

3D-GPR MODELING OF A CORAL REEF RESERVOIR ANALOGUE FROM EL PENEDÈS

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Abstract

The GPR method has not been classically used for the study of possible hydrocarbon reservoir analogues of subsurface coral reefs. This project aims to analyze different Miocene coral reefs from El Penedès area to investigate their electrofacies response. The project was carried out in outcrops located in Sant Sadurní d'Anoia, Sant Miquel d'Olèrdola and Sant Pau d'Ordal. In Sant Sadurní d'Anoia, a 3D model was generated to characterize the distribution of facies in time and space, as well as the behavior of the reflectors. For the other two Isolated Carbonate Buildups (ICBs), 2D profiles were acquired.

The present study determines that the GPR-based analogues can indeed be used to better understand the facies and structure of subsurface reservoirs. This method permits to characterize electrofacies, which can be linked to distinct depositional lithofacies and environments. The reflections obtained show very similar patterns as those observed in seismic data from reef facies. The reflections obtained are mound shaped, show low to moderate amplitudes and are discontinuous to semi-continuous. Nevertheless, the main drawback of the method in such poorly cemented coral-bearing limestones is the depth reached, which was only up to 2 meters.

Finally, the potential use of the studied ICBs as potential analogues for the hydrocarbon exploration is limited. The aerial extent of the ICBs from El Penedès is very reduced (i.e., 60x70x10 meters). Therefore, the volume of hydrocarbons that could be accumulated in these outcrops would be non-commercial.