. Data grouped in 5 m bins and plotted as KDEs. F. GPTS2012. Red lines = our ties to GPTS. Polarity: black = normal, white = reversed.

Figure F34. Magnetostratigraphic correlation, Hole U1536E. Gray dots = archive-half measurements, blue dots = discrete sample measurements after 15 mT demagnetization step, red stars = horizons with opposite polarities above and below observed in a single core. Polarity: black = normal, white = reversed, gray = undetermined.

Figure F35. Age-depth plot for data in Table T16, Site U1536. RAD = radiolarian. A. Data in mbsf. B. Data converted to CCSF-A depth using affine in Table T21.

Figure F36. AMS summary data, Site U1536. A. Bulk susceptibility (k). B. Normalized intensities of maximum (K_1), intermediate (K_2), and minimum (K_3) susceptibility components. Vertical dashed line at $K = 0.33$ represents isotropic behavior. C. Inclinations of maximum (I_1), intermediate (I_2), and minimum (I_3) susceptibility axes. D. Adjusted declinations of maximum ($D_{1\text{-ADJ}}$) and minimum ($D_{3\text{-ADJ}}$) susceptibility axes. E. Degree of anisotropy. Higher P values indicate higher degree of anisotropy.

Figure F37. AMS eigenvectors plotted in equal-area projections below 240 mbsf, Site U1536. Squares = principal (maximum) eigenvectors, circles = eigenvectors associated with minimum eigenvalue.

Figure F38. Methane concentrations, Site U1536.

Figure F39. IW properties (SO_4, PO_4, Ca, Ba, carbonate, methane, ammonium, alkalinity, salinity, pH, Na, Cl, K, Br, Na/K, and Br/Cl), Site U1536. Blue squares = seawater concentrations or elemental ratios for reference (where applicable).

Figure F40. 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), Site U1536. Blue squares = seawater concentrations or elemental ratios for reference (where applicable).

Figure F41. Bulk sediment TOC, TOC/TN ratio, and $CaCO_3$, Site U1536.

Figure F42. Bulk sediment major element compositions, Site U1536.

Figure F43. Selected sediment trace element compositions and elemental ratios, Site U1536. La is a rare earth element, and Zr is a high field strength element. Note that elemental ratios shown here are weight ratios.

Figure F44. Physical property data, Hole U1536A. MS: red = WRMSL, gray = SHMSL (MSP). *P*-wave velocity: line = WRMSL, squares = PWC. Wet bulk density: line = WRMSL, diamonds = discrete. cps = counts per second.

Figure F45. Physical property data, Hole U1536B. MS: red = WRMSL, gray = SHMSL (MSP). *P*-wave velocity: line = WRMSL, squares = PWC. Note that WRMSL velocity measurements are an underestimate because they were measured on unequilibrated core sections.

Figure F46. Physical property data, Hole U1536C. MS: red = WRMSL, gray = SHMSL (MSP). *P*-wave velocity: line = WRMSL, squares = PWC.

Figure F47. Physical property data, Hole U1536E. MS: red = WRMSL, gray = SHMSL (MSP). Wet bulk density: line = WRMSL, diamonds = discrete.

Figure F48. Crossplots and linear relationships of NGR, GRA, and MS, Holes U1536A–U1536C and U1536E.

Figure F49. MAD results, Hole U1536A. *P*-wave velocity = caliper velocity measurements with automatic and manually picked first arrival times.

Figure F50. MAD results, Hole U1536E. *P*-wave velocity = caliper velocity measurements with automatic and manually picked first arrival times.

Figure F51. SHMSL color reflectance L*, a*, and b* and color component R, Hole U1536A.

Figure F52. SHMSL color reflectance L*, a*, and b* and color component R, Hole U1536B.

Figure F53. SHMSL color reflectance L*, a*, and b* and color component R, Hole U1536C.

Figure F54. SHMSL color reflectance L*, a*, and b* and color component R, Hole U1536E.

Figure F55. WRMSL-derived GRA density and MS data, Holes U1536A–U1536C. Note that Cores 382-U1536C-1H and 2H (not plotted) were assigned affine ties using SHMSL MSP data. These cores were primarily collected for aDNA analysis, and whole-round GRA density and MS were not measured. (Continued on next page.)

Figure F55 (continued).

Figure F56. Spliced record of GRA density, MS, and NGR intensity, Site U1536. Two slumped intervals are highlighted. Note that Cores 382-U1536C-1H and 2H (not plotted) were assigned affine ties using SHMSL MSP data and included in the splice. These cores were primarily collected for aDNA analysis, and whole-round GRA density, MS, and NGR were not measured.

Figure F57. NGR from Hole U1536E logging data compared to NGR data from the splice and from Hole U1536A and U1536C HLAPC/APC cores below the splice (for this figure, core depths in CCSF-A were simply divided by 1.08 to account for growth due to the ties). Note some large-scale features in logging NGR that are not replicated in cores.

