



The formation of post-spreading volcanic ridges in the South China Sea

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In the South China Sea (SCS), the post-spreading magmatism (~8-13 Ma) largely masks the previous spreading fabric. The resulting post-spreading seamounts are more numerous in the northern part than in the southern part of the East sub-basin. In the eastern part of the East sub-basin, the post-spreading volcanic ridge (PSVR) is approximately N055° oriented and follows the extinct spreading ridge (ESR). In the western part of the East sub-basin, the PSVR, called the Zhenbei-Huangyan seamounts chain, is E-W oriented and hides the ESR. Based on swath bathymetric and magnetic data, the ESR in the eastern part of the East basin is also N055° oriented and thus is oblique the E-W Zhenbei-Huangyan seamounts chain (Sibuet et al., 2016).

We conducted a seismic refraction survey covering both the Zhenbei-Huangyan seamounts chain and the adjacent ESR, providing new constraints for understanding the relationship between the PSVR and the ESR. The detailed velocity structure shows that the Zhenbei-Huangyan seamounts chain was emplaced through a typical oceanic crust. The thicknesses of Zhenbei (14 km) and Huangyan seamounts (8 km) are larger than the ones of the normal oceanic crust. The correlation between crustal thicknesses and mean lower-crustal seismic velocities suggest that an asymmetric generation of seamounts in the East sub-basin where active upwelling mantle (Holbrook et al., 2001), the presence of a fertile mantle component (Korenaga et al., 2002), or buoyancy-driven decompression melting may happened (Castillo et al., 2010). Below the seamounts, the thickened lower crust is probably due to secondary magmatic intrusions and the large thickness of upper crust is possibly due to volcanic extrusions. The crustal thicknesses as well as the mean lower-crustal velocities of the Zhenbei and Huangyan seamounts are different, suggesting an independent origin for magmatic feeding. This research was granted by the Natural Science Foundation of China (91028002, 91428204, 41176053).

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