The residual gravity anomalies, on the other hand, emphasize the presence of the smaller geological bodies without the masking influence of the "regional background". The most striking local negative residual anomaly is caused by the Říčany (adamelite) granite body situated 30 km ESE of Prague in the northern margin of the Central Bohemian Pluton. The most remarkable positive residual anomalies are produced by basic bodies such as the central part of the Doupov Mts. composite volcano or the metabasite zone of the Brno Pluton.

Steep changes in the Earth's crust densities are perfectly shown by horizontal gradients of the gravity field. Marginal limits (boundaries) of the structures owing different densities can be clearly specified using this kind of derived data. The most expressive horizontal gradients border the contact zone of the "light" Karlovy Vary granite pluton with the high density Mariánské Lázně basic complex in the W of Bohemia. Another steep horizontal gradients are developed (among others) in the E-margin of the Bohemian Massif, i.e. in the area where the outcropping Moravian Paleozoic is in the contact with the Carpathian Foredeep.

Another special way to analyse the density environment consists in the calculation of so called Density Boundaries Maps by Linsser method. The position of boundary lines between the geologic structures of different densities can be shown in various depth levels by this method. (The density boundaries calculated for the depth level of 3 km are shown in the Fig. 1).

A new set of magnetic maps

Quite different properties of the rocks (predominantly the magnetic susceptibility) are manifested by magnetic anomalies. The primary map of magnetic anomalies of the Czech Republic (mostly based on the airborne data) shows rather complicated pattern of the complex magnetic response of both the local and the regional anomalies.

The analytical continuation upward which can be worked-out for different levels was proved to be the useful tool in the structural analysis. The secondary map of the analytical continuation upward to the level of 1 km above the ground belongs to the most frequent product applied in geological studies.

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The Eocene to Oligocene Changes of Depositional Environments in the Central Carpathian Paleogene Basin (Spišská Magura Mts., Slovakia)

