and along the Lepetitnica Valley probably to the western margin of Mszana tectonic window. This tectonic line was presented also by Slovakian geologists and named Prosečno dislocation system.

The exceptional position of Orava Basin is documented by model of the top of crystalline basement where its the most lower position is manifested at a ~18 km depth. On the geophysical map of Western Carpathians the course of axis of gravimetric minimum presents en-echelon pattern between Zážitivá sigmoid and Orava Basin (within rotated Orava Block).

Owing to support of the Committee for Scientific Re-

search — grant No 6PO4E 020 08, the seismic studies (refraction and reflection) and evaluation of earthquake of 11 September 1995 was carried out. The seismic study documents the complexity of Neogene structures near Czarny Dunajec and is in good agreement with the result of gravimetric interpretation. Interesting results of spatial and temporal analysis of epicentres of earthquakes from 11—13, 09 1995 are elaborated. The epicentres with contraction effects calculated from seisograms are spatially related with the zone of Domański Wierch left-lateral strike-slip fault, while the epicentres with dilatation effects were limited to vast flat area of Czarny Dunajec fan, a subsiding area.

Neogene tectonic evolution of the Mecsek Mts (Hungary, Tisia—Dacia unit)

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Prior to Neogene uplift Mesozoic beds experienced intense deformation which resulted in the formation of asymmetric anticlines, overturned beds, ramps of NW vergence. No significant post Mesozoic cover developed in Mecsek area. Five main tectonic phases were observed having close correlation with sedimentary cycles. The dating of these phases is possible on the basis of major Neogene discontinuity surfaces.

The first phase is an extensional one with NE—SW synsedimentary normal faults. The regional occurrence of these faults is well documented by the thickness map of Ottnangian —Eggenburgian (21–17 Ma) sediments. In addition indications of sinistral E—W strike-slips were also deduced.

The second phase is characterized by extension. The NW—SE dextral and NE—SW sinistral faults of this phase were active in the Carpathian (Lower Miocene). The axis of σ₁ has an N—S while the axis of σ₂ an E—W orientation. This phase well correlates with the regional large-scale Carpathian—Badenian (17–13 Ma) E—W extension of the Pannonian Basin.

The Sarmatian — Lower Pannonian (13–9 Ma) transtensional phase includes the development of normal faults (NE—SW). At some locations left lateral strike-slip faults (ENE—WSW) were also observed. The continuation of this strike-slip fault also exists to the East and to West.

The Late Pannonian (7.5–6 Ma) phase appears in different tectonic style. Flexural beds, pop-up structures, overthrust toward the foredeep (both to the North and to the South) indicate this change of stress field, and the compressional phase. The fold axes, strike-slip faults and overthrusts refer to σ₁ axis of N—S. This compressional phase resulted in the rejuvenation of large-scale left lateral strike-slip faults located at the southern margin of Mecsek Mts. In relation to this faulting en-echelon anticlines and synclines were formed.

The latest deformation of Upper Pannonian—Pleistocene to Recent period is of extensional origin with dextral (E—W) and sinistral (NNW—SSE) faults. This phase (σ₁ is NW—SE) appears to be active nowadays, too.

The gravity field of the eastern part of the Western Carpathians and its geodynamic implications

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In recent years, the study of geodynamic evolution of the Western Carpathians has been concentrated mainly in their western and central segments. For an integrated study of the whole Western Carpathians it is very important to investigate also their eastern part. In order to constrain the lithospheric structure and geodynamics of the region a detailed analysis of gravity field is done. The analysis of the gravity field in the eastern part of the Western Carpathians is based on local isostatic equilibrium by using published maps of topography, gravity field, thicknesses of sediments, crust and lithosphere and two-dimensional density modelling. A preliminary, two-dimensional gravity model is also presented along the Profile KP—X, which extends across the region investigated. Unfortunately, the interpretation can not be supported by available seismic refraction and reflection profiling observations, because they are missing in this region.

