Late Triassic alkaline complex in the Sulu UHP terrane: Implications for post-collisional magmatism

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Continental subduction and its interaction with overlying mantle wedge are recognized as fundamental solid earth processes, yet the dynamics of this system remains ambiguous. In order to get an insight into crust-mantle interaction triggered by partial melting of subudcted continental crust during its exhumation, we carried out a combined study of the Shidao alkaline complex from the Sulu ultrahigh pressure (UHP) terrane. The alkaline complex (SiO_2: 49.7– 6.7 wt.%) is composed of shoshonitic to ultrapotassic (K_2O: 3.4 – 9.3 wt.%) gabbro, pyroxene syenite, amphibole syenite, quartz syenite, and granite. Field studies suggest that the mafic rocks are earlier than the felsic ones in sequence. LA-ICPMS zircon U-Pb dating on them gives Late Triassic ages of 214 ± 2 to 200 ± 3 Ma from mafic to felsic rocks. These ages are slightly younger than the Late Triassic ages (225 – 210 Ma) of the felsic melts from partial melting of the Sulu UHP terrane during exhumation. The alkaline rocks have characteristics of an arc-like pattern in trace element distribution, e.g., enrichment of LREE, LILE (Rb and Ba), Th and U, depletion of HFSE (Nb, Ta, P and Ti), and positive Pb anomalies. The alkaline rocks with high SiO_2 contents also display features of an A2-type granitoids, suggesting a post-collisional magmatism during exhumation of the Sulu UHP terrane. The alkaline rocks have homogeneous initial $^{87}Sr/^{86}Sr$ ratios (0.7058 – 0.7093) and negative $\varepsilon_{Nd}(t)$ values (-18.6 to -15.0) for whole-rock. The Sr-Nd isotopic data remain almost unchanged with varying SiO_2 and MgO contents, suggesting a fractional crystallization (FC) process from the same parental magma. Our studies suggest a crust-mantle interaction in continental subduction interface as follows: (1) hydrous felsic melts from partial melting of subducted continental crust during its exhumation metasomatized the overlying mantle wedge to form a K-rich and amphibole-bearing mantle; (2) partial melting of the enriched lithospheric mantle generated the Late Triassic alkaline complex under a post-collisional setting; and (3) the alkaline magma experienced subsequent fractionational crystallization mainly dominated by olivine, clinopyroxene, plagioclase and alkali feldspar.