

Figure F1. Map of Scotia arc. Sites U1534 and U1535 are under the Subantarctic Front. Scotia Sea sites are in Dove Basin (U1536 and U1537) and Pirie Basin (U1538). Light blue dotted line and open arrows = Iceberg Alley after Anderson and Andrews (1999), large curved gray arrow = main wind direction of Southern Hemisphere westerlies (SHW), light blue solid arrows = Antarctic Circumpolar Current (ACC) flow direction, purple arrows = Weddell Sea Deep Water (WSDW) exit route (Maldonado et al., 2003), yellow dotted line = Subantarctic Front, yellow dashed line = polar front, green dotted line = Patagonian coastline during LGM (Iriando, 2000), white dotted line = limit of Patagonian Ice Sheet (PIS) at LGM (Hein et al., 2010), white dashed line = winter sea ice limit. APIS = Antarctic Peninsula Ice Sheet. Satellite bathymetry is shown (Weatherall et al., 2015).

Figure F2. Top: Seismic profiles for Subantarctic Front drift Sites U1534 and U1535 along Seismic Line SGF193_107 (Koenitz et al., 2008). Main discontinuities are marked by Reflectors A (top of Subunit 2A), B (top of Subunit 1B), and C (top of Subunit 1A). Bottom: Seismic profile for Site U1538 in Pirie Basin (Seismic Line SCAN 13/13), with seismic units from Pérez et al. (2017).

Figure F3. MCS profiles from Dove Basin (Maldonado et al., 2004). Top: Site U1536 along Line SCAN2004-L10. Bottom: Site U1537 along Seismic Line SCAN2004-L07. Seismic units from Pérez et al. (2017).

Figure F4. TOPAS profiles along three sites in Dove and Pirie Basins showing high-resolution seismic record formed by layered reflectors of medium–high acoustic amplitude forming wavy or mounded morphologies. MTDs are frequent in Dove Basin, interbedded with the layered seismic packages.

Figure F5. Age–depth relationship for the last 6 My, Expedition 382. Except for Sites U1534 and U1535, all sites show continuous deposition in this interval based on preliminary biomagnetostratigraphy. Site U1536 extends to middle Miocene (not shown in figure). Late Pleistocene sedimentation rates are highest in Pirie Basin (Site U1538), decrease slightly to southern Dove Basin (Sites U1536 and U1537), and lower substantially to northern Subantarctic Front (Sites U1534 and U1535). Ages according to GPTS2012 (Gradstein et al., 2012). Lower curves are $\delta^{18}\text{O}$ records (Lisiecki and Raymo, 2005). Colored bars in lower panel indicate temporal extent of MPT, Northern Hemisphere ice sheets, and mid-Pliocene warm period.

Figure F6. Operations schedule, Expedition 382. We tracked 153 icebergs over the course of the expedition. We had a total of 56 operational days. WOW = waiting on weather.

Figure F7. Drilling plan, Expedition 382. After transiting from Punta Arenas to Subantarctic Front, Sites U1534 and U1535 were drilled over 5 operational days at beginning of expedition. After transiting to southernmost working area at Dove Basin, Site U1536 was drilled. It took 21 days to achieve

APC/HLAPC and RCB coring as well as logging. Site U1537 was then drilled in 7 days. After transiting north to Pirie Basin, Site U1538 was drilled over 10 days. A total of 3228 m over 18 holes was cored during Expedition 382 with an overall core recovery of 2810 m.

Figure F8. Principal lithology, Expedition 382. Hole U1536E reached middle Miocene strata. All other holes cover Pliocene–Pleistocene sediments. Lithology is dominated by silty clays with interbedded diatom ooze (Scotia Sea) or nannofossil ooze (Subantarctic Front). APC/HLAPC core recovery was almost complete.

Figure F9. Lithology, paleomagnetic inclination after 15 mT AF demagnetization, and NGR, Expedition 382. Note that Sites U1536 and U1537 are plotted on the composite depth scale (core composite depth below seafloor, Method D [CCSF-D]), whereas Holes U1538A and U1534A are plotted on the mbsf scale because the splice covers only the upper part of the record. cps = counts per second. Green dots = discrete sample inclination data with low circular standard deviation ($<15^\circ$), open squares = discrete sample inclination data with high circular standard deviation ($>15^\circ$).

Figure F10. Examples of major lithologies of sediments from Iceberg Alley, Site U1538. (C) Interbedded silty clays and (A) diatom oozes change with lithification to (B) diatomite and (D) lithified silty clay. Pliocene deposits contain more (E) IBRD layers and (F) laminations.

Figure F11. Biostratigraphically important diatoms and radiolarians and selected palynomorphs, Expedition 382. Diatoms (scale bars = 10 μm): 1. *Fragilariopsis kerguelensis* (382-U1538A-16H-CC), 2. *Fragilariopsis obliquecostata* (382-U1537A-3H-CC), 3. *Rouxia constricta* (382-U1536A-14H-CC), 4. *Fragilariopsis rhombica* (382-U1537A-3H-CC), 5. *Fragilariopsis separanda* (382-U1536A-10H-1, 75 cm), 6. *Actinocyclus fasciculatus* (382-U1538A-49X-3, 75 cm), 7. *Shionodiscus oestrupii* var. *reimeri* (45X-CC), 8. *Fragilariopsis barronii* (382-U1536A-40F-CC), 9. *Rouxia antarctica* (382-U1538A-51X-1), 10. *Fragilariopsis aurica* (382-U1536C-40F-CC), 11. *Thalassiosira miocenica* (382-U1536E-22R-CC). Radiolarians (scale bars = 50 μm): 12. *Antarctissa cylindrica* (382-U1537A-10H-CC), 13. *Stylatractus universus* (382-U1536A-14H-CC), 14. *Phormospyris antarctica* (382-U1538A-6H-CC), 15. *Cycladophora pliocenica* (382-U1534A-29F-CC), 16. *Cycladophora davisiana* (382-U1537A-13H-CC), 17. *Helotholus? vema* (382-U1537D-40F-CC), 18. *Lampromitra coronata* (382-U1536E-4R-CC), 19. *Larcopyle polyacantha titan* (382-U1538A-73X-CC), 20. *Lychnocanium grande* (73X-CC), 21. *Acrosphaera labrata* (382-U1536E-18R-CC). Palynomorphs (scale bars = 20 μm): 22. *Selenopemphix* sp. 1 sensu Esper and Zonneveld (2007) (382-U1536A-3H-CC), 23. *Impagidinium* spp. (382-U1534A-9H-CC), 24. *Selenopemphix dionaeacysta* (16F-CC), 25. *Nothofagidites flemingii* (382-U1538A-60X-CC), 26. *Operculodinium? eirikianum* (382-U1536E-26R-CC).