# Nitrogen and oxygen isotopes in phengite from UHP metamorphic rocks in the Sulu orogen, China

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Ultrahigh-pressure (UHP) metamorphic rocks in the Dabie-Sulu orogenic belt of east-central China are documented to be remnant of the Neoproterozoic supercrustal materials that were subducted into the upper mantle in the Triassic. Prevous studies of O, H and Ar isotopes show that these UHP rocks experienced limited fluid-rock interaction during subduction and exhumation, and thus have preserved the stable isotope features of their protoliths that underwent extensive meteoric-hydrothermal alteration during magma emplacement. Here, ammonium-N contents and isotopes, combined with oxygen isotopes, of phengites in UHP eclogite and gneiss from the Donghai area in the Sulu orogen were investigated in an attempt to understand the behavior of this volatile element during continental subduction-zone metamorphism and the potential effect of the recycling of the continental crust on the mantle N reservoir.

The phengites show low $\delta^{18}O$ values of –11.9 to +3.3‰ as a result of different degrees of Neoproterozoic meteoric-hydrothermal alteration. The phengites also contain very low N from 6.5 to 34.4 ppm with a wide range of $\delta^{15}N$ from –4.5 to +8.9‰. Samples from Qinglongshan show a negative relationship between N concentrations and $\delta^{15}N$ values but no clear relationship between $\delta^{15}N$ and $\delta^{18}O$. However, a positively correlated trend between $\delta^{15}N$ and $\delta^{18}O$ was observed at a larger spatial scale. The low N concentrations of phengites in these rocks might be inherited from their igneous protoliths. However, the negative $\delta^{15}N$ are not consistent with an igneous origin, but indicate a significant negative shift by a $^{15}N$-depeleted N source or N-isotope fractionation during the Neoproterozoic water-rock interaction. The negative relationship between N concentration and $\delta^{15}N$ for the Qinglongshan samples could be caused by either Triassic subduction devolatilization or Neoproterozoic alteration. Further study of trace elements (Rb, Cs, etc.) may better constrain these possibilities. In either case, the presence of unnegligible amounts of N in phengites, which together with other K-rich minerals (e.g., muscovite, K-feldspar) may constitute of as much as 20 vol.% of the eclogites and 60 vol.% of the gneiss/schist, implies that considerable amounts of N could have been conveyed into the mantle due to breakoff of the subducted continental slab. Because the continental material is more $^{15}N$-enriched than the mantle, this deeply subducted N may have potentail to increase mantle $\delta^{15}N$ at a certain scale.

# Two Mesozoic volcanic activities in Fujian Province, China: constraints on the transformation of tectonic domain in Southeastern China

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Two representative geologic sections of the late Mesozoic “Nanyuan Formation” volcanic rocks in eastern Fujian Province have been dated by zircon SHRIMP U-Pb tecnonique. Two volcanic activities have been identified, i.e. the earlier at 162-150 Ma and the latter at 142-130 Ma.

Basaltic rocks of the earlier period have geochemical features similar to those of OIB with significant curstal contamination and fractional crystalization of olivine and clinopyroxene, while the counterpart of the latter period are rich in Al, Fe, LILE and LREE and depleted in HFSE. It seems that the two volcanic activities should not be grouped into the same Formation and the magmas may have been generated in different tectonic settings. The above data may indicate a transfromation of Mesozoic tectonic domain in Southeatern China in a period of 150-142 Ma.

It is suggested that the earlier volcanic activity was generated by local extension resulted from the combining action of Tethyan tectonic dynamic system and Paleo-Pacific tectonic system whereas the latter was attributed to the regional extension induced by high-angle subduction of the Paleo-Pacific plate.

KEY WORDS transformation of tectonic domain, U-Pb age, Nanyuan Formation, southeastern China.