



Late Mesozoic deformations of the Verkhoyansk-Kolyma orogenic belt, Northeast Russia

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The Verkhoyansk-Kolyma orogenic belt marks the boundary between the Kolyma-Omolon superterrane (micro-continent) and the submerged eastern margin of the North Asian craton. The orogenic system is remarkable for its large number of economically viable gold deposits (Natalka, Pavlik, Rodionovskoe, Drazhnoe, Bazovskoe, Badran, Malo-Tarynskoe, etc.). The Verkhoyansk – Kolyma orogenic belt is subdivided into Kular-Nera and the Polousny-Debin terranes. The Kular-Nera terrane is mainly composed of the Upper Permian, Triassic, and Lower Jurassic black shales that are metamorphosed at lower greenschist facies conditions. The Charky-Indigirka and the Chai-Yureya faults separate the Kular-Nera from the Polousny-Debin terrane that is predominantly composed of the Jurassic flyschoid turbidites.

The deformation structure of the region evolved in association with several late Mesozoic tectonic events that took place in the north-eastern part of the Paleo-Pacific. In Late Jurassic-Early Cretaceous several generations of fold and thrust systems were formed due to frontal accretion of the Kolyma-Omolon superterrane to the eastern margin of the North Asian craton. Thrusting and folding was accompanied by granitic magmatism, metamorphic reworking of the Late Paleozoic and the Early Mesozoic sedimentary rocks, and formation of Au-Sn-W mineralization. Three stages of deformation related to frontal accretion can be distinguished. First stage D1 has developed in the north-eastern part of the Verkhoyansk – Kolyma orogenic belt. Early tight and isoclinal folds F1 and associated thrusts are characteristic of D1. Major thrusts, linear concentric folds F2 and cleavage were formed during D2. The main ore-controlling structures are thrust faults forming imbricate fan systems. Frontal and oblique ramps and systems of bedding and cross thrusts forming duplexes are common. It is notable that mineralized tectonized zones commonly develop along thrusts at the contacts of rocks of contrasting competence. The superimposed structures are recognized from the early cleavage deformations. Folds F3 are often chevron type, open or tight. D1, D2 and D3 deformations are coaxial. In the Late-Neocomian-Aptian the Kolyma-Omolon superterrane started moving to the west. As a result, the thrust faults were reactivated with sinistral strike-slip motions along fault planes. At that time, granitoids of the North and Transverse belts were emplaced in the northwestern part of the Kolyma-Omolon superterrane. The strike slip faults were associated with cross open folds. The postaccretionary stage is associated with the development of the Albian-Late Cretaceous Okhotsk-Chukotka subduction zone. During this stage strike-slip faults and associated deformation structures were superimposed upon accretion-related tectonic structures of the Verkhoyansk – Kolyma orogenic belt.