

Hydraulic Fracturing in HPHT and Differentially Depleted Tight Gas Accumulations in Horizontal and Highly Deviated Wells

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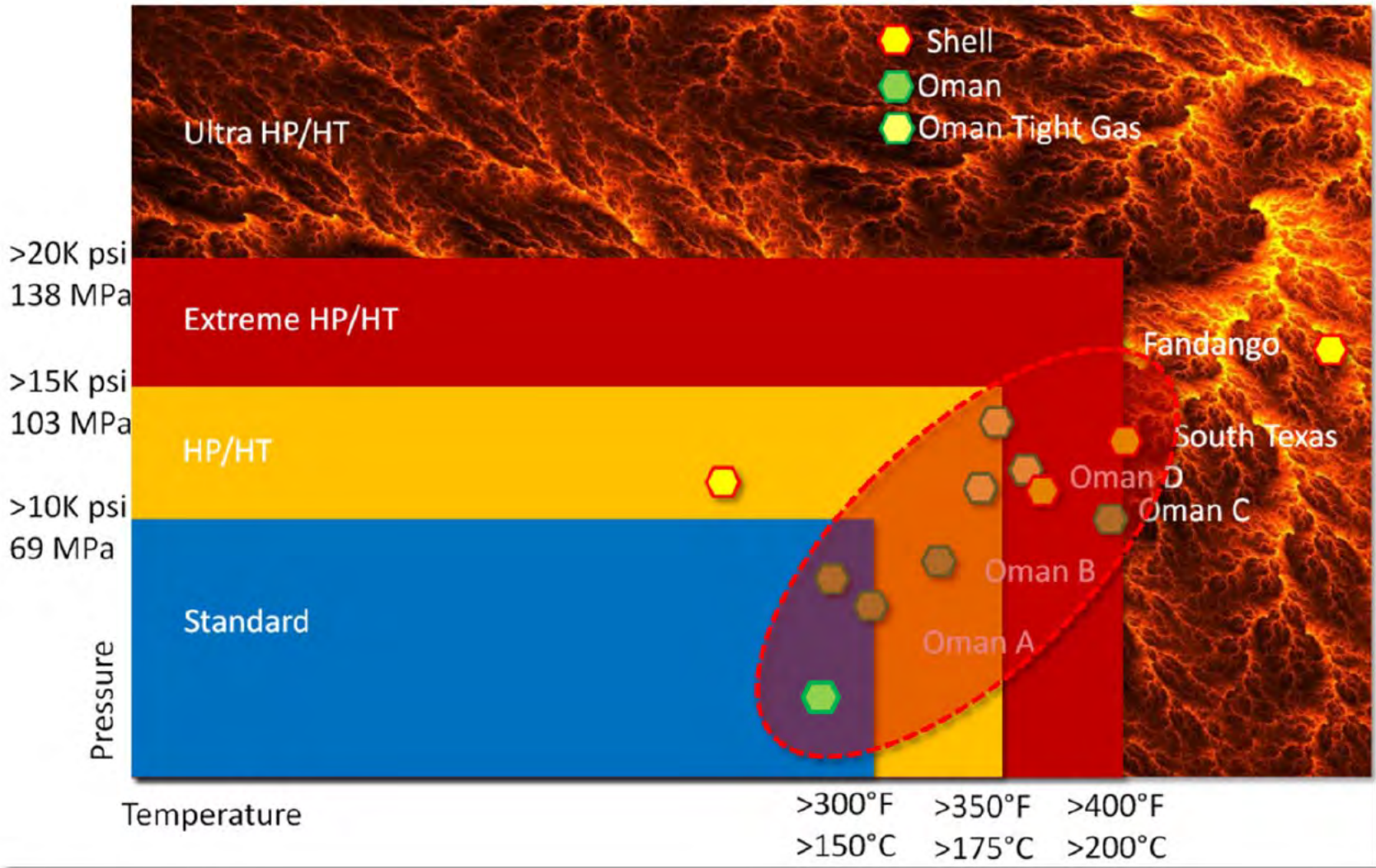
شركة تنمية نفط عُمان
Petroleum Development Oman



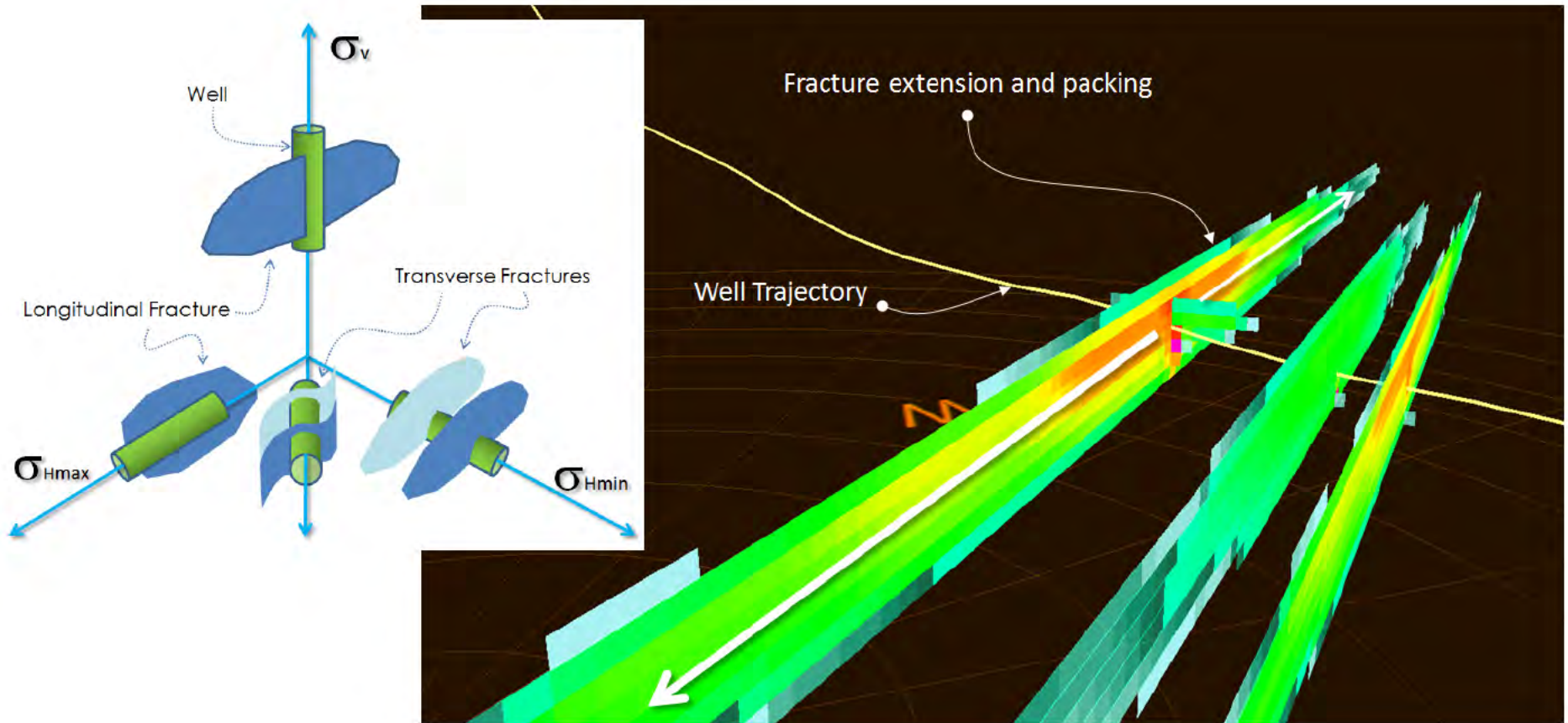
Discussion Outline

- Framing The Challenges
- Why Horizontal Wells with Transverse Fractures?
- Transverse fracture propagation - What we observe?
- Hydrocarbon production – How these transfers fracture perform?
- Defining Strategies
- Observations

