

Streszczenie w języku angielskim

At the Eocene/Oligocene transition, the progressive collision of Africa with Eurasia, Apulia, and the Arabian plate led to the final disappearance of the Tethys Ocean and the isolation of the marginal Paratethys Basin. Under conditions of a cooling climate and eustatic changes, the Paratethys was divided into smaller basins temporarily isolated from each other and from the global ocean. As a result of long-term water stratification and oxygen depletion, the deposition of rocks rich in organic matter (OM) occurred, represented primarily by shales, mudstones, and cherts of the Menillite facies. These rocks are widely considered source rocks for hydrocarbon deposits extending from the Vienna Basin through the Carpathians, the Black Sea, and the Caspian Sea regions, as far as Kazakhstan.

This work constitutes a comprehensive geochemical and petrographic study, the primary objective of which is to determine the sedimentary environmental conditions prevailing during the Oligocene in the Central Paratethys basins, namely the Tarcău and Vrancea basins and the Transylvanian Basin (TB). In these regions, previous molecular studies were very limited (Romanian Eastern Carpathians) or had not been conducted at all (TB). Using a variety of research methods, including gas chromatography-mass spectrometry, Rock-Eval pyrolysis, vitrinite reflectance and pyrite framboid measurements, and palynofacies analysis, an attempt was made to determine the mechanisms leading to the burial of significant amounts of organic carbon. Furthermore, the source of OM was determined, as well as the thermal maturity of OM and the hydrocarbon potential of the studied rocks were evaluated. Three Oligocene rock successions were selected for the study: two located within the Tarcău and Vrancea nappes belonging to the Romanian sector of the Outer Carpathians, and a third situated in the north-western part of the TB in northern Romania.

Geochemical and petrographic studies of the rocks from the Vrancea and Tarcău nappes revealed variations in the degree of OM transformation between the analysed tectonic units. A higher degree of thermal maturity, corresponding to the onset of the oil window, was found in the Tărcuța profile within the Tarcău Nappe, as indicated by vitrinite reflectance values, the T_{max} parameter (from Rock-Eval pyrolysis), and biomarker-based indices. Rocks from the Vrancea Nappe contain thermally immature OM. They are characterized by good to very good hydrocarbon potential, inferred from high total organic carbon content and high hydrogen index values.

In the TB, the presence of OM with a low stage of thermal maturity was established, evidenced by the presence of diasterenes and hopenes, products of early diagenesis, as well

as low vitrinite reflectance values, low T_{max} parameters, and biomarker indices. Lower Oligocene rocks exhibit very good hydrocarbon potential.

During the Early Oligocene in the Vrancea Basin, intensive bioproductivity of phytoplankton (diatoms and dinoflagellates) predominated, supported by the influx of nutrients from the land, as evidenced by the presence of terrestrial plant biomarkers (mainly gymnosperms). The presence of isorenieratane, its aryl derivatives, and Me,*i*-Bu-maleimides derived from green sulfur bacteria, combined with the predominance of small pyrite framboids, suggest at least periodic development of euxinic conditions reaching into the photic zone. This phenomenon was accompanied by a decrease in surface water salinity, which favored water column stratification and the burial of significant amounts of OM.

In the Tarcău Basin, OM of bacterial and cyanobacterial origin was deposited, with a simultaneous absence of compounds derived from higher plants, indicating open basin conditions and less intensive planktonic production. Anoxia/euxinia developed in the deeper parts of the water column, and the chemocline was located deeper, moving at least periodically above the sediment-water interface but remaining below the photic zone.

The results of biomarker and palynofacies analyses document the dynamic evolution of the sedimentary environment in the NW part of the TB. During the Early Oligocene, deep-water conditions prevailed with a clear dominance of OM of marine origin. Strong water stratification and the development of anoxia, or even euxinia periodically reaching the photic zone, occurred in the basin, confirmed by the presence of isorenieratane derivatives and a high proportion of small pyrite framboids. At the transition between the Early and Late Oligocene, progressive basin shallowing was recorded, correlated with the thrusting of the Pienides and the associated compressional episode in this part of the TB. An increased supply of terrestrial material is marked by a rich assemblage of higher plant biomarkers and numerous fragments of cuticles and wood. Oxidizing conditions prevailed in the water column. However, in the uppermost part of the profile within intervals richer in OM, recurrences of anoxic episodes and eutrophication were recorded, likely related to nutrient influx from the land and a decrease in water salinity.

In summary, the research presented in this dissertation allowed for the reconstruction of the evolution of the sedimentary environment in the NW TB and the Tarcău and Vrancea basins, highlighting the influence of tectonics and euxinia on organic carbon accumulation processes. The obtained biomarker data constitute valuable material for hydrocarbon prospection in the Carpathian region.