AOGS 2006

Crustal Growth in the Central Asian Orogenic Belt and the Arabian-Nubian Shield: A Comparison

ALFRED KRÖNER[3], BRIAN F. WINDLEY[2], GOMBOSUREN BADARCH[3], DUNYI LIU[4], ANTOINE DEMOUX[1], ERNST HEGNER[5], MICHAEL T. D. WINGATE[6]

[1] *Institut für Geowissenschaften, Universität Mainz, 55099 Mainz, Germany*

[2] *Dept. of Geology, University of Leicester, Leicester LE1 7RH, UK*

[3] *Institute of Geology and Mineral Resources, Mongolian Academy of Sciences, Ulaanbaatar 210351, Mongolia*

[4] *SHRIMP Laboratory, Chinese Academy of Geological Sciences, 26 Baiwanzhuang Road, Beijing 100037, China*

[5] *Institut für Umwelt- und Geowissenschaften, Universität München, Theresienstrasse 47, 80333 München, Germany*

[6] *Tectonics Special Research Centre, University of Western Australia, 35 Stirling Highway, Crawley, WA 6009, Australia*

The Central Asian Orogenic Belt(CAOB) records a history of arc and microcontinent accretion, from S to N, during evolution and closure of the southwest Pacific-type Palaeo-Asian ocean. It has been suggested that 50 % of the CAOB consists of jevenile material, largely generated in the Palaeozoic and implying an exceptional crustal growth rate, comparable to that estimated for the Arabian Nubian Shield(ANS). We contest this model on the basis of field relationships, zircon geochronology and Nd isotopic systematics and argue that crustal growth occurred over a much longer period of 800 Ma, from about 1000 Ma to ∼300 Ma. Although there are undisputed juvenile arc terranes, Precambrian zircon xenocrysts and negative E-Nd values in arc assemblages of Mongolia and Kazakhstan document involvement of older continental crust which is as old as 3.9 Ga. Furthermore a significant volume of predominantly felsic volcanic rocks in northern and central Mongolia is likely derived from remelting of older crust. We also found numerous Archaean to Neoproterozoic detrital zircons in Mongolian arc-derived clastic sediments, suggesting an origin from continental sources. These rocks are unlikely to have formed in an intraoceanic environment, and we favour an Andean- or Japan-type setting. Overall the CAOB records the formation of southwest-Pacific style small forearc and back_arc ocean basins that probably evolved between island arcs and microcontinents during the period ∼1020 to ∼290 Ma and were closed during continuous accretion between the Neoproterozoic and Palaeozoic. During this time the southward-growing southern margin of the Siberian craton always faced an open ocean. Final closure of the Palaeo-Asian ocean probably occurred in the late Permian when the North China craton(NCC) was attached to the CAOB. New SHRIMP dating of single zircons from arc terranes in the ANS of northern Saudi Arabia also casts doubt on the previous assumption of a largerly juvenile origin for this accretionary orogen. Numerous felsic rocks and granitoids contain zircon xenocrysts that signify remelting of older crust. Inherited zircons may also be derived from clastic sediments of nearby continental margins. We caution against the sole use of Nd isotopic systematics to estimate crustal growth rates.