foredeep to the north, including several Meso-Cenozoic basins flanked by thrusts on one or both sides.

The CSB marks the Eurasian–North American plate boundary extending from the Sea of Okhotsk to Kamchatka. It connects seismoactive zones of the Arctic and the Pacific. Seismoactive in it are sinistral, northwest-trending strike-slip faults bordered by trusts to the northeast and southwest. The CSB is dominated by compressive tectonic stresses that replace tension of the mid-ocean Gakkel Ridge near Buor–Khaya Bay of the Okhotsk shelf. The present-day topography of the Cherskiy Range is also due to Late Cenozoic compression.

High tectonic activity of the BSB and CSB faults is confirmed by epicenter clusters along their paths and seismic dislocations confined to them. Their kinematics is well-established on the basis of focal mechanisms, displacements of geological bodies in fault-affected zones, observations of fracturing and slickensides, study of seismodislocations, and imagery data. The development of definite types of active rupture dislocations in BSB and CSB fits well into geodynamic models for major strike-slip faults forming in an environment of large, convergent plates. The squeezed boundary area is uplifted to become dissected by strike-slip and bounded by thrusts. This is exactly the case at the boundary between the plates considered.

Kinematic evolution of the Subtatric–Ružbachy Fault System in the Spišská Magura region (Slovakia)

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The Spišská Magura region is a part of the Central-Carpathian Paleogene basin representing the northernmost part of the Central–West Carpathians. It consists of Paleogene deposits transgressively overlying the carbonate of the Krížna Nappe, belonging to the Central–West Carpathians, and tectonically bounded to the Pieniny Klippen Belt in the north and to the East-Slovakian Neogene Basin in the east. The deposits have a wide stratigraphic span ranging from the Middle Eocene to the Late Oligocene

The Subtatric–Ružbachy Fault System played a considerable role in Cenozoic evolution of the northern part of the Central-Carpathian Paleogene Basin. The system, which represents a shear zone with NE–SW direction, restricts the eastern continuation of the Mesozoic rocks of the Tatra Mts., bounds the Mesozoic Ružbachy Island to the Paleogene deposits having governed the deposition in the area since the Paleogene.

In the area neighboring the system, we distinguished four deformation stages:

The oldest deformation stage is connected with NNW–SSE compression resulting in overthrust structures of NE–SW direction dipping toward NW. The compression induced activity of the Subtatric–Ružbachy Fault System. This resulted in uplift of the Paleogene deposits in the Spišská Magura region and subsequent erosion of their uppermost parts which probably were analogous to the deposits occurring south of the Fault System in the Levoča Mts. today. The extensional component of this stage was of E–W strike. The effect of extension is more pronounced north of the Subtatric–Ružbachy Fault System, in the central domain of the studied area, where extensional component has NW-SE orientation. The extension resulted in the formation of NW–SE normal faults dipping toward NNE and SSW. It also governed origin of mesoscopic fold structures with fold axes dipping toward NE. The age of the deformation is suggested by timing of the Tatra Mts. uplift (some 15 Ma, Král' 1977). The proved Quaternary uplift also suggests the recent activity of the Fault System. The Miocene uplift also determined exposure of the oldest Paleogene sequences in the Spišská Magura region due to subsequent erosion of overlying younger deposits and subhorozontal indication of Paleogene formation toward N.

The second deformation stage in the SE part of the region is related to the E–W activity of the maximal compressional stress component. It resulted in NE–SW strike-slip faults of the Subtatric–Ružbachy system with dextral movements. The occurrence of travertine on the structures suggests their recent activity continuing from the Neogene.

The third deformation stage in the central part of the studied region is related to the maximum compresional stress component in NNE–SSW direction and with the maximum extensional stress component in WNW–SES direction. We assume almost synchronous development with the NNW–SSE shear zone.

The youngest deformation stage on the SE margin of the studied area is characteristic of prevailing extensional stress component with NW–SE direction. This phase of the evolution of the Subtatric–Ružbachy Fault System is associated with normal faults of NE-SW direction. This indicates the Late Miocene and/or Pliocene age of the faults.

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Geodynamics of the foreland plate during the Neogene Carpathian collision - integration of outcrop and seismic data (Polish Carpathian Foredeep basin)

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The Outer Carpathians and Carpathian Foredeep Basin (CFB) have developed due to convergence of the Alcapa microplate and the European plate. This convergence has resulted in plate flexure, forebulge migration and related erosion, development of compressional and extensional structures and reactivation of inherited faults. In order to study geodynamics of the foreland plate response to collision events, outcrop data have been combined with seismic data for the area located in the front of present-day Carpathian orogen. CFB deposits can be presently found both below the Carpathians (so-called inner CFB) as well as in front of the orogenic wedge (so-called outer CFB).

The Miocene foredeep basement is formed by European plate that was shaped by Late Cretaceous/Paleocene inversion of the Permo–Mesozoic Polish Trough. Subsequent Paleogene erosion resulted in partial peneplenation.

During the Lower Miocene the peneplain was cut down by deep paleovalleys located over pre-existing, NW striking basement faults. They were formed due to large morphological gradients related to development of inner CFB and forebulge uplift. The foredeep–forebulge geodynamic system developed in response to flexure of the lithosphere caused by subduction of the relict oceanic crust (Magura basin) beneath the Alcapa microplate. The advance of the Alcapa towards N (probably with eastward motion component) was associated with subduction-related volcanism in the Pannonian region, and with left-lateral rotation, forced by oblique collision with European plate.

The main phase of collision in the Polish segment of the Outer Carpathians took place during the Badenian. Contraction of the orogenic wedge induced shift of the CFB from its "inner" to "outer" position. Outer CFB sedimentary complex in Poland is divided into (simplified): the Lower Badenian pre-evaporitic series, the Middle Badenian evaporites, the Upper Badenian post-evaporitic series and, the youngest Sarmatian and Pannonian series.

In the Lower Badenian, marine transgression of the outer CFB associated with extensional stresses related to flexural stretching led to minor normal offsets on pre-existing basement faults. In the beginning of Upper Badenian, northward allocation of lithospheric flexure led to successive migration of subsidence centre to the north, associated with the main phase of foreland plate extension. For proximal zone of the foredeep, structural extension of the foreland plate, calculated along two seismic sections was of an order of 1.7 % and 2.5 %. Assuming that the whole extension was due to the bending of the plate, a depth of neutral surface (of constant length) was computed at 5–7 km. Shallow neutral surface implies thin brittle upper crust (ca. 10–14 km) being mechanically detached from the lower lithospheric levels. Obtained thickness of the upper crust is similar to the effective elastic thickness of the lithosphere (8–15 km) inferred from flexural modelling. The Miocene subduction was driven by slab-pull and roll back mechanisms. Simultaneously with extension of the foreland plate, thin-skinned compression was exerted at the orogen wedge causing folding and northward thrusting of the Outer Carpathians.

End of the Upper Badenian, compressional stresses was transmitted into the top of the foreland plate. It was evidenced by structural analysis of synsedimentary deformations of the uppermost Badenian series from open-cast sulphur mine located in a distal zone of the CFB. In this area, system of contractional features of wrench tectonic origin developed over dextral transpressive basement faults trending NW–SE.