Figure F1. Bathymetric map of the 30.6 Ma SAT study area showing location of Site U1583 and CREST multichannel seismic (MCS) Reflection Lines 1C/1D and 03 (Christeson and Reece, 2020). Seismic reflection profiles were acquired during CREST cruise (Reece et al., 2016). Solid black lines = location of wide-angle MCS profiles for which seismic images are shown in Figure F2.

Figure F2. CREST multichannel seismic (MCS) reflection profiles on ~30.6 Ma crust showing local basement topography, Site U1583. A. West–east MCS Line 1C/1D that crosses Line 03 approximately 3.3 km north of Site U1583. B. North–south Line 03. Black lines = intersections of MCS reflection profiles. CDP = common depth point, TWT = two-way traveltime.

Figure F3. Backscatter reflections from Site U1583 region collected during CREST site survey cruise (Reece et al., 2016; Reece and Estep, 2019; Christeson et al., 2020). Red = higher normalized reflectivity values, blue = lower normalized reflectivity values. Solid black lines = location of wide-angle multichannel seismic profiles for which seismic images are shown in Figure F2.

Figure F4. Map of holes drilled at Site U1583.

Figure F5. Launch of a free-fall funnel, named in honor of Professor Dick Kroon, Hole U1583F (Credit: Erick Bravo, IODP JRSO).

Figure F6. Lithostratigraphic summary of sediment units and correlation of full sediment sequences, Holes U1583C and U1583E. For epochs, see Age model and mass accumulation rates. For unit contact depths and thicknesses, see Table T2. Dashed lines = correlation between units. cps = counts per second.

Figure F7. Lithostratigraphic summary of volcanic units, Hole U1583F. Unit contact depths and thicknesses are expanded to account for <100% recovery (see Table T4 for curated and expanded contact depths).

Figure F8. Lithologic correlation of sediment holes, Site U1583. For epochs, see Age model and mass accumulation rates. Dashed lines = correlation between units. Bottom right: map with positions of each hole relative to one another.

Figure F9. Lithologic summaries, Site U1583. For epochs, see Age model and mass accumulation rates. cps = counts per second, RGB = red-green-blue. (Continued on next page.)

Figure F10. Ages and units, Holes U1583C and Hole U1583E.

Figure F11. Typical lithologies of each unit, Site U1583. A. Unit I alternating nannofossil-rich clay with foraminifera and nannofossil ooze with clay and foraminifera. B. Unit II nannofossil ooze with varying amounts of clay and foraminifera. C. Unit III clay with varying amounts of nannofossils and clayey nannofossil ooze. D. Subunit IVA nannofossil ooze with varying amounts of clay and foraminifera. E. Subunit IVB alternating calcareous ooze and nannofossil ooze with clay and foraminifera. F. Subunit IVC nannofossil ooze with varying amounts of clay and foraminifera.

Figure F12. Principal sediment types, Site U1583. Nannofossil-rich clays and nannofossil oozes/chalks. PPL = plane-polarized light, XPL = cross-polarized light. (Continued on next page.)

Figure F13. Characterization of bioturbation signatures and core photographs of typical trace fossil assemblages for each unit, Holes U1583C and Hole U1583E. For epochs, see Age model and mass accumulation rates. Zo = *Zoophycos*, Pl = *Planolites*, Th = *Thalassinoides*, Ch = *Chondrites*, Sk = *Skolithos*, Pa = *Palaeophycus*, mt = biogenic mottling, Ne = *Nereites*. (Continued on next page.)

Figure F14. Representative X-ray diffractograms of bulk sediments, Holes U1583C and U1583E.

Figure F15. Sediment/volcanic basement interface, Holes U1583C and U1583F. A. Glassy clasts and unrecovered sediment/basement contact. Note that Core 12H had 401% recovery following rebound of APC cutting shoe from unexpectedly hitting basalt interface, sucking in highly disturbed sediment. Consequently, stratigraphic positions of glassy fragments in this core are likely meaningless. Cryptocrystalline upper margin of Unit 1 was sampled for microbiology, and veins of indurated calcareous sediment are present in top of massive flow. B. Similar unrecovered sediment/basement contact with some indurated calcareous sediment veins.

