Figure F1. Location map, Sites U1612 and U1614–U1616 (red); proposed Expedition 402 drilling locations (purple = primary sites, pink = alternate sites); and Leg 42, 107, and 161 sites (yellow). White lines = locations of seismic reflection profiles.

Figure F2. Location and approximate penetration of IODP U1612, U1615, and U1616 (red) on Seismic Reflection Line MEDOC 9 (location in Figure F1). Black = proposed Expedition 402 drilling locations, gray = Leg 107 sites (location of Site 651 was projected). Dashed line = intersection with Seismic Reflection Line MC07. CDP = common depth point, TWT = two-way traveltime.

Figure F3. Severed drill pipe recovered onto drill floor, Hole U1612A.

Figure F4. Lithostratigraphic summary, Hole U1612A. Sedimentary and basement units are shown. See lithology key in Figure F8 in the Expedition 402 methods chapter (Malinverno et al., 2025). cps = counts per second.

Figure F5. Visual core description, Hole U1612A. Nannofossil and foraminifera ages and 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).

Figure F6. Example sections of main lithologies, with type of contact, drilling disturbance, and bioturbation degree, Site U1612.

Figure F7. Representative smear slides of main lithostratigraphic units with informative components highlighted: volcanogenic, biogenic, and siliciclastic, Hole U1612A. PPL = plane-polarized light, XPL = cross-polarized light. Note different scales.

Figure F8. Section Half Imaging Logger (SHIL) core images showing various degrees of bioturbation as well as diagenetic precipitates, Hole U1612A.

Figure F9. Volcanogenic sediments found at various core depths, Hole U1612A. A. Pumice grains (9R-CC, 10–15 cm). B, C. Volcaniclastic grains and glass (15R-CC, 0–2 cm). D. Volcanic glass (10R-CC, 9–14 cm).

Figure F10. Planktic foraminifera species (402-U1612A-1R-CC). A, B. *Globigerina bulloides*. C, D. *Globigerinoides ruber* var. white. E, F. *Neogloboquadrina acostaensis*. G, H. *Neogloboquadrina incompta*.

Figure F11. Planktic foraminifera species, Hole U1612A. A, B. *Globoconella bononiensis* (*Globoconella puncticulata*) (33R-CC). C. *Orbulina universa* (1R-CC). D. *Globorotalia excelsa* (1R-CC). E, F. *Globigerinoides obliquus* (31R-CC). G, H. *Globoconella inflata* (24R-CC).

Figure F12. Planktic foraminifera species, Hole U1612A. A, B. *Globorotalia crassaformis* (32R-CC). C, D. *Globorotalia scitula* (24R-CC). E. *Trilobatus quadrilobatus* (31R-CC). F. *Globigerinoides extremus* (32R-CC). G, H. *Globorotalia truncatulinoides* (2R-CC).

Figure F13. Samples examined for calcareous nannofossil analysis and biozones assigned according to Di Stefano et al. (2023) calcareous nannofossil biozonation scheme for Mediterranean area, Hole U1612A. See lithology key in Figure F8 in the Expedition 402 methods chapter (Malinverno et al., 2025).

Figure F14. NRM variation, Hole U1612A. A. Intensity of NRM and NRM after demagnetization at 20 mT peak AF. B. NRM inclination. C. Inclination of NRM after demagnetization at 20 mT peak AF of archive-half sections and ChRM of discrete samples.

Figure F15. Preliminary magnetostratigraphy, Hole U1612A. A–C. Close-up of 280–320 mbsf interval in Figure F14. Black and white stripes next to (C) indicate normal and reverse polarity zones, respectively. Gray stripes = intervals of uncertain polarity that may affect the interpretation. Correlation between polarity zones and GPTS 2020 is tentative.

Figure F16. A–C. Volcaniclastic rock consisting of biotite, pyroxene, and a foraminifera in a slightly altered matrix, Hole U1612A.

Figure F17. Contact between dolomitic sediments and basalt (basement contact), Hole U1612A.

