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1 The Baikal rift deep structure and evolution: insights from gravity, thermal and topography modelling

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The Baikal rift has been extensively studied during the last decades. Yet, no simple scenario explains its origin and development because the style of rifting has changed throughout its $\sim$30 Myr history. We use existing data and new forward and inverse models of gravity data to map the Moho and lithosphere-asthenosphere boundary in 3D.

Earthquake depths, mantle xenoliths, heat flow, seismic and gravity models advocate for a normal to moderately thinned continental lithosphere and crust, except beneath the Siberian craton which exhibits a $>$100 km-thick lithosphere. Relatively thin lithosphere (70-80 km) is found east and south of the rift system, and is in spatial connection with the Hangai-Hövsgöl region of anomalous mantle in Mongolia. The geometry of the Moho and lithosphere-asthenosphere boundary are used in forward 1D flexural models to predict the characteristic wavelength and amplitude of the topography; best-fitting models advocate for a mean effective elastic thickness of about 30 km. Finally, from top to bottom, the rift structure is asymmetric, and appears strongly controlled by the geometry of the suture zone bounding the Siberian craton. We then integrate these new results with existing geophysical and geological data on the Baikal rift structure and dynamics, and propose a scenario of its evolution.