

EGU2020-8920

<https://doi.org/10.5194/egusphere-egu2020-8920>

EGU General Assembly 2020

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## The stratigraphic and magmatic tape recorder of crustal thinning and lithospheric breakup: insights from the NW South China Sea

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In the last two decades, knowledge of the South China Sea (SCS) rifted margins has significantly evolved. However, there are still many open questions related to when, how, and under what conditions major crustal thinning (necking) and lithospheric breakup occurred and how these processes are recorded in the stratigraphic and magmatic tape recorder. In this study, we aim to explore the tectono-sedimentary-magmatic evolution of rift systems during crustal thinning and lithospheric breakup. Our study is based on observation of conjugate margins architecture along high resolution long offset reflection seismic sections through the Northwest SCS. We focus on crustal thinning and lithospheric breakup, and the transition to first oceanic crust and the birth of an oceanic spreading centre. We describe the Northwest SCS crustal architecture, define extensional domains (proximal, necking, hyper-extended, OCT, oceanic domain) and margin architecture (upper and lower plate). We determine the tectono-sedimentary evolution and discuss the evolution of deformation modes through time and space by linking the tectono-stratigraphic-magma evolution with the observed crustal thinning. These results have important implications for understanding the deformation history and processes in time and space, and enable the analysis and linkage of the tectono-stratigraphic evolution of rift systems with the observed crustal thinning and breakup processes.