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BRIEF REPORT

Seismic Interpretation and Inversion Leading to an Accurate Reservoir Characterization in a Carbonate Environment

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Seismic data acquired in the field show the subsurface reflectors or horizon among the geological strata, while the seismic inversion converts this reflector information into the acoustic impedance section which shows the layer properties based on lithology. The research aims to predict the porosity to identify the reservoir which is in between the tight layer. So, the output of the seismic inversion is much more better than the seismic as it is closer to reality such as geology. Seismic inversion is frequently used to determine rock physics properties, for example, acoustic impedance and porosity. Carbonate reservoirs exhibit complex pore structures and heterogeneity which increases the difficulty of their characterization. In this research, we aim to predict the porosity of the carbonate reservoir in Central Luconia, Sarawak. The objectives are accomplished through a cross-plot of porosity and Acoustic Impedance (AI). We also utilize seismic attribute interpretation and deterministic seismic inversion for this research. Acoustic impedance result from seismic inversion is compared to porosity in the zone of interest. The correlation in the zone of interest indicates the porosity estimate in the range of 10% – 35%. With help from the inversion results and porosity-impedance relationship, a conclusion is drawn that the zone of interest has the potential for a hydrocarbon reservoir. The novelty of our method is to integrate multiple geophysical approaches such as seismic attribute, interpretation, and seismic inversion in delineating reservoir which shows the possibility of hydrocarbon accumulation.

DISCUSSION & CONCLUSION

In this research, Petrel software has been used for data interpretation, and further for seismic inversion, Hampson-Russell software is used [1]. Data with a suitable format such as seismic and well-logging data of SEG-Y and LAS respectively is used in this study. Figure 1a shows the seismic interpretation window in which a top Carbonate with a green horizon and a base Carbonate with a yellow horizon was picked. These two horizons were selected to apply the seismic inversion within the reservoir. The acoustic impedance log is calculated by multiplying the sonic and density log in well location [2-4]. In a seismic inversion, the most significant step is wavelet extraction, a suitable seismic wavelet was extracted separately in the location of Well-A. The wavelet extraction and synthetic seismogram were repeated constantly until the correlation coefficient between the synthetic and the real seismogram become acceptable with minimal errors in the well location.

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Figure 1 Interpreted horizons top of Carbonate (green) and base of Carbonate (yellow). These two reflectors/horizons are the input for seismic inversion and QC blind well inserts of color computed impedance (compared with the model the correlation is quite good).

After the selection of the model-based inversion method for the seismic post-stack inversion process, the results show in figure 1b, the acoustic impedance contrast with the interpretation of reservoir tops. The seismic inversion process has enabled the image of the thin bed within the reservoir layer, that has been captured by the well-log but in the seismic impedance the layer strata are missing. This could be an image by the re-processing of legacy data set with inverted V_p in which well-log frequencies are used.

Integration of geological and geophysical data indicates that relatively higher porosity is expected in the reefal build-up area towards the west, along the south & eastern margin than the depressed lagoonal area of the central part of the structure and northern part of the field which has an impact on hydrocarbon reserves and production behavior in this field.

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References

1. Russell B. Post-stack inversion workshop. CGG.Com. 2016.
2. Babasafari AA, Bashir Y, Ghosh DP, Salim AMA, Janjuhah T, Kazemeini SH, Kordi M. A new approach to petroelastic modeling of carbonate rocks using an extended pore-space stiffness method, with application to a carbonate reservoir in Central Luconia, Sarawak, Malaysia. *Leading Edge*. 2000;39(8). <https://tinyurl.com/55e3h9ks>
3. Bashir Y, Babasafari AA, Biswas A, Hamidi R, Moussavi SY, Tariq Janjuhah H, Prasad Ghosh D, Weng SC. Cohesive approach for high-resolution seismic using inversion & imaging in malaysian carbonate field. *International Petroleum Technology Conference*. 2019. <https://tinyurl.com/49rjkfe4>
4. Bashir Y, Mohd Muztaza N, Moussavi Alashloo SY, Ali SH, Prasad Ghosh D. Inspiration for seismic diffraction modelling, separation, and velocity in depth imaging. *Applied Sciences*. 2020;10(12):4391. <https://tinyurl.com/2p8tbu6e>

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