Multiple Deformation in the Northeastern Alxa Block: Implications for the Southern Central Asian Orogeny and Its Subsequent Intraplate Evolution

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Abstract: As an important tectonic unit in the middle part of the southern Central Asian Orogeny, the Alxa Block was affected by multiple deformational events occurring in the Central Asian tectonic regime during the Paleozoic and Mesozoic. The record of deformation in the Alxa Block represents the entire evolutionary process from a continental margin to an intraplate setting. In the Langshan region of the northeastern Alxa Block, four important Paleozoic–early Mesozoic deformation events have been distinguished: (1) nearly north-south-striking ductile thrusting along the eastern Alxa Block in the Late Devonian; (2) nearly east-west-trending brittle top-to-the-south thrusting in the Mid-Late Permian; (3) nearly east-west-trending initially ductile then brittle dextral transtension with 125 km of displacement in the Late Permian; and (4) northeast-trending ductile sinistral shearing with 120-125 km of displacement in the Mid-Late Triassic. The ductile thrusting in the Late Devonian may have resulted from the interaction between the North China Craton and the Alxa Black, which was a peri-eastern Gondwana block. Parallel east-west-trending thrusts and related folds formed in the Neoproterozoic Langshan Group due to the closure of the Paleo-Asian Ocean in the Mid-Late Permian. The Late Permian east-west-trending and dextrally ductile transtension may have resulted from intraplate adjustment after the Central Asian Orogeny and the formation of the Ural Orogenic Belt to the west; this shear zone may have been part of a huge ductile tectonic belt developed along the whole southern Central Asian Orogenic Belt (CAOB). During the Early Triassic, the subduction of oceanic crust along the southern central CAOB terminated then the eastern Alxa Block was affected by the collision between the North China Craton and the Yangtze Craton to the south. Since the late Mesozoic, the Langshan region has experienced another five important deformation events, which were all far-field tectonic effects related to plate margin tectonic activities (e.g., the closure of the Mongolian-Okhotsk Ocean, the collision between the Qiangtang and Lhasa blocks and the India-Eurasia collision). The large-scale brittle and ductile strike-slip faults in the northeastern Alxa Block all formed in intraplate settings since the late Paleozoic in response to the collisional orogenies occurring along the plate margins or the intraplate adjustment following the closure of the Paleo-Asian Ocean.

Key words: Alxa Block, Langshan, Central Asian Orogenic Belt, North China Craton, multi-stage deformation

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References


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