

Machine Learning Technology – Understanding the Sub-surface in the Meramec Unconventional Resource Play, Blaine and Kingfisher Counties, Oklahoma

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ABSTRACT

Multi-attribute machine learning using SOM (which is an unsupervised learning process) can be shown to reveal details in the data not previously identified and which can be interpreted to be lithologic in nature. The detail comes with the statistical analysis of the data based on information from each sample at each trace in the data. The result of this sample-based statistical analysis is that one can interpret thin-bed resolution well below conventional wavelet tuning. This in turn, helps with highly accurate reservoir prediction when one ties the information to existing production or in the estimation of new reserves in exploration plays.

This presentation will be showing a project, commissioned by TGS, to study the ability of machine learning to see “sweet spots” in unconventional resources. The target area was in Blaine and Kingfisher Counties, Oklahoma, and the study formation was the Mississippian-age Meramec Formation. Wells used for calibration were straight holes as opposed to horizontal wells, due to the variation of completion techniques. TGS supplied the seismic data and various support volumes, including Inversion volumes for use in the analysis. They also supplied all the well information including digital logs and testing/production information.

Synthetics were created on key wells to better tie the neural information to exact points in completion.

The results support the ability to identify higher porosity and resistive beds within the Meramec Formation, which results in better performance in production. Additional work was done in calculating and predicting the production using geobody volumes created from the clustered data.

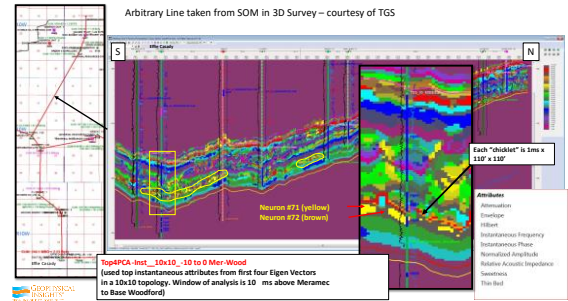


Figure 1

Acknowledgements:

TGS Corporation for allowing the use of their seismic and well database for this study.