^{40}Ar-^{39}Ar isotopic dating of muscovite from the Hukeng tungsten deposit, Jiangxi Province, South China

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Hukeng tungsten deposit, located in central part of Jiangxi Province, South China, is one large-scale quartz vein type wolframite deposit, which is in the south margin of Hukeng granite intrusion, covering the area of 6 km^2. The deposit can be divided into quartz-wolframite, quartz-fluorite-wolframite and quartz-pyrite-sphalerite-wolframite three metallogenic stages [1].

The muscovite for ^{40}Ar-^{39}Ar dating has eminent cleavage, weak pleochroism and high interference color, coexisted with wolframite in ore veins at depth of -60m of the Hukeng tungsten deposit. The variation of apparent age in low temperature (600-800℃) released stage of muscovite is large, varying between 92.0±15.0Ma and 132.7±1.4Ma, and ^{39}Ar only accounts for about 5.4% of the total ^{39}Ar released, which may be caused by lattice defect of mineral of minor argon loss in the periphery of mineral. Five high temperature released stages (1100-1400℃, ^{39}Ar occupies 94.6% of the total ^{39}Ar released) form a plateau age of 147.2 ± 1.4 Ma and an isochron age of 148.0± 2.8 Ma with MSWD of 0.51. The intercept of isochron ((^{40}Ar/^{36}Ar)$_0$) is 280, suggesting certain argon loss may exist in the lattice of muscovite. However, in the fitting process of plateau age, 94.6% ^{39}Ar conforms to plateau-forming conditions, and isoshron is adapted to compare and just the age, which can correct the influence of argon loss efficiently. Therefore, the plateau age of muscovite has geological significance and can represent the cooling age for the formation of muscovite.

In the deposit, homogenization temperatures for quartz from three mineralization stages range from 200 to 300°C [1], obviously lower than the closure temperatures of the ^{40}Ar-^{39}Ar mica chronometers. The closure temperature for the K-Ar isotope system in muscovite is 350–640°C [2]. Therefore, we can assume that the K-Ar system for muscovite remained closed after mineral precipitation, and thus, the ^{40}Ar-^{39}Ar date reported in this study is taken as the age of ore formation in the Hukeng tungsten deposit. Therefore, the absolute timing of tungsten mineralization in Hukeng is about 150 Ma.

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The inclusions of carbonates in UHP eclogite from the South Altyn Tagh, Northwest China: A new constraint for its peak metamorphic pressure

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Previous studies have revealed that eclogites from the South Altyn Tagh have been underwent UHPM according to coesite pseudomorphs in garnet and omphacite [1, 2], and the P-T conditions of the eclogites were estimated to be about 3GPa and 800°C. But the peak metamorphic pressure of the eclogite remains uncertain due to the absence of confident mineralogical constraints.

Recently, abundant inclusions of carbonations are recognized in garnet and omphacite in the eclogite by detailed petrography observations, Raman spectrum and eclectron probe analyses. Two most remarkable textures of the inclusions are as follow: 1) magnesite was found as relict, rounded inclusions with reaction rims of dolomite within garnet and omphacite. The transition from magnisite to dolomite is by means of the reaction of magnesite + aragonite = dolomite [3]; 2) inclusions of calcite aggregates have well developed radial fractures in garnet and omphacite, and have very similar textures to quartz pseudomorphs after coesite inclusions in garnet and omphacite in other UHP eclogites, which are interpreted as the aragonite pseudomorph. These textures reflect that the peak mineral assemblage of the eclogite is Grt+Omp+Mgs+Arg±Coe.

The reaction of dolomite = magnesite + aragonite has been experimentally and extensively investigated to be stable at mantle conditions (>5-20GPa) [4], and identified in many mantle xenoliths and UHP metamorphic rocks [3, 5]. The assemblage of Grt + Omp + Mgs + Arg ± Coe is observed at >6 GPa in recent experiment of cabonated eclogite [6]. According to the experimental data above, we estimate the peak metamorphic pressure of the eclogite is to be >6GPa, and the subducted depth should be at least 180 km.

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