



## **Geochronology and geochemistry of Paleozoic plutons in the Alxa Terrane: petrogenesis and tectonic implications**

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Situated between the Tarim Craton and the North China Craton (NCC), the Paleozoic magmatic record in the Alxa Terrane places important constraints on the accretionary orogenesis of the southern Paleo-Asian Ocean (PAO) forming the southern section of the Central Asian Orogenic Belt. New results of LA-ICPMS zircon U-Pb ages and whole-rock major- and trace-element compositions reveal two groups of diorites and granitoids in the Alxa Terrane. One group consists of diorites and granitoids that were emplaced at 458-440 Ma, characterized by lower  $Al_2O_3/TiO_2$  ratios and higher  $TiO_2$  contents, implying high temperature - low pressure crystallization conditions and a shallow source region. In contrast, the second group consists of granitoids that were formed at 417-407 Ma, displaying low high rare earth elements, very high Sr/Y ratios and mostly positive Eu anomalies, suggesting low temperature - high pressure crystallization conditions and source regions at deep crustal levels where garnet is stable in the residual phase. Both of two groups are mostly calc-alkaline to high-K calc-alkaline, and depleted in Nb, Ta and Ti and enriched in Ba, K and Sr, suggesting an arc affinity related to a PAO oceanic subduction regime since the Late Ordovician. Both zircon  $\epsilon Hf(t)$  and whole-rock  $\epsilon Nd(t)$  values decrease from 458 Ma to 440 Ma but increase from 417 Ma to 407 Ma, whereas whole-rock initial  $^{87}Sr/^{86}Sr$  ratios display an opposite trend. Such an isotopic change suggests a tectonic switch from an advancing to a retreating subduction setting in the Early Devonian. Compiled with previous studies, we suggest that the early Paleozoic magmatic arc existing in the Alxa Terrane represented the western extension of the super-large early Paleozoic active continental margin on the northern margin of the NCC.