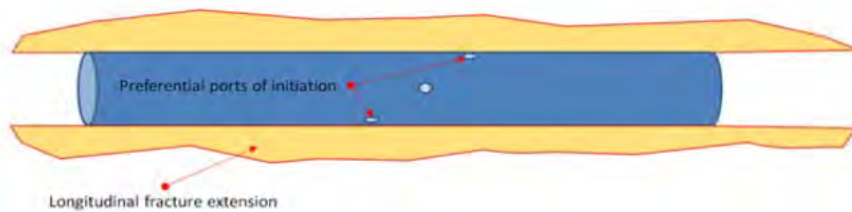
Framing The Challenges



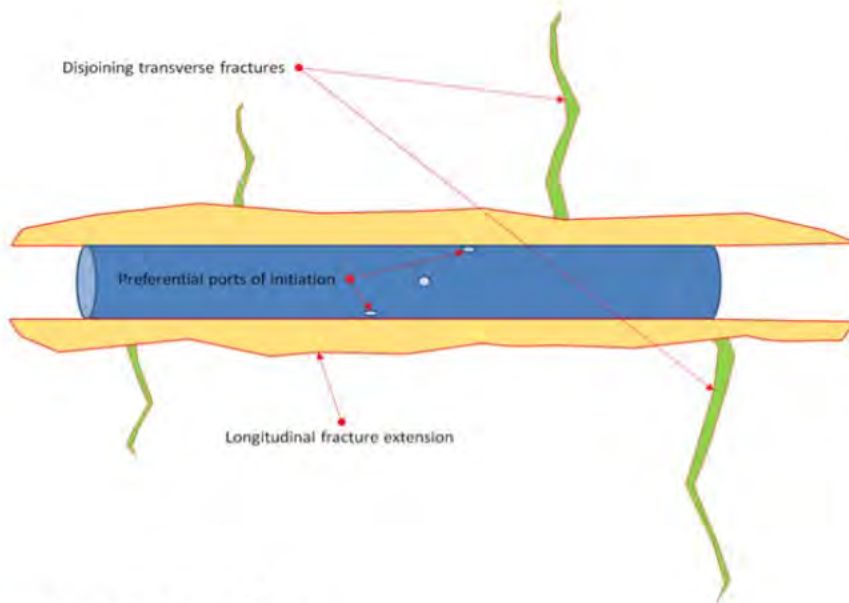
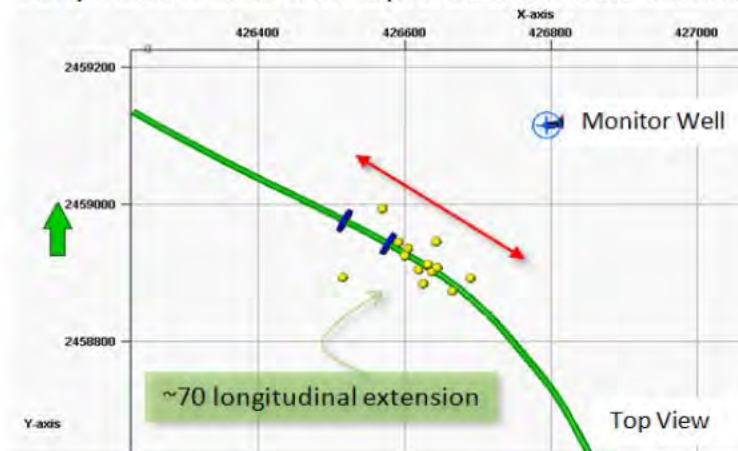
Why Horizontal Wells with Transverse Fractures?



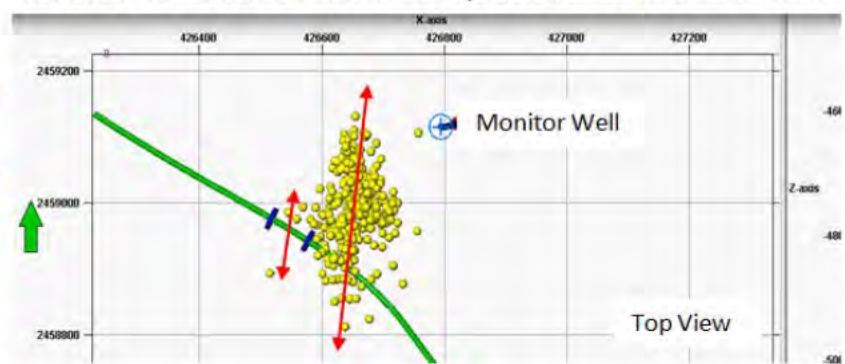
Transverse fracture propagation - What we observe?



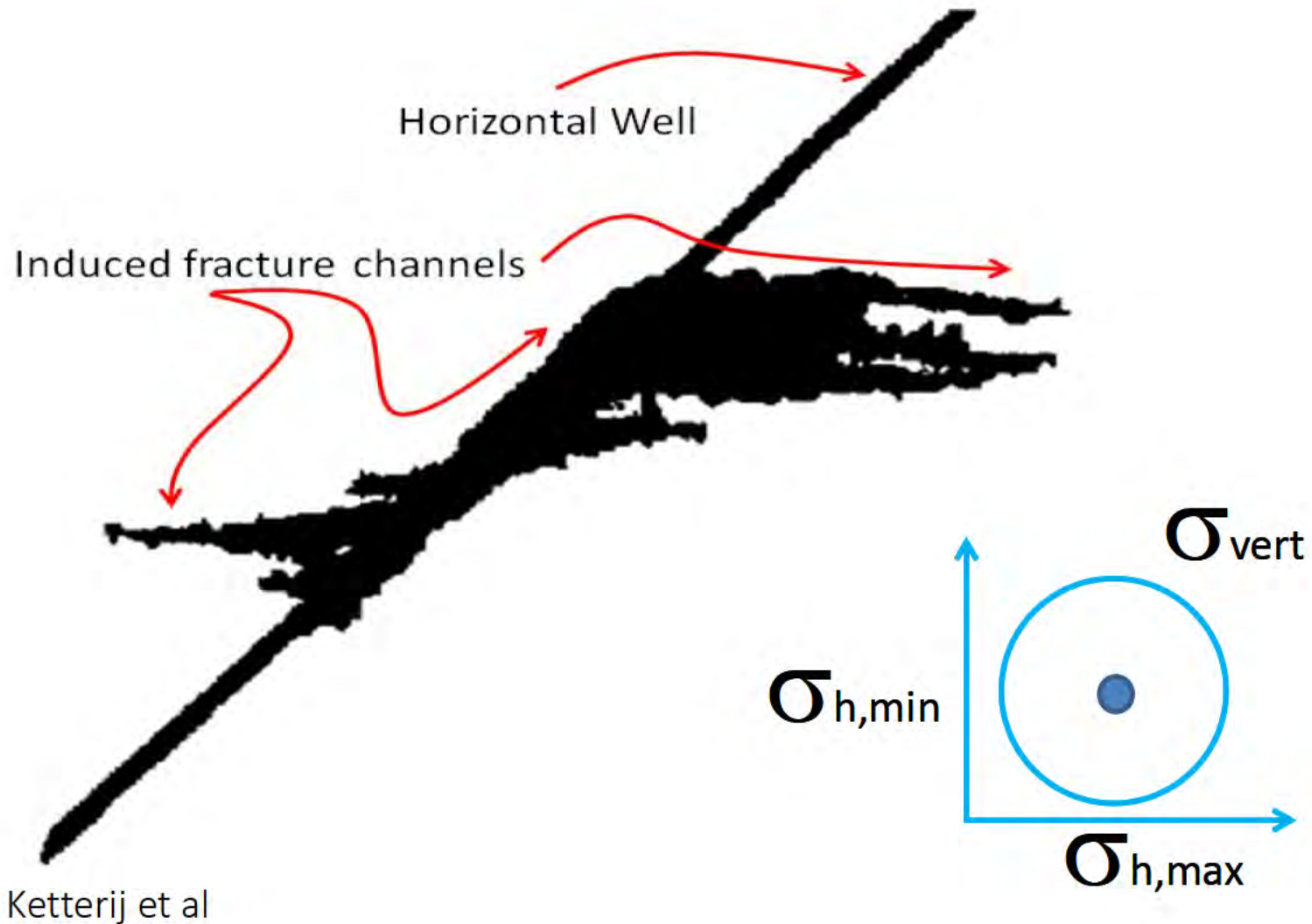
Early fracture extension captured with micro-seismic



