

The terrace equivalent of sediments within the studied area is found in S and SE flanks of the mountain range in the form of *Upper Terraces* with a base 35-45 m above the Danube River and with an accumulation thickness of up to 7 m.

In the overburden of the fluvial accumulation, the fluvial sediments of the younger part of the Middle Pleistocene, referred to as the middle part of the *Middle Complex of the "Danube gravel series"*, are deposited in the basin. Even these sediments are separated from the sediments of the lower part of the *Middle Complex* by 3-8 m roughly incoherent layer of sandy clays, corresponding to the Holstein interglacial. The sediments of the central part of the *Middle Complex* consist predominantly of coarser gravels, sandy gravels and coarse sands. Rarely, layers of clay, or silts or thick layers of gravel, secondary lithified by carbonates, occur in the form of calcretes.

The sediments of the middle part of the *Middle Complex* reach a thickness of 10-25 (30) m at the edge of the *Gabčíkovo Basin*; the thickness towards the centre of the basin is increased to about 50 m. On its E and E edges, the sediments either do not occur at all or reach only a minimum thickness. In the apical part of the delta in Bratislava the situation is similar. This indicates a possible slowdown in the tectonic subsidence of the basin up to its stagnation during this period.

The terrace equivalents occur in the adjacent peripheral elevation structures of the Little Carpathians in Bratislava on two levels of *Middle Terraces* on the slopes in Devínska brána Gate and in a double terrace at the edge of the basin in the city. At the edge of the Nitrianska pahorkatina Upland, syngenetic fluvial terrace sediments are buried below the loess deposits.

The fluvial accumulation of the Late Pleistocene forms the upper part of the *Middle Complex of the Danube gravel series*. Its area range is identical to the extent of the overlying Holocene accumulation. The exact separation of sediments from the underlying Middle Pleistocene accumulation is complex. When compiling the map, they were identified with frequent occurrences of layers of clay and silt and could be attributed to sedimentation under Eemian interglacial conditions. The upper part of the *Middle Complex* reaches a thickness of about 10-12 m on the edge of the *Gabčíkovo Basin*, including the territory of Bratislava, which coincides with the *Bottom Accumulation*. In the direction towards the centre of the basin, the thickness of the layer increases to 15-18 m and further to the SE it increases to values exceeding 50 m. From the centre of *Gabčíkovo Depression* to SE, it decreases gradually to 6-8 m at Komárno.

The sandy gravels of the upper part of the *Middle Complex* get close to the surface beneath the Holocene cover in the so-called core of the *Zitný ostrov* (Rye Island) in the section from Bratislava via Dunajská Streda with incoherency till Komárno. They are formed by sandy gravel and sand, often covered by flood plain muds.

The synchronic sediments are exposed in the form of *Low Terraces*, e.g. on the right bank of the Danube along the state border with Austria, on the left bank in Bratislava and on NE periphery of the area from Šoporňa to Nové Zámky. The *Low Terraces* are often covered with flood plain calcareous silts and fluvial and aeolian sands. Other occurrences in the region are artificial exposures in the form of gravel pits.

A more pronounced facies of the surface part of the *Bottom Accumulation* is the system of sand bodies of *natural levees*. The part of the river sand was replaced by wind action for a short distance and formed the basis for the formation of aeolian dunes, which were subsequently transformed during the Holocene.

The Holocene fluvial sediments form the *Upper Complex of the Danube gravel series* within the Quaternary facies of the Danube Basin sedimentation. The complex is discordantly deposited on the Middle Complex and reflects the intense hydrodynamic changes of all the flows of the territory in the lateral direction. The sediments are represented, in particular, by lithofacially varied, laterally changing flood plain deposits. They are made mainly of silt, sandy silt, sand, gravelly sand and gravel and clay. The map of the Pleistocene-Holocene transition period is a special feature of the map, which provides a more detailed overview of the area of the "core" of the Rye Island.

The thickness of the Holocene cover often increases from 0.5 to 3 m from the "core" of the Rye Island towards the main flows. In the area of *Gabčíkovo* the thickness attains more than 5 m.

The surface of the area is dominated by a dense network of oxbows and occasionally overflowed beds. In the fill of the oxbows and in other depressions of the relief, fluvial-organic, organogenic and palustrine sediments, peat bogs and humuliths have evolved.

On the foothills of the Malé Karpaty Mts. and on the slopes of the valleys of the Nitrianska pahorkatina Upland, a variety of the deluvial, deluvial-fluvial and deluvial-proluvial sediments of the Pleistocene-Holocene transition period developed.

