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Using 2D Reflectivity Data to Perform Seismic 3D Reservoir Characterization: Application to the Evaluation of an Oil Exploration Lower Cretaceous Prospect

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ABSTRACT

Nowadays, geophysical data, such as seismic reflectivity, is determinant to perform reservoir characterization, prospect evaluation and geological modelling. Seismic 3D reservoir characterization is very important and largely applied to define the reservoir structure and properties, as well as for building reliable 3D models of the subsurface. It plays a determinant role especially for integrated reservoir exploration studies, when the well data is limited and we should make the most from the available seismic data to predict reservoir architecture and properties among the wells.

In order to promote the success of exploration studies, all the data available that may have quality to describe the reservoir must be integrated and correlated. This contributes for a better evaluation of the prospective potential of the area and to the definition of new leads. However, exploration activities typically face the challenge of data restriction, not only wells but also limited seismic data coverage and quality. Historical, economic and financial reasons justify the fact that the availability of 2D seismic lines is much greater when compared with 3D seismic data. For example, in frontier exploration areas, usually remote and underexplored, the first seismic data available is usually 2D seismic lines. Besides, a large amount of 2D seismic data is also available in mature areas. Nevertheless, currently the traditionally and common industry seismic reservoir characterization and post-stack seismic analysis workflows are well recognized for 3D data. One of the motives it is because the incorporation of 3D seismic inversion results into the geological models improves significantly the interpretation and understanding of the reservoir, especially when the well data availability is scarce, sparse and biased. As such, the objective of this study is evaluating the effective incorporation of 2D seismic data to assess seismic characterization workflows designed for 3D by its application in a real carbonate case.