Figure F16. Unit 1 massive lava flow and glass near sediment/basement interface, Holes U1583C and U1583F. A. Fragments of altered glass from recovered sediment. B, C. Unit 1 massive flow microcrystalline chilled flow top. D. Vesicular upper interior of massive flow. E. Fine-grained central massive flow interior. F. Medium-grained lower massive flow interior. G. Probable cryptocrystalline and glassy basal margin of massive flow.

Figure F17. Unit 1 massive lava flow, Holes U1583C and U1583F. A. Vesicular, fine-grained basalt with plagioclase (Plag) phenocrysts ~1 m from flow (XPL). Ves = vesicle. B. Medium-grained central/lower massive flow interior with well-crystallized subophitic texture (XPL). C. Plagioclase laths and mostly interstitial clinopyroxene (Cpx) in upper flow interior, groundmass (XPL). D. Altered olivine phenocrysts and well-crystallized interstitial clinopyroxene in central to lower massive flow interior (XPL). E. Relatively abundant, coarse interstitial (Ti-)magnetite and sparse secondary pyrite (reflected light).

Figure F18. Volcanic Unit 2, Hole U1583F. A. Typical Unit 2 moderately plagioclase-olivine-phyric upper pillow margin and interior, both outer and cut core surfaces. B. Dipping glassy margin of Unit 2 pillow lava. Whole thin section images of (C) plagioclase-olivine-phyric microcrystalline basalt altered around thin carbonate vein (XPL) and (D) fresh glassy margin and moderately plagioclase-olivine-phyric flow interior. E. Close up photomicrograph of glassy selvage and edge of spherulitic transition, with fresh plagioclase (Plag) and olivine (Ol) microlites. F. Photomicrograph of cryptocrystalline groundmass of fibrous clinopyroxene (cpx) and plagioclase laths with sparse olivine microlites.

Figure F19. Volcanic Unit 3, Hole U1583F. A. Aphyric, completely recovered ~30 cm thick Subunit 3A pillow lava with two glassy margins, cut by calcareous sediment veins. B. Corrugated glassy flow top. C. Aphyric microcrystalline flow interior. D. Planar glassy flow top and upper interior of Subunit 3B sheet flow. E. Interflow breccia from Subunit 3A.

Figure F20. Unit 4 sedimentary breccia and Sequence A/B boundary, Hole U1583F. A. Sedimentary breccia of moderately phyric basalt clasts and altered glass in matrix of indurated calcareous sediment. B. Similar breccia, with disaggregated and carbonate-cemented domain. C. Archive half images of entire Unit 4 breccia zone. D. 35 cm continuous breccia piece. E. Piece of carbonate-cemented, matrix-free breccia with mostly glass clasts.

Figure F21. Volcanic Unit 5, Hole U1583F. A. Moderately plagioclase (Plag)-olivine-phyric Subunit 5A basalt pillow lava with steeply dipping lower margin along left side of piece. B. Thin sedimentary breccia Subunit 5B. C. Moderately plagioclase-olivine-augite phyric Subunit 5C pillow lava top, altered along (radial?) fractures, cut and outer core surfaces. D. Whole thin section image of alteration halo and fresher background from Subunit 5A flow interior (XPL). E. Fresh plagioclase-augite phyric microcrystalline Subunit 5C basalt (XPL).

Figure F22. Basalt and sedimentary breccia Unit 6, Hole U1583F. A. Mixed basalt and breccia pieces. B. Whole-round close-up of upper breccia. C. Whole-round and cut surface images of recovered contact between breccia and Subunit 7A pillow lava.

Figure F23. Volcanic Unit 7, Hole U1583F. A. Curved glassy margin of moderately plagioclase-olivine-augite phyric Subunit 7A pillow basalt, outer and cut core surfaces. B. Inner chilled margin of sparsely plagioclase-olivine phyric Subunit 7B lava, outer and cut core surfaces. Thin section photomicrographs of (C) moderately plagioclase-phyric, microvesicular Subunit 7A pillow lava flow interior and (D) comparable primary lithology to C, but with mottled texture and resorbed plagioclase phenocrysts. E. Fresh glassy margin of Subunit 7B pillow lava that grades from glassy to microcrystalline groundmass.