TECTONICS

The area depicted on the geological map is divided by the main fault zones into a system of partial depressions and elevations (Pospíšil et al., 1978; Vass et al., 1988; Elečko et al., 1998; Bezák et al., 2004).

The Little Carpathians fault system (represented in the region by *Boleráz Fault*) is developed at the SE part of the Little Carpathians horst. It was formed in the Badenian, later in the Late Miocene it was amplified and revived (Magdolen et al., 1979). It is recently seismically active (Čepek, 1938). Most authors consider the Little Carpathians fault system to be a normal fault, inclining to the SE, separating the Little Carpathians from the Neogene of the Danube Basin (Cambel and Valach, 1956; Janáček, 1971; Fusán et al., 1971).

Blatné Depression. – The southernmost part of the Blatné Depression reaches to the NW edge of the territory of interest. Maximum subsidence was reached in the Middle and Late Badenian period. The total thickness of the Neogene sediments is about 3,600 m; however, it is significantly smaller in this area.

Inovec Elevation. – From the Blatné Depression it is separated by the fault system (Hynie, 1927; Mahef, 1950, 1951; Putiš, 1981; Bezák et al., 2004). In this area it is bounded at the NW by the NE termination of *Hamuliakovo Fault* and by the NE termination of the *Sládkovičovo Fault*. In the south, it is limited by the *Saliby Fault*. The sediment thickness does not exceed 1,000 m.

Rišňovce Depression. – It is situated between the Inovec and Tribeč elevations. Maximum subsidence took place during the Badenian and Sarmatian periods. In the Sarmatian, freshwater sediments of the Ripňany Fm., reaching a thickness of up to 1,430 m, deposited in a rapidly subsiding depression. The total thickness of the Neogene rocks in its centre is about 3,500 m.

Tribeč Elevation. – It is separated from the Rišňovce Depression by the *Veľké Zálužie Fault*, from SE it is bounded by the *Mojmírovce Fault*. The elevation gradually drops to the SW and in the Šála area it is covered by the Neogene sediments with a thickness of about 3,000 m.

Dobrá Voda Fault (sensu Elečko et al., 1993) runs through Brezová Depression and continues along the southern borders of the Považský Inovec and Tribeč Mts. Along it, the horst of the Považský Inovec gradually drops towards S and submerges below the Neogene of the Danube Lowland (Fusán et al., 1971). The manifestations of this NW-SE oriented fault in the Early Miocene period can be observed up to Štúrovo.

Komjatice Depression. – On the NW it is bounded by the Tribeč Elevation and on the SE by the Levice Elevation (which does not interfere with the region). The maximum subsidence activity was in the Middle Miocene and Pannonian. The total thickness of the Neogene sediments at its southern end is about 3,500 m.

Gabčíkovo Depression. – It forms the central part of the Slovak part of the Danube Basin. At the NE it is limited by the *Saliby Fault*, on the W by high blocks created by Malé Karpaty faults. At the E it continues with the high blocks created by *Palkovičovo*, *Hurbanovo* and *Komárno faults*. Maximum sedimentation occurred mainly in the Late Miocene and Pliocene. During the Quaternary period, the subsidence activity did not fade out and about 500 m of the Quaternary sediments deposited in the area of *Gabčíkovo* (Scharek (ed.) et al., 2000).

The detailed characteristic of the block structure of the central part of the *Gabčíkovo Depression*, which is the result of the youngest Quaternary phase of neotectonic evolution, is presented in Pospíšil et al. (1978). The fault failures active in the Quaternary, which the authors defined mainly based on the study of the thickness of the Quaternary sediments on individual blocks, geophysical results and flood control in the year 1965, are indicated on the attached tectonic scheme.

The peak activity of the normal fault systems, many of which also violate the pre-Cenozoic basement, had occurred in the period of the Early to Middle Miocene. The jump height ranges from a dozen to the first hundred meters. It has been certainly affected by the sediment compaction processes, depending on their grain-size composition.



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REGIONÁLNE GEOLOGICKÉ MAPY SLOVENSKA

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GEOLOGICKÁ MAPA PODUNAJSKEJ NÍŽINY – PODUNAJSKEJ ROVINY

GEOLOGICAL MAP OF THE DANUBE LOWLAND – DANUBE FLAT

ŠTÁTNY GEOLOGICKÝ ÚSTAV DIONÝZA ŠTÚRA BRATISLAVA

