Figure F1. Bathymetric location map, Sites U1385 and U1609 with nearby sites from Expeditions 339 and 397. White line = location of seismic profile in Figure F3.

Figure F2. Locations of Site U1385 holes drilled during Expeditions 339 (Holes U1385A–U1385E), 397 (Holes U1385F–U1385J), and 401 (Holes U1385K and U1385L).

Figure F3. Salinity and silicate profiles on World Ocean Circulation Experiment (WOCE) Line A03 (36°N) showing Sites U1385 and U1609 as well as Expedition 397 site locations on Iberian margin relative to each identified subsurface water mass. Tongue of high salinity water between ~800 and ~1300 m is MOW. High Si (>35 µmol/kg) below 3000 m represents contribution from Lower Deep Water (LDW) sourced from Southern Ocean. Water masses do not have clearly defined boundaries but rather consist of series of core layers bordered by transition (mixing) zones between adjacent layers. ENACW = East North Atlantic Central Water. Figure modified after Hodell et al. (2024a).

Figure F4. Seismic Line JC89-9 crossing Site U1385 penetration during Expeditions 339, 397, and 401 to ~4.2 s two-way traveltime (TWT). See figure 12 in Hodell et al. (2022) for cross-line and site map.

Figure F5. Lithologic synthesis, Holes U1385K and U1385L. See SYNTHLOGS in Supplementary material for editable version of this figure.

Figure F6. Lithologic summary, Holes U1385K and U1385L. Curve in sedimentary log indicates long-term relative variations of coarser versus finer grained sediments.

Figure F7. Core and bed thickness by lithology, Holes U1385K and U1385L. Visual bed thickness for calcareous clay in lower part of sequence is not inline with cycle thickness from physical properties data (see Stratigraphic correlation and age model).

Figure F8. Cyclicity, Holes U1385K and U1385L. Red channel is from Section Half Imaging Logger. Reflectance L* is from Section Half Multisensor Logger. cps = counts per second.

Figure F9. Example facies description for each unit, Holes U1385K and U1385L. Linescan image and RGB color are from Section Half Imaging Logger. X-ray image is from X-Ray Linescan Logger (XSCAN). Reflectance (L*a*b*) and MS are from Section Half Multisensor Logger. Vfs = very fine sand, fs = fine sand, Ms = medium sand, Cs = coarse sand, vcs = very coarse sand. Ch = *Chondrites*, Pl = *Planolites*, Th = *Thalassinoides*, Zo = *Zoophycos*. cps = counts per second, IU = instrument units. A. Greenish gray clayey calcareous ooze and greenish gray (slightly darker) calcareous clay, Subunit Ia. (Continued on next three pages.)

Figure F9 (continued). B. Greenish gray (darker) calcareous clay and light greenish gray clayey calcareous ooze, Subunit Ib. (Continued on next page.)

Figure F9 (continued). C. Greenish gray (darker) calcareous clay, light greenish gray clayey calcareous ooze, and light olive-gray calcareous mud, Unit II. (Continued on next page.)

Figure F9 (continued). D. Greenish gray (darker) calcareous clay, greenish gray (intermediate shade) calcareous clay, and light greenish gray clayey calcareous ooze, Unit III.

Figure F10. Typical trace fossil assemblage, Site U1385. Ch = *Chondrites*, Pl = *Planolites*, Zo = *Zoophycos*, Th = *Thalassinoides*. Note presence of trace fossils throughout interval and frequent crosscutting relationships among ichnotaxa.

Figure F11. Powder XRD patterns of different lithologies in Units I–III, Site U1385. Samples are arranged from shallow (top) to deep (bottom). Patterns are plotted with intensity on logarithmic scale to highlight presence and nature of smaller peaks. Bulk mineral assemblage is nearly constant downhole.

Figure F12. Variation in total carbonate content based on coulometry (see Geochemistry) and XRD data (calcite + dolomite + siderite), Holes U1385K and U1385L. Some XRD and coulometry analyses were made on same squeeze cake sample, and some were made on same stratigraphic interval but not on same sample. Total carbonate content determined on samples by two methods generally shows good agreement.

