SHRIMP U-Pb ZIRCON DATING OF FELSIC VOLCANISM IN THE WUTAI COMPLEX, NORTH CHINA CRATON: OVERTURNING THE STRATIGRAPHIC MODEL

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The Wutai Complex, located approximately 400 km west-southwest of Beijing, consists of a sequence of paragneisses, amphibolites and carbonates (metamorphosed to amphibolite facies) structurally overlain by interleaved clastic sediments and mafic, intermediate and felsic volcanic rocks (metamorphosed to greenschist facies). This has traditionally been considered to represent a stratigraphic succession and to contain the type section of the 'Wutai movement' tectonic stage in China. The Wutai 'Group' is reputed to show the following features: 1) two or three subgroups bounded by unconformities; 2) an increase in metamorphic grade from base to top; 3) to be overlain unconformably by the Hutou Group sediments; 4) to be Palaeoproterozoic in age. SHRIMP U-Pb zircon dating of felsic volcanic rocks from 'formations' in the lower, middle and upper parts of the Wutai succession reveal identical ages of ~2520 Ma. In simplistic terms, this might be regarded as either due to extremely rapid eruption/deposition or the result of tectonic repetition. The total estimated thickness of ~6.5 km, the strong deformation fabric present in all rocks, the common occurrence of isoclinal folding and the abundance of shear zones makes the former explanation untenable. Geochemical data indicate that the felsic to intermediate volcanics are calc-alkaline in nature, although some of the basaltic rocks are tholeiitic with N-MORB affinity. It is considered that rocks of the Wutai Complex formed in an arc/back arc environment and that they underwent extreme deformation during a collisional event, resulting in extensive repetition of the sequence. The adjacent high-grade Fuping and Hengshan Complexes, dominated by TTG gneisses and deformed gabbros and diorites, most likely represent the basal portion of the same arc system which was disrupted and juxtaposed with the upper crustal segments during Palaeoproterozoic collision at ~1.8 Ga.