The genetic links between rift magmatism, crustal growth and reworking, and granitoid petrogenesis are an important issue with respect to supercontinent breakup. A combined study of U-Pb age, Hf and O isotopes in zircons from Neoproterozoic granitoids in South China, including the Jiangnan orogen between the Yangtze and Cathaysia Cratons, the Kangdian rift along the western margin of the Yangtze Craton, and the Dabie-Sulu orogen along the northern margin of the Yangtze Craton. Two generations of magma crystallization are discerned for the granitoids, with double-bimodal features in their zircon Hf and O isotope compositions. Despite consistently high δ18O values of 8.1 to 10.4‰ for zircons, ~825 Ma S-type granitoids in the Jiangnan orogen show not only positive εHf(t) values of 3.4 to 5.4 with young HF model ages of 1.17 to 1.25 Ga, but also negative εHf(t) values of ~3.4 to ~1.6 with old HF ages of 1.81 to 1.92 Ga. In contrast, 760~750 Ma bimodal I-type intrusives in the Kangdian rift are characterized by positive εHf(t) values of 3.5 to 9.9 with young model HF ages of 0.94 to 1.18 Ga, and by both low and high δ18O values of 4.2 to 6.2‰ relative to 5.3±0.3‰ for normal mantle zircons. Bimodal protoliths of 780~750 Ma ages for metagneous rocks in the Dabie-Sulu orogen have consistently low δ18O values of ~4.3 to 4.4‰ for igneous zircons, but their HF isotopes are subdivided into two groups: one has positive εHf(t) values of 5.9 to 12.9 and young HF model ages of 0.82 to 1.24 Ga, and the other has neutral εHf(t) values of ~2.7 to 2.3 and old HF model ages of 1.68 to 1.92 Ga.

The zircon Hf-O isotope systematics provides a link of granitoid petrogenesis to orogenic collapse, rift magmatism, water-rock interaction, and the Rodinia breakup. Growth and reworking of juvenile and ancient crusts are dated by means of water-rock interaction, and the Rodinia breakup. Growth and granitoid petrogenesis to orogenic collapse, rift magmatism, orogen have consistently low compositions. Despite consistently high bimodal features in their zircon Hf and O isotope crystallization are discerned for the granitoids, with double-

The Nushan Quaternary volcanic cone in northeast Anhui province, carries abundant mantle xenoliths which including spinel and garnet phase peridotites with or without volatile-bearing minerals such as amphibole, phlogopite and apatite. 12 representative xenoliths were selected for determination of Re and Os concentrations and Os isotope compositions. Os and Re abundances range from 0.876 to 2.417 ppb and from 0.019 to 0.306 ppb respectively, while 187Os/188Os and 180Re/188Os ratios vary from 0.1149 to 0.1310 and from 0.037 to 0.805 respectively in this sample set. 4 of 12 samples have Os concentrations of <1.0ppb. Such low Os concentrations have usually been attributed to S-undersaturated melts percolation that remove Os-bearing sulfides. 2 of 3 fertile garnet lherzolites with high equilibration temperatures (~1100°C) have the highest 187Os/188Os ratios, similar to the present value of PUM (~0.1296). All spinel lherzolites from fertile to refractory in major chemical compositions, with or without amphibole and/or phlogopite have radiogenic 187Os/188Os ratios. 6 of 12 samples have 187Re/188Os ratios higher than the PUM ratio of 0.435 that indicating recent Re addition. Nushan mantle xenoliths define a well-correlated linear trend between 187Os/188Os and both Al2O3 and Yb, through the PUM model age of primitive melt extraction event (~2.0Ga).

Previous data indicate that 143Nd/144Nd and 87Sr/86Sr isotope ratios of clinopyroxenes separated from the sample set fall on the mantle array in the depleted quadrant. It is interesting that 187Os/188Os and 143Nd/144Nd ratios have a linear positive correlation for the sample set. The sample with the most depleted 187Os/188Os ratio has the richest 143Nd/144Nd ratio and 2 garnet lherzolites with the highest 187Os/188Os ratio have rather depleted 143Nd/144Nd ratios. The decoupling of Os and Nd isotope compositions of the Nushan mantle xenoliths indicate that SCLM experienced complex multiple modification via modal and/or cryptical mantle metasomatism after primitive melt extraction.

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