

Figure F1. Oceanographic and bathymetric setting, Site U1544. A. Overview map with marine geological features. Yellow lines = seismic lines available in the region. B. Detailed bathymetry with seismic lines and shotpoints.

Figure F2. Large-scale geodynamic overview, Site U1544. The deep seismic record of Line IT95-171 is shown, along with the interpreted line drawing showing the tectonic units. Plots are after Polonia et al. (2007). s.p. = shotpoint, cdp = common depth point, BSR = bottom-simulating reflector.

Figure F3. (Left) Multichannel seismic (MCS) and (Right) Parasound profiles across Site U1544. TWT = two-way traveltime.

Figure F4. Surface circulation in the Southeast Pacific with examples of surface buoy trajectories (each 30-day position is marked by a circle) indicating northeast flow of northern Antarctic Circumpolar Current (ACC) water after crossing the East Pacific Rise. Also shown is the bifurcation of surface waters close to the Chilean coast (at about 45°S) with northward flowing water in the Humboldt Current System (HCS) and strongly accelerated southward flow in the Cape Horn Current (CHC) toward the Drake Passage. West–east drifting buoys follow the South Pacific Current (SPC). Modified from Chaigneau and Pizarro (2005) and Lamy et al. (2015).

Figure F5. Schematic view of the southern Chilean margin and the Drake Passage region with major surface and intermediate water circulation and location of Expedition 383 sites and ODP Leg 202 Site 1233. HCS = Humboldt Current System, SPC = South Pacific Current, AAIW = Antarctic Intermediate Water, CHC = Cape Horn Current, ACC = Antarctic Circumpolar Current, SAF = Subantarctic Front, WSI = winter sea ice (approximate location).

Figure F6. Modern oxygen distribution in the eastern South Pacific used to visualize major water masses. AAIW = Antarctic Intermediate Water, PDW = Pacific Deep Water, CDW = Circumpolar Deep Water, AABW = Antarctic Bottom Water.

Figure F7. Hole summary, Hole U1544A. GRA = gamma ray attenuation, MSP = point magnetic susceptibility, RGB = red-green-blue, NGR = natural gamma radiation, cps = counts per second.

Figure F8. Lithofacies observed at Site U1544 (and other Expedition 383 sites) in (A) siliciclastic and (B) combined siliciclastic-biogenic ternary sedimentary diagrams that include (A) silt, sand, and clay and (B) carbonates, diatoms, and combined silt and clays as defining components.

Figure F9. Representative (A) core and (B) X-ray and photomicrograph images of mineral properties of Lithofacies 7 (biosilica-bearing silty clay) in (C) plane-polarized light (PPL) and (D) cross-polarized light (XPL), Site U1544.

Figure F10. Representative (A) core and (B) X-ray and photomicrograph images of mineral properties of Lithofacies 8 (silty clay) in (C) PPL and (D) XPL, Site U1544.

Figure F11. Representative (A) core and (B) X-ray and photomicrograph images of mineral properties of Lithofacies 10 (clay-, silt- and/or diatom-bearing to rich calcareous ooze) in (C) PPL and (D) XPL, Site U1544.

Figure F12. Representative (A) core and (B) X-ray and photomicrograph images of mineral properties of Lithofacies 11 (sand) in (C) PPL and (D) XPL, Site U1544.

Figure F13. Erosive basal contacts of Lithofacies 11 with surrounding lithofacies, Site U1544.

Figure F14. Summary of primary lithostratigraphic variations, Site U1544. MSP = point magnetic susceptibility, RGB = red-green-blue.

Figure F15. Relative contribution of lithofacies to Lithostratigraphic Unit I, Site U1544.

Figure F16. Characteristic variations in major lithology and physical properties, Hole U1544A. Horizontal brown bars = sand (Lithofacies 11), light brown bars = nannofossil ooze (Lithofacies 4 and 10; pale orange), white bars = siliciclastic sediments, typically silty clay (Lithofacies 7 and 8). GRA = gamma ray attenuation, NGR = natural gamma radiation, cps = counts per second, MS = point magnetic susceptibility, RGB = red-green-blue.

Figure F17. Distribution of siliceous and calcareous microfossils, Hole U1544A. B = barren, R = rare, F = few, C = common, A = abundant, D = dominant. Ostracods reported as number of valves per sample (>125 mm fraction).

Figure F18. Diatom and calcareous nannofossil zonations and biostratigraphic events, Hole U1544A.

Figure F19. Planktonic foraminifers, Site U1544. Scale bars = 100 μ m. A. *Globigerina bulloides*. B. *Globigerinita glutinata*. C. *Neogloboquadrina incompta*. D. *Neogloboquadrina pachyderma*. E. *Orbulina universa*. F, G. *Truncorotalia crassaformis* in (F) umbilical and (G) side view. H, I. *Truncorotalia truncatulinoides* in (H) spiral and (I) umbilical view. J. *Hirsutella scitula*. K, L. *Globocanella inflata* in (K) side and (L) umbilical view.

Figure F20. Abundance of dominant benthic foraminifer genera and species *Uvigerina* spp., *Oridorsalis umbonatus*, *Melonis* spp., *Globocassidulina subglobosa*, *Cibicides/Cibicides* spp., *Fursenkoina* spp., and *Ehrenbergina* sp., Site U1544.

Figure F21. Natural remanent magnetization (NRM) intensities and inclination measured before and after 15 mT peak AF demagnetization, Hole U1544A.

Figure F22. Headspace methane concentrations, Site U1544.

Figure F23. Interstitial water alkalinity and pH, Hole U1544A.

Figure F24. Interstitial water chloride and sodium, Hole U1544A.

Figure F25. Interstitial water ammonium, phosphate, and sulfate, Hole U1544.

Figure F26. Interstitial water calcium, strontium, and magnesium, Hole U1544A.

Figure F27. Interstitial water iron, manganese, and lithium, Hole U1544A.

Figure F28. Interstitial water silicon, barium, potassium, and bromide, Hole U1544A.

Figure F29. Whole-Round Multisensor Logger magnetic susceptibility (MS; red) and Section Half Multisensor Logger point magnetic susceptibility (MSP; orange), Hole U1544A.

Figure F30. Splice data: WRMSL MS (red line), Section Half Multisensor Logger point magnetic susceptibility (MSP; orange), and gamma ray attenuation density–normalized natural gamma radiation (NGR*; black), Site U1544.

Figure F31. Calculated U/Th ratio from deconvolved gamma ray attenuation density–normalized natural gamma radiation (NGR*; blue) and NGR* (brown), Site U1544.

Figure F32. Bulk density from Whole-Round Multisensor Logger gamma ray attenuation (blue) and discrete moisture and density measurements (red), Site U1544.

Figure F33. Processed Whole-Round Multisensor Logger (WRMSL) gamma ray attenuation bulk density (green) and WRMSL magnetic susceptibility (MS; red), Site U1544.