$^{40}Ar/^{39}Ar$ thermochronological constraints on the retrogression of UHP metamophic rocks from North Qinling, China

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The ultra-high pressure (UHP) metamorphic eclogites in the North Qinling terrane, central China, containing coesites and microdiamonds, have been widely retrograded into amphibolites. Previous geochronological studies on these UHP rocks focused on the timing of the peak eclogite facies metamorphism [1].

In this study, mafic amphibolites from the Kanfenggou domain were collected for $^{40}Ar/^{39}Ar$ dating to further constrain the retrograde evolution. Two generations of amphibole can be recognized based on their rock types, mineral paragenesis and $^{40}Ar/^{39}Ar$ ages. Generation-1 amphiboles separated from the garnet amphibolites yield irregularly-shaped age spectra with anomalously old apparent ages. The data points define inverse isochrons on $^{36}Ar/^{40}Ar$ *vs.* $^{39}Ar/^{40}Ar$ plots with isochron ages of 484 − 473 Ma and initial $^{40}Ar/^{36}Ar$ ratios of 3695 − 774, indicating that some excess argon resided inside. Generation-2 amphiboles from the epidote amphibolites yield flat age spectra with plateau ages of 464 − 462 Ma without contamination of excess argon. The isochron ages of the G1 and G2 amphibolites suggest that the amphibolite-facies metamorphism has taken place as early as 484 Ma and prolonged until 462 Ma for the North Qinling UHP metamorphic rocks.

Based upon our petrological studies and new $^{40}Ar/^{39}Ar$ ages in combination with previous zircon U–Pb geochronological data, we constructed a pressure-temperature-time (*P-T-t*) path to illustrate the retrograde metamorphism and exhumation rates of the North Qinling eclogite and host schist. The *P-T-t* path suggests that the UHP metamorphic rocks at the Kanfenggou domain experienced initial medium-high speed exhumation (*c.* 8.5 mm/yr) during the Early Ordovician (489 − 484 Ma).

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[1] Yang, J.S *et al. (2003) Terra Nova 15, 370-379.*