Submission code: N8L06YK58Y

See this and other abstracts on our website: https://home.sbgf.org.br/Pages/resumos.php

Tracking of Silicified Mounds in the Pre-Salt region of the Santos Basin

João Marques (PETROBRAS), Carlos Saraiva (IesBrazil), Ana Krueger (Bluware/University of Houston), Neida Ilana (IesBrazil Technology & Innovation)

Tracking of Silicified Mounds in the Pre-Salt region of the Santos Basin

Abstract

The carbonate mounds in the Santos Basin are geological features of great importance for hydrocarbon exploration. In the pre-salt section, they occur as convex or conical structures with chaotic and discontinuous internal seismic reflections. These buildings can also have silicified facies which can lead to changes in the expected permo-porosity behavior of the area. Seismic inversion is widely used in the studied field to provide better characterization of the reservoir and hydrocarbon estimation in the complex pre-salt environment. Using seismic reflection data, this technique would convert them to quantitative rock properties such as acoustic impedance, thus enabling the geoscientist to differentiate reservoir rocks from non-reservoir formations. Given the ultra-deep waters of the studied field with heterogeneous carbonate reservoirs, seismic inversion eases fluid detection, porosity estimation, and reservoir modeling while minimizing drilling risks and optimizing production. Silicification is a predominant diagenetic process whereby silica replaces the original carbonate minerals and thus affects the properties of the pre-salt carbonate reservoirs. This phenomenon can reduce porosity and permeability, which lowers reservoir quality by the introduction of dense low-permeability zones. In other instances, however, it could enhance mechanical strength and fracture networks, affecting fluid-flow behavior. Understanding silicification through seismic inversion, petrographic analysis, and well logs is essential for optimizing drilling and production strategies for this ultra-deepwater field. This work relies on the application of deep learning through seismic inversion volumes IP, IS and VPVS ratio. One well was used to confirm the mound feature and the silicification occurrence. Labels were added just to this specific area bounded by the well used. The parameters implemented to this case were E-net architecture, RMS loss function. Probability cubes and geobodies were generated and imported into a 3D seismic interpretation platform to QC and use the deep learning results. Through Deep Learning, possible zones of silicification were mapped. It was not possible to confirm whether all anomalies (geobodies) are relevant or false based on the response of the well used. More wells should be added to this research whether to confirm or not the zones mapped.