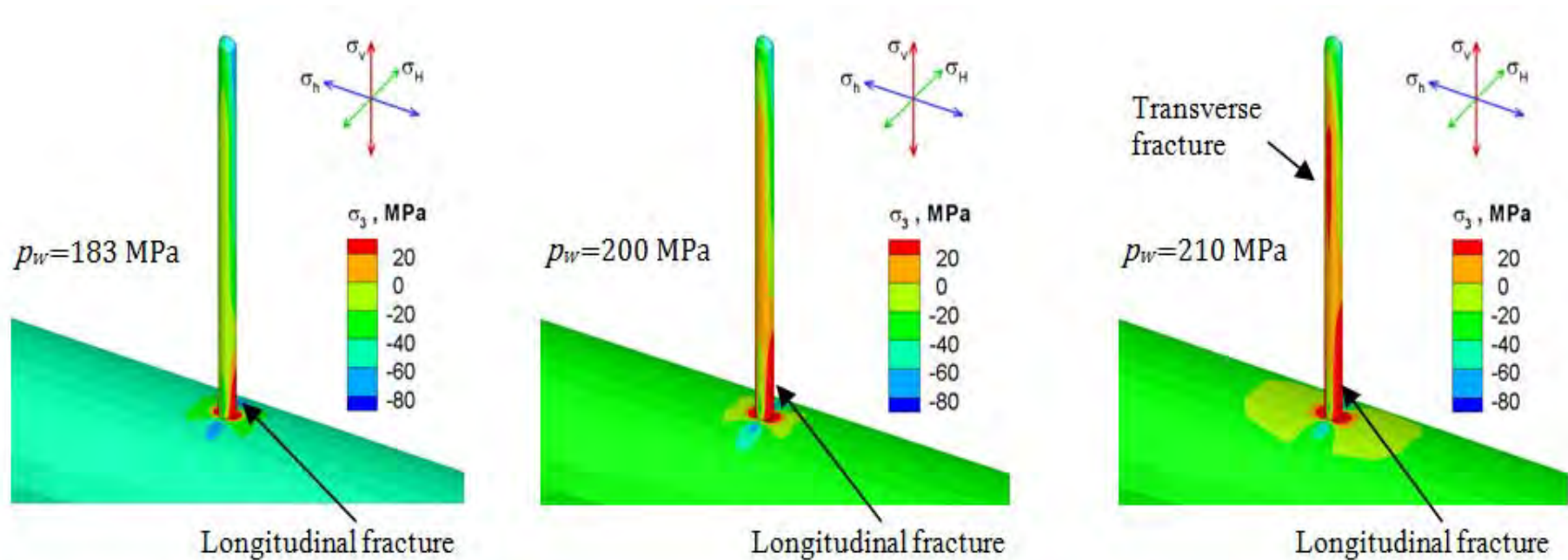
Transverse fracture extension captured with micro-seismic



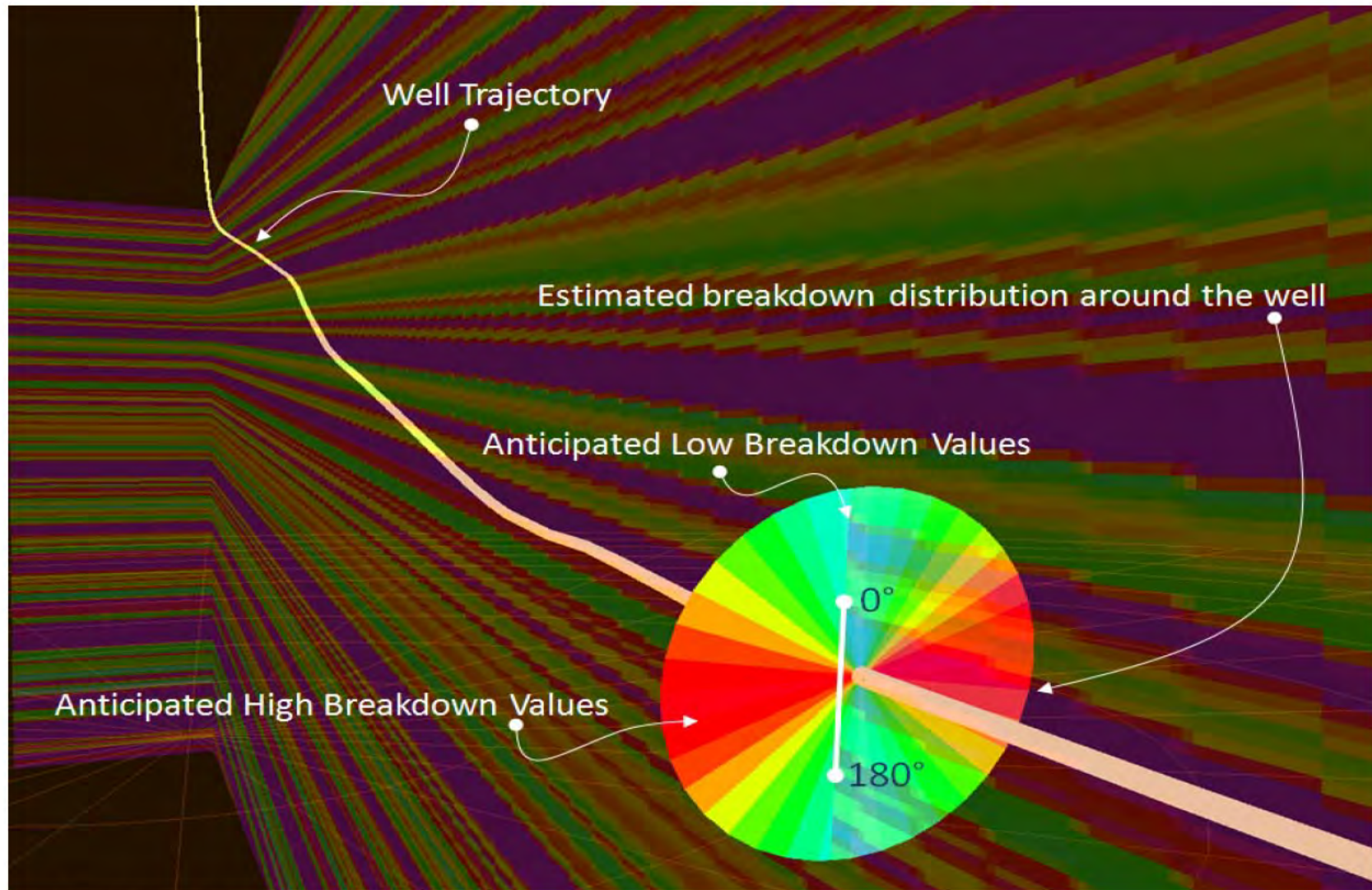
Transverse fracture propagation - What we observe?



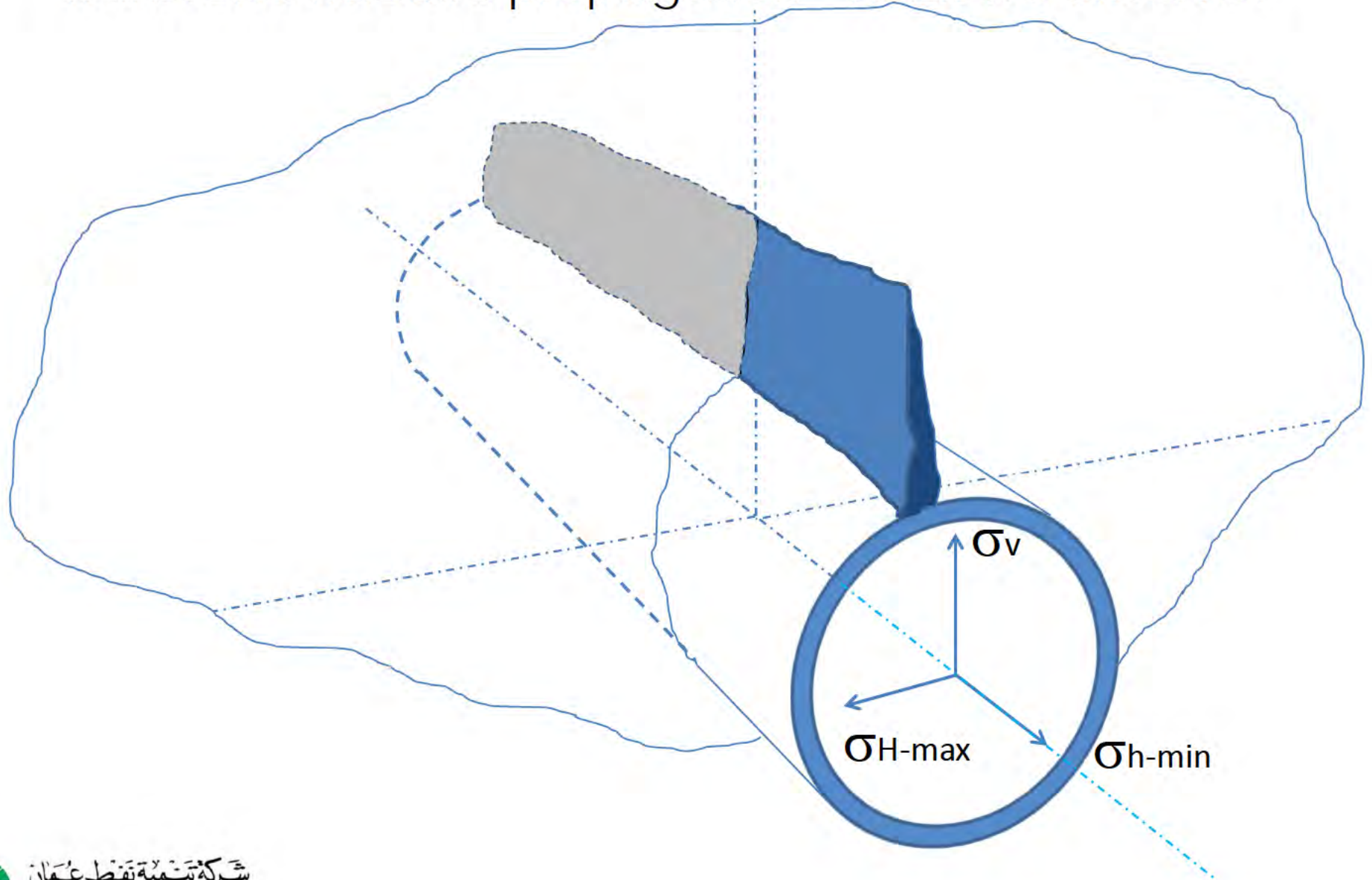
Transverse fracture propagation - What we observe?



