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The enigmatic Mongol-Okhotsk Belt in NE Mongolia - a preliminary evaluation of the geodynamic development

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The Mongol-Okhotsk Belt (MOB) extends from Central Mongolia across eastern Siberia towards the Okhotsk Sea in the northwestern Pacific. The belt formed in a late stage of Jurassic orogeny in the composite Central Asian Orogenic Belt by the consumption of the Mongol-Okhotsk ocean (MOO). The Late Paleozoic-Mesozoic sediments associated with the belt in Mongolia are investigated in order to evaluate the timing and mode of ocean formation, the subduction and the collision of the framing margins. We apply an advanced provenance analysis including (1) heavy mineral and sandstone framework grain analysis and (2) U/Pb laser ablation ICPMS dating, trace element, and Hf isotope analysis of detrital zircons.

We differentiate three tectono-stratigraphic units: (1) the Adaatsag and Doschgol terranes, which are supposed to represent the suture zone, (2) the Hangai-Hentei basin to the northwest of the suture, and (3) the Ereendavaa terrane and the Middle Gobi volcanic belt to the southeast. The latter two are concurrent with the northern and southern margins of the former MOO (in modern coordinates) respectively. The northern margin development is documented by ophiolitic accretionary wedge and fore-arc deposits. The southern margin is represented by Devonian-Carboniferous sediments presumably laid down on deformed and metamorphosed Neoproterozoic-Early Paleozoic continental and ophiolitic basement, which initially was accreted against the North Asia Craton (Siberia) by the closure of the Paleoasian ocean in the Ordovician. The available tectono-stratigraphic arguments together with biostratigraphic and radiometric age data suggest that the Mongol-Okhotsk ocean opened in Late Silurian, possibly by back-arc spreading within the Early Paleozoic collage due to northward subduction of the Paleotethys/Paleopacific ocean under the accreted Mongolian margin.
The syn-sedimentary U/Pb detrital zircon age patterns and Hf isotopic values (epsilon Hf +6 - +7 in Devonian and Permo-Carboniferous time) show similar subduction related magma production processes in the northern and southern margin. However, the two continental margins of the MOO were presumably active at different periods.

Our preliminary data propose that along the northern margin, from Silurian to Early Carboniferous subduction and accretion prevailed, which was re-initiated during the Permian. Reworking of older basement zircons is sparse. The contemporaneous Silurian-Devonian southern margin represented an extensional continental margin showing reworking of Neoproterozoic-Early Paleozoic zircons from the basement. It presumably turned into an active continental margin with starting arc magmatism in the Carboniferous. Continued subduction is manifested by the occurrence of Permian and Triassic zircons. On both margins Triassic and Jurassic continental sediments unconformably overlie tectonically deformed fore-arc series.
In the suture zone in-between, Permo-Triassic and Jurassic samples contain Permian zircon grains, and an irregular mixing with Cambrian to Carboniferous zircons is documented. The pre-Permian zircon age spectra closer compare with the southern margin age distributions. Synsedimentary magmatic activity is documented until Late Triassic-Liassic ($\approx$ 202 Ma). This volcanic source age approximately correlates with the time of closure of the MOO in the Mongolian segment of the mountain belt.