Figure F1. Bathymetry of the PPA showing the locations of the four sites (U1586, U1587, U1385, and U1588) drilled during Expedition 397, Marion Dufrense (MD) piston cores, and IODP Site U1391. Site U1385 was occupied previously during Expedition 339, as was Site U1391. The map is modified from Hodell et al. (2015) and was made with GeoMapApp (**www.geomapapp.org**) using the bathymetry of Zitellini et al. (2009).

Figure F2. Depth distribution of Expedition 397 drill sites on the PPA looking onshore to the east. The sites are located on a bathymetric transect that intersects each of the major subsurface water masses of the North Atlantic. Depths range from 1339 mbsl (Site U1588) to 4692 mbsl (Site U1586). Expedition 339 Site U1391 is also shown. (Figure made by Helder Pereira using Mirone and iVew4D software.)

Figure F3. Location of Site U1586 at the toe of the PPA at a water depth of 4692 mbsl. See Figure F2 for broader bathymetric context. (Figure made by Helder Pereira using Mirone and iVew4D software.)

Figure F4. Bathymetric map of Cruise JC89 Seismic Lines 2 and 3 showing location of Site U1586 and Piston Core JC89-5.

Figure F5. Original and interpreted Seismic Profile JC89-2 showing the location of Site U1586. The age of the reflectors has been revised to reflect the age of the recovered sediment. Penetration = 350 mbsf.

Figure F6. Original and interpreted Seismic Profile JC89-3 showing the location of Site U1586. Penetration = 350 mbsf.

Figure F7. Salinity and silicate profiles on WOCE Line A03 (36°N) showing proposed site locations on the Iberian margin. Tongue of high salinity water between 600 and 1200 m is MOW. High Si (>35 µmol/kg) below 3000 m represents a contribution from LDW sourced from the Southern Ocean. Water masses do not have clearly defined boundaries but rather consist of a series of core layers bordered by transition (mixing) zones between adjacent layers. The positions of Expedition 397 sites are shown relative to each of the identified subsurface water masses.

Figure F8. Ca/Ti and Zr/Sr measured using XRF on Piston Core JC089-5-3P. Heinrich stadials (H1, H2, etc.) are marked by peaks in Zr/Sr and minima in Ca/Ti, reflecting an increase in detrital over biogenic sedimentary components. LGM = Last Glacial Maximum, BA = Bølling-Allerød, IS = prominent Greenland interstadials. Data from Channell et al. (2018).

Figure F9. Lithofacies I, Site U1586. All images: upper left = transmitted light brightfield, lower left = cross-polarized light (XPL), right = section half images, which include the interval where smear slides were taken.

Figure F10. Lithofacies 2, Site U1586. All images: upper left = transmitted light brightfield, lower left = XPL, right = section half images, which include the interval where smear slides were taken.

Figure F11. Lithofacies 3, Site U1586. A. Section half showing the location of Thin Section 397-U1586A-42X-1, 86–90 cm (red box). B. XPL. C. Transmitted, XPL. D. Section half showing the location of Thin Section 397-U1586C-36X-4, 60–62 cm (red box). E. XPL. F. Transmitted, XPL.

Figure F12. Distribution of lithofacies in lithostratigraphic units, Site U1586. Principal lithology name from visual core description was used to categorize intervals into different lithofacies. Percentages of lithofacies were calculated based on their relative thicknesses in each lithostratigraphic unit.

Figure F13. Diagenetic features, Site U1586. The most common diagenetic features observed were (A, B, C) pyrite nodules and (D, E) dark patches, which are possibly iron monosulfides.

Figure F14. Section halves, Site U1586. Red boxes = intervals where smear slides were taken and spherules were found. All images are in transmitted light brightfield. A. Smear slide image (105 cm). B. Smear slide image (142.5 cm). C. Smear slide image (51 cm). Scale bars = 0.1 mm.

