Ant Tracking Seismic Volumes for Automated Fault Interpretation

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Introduction

The interpretation of faults in 3D seismic volumes can be a tedious task and influenced by predefined bias of the interpreter. The ant tracking process available in the Petrel software uses a series of unique seismic attributes in a workflow to identify and track faults, from an unbiased perspective, through 3D seismic volumes. This presentation will discuss the ant tracking process and apply it to various 3D data sets from across Canada.

The Ant Track Process

In nature, ants, while individually simple, use swarm intelligence to accomplish complex tasks such as finding food and building nests. When searching for food ants use pheromone trails to direct other colony members to food they have found. Through this process the ants find the most efficient path from the nest to the food. Similarly, by populating a preprocessed 3D seismic volume with computer agents coded to follow discontinuities, swarm intelligence is used to identify, track and sharpen faults (Pedersen et al., 2002).

In the general ant tracking workflow, preprocessing can involve preparing the seismic with structural smoothing, filtering or other attributes, followed by discontinuity attributes such as chaos (Randen et al., 2000) or variance (Van Bemmel and Pepper, 2000). The resultant volume(s) are tracked by the “ant” agents, which are tuned to follow the desired faults while avoiding known noise sources (e.g. survey overprint).

Results

The Ant Tracking process, applied to 3D surveys from various Canadian structural environments is presented. Data and results from the extensional faults of the offshore east coast, reverse faults of the foothills and subtly structured western Canadian plains environments are shown.

References

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