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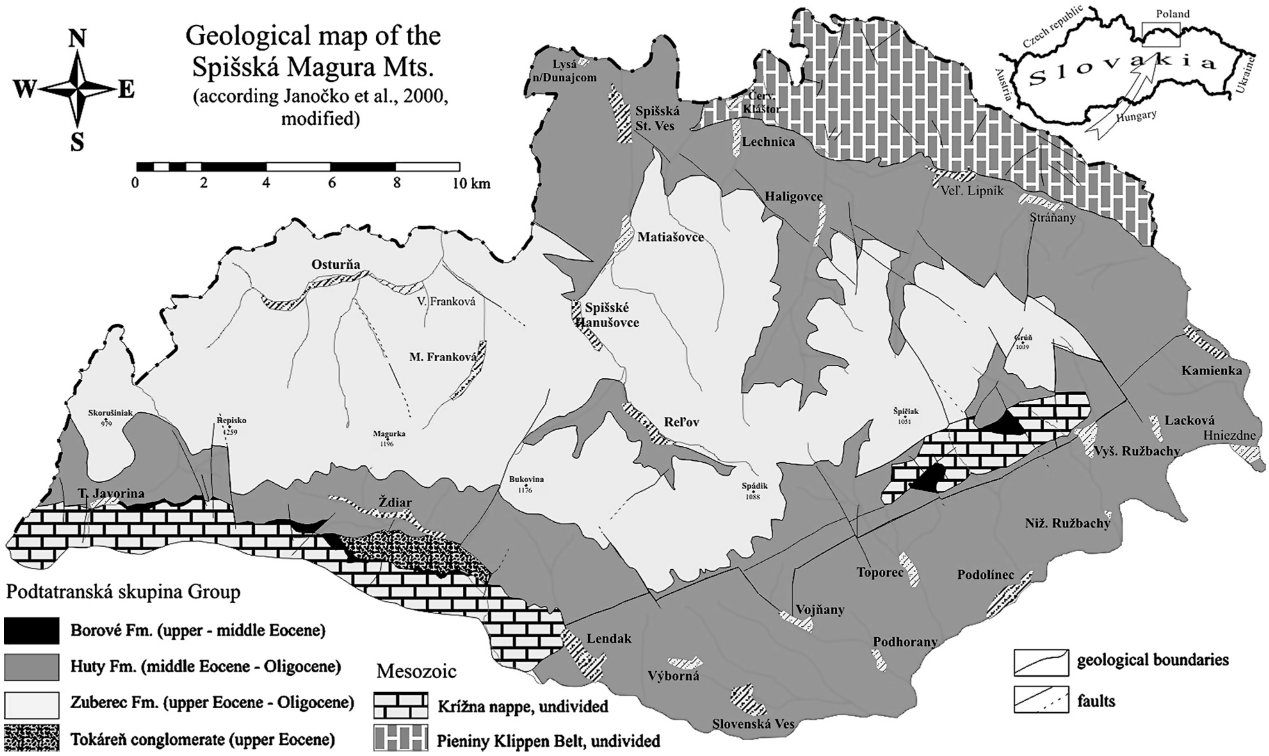
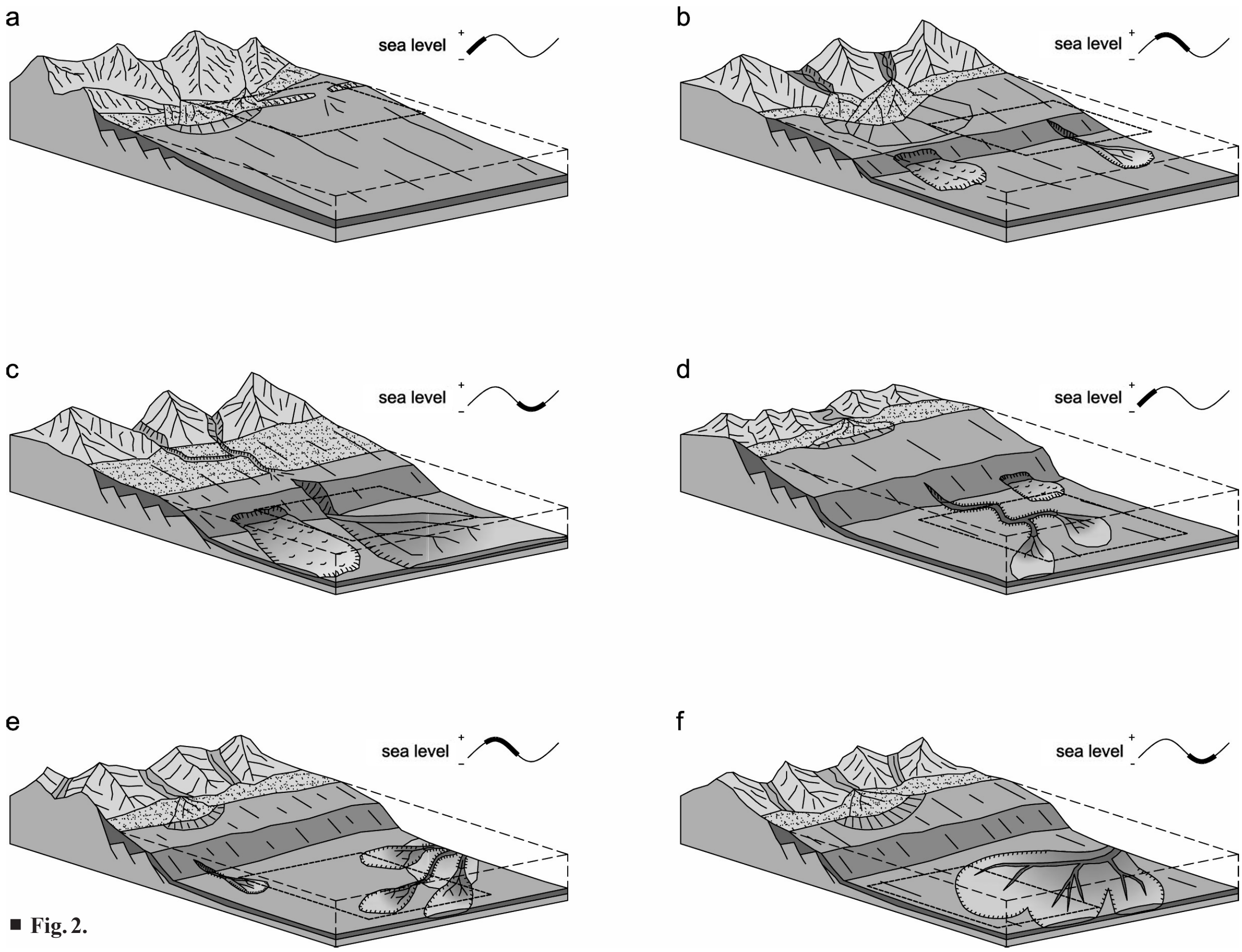
The Central Carpathian Paleogene Basin (CCPB) is one of well preserved Paleogene basins in Western Carpathians, its sedimentary succession provide good tool for sedimentological studies. Sedimentary fill of the CCPB is consisting terrestrial and shallow to deep marine sediments, from several hundred metres to several kilometres thick (Soták et al. 2001). Basin is interpreted as forearc basin, situated on upper plate on front of Outer Carpathians accretional wedge. The sediments of the CCPB are assigned to four sedimentary formations: Borové Fm., Huty Fm., Zuberec Fm. and Biely Potok Fm. according Gross et al. (1984). The age of sedimentary formations is Bartonian to Lowermost Miocene (Olszewska and Wieczorek 1998, Soták 2001).

