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Evolution of melting anomalies in flanks of the Japan-Baikal geodynamic corridor: Case study of the Vitim and Selenga basins of the Baikal-Mongolian region

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The development of tectonic and magmatic processes of Asia at the latest geodynamic stage is satisfactorily described by the hypothesis on the Japan-Baikal Geodynamic Corridor (JBGC) – a laterally limited movable band of the brittle lithosphere and ductile sub-lithospheric mantle in Central and East Asia that was affected by pull-to-axis forces (Chuvashova et al., 2017). An axis of the corridor extends from the Sea of Japan spreading center to the central part of the Baikal Rift System. Due to these pull-to-axis forces in the asthenosphere, the lithosphere in the northern flank of the corridor responded by the development of north-south and west-east angular-type combinations of transtensional segments comprising into the Vitim-Udokan zone. Another (southern) flank of the corridor was also affected by pull-to-axis forces, but, in addition, it was subjected to forces governed by Indo-Asian interaction. In this presentation, we report results of comparative study of melting anomalies in the Vitim and Selenga basins that occupy flanks of the JBGC in the Baikal-Mongolian region.

The former basin is dominated by northeastern extended tectonic units and magmatic conduits that satisfy to the theoretically predicted pull-to-axis force in the JBGC. In the time interval of the last 16 Myr, volcanic pulses of the Udokan melting anomaly regularly responded to those of the Vitim anomaly. The latter basin is dominated by left-lateral transtension in the East Hangay orogen, instead of the theoretically predicted right-lateral one, and by right-lateral transtension in the Chulutyn zone, instead of the theoretically predicted left-lateral one. Dispersed hot transtension of the East Hangay segment in the time interval of 32–8 Myr was followed with the concentrated transtension along the Chulutyn zone in the last 10 Myr. This transition was accompanied by a change of sources from lithospheric signatures to the OIB-like and crustal ones. The latter indicated on the development of delamination processes. The found inconsistency between the lithospheric and sub-lithospheric dynamics in the Selenga basin and especially a controversy of the developed transtension versus the predicted JBGC pattern should be attributed to effect of the Indo-Asian interaction. From volcanic evolution, we infer, however, that convergent processes caused only a northward shift of volcanism along the Chulutyn transtensional zone in the time intervals of 10.0–7.0 Ma and in the last 4.5 Ma, but, similar to volcanism responses in the Vitim basin, the lateral-shift mechanism of the JBGC was defiantly displayed in volcanism that propagated across the Selenga basin in the time intervals of 18–11 Myr ago, 7.0–4.5 Myr ago and was also slightly resumed at the end of the Quaternary.
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Chuvashova I., Rasskazov S., Sun Yi-min, Yang Chen, 2017. Origin of melting anomalies in the Japan-Baikal corridor of Asia at the latest geodynamic stage: evolution from the mantle transition layer and generation by lithospheric transtension. Geodynamics & Tectonophysics 8 (3): 435–440. Doi.org/10.5800/GT-2017-8-3-0256.