PARADISE

A Paradise™ Application Brief

Using Self-Organizing-Maps to Define Seismic Facies (Pressure?)

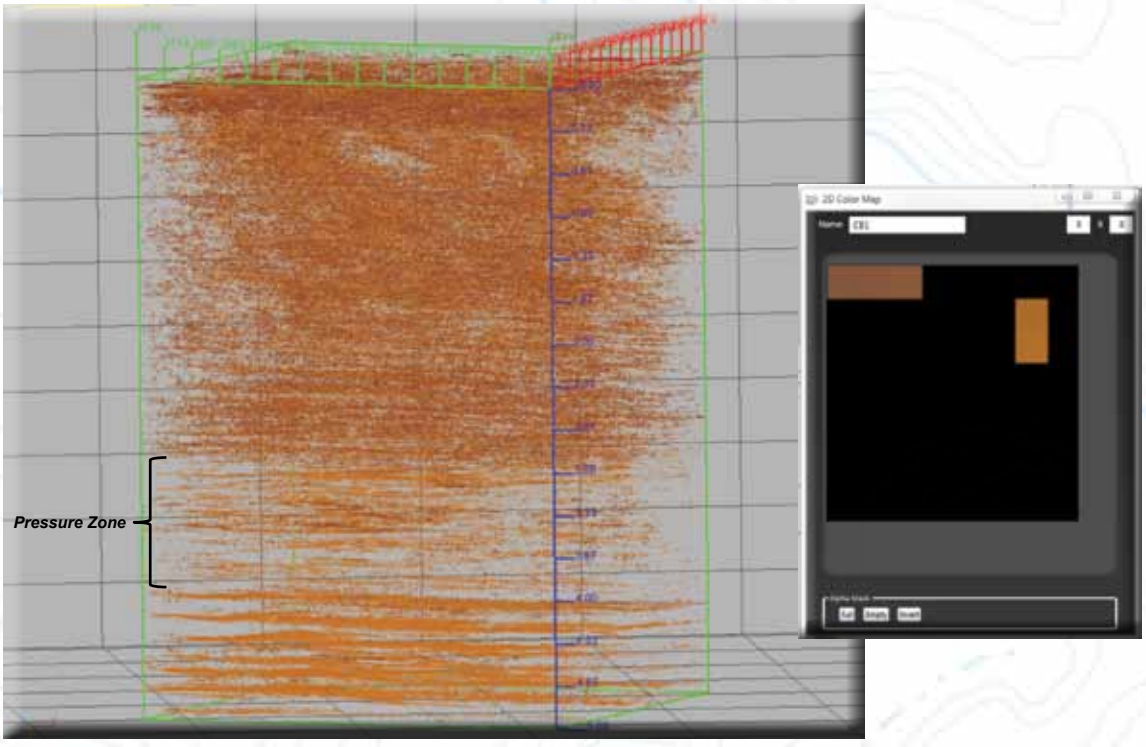
Offshore South America Seismic Facies Analysis

This analysis and application of Paradise involved the evaluation of a 3D volume offshore South America. A well had been drilled and encountered unexpected high pressures which prevented drilling to the desired deeper target. Traditional methods to identify pressure did not readily reveal a high pressure zone before drilling. The challenge was to identify the high pressure zone employing Self-Organizing-Maps (SOM's).

Initial evaluation of the 3D seismic volume suggested there may be facies and stratigraphic variations in the high pressure zone. After an interpretation of the local geology and putting this into a regional context, the anomalous high pressure area appeared to be associated with a slope facies as interpreted from the conventional stacked seismic data.

Therefore, five different combinations of seismic attributes were applied in a SOM analysis to help define the seismic facies in the zone of interest. One specific combination of six seismic attributes clearly defined the seismic slope facies and associated high pressure region. With the use of 2D colorbars in the 3D Viewer in the Paradise software, the highlighting of specific neurons enabled the visualization of the high pressured seismic facies.

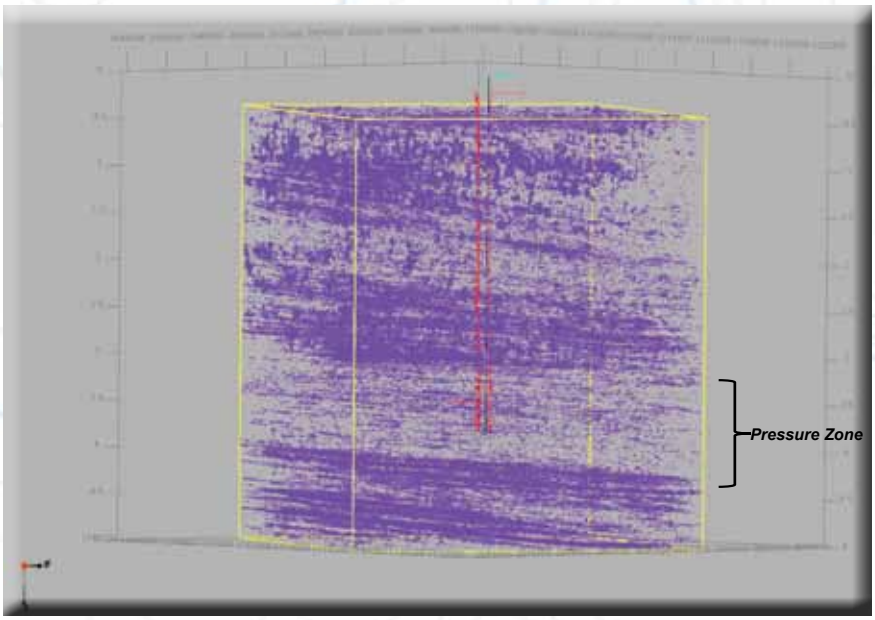
A SOM classification display that exposes the region of high pore pressure using the Paradise 2D neural color map (right)

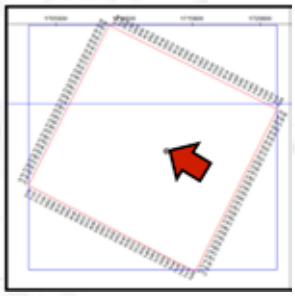


Analysis Results – Exposing High Pore Pressure Region

- Based on pressure readings from a single well, the increase in pressure seems to be associated with a hummocky, wavy, and at times chaotic seismic reflection character.
- This reflection character is typically associated with a slope setting where there are rapid facies changes, discontinuous siltstone and mudstone beds and at times channelized sands with interchannel mudstones.
- Dozens of seismic attributes were generated to help define this seismic facies associated with pressure in the well.
- Five different sets of seismic attributes were selected for SOM analysis to define this pressure associated seismic facies.
- All of the SOM Classification volumes and to some degree Probability volumes defined components of this seismic facies (e.g., top, bottom, internal seismic reflection character, reflection character above and below, etc.).
- A specific set of seismic attributes effectively isolated the pressure zone through a SOM analysis.

A SOM probability display showing the high pore pressure region as an anomaly in Paradise





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