Figure F1. Locations of IODP Site U1613 (red), Expedition 402 alternate drilling locations (pink), and DSDP Leg 42 and ODP Leg 107 and 161 sites (yellow). White line = location of seismic reflection profile MEDOC 6 in Figure F2.

Figure F2. Site U1613 location and estimated penetration (red line) on Seismic Reflection Line MEDOC 6 (location in Figure F1). Black line = alternate Site TYR-01A. CDP = common depth point.

Figure F3. Lithostratigraphic summary, Hole U1613A. Sedimentary and basement units are shown. See lithology key in Figure F8 in the Expedition 402 methods chapter (Malinverno et al., 2025).

Figure F4. VCD, Hole U1613A. Nannofossils and foraminifera ages and the main physical properties used for unit identification are shown. See lithology key in Figure F8 in the Expedition 402 methods chapter (Malinverno et al., 2025). cps = counts per second.

Figure F5. Section Half Imaging Logger (SHIL) core images showing representative examples of the main lithologies, Site U1613.

Figure F6. Smear slides of main lithologies, Site U1613. PPL = plane-polarized light, XPL = cross-polarized light, red circles = gypsum grains in the Messinian unit.

Figure F7. Distinctive features and sedimentary structures, Site U1613. A. Color banding resulting from foraminifera content. B. Potential soft-sediment deformation causing convolute bedding. C. Fining-upward sequences. D. Sparse bioturbation with white patches of diagenetically altered organic matter.

Figure F8. XRD diffractogram showing the abundance of quartz (Qtz), clay, and goethite (Gth) (402-U1613A-15R-1, 145–150 cm).

Figure F9. L* and a* plots showing observed color changes, Hole U1613A. Black lines = 10-point moving averages. Smear slides show similar lithologies with iron staining causing the color changes.

Figure F10. Planktic foraminifera, Hole U1613A. A, B. *Globorotalia excelsa* (4R-CC; 28.5–28.62 mbsf). C, D. *Globigerina bulloides* (1R-CC; 4.73–4.78 mbsf). E, F. *Globigerinella calida* (1R-CC; 4.73–4.78 mbsf). G, H. *Globigerinoides ruber* (white) (3R-CC; 28.38–28.43 mbsf).

Figure F11. Planktic foraminifera, Hole U1613A. A, B. *Neogloboquadrina* spp. (sin) (6R-CC; 51.22–51.27 mbsf). C, D. *Globorotalia truncatulinoides* (7R-CC; 61.96–62.01 mbsf). E, F. *Globoconella inflata* (9R-CC; 83.35–83.4 mbsf). G, H. *Globorotalia crassaformis* (10R-CC; 83.35–83.4 mbsf).

Figure F12. Planktic foraminifera, Hole U1613A. A, B. *Globigerinoides extremus* (10R-CC; 83.35–83.4 mbsf). C, D. *Globorotalia margaritae* (12R-CC; 114.38–114.43 mbsf). E, F. *Neogloboquadrina acostaensis* (14R-CC; 134.15–134.2 mbsf). G, H. *Sphaeroidinellopsis seminulina* (14R-CC; 134.15–134.2 mbsf).

Figure F13. Planktic foraminifera, Hole U1613A. A. *Orbulina universa* (1R-CC; 4.73–4.78 mbsf). B. *Globigerinoides obliquus* (10R-CC; 83.35–83.4 mbsf).

Figure F14. Calcareous nannofossil biozonal assignment for examined samples according to the scheme for the Mediterranean area of Di Stefano et al. (2023), Hole U1613A. See lithology key in Figure F8 in the Expedition 402 methods chapter (Malinverno et al., 2025).

Figure F15. Detail of nannofossil assemblage (402-U1613A-15R, 8 cm). Photomicrograph from optical microscope (XPL; background) and SEM (PPL; foreground).

Figure F16. NRM variation, Hole U1613A. A. Intensity of NRM and NRM after demagnetization at 20 mT peak AF. B. NRM inclination. C. NRM inclination after demagnetization at 20 mT peak AF. Dashed lines in B and C = GAD values.

Figure F17. Reddish conglomerates mark the transition from the Tyrrhenian sedimentary package to the basement of the basin, Hole U1613A.

Figure F18. Yellow-reddish mudstone from basement, Hole U1613A. The core section shows complex structures as a result of drilling disturbances.

Figure F19. Reddish polymictic conglomerate consisting of rounded clasts of quartz, pumice, and unidentified volcanic material in a sandy matrix from basement, Hole U1613A.

Figure F20. Yellowish sandy mudstone from basement, Hole U1613A.

Figure F21. Black shale from the lowermost recovered basement unit, Hole U1613A.

Figure F22. Dip variations of lamination and faults and fractures with depth, Site U1613.

