Origin of the late Mesozoic granitoids in the East Qinling Orogenic Belt of Central China and constraints on the disparity of Mo mineralization

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The East Qinling Orogenic Belt in central China consists of four distinct terranes, i.e., the southern margin of the North China Craton (SMNCC), North Qinling, South Qinling, and the northern margin of the South China Block (SCB) from north to south. More than 6 Mt metal molybdenum reserves are hosted in the late Mesozoic porphyry Mo deposits, occurring in the SMNCC. On the contrasts, only relatively insignificant and distinctively Cu dominated porphyry ore deposits were found in the other three terranes.

Zircon $\varepsilon_{Hf}(t)$ values of -10 to -30 and T_{DM2} ages of 1.6 to 2.5 Ga, as well as zircon $\delta^{18}O$ values of +5.0 to +8.7‰ for the late Mesozoic granitic rocks in the SMNCC suggest an affinity to crustal rocks in the northern margin of the SCB rather than the autochthonous basement[1], whereas zircon U-Pb dating demonstrated a prolonged history of magma assembly and crystallization of nearly 10 Myr. We thus propose that the longevity of the magma-hydrothermal system and Mo-rich source rocks, subducted continental crust of the SCB, stagnated beneath the SMNCC, are critical for the extensive Mo mineralization in the East Qinling porphyry Mo belt[2]. On the contrasts, the comtemperaneous granitoids in the other three terraines have features of typical high Ba-Sr granites. The narrow ranges of whole rock initial $^{87}Sr/^{86}Sr$ (0.7056-0.7069), $\varepsilon_{Nd}(t)$ (-7.4 to -9.7), zircon $\varepsilon_{Hf}(t)$ (-2.49 to -5.13) and $\delta^{18}O$ (+5.58 to +6.49‰) values, along with the significant Nd-Hf isotopic decoupling (ΔHf =+7.61 to +11.3) suggest a lower crustal origin with involvement of partial melts of the enriched subcontinental lithospheric mantle. Therefor, recycling of Mo-rich sedimentary rocks in the SCB is the primarily control on massive Mo mineralization in the SMNCC and the heterogeneous ore mineralization in the East Qinling Orogenic Belt.

[1] Bao et al. (2017), Ore Geol. Rev. **81**, 451–465. [2] Bao et al. (2018), J. Asian Earth Sci. doi.org/10.1016/j.jseaes.2017.12.022.