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Curie-point depth and thermal status in the southern margin of the South China Sea constrained by magnetic data

Ziqiang Ren (1,2), Xiaobin Shi (1), Mei Chen (1,2)

(1) Key Laboratory of Ocean and Marginal Sea Geology, South China Sea Institute of Oceanology, Chinese Academy of Sciences, Guangzhou, China, (2) University of Chinese Academy of Sciences, Beijing, China

After the Late Cretaceous through early Cenozoic continental rifting, the southern margin of the South China Sea (SCS) evolved into a marginal basin with seafloor spreading commencing at 30 Ma and terminating at 16 Ma. Seismic tomography researches show that there is a low-velocity structure extending from the lower mantle beneath the SCS. Geochemical and petrological data also suggest that the extensive magmatism in the SCS and its adjacent area since the Miocene is closely related with a deep thermal source. The deep thermal anomaly might have played a key role in the evolution and surface processes of the southern margin of SCS, and have a great effect on the hydrocarbon generation in the widespread developed sedimentary basins on the southern margin of the SCS. However, sparse and unevenly distributed seafloor heat flow sites in this region make it difficult to give reliable thermal state. In this study, to better reveal the thermal status in the southern margin of the SCS and provide independent evidence for the deep thermal anomaly, we present a Curie-point depth map constrained by magnetic data based on the de-fractal method. Our results show that the Curie depth of southern margin varies from 7 to 19 km. The East Vietnam fault zone locating in the northwest of this region has a shallow Curie depth of 7-13km, and shows a hot setting. Curie depth along the Nansha Trough increases from 9km to 13km from south to north. And the Nansha block, which is north of the Nansha Trough, has a deeper Curie depth ranging from 13km to about 19km. The Curie depth shows that this thermal structure is controlled by the main fault zone, which accords with the spreading model of the SCS. Comparing with Curie depth of the South China continent derived from thermal model and magnetic data, these depths of southern margin of the SCS present nonuniform decrease. It's suggests that this crust thermal structure is constrained by its nonuniform extension which is shown in seismic reflection profile. Our results show better correlation with the tectonic setting and surface heat flow than previous studies.