Figure F15. Section halves and MS, Site U1586. Red bars = MS peaks, which at their maximum exceed 100 SI.

Figure F16. Deep sea corals in (A, C, E) closeup images and (B, D) whole-round X-ray scans (kV = 80; mA = 0.7; time = 300 ms; stack = 20). X-rays are scaled to the adjacent closeup image depth scale.

Figure F17. Slumped interval (397-U1586C-7H-2). All images: left = section-half image, right = X-ray scans (kV = 80; mA = 0.7; time = 120 ms; stack = 20). X-rays are scaled to the adjacent section-half image depth scale.

Figure F18. Examples of trace fossils found in Lithofacies 2. A. Trace fossils include *Chondrites* (Ch), *Planolites* (Pl), and *Zoophycos* (Zo). These are commonly observed in cores from all holes. B. *Zoophycos*.

Figure F19. Examples of drilling disturbances, Site U1586. A. Moderate biscuiting. B. Severe fall-in. C. Strong fragmentation. D. Moderate to strong soupy/slurry. E. Strong basal flow-in. F. Severe up-arching.

Figure F20. $CaCO_3$ measurements, Hole U1586A. Color shading = boundaries of lithostratigraphic units.

Figure F21. Lithologic summary, Site U1586. M/G = Matuyama/Gauss, T.Thvera = Top Thvera, ? = uncertainty. Blue dashed lines = unit divisions, blue dotted line = subunit division (not slump related), green overlay = slumped interval correlation (Subunits IB, ID, IF, IH, and IIB). Nannofossil biozones and paleomagnetic boundaries are summarized from shipboard data and may disagree. Inset: cropped section of Seismic Line JC89 Line 3 showing location along transect and depth of Holes U1586A–U1586D. SB = seabed, MP = middle Pleistocene, BPle = Base Pleistocene, BPli = Base Pliocene, MM = middle Miocene.

Figure F22. Magnetite grain (397-U1586D-17X-5).

Figure F23. Preliminary age model based on calcareous nannofossils and planktonic foraminifer events.

Figure F24. Distribution of key ecological planktonic foraminifer species from Hole U1586A and benthic/planktonic foraminifer ratio. See Biostratigraphy in the Expedition 397 methods chapter (Abrantes et al., 2024) for abundance scale details. Blue shading = dominance of typical North Atlantic species, red = dominance of temperate to subtropical species, gray = dissolution-affected foraminifers.

Figure F25. Paleomagnetism data after 20 mT AF demagnetization, Hole U1586A. A. APC and HLAPC archive halves. B. XCB archive halves. Chron: black = normal polarity zone/boundary, white = reversed polarity zone/boundary, gray = uncertain polarity zone/boundary. Squares = depths where discrete cube samples were collected. Inclination: dashed lines = expected GAD inclinations at the site latitude during reversed and normal polarities. Pink shading = strongly disturbed intervals, green shading = slump intervals. Declination: gray = measured declination values, green = declination values corrected using core orientation data collected with the Icefield MI-5. Susceptibility: magenta = SHMSL, black = WRMSL.

Figure F26. Paleomagnetism data after 20 mT AF demagnetization, Hole U1586B. A. APC archive halves. B. XCB archive halves. Chron: black = normal polarity zone/boundary, white = reversed polarity zone/boundary, gray = uncertain polarity zone/boundary. Squares = depths where discrete cube samples were collected. Inclination: dashed lines = expected GAD inclinations at the site latitude during reversed and normal polarities. Pink shading = strongly disturbed intervals, green shading = slump intervals. Declination: gray = measured declination values, green = declination values corrected using core orientation data collected with the Icefield MI-5. Susceptibility: magenta = SHMSL, black = WRMSL.

