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New Archean to Proterozoic SHRIMP ages on granulites from the Siberian Carton

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Along the southern margin of the Siberian craton several granulites, granites and migmatites were collected from different crystalline blocks to reveal the magmatic and metamorphic evolution of this craton. The studied areas cover a distance of about 500 km from the Kitoi river (150 km west of Irkutsk) through the Sharizhalgai block (southern end of Lake Baikal) to Cape Kaltigey and Cape Khadarta up to the North of Lake Baikal (western shore).

After first U-Pb single zircon TIMS analyses and detailed cathodoluminescence studies, one migmatite, six granulites and three granites were dated using SHRIMP at the ANU (Canberra) and the Curtin University (Perth). This high precision U-Pb zircon dating revealed new insides into a multistage magmatic and metamorphic evolution of the Siberian Craton.

For the granulites, an Archean protolith (3.4 Ga) was documented, followed by a first granulite formation 2.6 Ga ago. In Early Proterozoic times the migmatisation (2.0 Ga) as well as two stages of granulitisation and granite emplacement 1.88 Ga and 1.85 Ga ago could be detected by SHRIMP as well as by TIMS. The latter event (1.85 Ga) is interpreted to mark the final consolidation of the Siberian Craton.

The results from the SHRIMP and TIMS zircon dating are in excellent correspondence with Pb-Pb isotope investigations on fresh whole rock splits for some of the dated samples. Especially for the 1.88 Ga and 1.85 Ga events at the Kitoi river and Cape Kaltigey, the Pb-Pb isochrons agree within error with the SHRIMP and TIMS dating. This gives evidence that the common Pb system was not disturbed since the Proterozoic.

As our study proves, at least the southern part of the Siberian craton was protected to any younger event such as the Rodinia assemblage in Neoproterozoic. Instead of an active role during the Rodinia evolution, Siberia seems to have been involved in the history of an older supercontinent. The geochronological results require that the Siberian craton was included into the assemblage of the supercontinent Columbia in early Proterozoic times.

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U-Pb dating of zircon and monazite from granitoids and migmatites in the core and eastern periphery of the Central Rhodopean Dome, Bulgaria

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The Late Alpine extensional system of the eastern periphery of the Central Rhodopean Dome [1] consists of two plates: a lower plate (Arda unit) affected by migmatisation, and an upper plate (Startsevo unit) that has been subdivided by a shear zone into the migmatised Startsevo and non-migmatised Borovitsa lithotectonic units [2]. The following rock types were dated by single-grain isotope-dilution U-Pb techniques: 1) an orthogneiss in the core of the dome, Arda unit, ca. 15km E of Madan. The zircons from mesosome and leucosome yield a Variscan age of the protolith (311.8±4.4 Ma) and both zr and mz define an Eocene age (37.3±0.65 Ma) for the crystallization of the newly formed anatectic melt, corresponding to the T-peak of metamorphism. The post-peak exhumation is dated by mz from a crosscutting and undeformed pegmatite yielding 35.7±0.23 Ma. 2) a biotite orthogneiss and a metatectic migmatite from the Startsevo unit, 2km E of Zlatograd. The zircons yield a concordant protolith age (151.9±2.2 Ma), whereas the monazites point to a 47.4±0.66 Ma age, which is interpreted as the time of T-peak metamorphism in this unit (P 6-8 kbar, T 620ºC). 3) a deformed porphyroclastic granite from the Borovitsa unit, ca. 1km south of General Geshevo. The zircons are concordant at 149±0.66 Ma, interpreted as the age of crystallization. The onset of extension is dated by both zr and mz in the post-deformation Pripek granite at 52.8±0.89 Ma.

In conclusion, the U-Pb data show that granites from the core and periphery of the dome yield different protolith ages (Variscan vs. Mesozoic) and that the peak of metamorphism is heterochronous, due to different structural evolution within the dome. Extension started at about 52 Ma and continued with the exhumation of the migmatites between 47 Ma in the upper plate and 37-35 Ma in the lower plate.

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