



Status of Shale Research in The EDGER Forum

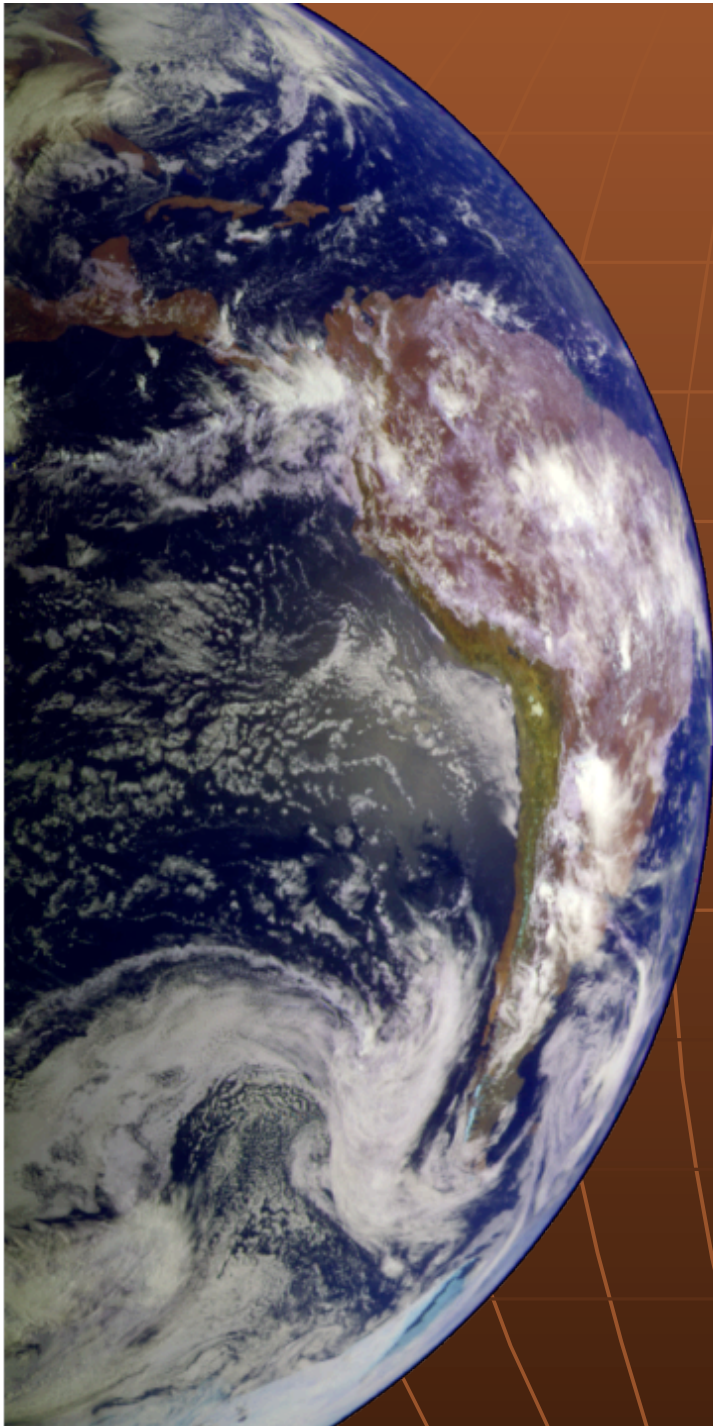
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SCHOOL OF GEOSCIENCES



Question:

In resource plays, all wells should (ideally) be productive. In practice, one good well (3 day payout) may be followed by a 3 year payout well in an adjacent offset location. Can seismic help discriminate between better and poorer wells?

Question:

**How can seismic help
optimize production in
Resource Plays?**

- **Fault Identification**
- **Reservoir Characterization**

Reservoir Characterization Projects in the EDGER Forum

Student (MS) research project

Back-to-basics studies to address how seismic responds to change in reservoir parameters. Use borehole data evaluate how the surface seismic response to changes in relevant reservoir properties.

Required Knowledge:

- Reservoir Geology
- Completion Techniques
- Actual borehole data (Sonic, Dipole sonic, Density and other logs)
- Subsurface data in both good and bad wells.

Back to Basics approach:

- Start with log data (including shear information) and reservoir description
- Evaluate seismic response to reservoir properties that can be seismically observed
- Predict surface seismic response to variations in reservoir properties (Sensitivity and Resolution Analysis)

Results (Suggestions) to date:

Seismic
Property

Shale
Property

Poisson's Ratio

'Chertiness'

HTI

Fracturing

VTI

Clay content
(Source or Seal)

Results (Suggestions) to date:

Seismic
Property

Shale
Property

More speculative hints:

Crack Aspect Ratio

Gas/Liquid
effects

Crack density

Fracturing
Stress-State

To-do, with producers:

Subsurface information to relate:

Poisson's ratio to 'chertiness'

HTI parameters to fracturing and stress state

VTI parameters to Clay content, source richness and seal efficacy

One way to accomplish this:

Working group of EDGER Sponsors to
coordinated data and interpretation

Example:

Bakken Shale

Upper unit—seal (and source?) VTI

Middle unit—reservoir (Fracibility) σ

Lower unit—source VTI

Do we have well (Logs and interpretations)
to allow estimation of both seismic and clay
parameters for calibration?

Status:

Considerable progress in two shales: Bakken and Woodford

Results suggest observable variations in seismic response for variations in HTI, VTI and σ

To date—no particular seismic technique has been isolated to actually interpret the variations.

Suggestion (Proposal?):

Working group with a subset of sponsors to coordinate research on specific shales.

One possible task: Address the tie between shale properties and seismic response.

Focus on Bakken (or ??)