In Spišská Magura Mts. are preserved sediments of the Borové Fm., Huty Fm. and Zuberec Fm. (Janočko et al. 2000a,b, Fig. 1). Biely Potok Fm. is not present because of considerable erosion of upper part of basin fill. However, erosion rate decreasing westward and in western part of mountain and in adjacent part of Podhale Basin are preserved upper Oligocene to Lower Miocene deposits, belonging to Brzegi Mb., which are presumable coeval to Biely Potok Fm. (Gedl 2000).

Borové Fm. are laterally very variable, we recognized there sedimentary facies of alluvial fans, wave reworked fan deltas and shallow marine inner shelf facies (Fig. 2a). Fan delta activity is connected with falling to slow rising of relative sea level, during Upper Eocene transgression the shallow marine, fossiliferous sand were deposited. The lowermost part of the Huty Fm. suggest to renewed deltaic build-up near Ždiar village, on other parts of basin outer shelf to deep-marine sedimentation started due to tectonically controlled subsidence (Fig. 2b). During Lower Oligocene early lowstand a 170–200 m deep submarine canyon was cut into basement (Fig. 2c), which was later backfilled by conglomerates and sandstones (Tokáreň Mb.). Due to slow rise of sea level during late lowstand activity in canyon terminated; overlying strata were deposited in slope setting. Upper part of the Huty Fm. represents transgressive, mud-rich fan deposits, with sedimentary facies of channel-levee, depositional lobe to basin


Geological map of the Spišská Magura Mts.
(according Janočko et al., 2000, modified)
N
W
E
S
0
2
4
6
8
10 km
Slovakia
Czech republic
Poland
Austria
Hungary
Ukraine
Lysá n/Dunajcom
Spišská St. Ves
Červ. Kláštor
Lechnica
Haligovce
Veľ. Lipník
Stráňany
Matiašovce
Osturňa
V. Franková
M. Franková
Spišské Hanušovce
Kamienka
Lacková
Hniezdne
Vyš. Ružbachy
Niž. Ružbachy
Reľov
Špičiak 1051
Spádik 1088
Bukovina 1176
Magurka 1196
Repisko 1259
Skoruśniak 979
T. Javorina
Ždiar
Toporec
Podolínec
Vojňany
Podhorany
Lendak
Výborná
Slovenská Ves
Podtatranská skupina Group
Borové Fm. (upper - middle Eocene)
Huty Fm. (middle Eocene - Oligocene)
Zuberec Fm. (upper Eocene - Oligocene)
Tokáreň conglomerate (upper Eocene)
Mesozoic
Krížna nappe, undivided
Pieniny Klippen Belt, undivided
geological boundaries
faults

