Paper Number: 2264

U-Pb-Hf isotopic characteristics of the Jurassic granitoids in the Jiaodong area and their tectonic significance

Wang Dong, Li Hongyan, Yu Hong, Niu ZhiJian, Wang TianQi

Institute of Mineral Resources, Chinese Academy of Geological Sciences, 26 Baiwanzhuang Street, Beijing 100037, PR China. Email：wdong14@126.com

---

The Jiaodong area in Eastern China is characterized by a series of remarkable geological events in the Mesozoic era: 1) the collision between the North China Craton and Yangtze Craton accompanied by ultra-high pressure metamorphism; 2) the subduction of paleo-Pacific oceanic plate and its long-range effects; 3) the destruction of the North China Craton; and 4) gigantic scale gold mineralization. The interaction and overlapping of these events imparted a complex tectonic evolution to the area and underpin the debates concerning the interpretations of the geological history.

Numerous Jurassic intrusive granitic bodies occur within the Jiaodong area. Their genesis is not only correlated with crust-mantle interaction and the tectonic evolution, but is also closely linked with the mineralization of abundant gold deposits. Based on previous research, we compared petrography, zircon U-Pb geochronology and zircon Hf isotopic geochemistry of three Jurassic granitic bodies from different geotectonic units in the Jiaodong area.

Granite and mafic dyke samples were collected from the Wendeng pluton, the Duogushan pluton and the Linglong pluton. Zircon U-Pb dating with LA-ICP-MS shows that the three plutons were all formed in Mid-late Jurassic era (c. 160 Ma). Inherited zircons with ages of Neoproterozoic and metamorphic zircons with ages of Triassic were found in all three plutons. Hf isotopic features of the Neoproterozoic inherited zircons are similar to those in the orthogneiss and eclogite sampled from the CCSD (Chinese Continental Scientific Drilling) drilling core. The Triassic age of the metamorphic zircons is coeval with the ultra-high pressure metamorphism caused by the collision between the Yangtze Craton and the North China Craton. Therefore, the Jurassic granite in the Jiaodong area should have a source incorporating material from the Yangtze Craton which was subducted beneath the North China Craton and experienced UHP metamorphism. Age of c. 1800 Ma and c. 2500 Ma, which are fingerprints of the North China Craton, were also obtained for the inherited zircons from the same samples. Moreover,

inherited zircon with a concordant age of c. 2500 Ma is also identified in the Wendeng granite. Its εHf(t) is 5.7 and single stage model age is 2623±32 Ma, which is roughly consistent with its U-Pb age. This implies that the age record of c. 2500 represents a major crust-mantle differentiation event, corresponding to the crustal accretion record typical of the North China Craton. Therefore, the Wendeng pluton, which is located within the Sulu UHP terrane, also incorporated material from the North China Craton.

The εHf(160Ma) values of the three Jurassic granitic plutons shows a slight rising trend from the east (Wendeng pluton) to the west (Linglong pluton). Combined with the inherited zircon age pattern, the most likely interpretation for the origin of these granitic rocks is that the dehydration melting of the subducted Yangtze Craton was contaminated to various extents by the overlying lithosphere of the North China Craton. Furthermore, this also suggests that the lithosphere architecture of the Jiaodong area in Jurassic times was still dominated by the collision between the Yangtze Craton and the North China Craton.