Figure F24. Macroscopic core observations, Hole U1583F. A. Cr/Ti ratios from pXRF analysis of split core surfaces (see Figure F25 for additional results). B. Phenocryst abundance. C. Flow interior grain size. D. Vesicularity. E. Glass occurrences per meter of recovered core for each core.

Figure F25. A–F. Shipboard split core surface pXRF and ICP-AES whole rock powder analyses of major and trace element concentrations and ratios, Hole U1583F. Total Fe is calculated as Fe_2O_3. MORB reference means and 95% confidence intervals from Gale et al. (2013). pXRF data available in Table T6; ICP-AES data available in Table T35. D-MORB = depleted MORB.

Figure F26. Alteration overview showing abundance of background alteration, alteration halos, fresh and altered glass, and altered sediment, Hole U1583F. Data are plotted at individual core level, except where igneous units straddle a core, in which case data are separated by igneous unit. Data are plotted at top of cored intervals. Black trend lines = locally weighted scatter plot smoothing (LOWESS) nonparametric regression, gray shaded areas = 2σ of mean.

Figure F27. Glass alteration along chilled margins, Hole U1583F. A. Thick (>10 mm) glass margin with minimal alteration to clays on outer edge, overlain by remnants of sediment vein. B. Similarly thick (>10 mm) glassy margin that is more altered, with thicker band of clays on outer edge, and incipient alteration around veins and fractures within margin itself. C. Chilled margin where glass is beginning to alter to yellow-brown clay minerals at inner edge of margin and along veins.

Figure F28. Downhole distribution of background alteration types calculated on section unit scale, Hole U1583F. Olivine phenocryst abundance (*) shown for context and plotted as olivine phenocryst abundance (area percent) × 10.

Figure F29. Background alteration, Hole U1583F. A. Typical uniform, gray (GLEY 1 5/N) pseudomorphic background alteration. B. Narrow band of mottled gray alteration that transitions into dark gray (2.5Y 3/1) patchy to variolitic background alteration away from chilled margin at top of image. C, D. Typical replacement of mesostasis and groundmass to yellow-brown clays (arrows) in background. Phenocrysts are unaltered.

Figure F30. Downhole variation in area abundance of alteration halo types calculated on section unit basis, Hole U1583F. Height of each bar scaled to advance in depth. Halo abundance increases downhole, driven by increasing abundance of orange and brown halos below 205 mbsf.

Figure F31. Dark gray halos, Hole U1583F. A. Dark bluish gray halo around clay vein. B. Dark gray halo around clay vein. In both examples, halos form pervasive bands of alteration flanking veins.

Figure F32. Light brownish gray halos, Hole U1583F. This halo type commonly co-occurs as an inner halo to dark gray halos around veins and vugs.

Figure F33. Brown halo types, Hole U1583F. A. Irregular (23–29 cm) and pervasive (30–35 cm) brown (7.5YR 5/3) alteration around chilled margins. B. Brown (7.5YR 5/2) halos around veins with diffuse boundary with gray background (23–32 cm). C. Extensive dark gray (brown) alteration with no recovered vein or chilled margin.

Figure F34. Orange halo types, Hole U1583F. A. Orange (reddish yellow) alteration zone related to chilled margins. B. Orange (reddish brown) irregular halos around carbonate veins (arrows).

Figure F35. Multihalo types, Hole U1583F. A–D. Layered halos of light yellowish brown–dark greenish gray and reddish brown. Each halo type is identified in C. B. Close up of A showing enlargement of groundmass to illustrate variable vesicle fills across halo types. Dark greenish gray halos host green clay–filled vesicles and light yellowish brown vesicles with orange-brown clays ± FeOH. D. End on view of vein present on left side of A. This vein composition changes across vein surface, from green clay to dark orange-brown clay ± FeOH, with sharp boundary between compositions. E. Dark bluish gray halo with sharp outer boundary of reddish brown. Bgd = background.

