~2.5Ga Sanukitoids from Guyang greenstone belt, North China

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The late Archaean Guyang greenstone belt, the largest greenstone belts in the Western block of North China Craton (NCC), locates in the central Inner Mongolia, North China. It consists of three tectonically contacted low-grade volcanic-sedimentary assemblages,and the main emplacement age is around 2.5Ga (Li *et al*., 1987; Wang, 1993).

The sanukitoid suite occurs in middle part of the lower assemblage. The suite is predominately andesitic (SiO_2=58-65%) and is characterized by high Mg number (0.52~0.57), as well as high K_2O contents (2.5~4.4%), high K_2O/Na_2O ratios (0.7~2.1) and low FeO_T/MgO ratios (1.6~2). The high K_2O/Na_2O and low FeO_T/MgO ratios are consistent with calc-alkaline serie trend. The high Ba (349~1062ppm) and Sr contents (150~670ppm), moderately to strongly fractionated REE patterns (La/Yb_{CN}=12~50), weak Eu anomalies (0.8~1.3) and low HREE contents (Y=5~14ppm, Yb=0.5~1.4ppm) are comparable to modern adakites. However, Cr (114~350ppm) and Ni (60~118ppm) of the suite are significantly higher than adakites, indicating a high-extent hybridization with mantle peridotites (Smithes and Champion, 2000). The sanukitoids also have high Zr/Y ratios ranging from 8.6 to 30.7. In the primitive mantle normalized spider diagram, depletion of Nb and Ti relative to neighboring REE is significant (Nb*=0.07~0.47, Ti*=0.33~0.67), while Zr and Hf anomalies are less evident, comparable to average compositions of sanukitoids in Martin *et al*. (2005).

In Guyang greenstone belt, the sanukitoids occur in association with Nb-enriched basalts (NEB) (Chen, in preparation, 2007). The association has widely been proved to be the magmatic products of interaction between slab derived melts and overlying mantle wedge, hence is indictive of a modern-style subduction setting developed around 2.5Ga in the western block of NCC.

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Are peridotite xenoliths in Mesozoic plutons inherited from Paleozoic kimberlites?

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Mantle xenoliths-fragments of the Earth's mantle, are transported to the surface via volcanic/subvolcanic exclusively [1]. As direct mantle samples, these peridotite-dominated xenoliths provide principal approach to investigate the nature of the Earth's mantle. Recently, peridotite xenoliths are exceptionally found in some Mesozoic diorite-gabbro plutons of North China Craton (NCC), and their genesis is still controversial [2-5]. Here we use zircons from a composite dunite-phlogopite orthopyroxenite xenolith from Tietonggou pluton in Laiwu, one of Mesozoic plutons in the NCC, to trace the nature of these xenoliths. This sample is composed mainly of phlogopite-rich orthopyroxenite and subordinate pebble-like dunites [6]. Two stages (130 Ma and 450 Ma) of zoned zircons are found in this sample, the ages of which are concordant with those of the host pluton and of the Paleozoic kimberlites of the NCC, respectively. The similarities of Hf isotopes and rare earth element patterns, as well as the clear correlations between T(Ti) and Th/U ratio and T(Ti) v.s. Hf content for both the zoned Cretaceous zircons and the diorite zircons, demonstrate that these zircons were crystallised in the same magma chamber. In contrast, similarities in the compositional signature of phlogopite and the Nd-Hf isotopic compositions suggest that this composite xenolith was originally Paleozoic kimberlite with dunite xenoliths before incorporation by the host pluton. We therefore suggest that peridotite xenoliths found in the Mesozoic plutons are inherited from the destroyed Paleozoic kimberlites.

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