

## **Integrating Geological Attributes with a Multiple Linear Regression of Geophysical Well Logs to Estimate the Permeability of Carbonate Reservoirs in Campos Basin - Southeastern Brazil**

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### **Abstract**

The knowledge of petrophysical properties of hydrocarbon reservoirs is essential for the development of an oil field. Among the main petrophysical properties, the permeability is one of the most complex to be determined, because it is not a direct measure. Its estimate can be done in different ways some of which are: formation test, empirical models with data obtained from basic or nuclear magnetic resonance (NMR) well logs or laboratory analysis of core samples or plugs. The distribution of petrophysical properties in carbonate rocks, when compared to siliciclastic, tends to be more heterogeneous due to diagenetic processes that they suffer and, therefore, the more complex is its determination. Thus, a more accurate analysis can be performed by combining the contributions of different sources to estimate the permeability. The well logs and the laboratory data from two wells (A3 and A10) drilled in a carbonate reservoir of Campos Basin were used in this work to assess the permeability using different approaches, such as multiple linear regression (MLR), rock types and empirical models, integrating available geological attributes in order to validate the study in a qualitative way. Campos is a sedimentary basin located along the continental margin of Southeastern Brazil, which has several oil fields. The basin covers an area of approximately 100.000 km<sup>2</sup>, corresponds to the main oil province of Brazil, comprising approximately 80% of the country's oil reserves. Hydrocarbon reservoirs occur throughout almost the entire stratigraphic column of this basin, being that the main sequences consist of fractured basalts, coquinas, turbidites, and carbonate rocks. So, the results of the study of this carbonate reservoir indicate that the permeability estimated by MLR method associated with reservoir zoning based on environmental energy zones is one that comes closest of laboratory data.