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# Mapping of crustal domains in the northeasternmost segment of the South China Sea

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## Résumé

The formation of the northeasternmost segment of the South China Sea remains under-investigated compared to the adjacent Pearl River Mouth basin. This NE region preserves a polyphase tectonic evolution spanning from Mesozoic Andean-like subduction, Paleogene rifting, continental breakup, and widespread post-breakup magmatism. All these events significantly impacted the structure and evolution of this segment of the South China Sea.

To constrain the crustal structure of this segment a series of well logs, seismic refraction and reflection profiles, free-air gravity, and bathymetry data were used. Moho depth and crustal thickness determined from gravity inversion were integrated with seismic data and used to identify and map regional structures. The joint inversion of interpreted seismic and gravity-inverted Moho along an array of 2D profiles provided us with the average crustal density variations between the interpreted top basement and seismic Moho.

This approach allowed us to distinguish five NE-SW trending crustal domains with contrasting stratigraphic and structural styles, crustal thicknesses, and average densities. (a) The proximal margin shows crustal thicknesses > 20-25km thick. (b) The necking domain corresponds with a deepening of the top basement and increasing crustal thinning. (c) The domain of hyper-thinned crust (2900 kg/m<sup>3</sup>). (e) An unambiguous oceanic crust, with an average thickness of ~6 km and smooth basement topography, is passively draped by post-Oligocene sediments.

The thicker crust (d) has uncommon and unexpected characteristics. We explored two main hypotheses for its nature: i) a highly thinned Eocene continental crust subsequently overprinted by post-rift magmatism, or ii) a Mesozoic oceanic plateau accreted to Eurasia during the Mesozoic and overprinted by post-rift magmatism.

**Mots-Clés:** Crustal Structure, Post rift magmatism, Rifted margin, South China Sea, Tainan Basin

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