Figure F13. Variations in sediment composition, Holes U1385K and U1385L. Bulk mineralogy was determined from bulk XRD patterns using Rietveld refinements method (see Lithostratigraphy in the Expedition 401 methods chapter [Flecker et al., 2025a]). Feldspar = plagioclase + K-feldspar. Available organic carbon (OC) data are also included (see Geochemistry in the Expedition 401 methods chapter [Flecker et al., 2025a]).

Figure F14. Examples of sedimentary structures (color banding, parallel lamination, cross lamination, and lenticular bedding) associated with calcareous clays, Holes U1385K and U1385L. A, D. Unit II. B. Subunit Ib. C, E. Subunit Ia. Ch = *Chondrites*, Pl = *Planolites*.

Figure F15. Major lithologies for Units I–III, Hole U1385K. Dominant siliciclastic and biogenic components are annotated. Bs = biosiliceous fragment, Cl = clay, Cn = calcareous nannofossils, Dc = silt-sized detrital carbonate, Dol = dolomite, Fm = foraminifer, Gl = glauconite, Qz = quartz.

Figure F16. Texture (grain size) of main lithologies in Units I–III, Site U1385. Top: data averaged from smear slide analyses. Bottom: all data (n = 53) are plotted; diagram is expanded for visibility.

Figure F17. Cycles between clayey calcareous ooze (lighter facies) and calcareous clay (darker facies) in Subunit Ia, Hole U1385K. Trace fossils and contact between facies (dashed white line) are highlighted in expanded section of core. Note differentiation between dark (black arrows) and light (white arrows) trace fossil assemblages and penetration of dark trace fossils into lighter sediments. Note moderate bioturbation in middle part of clayey calcareous ooze and parallel lamination in lower part of calcareous clay. Ch = *Chondrites*, Pl = *Planolites*, Th = *Thalassinoides*.

Figure F18. Dark infilled *Zoophycos* (Zo) penetrating from calcareous clay (darker facies) to clayey calcareous ooze (lighter facies), Subunit Ia in Hole U1385L and Unit II in Hole U1385K. Note penetration from contact between facies (dashed white lines) (i.e., darker clay is bioturbated down into lighter calcareous ooze).

Figure F19. Mineralogical composition of main lithologies in Units I–III, Site U1385. Top: data averaged from smear slide analyses. Bottom: all data (n = 53) are plotted.

Figure F20. Cyclicity near base of Unit I, Hole U1385K. Red channel is from Section Half Imaging Logger. Reflectance L* is from Section Half Multisensor Logger. cps = counts per second.

Figure F21. Alternating beds of clayey calcareous ooze (lighter facies) and calcareous clay (darker facies) in Unit III with details of trace fossils at contact between facies (dashed white lines), Hole U1385K. Note differentiation between dark (black arrows) and light (white arrows) trace fossil assemblages and penetration of dark traces into lighter sediments. Ch = *Chondrites*, Pl = *Planolites*, Th = *Thalassinoides*, Zo = *Zoophycos*.

Figure F22. Biostratigraphic events, Site U1385. Events are plotted at their mean depth (Tables T3, T4). S/D = sinistral/dextral.

Figure F23. Abundance of benthonic foraminifer assemblages based on total counts between 85 and 120 benthonic foraminifers from each sample, Holes U1385K (black text; solid colors) and U1385L (red text; dashed lines). They are arranged in depth order as determined from splice between the two holes (see Stratigraphic correlation and age model). *Cibicidoides* spp. and *Textularia* spp. make up epibenthonic assemblage; Uvigerinids include *U. peregrina* and *U. hispida* (Table T9).

