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Asymmetric Distribution of Seamounts and Its Implication for Post-spreading Tectonics of the South China Sea Basin

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Seamount volume visually reflects the intensity of tectonics and magmatism during the evolution of the oceanic lithosphere. Drilling and dredging results report most of the volcanic seamounts in the oceanic basin of the South China Sea were formed after cessation of the seafloor spreading. By using an SRTM15_PLUS Digital Elevation Model with a 15-arc-second grid, we developed a spatial filtering method based on the Top Hat Transform to extract seamounts with elevations greater than 0.05 km. This method provides a significant improvement in identification precision and efficiency compared to previous studies. Multichannel seismic reflection profiles across the entire oceanic basin and gravity maps were used to validate the distribution of post-spreading seamounts. The asymmetry of post-spreading seamount distribution consists of (1) larger volumes of seamounts are located in the north of the extinct spreading center, and (2) seamounts are clustered in quasi-periodic intervals relative to the spreading center. Combining with the regional tectonics, we propose the ridge jump induced a larger amount of enriched mantle materials locally which resulted in more intense magmatism in the north. Besides, re-orientation of the seafloor spreading may cause the quasi-periodic spacing of the post-spreading seamounts. Similar to other marginal basins, magmas formed by spontaneous partial melting would migrate through weak lithosphere where the extension direction changed, causing post-spreading magmatism in the lithospheric weak zones.