Figure F27. Paleomagnetism data after 20 mT AF demagnetization, Hole U1586C. A. APC archive halves. B. XCB archive halves. Chron: black = normal polarity zone/boundary, white = reversed polarity zone/boundary, gray = uncertain polarity zone/boundary. Inclination: dashed lines = expected GAD inclinations at the site latitude during reversed and normal polarities. Pink shading = strongly disturbed intervals, green shading = slump intervals. Declination: gray = measured declination values, green = declination values corrected using core orientation data collected with the Icefield MI-5. Susceptibility: magenta = SHMSL, black = WRMSL.

Figure F28. Paleomagnetism data after 20 mT AF demagnetization, Hole U1586D. A. APC archive halves. B. XCB archive halves. Chron: black = normal polarity zone/boundary, white = reversed polarity zone/boundary, gray = uncertain polarity zone/boundary. Squares = depths where discrete cube samples were collected. Inclination: dashed lines = expected GAD inclinations at the site latitude during reversed and normal polarities. Pink shading = strongly disturbed intervals, green shading = slump intervals. Declination: gray = measured declination values, green = declination values corrected using core orientation data collected with the Icefield MI-5. Susceptibility: magenta = SHMSL, black = WRMSL.

Figure F29. Discrete cube sample AF demagnetization results, Hole U1586A. Results are organized by sample depth. All samples: left = intensity variation with progressive demagnetization, middle = NRM demagnetization data on orthogonal (Zijderveld) projections, right = equal area projections. Orthogonal projection plot: blue squares = horizontal projections, red circles = vertical projections. Data from the first few demagnetization steps (typically <4–10 mT) that are often heavily influenced by drilling-induced overprint have been removed from the orthogonal projection plot to better show the main characteristics of the NRM data. Equal area projection plot: solid circles = positive inclinations, open circles = negative inclinations. (Continued on next six pages.)

Figure F30. AF demagnetization results for discrete cube samples, Hole U1586B. Results are organized by sample depth. All samples: left = intensity variation with progressive demagnetization, middle = NRM demagnetization data on orthogonal (Zijderveld) projections, right = equal area projections. Orthogonal projection plot: blue squares = horizontal projections, red circles = vertical projections. Data from the first few demagnetization steps (typically <4–10 mT) that are often heavily influenced by drilling-induced overprint have been removed from the orthogonal projection plot to better show the main characteristics of the NRM data. Equal area projection plot: solid circles = positive inclinations, open circles = negative inclinations.

Figure F31. AF demagnetization results for discrete cube samples, Hole U1586C. Results are organized by sample depth. All samples: left = intensity variation with progressive demagnetization, middle = NRM demagnetization data on orthogonal (Zijderveld) projections, right = equal area projections. Orthogonal projection plot: blue squares = horizontal projections, red circles = vertical projections. Data from the first few demagnetization steps (typically <4–10 mT) that are often heavily influenced by drilling-induced overprint have been removed from the orthogonal projection plot to better show the main characteristics of the NRM data. Equal area projection plot: solid circles = positive inclinations, open circles = negative inclinations.

Figure F32. AF demagnetization results for discrete cube samples, Hole U1586D. Results are organized by sample depth. All samples: left = intensity variation with progressive demagnetization, middle = NRM demagnetization data on orthogonal (Zijderveld) projections, right = equal area projections. Orthogonal projection plot: blue squares = horizontal projections, red circles = vertical projections. Data from the first few demagnetization steps (typically <4–10 mT) that are often heavily influenced by drilling-induced overprint have been removed from the orthogonal projection plot to better show the main characteristics of the NRM data. Equal area projection plot: solid circles = positive inclinations, open circles = negative inclinations.

Figure F33. Dissolved SO_4, Fe, Mn, and Ba with headspace CH_4 concentrations, Hole U1586A.

Figure F34. Dissolved concentrations of Na, K, and Cl, Hole U1586A. Open circles = two outliers.

Figure F35. Profiles of alkalinity, pH, NH_4, and PO_4, Hole U1586A.

Figure F36. Dissolved Ca, Sr, and Mg, Hole U1586A.

