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The latest geodynamic stage in Asia: Pb-isotope signatures and temporal change of sources for volcanic rocks of primary and secondary melting anomalies

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High-resolution seismic tomography demonstrates a present-day snapshot of the Earth's interior, but the currently active tectonic state of Asia is factually resulted from processes evolved during the latest geodynamic stage that was initiated about 90 Myr ago (Rasskazov, Chuvashova, 2013) and was designated by a failure of the Earth's orbital rotation (Ma et al., 2017). Over time, quasi-periods of magmatic perturbations in Asia changed from 20 Ma to 2.5 Ma. The latter quasi-periods correspond to the grand cycle of the Earth's orbital eccentricity. Interpretation of Pb-isotopic signatures of volcanic rocks from Asia is consistent with the model of Rasskazov et al. (2010) that assumes a lead evolution of the molten Earth's material along the Concordia during initial accretion to ca. 4.31 Gyr ago, followed by a lead evolution along the diffusional Discordia. Geochemical data on sources of volcanic rocks in Asia are also indicative for transition from a lamination regime in an enrichment-depletion mode to a delamination one, which provided mixing of material from sources of different depths since ca. 1.87 Gyr ago. In the Japan-Baikal geodynamic corridor of both East and Inner Asia, volcanism of 90–20 Ma marked erupted material of primary (transition layer) melting anomalies showing Pb-isotope signature imprinted the 4.31 Gyr event. Volcanic rocks of the last 20 Myr marked erupted material from sources of secondary (upper mantle) melting anomalies. These rocks of Inner Asia also revealed a material of 4.31 Gyr, but convectively ascended from the lower to the upper mantle ca. 650 Myr ago. Coeval rocks of East Asia demonstrated a laminated material of 4.31–1.87 Gyr occasionally affected by Mesozoic and Cenozoic reactivations.
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