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Nature of Qinling Collisional Orogen Basement: Nd Isotopic Evidence from Mesozoic Granitoids

WANG Xiaoxia^{1,*}, WANG Tao², KE Changhui¹ and YANG Yang³

1. Institute of Mineral Resources, Chinese Academy of Geological Sciences, Beijing 100037, China

2. Institute of Geology, Chinese Academy of Geological Sciences, Beijing 100037, China

3. China University of Geosciences, Beijing 100083, China

The Qinling Orogen is one of the main orogenic belts in Asia and characterized by multi-stage orogenic processes culminating during Mesozoic. The orogen mainly consists of four distinct blocks or tectonic units. These are, from north to south, the North China Craton (NCC), the North Qinling Belt (NQB), the South Qinling Belt (SQB) and the South China Craton (SCC). A study of the nature of basements of these blocks and tectonic units is important for understanding orogenic processes (collision or accretion), composition and crustal growth of the Qinling orogen.

Voluminous Paleozoic and Mesozoic granitoids occur in the Qinling Orogen. The Mesozoic granitoids can be divided into Early Mesozoic and Late Mesozoic periods. The Early Mesozoic granites are widespread in the western Qinling, and the Late Mesozoic ones in the eastern Qinling. Some of the Late Mesozoic granites are related to large molybdenum deposit. Twenty five new and 204 published whole-rock Nd isotopic data of Mesozoic granitoids from the Qinling Orogen were used for both isotopic mapping and approaching of the basement nature of blocks and units involved in the formation of the orogen.

The Mesozoic granitoids have $\epsilon_{\text{Nd}}(t)$ values, at 245-100

Ma, range from -21.9 to -10.9 in the southern margin of NCC, from -14 to -1.2 in NQB, from -10 to -1.8 in SQB and from -6.5 to -3.2 in the northern margin of SCC. Correspondingly, Nd model ages (T_{DM}) vary from 2.82 to 1.47 Ga, 2.38 to 0.87 Ga, 1.79 to 1.13 Ga and 1.52 to 1.25 Ga in these four blocks. These results demonstrate that these blocks involved different basement rocks in Mesozoic. The southern margin of NCC contains widespread old basement rocks that are similar to the NCC. This old basement controls the distribution of large Mesozoic molybdenum deposits, whereas the NQB, SQB and the northern margin of SCC comprises slightly older basement rocks (or contains higher proportion of juvenile crust). The NQB, which has wide ranges in both $\epsilon_{\text{Nd}}(t)$ values and T_{DM} , may have involved a basement which is more complex than that of the other blocks.

All these signatures of the basement rocks confirm that continental growth mainly occurred during the Proterozoic, and that the Qinling Orogen is a typical one of continental (or arcs) collision orogens, rather than an accretion orogen such as the Central Asian Orogenic Belt.

Key words: Granitoid Source; Nd isotopes; Continental basement; Qinling

* Corresponding author. E-mail: xiaoxiawang@hotmail.com