Density contrast between crust and upper mantle (+300 kgm⁻³) and lower lithosphere and asthenosphere (~30 kgm⁻³)
results in isostatic equilibrium for approximately 10 km deepening of the Moho and about 70 km thickening of the lithosphere/asthenosphere boundary from the Pannonian Basin to the Western Carpathian exterminides. The Moho gravity effect is fully compensated by topography and lithosphere/asthenosphere boundary. In spite of rough approximation of crustal and lithospheric geometry the calculated Bouguer anomaly in local isostasy correlates relatively well with the observed gravity anomaly. Two-dimensional lithospheric density cross-section indicates that a slope of underthrusting the European lower plate under the upper Carpatho-Pannonian upper plate is very steep and post-collisional crustal shortening is small (about 10–20 km). Furthermore the modelling results suggest a crustal slab under the Vihorlatské vrchy Mts. The analysis of the gravity field taking into account other geophysical and geological data assumes that the eastern part of the Western Carpathians represents very complicated area in which interaction of compression, strike-slip and extension can be observed. This interplay leads to the formation of the East Slovakian Basin. The basin is characterized by a large thickness of sediments, thinning of the crust and lithosphere. Extension process is accompanied by intrusions of high-density material into the lower crust and volcanic activity.

Fault tectonics of the Ukrainian Carpathian foredeep and its basement

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The development of the fault tectonics of the Ukrainian Carpathian Foredeep (UCF) and its basement from the passive continental margin to neotectonic stage is discussed. The investigations are based on the geophysical data, well sections, subcrop maps, the maps of thickness of Jurassic, Cretaceous and Miocene deposits. By the study of paleostresses that caused the fault formation we have used their kinematic characteristics. It was created the charts of Δd across several profiles to determine the synsedimentary character of fault development. Neotectonic investigations of the UCF were carried out for the study of the influence of active fault structures on relief forming processes. Among them are the creation of relief maps, the maps of neotectonic elevation measuring the strike of linear stream system on topographic maps.

The results of the investigations mentioned above are: On the stage of passive continental margin the faults of the UCF developed as synsedimentary central faults. This is suggested by the thickness changes of the contemporaneous deposits in hanging and footwalls of the faults. The changes of the thickness of Jurassic and Cretaceous deposits along strike of the Ukrainian Carpathian Foredeep indicate the existence of three segments within basement: NW, central and SE ones. These segments different had geological history. On the stage of the transition from passive continental margin to the foredeep some of the faults of the UCF acted post-tectonic. These peculiarities of the fault development were distinguished by the analysis of Δd charts.

The forming of the Miocene faults is connected with the development of the UCF. Some of the faults are inherited from previous stages. The Miocene faults are characterized as synsedimentary ones. Their amplitudes increase toward the Carpathians. The main forces that caused the fault formation are shown on the base of the plane dips and strikes of the faults and movement directions along them.

The main plane of the extension dips to the west under 70–80°. These faults are probably connected with development of the retreating subduction zone in studied area. The reflection of thrust nappes and strike-slip faults in relief is typical for the neotectonic stage. This is visible on Δh maps, neotectonic amplitude map and on the map of the strike of linear stream systems. The activity of faults (thrusts) decreases toward the foredeep. The most active was the NW segment of the UCF. The UCF consists of two parts: outer- autochthonous and inner—allochthonous ones which have different fault history. In the outer zone faults are inherited from the basement while thrusts and strike-slip faults are newly formed.

Structural evolution of the NE part of Hungary

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Three Mesozoic structural units are exposed in N Hungary: the lowermost Torna-Bükk unit, the overriding oceanic Meliata–Szarvaskő unit, and the topmost Szilice–Bődva unit. These are covered by Tertiary strata. We were mainly interested in the structural evolution of the Mesozoic units, because Tertiary strata have already been investigated. We measured structural elements in main outcrops, caves and quarries near the Hungarian/Slovakian border. Dating of the structures is relative and questionable.

A first E–W tensional phase was recorded by syndepositional, mostly W dipping normal faults in early Middle Triassic limestones. A first ductile shear phase was recorded in the lower Torna and Meliata units. This comprises SE striking stretching lineations with top to SE rotated clasts. The proposed age for this deformation is Late Jurassic, coeval with high pressure metamorphism.

The next phase was recorded in the Szilice units with