

CHRONOLOGY, METAMORPHISM AND DEFORMATION IN THE LOWER CRUSTAL HENGSHAN COMPLEX AND SIGNIFICANCE FOR THE EVOLUTION OF THE NORTH CHINA CRATON

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The Hengshan Mts. in northern Shanxi Province are part of the North China Craton some 200 km W of Beijing and consist of strongly ductilely deformed late Archaean to early Palaeoproterozoic (~2540-2470 Ma) granitoid orthogneisses intruded by numerous mafic dykes of gabbroic composition. The generally strongly deformed and boudinaged mafic rocks occasionally preserve primary igneous textures and underwent HP granulite metamorphism (Grt-Cpx-Pl-Qz-Rt) at conditions of 850-900 °C and ~14 kbar, suggesting that the entire Hengshan metamorphic assemblage (HMA) experienced HP conditions equivalent to crustal depths of about 50 km. SHRIMP zircon dating suggests an age of ~1880 Ma for the HP event, followed by near-isothermal decompression (Opx-bearing granulite stage) and anatexis melting at ~1860 Ma. This confirms previous data by Chinese authors and rules out an Archaean age for the HP event. The HMA rocks are mylonitized in three distinct steeply dipping E-W dextral strike-slip shear belts, between 0.5 and 2.5 km wide, where they were previously mapped as supracrustal rocks and correlated with the late Archaean Wutai greenstone belt that occurs S of the Hengshan Mts. The mylonites imparted a planar fabric to the sheared rocks in which all evidence of previous deformation is eradicated. This led to an alternation of fine-grained quartzofeldspathic gneisses (granitoid gneisses, previously interpreted as clastic metasediments) and amphibolites (deformed gabbroic dykes, previously interpreted as basaltic metavolcanics) in the shear zones and retrogression to amphibolite and greenschist facies assemblages. We interpret the HMA as the lower, plutonic, part of a late Archaean to early Palaeoproterozoic magmatic arc complex, coeval with the adjacent Wutai greenstone belt. The shear zones are major lower crustal discontinuities post-dating the peak of HP granulite metamorphism in the HMA. We suggest that they formed during orogenic collapse and uplift of the Hengshan Complex in the late Palaeoproterozoic (1800 Ma).