

Geochemistry of the South China Sea basalts, IODP Expedition 349

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International Ocean Discovery Program (IODP) Expedition 349 drilled five sites in the South China Sea to study regional geodynamics and oceanic crustal evolution. The oceanic crust was recovered for the first time at three sites nearest the fossil spreading centers and is overlain by hemipelagic claystone units with biostratigraphic ages of ca.15 Ma at Site U1431E, ca.18 Ma at Site U1433B, and ca.12 Ma at Site U1434. Site U1431E in the East Subbasin recovered about 70 m thick upper section and at least 30 m-thick lower section of thick massive flows separated by an interflow claystone unit. Sites U1433B and U1434 in the Southwest Subbasin recovered 37.5 m and 30.3 m thick, respectively, of thin, pillowed flow successions, underlain by 23 m thick of mostly massive flows at Site U1433B. Geochemical results confirm recovery of oceanic ridge basalts at all sites, with Re-Os isochron ages consistent with paleontological dating. Nd and Os isotope data indicate three isotopically distinct magmatic types, apparently representing at least three stages of magmatism in the South China Sea: 1) the lower section at Site U1431E; 2) the upper section at Site U1431E and the whole section at Site U1433B, and 3) the whole section at Site U1434. The most radiogenic Os isotopic composition occurs toward the end of spreading at all sites while the influence of continental crustal input is strongest in the source of Site U1434 basalts in the Southwest Subbasin. Spreading at Site U1431E may have occurred in two stages, with an earlier episode dominated by mixed sources involving ocean-ridge type magmatism, with altered oceanic crustal input, and later shifted to more Sr, Nd and Os isotopically enriched ocean ridge-type magmatism. This interpretation is consistent with a rifting model initiated at the East Subbasin and progressed toward the Southwest Subbasin.