Figure F37. Dissolved Si, Li, and B using ICP-AES, Hole U1586A.

Figure F38. Discrete measurements of $CaCO_3$ using coulometry (squeeze cakes and split-core halves) and ICP-AES with L* reflectance, Hole U1586A.

Figure F39. Discrete measurements of $CaCO_3$ and NGR, Hole U1586A. cps = counts per second.

Figure F40. Crossplot and linear regression of $CaCO_3$ and L* reflectance, Hole U1586A. IW squeeze cakes were removed prior to core splitting, so L* values were extrapolated from adjacent core intervals. Black line = linear regression of all working-half data with 95% confidence interval (CI) shading, dashed line = linear regression of working-half data measured by coulometry with 95% CI, red line = linear regression of all data with 95% CI shading.

Figure F41. Crossplot and linear regression of $CaCO_3$ vs. NGR, Hole U1586A. IW squeeze cakes were removed prior to NGR measurement, so NGR values were extrapolated from adjacent measured intervals. cps = counts per second, black line = linear regression of all working-half data with 95% confidence interval (CI) shading, dashed line = linear regression of working-half data measured by coulometry with 95% CI, red line = linear regression of all data with 95% CI shading.

Figure F42. Sedimentary TOC, TN, C/N, and TS vs. top depth, Hole U1586A. TN error bars = absolute difference between duplicate measurements.

Figure F43. Crossplot of sedimentary major and minor element concentrations vs. Al_2O_3 content, Hole U1586A.

Figure F44. Bulk sedimentary Si/Al, K/Al, Ti/Al, Ca/Ti, biogenic Ba, and Sr/Ca, Hole U1586A.

Figure F45. GRA and MAD bulk density, porosity, thermal conductivity (TCON), and *P*-wave velocity (PWC and PWL), Hole U1586A. ma-20 = moving average of 20 points.

Figure F46. MS (WRMSL), MSP (SHMSL), NGR, and L*a*b* values, Hole U1586A. Solid lines = moving average of 20 points, cps = counts per second.

Figure F47. X-ray images and MS, Holes U1586A and U1586B.

Figure F48. NGR; K, Th, and U deconvolved and extracted from NGR spectra; and U/Th and K/Th ratios, Hole U1586A. All data from section edges (top and bottom) were cut. cps = counts per second.

Figure F49. Section-half X-ray images of authigenic mineral grains (pyrite), Hole U1586C.

Figure F50. Downhole logging data, Hole U1586D. LCAL = caliper, HFK = formation potassium, HURA = formation uranium, HTHO = formation thorium, HROM = HLDS-corrected bulk density, RT_HRLT = true resistivity, RLA1 = shallow apparent resistivity, RLA3 = medium apparent resistivity. HSGR, K, Th, and U are downlog data, and the others are uplog data.

Figure F51. Comparison of downhole logs and core physical properties data, Hole U1586D. Logging data include (A) hole size, (B) GR, (D) density, and (F) MS from uplog pass and plotted against the WMSF depth scale. Dashed line = the bit size of 12 inches. Core measurement data include (C) NGR, (E) density, and (G) MS plotted against the CSF-A depth scale. Solid lines in C, E, and G = moving average of 5 points. cps = counts per second.

Figure F52. Comparison of GR and K, Th, and U concentrations from downhole logs and core measurements, Hole U1586D. Logging data are all from uplog pass. For core data, measurements from the section edges were cut. cps = counts per second.

Figure F53. APCT-3 heat flow calculations, Hole U1586A. A. Downcore thermal conductivity data. B. Thermal resistance calculated from thermal conductivity measurements. C. In situ APCT-3 data for Cores 4H, 7H, 10H, and 13H. red square = average value of minimum mudline temperatures.

Figure F54. Composite section construction using MSP in 50 m increments, Site U1586. (Continued on next page.)

