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Depogrid Fault Seal Analysis

Accurate fault seal risk assessment: geologically consistent history matching

Applications

- Exploration fault seal risk assessment
- Complex field development decisions: scenario modeling of field connectivity and compartmentalization
- History match compartmentalized fields

Benefits

- Highly accurate modeling of both simple and complex geometries at any grid resolution
- Highly accurate reservoir simulation using grid tensor permeability
- Grid orthogonality and uniformity for reservoir simulation
- Accurate fault seal analysis predictions on geological faults
- Scaling methodology that preserves geological relationships

Features

- Fault slip field derived from depositional space mapping
- Fault offset and clay distribution
- Derive fault threshold pressure, permeability, and thickness
- Direct consumption of fault properties in flow simulator transmissibility calculation

A comprehensive set of fault seal analysis tools are provided in the Petrel* E&P software platform on unstructured Depogrids. These tools enable you to derive new insights into your reservoir behavior with an integrated workflow that provides unrivalled accuracy.

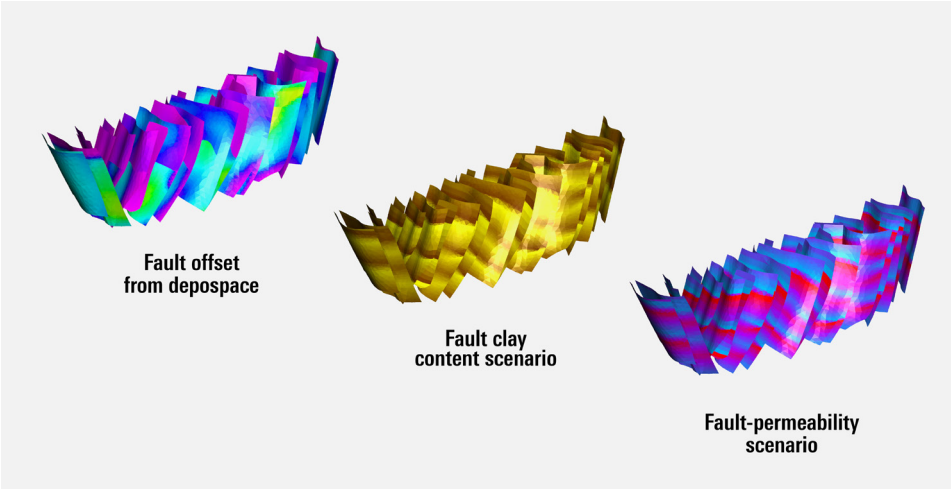
You will be able to calculate fault offset and clay content distributions on modeled faults, along with the subsequent derivation of fault threshold pressure, permeability, and thickness properties. These properties can be analyzed using various visualization workflows and applied within fault seal sensitivity and screening studies to understand the critical range of potential flow responses. The analysis continues seamlessly to dynamic workflows using the INTERSECT* high-resolution reservoir simulator, which directly consumes and geologically scales the fault transmissibility.

Accurate fault seal analysis using high-fidelity grid and depospace representations

The unstructured Depogrid is a highly accurate representation of the structural model. The dual views of both the structural model and Depogrid in geological and depositional spaces are used to define a patented method for calculating the fault slip field. The result is a refined estimate of the slip field, capturing its local variations. This workflow is further complemented by enhanced property modeling workflows available in the Petrel* E&P Software Platform that leverage this dual representation.

Users can leverage Depogrid's accurate modeling of structural and stratigraphic complexity with industry-leading property modeling algorithms to perform fault offset and clay content predictions. These analyses are the basis for exploration or development fault seal workflows.

A range of fault seal scenarios can be rapidly generated for potential fault threshold pressure, permeability, and thickness predictions. Filtering and cross-fault analysis options allow an exploration analysis of fault column height distributions and the static screening of local and model-wide fault transmissibility variations.



Data courtesy of Royal Holloway University

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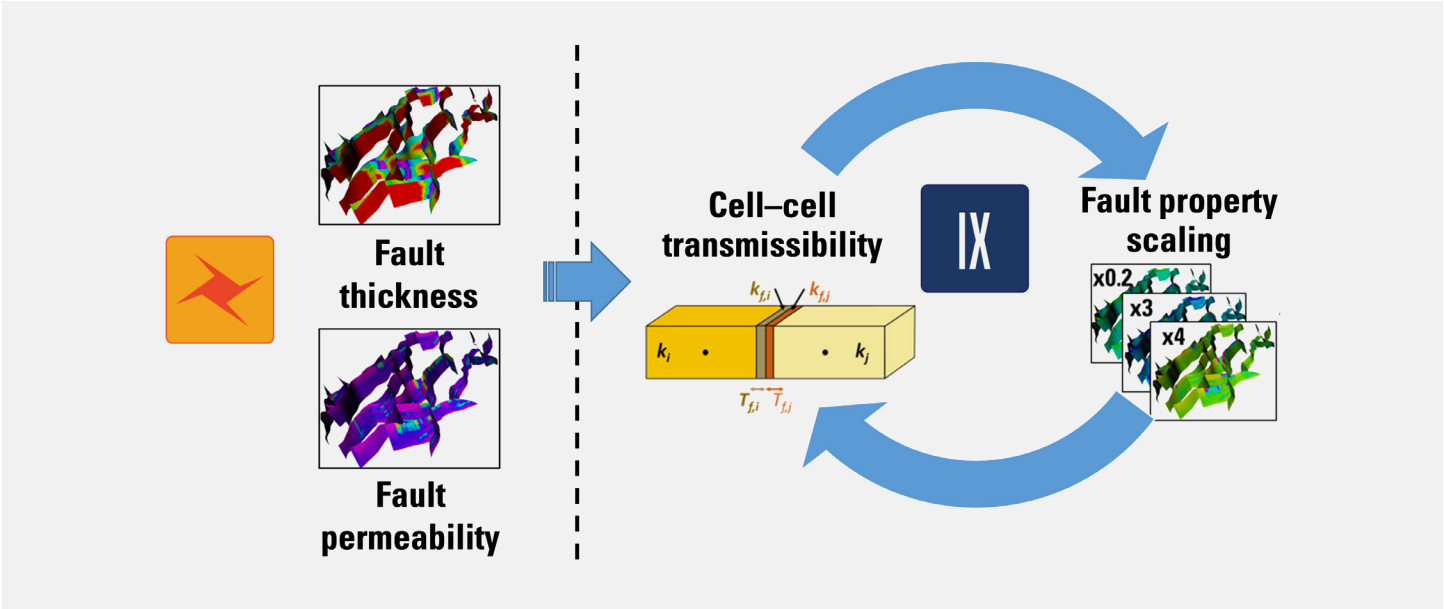

Depogrid Fault Seal Analysis workflow

Simple, geologically consistent history matching using fault transmissibility scaling factor

A new approach has been enabled in the INTERSECT simulator that incorporates the fault permeability and thickness directly into its cell-to-cell transmissibility calculation. This workflow avoids the oversimplification that typically occurs as a result of the transmissibility multiplier (TM) approach.

Constant TMs do not account for observed geological distributions of fault transmissibility and geological TMs cannot be tuned in isolation during history matching. By providing geological fault properties, and critically a transmissibility scaling factor, into the simulator we have both maintained the simple user experience for history matching and ensured the consistency of the adjusted fault impact on the dynamic reservoir behavior. This patented workflow both honors the detailed static geological analysis and accelerates the history matching for improved field development decisions.

This innovative solution seamlessly connects unstructured Depogrids to both the static and dynamic analyses of fault sealing.

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