

RECOGNITION OF ELEMENTS OF PETROLEUM SYSTEM IN THE EASTERN PART OF POLISH CARPATHIANS USING MAGNETOTELLURICS

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The petroleum system applies to predispositions of hydrocarbon generation, migration and accumulation. To recognize petroleum system, multi-stage interdisciplinary studies including geological, geophysical and geochemical methods are needed. The electromagnetic methods can be effectively used at initial stages of the studies as well as complementary tools in advanced investigations. Source rocks of clastic series typical of the Carpathian orogen are related with shaly-mudstone sediments that have very low electric resistivity. Reservoir rocks are generally related with high-resistivity coarse-clastic complexes. The above given regularities make premises for connecting resistivity distribution with the occurrence of source rocks and reservoir rocks as well as recognition of tectonic zones that indirectly predetermine migration paths or the conditions for forming reservoir traps. It seems most advisable to use the electromagnetic methods in areas which are difficult to be examined with seismics, such as the Flysch Carpathians. Regional-scale and semi-detailed magnetotelluric surveys and, locally, detailed magnetotelluric surveys were conducted in the Carpathians. The results of survey allowed elements of the tectonics, location of potential source rocks and possible zones of reservoir rocks to be evaluated at a regional scale for the eastern part of the Polish Carpathians. Of particular usefulness for that task were resistivity maps showing resistivity distributions at different depths, maps of thickness of low-resistivity sediments related with shaly-mudstone rocks, and maps of thickness of high-resistivity sediments comprising sandstone complexes. Tectonic zones are shown both in maps of resistivity and structural maps as well as in magnetotelluric cross-sections with elements of geological interpretation.

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