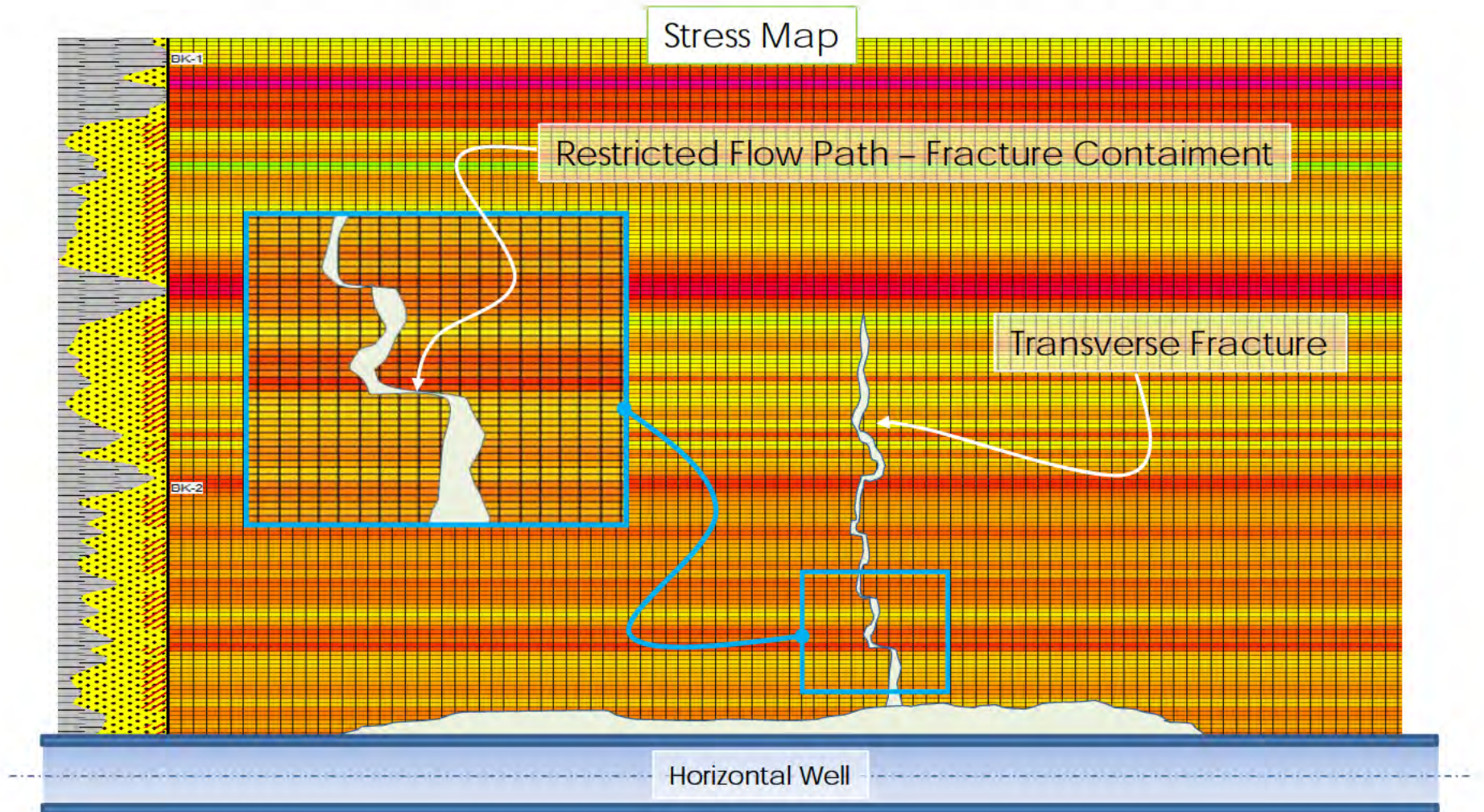
Transverse fracture propagation - What we observe?



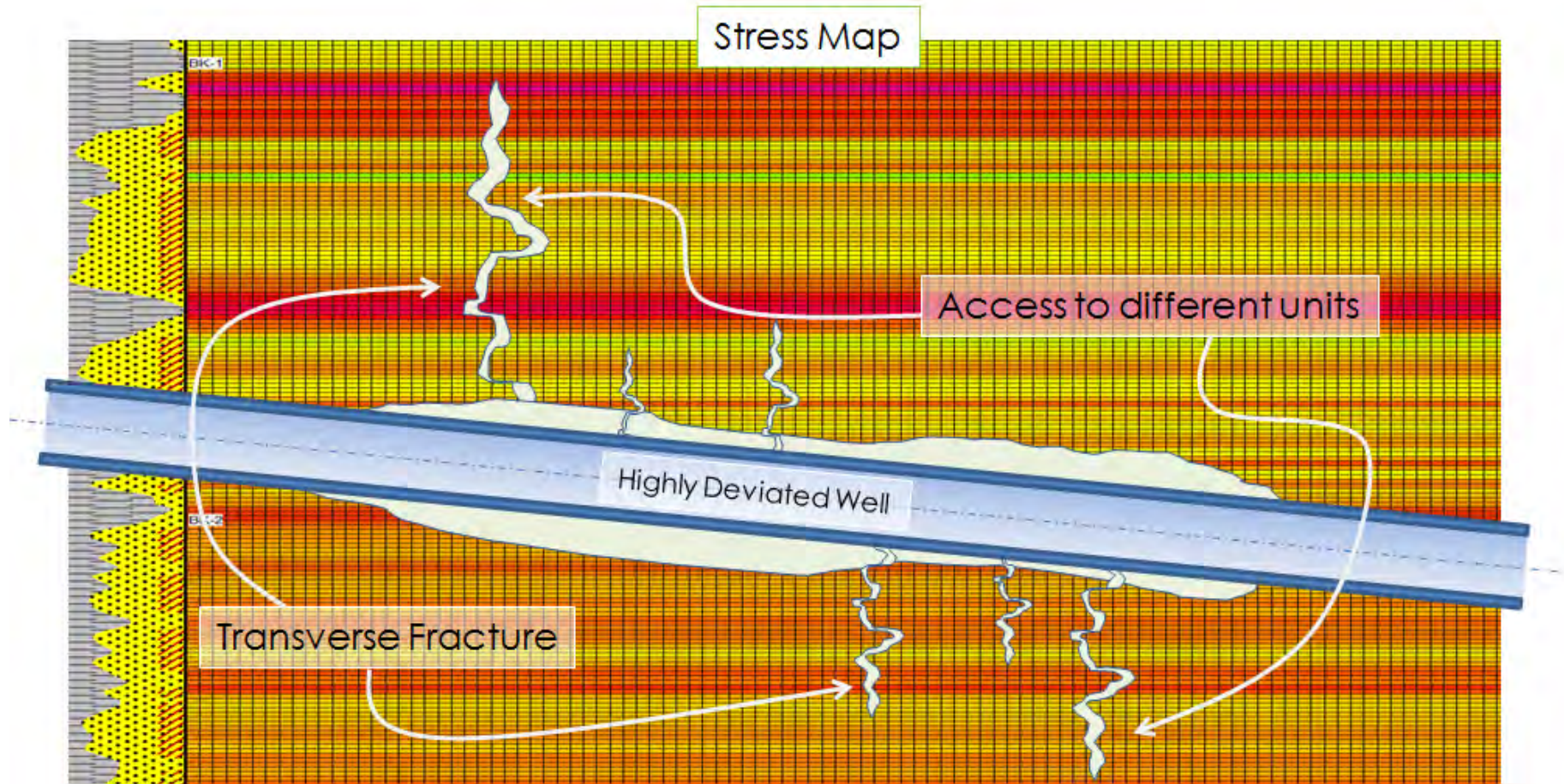
Transverse fracture propagation - What we observe?



