Geophysical Research Abstracts
Vol. 20, EGU2018-16837, 2018
EGU General Assembly 2018

Crustal structure of the South China Sea continental margin: many rifts in one

Alejandra L. Cameselle (1), César R. Ranero (2), Udo Barckhausen (3), and Dieter Franke (3)

(1) Universidade de Aveiro, Departamento de Geociencias, Aveiro, Portugal (acameselle@uvigo.es), (2) Barcelona Center for Subsurface Imaging, ICREA at CSIC, Institut de Cie´ncies del Mar, Barcelona, Spain (cranero@cmima.csic.es), (3) Bundesanstalt fu¨r Geowissenschaften und Rohstoffe (BGR), Hannover, Germany

Rifted continental margins result from extension of continental lithosphere leading to breakup and the onset of seafloor spreading, with the modes of extension and the transition to spreading are typically described with end-member conceptual models. Here, we examine the rifting evolution of the South China Sea from geophysical and geological observations. We analyze the tectonic structure of a complete > 1000 km long transect encompassing the entire rift system to study the mechanisms for crustal extension and final breakup. The images of the entire rift segments permit us to study the symmetry/asymmetry of conjugate margins and the evolution of the processes controlling their contrasting geometry and crustal architecture.

Our observations indicate that the broad-scale several 100 km wide segments at both conjugate margins of the of the South China Sea underwent largely simultaneous extensional deformation from early Eocene (∼45 Ma) to late Oligocene – early Miocene (∼23 Ma), which result in a ∼850 km-wide area of stretched continental crust abutting ∼200 km of oceanic crust. The seismic profiles show several areas where continental crust is thinned down to <10 km (ß ∼3.3 – 6.6), alternated with areas where continental crust is comparatively little or very little thinned (ß ∼1.4 – 2). The absence of sills in the syn-tectonic strata or magmatic constructs in the upper crust support the idea that lithospheric thinning was not accompanied by any significant melt production even in highly stretched areas. However, the continent ocean transition is abrupt lacking evidence for mantle exhumation. The final morphology and structure of the rifted crust is asymmetric straddling the axis of final breakup.

We interpret this tectonic structure as the result of continuous wide-rift mode of deformation from the early rifting to breakup. We suggest that final continental breakup was not a consequence of lithospheric thinning during rifting, but resulted from the arrival of the spreading ridge from the NE. We analyzed the final structure of the conjugate margins and interpret the observed asymmetry as a secondary consequence of the direction followed by the ridge propagator.