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Palynostratigraphy and evaluation of hydrocarbon source rock potential of the Upper Cretaceous Hangu Formation (Eastern Carpathians)

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A palynological, palynofacies and organic geochemical study of the Upper Cretaceous deposits cropping out in three areas of the Eastern Carpathians (Pluton-Pipirig, Sucevița and Brădăceşti sections) has been carried out. All samples were collected from the marine Hangu Formation, and yielded an assemblage of dinocyst markers represented by *Odontochitina operculata*, *Alterbidinium varium*, *Cladopyxidium paucireticulatum* and *Deflandrea galeata* that supports a Late Campanian–late Maastrichtian age. Terrestrial palynomorphs include specimens assigned to the Normapolles group (e.g., *Trudopollis* div. sp., *Oculopollis praedicatus*, *Hungaropollis krutzschii*), in association with various gymnosperms (*Pinuspollenites*, *Araucariacites australis*) and fern spores (*Gleicheniidites senonicus*, *Lycopodiumsporites* sp., *Biretisporites potoniaei*), which were previously identified in the upper part of the Hangu Formation.

The Total Organic Carbon (TOC) content indicates that the sediments are moderately-rich in organic matter, with TOC ranging between 0.5 and 1.45%, and palynofacies analysis shows a high frequency of organic matter of continental origin represented by translucent phytoclasts (woody tissues, cuticles), opaque phytoclasts (inertinite macerals), and a minor fraction of organic matter of marine origin (phytoplankton).

The results inferred from gas chromatography–mass spectrometry (GC-MS) analysis suggest mixed kerogen (both continental and marine origin), albeit the frequency of the organic matter of continental origin is higher. The Pr/n-C17 vs. Ph/n-C18 ratios mainly indicate a type III kerogen (gas prone).

The thermal maturity of rocks was determined using vitrinite reflectance (VRo%) and Spore Coloration Index (SCI) methods. According to the obtained data, VRo ranges from 0.54 to 0.89, and SCI varies between 4.5 and 6.5, thus the analyzed kerogen is thermally mature.

Both the geochemical analyses and the palynofacies of the rocks indicate an inner-middle neritic area of the sedimentary basin during the Late Campanian–early Maastrichtian, followed by a marine transgression during the late Maastrichtian.

Keywords: northern Tethys, organic geochemistry, palynology, thermal maturity.

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