Figure F1. Schematic diagram of induced versus spontaneous subduction initiation models (adapted from Stern, 2004).

Figure F2. Philippine Sea region. Izu-Bonin and Mariana arcs and associated trenches form the eastern boundary of the Philippine Sea plate. The western boundary includes the Ryukyu-Kyushu and Philippine arcs and trenches. Back-arc basins such as the Shikoku Basin, Parece Vela Basin, and Mariana Trough were created by seafloor spreading between the formerly contiguous remnant arc (Kyushu-Palau and West Mariana Ridges) and eastward-migrating active volcanic arcs, now represented by the Izu-Bonin and Mariana arcs. Pink star in Amami Sankaku Basin = Site U1438. Smaller pink star in eastern West Philippine Basin = ODP Site 1201.

Figure F3. Oceanic crustal age grids at 55 and 45 Ma, after Whittaker et al. (2007). Black arrows = motion of the Pacific plate (mm/y) relative to fixed African hotspot reference frame. WPB = West Philippine Basin, IBM = Izu-Bonin-Mariana arc.

Figure F4. History of the West Philippine Basin (WPB). A. Interpretation of magnetic anomalies of the WPB (Hilde and Lee, 1984); figure modified after Deschamps et al. (2002). Chron 25 corresponds to ~57 Ma; Chron 13 corresponds to ~33 Ma. B. Schematic tectonic history for the Oki-Daito province and WPB, from Ishizuka et al. (2013). C. Evolutionary model of the WPB at 50 Ma (adapted from Deschamps and Lallemand, 2003). D. Paleogeodynamic reconstruction of the western Pacific after Jolivet et al. (1989), based on the "trapped basin model" for generation of the WPB. AP = Amami Plateau, DR = Daito Ridge, EM-2 = enriched mantle 2, OIB = ocean island basalt, CBF = Central Basin Fault, OD = Oki-Daito Ridge, PAC/AUS = Pacific plate/Australian plate.

Figure F5. Distribution of $^{40}Ar/^{39}Ar$ ages (Ma) for volcanic rocks from the Kyushu-Palau Ridge area (after Ishizuka et al., 2011b).

Figure F6. Variation of $^{206}Pb/^{204}Pb$ along-strike of volcanic rocks of the Izu-Bonin-Mariana arc and Kyushu-Palau Ridge (modified from Ishizuka et al., 2007, 2011b).

Figure F7. Distinct geochemical characteristics of volcanic rocks from the Kyushu-Palau Ridge (KPR)/Daito Ridge intersection (modified from Ishizuka et al., 2011b). Pb isotopes clearly discriminate these volcanic rocks from other KPR volcanics. $\Delta 8/4$ = deviation of $^{208}Pb/^{204}Pb$ at a specific $^{206}Pb/^{204}Pb$ compared with the Northern Hemisphere reference line. EM-1, enriched mantle 1, EM-2 = enriched mantle 2, MORB = mid-ocean-ridge basalt, PSP = Philippine Sea plate, OIB = ocean-island basalt, HIMU = high μ ($^{238}U/^{204}Pb$).

Figure F8. Location of *Shinkai 6500* Dive 337 and Site U1438.

Figure F9. Track map of MCS survey Lines D98-A and D98-8. Site U1438 is located at the intersection of the two survey tracks (modified from Japan National Oil Corporation, 1998).

Figure F10. Seismic reflection images, Site U1438 (modified from Japan National Oil Corporation, 1998). Top two panels show MCS Line D98-8 (upper) and interpreted major reflectors (lower) with the location of Site U1438. Lower two panels show MCS Line D98-A (upper) and interpreted major reflectors with the location of Site U1438 (lower). Seismic interpretation from Higuchi et al. (2007).

Figure F11. Location of MCS Line D99-2 and ODP Site 1201 (right) and results from the same line in cross-section (left).

Figure F12. Graphic summary of stratigraphy, Site U1438. Lith = lithologic, Cl = clay, Si = silt, Vfs-fs = very fine sand–fine sand; Ms-vcs = medium sand–very coarse sand, Gr = gravel. Sediment grain size is averaged over 5 m intervals.

Figure F13. Biostratigraphic- and paleomagnetic-based age-depth plot, Site U1438.

Figure F14. Ca, Na, K, and Mg (note the twin scale used on the *x*-axis) in IW. Ca concentrations increase by ~27 times seawater value whereas Na, K, and Mg decrease. These chemical variations are best explained by breakdown of volcaniclastic sediment releasing Ca into IW followed by ion exchange reactions involving Na, K, and Mg during production of alteration phases downhole.

Figure F15. MgO vs. SiO_2 for unconsolidated sediments and sedimentary rocks (Units I to III) and basalts from Unit 1.

Figure F16. Y vs. Zr for samples from a compilation of global MORB glasses (Jenner and O'Neill, 2012) compared to whole-rock basement samples from ODP Site 1201 (Savov et al., 2005), fore-arc basalts (FAB) from the Izu-Bonin-Mariana fore arc (Reagan et al., 2010), and Unit 1 at Site U1438.

Figure F17. Downhole temperature, thermal conductivity, thermal resistance, and Bullard plots, Hole U1438A.