



Characterization of a Miocene carbonate reservoir analog in Southern Mallorca (Balearic Islands, Spain)

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Carbonate reservoirs contain more than half the world's oil reserves, including highly productive reservoirs in Cretaceous and Cenozoic carbonates from the Middle East and Southeastern Asia. They are usually characterized by the complexity both of their internal architecture and of the distribution of their diagenetic fabrics which hampers crosshole correlations at various scales, and predictions regarding flow paths and volumes of fluids. Reservoir analogs can have the advantage of easier accessibility and sampling and less severe diagenetic alteration. Their study often provides information complementary to the knowledge of hydrocarbon reservoirs and it leads to a better understanding of carbonate systems, important to make better predictions on other potential reservoirs. Significant advances can be made from joint research in natural laboratories integrating outcrops and shallow boreholes, with extensive control on geophysical, geological and petrophysical parameters.

The southern part of the island of Mallorca appears as a natural laboratory where a direct comparison between outcrop and shallow subsurface datasets is the objective of the current study. This region is characterized both by spectacular outcrops, especially in the Cabo Blanco area, which were previously studied [e.g. 1], and by shallow holes, 100 m deep on average, that have been drilled especially at Can Roses, Ses Pastores and Ses Sitjoles, from west to east. This geographical extension of the study area provides the opportunity to better explore and understand the Miocene carbonate complex which comprises the Llucmajor platform.

This study incorporates a wide range of analytical techniques to characterize the reservoir aspects, such as conventional microscopy of thin sections, XRD analysis, isotopic carbon and oxygen analysis, isotopic strontium dating analysis, petrophysical measurements, high-resolution borehole images and CT scan data. These techniques are used to unravel the sedimentology and chronology of the carbonate sequences and help to reconstruct their diagenetic history. Another objective is to analyze the impact of diagenesis on the petrophysical properties of the rocks. Furthermore, the distribution of the studied outcrops and drill cores allow the evaluation of lateral continuity of sequences, facies variations through time and space, and heterogeneity in diagenetic features, such as dolomitization, and petrophysical characteristics.

The results of our study reveal new insights in this carbonate reservoir analog, which require an adaptation of the current sedimentological model that was proposed previously for Southern Mallorca based solely on the exposed carbonate sequences.

References

[1] Pomar, L., Ward, W.C., 1994, Geology, 22, 131-134.