Figure F55. Spliced composite records of core WRSML MS, L* color reflectance, RGB blue, and NGR along with wireline GR, Site U1586. Core data are plotted on the CCSF-A* depth scale. B–L = Burdigalian–Langhian, cps = counts per second.

Figure F56. Depth scales, Site U1586. Left: comparison of CSF-A and CCSF-A depth scales. A 1:1 line is shown for comparison. Right: comparison of the growth of cumulative depth offset and CSF-A depth scale.

Figure F57. Blue channel color reflectance splice with Pleistocene marine isotope stages tentatively identified and compared with biostratigraphic constraints from nannofossil datum events, Holes U1586A and U1586B. The splice was constructed after compressing each core by the growth factor of the composite section (CCSF-A*) and making slight adjustments to the driller's depth to align the signals. Gray bands = slumped intervals.

Figure F58. Characteristic Pliocene amplitude modulated cycles, Holes U1586A and U1586C. MSP is inverted to correspond to inferred carbonate content. The splice was constructed after compressing each core by the growth factor of the composite section (CCSF-A*) and making slight adjustments to the driller's depth to align the signals.

Figure F59. GRA bulk density, Holes U1586A–U1586C. The interval where Holes U1586B and U1586C were switched from APC to XCB coring and Hole U1586A continued to be drilled using the APC system is shown. The drop in GRA bulk density occurs between Cores 397-U1586B-16H and 17X and 397-U1586C-14H and 15X. This drop reflects the decrease in the diameter of XCB cores relative to APC cores and affects all volume-sensitive measurements.

Figure F60. Correlation of splice depth (CCSF-A) to driller's depth (equivalent to CSF-A) for tie points used in splice construction, Site U1586. The polynomial fit to the trend can be used to invert composite depth to a close approximation of the true stratigraphic depth (CCSF-A*).

Plate P1. Calcareous nannofossils. All samples are from Hole U1586A unless otherwise specified. a. *Reticulofenestra asanoi* (8H-2, 20 cm). b. *Discoaster quinqueramus* (33X-6, 91 cm). c. *Coccolithus miopelagicus* (35X-7, 19 cm). d. *Helicosphaera inversa* (6H-6, 70 cm). e. *Amaurolithus primus* (50X-3, 77 cm). f. *Minylitha convallis* (32X-6, 75 cm). g. *Gephyrocapsa omega* (5H-5, 85 cm). h. *Discoaster asymmetricus* (30X-6, 92 cm). i. *Reticulofenestra rotaria* (52X-5, 84 cm). j. Large (>5 µm) *Gephyrocapsa* (8H-7, 33 cm). k. *Nicklithus amplificus* (397-U1587B-55X-6, 40 cm). l. *Orthorhabdulus rugosus* (397-U1587A-45X-1, 71 cm).

Plate P2. Planktonic foraminifers, Hole U1587A (Samples 1H-CC, 8H-CC, 25X-CC, 36X-CC, 40X-CC) and Hole U1385A (Samples 20X-CC, 32X-CC). Views are umbilical unless otherwise noted. Scale bars = 300 µm. a. *Globigerinella calida* (Parker, 1962). b, c. *Globorotalia hirsuta* (d' Orbigny, 1839) in (b) umbilical and (c) spiral view. d. *Globorotalia tosaensis* Takayanagi and Saito, 1962 in spiral view. e, f. *Globorotalia crassaformis* (Galloway and Wissler, 1927) in (e) umbilical and (f) spiral view. g, h. *Globoconella puncticulata* (Deshayes 1832) in (g) spiral and (h) umbilical view. i, j. *Globorotalia truncatulinoides* (d'Orbigny, 1839) in (i) spiral and (j) apertural view. k, l. *Globoconella inflata* (d'Orbigny, 1839) in (k) spiral and (l) apertural view. m. *Neogloboquadrina acostaensis* (Blow, 1959). n. *Globigerinoides bollii* (Blow 1959). o. *Globigerinoides ruber* (d'Orbigny, 1839). p. *Globoturborotalita nepenthes* (Todd, 1957). q. *Sphaeroidinellopsis kochi* (Caudri, 1934). r. *Sphaeroidinellopsis paenedehiscens* Blow, 1969. s. *Sphaeroidinellopsis seminulina* (Schwager 1866). t. *Dentoglobigerina baroemoenensis* (LeRoy, 1939).

