

U-Pb zircon dating on the granitic conglomerates of the Hutuo Group: affinities to the Wutai Granitoids and significance on the tectonic evolution of the Trans-North China Orogen

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The Wutai-Fuping-Hengshan region represents the best and classical cross-section in the middle segment of the Trans-North China Orogen. Unconformably overlying the Wutai and Fuping Complexes is the Hutuo Group, which has been considered as the youngest lithostratigraphic unit in this region. Recent work has revealed the importance of the Hutuo Group to both the interpretation of the Precambrian history of this region and the overall evolution of the Trans-North China Orogen. However, lack of knowledge about the provenance of the sedimentary rocks in this group has hindered the further understanding of the depositional environment and tectonic significance. In this study, we applied LA-ICP-MS to obtain U-Pb zircon ages from the granitic conglomerates, the lowest lithostratigraphic rock of the Hutuo Group. Combined with previous geological data, this study provides constraints on the sedimentary provenance and tectonic evolution of the region.

The sequence of the Hutuo Group ranges upward from lower basal conglomerates and volcanoclastic rocks (Doucun Subgroup), through clastic sediments, slates, dolomites and marbles (Dongye Subgroup), to sandstones and conglomerates at top (Guojiashai Subgroup). Zircons from the granitic conglomerates that are preserved in the basal conglomerates of the Doucun Subgroup, give discordant upper intercept ages between 2541Ma and 2550Ma, which are totally same as the ages of the Wutai Granitoids, indicating that these granitic conglomerates were derived from the pre-existing Wutai granitic intrusions (~2550Ma). Results of this study, combined with the underlying turbidites of the upper Wutai Group, indicate an integrated sedimentary sequence of foreland basin during subduction. Associated with previous studies, these data lead us to propose that the Hutuo Group was a retro-arc collisional foreland basin, which developed behind the Wutai arc during eastwards subduction of oceanic plates. This basin underwent a long term sedimentation and finally closed during the ~1850Ma collisional event that resulted in the final amalgamation of the North China Craton.

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