Central Carpathian Paleogene Basin (CCPB) is located in northern Slovakia, and partly also in southern Poland. This geological unit comprises sedimentary rocks deposited in a sea basin formed in the Central Carpathian area in the Eocene. The basement on which the basin was developed consisted of Mesozoic rocks belonging to allochthonous thrust sheets. During the Turonian, these nappes were thrust onto the Central Carpathian massifs (e.g., Tatra Mts., Malá Fatra Mts., Strážov Mts.), over their crystalline basements with their paraautochthonous sedimentary cover. The CCPB and the Tatra Mts. were the subject of a broad range of studies for over two centuries. However, several questions still remain unanswered. Contemporary advances in diverse research methods provide excellent tools to revisit some of the unresolved issues. In general, this research focuses on reconstructing the evolution of the CCPB and Tatra Mts from the Cretaceous to the Neogene. The emphasis was placed on the following topics: the sedimentary conditions in the CCPB rocks, the Oligocene-Miocene burial event in the Central Carpathians, and the tectonic evolution of the Cretaceous and Paleogene rock sequences.

A complex, multi-faceted approach was adopted to shed new light on these issues. The methods comprise organic geochemistry (e.g., gas chromatography-mass spectrometry, total organic carbon measurements, Rock-Eval analysis), petrography (e.g., vitrinite reflectance, pyrite framboid diameter measurements) and rock magnetism coupled with magnetic fabric analyses. The units chosen for this study are as follows: the Lower Cretaceous marls, marly limestones, and limestones of the Mraznica Fm., which is a member of the thrust nappe system, and the clastic rocks along with coaly layers of the Huty, Zuberec, and Biely Potok Fms. which belong to the CCPB.

Biomarker analysis revealed a changing depositional environment during the sedimentation of the CCPB rocks. In the early Oligocene, an open-marine basin prevailed, and the sedimentation proceeded under dysoxic to euxinic conditions. Mixed marine and terrestrial organic matter with abundant organic compounds associated with dinoflagellates, suggests open marine conditions with terrestrial input from the land. The presence of isorenieratane and its derivatives, along with tiny pyrite framboids documents the occurrence of photic zone euxinia. Over time, the morphology of the basin has changed, largely remodeling the sedimentary conditions. In the Late Oligocene, the sedimentation proceeded in an estuarine-type basin. The conditions in the water column were predominantly oxic, while disoxic conditions occurred only intermittently in the sediment. The terrestrial type of organic matter prevailed over the marine type, reflecting the gradual shallowing of the basin. Abundant angio- and gymnosperm biomarkers along with fungi-related compounds point toward an intense supply of terrigenous organic matter. Moreover, intense erosion resulting in terrestrial run-offs to the basin could be facilitated by wildfire episodes documented in the Late Oligocene units.

The sedimentation of the CCPB rocks led to the subsequent burial of the study area and reached their maximum in the Late Oligocene-Early Miocene. The impact and intensity of the burial are recorded by a changing paleotemperature pattern in the studied area. Biomarker-based parameters and Rock-Eval-derived T_{max} document the highest thermal maturity in the Spiš Basin, whereas the least thermally affected areas comprise the northern part of the Orava Basin, and the Šariš Upland. The calculated paleotemperatures span from <60°C in the least mature regions, to 200°C in the highly altered CCPB parts. Moreover, this trend is closely reflected by the paleotemperature pattern documented in the nappe rocks of the Choč-Tatra Belt by organic and rock magnetic methods. The burial impact is the highest in the Belianske Tatra Mts., and slowly decreases towards the west. Its impact is reflected in the magnetic mineralogy, and is characterized by an increasing content of ferromagnetic (*sensu lato*) minerals. This similarity suggests that the Oligocene-Miocene burial had a larger impact on the nappe rocks than the Turonian one.

Magnetic fabrics of the Mraznica and Huty Fms. recorded different evolution stages of the Tatra Mts and their foreland. The main minerals controlling the fabrics are phyllosilicates and/or iron oxides. All fabrics are characterized by a mixture of sedimentary and tectonic features, mainly a compactional magnetic foliation and a strain-related magnetic lineation. In the Mraznica Fm., the anisotropy of in-phase magnetic susceptibility (ipAMS) documented the shortening direction linked with Turonian thrusting, whereas the Huty Fm. rocks recorded the compression during the Miocene uplift and tilting of the Tatra Mts. Ferromagnetic-driven fabrics, such as anisotropy of out-of-phase magnetic susceptibility (opAMS) and anisotropy of anhysteretic remanent magnetization (AARM), revealed burial-related fabrics. In the Huty Fm., extension during the opening of the CCPB was documented in the majority of studied sites. The burial resulted in the formation of magnetite on the phyllosilicate matrix, resulting in opAMS and AARM fabrics mirroring the ipAMS fabrics in some sites. Moreover, the ferromagnetic fabrics in Mraznica Fm. rocks from the Western and High Tatra Mts., recorded an impact of transpression during uplift.

In conclusion, this thesis sheds new light on the geological evolution of the CCPB and Tatra Mts. Furthermore, it provides novel data on the sedimentary conditions and paleotemperature patterns in the CCPB. Moreover, combining different methods proved to be a good approach to investigating sedimentary basins.