Plate P3. Benthic foraminifers. All samples are from Hole U1587A unless otherwise noted. Scale bars = 300 µm. a. *Nodosaria* sp. (13H-CC). b. *Bolivina* sp. (10H-CC). c. *Hyalinonetrion* sp. (13H-CC). d. Agglutinated benthic foraminifers (397-U1587B-mudline). e. *Stilostomella* sp. (13H-CC). f. *Dentalina* sp. (13H-CC). g. Agglutinated benthic foraminifers (397-U1587B-mudline). h. *Uvigerina peregrina* (52X-CC). i. *Uvigerina mediterranea* (14H-CC). j. *Globobulimina* sp. (13H-CC). k. *Ehrenbergina* sp. (52X-CC). l. *Globocassidulina subglobosa* (50X-CC). m. *Sphaeroidina bulloides* (3H-CC). n. *Eggerella bradyi* (51X-CC). o. *Pullenia quinqueloba* (24X-CC). p. *Sigmoilopsis* sp. (U1587B-mudline). q. *Quinqueloculina* sp. (50X-CC). r. *Pyrgo* sp. (50X-CC). s, t. Shallow-water marine benthic foraminifers, Hole U1586A (Samples 40X-CC, 41X-1, 29–31 cm, and 41X-CC). Scale bars = 2 mm. s. *Spirillina* sp. t. *Dentoplanispirinella* sp.

Plate P4. Benthic foraminifers, Hole U1587A. Scale bars = 300 µm. a. *Laticarinina pauperata* (51X-CC). b. *Lenticulina inornata* (24X-CC). c, d. *Cibicides wuellerstorfi* (50X-CC). e. *Karreriella bradyi* (52X-CC). f, g. *Melonis* sp. (52X-CC). h. *Heterolepa* sp. (52X-CC). i. *Pullenia bulloides* (52X-CC). j, k. *Oridorsalis umbonatus* (51X-CC). l. *Nuttalides umbonifera* (51X-CC). m. *Marginulina* sp. (31X-CC). n. *Elphidium* sp. (24X-CC). o, p. *Gyroidinoides* sp. (57X-CC). q. *Oolina* sp. (32X-CC). r. *Lagena* sp. (32X-CC). s. *Fissurina* sp. (51X-CC).

Plate P5. Deep-sea ostracods, Hole U1586A. a. *Krithe* sp. A (880 µ). b. *Krithe* sp. B (950 µ). c. *Krithe* sp. C (890 µ). d. *Krithe* sp. D (724 µ). e. *Poseidonamicus hisayoae* Yasuhara, Cronin, Hunt, and Hodell 2009 (795 µ). f. *Pelecocythere* sp. A (920 µ). g. *Dutoitella* sp. A (760 µ). h, i. *Legitimocythere acanthoderma* (Brady 1880) (1020 µ). j. *Henryhowella asperrima* (Reuss 1850) (700 µ). k, l. *Henryhowella* sp. A (980 µ). m–u. Shallow-water marine *Ostracoda* from Samples 40X-CC, 41X-1, 29–31 cm, and 41X-CC. m. *Hermanites* sp. (780 µ). n, o. *Pokornyella deformis* (Reuss) (750 µ). p. Undetermined species (760 µ). q. *Aurila larieyensis* Moyes, 1961 (670 µ). r. *Pseudopsammocythere kollmanni* Carbonel 1966 (600 µ). s. *Triebelina* sp. (500 µ). t. *Neonesidea* sp. A. (1140 µ). u. *Neonesidea* sp. (1000 µ).