Figure F58. NGR and age vs. log depth, Hole U1536E. Age datums from magnetic reversals and LOs from biostratigraphic datums are shown. Magnetic reversals are used to construct a simple age model. Dashed line = age model used to construct the time series in Figure F60, shading = general sedimentary units encountered at Site U1536. Although recovery was poor in Hole U1536E, the broad structure of lithostratigraphic observations are captured by the log.

Figure F59. Summary of logging data, Site U1536.

Figure F60. NGR (black) and K/Th (red) from logging on timescale developed in Figure F58, Site U1536. K/Th ratio has a dip near the boundary between silty clay and diamict facies at ~4.5 Ma.

Figure F61. Comparison of lithology and laboratory GRA and MSL measurements (Holes U1536A and U1536E) with up and down logging runs of density, MS, and resistivity (Hole U1536E). MD = measured depth (from logging tool and from synthetic seismogram for core data), LCAL = logging tool caliper, LSUS_d = MS down, LSUS = MS up, RT_HRLT = resistivity up, RT_HRLT_d = resistivity down.

Figure F62. Comparison of lithology and laboratory NGR measurements (Holes U1536A and U1536E) with up and down logging runs of NGR, K, U,

and Th estimations (Hole U1536E). MD = measured depth (from logging tool and from synthetic seismogram for core data), LCAL = logging tool caliper, HSGR = NGR up, HSGR_d = NGR down, HFK = K up, HFK_d = K down, HURA = U up, HURA_d = U down, HTHO = Th up, HTHO_d = Th down.

Figure F63. Comparison of lithology and laboratory PWC measurements (Holes U1536A and U1536E) with up and down logging runs of sonic and shear velocities (Hole U1536E). Note that shear velocity up (SSVE) values alternate between likely valid values and offset artifact values caused by automated velocity picking algorithm and difficulties in picking shear wave arrivals in the slow formations logged here. MD = measured depth (from logging tool and from synthetic seismogram for core data), LCAL = logging tool caliper, SVEL = sonic velocity up, SVEL_d = sonic velocity down, SSVE_d = shear velocity down.

Figure F64. APCT-3 temperature-time series, Site U1536.

Figure F65. Heat flow calculation, Site U1536. Right panel shows Bullard plot of heat flow calculated from linear fit of temperature data.

Figure F66. Physical property measurements and comparison with seismic reflections in MCS Line SCAN2004-L10, Holes U1536A and U1536E. MD = measured depth.

Figure F67. MCS Profile SCAN2004-L10 and physical properties, Holes U1536A and U1536E. Green line = PWL, diamonds = PWC, magenta line = GRA, open dots = discrete wet bulk density (MAD), black line = MSL, blue line = NGR. CDP = common depth point, SP = shotpoint.

Figure F68. Physical property measurements and comparison with TOPAS Profile SCAN2004-L10, Holes U1536A and U1536E. SSTVD = subsea true vertical depth.

Figure F69. TOPAS Profile SCAN2004-L10 and physical properties, Holes U1536A and U1536E. Thin black line = PWL, diamonds = PWC, magenta line = GRA, open dots = discrete wet bulk density (MAD), black line = MSL, blue line = NGR.

Figure F70. Comparison of seismic column with up and down logging runs (Hole U1536E) and laboratory measurements (Holes U1536A and U1536E). LCAL = logging tool caliper, RHOM = downhole density, LSUS_d = MS down, LSUS = MS up, RT_HRLT = resistivity up, RT_HRLT_d = resistivity down. Depths computed by means of synthetic seismogram.

Figure F71. Comparison of seismic column with up and down logging runs (Hole U1536E) and laboratory measurements (Holes U1536A and U1536E). LCAL = logging tool caliper, SVEL = sonic velocity up, SVEL_d = sonic velocity down, SSVE = shear velocity up, SSVE_d = shear velocity down. Depths computed by means of synthetic seismogram.

Figure F72. Comparison of seismic column with up and down logging runs (Hole U1536E) and laboratory measurements (Holes U1536A and U1536E). LCAL = logging tool caliper, HSGR = NGR up, HSGR_d = NGR down, HFK = K up, HFK_d = K down, HURA = U up, HURA_d = U down, HTHO = Th up, HTHO_d = Th down.

Figure F73. Generation of synthetic seismogram, Site U1536. From left to right: wet bulk density (MAD) and PWC measured on cores, impedance, computed statistical wavelet, its power spectrum and phase, comparison of seismic data together with final synthetic seismogram and traces, cross correlation, residual between synthetic seismogram and data, interval velocities, and drift between output and input interval velocities. TVD = true vertical depth, RC = reflection coefficient.