Geophysical fields and geodynamic model of the Verkhoyansk–Kolyma orogen (North-East Russia)

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The Verkhoyansk-Kolyma orogen (VKO) is located in northeast Russia and bounded by the Verkhoyansk and Sette–Daban Ranges to the west and Moma Range to the east. The VKO is reflected in the low-frequency component of the gravity field as a negative Bouguer anomaly (up to 100 mGal) of a size of 1100x1200 km. The average heat flow in the VKO is about 65 mW/m^2, with values as high as 100 mW/m^2 in the Suntar–Khayata Range and 88 mW/m^2 in the Tas–Kystabyt Range. The earthquakes of this region belong to the Arctic-Asia seismic belt being located in the areas of the Kharaulakh Range and the Chersky mountain system. Variations in the VKO crustal thickness from 35 to 45 km (average thickness is about 37 km) were established using seismic wave travel time data obtained for regional seismic events (Mackey et al. 1998). The result of combined investigations conducted by the authors was a model of the VKO deep structure. The velocity of P-waves in the upper mantle was computed from the velocity-density correlation and data of deep seismic investigations of the Europe–East Siberia transect (Pavlenkova 1997).

The supposed model of the VKO structure (to a depth of 200 km) has four layers. The upper layer of the Earth's crust (0–15 km) has a density of 2.65–2.75 g.cm^{-3} and consists mainly of terrigenous–carbonate sedimentary rocks. The middle layer of the Earth's crust (15-25 km) has a density of 2.75–2.85 g.cm^{-3} and the low layer (25–37 km) 2.90–3.0 g.cm^{-3}. According to the model, the density of the upper layer of the mantle (37–200 km) varies from 3.24 to 3.40 g.cm^{-3}. A low density (σ = 3.24 g.cm^{-3}) lens-like body (asthenolith?) is supposed to exist at a depth of 37–120 km in the mantle. The formation of the low density plume seems to have occurred in the Late Proterozoic. This generated the development of rift-related structures and aulacogens with a subsequent formation of a sedimentary basin within the passive margin of the North Asia craton. The ascent of the cooling asthenolith at the 37 km level during Mesozoic-Cenozoic times caused the development of an orogen due to the change of extensional stresses into compressional ones. Movements of the crystalline basement blocks within the upper and middle crustal layers were responsible for the formation of small rift-related structures, among them pull-apart basins, and causing high seismicity in the region.

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Late extension in the Western internal Alps inferred from converging brittle tectonic, geodetic and seismotectonic analyses

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To the SE of the Pelvoux massif, in the Briançonnais Zone of the Western Alps, a late alpine normal fault network overprints at every scales all the alpine compressive structures: pile of Briançonnais nappes, folds, and associated schistosities. Two main faults families trending NNW–SSE (longitudinal to the belt) and WSW–ENE (transverse to the belt) acted synchronously to forms this fault network. Some neotectonic indications have been found along these faults, showing a Quaternary activity. This normal faults network has partly been reacti-