Figure F1. Bathymetric map of ~61 Ma SAT study area showing locations of Sites U1556, U1557, and U1561 and CREST multichannel seismic reflection (MCS) Lines 1A/1B and 05 (Christeson and Reece, 2020). Seismic reflection profiles were acquired during CREST cruise (Reece et al., 2016). Solid black lines = locations of wide-angle MCS profiles for which seismic images are shown in Figure F2.

Figure F2. Multichannel seismic (MCS) reflection profiles for SAT sites on ~61 Ma crust showing local basement topography. A. West–east MCS reflection profile CREST Line 1A/1B that crosses CREST Line 05 ~5.7 km south of Site U1561. B. North–south MCS reflection profile CREST Line 05. Black lines = intersections of MCS reflection profiles, blue lines = site locations. CDP = common depth point, TWT = two-way traveltime.

Figure F3. Backscatter reflections from region around Sites U1556, U1557, and U1561 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 = locations of wide-angle multichannel seismic profiles for which seismic images are shown in Figure F2.

Figure F4. Map of holes drilled at Sites (A) U1556, (B) U1557, and (C) U1561.

Figure F5. Lithologic summary, Holes (A) U1561A, (B) U1561B, and (C) U1561C. For epochs, see Age model and mass accumulation rates. For physical properties analyses, see Physical properties and downhole measurements. MS = point magnetic susceptibility, a* = red–green value (greater value = redder) smoothed with a 100-point moving average. cps = counts per second. RGB is plotted in machine units.

Figure F6. Main sedimentary components, Hole U1561A. A, B. Silty clay clast with zeolite (or clay mineral, acicular shape clasts; 1H-4, 81 cm). C, D. Calcareous nannofossil ooze with few foraminifera (6H-1, 62 cm). A, C = cross-polarized light (XPL); B, D = plane-polarized light (PPL).

Figure F7. Representative X-ray diffractograms of bulk sediments, Hole U1561A. Unit I is composed of silty clay; Unit II is composed of carbonate (ooze/chalk).

Figure F8. Core sections, Hole U1561A. A. Brown silty clay (Unit I; 1H-4). B. Transition from Unit I to Unit II (3H-5 through 3H-7). C. Very pale brown nannofossil-rich chalk (Unit II; 6H-1).

Figure F9. Scatter plot of SHMSL MSP and L* (reflectance), Site U1561 (see Sedimentology in the Expedition 390/393 methods chapter [Coggon et al., 2024c]). L* is lightness (greater value = lighter). Insets on left: properties of individual subunits with brief descriptions.

Figure F10. Scatter plot of SHMSL color reflectance data. Insets on left: properties of individual subunits with brief descriptions.

Figure F11. Numerous chilled contacts recovered in Hole U1561A basalts. Chilled contacts occur in Section 8X-1 at 33–34, 71–73, 81, and 100 cm, and in Section 9X-1 at 4–12, 29–35, and 99–103 cm.

Figure F12. (A) Skeletal olivine microphenocryst and (B) groundmass crystals, indicating rapid crystallization (395E-U1561A-9X-1, 90–92 cm). Note acicular plagioclase needles in cryptocrystalline groundmass with associated rectangular, highly skeletal quench overgrowths.

Figure F13. Bull's-eye alteration pattern in chilled margin formed by concentric zones of reddened and darkened altered groundmass (395E-U1561A-9X-1, 90–92 cm, TS66). These textures appear to nucleate preferentially on heterogeneities such as phenocrysts or chilled margin varioles of radiating clusters of quench crystals.

Figure F14. Crosscutting relationships between (I) white carbonate vein and (II) compound carbonate + zeolite veins (395E-U1561A-8X-1, 51–66 cm). Typical orange speckled background from fresher core of a pillow is also shown.

Figure F15. Calcareous nannofossil and planktic foraminiferal biostratigraphic zones and datums, Site U1561.

Figure F16. Group abundance and preservation of calcareous nannofossils and planktic and benthic foraminifera, Site U1561.

Figure F17. Archive-half MSP (MS; from SHMSL) and SRM measurements, Hole U1561A. Dashed lines on declination = value expected for normal (360°) and reversed (180°) polarity chrons. Dashed lines on inclination = GAD inclination (±49.1°) expected for this latitude (~30°S) during normal and reversed polarity chrons. Cores 1H–4H and 6H were oriented using Icefield MI-5 core orientation tool.

Figure F18. Archive-half MSP (MS; from SHMSL) and inclination measurements, Holes U1561A (0–26 m CSF-B) and U1561B. Dashed lines on inclination = GAD inclination (±49.1°) expected for this latitude (~30°S) during reversed and normal polarity chrons.

Figure F19. Histograms of inclination after 20 mT AF demagnetization, Holes (A) U1561A and (B) U1561B. Red lines = inclination (±49.1°) of the GAD expected for this latitude (~30°S) during normal (N) and reversed (R) polarity chrons.

Figure F20. Age-depth model showing biostratigraphic datums, Hole U1561A. Linear sedimentation rates based on datums in Table T8 are also shown. See Sedimentology for description of lithologic symbols.

Figure F21. (A) MAR, (B) CAR, and (C) OCAR calculated at 10 My intervals, Hole U1561A.

Figure F22. Summary of core physical properties data, Hole U1561A. cps = counts per seconds.

Figure F23. Construction of Site U1561 composite depth scale (CCSF) and splice showing MS data. Dashed lines = correlation tie points aligning similar stratigraphies between holes. Interval shows selected intervals that make up the splice.

Figure F24. Splice for Site U1561 showing correlated data types (MS, GRA bulk density, and NGR). Interval shows selected intervals that make up the splice. cps = counts per second.

Figure F25. APCT-3 temperature record (Core 395E-U1561A-4H). Highlighted time interval shows 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 F26. Estimation of conductive heat flow, Site U1561. A. Thermal conductivity measured on cores. Mean thermal conductivity interval above deepest temperature is shown. B. Calculated thermal resistance and linear regression. C. Temperature and linear regression for all measurements. D. Bullard plot of measured temperature vs. calculated thermal resistance. Slope of regression line is conductive heat flow for Site U1561.

Figure F27. (A) Chloride, (B) bromine, (C) sodium, and (D) potassium pore water concentrations from IC, Hole U1561A. Seawater (SW) reference values (dashed lines) correspond to IAPSO standard composition.

Figure F28. (A) pH, (B) alkalinity, (C) calcium, (D) magnesium, and (E) strontium pore water concentrations, Hole U1561A. Blue shaded area in A = range in pH observed for bottom seawater at this location (7.7–7.8; Ríos et al., 2015). Dashed lines = IAPSO seawater (SW) standard reference values.

Figure F29. (A) Boron, (B) lithium, and (C) silica concentrations from ICP-AES, Hole U1561A. Dashed lined = seawater (SW) reference values for B and Li correspond to IAPSO standard composition and local Si concentration is sourced from World Ocean Atlas (Boyer et al., 2018).

Figure F30. (A) Sulfate, (B) manganese, (C) ammonium, (D) phosphate, and (E) barium concentrations, Hole U1561A. Seawater (SW) reference value for sulfate (dashed line) corresponds to IAPSO standard composition.

Figure F31. (A) Calcium carbonate, (B) TOC, and (C) TN, Hole U1561A.