

PETROLEUM EXPLORATION IN SUBANDEAN BASINS

“Learning from the past - Looking to the Future”

Abstract

Low-frequency Passive Seismic Case Study in the Llanos Basin

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A growing number of surveys at different oil and gas fields throughout the world have established the presence of hydrocarbon micro-tremors with a high degree of correlation to the proven location of these reservoirs. These tremors, identified using Low Frequency Passive Seismic (LFPS) technology, can be used as a hydrocarbon indicator for the optimization of borehole placement during exploration, appraisal and production.

One such project was carried out in the Rubiales Production field located in the Llanos Basin. It was a blind test to determine whether the LFPS technology could detect the heavy oil deposits located in the field. The project was carried out in 12 days using 6 highly-sensitive seismometers. Three line profiles were recorded, totaling approximately 49 measurements, with recording times between 18 and 24hrs each. The processing and analysis of the data was carried out by Spectraseis within 90 days and anomaly maps were presented to the operator. The results were discussed together and reservoir outline information was provided to be compared with the survey results. Drilling operations were subsequently carried out in 4 locations, giving good correlation between the LFPS project results, the known reservoir outline, and the results of the drilling operations.

A first-time application in Colombia, it is important not only because it provides a new, proven tool that is also applicable to heavy oil, but also because of its rapid application and minimal environmental impact.

This paper will present the case study including acquisition, processing and analysis which was later corroborated with drilling results.

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