

# Visualizing Gas Chimney Volumes Reduces Exploration Risk: A Case Study from Onshore Louisiana

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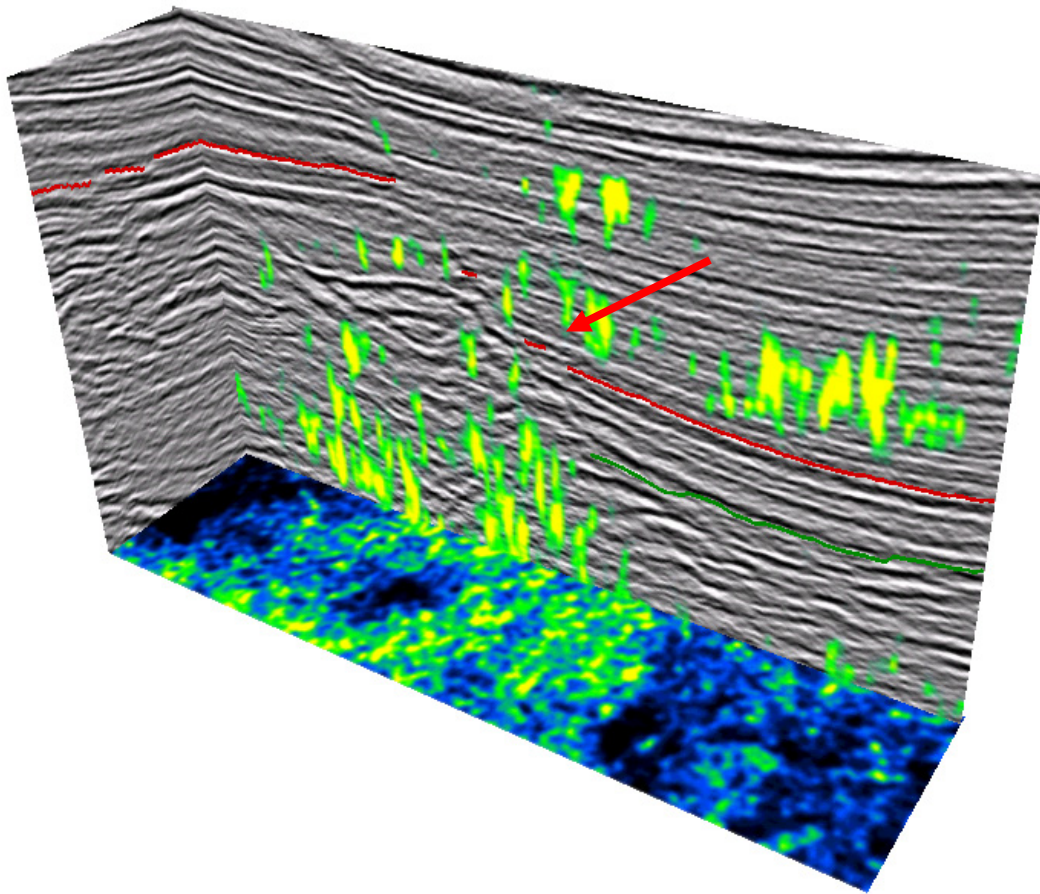
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## Abstract

Fluid migration pathways can be visualized using gas chimney volumes derived from 3D seismic data. An example from onshore Louisiana demonstrates the relationship of gas chimneys to producing reservoirs, and the use of gas chimney detection in assessing risk for a deep gas prospect.

Chimney processing involves selecting a number of seed points with suspected chimney events versus non-chimney events. Then a number of attributes are calculated at those points. A neural network is then trained on the seismic attributes extracted at the representative example locations yielding a chimney probability volume. Chimney processing, in a number of analog studies, has been shown to delineate these more subtle hydrocarbon migration pathways more effectively than conventional seismic processing, Ligtenberg (2003), Walraven et al (2004), and Hegglund (2004). Gas chimneys can display different morphologies, which have implications for prospect risking, see Connolly (2006). Fault related chimneys above a prospect often indicate vertical leakage from the prospective formation, and thus higher seal risk. However, a gas cloud type chimney over a prospect or fault related chimneys below, but not above, a prospective level are positive indications of trapped hydrocarbons.

The results of the chimney processing of a 3D seismic volume from onshore Louisiana show clear evidence of both fault related gas chimneys and gas clouds. Subtle gas clouds are detected above the shallow producing gas sands and also above a deep gas prospect. Fault related chimneys indicate hydrocarbon charging of both the shallow producing zones and the deep gas prospect. These fault related chimneys terminate in the shaly intervals overlying these reservoirs. This indicates an effective seal for the producing sands and a lower risk for seal failure in the deep prospect. Comparison of the Velocity and gas chimney volumes shows a strong correlation between low interval velocities and presence of gas clouds.



**Figure 1. High probable chimneys in yellow charging shallow gas reservoirs (red horizon). Fault above reservoir does not have chimneys indicating effective seal.**

#### **References**

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