Figure F36. Breccias, Hole U1583F. A. Clasts within breccia that are variably altered to gray background and range of halo types. B. Open space filling carbonate cement on outside surface. Open spaces exist close to edges of larger clasts. C. Breccia with zeolite vein (0.1–0.2 mm thick) that coats edge of sample and must postdate formation of breccia. D. Breccia with clasts that show prominent alteration halos around edges of clasts. E. Breccia of volcanic glass clasts that has almost no matrix and is cemented by calcium carbonate. Glass clasts show strong alteration to brown clays along rims of clasts.

Figure F37. A, B. Breccia showing altered glass clasts extensively replaced by clay minerals forming concentric rings and basaltic clasts that are variably altered, Hole U1583F. Clasts are cemented by calcium carbonate and zeolite. Zeolite is preferentially found adjacent to glass clasts.

Figure F38. A–C. Vein width characteristics, Hole U1583F. C: solid line = median value (0.5 proportion), dashed lines = 1σ equivalent range of median, dot-dashed lines = 2σ equivalent range of median. Expanded depth scale stretches curated depths within each core advance to compensate for incomplete recovery (see the Expedition 390/393 methods chapter [Coggon et al., 2024a]).

Figure F39. Vein density per meter normalized to core recovery, Hole U1583F. Total veins are separated by secondary mineral fill. Data plotted at the top depth of each core. Black trend lines = locally weighted scatter plot smoothing (LOWESS) nonparametric regression, gray shaded areas = 2σ of mean.

Figure F40. Secondary mineral abundance normalized to core recovery, Hole U1583F. Black trend lines = locally weighted scatter plot smoothing (LOWESS) nonparametric regression, gray shaded areas = 2σ of mean.

Figure F41. Typical vein assemblages, Hole U1583F. A. Crack-seal syntaxial calcium carbonate vein showing localized incorporation of wall rock into vein assemblage. B. Multiple generation vein assemblage composed of calcium carbonate, Fe oxyhydroxide, and clay. C. Irregular sediment infilling vein with vugs filled by calcium carbonate. D. Vein assemblage composed of calcium carbonate and zeolite with zeolite lining vein edge. E. Green clay and Fe oxyhydroxide vein with change in composition occurring along vein, resulting in discrete sharp contact.

Figure F42. A, B. Internal structure of zeolite vein, Hole U1583F. Crack-seal syntaxial zeolite vein occurring in variably altered chilled margin associated with halo.

Figure F43. Vein width and dip angle statistics, Hole U1583F. A. Vein width histogram of vein types: single event veins (massive veins; see Alteration petrology in the Expedition 390/393 methods chapter [Coggon et al., 2024a]), multiple event veins (polycrystalline veins and crack-seal veins), and open space fillings. B. Vein width cumulative frequency of differing vein types. C. Vein dip angle histogram of vein types with respective probability density. D. Vein dip angle cumulative frequency of differing vein types.

Figure F44. Vein width and dip angle statistics differentiated by halo association, Hole U1583F. A. Vein width histogram. B. Vein width cumulative frequency. C. Vein dip angle histogram. D. Vein dip angle cumulative frequency.

Figure F45. A. Vein dip angles, Hole U1583F. B. Histogram is binned into 12 distinct groups (spaced 7.5° each) showing multimodal distribution. C. Dip angle proportions. Solid line = median value (0.5 proportion), dashed lines = 1σ equivalent range of median, dot-dashed lines = 2σ equivalent range of median. Expanded depth scale stretches curated depths within each core advance to compensate for incomplete recovery (see the Expedition 390/393 methods chapter [Coggon et al., 2024a]).

Figure F46. A–E. Overview of alteration zones, Hole U1583F.

Figure F47. Calcareous nannofossil and planktic foraminiferal biostratigraphic zones and datums, Holes U1583C and U1583F. Upward arrows = bioevent base (first occurrence), downward arrows = bioevent top (last occurrence).

Figure F48. Downhole variations in group abundance and preservation of calcareous nannofossils and planktic foraminifera, Holes U1583C and U1583E.

Figure F49. Biostratigraphically important and other notable calcareous nannofossil taxa, Site U1583 ([a] XPL and [b] PPL at 1000× magnification). (Continued on next page.)