Figure F24. Paleomagnetic results, Hole U1385K. Red vertical line = GAD inclination at site latitude in normal polarity. Smoothed inclination used 1 m moving window. Orange band = standard deviation of smoothing results. ChRM inclination of discrete samples have α_{95} uncertainties. Blue triangles = discrete sample positions. Chron columns: black = normal polarity, white = reversed polarity, gray = zones of uncertain normal polarity. Lines and numbers along interpreted chron column = tie points between hole and GPTS. Dashed lines between hole and GPTS = best-fit correlation of uncertain polarity boundaries.

Figure F25. Paleomagnetism after 20 mT AF demagnetization, Hole U1385L. Red vertical line = GAD inclination at site latitude in normal polarity. Smoothed inclination used 1 m moving window. Orange band = standard deviation of smoothing results. ChRM inclination of discrete samples have α_{95} uncertainties. Blue triangles = discrete sample positions. Chron columns: black = normal polarity, white = reversed polarity, gray = zones of uncertain normal polarity. Lines and numbers along interpreted chron column = tie points between Hole U1385K and GPTS. Dashed lines between hole and GPTS = best-fit correlation of uncertain polarity boundaries.

Figure F26. AMS determinations, Holes U1385K and U1385L. Left: orientation of principal AMS axes K_{max}, K_{int}, and K_{min}. Right: shape factor of AMS ellipsoid versus AMS degree.

Figure F27. AF demagnetization results, Holes U1385K and U1385L. Left: vector endpoints of paleomagnetic directions measured after each demagnetization treatment on an orthogonal projection (Zijderveld) plot. Examples of normal (positive inclinations) and reversed (negative inclinations) polarity are shown in left and right panels, respectively. Squares = horizontal projections, circles = vertical projections. Right: intensity variation with progressive demagnetization.

Figure F28. Sediment accumulation curve resulting from magnetostratigraphic correlations to GPTS 2020 (Raffi et al., 2020), Holes U1385K and U1385L. Squares with solid lines = well-established reversals, squares with dashed lines = uncertain ages. Ages are fitted to polynomial of 3° using least squares method.

Figure F29. Headspace gas methane and ethane, Hole U1385K. Results from overlying Pliocene–Pleistocene sequence from Expedition 397 Hole U1385G are shown for comparison (Hodell et al., 2024a).

Figure F30. Comparison of several key chemical profiles from IW, Hole U1385K. Expedition 397 Hole U1385G data are also shown (Hodell et al., 2024a). Dashed line = IAPSO standard seawater.

Figure F31. IW alkalinity and pH, Hole U1385K. Dashed line = IAPSO standard seawater. Results from Expedition 397 Hole U1385G are shown for comparison (Hodell et al., 2024a).

Figure F32. IW sodium and chloride concentrations, and Na/Cl ratios, Hole U1385K. Dashed line = IAPSO standard seawater. Results from Expedition 397 Hole U1385G are shown for comparison (Hodell et al., 2024a). Note apparent offsets between expedition data sets for sodium and chloride concentrations that are likely analytical artifacts.

Figure F33. IW major anion concentrations (sulfate and bromide), Hole U1385K. Dashed line = IAPSO standard seawater. Results from Expedition 397 Hole U1385G are shown for comparison (Hodell et al., 2024a). Note apparent offset between expedition data sets for bromide concentrations that is likely an analytical artifact.

Figure F34. IW major cation concentrations (calcium, magnesium, and potassium), Hole U1385K. Dashed line = IAPSO standard seawater. Results from Expedition 397 Hole U1385G are shown for comparison (Hodell et al., 2024a).

Figure F35. IW major nutrient concentrations (ammonium and phosphate), Hole U1385K. Results from Expedition 397 Hole U1385G are shown for comparison (Hodell et al., 2024a). Note offset between expedition data sets for phosphate concentrations that may be an artifact of sample preparation; Expedition 401 results were replicated to confirm calibration and data reported from Hole U1385K.

Figure F36. IW minor element concentrations (Li and Si) and crossplot of alkalinity versus silicon concentration, Hole U1385K. Dashed line = IAPSO standard seawater. Results from Expedition 397 Hole U1385G are shown for comparison (Hodell et al., 2024a).

