

IODP Expeditions 367 and 368: South China Sea Rifted Margin

Site U1503 Summary

Background and Objectives

Site U1503 (proposed Site SCSII-9B) is located in 3868 m of water depth near the top of the structural high named Ridge C. Ridge C is the most seaward ridge of the three margin-parallel ridges A, B, and C that characterize the lower continental slope underlain by thin (5–7 km) crust. Ridge C is believed to represent at least partly, if not full, igneous crust, and hence the completion of continental breakup along this margin segment of the northern South China Sea (SCS).

A key operational objective of Site U1503 was to sample the lowermost ~300 m of sediments on top of basement to constrain the age and subsidence history of the crust at this location, the timing of normal faulting, and environment of the early half-graben fill. The second and most important goal was to sample the igneous stratigraphy to at least 100 m below the basement. Due to a rig floor equipment failure (drawworks), we abandoned the site after installing casing in Hole U1503A to 991.5 m.

Following the findings of breakup related basaltic magmatism at both Site U1502 (Ridge A) and Site U1500 (Ridge B), it was realized that this rifted margin, unlike the magma-starved Iberia-type margins, had experienced massive igneous activity during breakup, and that highly extended subcontinental lithosphere within the Continent-Ocean-Transition (COT), if present at all, now is likely to be more or less covered by igneous rocks. By implication, the details of the final stages of lithospheric thinning prior to final breakup need to be gleaned from the detailed composition of the igneous products, such as continental crustal contamination of the magmas, the depth of and shallowing of mantle melting with time, and mantle composition including wetness and possible temperature anomalies. The crust at Ridge C is interpreted to represent the end member of the transition from breakup igneous activity initially modified by an overlying lid of continental lithosphere to accretion of igneous unmodified by a preexisting lithosphere. Deep representative sampling of the basaltic material at this site would have provided an important reference frame for the modeling of breakup. With an estimated sediment thickness of 1640 m overlying basement, obtaining basement samples and log data at this site represented a challenging operation.

Operations

To reach our objectives we conducted operations in one hole (Hole U1503A, located at 18°8.6300'N, 116°18.8456'E, in a water depth of 3868 m). We successfully installed a reentry system and 991.5 m of 10.75 inch casing in Hole U1503A. However, we were unable to deepen the hole below the casing because of repeated breakdowns of the low clutch diaphragm in the

drawworks and concerns that we did not have enough spares to last the remainder of the expedition. Without the drawworks low clutch, we could not conduct drilling operations at depths greater than 3400 m (water depth plus penetration depth). Since Site U1503 had a planned depth of 5695 m (including water depth plus penetration), we abandoned Hole U1503A without addressing any scientific objectives. Hole U1503A remains cased and open for possible future, post Expedition 368, occupation.