

Challenges/Motivations

- Reservoir fractures and fluids—such as oil, gas, water, and CO₂—in the subsurface are difficult to detect
- An echoed sound wave (seismic signal) contains critical information about reservoir fractures and fluids, but the information is difficult to extract, visualize, and use
- There is a gap between existing fractured reservoir models and underutilized 3D seismic data

Technology Overview

- The new methods better use seismic signal to reveal critical geologic information and better integrate 3D seismic data into fractured reservoir analysis
- Specifically, the methods more effectively translate and enhance seismic signal to better evaluate reservoir storage capacity, caprock integrity, and leakage risk
- The methods generate superior results with enhanced accuracy and resolution while significantly reducing analysis time, thus leading to lower exploration cost and less environmental damage

Industry Significance

- The methods help companies to increase exploration success rate and reduce economic risk by more precisely locating resources
- The methods enable companies to mitigate environmental footprints by drilling fewer but more effective well bores, and by better predicting contamination risk

Technology Advantages: Examples

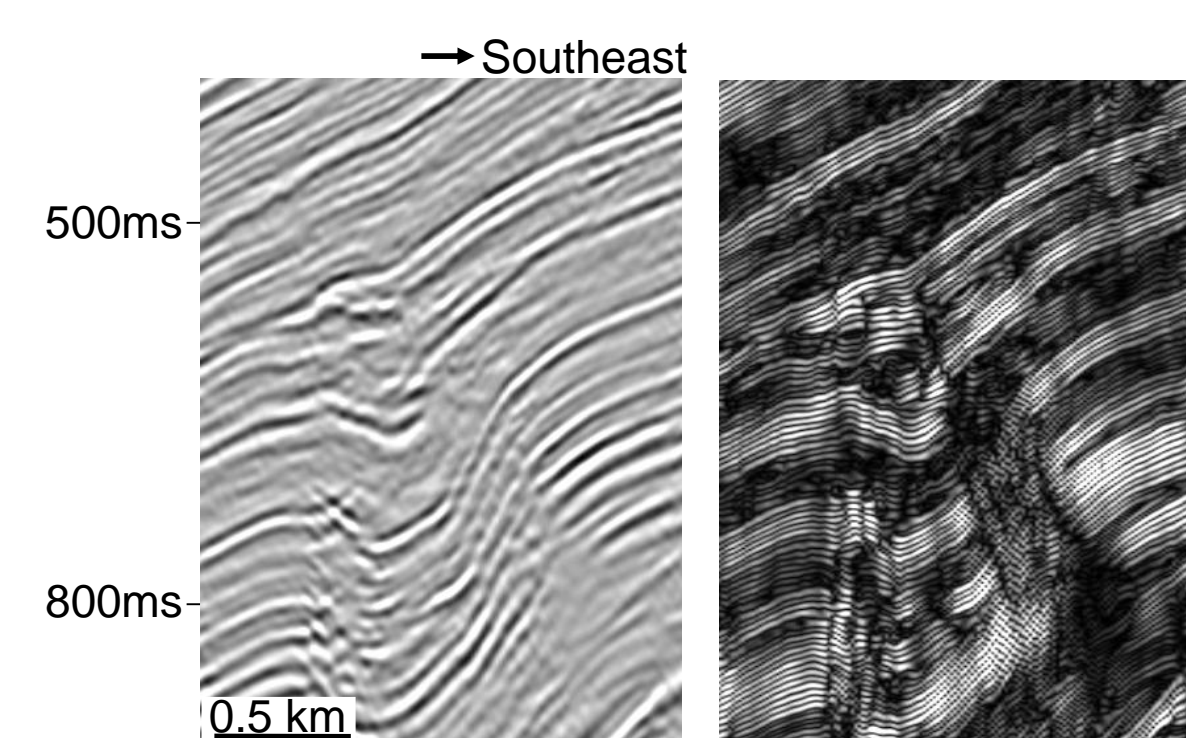


Figure 1. Improved image (right) for reservoirs and caprocks