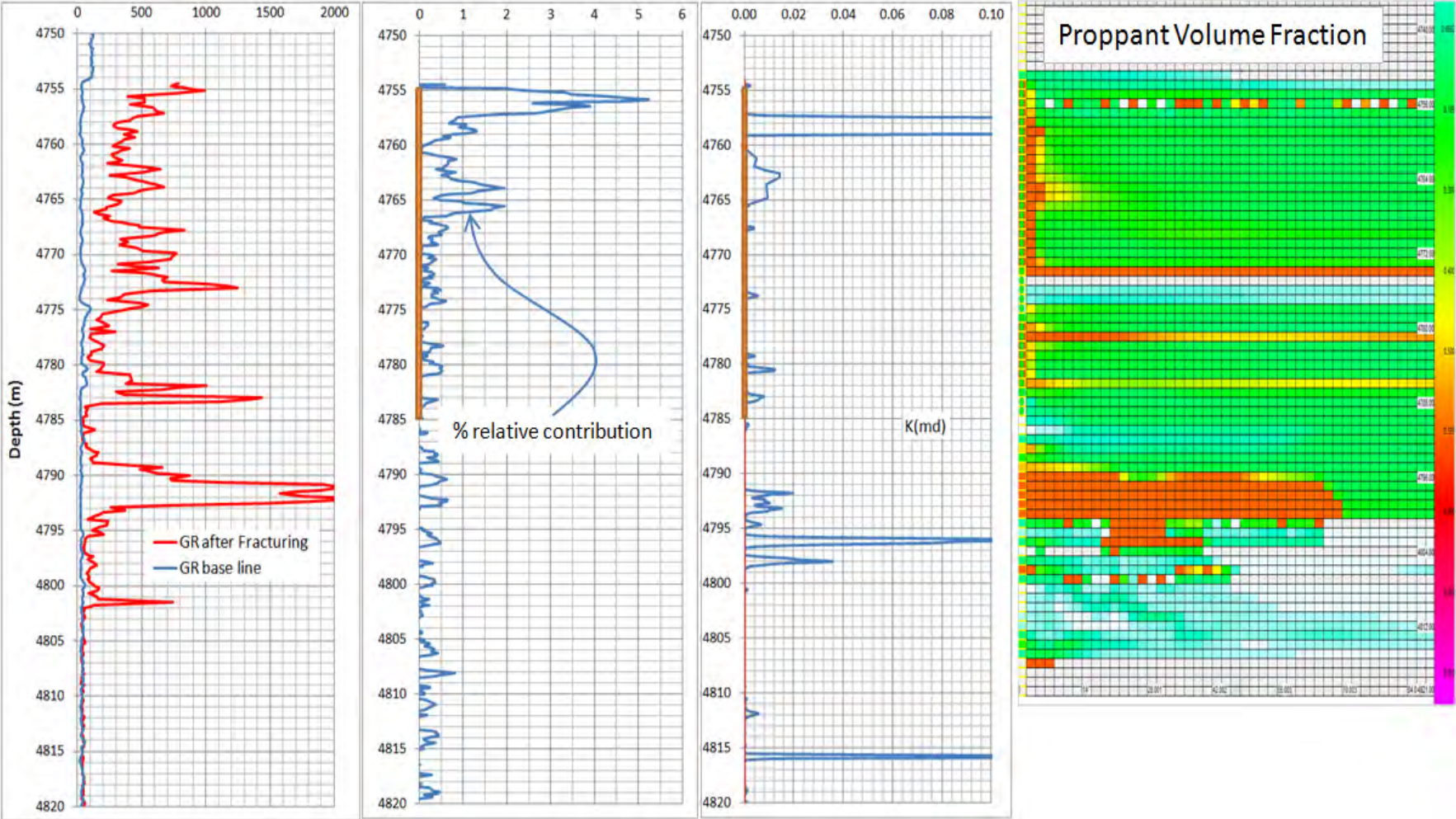
How these transfers fracture perform?



