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Seismic Reflection Moho Structure of Southwest Sub-basin of South China Sea and Implications for Continental Break-up and Seafloor Spreading Mechanisms

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Across-basin Moho structure of South China Sea is important for understanding crustal evolution mechanisms of both continental break-up and seafloor spreading processes. Among all the basins in South China Sea, southwest sub-basin opened up the latest and has the closest continental margins, making it the best to study the across-basin structure. Multichannel seismic (MCS) reflection data of NH973-1 line that crosses southwest sub-basin in NW-SE direction were reprocessed in order to image Moho structure. In MCS data Moho reflectors are observed in places, which were not revealed in prior researches. The Moho generally shows symmetric structure on the both sides of the central rift valley. Beneath the oceanic crust in the middle of the basin, the Moho is ∼2 seconds depth in two-way travel time (TWTT), which corresponds to ∼7 km depth, showing normal oceanic crustal accretion during the seafloor spreading process. When getting close to continent-ocean boundary (COB), the Moho becomes shallow to <1 second depth in TWTT (∼3.5 km), implying strongly crustal thinning. At south COB, the Moho depth almost reaches zero, which implies nearly no crust exists and probably the upper mantle could be exhumed. In addition, two low-angle, deep-penetrating normal faults are observed at south COB. The faults cut across the Moho into the upper mantle, which may have been caused by lithospheric hyper-stretching at COB during the continental break-up process.