Figure F50. Scanning electron microscope images of biostratigraphically important and other notable planktic foraminiferal taxa, Hole U1583C. Each number represents a specimen; differing views of same specimen are denoted by the addition of letters (except for 4 and 7, which are the same specimen). 1, 2. 1H-1, mudline: (1) *Globorotalia hirsuta;* (2) *Globorotalia truncatulinoides*. 3, 4, 7. 1H-CC, 14–19 cm: (3) *Dentoglobigerina altispira*; (4, 7) *Globorotalia crassaformis*. 5, 6, 8, 9. 2H-CC, 16–21 cm: (5) *Trilobatus sicanus*; (6) *Praeorbulina glomerosa;* (8) *Catapsydrax dissimilis*; (9) *Globoquadrina dehiscens*. 10, 11. *Paragloborotalia kugleri* (10: 3H-CC, 16–21 cm; 11: 4H-CC, 32–37 cm). 12, 13. *Paragloborotalia pseudokugleri* (12: 3H-CC, 16–21 cm; 13: 4H-CC, 32–37 cm). 14, 15. 4H-CC, 32–37 cm: (14) *Trilobus trilobatus;* (15) *Ciperoella ciperoensis*. 16, 17. *Paragloborotalia opima* (9H-CC, 20–25 cm). 18, 23. *Subbotina angiporoides* (12H-CC, 12–17 cm). 19–22. *Chiloguembelina cubensis* (10H-CC, 20–25 cm).

Figure F51. Archive-half MSP (MS; from SHMSL) and SRM measurements in sediments, Hole U1583C. Dashed lines on inclination = inclination (±49.1°) expected based on GAD for this latitude (~30°S).

Figure F52. Archive-half MSP (MS; from SHMSL) and SRM measurements in sediments, Hole U1583E. Dashed lines on inclination = inclination (±49.1°) expected based on GAD for this latitude (~30°S).

Figure F53. Histogram of inclination data after 20 mT AF demagnetization for sediments, Holes U1583C and U1583E. Dashed lines = inclination (±49.1°) expected based on GAD for this latitude (~30°S) for normal (N) and reversed (R) chrons.

Figure F54. Representative AF demagnetization results for each lithostratigraphic unit, with equal-angle projections, orthogonal vector plots (Zijderveld, 1967), and demagnetization trends of normalized intensity, Hole U1583C.

Figure F55. A. SIRM acquisition curves up to 1200 mT and backfield IRM truncated at −300 mT for representative samples from each sediment lithostratigraphic unit, Hole U1583C. B. Coercivity distribution and unmixing of IRM acquisition curves (Maxbauer et al., 2016) for representatives of clay-rich (Unit III) and nannofossil ooze (Unit IV) lithologies.

Figure F56. Magnetic mineralogy data, Hole U1583C. $K_{fd\%}$ = frequency-dependent susceptibility.

Figure F57. A. Equal-area projection (in core coordinate system) showing orientation of principal magnetic susceptibility axes (K_{max}, K_{int}, and K_{min}) for measured discrete samples of sediments, Site U1583. B. Shape parameter (*T*) vs. degree of anisotropy (*P*).

Figure F58. Bulk susceptibility (K_m) and AMS parameters (Jelinek, 1981), Hole U1583C.

Figure F59. Archive-half SRM inclination measurements after 20 mT demagnetization for Hole U1583C and U1583E sediments, plotted with splice. Red lines = intervals where reversal patterns were associated with GPTS (Gradstein et al., 2020). Biostratigraphic ages based on nannofossils and planktic foraminifera used to constrain magnetic polarity ties are also shown.

Figure F60. Archive-half MSP (MS; from SHMSL) and SRM measurements from volcanic rocks, Hole U1583F. Dashed lines = inclination (±49.1°) expected based on GAD for this latitude (~30°S).

Figure F61. Histogram of inclination data after 20 mT AF demagnetization for volcanic rocks, Hole U1583F. Dashed lines = inclination (±49.1°) expected based on GAD for this latitude (~30°S) for normal (N) and reversed (R) chrons.