Figure F18. A, B. Contact between dolomitic sediments and basalt, Hole U1612A. CT = computed tomography.

Figure F19. Contact between dolomitic sediments and basalt, followed by unconsolidated breccia downcore, Hole U1612A. Breccia is polymictic and consists of clasts of serpentinized mantle peridotite, aplite, dolerite, and granitoids.

Figure F20. A. Granitic gneisses transitioning from ultramylonite to protomylonite, Hole U1612A. B. Ultramylonite with sigma clast plagioclase with top to the right shearing. Amphibole vein crosscuts the sample. C. Ultramylonite with quartz (Qtz) dynamically recrystallizing and plagioclase (Plg) exhibiting bulging. Bio = biotite. D, E. Protomylonite with large amphibole (Amph) and plagioclase clasts and quartz exhibiting some polygonal boundaries likely indicating static recrystallization/annealing.

Figure F21. A. Serpentinized peridotite (402-U1612A-37R). B. Weathered olivine replaced by clay minerals and possibly pyroxene. C. Mesh texture with serpentine veins in the peridotite. D. Remnants of orthopyroxene (Opx) in the peridotite.

Figure F22. Dip variations of lamination (0–323 mbsf) followed by CPF with depth, Hole U1612A.

Figure F23. Deformational structures observed in the sediments, Hole U1612A. A. Faulted and folded lamination with reverse faulting (white lines). B. Reverse faulting in horizontal lamination. C. Boudinage and reverse faulting in lamination. D. Normal faulting in dolomite lamination. Microstructures are locally affected by drilling disturbance (highlighted white dashed lines).

Figure F24. IW basic chemistry, Hole U1612A.

Figure F25. IW major cation concentrations, Hole U1612A. Sodium, magnesium, calcium, and potassium are abundant but show different trends with depth.

Figure F26. IW major anion concentrations, Hole U1612A.

Figure F27. IW minor elemental compositions, Hole U1612A.

Figure F28. IW ammonium and phosphate concentrations, Hole U1612A.

Figure F29. Vertical distribution of calcium carbonate ($CaCO_3$) contents, total carbonate contents, and relative percentages of different carbonate phases, Hole U1612A.

Figure F30. Total organic matter, TOC, atomic TOC/TN ratio, and TS, Hole U1612A.

Figure F31. Trends in geochemistry of section halves (SHLF) and IW squeeze cakes (SC) determined by pXRF, Site U1612.

Figure F32. Dissolved methane (CH_4) concentrations in headspace gas samples, Hole U1612A.

Figure F33. TAS plot for basalt, Hole U1612A. Classifications are from Le Bas et al. (1986). Tyrrhenian basalt data are from Beccaluva et al. (1990).

Figure F34. TAS plot for felsic rocks, Site U1612. Classifications are according to Middlemost (1994).

Figure F35. Physical properties, Site U1612. Note that for Hole U1612B only three MAD measurements on unsoaked samples were carried out, and thermal conductivity of basement rocks was measured on dry samples because of lack of time. cps = counts per second. See lithology key in Figure F8 in the Expedition 402 methods chapter (Malinverno et al., 2025).

Figure F36. Physical properties at Unit III–IV transition (402-U1612A-35R-1). cps = counts per second.

Figure F37. Left: V_P profile from WRMSL and discrete Gantry measurements with velocity-depth functions, Site U1612. Red line = ultrasmooth three-degree polynomial model, green line = less smoothed Savitzky-Golay filter. Right: TWT plot of Site U1612 core tops (green stars) computed using smoothed velocity-depth-time function overlain on Seismic Reflection Profile MEDOC 9 (courtesy of Institute of Marine Science of the Spanish National Research Council [ICM-CSIC]) (Ranero and Sallarès, 2017). CDP = common depth point.

Figure F38. Temperatures measured near seafloor and downhole in Vavilov Basin and local temperature gradient from least-squares line fit, Site U1612.

Figure F39. Oxygen concentration profile, Hole U1612A. See lithology key in Figure F8 in the Expedition 402 methods chapter (Malinverno et al., 2025).