Figure F37. IW minor and trace element concentrations (Ba, B, and Sr), Hole U1385K. Dashed line = IAPSO standard seawater. Results from Expedition 397 Hole U1385G are shown for comparison (Hodell et al., 2024a).

Figure F38. IW trace element concentrations (Fe and Mn), Hole U1385K. Fe and Mn concentrations below detection limit are plotted as 0 µM. Results from Expedition 397 Hole U1385G are shown for comparison (Hodell et al., 2024a). Note apparent offset between expeditions that may be an artifact of sample preparation.

Figure F39. $CaCO_3$, organic carbon, nitrogen, and C/N in sediments, Holes U1385K and U1385L. Results from Expedition 397 Hole U1385G are shown for comparison (Hodell et al., 2024a).

Figure F40. Relationship between carbonate weight percent determined by analysis of XRD spectra and coulometry, Holes U1385K and U1385L. Symbol color indicates lithologies found immediately above and below each IW whole-round sample; where they differ, interior color shows lithology above and exterior color shows lithology below.

Figure F41. Relationship between carbonate weight percent, NGR, and MS, Hole U1385K. NGR and MS measurements represent closest analysis to carbonate sample (usually within 15 cm). cps = counts per second, IU = instrument units.

Figure F42. Section Half Multisensor Logger MS and WRMSL GRA density, NGR, and *P*-wave velocity, Holes U1385K and U1385L. Gray dots = original data sets (with anomalous values removed from GRA density and PWL), overlying black lines = 15 point locally weighted nonparametric regression (LOWESS) smooth run on MS, GRA density, and PWL to highlight variations and secular trends and 5 point LOWESS smooth run on NGR because data set was smaller. Red dots = PWC measurements. IU = instrument units, cps = counts per second.

Figure F43. MS and L*, a*, and b* color variation, Holes U1385K and U1385L. Gray dots = original data sets (with anomalous values removed from L*, a*, and b*), overlying black lines = 15 point. locally weighted nonparametric regression (LOWESS) smooth run on all data sets to highlight variations and secular trends. Gray dashed line = lithostratigraphic subunit boundary, black dashed lines = lithostratigraphic unit boundaries. IU = instrument units.

Figure F44. MS; GRA density; NGR; and L*, a*, and b* color variation from ~455 to ~490 m CSF-B, Hole U1385K. Note how MS peak (red arrows) corresponds to NGR trough (blue arrows), and vice versa (466.5 and ~476 m CSF-B). Dashed line = Lithostratigraphic Unit I/II boundary. IU = instrument units, cps = counts per second.

Figure F45. Thermal conductivity, MAD, GRA bulk density, porosity, and grain density, Holes U1385K and U1385L. Porosity and grain density were obtained from MAD measurements.

Figure F46. NGR measurements, Holes U1385K and U1385L. Corresponding spectral NGR components (potassium, uranium, and thorium) extracted from total NGR counts using shipboard codes based on method described by De Vleeschouwer et al. (2017). cps = counts per second.

Figure F47. PWL (WRMSL) and PWC, Holes U1385K and U1385L. Comparisons of PWL and PWC results between holes are also shown.

Figure F48. Porosity, grain density, and bulk density with lithologies based on MAD, Hole U1385K. Note that recovered lithologies are clayey calcareous ooze and calcareous clay.

Figure F49. Porosity, grain density, and bulk density with lithologies based on MAD, Hole U1385L. Note that recovered lithologies are clayey calcareous ooze and calcareous clay.

Figure F50. Stratigraphic correlation in NGR and MS, Holes U1385K and U1385L. Correlation to overlapping depth interval generated during Expedition 397 (Holes U1385F–U1385H and U1385J) is also shown. CCSF = core composite depth below seafloor. cps = counts per second.

Figure F51. A. Age model tie points, Holes U1385K (blue) and U1385L (orange). B. Sedimentation accumulation rates for each data set (foraminifers, nannofossils, and paleomagnetism). C. Cycle thickness measured on both holes using MS and NGR core data. Only cycles not disturbed by section or core breaks were included in this data set.