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# The SE China-NW Palawan conjugate continent ocean transitions: Insights for mechanism of continental breakup

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Recent high-quality seismic acquisitions on rifted margins around the world highlight the variability of the architecture of Continent-Ocean Transitions (COT). Drilling control, to determine the basement nature and timing of deformation, combined with the analysis of conjugate sections are essential to constrain tectono-magmatic evolution of rifting and breakup. With the recent deep-sea drillings (IODP 349-367 & 368), the high-resolution seismic data and potential field data, the SE China-NW Palawan margins provide an ideal natural laboratory to investigate the mechanisms of continental breakup and for comparison with the evolutionary models developed on the Atlantic margins.

Seismic architecture of the drilled segment of the SE China COT is characterized from NW to SE by a basement high (the so-called Outer Margin High, OMH) that thins oceanward, three faulted basement ridges (A, B and C) and a 6 km thick oceanic crust. Deep sea drilling across the SE China COT presents significant basement lithology variations across these distinct structural features. From continent to ocean, pre-rift sediments (OMH), metamorphic rocks (OMH), highly altered basalt (Ridge A) and fresh pillow basalt (Ridge B) were recovered. Gravity anomaly inversion and joint inversion performed on seismic profiles show an increase of the average crustal basement density between ridges A and B interpreted as representing the transition from continental basement to igneous crust. Ridge A is composite, late syn-rift magmatism is emplaced within thinned continental crust, which shows the interactions between MORB magmatism and tectonic thinning. Ridges B and C are made of igneous crust subsequently faulted. At the NW Palawan margin, in contrast to the SE-China margin, no extensional faults have been observed in the igneous crust. Moreover, the older interpreted oceanic magnetic anomaly (C11) is only identified on the SE China side, whereas the magnetic anomaly C10 is observed on both side and located oceanward.

Based on our results, we propose a tectono-magmatic model constrained in time and space for the breakup of this segment of the South China Sea. The main observations are: 1) MORB magmatism increases concomitant with crustal/lithospheric thinning; 2) The SE China and NW Palawan COT are asymmetric with tectonic extension in igneous crust and magnetic anomaly C11 only observed on the SE China side; 3) the formation of igneous crust occurs $\sim$2 Ma before the initiation of steady state sea-floor spreading; 4) extension at the SE China COT during this time lag is accommodated by the interplay between magmatic accretion and faulting. These results show that breakup leading to the formation of a steady state sea-floor spreading is not instantaneous, and involves a period during which magmatism and tectonic extension are not yet localized.