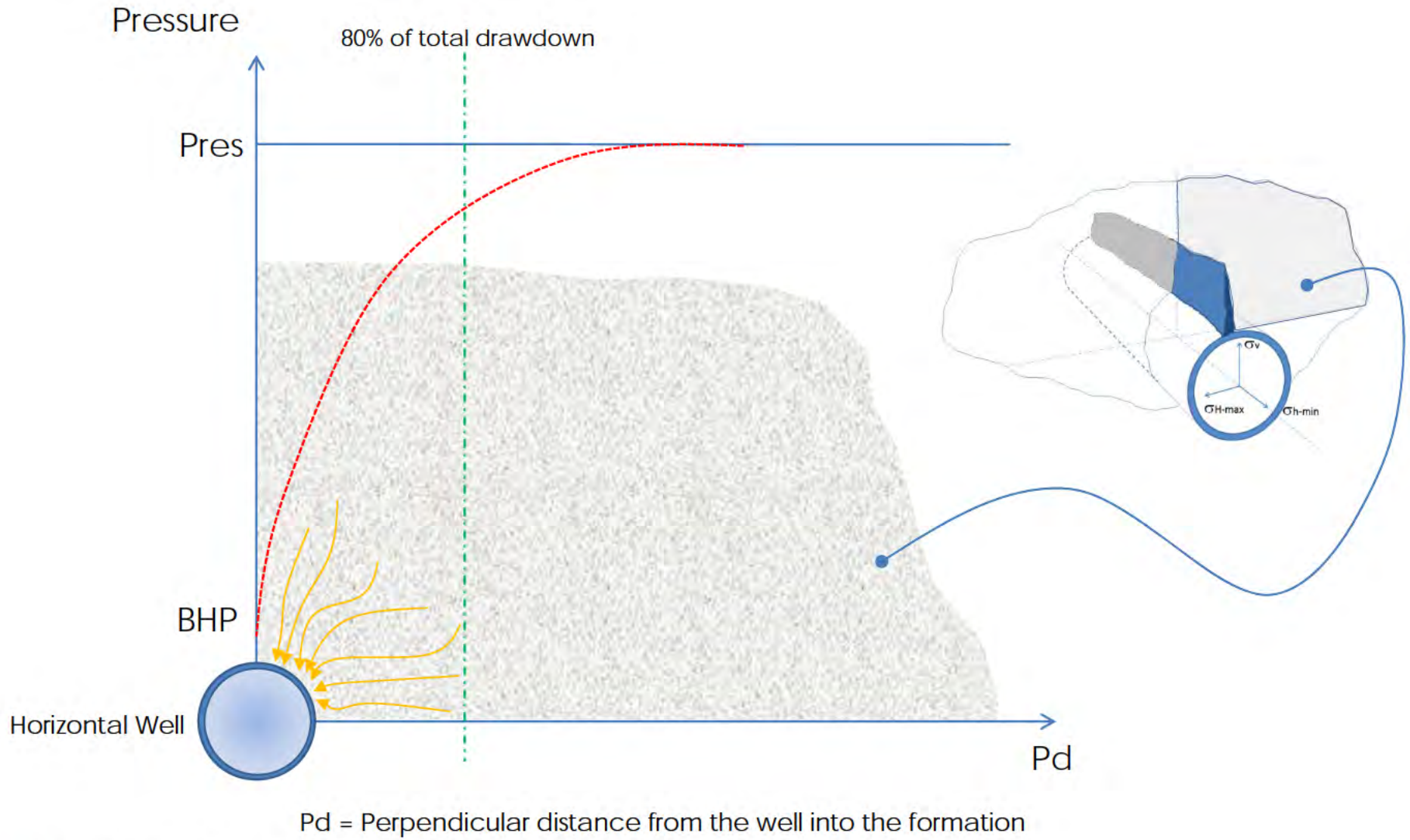
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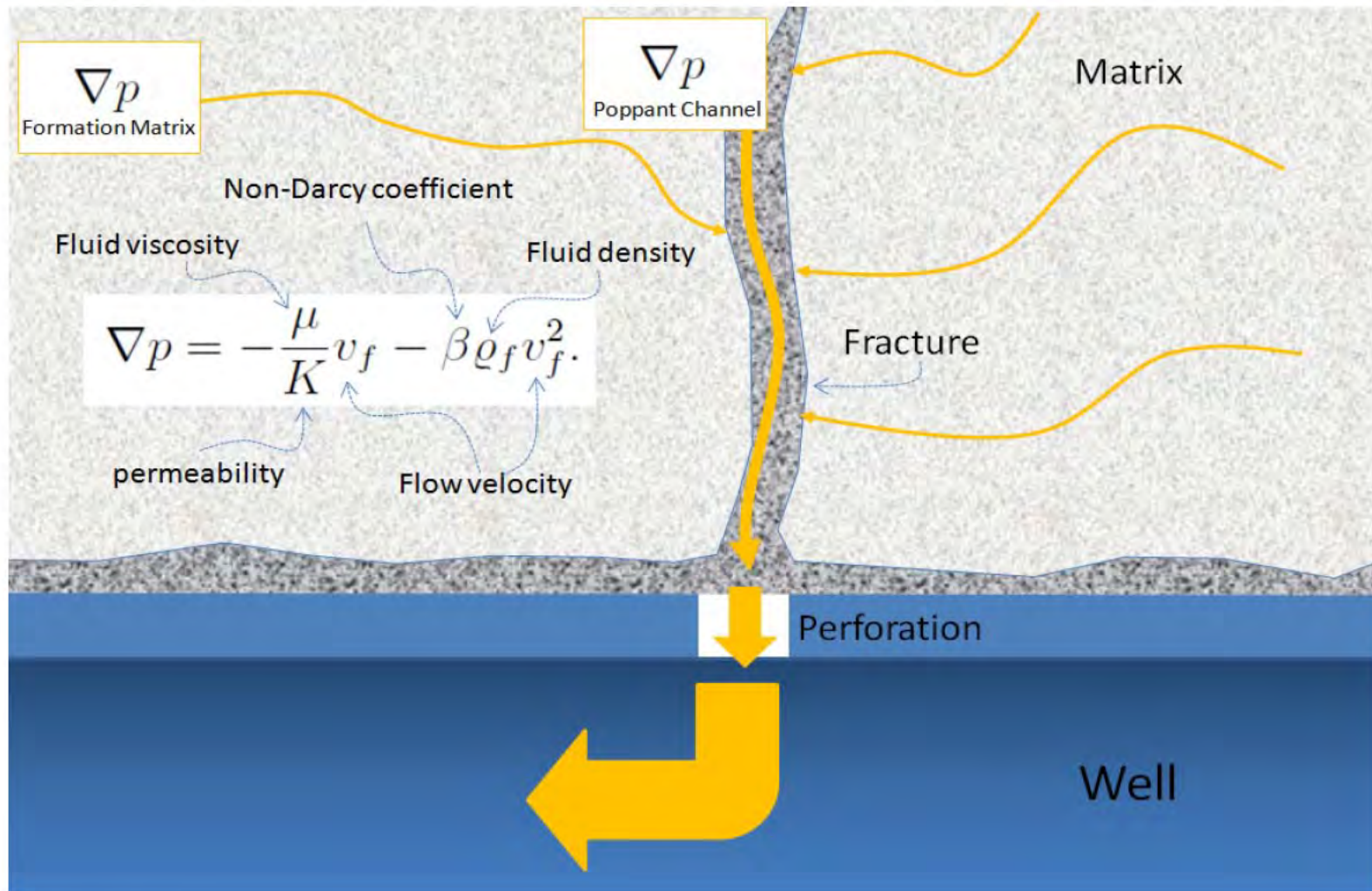
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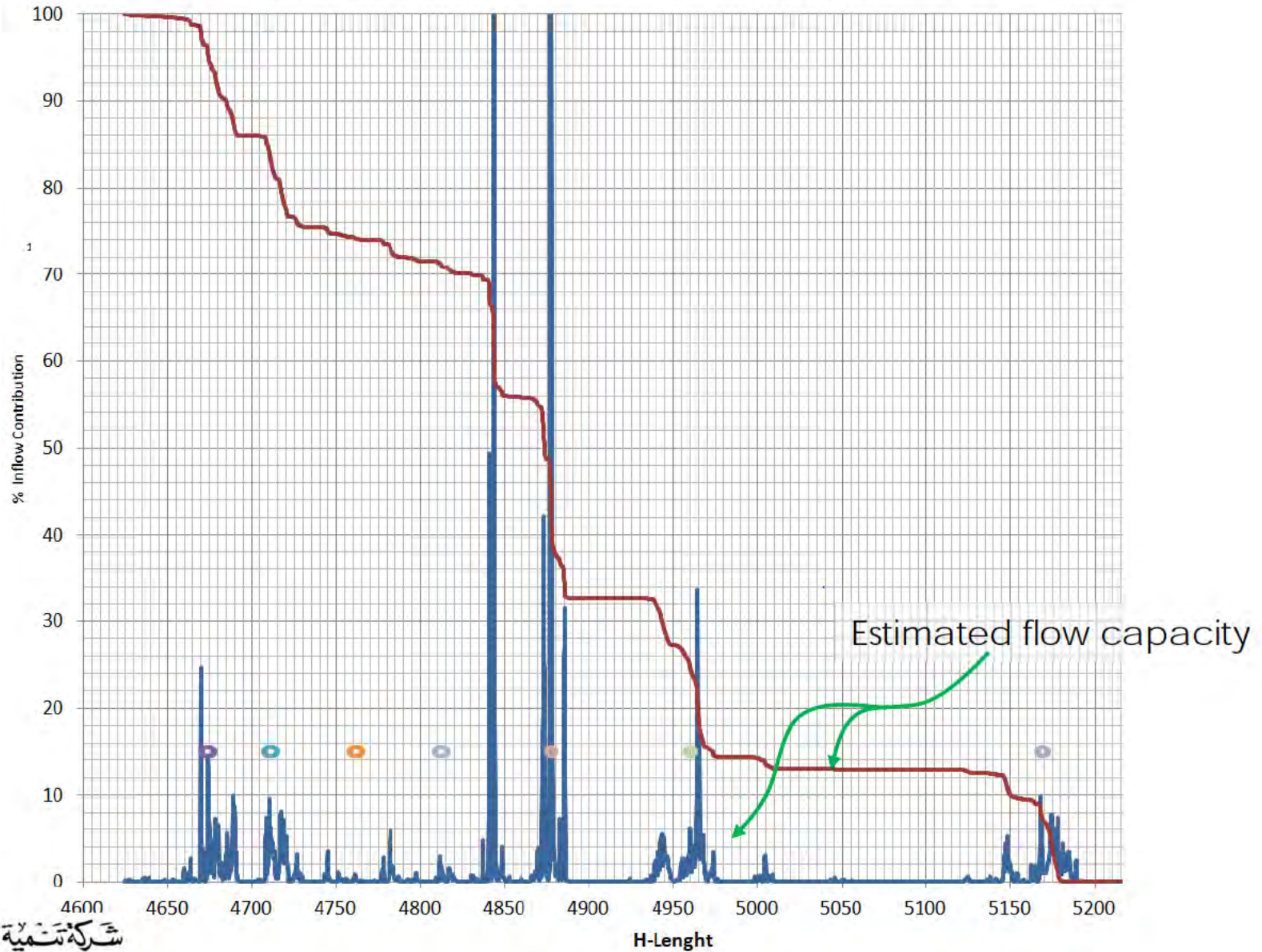
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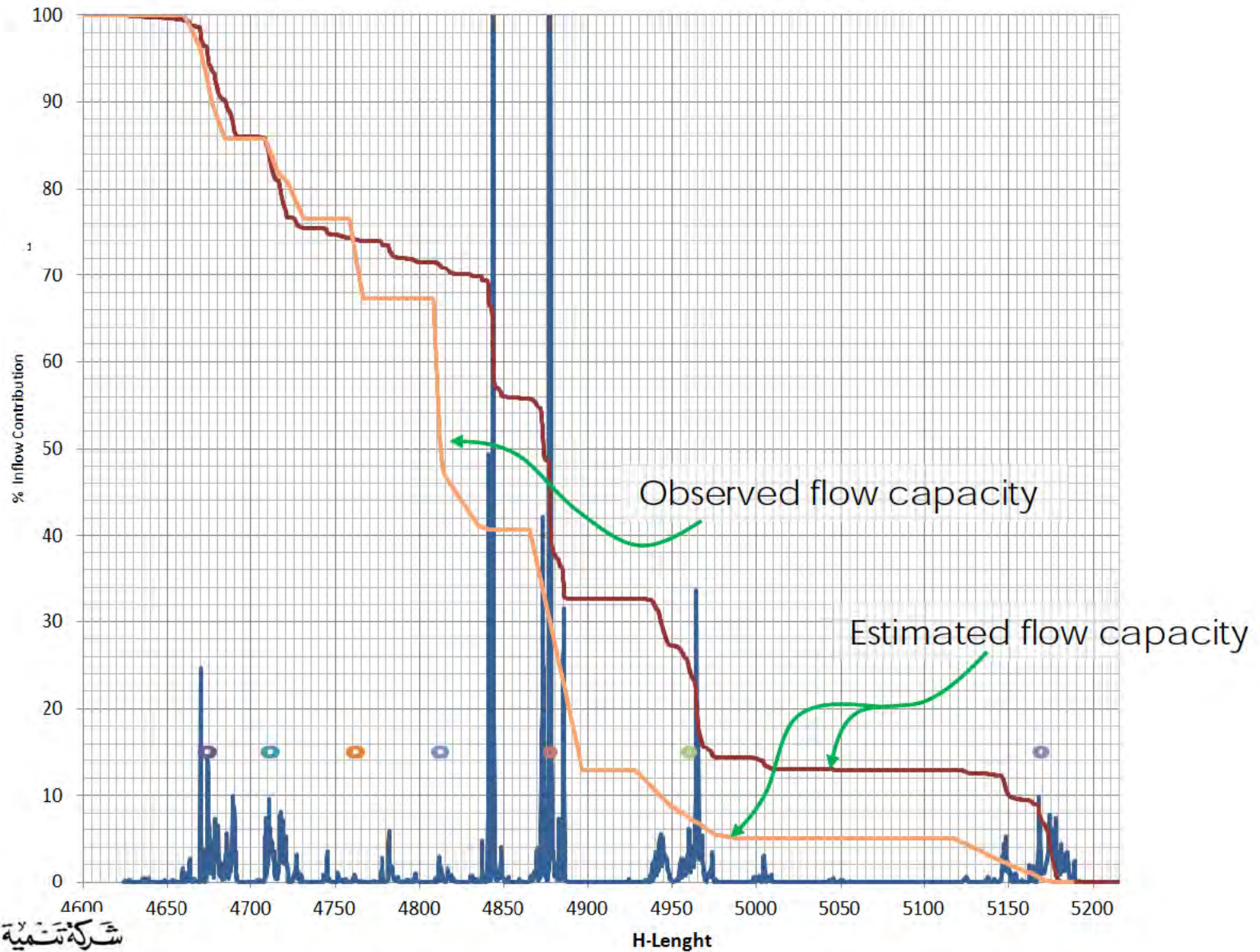
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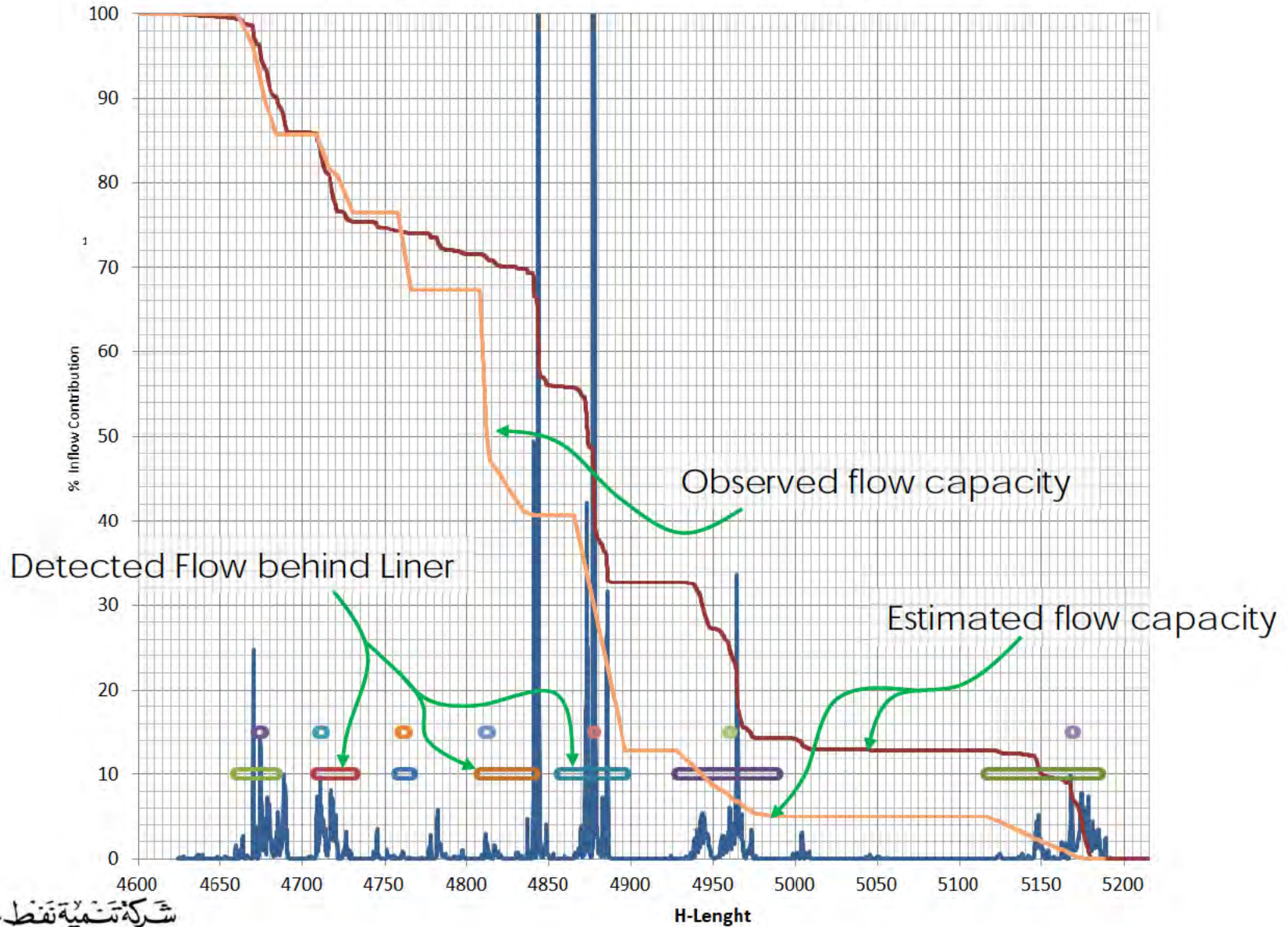
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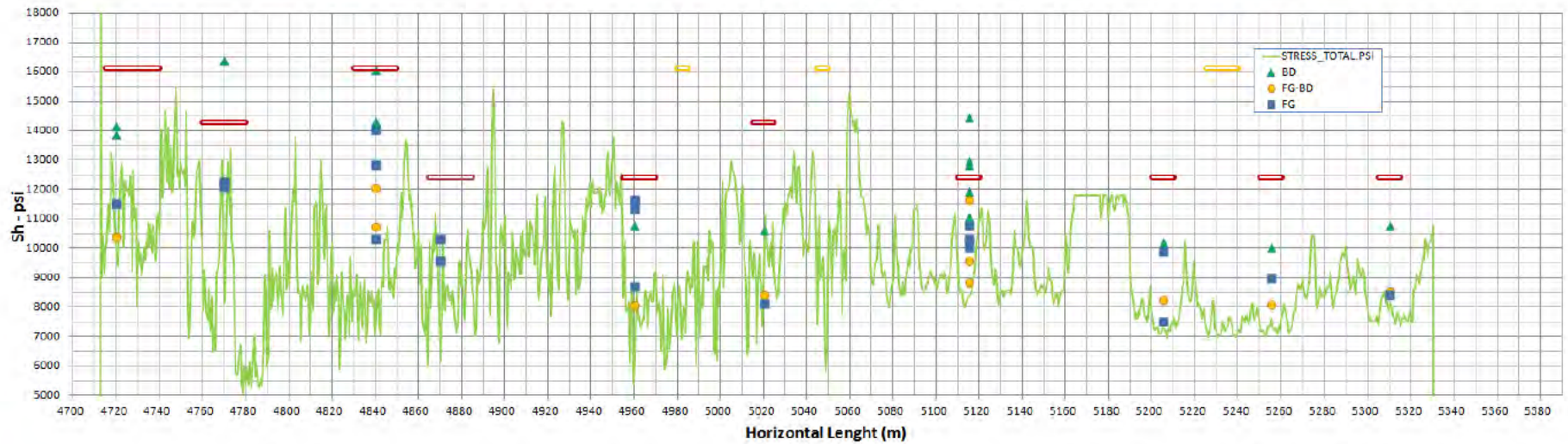
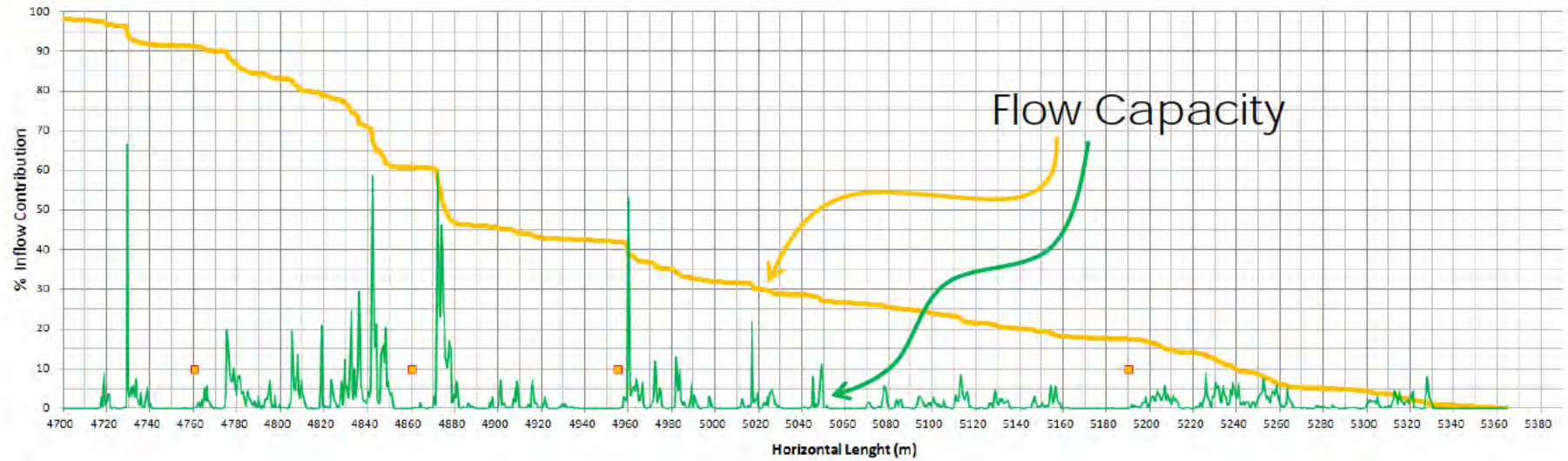
