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Tectono-stratigraphic evolution of the Tainan Margin: comparison with the Pearl River Mouth Basin

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The wide rifting mode that preceded the opening of the South China Sea in the Cenozoic generated a complex network of sedimentary basins. The Tainan-Taixinan Basin (sensu lato) represents the oldest passive margin segment that has not been integrated in Taiwan orogenic system yet.
This work aims to review and revisit the tectono-stratigraphic evolution of this segment of the South China Sea from the continental shelf (i.e., Taihsi, Penghu, Nanjihtao basins) to the most distal margin and oceanic domain.
We used a gravity inversion scheme that incorporates a thermal gravity anomaly correction and a parameterization of decompression melting to predict volcanic additions to determine the regional crustal thickness variations. Results show a contrasted crustal structure defining different domains. Only limited crustal thinning is observed under the continental shelf. In contrast, the distal domain shows more a diverse crustal structure from north to south: 1) a patch of highly thinned crust under the southern depression (~5km); 2) and a terrace of thicker crust (~15km) before reaching the oceanic domain.
We reviewed the seismic stratigraphy of these different crustal domains. Over the continental shelf, half grabens, controlled by counter regional faults are observed and filled by Eocene syn-rift sediments. No well calibrations are available for the distal domains. There, we identified several seismic units based on their geometries and seismic facies. Our results show only thin syn-rift sediments, locally controlled by a low-angle normal fault in the southern depression. In contrast, the syn-rift sequence is overlain by thick post-rift successions, significantly thinner over the southern terrace.
Based on our results we propose age correlations from the continental shelf to the distal domains. To illustrate along strike variations of the crustal structure and stratigraphic style, we build an array of regional geological cross sections that can be compared with existing data in the adjacent Pearl River Mouth Basin.

Keywords: Crustal structure; Gravity inversion; Rift domains; Rifted margins; South China Sea; Tainan Margin