Figure F62. A, B. AF demagnetization results for representative discrete samples, Hole U1583F. Equal-angle projections, orthogonal projection diagrams (Zijderveld, 1967), and demagnetization trends of normalized intensity.

Figure F63. A. SIRM acquisition curves up to 1200 mT and backfield IRM truncated at −300 mT for 4 volcanic rock samples, Hole U1583F. B. Coercivity distribution and unmixing of IRM acquisition curves (Maxbauer et al., 2016). C. Magnetic mineralogy data.

Figure F64. A. Equal-area projection showing orientation of principal magnetic susceptibility axes (K_{max}, K_{int}, and K_{min}), Site U1583. Green = massive flow, violet = pillow lavas. B. Shape parameter (*T*) vs. degree of anisotropy (*P*). C. Bulk susceptibility (K_m) and AMS parameters (Jelinek, 1981).

Figure F65. Age-depth model showing biostratigraphic and magnetostratigraphic datums, Hole U1583C. LSRs calculated based on indicated datums in Table T21 and averaged for Pleistocene, Pliocene, Miocene, and Oligocene. See Sedimentology for description of lithology symbols.

Figure F66. Age-depth model showing biostratigraphic and magnetostratigraphic datums, Hole U1583E. LSRs calculated based on indicated datums in Table T22 and averaged for Pleistocene, Pliocene, Miocene, and Oligocene. See Sedimentology for description of lithology symbols.

Figure F67. (A) MAR, (B) CAR, and (C) OCAR calculated at 1 My intervals, Hole U1583C. Gaps in CAR and OCAR values = 1 My time intervals with no carbonate or TOC data available.

Figure F68. Summary of track physical properties, Hole U1583C. Solid circles = discrete bulk density and *P*-wave velocity measurements. cps = counts per second.

Figure F69. Summary of discrete physical properties, Hole U1583C. *P*-wave velocity data shown is highest value measured for each sample. See Sedimentology for description of lithology symbols.

Figure F70. Summary of track physical properties, Hole U1583E. cps = counts per second. See Sedimentology for description of lithology symbols.

Figure F71. Concentrations of K, U, and Th derived from NGR, Hole U1583C. cps = counts per second. See Sedimentology for description of lithology symbols.

Figure F72. Concentrations of K, U, and Th derived from NGR, Hole U1583E. cps = counts per second. See Sedimentology for description of lithology symbols.

Figure F73. Crossplots of sediment samples by lithostratigraphic units, Hole U1583C. A. NGR vs. V_P. B. GRA bulk density vs. V_P. C. NGR vs. GRA bulk density. D. NGR vs. MS. Mean (stars) and standard deviation (error bars) for each unit are shown. cps = counts per second.

Figure F74. Crossplots of sediment samples by lithology, Hole U1583C. A. NGR vs. V_P. B. GRA bulk density vs. V_P. C. NGR vs. GRA bulk density. D. NGR vs. MS. Mean (stars) and standard deviation (error bars) for each lithology are shown. cps = counts per second.

Figure F75. A. SHIL core image compared to XMAN X-ray image to identify trace fossils, Hole U1583C. Interval shows heavy bioturbation. Zo = *Zoophycos*, Pl = *Planolites*, Sk = *Skolithos*, Ch = *Chondrites*. B. Black spots in X-ray images identified as carbonate nodules, Hole U1583E. C. Bands and bubble-like features identified as drilling disturbance instead of real sedimentological features, Hole U1583C.

Figure F76. APCT-3 temperature records. A. Hole U1583C. B. Hole U1583E. Highlighted time intervals show where best-fit temperature decay model (green curve) was calculated to derive equilibrium temperature for each deployment. In situ formation temperature value for each record is extrapolated from best-fit model.

Figure F77. Estimation of conductive heat flow, Site U1583. A. Thermal conductivity measured on cores, Hole U1583C. Mean thermal conductivity for interval above deepest temperature is shown. B. Calculated thermal resistance for Holes U1583C (red) and U1583E (blue) and linear regression for the site. C. Temperature for Holes U1583C and U1583E and linear regression for all measurements. D. Bullard plot of measured temperature vs. calculated thermal resistance, Holes U1583C and U1583E. Slope of regression line is conductive heat flow for Site U1583.

