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The Jurassic strata in the Polish Lowlands (central Poland) - future of unconventional sources?

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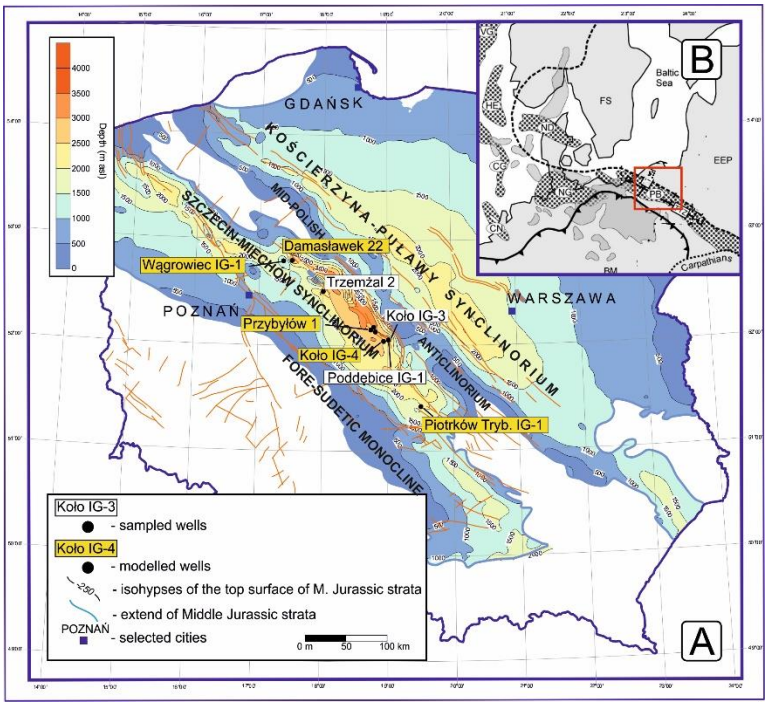
The study area is located in the central part of the Polish Basin (PB) (Fig. 1A). This basin belongs to the Central European Basin System (Fig. 1B), a continental rift system related to the Permo-Mesozoic breakup of Pangea [1]. The PB is filled with Permian to Mesozoic sediments, covered by a thin layer of Cenozoic deposits [2], and bounded by the Precambrian East European Craton to the NE and the Paleozoic Platform of Western and Central Europe to the SW.



The source rocks are characterized by high organic carbon content up to 7.5 wt% in the Upper Jurassic and even to 5.5 wt% in the Middle Jurassic strata, respectively. Also the hydrocarbon content and hydrocarbon potential are high, up to 48 mg/g rock and to 625 mg HC/TOC, respectively in the Upper Jurassic, and 4.5 mg/g rock and to 282 mg HC/TOC, respectively in the Middle Jurassic strata. The results of Rock-Eval indicate the presence of mixed organic matter (kerogen type III/II) occurring in the Upper Jurassic, whereas gas-prone type III kerogen prevails in the Middle Jurassic. The organic matter was deposited in an oxic to suboxic environment.

Figure 1: Structural map of the top of Middle Jurassic horizon [3]
and (B) regional setting of PB in the Central European Basin System [4].

The maturity of organic matter in these units ranges from immature phase to mid-phase of "oil window".

The thermal modelling shows that the organic matter in the Jurassic strata is generally low mature. The significant growth of organic matter maturity took place in two stages: (i) during deposition of the Upper Jurassic strata and (ii) during deposition of Upper Cretaceous strata. The maximum maturity of organic matter is 0.95% Ro in the Middle Jurassic strata and 0.70% Ro in the Upper Jurassic. Generally, both the Middle and Upper Jurassic source rocks achieved maturity in the "oil window" phase. The modelling shows that the onset of hydrocarbons generation from Middle and Upper Jurassic source rocks was reached in the Cretaceous-early Paleogene time. The generation was terminated as a result of post-Cretaceous inversion of the study area. The transformation of organic matter reaches up to 40% in the Middle Jurassic and up to 10% in the Upper Jurassic source rocks. The Jurassic source rocks do not show

expulsion. The pore spaces are saturated by hydrocarbons indicating possible presence of unconventional hydrocarbons accumulation in the analyzed strata.

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