



The rift to drift evolution of the South China Sea

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Re-processing with modern algorithms of multichannel seismic reflection records from the South China Sea provide novel images on the crustal structure of the continental margin and its boundary zone with the oceanic crust (COB). The selected re-processed seismic lines strike perpendicular to the margins' trend and cross the entire basin, providing complementary images of conjugated rift segments of the NW, SW, and E sub-basins. Re-processed sections image the post-rift and syn-rift sediment, and fault-bounded basement blocks, often also intra-crustal fault reflections that together provide detailed information of the tectonic structural style during rifting. Further, the largest imaging improvement has been obtained in the delineation of -very often- clear fairly continuous reflections from the crust–mantle boundary across the continental margin into the oceanic crust.

The images show how crustal thickness and structure change in parallel to changes in the tectonic style of the deformation during the evolution of the rift. The interpreted COB occurs in regions where the tectonic style displays the most noticeable changes from segments where extension is dominated by normal faulting to segments where faulting is comparatively minor and the crust shows fairly gentle lateral thickness variations; these latter segments are interpreted as oceanic crust.

The identification of the continental and oceanic tectonic domains permits to study the along-strike evolution in rifting processes and rift segmentation. Also, the comparison of the tectonic structure of the conjugated flanks of the continental rift across the ocean basins is used to understand the last stages of rifting and the relative importance of tectonic extension and magmatism in final break up and spreading initiation.

Although there is ample evidence of important volcanism in the images, with some spectacular large conical volcanoes formed over continental crust and numerous sill-like reflections in the sediment cover, the images support that continental rifting was largely a-magmatic. However, the COB appears abrupt and the ocean crust well defined next to rift-related structures indicating that the SCS rifting processes departs from current models of magma-poor rift processes.