Figure F78. Construction of Site U1583 composite depth scale (CCSF) and splice, using NGR and paleomagnetic inclination. Polarity: black = negative inclination (normal polarity for sites in Southern Hemisphere), white = positive inclination (reversed polarity), gray= no data or magnetic polarity is uncertain. cps = counts per second.

Figure F79. Summary of physical properties, Hole U1583F. cps = counts per second.

Figure F80. Site U1583 discrete basalt sample physical properties by lithostratigraphic unit (see Igneous petrology). A. V_P vs. porosity. B. V_P vs. bulk density. C. Bulk density vs. porosity. D. Grain density vs. porosity. V_P shown is maximum velocity measured for each sample. Mean (stars) and standard deviation (error bars) for each unit are shown. Breccia samples are not shown or included in means, standard deviations, or regressions.

Figure F81. Site U1583 discrete basalt sample physical properties by emplacement style (see Igneous petrology). A. V_P vs. porosity. B. V_P vs. bulk density. C. Bulk density vs. porosity. D. Grain density vs. porosity. V_P shown is maximum velocity measured for each sample. Mean (stars) and standard deviation (error bars) for each emplacement style are shown. Breccia samples are not shown or included in means or standard deviations.

Figure F82. Site U1583 discrete basalt sample physical properties by groundmass grain size (see Igneous petrology). A. V_P vs. porosity. B. V_P vs. bulk density. C. Bulk density vs. porosity. D. Grain density vs. porosity. V_P shown is maximum velocity measured for each sample. Mean (stars) and standard deviation (error bars) for each groundmass grain size are shown. Breccia samples are not shown or included in means or standard deviations.

Figure F83. Site U1583 basalt discrete sample physical properties by alteration level (see Alteration petrology). A. V_P vs. porosity. B. V_P vs. bulk density. C. Bulk density vs. porosity. D. Grain density vs. porosity. V_P shown is maximum velocity measured for each sample. Mean (stars) and standard deviation (error bars) for each alteration level are shown. Breccia samples are not shown or included in means or standard deviations.

Figure F84. Comparison of discrete physical properties measurements, Hole U1583F and ODP Hole 896A. Hole U1583F data are colored by alteration level (see Alteration petrology). See Figure F83 for color legend. Mean values for Hole 896A, calculated from entire data set for each parameter, are shown (red lines = mean value of each data type, shaded boxes = ±1 standard deviation). *P*-wave velocity shown for Hole U1583F is maximum velocity measured for each sample. Thermal conductivity measurements lack alteration level information.

Figure F85. Summary of logging data recorded with triple combo tool string, Hole U1583F. Caliper is combination of the two upward passes. Total and spectral gamma ray data are from Hostile Environment Natural Gamma Ray Sonde downlog. Resistivity data are combination of downlog and first pass. RLA1 = shallow apparent resistivity from computed focusing mode 1, RLA3 = medium apparent resistivity from computed focusing mode 3, RLA5 = deep apparent resistivity from computed focusing mode 5, RT = true resistivity calculated from all modes.

Figure F86. Summary of logging data recorded with FMS-sonic tool string, Hole U1583F. V_P core measurements are maximum velocity for each sample. Black line = V_P from logging data. Coherence calculated from monopole and dipole waveforms provides a measure of velocity measurement reliability. Sonic data shown are combination of downlog and main upward pass.

Figure F87. Gamma ray logs recorded through pipe (in sediment section) during two logging runs in Hole U1583F (WMSF) compared with NGR track data (CSF-A) from Holes U1583C and U1583E. HSGR = total spectral gamma ray, HNGS = Hostile Environment Natural Gamma Ray Sonde, ECGR = environmentally corrected gamma ray, EDTC = Enhanced Digital Telemetry Cartridge.

Figure F88. Comparison of resistivity logs and cable tension records during three passes of triple combo tool string with caliper logs from the two upward passes, Hole U1583F. Resistivity is true resistivity (RT). Tension is Calibrated Downhole Force (CDF) recorded at top of tool string.