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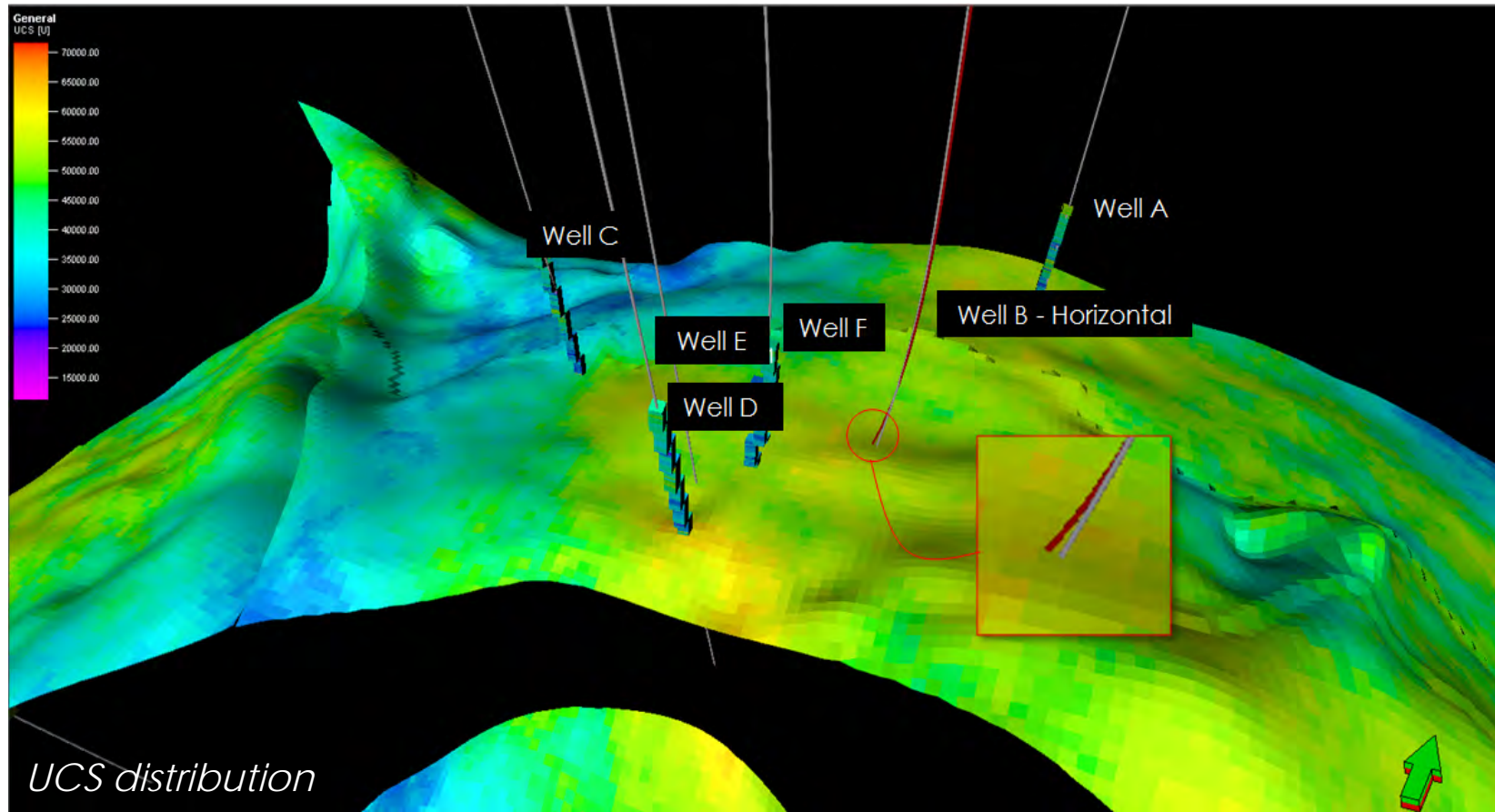
How these transfers fracture perform?



Defining Strategies



Defining Strategies



3D Grid Visualization Block

Comprehensive integration of static and dynamic data

Observations

- Combined reservoir Characterization, detailed fracture propagation modeling and diagnostic strategies were essential to Increase Understanding and orient subsequent drilling, completion and fracturing strategies.
- Micro-seismic monitoring proved to be essential to assess transverse fracture propagation behavior and Reduce Uncertainties during evaluation of the implementation.
- Fracture Diagnostics was Enhanced by the combination of Microseismic data with Production Logging.
- Observed Fracture Complex Paths created near wellbore and the partial well to fracture connectivity, significantly effect the Pressure Losses as gas expand and contract during the flow from the matrix to the fracture and finally into the wellbore.
- A 3D visualization data approach provides a new dimensions for the selection of horizontal well locations to honor the identified parameters associated with Enhanced Fracture Placement and Deliverability.

