

The foreland of the Verkhoyansk fold-and-thrust belt (Russian North-East): evolution and tectonic structure

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The belt stretches longitudinally for about 2000 km along the eastern Siberian platform boundary and is made of a thick (up to 15 km) wedge of deformed clastic rocks of Carboniferous, Permian, Triassic, and Jurassic ages representing typical accumulations of a passive continental margin. These are shelf and deltaic sediments which, on and near the platform, are replaced by deposits of the coastal accumulation plain wedging out to the west, and prograde into deep-water black shales and turbidites of the continental slope and its rise to the east. The formation of the Verkhoyansk passive margin is related to Devonian rifting. In the southern sector of the belt there are thick clastic and carbonate shelf rock sequences of Early to Middle Paleozoic and Later pre-Cambrian age. The sequences show the same changes in composition and thickness away from the platform edge as the Late Paleozoic and Mesozoic deposits do. One can assume that Devonian rifting merely modified the passive continental margin (carbonate platform) which had existed here since the Early Vendian. The formation of the continental margin related to the detachment of Siberia from another large continental block, probably North America, likely occurred in the Late Riphean–Early Vendian due to the preceding Riphean rifting.

The belt is subdivided into a number of seg-

ments, each with its own geometry of thrust systems. Balanced cross-sections for each segment based on the structural study of a surface geology and available gravity, seismic and drilling data are presented. It seems possible that large anticlinoria of the central and northern Verkhoyansk belt have a duplex structure. The structure of the southern Verkhoyansk belt is defined by the Kyllakh thrust with a horizontal displacement of up to 90 km. The frontal thrusts to the west of the belt were initiated during sedimentation as early as in Late Jurassic time.

This period marks the beginning of the collision between the Siberian continent and the Kolyma–Omolon superterrane located 500 km to the east of the Verkhoyansk front and the accretion of the Okhotsk terrane to the southern Verkhoyansk belt. The deformation ended by the late Late Cretaceous. The frontal thrust structures formed in Late Cretaceous time were rejuvenated during the Middle to Late Pleistocene reactivation which produced the modern high mountain topography. The general configuration of the Verkhoyansk foldbelt and its frontal structures is defined by the geometry of the Devonian rift-related structures on the eastern platform margin under the conditions of general compression in latitudinal direction in Late Cretaceous time.

Types of fronts of the Verkhoyansk fold-and-thrust belt

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The Verkhoyansk fold-and-thrust belt extends along the eastern margin of the Siberian platform and belongs to the external zone of the Verkhoyansk–Chersky collisional orogenic belt. The belt is subdivided into the West Verkhoyansk and South Verkhoyansk sectors. Within the West Verkhoyansk sector three zones are distinguished: frontal, middle, and inner. The frontal zone mainly includes fold-thrusts. The middle zone has a passive roof duplex. Main detachment in these zones is traced at the base of the Late Paleozoic–Mesozoic clastic complex. The inner zone represents a blind autochthonous roof duplex of the Late Precambrian–Middle Paleo-

zoic carbonate complex and imbricate fans and pop-up structures in the clastic complex. The structure of the South Verkhoyansk sector is defined by the high-amplitude Kyllakh thrust and an allochthonous roof duplex in its central part. We used two classifications of thrust fronts, one of I. Vann et al. (1988) and the other of C. Morley (1986), which complement each other. The front of the Verkhoyansk fold-and-thrust belt is divided into a number of branches which, in some cases, coincide with western terminations of previously established segments. The northern Lena–Anabar branch includes frontal monocline and anticlines with steeper southern