Recognition of Neoproterozoic carbonatite intrusion in NW Yangtze block and its implications for continental evolution of South China

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Carbonatites are few but significant to understand carbon recycling of the earth, the crust-mantle interactions, deep mantle magmatism and regional continental evolution. The Lijiahe carbonatite intrusion, located at the Micangshan Mountains along the NW margin of the Yangtze block, South China was emplaced into the Paleoproterozoic strata, but the timing of the igneous event has long been unknown. Dating by U-Pb apatite was carried out by this work, and it gives an age of 766 ± 11 Ma (MSWD=0.15) for the carbonatitic magmatism of the region.

The carbonatite comprises mainly of calcite, magnitite and apatite with minor minerals of salite, biotite, tremolite, hornblende and muscovite and accessary minerals of pyrrhotite, silver marcasite, niobite, spinel and zircon. Its spatial distribution was obviously controlled by regional tectonics. Besides, ultra-alkaline silicate intrusive complex in the region has been reported by us and other works, and mostly consists of iolite, urtite and jacupirangite with ages of ~890-875 Ma. Furthermore, a large number of gabbro and diorite plutons are found in the Micangshan Mountains and dated at ~780-760 Ma.

NW margin of the Yangtze block is connected with the South Qinling orogenic belt generally thought having an affinity of the Yangtze block during the Neoproterozoic. Our works revealed that the South Qinling is discriminated from the NW Yangtze by intensive ~680 Ma igneous activities which are poorly reported in the interior of South China.

Given that a ~815 Ma collision between the South Qinling ribbon and NW Yangtze margin is recognized by our recent work, the regional massive mantle-derived magmatism including the Lijiahe carbonatitic pluton is explained to indicate a drifting of South Qinling terrane from the NW margin of Yangtze block along previous weak-tectonic zones during the Rodinia breakup caused by continental rifting.

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