Figure F89. Comparison of FMS electrical images from shallowest part of interval logged with SHIL core images (393-U1583F-3R-1 and 3R-2). FMS images were moved up 1.7 m to achieve best visual match.

Figure F90. IW profiles of (A) sodium, (B) chloride, and (C) bromide concentrations, Hole U1583C. Moving averages (3–5 points) highlight concentration offsets between squeezed IW and Rhizon-sampled fluids. Seawater (SW) reference values correspond to IAPSO standard composition. Shaded gray lines = unit boundaries. RZ = Rhizon sampler.

Figure F91. IW profiles of (A) pH and (B) alkalinity, Hole U1583C. Reference values for bottom seawater (SW) pH are based on Ríos et al. (2015) for pH and IAPSO seawater standard composition for alkalinity. Shaded gray lines = unit boundaries.

Figure F92. IW profiles of (A) calcium, (B) magnesium, (C) strontium, and (D) Sr/Ca ratios, Hole U1583C. Seawater (SW) reference values are based on IAPSO standard. Shaded gray lines = unit boundaries. RZ = Rhizon sampler.

Figure F93. IW profiles of (A) boron, (B) lithium, (C) silicon, and (D) potassium concentrations, Hole U1583C. Seawater (SW) reference values for B, Li, and K correspond to IAPSO standard composition; local Si concentration is from Sarmiento et al. (2007). Shaded gray lines = unit boundaries. RZ = Rhizon sampler.

Figure F94. IW profiles of (A) sulfate, (B) ammonium, and (C) manganese and (D) in situ oxygen, Hole U1583C. Seawater (SW) reference value sulfate is based on IAPSO standard composition. Shaded gray lines = unit boundaries. RZ = Rhizon sampler.

Figure F95. Sediment (A) calcium carbonate and total inorganic carbon (TIC) and (B) TOC, Hole U1583C. Shaded gray lines = unit boundaries.

Figure F96. Total alkalis vs. silica diagram (Le Bas et al., 1986) showing ICP-AES data from Site U1583 compared to other SAT sites.

Figure F97. Sr vs. TiO_2 contents comparing Site U1583 basalts to other SAT basalts and South Atlantic basaltic glass compositions compiled from EarthChem Portal (**http://portal.earthchem.org/**) on 10 July 2022 via map polygon function for MORB basalt glasses <100,000 y old from South Atlantic Ocean (specific sources: Kelley et al., 2013; Kendrick et al., 2017; Le Roux, 2000; Michael and Graham, 2015; Paulick et al., 2010; Reekie et al., 2019; van der Zwan et al., 2017; Yang et al., 2018).

Figure F98. Major elements analyzed on sample powders by ICP-AES and pXRF, as well as on sample surfaces via pXRF, Site U1583. Two volcanic sedimentary breccia samples are from Unit 4. Dotted lines = lithostratigraphic boundaries identifiable in downhole chemical variations.

Figure F99. K_2O and MgO contents, Site U1583. Dotted lines = lithostratigraphic boundaries identifiable in downhole chemical variations.

Figure F100. K/Zr vs. Cr/TiO_2 for Site U1583 contrasted with other SAT sites (yellow area = Site U1557 and Stratigraphic Sequence 3 from Site U1556), blue area = Site U1558, red area = Site U1559) and data for zero-age Mid-Atlantic Ridge (MAR) 26°S basalt glasses (Marschall et al., 2017; gray area).

Figure F101. Zr/Y vs. Zr tectonic discrimination diagram of Pearce and Norry (1979) for Site U1583 by ICP-AES and pXRF powders compared to other SAT sites (shaded field).

Figure F102. V vs. Ti/1000 discrimination diagram of Shervais (1982) for Site U1583 by ICP-AES and pXRF compared to other SAT sites (yellow area = Site U1556, green area = Site U1557, blue area = Site U1558, red area = Site U1559. Shaded field encompasses all SAT sites.

Figure F103. Samples collected for shore-based microbiology research, Hole U1583F.

Figure F104. PFMD tracer concentrations measured by gas chromatography comparing concentrations on core exterior surfaces with whole-round interiors for microbiological analyses, Hole U1583F.