"Thickness estimation and distribution of ""X"" reservoir, in The Asa Field, West Natuna Basin, using Discrete Fourier Transform (DFT) approach"

Margaretha E. M. Purwaningsih, author

Abstrak

ABSTRACT
The study establishes the thickness and distribution of the ?X? sandstone reservoir in the ASA Field that is located at the southern margin of West Natuna Basin, southwestern South China Sea. The field is located on top of the ?D? horst, which is bordered by the east-northeast (ENE) -west-southwest (WSW) trending basement ridge on the south. By application of discrete Fourier transform (DFT) on high-resolution 3D seismic data over a short window covering the geologic zone of interest, the amplitude spectra of an ?X? sandstone prone channel can help delineate temporal bed thickness variability and sandstone distribution.
Spectral decomposition is just valid for analysis covered one wavelet seismic that will decrease the noise, so that all of frequency range until Nyquist frequency can be used for analysis. Noise appearance can be used to determine geological boundaries such as channels and sand bars, but it cannot be used for the thickness estimation. The maximum value of the first peak frequency will determine the thinnest layer observable within analysis window.
The average tuning thickness ranges is from 30 to 40 feet. The thinnest detectable layer is about 12 feet that are found at the finite area, this is equal with 1/12λ, where λ is seismic wavelet wavelength. The tuning thickness of the sandstone reservoir detected by spectral decomposition analysis is thinner than conventional tuning calculation which is about 35 feet on ¼λ.
The paleo-stream flow is interpreted to be from northwest to southeast across the study area based on spectral decomposition analysis. Faulting was not active during ?X? sandstone deposition as evidenced by lack of downthrown thickening and continuity of interpreted sand bars across faulted area.
Based on this study, more advance study is recommended to be done to understand the optimum window length for spectral decomposition analysis especially using more than one seismic wavelet to determine sand distribution and its thickness. More advanced method of spectral decomposition analysis is necessary to detect, within one seismic wavelet, variation in bulk rock properties from which inferences regarding depositional environment and lithology can be made.