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NO EXCESSIVE CRUSTAL GROWTH IN THE CENTRAL ASIAN OROGENIC BELT: FURTHER EVIDENCE FROM FIELD RELATIONSHIPS AND ISOTOPIC DATA

Alfred Kröner[1, 2], Victor Kovach[3], Dmitriy Alexeiev[4], Kuo-Lung Wang[5, 6], Jean Wong[7], Kirill Degtyarev[4], Ivan Kozakov[3]

[1] *Beijing SHRIMP Centre, Institute of Geology, Chinese Academy of Geological Sciences, Beijing 100037, China*
[2] *Institute of Geosciences, University of Mainz, Mainz 55099, Germany*
[3] *Institute of Precambrian Geology and Geochronology of RAS, St. Petersburg, Russia*
[4] *Geological Institute of RAS, Moscow, Russia*
[5] *Institute of Earth Sciences, Academia Sinica, Taipei 11529, Taiwan*
[6] *Department of Geosciences, National Taiwan University, Taipei 106, Taiwan*
[7] *Department of Earth Sciences, University of Hong Kong, Pokfulam Road, Hong Kong, China*

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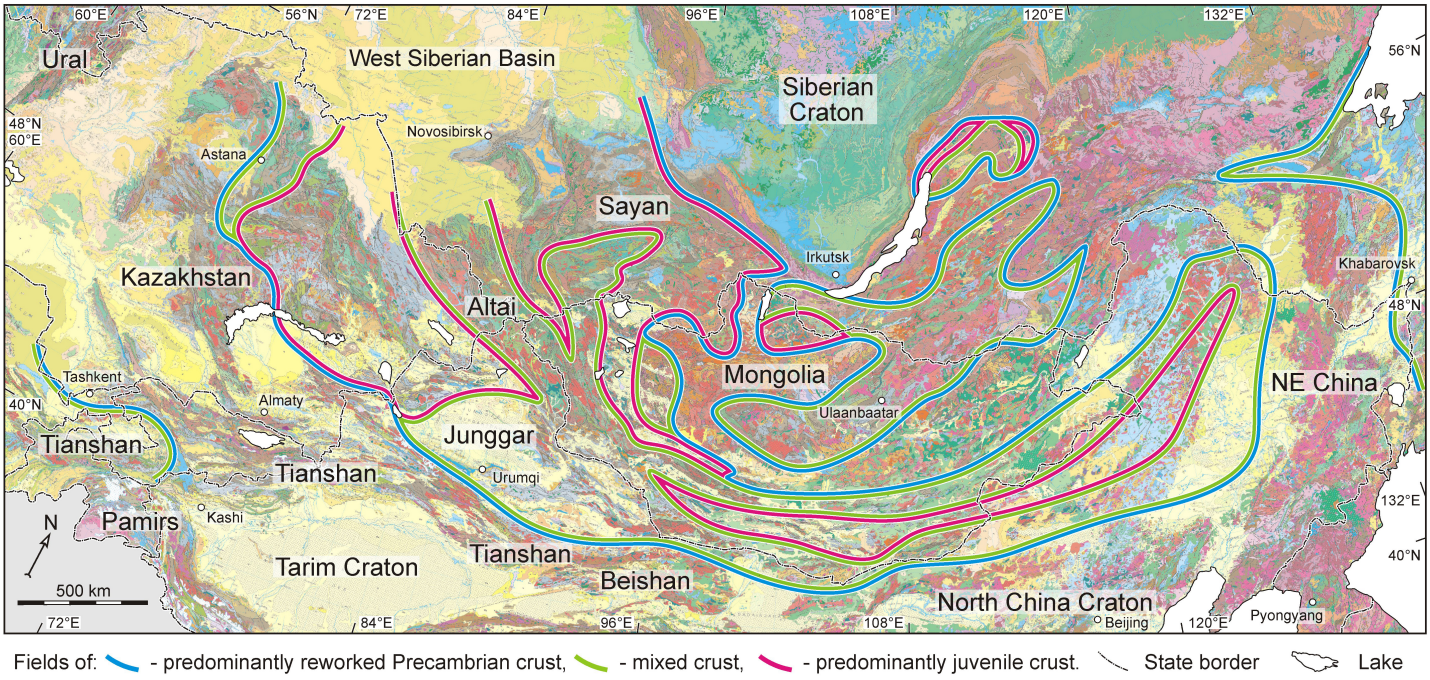
We provide new field observations and isotopic data for key areas of the Central Asian Orogenic Belt (CAOB), reiterating that no excessive crustal growth occurred during its ca. 800 Ma long orogenic evolution. Many Precambrian blocks (microcontinents) identified in the belt are exotic and are most likely derived from the northern margin of Gondwana, including the Tarim craton. Ocean opening in the Palaeo-Asian Ocean, arc formation and accretionary processes began in the latest Mesoproterozoic along the southern margin of the Siberian craton and continued into the Neoproterozoic, giving rise to tectono-metamorphic terranes distinct from the exotic microcontinents in that they include tectonically mixed ancient crust as well as juvenile, mantle-derived igneous rocks. Several previous assessments of crustal growth based on the distribution of oceanic and island arc complexes and on Nd isotopic data for post-accretion igneous rocks are questionable, and we show that such data, in combination with the occurrence of old zircon xenocrysts, frequently signify tectonic mixing of juvenile and ancient crustal components. The only truly juvenile terranes, including



Geological map of the CAOB showing isotopic provinces (from [*Kröner et al., 2017*]).

oceanic crust and intra-oceanic arcs, seem to occur in northeastern Kazakhstan, in the Altai-Sayan region of Siberia and in the Lake and Trans-Altai zones of Mongolia (Figure). The largest area of pre-CAOB continental crust forms a broad belt from northwestern Kazakhstan via the Kyrgyz North and Middle Tianshan to the Yili Block and Chinese Central Tianshan in NW China (Figure). Most arcs in the CAOB formed on older continental crust, or with substantial addition of old crustal material via sediment recycling, similar to the situation in the present Southwest Pacific in southern Indonesia. We suspect that the volume of old material in the lower crust of the CAOB is considerable but largely unaccounted for because of lack of geophysical data. Comparing the lithospheric mantle domains as revealed by Os model ages with ancient crust at least Mesoproterozoic in age and predating formation of the CAOB significantly reduces the volume of new juvenile crust generated during the orogeny. We conclude that the volume of truly juvenile crustal material in the CAOB is about 20 %, similar to that in other accretionary orogens through Earth history, and considering the ca. 800 Ma history of the belt this is not anomalous [*Kröner et al., 2017*].

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