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Inference of possible flow pathways in carbonate reservoir models using seismic data: a case study in a pre-salt field in Santos Basin.

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Reservoir characterization is a very important stage for the oil and gas industry. When building a 3D model of a field, it is essential to ensure that the geological characteristics, such as porosity and permeability, are properly estimated; otherwise, hydrocarbon exploitation may be negatively affected. The importance of seismic data in reservoir modeling studies is already well established. This data provides regional information, which allows us to estimate reservoir properties between drilled wells. It can be said that a reliable reservoir characterization depends on three main factors: 1) a good conceptual geological model of the field; 2) high-quality seismic data, which gives regional information about the area; and 3) well information (hard data), which offers more precise data regarding the characteristics of the rock and the fluid. This work shows the use of seismic attributes as a tool for inferring geological properties, focusing on preferential flow pathways in a carbonate reservoir model, located in the pre-salt of the Santos Basin. To achieve this, a few seismic attributes, such as amplitude, acoustic impedance and geometric attributes, were used to support the extrapolation of properties within the 3D model. In addition, some logs from the producer and injection wells of the field were considered, providing local information about porosity, permeability, fractures and other properties that were used to calibrate the model. The conclusion of this study points out the importance of using seismic attributes for inferring preferential flow pathways along a 3D model, giving non-direct information about the reservoir permeability and porosity. It is expected that this work can be helpful to improve reservoir management in carbonate fields.