The Mesozoic mineral systems of South China: lithospheric structure and deep processes constrained from integrated geophysical data—preliminary results

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South China Block produces more than tens of mineral commodities from a wide variety of deposit types, the reserves of Tungsten, tin, antimony and bismuth lists world No. one. The other minerals such as REE, Cu, Fe, Zn and Pb are all of remarkable reserves in China (Hu et al., 2015). Most major deposits lie in highly endowed four metallogenic belts with distinct mineral systems and metal assemblage, and formed at relatively short time window during late Jurassic to the early Cretaceous. In order to understand the lithospheric structure and geodynamic processes responsible for the remarkable Mesozoic mineral systems and deposits, we have carried out an integrated geophysical exploration over South China focusing on the four major metallogenic belts, these include broadband seismic array, magnetotelluric array and selected geophysical transects crossing the major geological boundaries, along which the deep seismic reflection/refraction and a more dense MT data were collected. Other studies such as tectonics, geochemistry and metallogeny were also conducted in line with the geophysics. The preliminary results based on the interpretation of seismic, MT and broadband array data include: (1) the Moho is general flat with variation from 35-28 km, the middle and lower Yangtze metallogeny belt (MLYB) and Cachaysia Block show the most shallow Moho; (2) the “Crocodile” structure and tectonic wedge, indicated by the NW-dipping reflections have been observed beneath the Jiangnan Orogeny. The NW-dipping reflections of the lower crust is interpreted as Proterozoic Orogenic fabrics between Yangtze and Cathaysia Blocks overprinted by the Yanshanian intra-continental orogeny; (3) the Cathaysia Block consists of two blocks, evidenced by dipping seismic fabric, with the boundary lie in Northwest Fujian Fault. Within each blocks the Moho is flat and the lower crust show dense continues horizontal reflections, indicating an anatexis and a shear processes; (4) Poisson ratio (Vp/Vs) show a regional variation with high value distributed along northeast part and southeast coast of SCB; (5) the lower resistivity seems in accordance with the MLYB and Jiangnan fault, the northwest boundary of Jiangnan orogeny.

The integrated geophysical data indicate that the SCB has experienced a strong spatially varied intra-continental deformation during the late Mesozoic, which caused the crustal thickening and reworking of Jiangnan orogeny, the former induced an widespread anatexis and emplacement of granites, and the later may inherited the orogenic structure fabric and induced subduction or broken of continental lithosphere, which caused mantle magma underplating in the C/M boundary (Lü et al., 2015). The two cases are observed beneath the Nanling and the MLYB belts respectively, and could best be explain their metallogeny and metal assemblage.

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