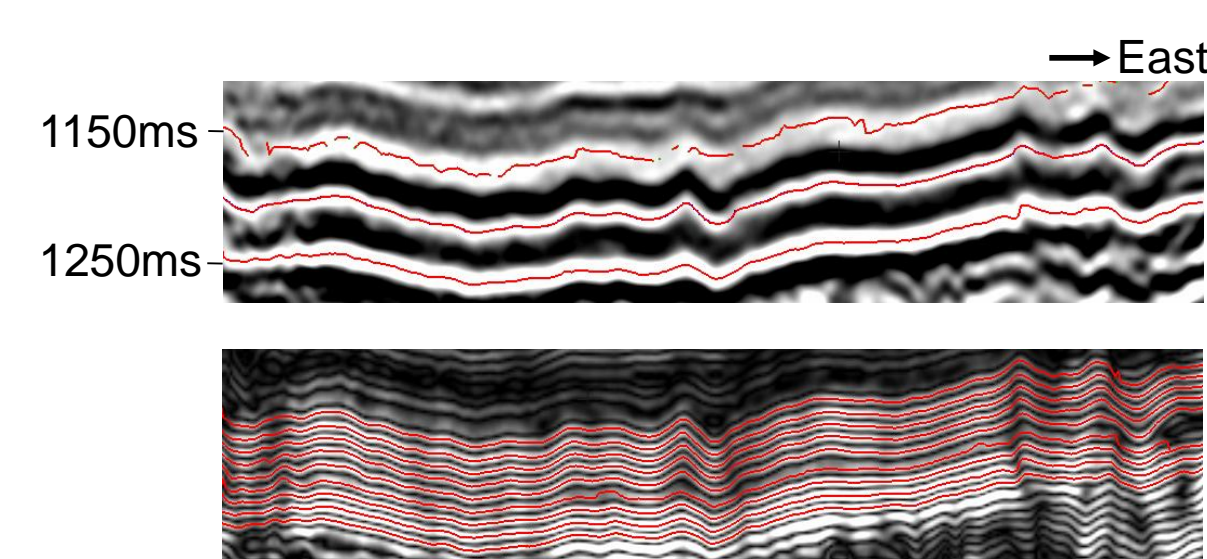


Figure 2. Enhanced resolution (bottom) for reservoir structures

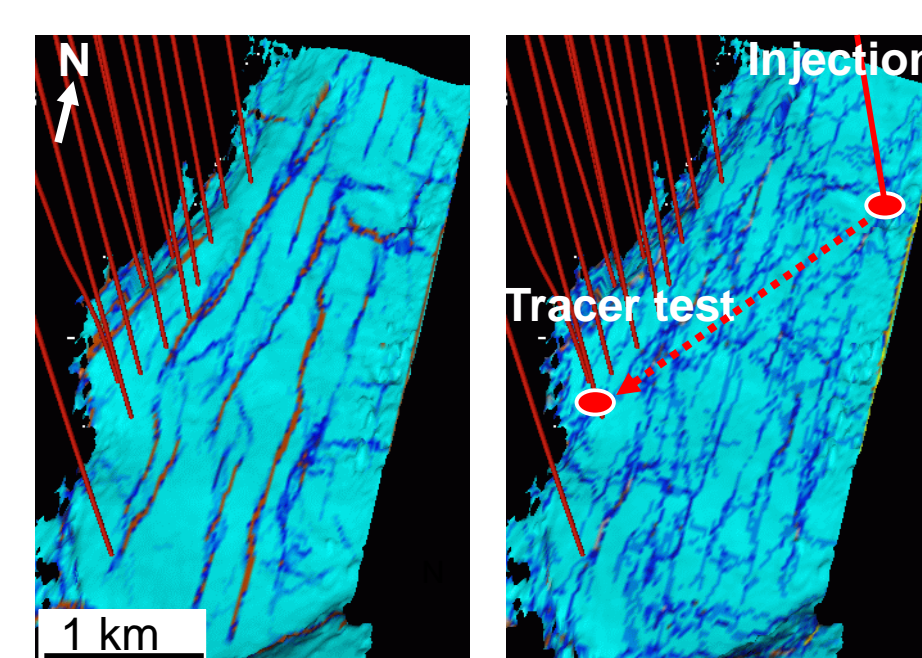


Figure 3. Enhanced definition (right) for reservoir fracture orientation

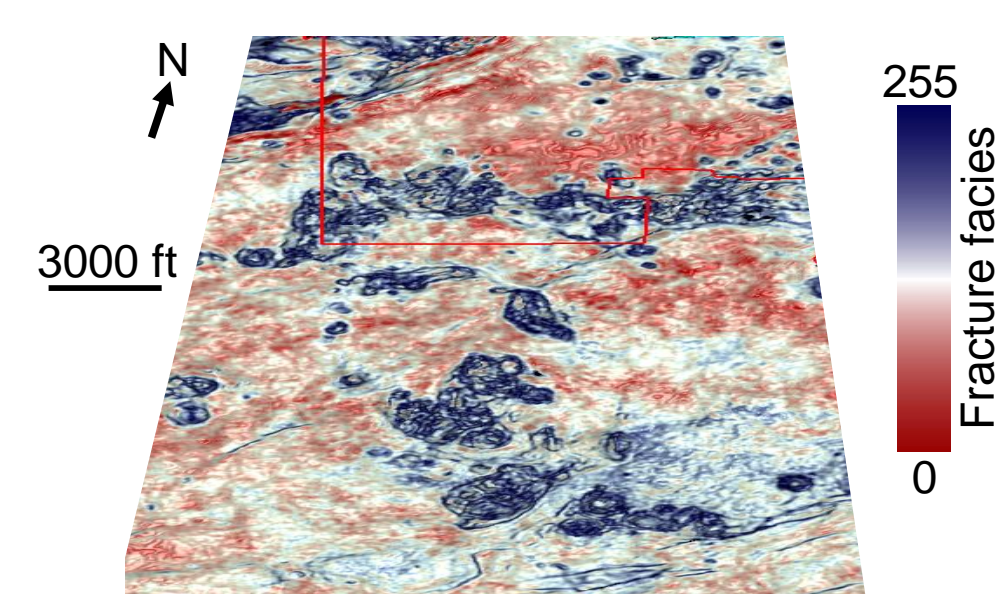


Figure 4. Improved detection for reservoir fracture facies (water-filled)

Benefits to Partner

- These are the only known methods of the kind in the world
- The methods help mine and add value from available but underutilized 3D seismic data without expensive new acquisition & special processing
- The methods could help save time, money, and environment by avoiding wasteful drilling on sites with poor resource yields

Opportunity

- I am seeking companies to support new research and development efforts in the area of 3D seismic characterization for both conventional and unconventional reservoirs
- I am particularly interested in the application of the new seismic technologies to fossil energy exploration, production, and CO₂ sequestration in the Appalachian Basin

Development Status

- The methods were developed in 2009, and were modified in 2011 and tested in 2012
- The methods have been tested with fractured reservoirs (tight sand in Powder River Basin and Marcellus gas shale in Central Appalachian Basin), with demonstrated competitive advantages over existing ones

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