

Sr-Nd-Pb isotopic geochemistry and origin of Mesozoic volcanic-intrusive rocks from the northern margin of Dabieshan, China

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To the north of Dabieshan in China there outcropped a Mesozoic (144-117Ma) rock belt which is composed of high-K calc-alkaline (HKCA), shoshonitic (SHO) and alkaline series (A) volcanic-intrusive rocks. All were approximately contemporaneous and overlaid or intruded into pre-Mesozoic metamorphic basement rocks. This belt is strictly confined to the north of Tongbai-Tongcheng Fault, which separates it from the Dabie Orogen in the south.

Rb-Sr, Sm-Nd and Pb-Pb isotopic compositions and the two-stage depleted mantle model ages of the series were as follows and slightly different from each other. A: $I_{Sr}=0.70843\sim0.71014$, $\epsilon_{Nd}(T)=-14.7\sim-15.8$, $^{206}Pb/^{204}Pb=17.308\sim17.363$, $^{207}Pb/^{204}Pb=15.494\sim15.537$, $^{208}Pb/^{204}Pb=37.984\sim38.088$ and $T_{DM}=2.12\sim2.20Ga$; HKCA: $I_{Sr}=0.70750\sim0.71054$, $\epsilon_{Nd}(T)=-17.2\sim-19.1$, $^{206}Pb/^{204}Pb=16.385\sim17.317$, $^{207}Pb/^{204}Pb=15.305\sim15.435$, $^{208}Pb/^{204}Pb=36.965\sim38.816$ and $T_{DM}=2.32\sim2.48Ga$; SHO: $I_{Sr}=0.70873\sim0.70912$, $\epsilon_{Nd}(T)=-20.7\sim-21.7$, $^{206}Pb/^{204}Pb=15.975\sim16.010$, $^{207}Pb/^{204}Pb=15.349\sim15.442$, $^{208}Pb/^{204}Pb=36.873\sim36.931$ and $T_{DM}=2.60\sim2.68Ga$. It shows that the source for the alkaline series is of high maturity with relatively enriched U and Th, while that for both HKCA and SHO is relatively depleted in U and Th due to previous high-grade metamorphism. Comparative studies indicate that the alkaline rocks were mainly derived from Dabie Group with minor relatively younger crustal rocks, such as Foziling Group and Luzhengguan Group, the high-K calc-alkaline rocks were predominantly derived from Dabie Group while the shoshonitic rocks were of enriched mantle origin probably with minor even older crustal rocks similar to Taishan Group.