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Thermal maturity and depositional conditions in the Orava part of Central Carpathian Palaeogene Basin

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Central Carpathian Palaeogene Basin (CCPB) is a wedge-top basin that opened in the Central Western Carpathians in Lower Palaeogene. Orava sub-basin (OSB), located in N-Slovakia, comprises the NW remnants of CCPB. Based on previous studies (Środoń et al., 2006), OSB is the least mature part of CCPB. Yet, the estimated palaeotemperatures are relatively high and reach 95-100°C. Obtained results based on biomarkers study show differences in thermal maturity depending on the location of sampling sites and lithostratigraphy. Generally, maturation increases from N to S and Biely Potok (Upper Oligocene) to Huty Fm (Lower Oligocene). The occurrence of $\beta\beta$ -hopanes, hopenes, oleanenes, and low values of 22S/(22S+22R) homohopane ratio (~0.4), as well as 20S/(20S+20R) sterane ratio (~ 0.1 - 0.2), suggests low thermal maturity of organic matter in N and NE part of OSB. On the contrary, the S part is characterized by relatively high values of 22S/(22S+22R) ratio (>0.5), the 20S/(20S+20R) ratio (>0.4) and lack of unsaturated compounds, indicating that these units have reached the oil window stage. Rock-Eval analysis reveals the dominance of III-type kerogen in both Lower and Upper Oligocene due to terrestrial organic matter input. Biomarkers of terrestrial origin were detected in all samples including both angiosperm and gymnosperm affinity. Moreover, in less mature samples perylene is present as one of the major compound. This compound is interpreted as derived from soil and/or wood degrading fungi (Marynowski et al., 2013). In the Lower Oligocene, dysoxic to euxinic depositional environments are prevalent, which is manifested by the occurrence of isorenieratane and its derivatives, as well as small (<5 μ m) pyrite framboid diameters in many samples. However, a change of sedimentary conditions to oxic/dysoxic was found in Upper Oligocene samples. The results show larger framboid diameters (>5 μ m), a lack of isorenieratane and homohopanes with more than 33 carbon atoms in the molecule. In summary, sedimentary conditions in the Oligocene of CCPB changed from predominantly anaerobic to aerobic, with increased input of terrestrial organic matter.

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