

## Trace elemental geochemistry of black shale from Chengkou district, Chongqing, southwest China and its genetic significances

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The black rock series in Lower Cambrian are well developed in Chengkou district, Chongqing, representing a potentially large multi-metal deposit source in China. Previous study in Chengkou district showed that multi-metals including Ag, V, Se are enriched in black shale. In order to understand the genetic significances of black shale and multi-metal enrichment, ICP-MS techniques was used to analyze trace elemental contents in Lower Cambrian black rock series including cherts, black siltstones and multi-elements concentrated layers. The results indicated that REE is very low relative to other regions such as northern Guizhou, northwestern Hunan, and LREE is relative abundant.  $\delta\text{Ce}$  shows almost negative anomaly, and  $\delta\text{Eu}$  shows un conspicuous anomaly. The indicators of  $\delta\text{Ce}$ ,  $\delta\text{U}$ , V/Cr, Ni/Cr and V/(V+Ni) demonstrated that black rock series formed in the anoxic environment. REE geochemical characteristics and their diagrams, high enrichments of Cr, Sb, As, Bi and U/Th ratios indicated that black rock series mainly formed by hydrothermal deposition. Meanwhile, the petrogenesis of black rock series was associated with volcanism, and volcanism possibly provided the composition and dynamics to the hydrothermal activity.

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[1] Blas *et al.* (1999) *Earth Planet. Sci. Lett.* **171**, 253-266.

[2] Teranes *et al.* (2005) *Limnol. Oceanogr.* **50**, 914-922.

[3] Hollander *et al.* (2001) *GCA* **65**, 4321-4337.

## Metamorphic fluid activities and their effects on petrological and geochemical characteristics of UHP rocks, Southern Sulu UHP Terrane, China

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Since the 2000s, more and more research work disclosed metamorphic fluid activities during the deep subduction process of the continental materials in many UHP terranes. However, the property, scale and geological significance of the metamorphic fluid activities are still not clear.

Eclogites from the Qinglongshan area in the southern end of the Sulu UHP terrane have acquired celebrity in their unusual oxygen isotope compositions. We take two types of eclogites, an epidote-bearing and an epidote-free for this study in the Qinglongshan area. Four metamorphic stages are identified for the evolution of epidote-bearing eclogite. However, the epidote-free eclogite only records eclogite facies metamorphism. They have distinguished petrological, geochemical and Sr-Nd isotopic characteristics.

In the epidote-bearing eclogite, kyanite-zoisite-paragonite-quartz veins of several to decadal centimeters are developed. These veins were formed from the pre-existed hydrous UHP metamorphic mineral (lawsonite) and give a zircon U-Pb age of  $219 \pm 9$  Ma, which indicate a metamorphic fluid activity in the early stage of the exhumation of the deep subducted continental materials.

U-Pb and Lu-Hf isotope studies of zircon are also carried out for the country gneiss of the epidote-bearing eclogite which develops kyanite-zoisite-paragonite-quartz veins. Zircons from the granitic gneiss have core-rim structure. Although the cores and rims have obviously different Hf isotopic characters, they show no difference in Th/U ratio, REE pattern and U-Pb age. Strongly in contrast with previously published zircon U-Pb ages of the Dabie-Sulu UHP metamorphic rocks where protolith ages of 700–800 Ma are commonly recorded, only metamorphic age of  $218 \pm 5$  Ma, identified either in rim or core of the zircons, are recorded in this granitic gneiss. This result show that, in the locality with strong retrograde metamorphic fluid activities, the U-Pb isotope system of zircon could be reset completely from its magmatic precursor, while the Lu-Hf isotope system could remain relatively close.