■ **Fig. 1.**


a
sea level
b
sea level
c
sea level
d
sea level
e
sea level
f
sea level

■ **Fig. 2.**

plain environments (Fig. 2d). Paleotransport indicators in lower part of the Huty Fm. suggest to east northward to west northward oriented paleocurrents, reprendicular to basin axis. Sediments of Zuberec Fm., developed during Mid-Oligocene see level fall, they were deposited in elongate, more sand-rich fan (Fig. 2e). The study area is on distal part of this fan, however, shallow channels flanked by levees often reached into smooth, outer fan area. Youngest preserved part of the CCPB fill represents deposit of Biely Potok Fm., which is typical sand-rich fan (Fig. 2f). Proximal part of this fan with well developed suprafan lobes is in western part of basin (Orava region), in study area is preserved its distal part (Brzegi Mb.). Paleotransport direction in both, Zuberec Fm. and Brzegi Mb. is oriented toward east; submarine fans were redirected to axial position in basin.

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Gosau Deposits of the Apuseni Mts. as a Support to Understanding the Geodynamic Evolution of the Alpine/Carpathian Orogen

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The present-day shape of the Alpine chain is a consequence of Mesozoic to Tertiary plate movements within the Tethys region. As part of this orogen, the Apuseni Mts. in Romania were formed during the Upper Cretaceous convergence between the Tisia and Dacia microplates. In both orogens (the Apuseni Mts. and the Eastern Alps) an Upper Cretaceous basin evolved, which commonly is known as Gosau basin. This work focuses on the sedimentologic and geodynamic evolution of the Gosau basins of the Apuseni Mts.

Sedimentologic records yield facies differences within the Apuseni Mts: the southern and eastern parts of the Apuseni Mts. record both, deep marine and shallow marine sediments, which, according to the Austroalpine definition, are grouped into the Lower Gosau Subgroup (shallow marine facies) and Upper Gosau Subgroup (deep marine facies). In the northern Apuseni Mts. only shallow marine sediments were deposited. Paleontological data constrain the stratigraphic range: sedimentation started in Upper Turonian time and ended in the uppermost Cretaceous. The sedimentation onset of the Lower Gosau Subgroup occurred diachronously with a lateral shift from southwest to northeast (Schuller 2004). The sedimentation onset of the Upper Gosau Subgroup does not show a diachronous pattern. Heavy mineral assemblages prove the erosion of areas lying on both sides of the elongated basin. Basin modeling based on vitrinite reflectance confirms maximum sediment thickness of approximately 3000 m, similar to what is know from the Eastern Alps. Fission-track age populations of detrital zircons from the Gosau sediments reflect three Mesozoic tectonothermal events in the hinterland: at 90–110 Ma, 130–150 Ma and 170–200 Ma (Schuller 2004). Two additional age populations record Paleozoic ages (250–300 Ma and ~400 Ma). The convergence of the Tisia and Dacia microplates resulted in a “soft” collision, which is indicated by non-resetting of detrital apatite fission-track ages from the Gosau sediments. However, there was increased exhumation in the crystalline hinterland, which is shown by thermal modeling of apatite fission-track lengths (Schuller 2004).

The achieved data lead to a reinterpretation of the plate tectonic evolution of the studied area and the proposal of a geodynamic model for the generation of such type of basins. Initial basin subsidence is a consequence of high-strain forced subduc-