



High-Ti phengite in the eclogitic rocks at Yangkou from the Sulu

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The Yangkou eclogitic rocks from the Sulu ultrahigh-pressure metamorphic belt can be classified into four types based on the rock textural features: coronal metagabbro, coronal eclogite, fine-grained and coarse-grained eclogite, which formed in a prograde metamorphism during the subduction-collision between the north China and Yangtze cratons. Phengites in the four rock types range from 0.20 to 3.90 wt% TiO_2 , with 1.02 to 3.90 wt% in coronal metagabbro, 0.59 to 1.31 wt% in coronal eclogite, 0.65 to 1.41 wt% in fine-grained eclogite and 0.29 to 0.75 wt% in coarse-grained eclogite, respectively. Ti change of phengites may be described as the substitution of $\text{AlVI} + \text{Si} = \text{AlIV} + \text{Ti}$ in association with the substitution of $\text{Ba} + \text{AlIV} = \text{K} + \text{SiIV}$ and dissolution of biotite component. High Ti contents in phengites can be attributed to the result of high-temperature metamorphism, which is evidenced by (1) high-pressure granulite facies mineral assemblages in local reactive sites in coronal metagabbro, e.g., albite + kyanite + K-feldspar + zoisite garnet omphacite quartz in plagioclase pseudomorphs and garnet + K-feldspar + melt at the reactive sites between biotite and plagioclase pseudomorph; and (2) Ti-in-zircon thermometer yields the metamorphic temperature estimates from 680 to 955 C. Zr-in-rutile thermometer is also used to estimate the metamorphic temperatures of the rocks, which gives the temperatures from 609 to 685 C at 2.0 GPa and 639 to 717 C at 3.5 GPa, respectively. The lack of $T > 750$ C in rutiles is interpreted as a result of completely resetting of Zr in rutile during the late UHP to retrograde metamorphism. The systematic change of Ti content in phengite and mineral assemblages in the four rock types suggest that the Yangkou eclogitic rocks have suffered an anti-clockwise P–T path. Such P–T path is interpreted that the Yangkou protolith of eclogitic rocks came from the arc setting of hanging wall, and was juxtaposed with subducted continental slab during the subduction-collision process between the Yangtze and North China cratons.