

Nd–Hf isotopic mapping of Late Mesozoic granitoids in the East Qinling orogen, central China and its applications

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Abstract: Numerous Late Mesozoic granitoid plutons and the world's largest Mo deposit belt occur in the East Qinling. This paper presents the results of Nd-Hf isotopic mapping for the Late Mesozoic granitoids and reveals their constraint on the basement compositions and the distribution of the Mo deposits. The isotopic mapping was based on 98 whole-rock Nd isotopic and 29 average zircon Hf isotopic data. The results show three isotopic regions (I, II, III) from north to south. Region I (oldest basement) has oldest Nd and Hf model ages with very low $\epsilon_{Nd}(t)$ and $\epsilon_{Hf}(t)$ values; region II (old basement) is characterized by old Nd and Hf model ages and low $\epsilon_{Nd}(t)$ and $\epsilon_{Hf}(t)$ values; and region III (juvenile basement) shows juvenile Nd and Hf model ages and relatively high $\epsilon_{Nd}(t)$ and $\epsilon_{Hf}(t)$ values. The three isotopic regions approximately correspond to the three different terranes, the southern margin of the North China Block (S-NCB), the North Qinling Belt (NQB) and the South Qinling Belt (SQB), respectively. These indicate that the granitoids in the different terranes have distinct sources and their sources change from old to more juvenile from north (S-NCB) to south (SQB) in Late Mesozoic. The S-NCB contains old compositions such as Neoarchaean to Paleoproterozoic basement, the NQB comprises Archaean to Neoproterozoic and the SQB Mesoproterozoic to Neoproterozoic, suggesting that the continental crust of the East Qinling were mainly formed during Archaean to Neoproterozoic, different from a typical accretion orogen. Mo deposits are mainly hosted by the terranes with oldest basement and related to the granitoids with old sources. The scale and number of the Mo mineralization and deposits decreased from the S-NCB to SQB.