# Zircon U-Pb ages of Devonian Molasse from the North Qilian Orogenic Belt, China: Provenance and tectonic affinity

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The NWW-SEE trending Qilian orogen formed during the late Caledonian collision between the North China Plate and the Qaidam Terrane, which divided into the North Qilian orogenic belt, the Middle Qilian Terrane and the South Qilian orogenic belt from north to south. The North Qilian orogenic belt is divided into four tectonic units from north to south: the Corridor back-arc basin, South Mountain of Corridor island-arc, subduction complex and obduction ocean-crust slice.

Devonian is the key period when the North Qilian orogenic belt uplifted quickly. A mass of terrestrial molasse was unevenly filled in the synorogenic basin on the northern margin of orogenic belt. The provenance of molasse is constrained by the U-Pb ages of detrital zircons, which shed light on the tectonic affinity of their source areas. The U–Pb age data for 158 detrital zircon grains in two sandstone samples from the Lower-Mid Devonian Laojunshan Fm. and Upper Devonian Shaliushui Fm. reveal the presence of 3.6-0.42Ga zircons, with the peaks in the Early-Paleozoic (451-438Ma), Neoproterozoic (968-941Ma) and Early-Proterozoic (2488-2447Ma). (1) Ages of the early Paleozoic and Neoproterozoic zircons are consistent with the time of island-arc and the high-grade metamorphic basement of the Middle Qilian Terrane, respectively. Ages of the early Proterozoic zircons indicate a source from the orogen or the North China Plate. (2) The occurrence of Neoproterozoic zircons indicate that the Middle Qilian Terrane had a strong affinity with the Yangtze Plate and might have belonged to the Gondwana supercontinent in the Neoproterozoic.

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# Geochemistry and geodynamics of Cenozoic magmatism in NE China

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Major, trace element and Sr-Nd-Pb isotopic composition are presented for Cenozoic basalts from the Mudanjiang-Mishan area, northeast China, with aims of investigating tempo-spatial variation of magmatism and geodynamics that governed magma generation. Tertiary alkali basalts have OIB-like trace element and positive $\varepsilon_{Nd}$ (1.1-5.4), suggesting a dominant asthenospheric origin. Overall, the isotopic composition of the Tertiary basalts from NE China can be accounted for in terms of mixing between three components (N-MORB, EMI and EMII). Temporally, the source of basalts have experienced three episodes of change: the mantle source of basalts erupted prior to the opening of the Japan Sea is characterized by an enriched lithospheric mantle (EMI); that of post-opening basalts is mainly of asthenosphere with both EMI and EMII components. In the spatial scheme, the basalts from continental margins show a prominent EMII signature, whereas those from the interior of the continent are characterized by a predominant EMI signature. Given this spatial distribution of mantle domains, EMII components may be related to subducting slab-derived melts, whereas EMI components are likely related to thinning of the old lithospheric root in eastern China[1]. It is proposed that the mantle flow associated with the lithospheric thinning underneath Eastern Asian continent is eastward, probably enhanced by the Indo-Asian collision and corner-suction of Pacific subduction [2, 3], whereas mantle flow triggered by subduction of Pacific plate is westward. Consequently, the mantle dynamics governing the genesis of the Cenozoic volcanism in NE China can be translated to the interaction between this two mantle regimes [4].

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