

# Fracture Prospecting with 3D Azimuthal Imaging

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## Abstract

Seismic characterization of fractured reservoirs using standard land acquisition techniques has been a stretch goal of the processing industry for more than 20 years. Proper placement of wells either in a fractured ‘sweet-spot’ or away from a potential frac ‘thief-zone’ is critical for effective field development. Advances in pre-migration azimuthal velocity analysis have given us a glimpse of what’s available from 3D seismic surveys but have lacked the spatial resolution to reduce drilling risk. Azimuthal Imaging is the next step in the progression of technology for the seismic prediction of stress and fracture distribution in a target reservoir.

Stress and Fracture changes across an interval result in azimuthal changes in the velocity field. Azimuthal variations in the velocity field have long been recognized as a problem but generally disregarded in the imaging process for lack of a proper imaging tool. The focus of this presentation is on the use of azimuthal imaging technology in various shale and complex-structure plays. In shale and fracture targets we offer a technique for improving the spatial resolution of the reservoir variations for better fracture delineation. The Azimuthal migration removes dip effects and improves signal to noise permitting more confident reservoir property estimation. In complex structural settings, azimuthal migration has the potential to properly image structures where isotropic time and depth migration fails.