Figure F23. Deformation structures in sediments and breccias, Hole U1613A. A. Faulted lamination. Faults (white dashed lines) mostly show reverse shear sense. The apparent fold is an effect of drilling disturbance. B. Faulted and folded convoluted lamination in a slumped layer. Both reverse and normal faults are observed (two are highlighted). C. Contact of polymictic breccia (top) with fractured shale (bottom). The breccia is reddish matrix with clasts of conglomerate and altered (greenish) and fresh (dark) shale clasts. The breccia locally shows complex structures (white thin dashed lines) that might be from drilling disturbance. The shale clast is highly fractured with local, centimeter-scale normal faults (white dashed lines). D. Contact between altered shale above and black shale below, overprinted by a network of parallel, anastomosed veins filled with yellowish material.

Figure F24. Tectonic interpretation (left) according to the evolution of shale deformation (right) with depth, Hole U1613A. The shale breccia progressively changes color with depth from greenish to darker shades. Also note the layer of well-cemented conglomerate/breccia with rounded clasts (23R-2 through 24R-CC).

Figure F25. Alkalinity, pH, and salinity in IW, Hole U1613A.

Figure F26. Na^+, Cl^-, and sulfate in IW, Hole U1613A.

Figure F27. Major elements Mg^{2+}, Ca^{2+}, and K^+ in IW, Hole U1613A.

Figure F28. Ammonium and phosphate in IW, Hole U1613A.

Figure F29. Calcium carbonate and total carbonate and relative percentages of different carbonate phases, Hole U1613A.

Figure F30. Total organic matter, TOC, TOC/ TN, and TS, Hole U1613A.

Figure F31. Relationship between TOC and TS, Hole U1613A.

Figure F32. pXRF elemental concentration, Hole U1613A. SHLF = section half, IW SC = IW squeeze cake.

Figure F33. Dissolved methane concentrations in headspace gas samples, Hole U1613A.

Figure F34. Physical properties, Site U1613. cps = counts per second. Axis limits are scaled to highlight the major variations in physical properties and do not necessarily capture the full range of all the collected data. See lithology key in Figure F8 in the Expedition 402 methods chapter (Malinverno et al., 2025).

Figure F35. Physical properties for the sediment–basement transition, Hole U1613A. cps = counts per second. Axis limits are scaled to highlight the major variations in physical properties and do not necessarily capture all recorded

data. See lithology key in Figure F8 in the Expedition 402 methods chapter (Malinverno et al., 2025).

Figure F36. Left: V_P profile from WRMSL and discrete Gantry measurements with fitted velocity-depth functions, Site U1613. Red line = ultrasmooth three-degree polynomial, green line = less smoothed Savitzky-Golay filter. Right: Plot of Site U1613 core tops (green stars) in TWT computed using the smoothed velocity function (green line) overlain on MEDOC 6 seismic reflection profile (Ranero and Sallarès, 2017). CDP = common depth point.

Figure F37. Temperatures measured near the seafloor and downhole on the Cornaglia Terrace and local temperature gradient from a least-squares line fit, Site U1613.

Figure F38. LEH-PT temperature measurements, Hole U1613A. For both passes, the down log (dw) was affected by a series of obstructions from ~100 mbsf. Dashed line = bottom of the drill pipe during logging operations at 74 mbsf.

Figure F39. Natural gamma ray and caliper data, Hole U1613A. The hole restriction measured with the density tool caliper at 148 mbsf did not block the tool on its way down the hole.

Figure F40. Downhole logging and physical properties measurements, Hole U1613A. in. = inches. Lines = downhole log data, dots = physical properties core measurements. SGR: dark green = spectral gamma ray (SGR), light green = computed gamma ray (CGR) with uranium component removed. NGR = natural gamma radiation measured on cores. cps = counts per second. Density: black profile from log and small red points = WRMSL, larger pink points = MAD. K = Potassium. Th = Thorium. U = Uranium, with profiles from SGR log tool and dots represent values extracted from core NGR data. MS: dark purple profile is MSS log and small pink dots = SHMSL, small violet dots = WRMSL. Resistivity: cyan = R3 (moderate investigation depth), blue = RT (true resistivity). V_P: light blue dots = discrete Gantry measurements, dark blue dots = WRMSL, dark blue profile = downhole V_P data from DSI. See lithology key in Figure F8 in the Expedition 402 methods chapter (Malinverno et al., 2025).

Figure F41. Downhole logging near the sediment/basement interface, Hole U1613A. in. = inches. Lines = downhole log data, dots = physical properties core measurements. SGR: dark green = spectral gamma ray (SGR), light green = computed gamma ray (CGR). Th = Thorium. Th/K = Thorium/Potassium ratio, with profiles from SGR log tool and dots represent values extracted from core NGR data. Density: black profile from log and red dots = GRA bulk density, pink dots = MAD. Dashed lines = logging unit boundaries.

Figure F42. Th vs. K correlation plot for core data, Hole U1613A.

Figure F43. Oxygen concentration profile, Hole U1613A. See lithology key in Figure F8 in the Expedition 402 methods chapter (Malinverno et al., 2025).