

Multi-Disciplinary Approach for Underexplored Plays in Mature Basins: Case Study from the Pannonian Basin

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Abstract

The Pannonian Basin has a rich history in the oil and gas industry, spanning back to its inception in the early 1930s. Among its notable sub-basins, the Dráva Basin has stood out since the first significant discovery was made there in 1957. Over the decades, extensive exploration and drilling activities have targeted various geological plays, with particular emphasis on the prolific Late Miocene play.

However, as global energy demands continue to rise, there has been a strategic shift towards exploring the more complex plays within the basin. This shift reflects the industry's recognition that the remaining reserves in the basin require more sophisticated exploration techniques and carry higher inherent risks.

In 2022 a near field gas prospect was matured in a previously underexplored play. The structural closure with Middle Miocene limestone reservoirs was expected to hold gas, which was generated from deep marine shales, which are heteropic to the reservoirs. To mitigate exploration risks, a comprehensive approach was adopted, leveraging the wealth of data available in the mature Pannonian Basin. Structural reconstruction, along with wells and seismic attributes were used to recreate the paleo topography, which was the input of the depositional environment maps. This was crucial for the prospect as the reservoir and source rocks belong to the same stratigraphic unit. The determination of reservoir parameter distributions was supported by geophysical modeling.

The prospect was drilled in 2023, and resulted in a gas discovery. The geological model was validated and the in place gas volumes were around the P10 pre-drill volumes. An 18 m core was cut, which has confirmed that the limestone was deposited in a shallow water setting with. The core has shown very high vuggy porosity, which was the result of the dissolution of the limestone. Overall the permeability was low, due to small pore throat radii, but still higher than most discoveries in these limestones. The gas quality have been lower than expected, very high CO₂ content was encountered, which was probably sourced from the underlying metamorphites.

Overall the substantial amount of gas has opened the way for further exploration of this play. This project has shown that multi-disciplinary collaboration is essential in exploring in mature basins as most of the straightforward targets have already been drilled.