

# **The Application of Well Logging and Seismic Modeling to Assess the Degree of Gas Saturation in Miocene Strata (Carpathian Foredeep, Poland)**

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## **A b s t r a c t**

The presence of natural gas in the pore space of reservoir rocks results in a significant decrease in  $P$ -wave velocity. Even low gas saturation can generate seismic anomalies (DHI) and false image of gas accumulation of economic importance. This article presents an attempt to evaluate gas saturation from 2D seismic section in the Miocene sandstone strata in the south-eastern part of the Carpathian Foredeep. The ESTYMACJA program and the Biot–Gassmann model were used to study the dependence between elastic parameters and saturating fluids (water and gas) recorded in wells. Series of calculations was carried out using a method of fluid substitution for various gas saturation. The applicability of seismic data for evaluating gas saturation of reservoir beds was assessed with the use of 1D modelling (synthetic seismograms) and 2D modelling (theoretical seismic section) calculated for different gas saturation. The proposed methodology can be used to identify low and high gas-saturated zones and contour the reservoir.

**Key words:** seismic and well logging modelling, gas saturation, fluid substitution, seismic anomalies, Carpathian Foredeep – Poland.