

Velocity and anisotropic structure in the crust-upper mantle beneath South China and its implications for deep mineralization

Guoming Jiang¹, Guibin Zhang¹, Hongyi Li¹, Changrong Zhang¹

¹China University of Geosciences, Beijing 100083, China, jiang_guoming@cugb.edu.cn

The South China Plate is located on the southeastern margin of the Eurasia Plate, which is composed of the Yangtze Block and the Cathaysia Block. In the Mesozoic, massive magmatism and lithospheric thinning have jointly caused the extremely complex structure of the crust-upper mantle, and have formed such metallogenic belts as the middle-lower Yangtze river belt (MLYB), the Qinhang belt, the Wuyi belt and the Nanling belt, and so on. We have studied the velocity model and anisotropic structure beneath South China to discuss the deep geodynamics in the past few years by teleseismic tomography, SKS splitting, ambient noise tomography and teleseismic two-plane-wave tomography, respectively.

Our results are (1) an obvious lower velocity zone exists right under the MLYB between a depths of 100-300 km and some higher velocity anomalies below the lower-V zone in the mantle transition zone, which might represent the upwelling asthenosphere and the detached lithosphere respectively (Fig. 1); (2) the axis is approximately oriented N-S for the fast P-wave velocity but nearly E-W for the S-wave beneath the MLYB and the fast P-wave axis forms an anticlockwise ring circle at a depths of 200-400 km (Fig. 2), which denotes the current state of stress in the asthenosphere.

Combining our results with previous geological, geochemical and geophysical results, we infer that these velocity anomalies are associated with the late Mesozoic dynamic process and the Cretaceous magmatism that may have caused the deep mineralization beneath South China. The deformation in the lithosphere and upper mantle may imply that the westward subduction of the Philippine Sea Plate and the remote effects of the collision between the Indian and Eurasia Plates during the Cenozoic commonly contributed to the present stress environment in South China (Li et al., 2018).

References

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