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Giacomo Spadini[1], Maurizio Cardamone[1], Mark Woodfin[2], John Seedhouse[2] (1) ENI - E&P Division, San Donato Milanese, Italy (2) Agip UK, Aberdeen, United Kingdom

Effectively Integrating Elastic Inversion, AVO Modeling and Petro-Elastic Analysis: a Frontier Exploration Case in the North Atlantic

The Upper Paleocene turbiditic deposits in the deep-water North Atlantic provide the opportunity to validate the effectiveness of the Elastic Impedance Inversion (EI) approach (AVA simultaneous inversion) when the lithological characterization is the main target. In an area where sand is poorly imaged by amplitude changes and where acoustic impedance alone fails to separate sand from shale, elastic impedance demonstrates to be an important tool to help with exploration drilling decision. Knowledge of P- Impedance, S-Impedance and Poisson Ratio sheds light on the subtle lithological variations responsible for the possible stratigraphic closures and the related reservoir presence. Lithologic classification from EI relies on a compounding analysis of the petro-acoustic character of the drilled sequences at the only available well in the area. At the same time, indications of possible hydrocarbon presence are supported by modeling of different hydrocarbon saturation conditions. The integration of those diagnostics from well data analysis and fluid-replacement modeling appears to be the key ingredient for a correct interpretation and use of the EI results. A second well, made available after the completion of the study provides the interesting chance of a blind-test on the validity of the method.