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The velocity structure of the Longnan seamount in the Southwest Sub-basin, South China Sea

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Seamounts comprise up to 25% of the seafloor (Gilbert, 2004) and most of them are volcanic origin (e.g., Smith & Cann, 1992). Submarine volcanism has resulted in the large vertical and horizontal displacements (e.g., Staudigel & Clague, 2010) and the emplacement of seamounts(e.g. Contreras-Reyes et al., 2010). However, the internal structure and evolution of the seamounts remains unclear, which limits the understanding of post-spreading magmatism in the South China Sea.

We conducted a seismic refraction survey over an axial seamount (Longnan Seamount) in the Southwest Sub-basin, South China Sea in 2010. Results show that the post-spreading axial seamount was mainly formed by an extrusive process. The upper-crustal velocities (2.9–4.7 km/s) observed at the seamount are significantly lower than those of normal oceanic crust (∼4.7 km/s), suggesting explosive materials and increased porosities in the basalts. The lack of clear Moho reflections and a low-velocity upper mantle (7.7–7.8 km/s) may indicate mantle serpentinization beneath the seamount(e.g. Delescluse et al., 2015). Compared with the Huangyan and Zhenbei seamounts in the East Sub-basin, the Longnan seamount in the Southwest Sub-basin is characterized by the crustal accretion occurring in layer 2 only, which may be result from the difference tectonic characteristics. The proposed model for post-spreading seamount formation is marked by an episodic process and controlled both by tectonics and by magmatism.

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