

**CONTROL ID:** 2852686

**TITLE:** A New Approach for Integrating Dynamic Petroleum Systems Thinking with Static High Resolution Seismic Descriptions through 4D Accommodation Space Analysis:

**AUTHORS (FIRST NAME, LAST NAME):** Steven Tobias<sup>1</sup>, Jie Huang<sup>1</sup>

**INSTITUTIONS (ALL):**

1. ..., NearFX, LLC, Houston, TX, United States.

**PRESENTER:** Steven Tobias

**Poster Consideration:** Yes

**ABSTRACT BODY:**

**Abstract Body:** Basin modelling typically involves the restoration of structural growth and sedimentation with heat and fluid flow, all of which are inherently dynamic processes. In contrast, high resolution seismic interpretation typically involves the partial description of highly detailed seismic data through the mapping of a small percentage of the available reflectors– an inherently “static” undertaking. Integrating the two has always been challenging.

This poster suggests a better way, and starts with a fuller capture of the granularity of the seismic data. This is especially important when detailed geometries capture the complex structural history in faulted, repeatedly inverted and salt-influenced areas. A loss of granularity translates into a loss of geological history and petroleum systems understanding. By manually guiding the machine-assisted optimization algorithms that propagate interpretations throughout the rock volume, it becomes possible to create a data-driven 3D geomodel that captures significantly more granular information about depositional geometries.

The innovation of this approach derives from the application of a simple mathematical transform to the geomodel, which converts it into a record of relative variations in accommodation space through time. These variations can be visualized in map view through carefully prepared animations, something that literally introduces a new dimension into petroleum systems visualization. This new tool increases the understanding of basin development by combining the static world of seismic interpretation with the dynamic world of petroleum systems modelling, an innovation that helps create a continuum of understanding from the regional scale down to the play and the prospect. The integration of QI techniques such as spectral decomposition and volume curvature into this process helps to add needed granularity to petroleum systems thinking.

A high-resolution study of the development of accommodation space through time clarifies the structural-sediment interaction of the facies that fill available accommodation space, something that has a direct bearing on reservoir depositional systems and seal facies capacity. The timing relationships between hydrocarbon migration and trap-charge interaction also become refined, which can be a significant aid to risk and resource assessment.

Examples of this approach are shown from the North Sea and offshore New Zealand.