



The continent-ocean transition on the northwestern South China Sea

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

(1) Barcelona-CSI, Institut de Ciències del Mar (CSIC), Barcelona, Spain (acameselle@icm.csic.es), (2) Barcelona-CSI, ICREA at CSIC, Barcelona, Spain, (3) BGR, Hannover, Germany

Rifted margins are created as a result of stretching and breakup of continental lithosphere that eventually leads to oceanic spreading and formation of a new oceanic basin. A cornerstone for understanding how rift characteristics vary along strike in the same system and what processes control the final transition to seafloor spreading is the continent-ocean transition (COT). We use four regional multichannel seismic profiles and published magnetic lineations to study the structure and variability of COT on the northwest subbasin (NWSB) of the South China Sea and to discern continental from oceanic domains. The continental domain is characterized by tilted fault blocks overlaid by thick syn-rift sedimentary units and fairly continuous Moho reflections typically at 8-10 s twtt. Thickness of the continental crust changes from ~20-25 km under the uppermost slope to ~9-6 km under the lower slope. The oceanic domain is interpreted where a highly reflective top of basement, little faulting, no syntectonic strata, and fairly constant thickness basement (4-8 km) occur. The COT is imaged as a ~5-10 km wide zone where oceanic-type features abut continental-type structures.

The South China margin is deformed by abundant normal faults dissecting the continental crust, whereas the conjugate Macclesfield Bank margin displays comparatively abrupt thinning and little faulting. Seismic profiles show an along-strike variation in the tectonic structure of the continental margin. The NE-most lines display ~20-40 km wide segments of intense faulting under the slope and associated continental-crust thinning. Towards the SW, faulting and thinning of the continental crust occurs across a ~100-110 km wide segment.

We interpret this 3D structural variability and the narrow COT as a consequence of the abrupt termination of continental rifting tectonics by the NE to SW propagation of a spreading center. We suggest that breakup occurred by spreading center propagation to a larger degree than by lithospheric thinning during continental rifting. Based on the sedimentary successions overlying the oceanic crust, we propose a kinematic evolution for the oceanic domain of the NWSB consisting of a southward spreading center propagation followed by a first narrow ridge jump to the north, and then a younger larger jump to the SW into the east subbasin.