Implications for the lower crustal evoluiton in the West Qinling Orogen, central China from geochemical and isotopic compositions of Early Mesozoic magmatic rocks

BIJI LUO[1], HONGFEI ZHANG[1], HE YANG[1], WANGCHUN XU[1], LIANG GUO[1]

[1]School of Earth Sciences, China Universityof Geosciences, Wuhan 430074, PR China (luobiji@163.com)

The West Qinling Orogen (WQO) is the westward extension of the Qinling-Dabie-Sulu orogen in central China. The widespread Early Mesozoic magmatic rocks in the WQO may shed light on the crustal structure in this region. Their emplacements could be divided into two stages: the Early Indosinian (~245-230 Ma) and the Late Indosinian (~230-205 Ma). The Early Indosinian magmatic rocks are mainly composed of diorites, mafic magmatic enclaves (MMEs), high and low Sr/Y granitoids, while The Late Indosinian magmatic rocks consist of only low Sr/Y granitoids and MMEs.

The Early Indosinian high Sr/Y granitoids exhibit high Sr/Y and $(La/Yb)_N$ imply a garnet-bearing source region. They belong to high-K calc-alkaline series and display I_{Sr} = ~0.706-0.709, $\varepsilon_{Nd}(t)$ = –9 ~ –4, with T_{DM2} = 1.46-1.74 Ga, indicating derivation from ancient Proterozoic K-rich thicken mafic lower crust. The Early Indosinian low Sr/Y granitoids with low $(La/Yb)_N$ and negative Eu anomalies imply an source region with residual amphibole and plagioclase, probably at a shollower middle crust depth. They show similar Sr-Nd isotopes as those high Sr/Y granitoids, suggesting that they may be comagmatic. Besides, both of the Early Indosinian high and low Sr/Y granitoids mainly show high $Mg^{\#}$, Cr, and Ni values. Coeval diorites and MMEs are abudant in the field. These lines of evidence indicate a culmination of basalt underplating during the Early Indosinian. In contrast, the Late Indosinian granitoids are commonly featured by low MgO, Cr, Ni, Sr/Y and $(La/Yb)_N$ but high K_2O, Rb, and I_{Sr}, indicating that they were derived from a more evolved and less thick crust, with fewer juvenile material contributions. On the other hand, previous seismic refraction profile results suggest an intermediate composition at the base of the present crust in the West Qinling, with the likely absence of a mafic lower crust. Our new results imply that lower crust delamination mostly have occured during the Late Indosinian and the underplating in the Early Indosinian may have promoted this process.