Figure F1. Seismic data coverage and magnetic anomalies of the South China Sea basin, Expeditions 367, 368, and 368X. Black lines = ocean-bottom seismometer (OBS) refraction data. Other seismic lines are mostly multichannel seismic reflection data. Yellow lines = magnetic isochrons from Briais et al. (1993). White stars = Expedition 367, 368, and 368X drill sites, red squares = ODP Leg 184 sites, red circles = IODP Expedition 349 sites. For more details, see Figure F2.

Figure F2. Two-way traveltime to (A) acoustic basement (Tg reflector) and (B) Unconformity T60 with Expedition 367, 368, and 368X sites. Proposed drilling transect (thick black line) was located approximately at the center of a margin segment bounded to the southwest by a transform fault. Northeastern boundary of the margin segment is located around IODP Expedition 349 Site U1435. In this location, the OMH and Ridge A seem to coalesce, and Ridges B and C of the COT become indistinct toward the northeast in the next margin segment. Note that the OMH is slightly oblique to the more parallel Ridges A, B, and C.

Figure F3. Bathymetric maps showing Expedition 367, 368, and 368X sites (stars) and (A) regional and (B) local coverage of 2-D, time-migrated multichannel seismic reflection seismic data and OBS data. Orange lines = magnetic isochrons from Briais et al. (1993), thick blue lines = key seismic lines used for planning of the drilling transect, red lines = other important seismic lines near the drilling sites.

Figure F4. A–D. Schematic development of continental breakup initiated by a simple shear along a deep, low-angle fault. B–D are slightly modified from Huismans and Beaumont (2011) and illustrate modeling-based stages of extension at magma-poor, Iberia-Newfoundland type rifted margins. Key features of D: thinning of the upper crust and juxtaposition of lower crust with serpentinized mantle between the outer margin and igneous oceanic crust. UP = upper plate, LP = lower plate. The Expedition 367, 368, and 368X drilling strategy was designed to sample and test whether or not these fundamental crustal units and tectonic relationships are present at the northern South China Sea rifted margin.

Figure F5. Deep crustal time-migrated seismic reflection data without and with interpretation. Note the rather thin lower crust (two layers) above a strong Moho reflector that can be followed oceanward. Moho reflection is weak to absent seaward from around the middle of the interpreted COT. Wide-angle seismic data (Yan et al., 2001) confirm ~6 km thick ocean crust (OC) seaward of the COT. A large detachment fault ~150 km inland of the COT separates more stable crust landward from that of highly extended crust seaward. An OMH is a fairly consistent feature along this margin segment. Key seismic unconformities are shown in purple (T70; ~32 Ma breakup unconformity?) and blue (T60; ~23 Ma regional basin event). These ages are inferred from long-distance (>100 km) correlation of seismic unconformities with industry holes and ODP Leg 184 Site 1148 (T60); they need confirmation by coring and are only tentative. Tg reflector (green) = basement. Arrows and labels C11n, C10n, and C9n = approximate position of seafloor magnetic anomalies with chron numbers (from Briais et al., 1993). Seismic data are from Line 04ec1555-08ec1555 (courtesy of the Chinese National Offshore Oil Corporation [CNOOC]). Location of line is shown in Figures F2 and F3. CDP = common depth point. P = projected location of drilling site onto the seismic profile.

Figure F6. Expedition 368 reentry system and casing installation, Hole U1503A.

Figure F7. Expedition 368X reentry system and casing, Hole U1503A.

Figure F8. Bathymetry at Site U1503 and location of the site in relation to seismic Lines 15eclw5 and 08ec1555.

Figure F9. Lithostratigraphic summary, Hole U1503A.

Figure F10. Sedimentary structures from Unit I, Hole U1503A. A. Fining-upward sequence from massive medium-grained sandstone to laminated silty fine-grained sandstone. The sequence is overlain by the planar base of the next fining-upward interval. B. Dark brownish gray laminated clayey siltstone with sand over dark greenish gray sandstone with a low carbonate content. This lithology is underlain by greenish gray sandstone with a high carbonate content. The laminated clayey siltstone with sand has claystone intraclasts. C. Two fining-upward sequences with claystone overlain by laminated clayey siltstone, laminated silty claystone, and claystone. The laminated clayey siltstone has a sharp base that overlies the claystone. The intensity of bioturbation increases upward in the fining-upward sequence. D. Inclined burrow filled with light gray silty sediment cutting across olive-gray, highly bioturbated claystone. E. Sandstone with claystone intraclasts overlain by claystone. F. Convolute and plane laminations in silty fine sandstone. G. Parallel laminations in fine sandstone. H. Greenish gray massive and well-sorted sandstone. Blue star = location of image in I. I. Thin section image of sandstone in H with subangular quartz (Qtz), plagioclase (Pl), muscovite (M), and a foraminifer (F) in carbonate cement.

Figure F11. Macroscopic features in igneous lithologic Unit 1, Hole U1503A. A. Moderately plagioclase (Plg)-olivine (Ol) phyric basalt with an altered glassy chilled margin. B. Baked blueish gray chert with some glass residue on its side. C. Macroscopic vesicles filled by recrystallized carbonate (CalV) and zeolite (ZV). D. Sparsely Plg phyric basalt with porphyritic texture (most common macroscopic texture observed throughout lithostratigraphic Unit IV). E. Vein with angular basalt fragments in calcite cement. F. Composite vein network with vuggy texture and carbonate (Cal), Fe oxide (FeO) and pyrite (Py) infill.

Figure F12. Magnetic measurements, Hole U1503A.

Figure F13. Headspace gas concentration, carbon content, and TOC/TN, Hole U1503A.

Figure F14. Physical properties summary, Hole U1503A. Note the log scale of magnetic susceptibility (MS). WRMSL = Whole-Round Multisensor Logger.

Figure F15. Physical properties and VSI data, Hole U1503A. Red dashed line = average *P*-wave velocity for sediments. Estimated seismic depth is calculated using a composite velocity-depth relationship from the VSI and *P*-wave velocity. Seismic image is not corrected to depth. Open circles and thin black lines connect prominent seismic reflectors to the individual seismic wave forms. Seismic data are from Line 04ec1555-08ec1555 (courtesy of CNOOC).