O isotope constraints on radiometric dating for UHP eclogite and granitic gneiss at Taohang in the Sulu terrane of east-central China

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Mineral Sm-Nd and Rb-Sr isochron methods have successfully applied been to date high-grade metamorphic events, but they suffer isotopic disequilibrium due either to incomplete metamorphic reaction in the absence of aqueous fluid or to retrograde alteration in the presence of fluid. Because of close comparability in O, Nd and Sr diffusivity for some metamorphic minerals, the mineral-pair O isotope study is a powerful tool in deciphering the complexity of metamorphic geochronology. This is illustrated in this study for metamorphic minerals from UHP eclogite and granitic gneiss at Taohang in the Sulu terrane.

Laser fluorination O isotope analysis exhibits heterogeneous ^{18}O depletion in both lithologic units, and O isotope thermometry shows that some of mineral-pairs (quartz-garnet) achieved and preserved equilibrium at eclogite-facies temperatures (700 to 850°C), and the others (quartz-feldspar and dolomite-rutile) achieved reequilibration at amphibolite-facies conditions (450 to 550°C) subsequent to the eclogite-facies metamorphism. Zircons from the UHP rocks have low $\delta^{18}O$ values of −1.3 to 4.2‰, indicating the ^{18}O depletion of their protolith. SHRIMP and LA-ICPMS U-Pb dating for the ^{18}O-depleted zircons from eclogite and granitic gneiss yielded discordia intercept ages of 762 to 834 Ma for protoliths and 202 to 249 Ma for metamorphism, respectively. Correspondingly, CL imaging shows magmatic cores and metamorphic rims. Thus the middle Neoproterozoic ages are interpreted to date the timing of low $\delta^{18}O$ water-rock reaction, and the Triassic ages correspond to the timing of both UHP eclogite-facies and retrograde amphibolite-facies events.

A mineral Sm-Nd isochron age of 215±11 Ma was obtained for a sample of granitic gneiss that shows O isotope temperatures of 685°C for a quartz-garnet pair and 355 to 405°C for two quartz-feldspar pairs. It is know that the peak UHP eclogite-facies metamorphic event occur at 235 to 226 Ma in the Dabie-Sulu orogenic belt. It appears that the Sm-Nd age represents the cooling age during exhumation. This indicates that the Sm-Nd system in the UHP metamorphic minerals was reset during the amphibolite-facies retrogression.

In-situ U–Pb geochronology and Hf isotope analyses of the Rayner Complex, east Antarctica

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In-situ zircon U–Pb and Hf isotopic analysis via laser ablation microprobe-inductively coupled plasma mass spectrometer (LAM-ICPMS) of samples from Kemp and MacRobertson Lands, east Antarctica suggests that Kemp Land evolved as a separate terrane from the rest of the Rayner Complex. Isotopic data indicate this region represents part of the Napier Complex, tectonically reworked during the Rayner Structural Episode (RSE) ca. 940-900 Ma. Recently reported ca. 1,600 Ma isotopic disturbance in rocks from the Oygarden Group may be correlated with a charnockitic intrusion in the Stillwell Hills before ca. 1,550 Ma. Rocks to the east of the Stillwell Hills represent crust accreted to a complexly deformed Archaean craton after ca. 1600 Ma. T^{Hf}_{DM} ages indicate felsic orthogneiss from Rippon Point, the Oygarden Group, Havstein Island and the Stillwell Hills share a ca. 3,660–3,560 Ma source that is indistinguishable from that previously reported for parts of the Napier Complex. More recent additions to this crust include Proterozoic charnockite in the Stillwell Hills and the vicinity of Mawson Station. These plutons have distinct $^{176}Hf/^{177}Hf$ ratios and formed via the melting of crust generated at ca. 2,150–2,550 Ma and ca. 1,790–1,870 Ma respectively. The intrusion of the Mawson Charnockite ca. 980 Ma and a probable thermal disturbance soon after crystallisation supports the initiation of the RSE in MacRobertson Land as occurring some 40-50 Myr earlier than in Kemp Land.

Reference

Kelly N.M., Clarke, G.L., Carson, C.J., White, R.W., (2002), *Precambrian Research* **116**(3-4): 307-330.