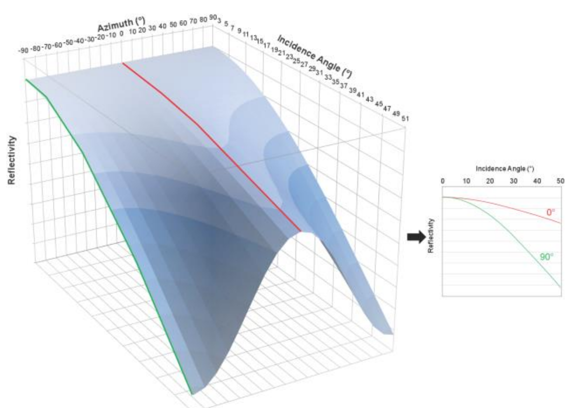
Fracture Analysis

From microscopic cracks to regional faults, fracture analysis is crucial for understanding permeability, planning completions, and avoiding hazards.

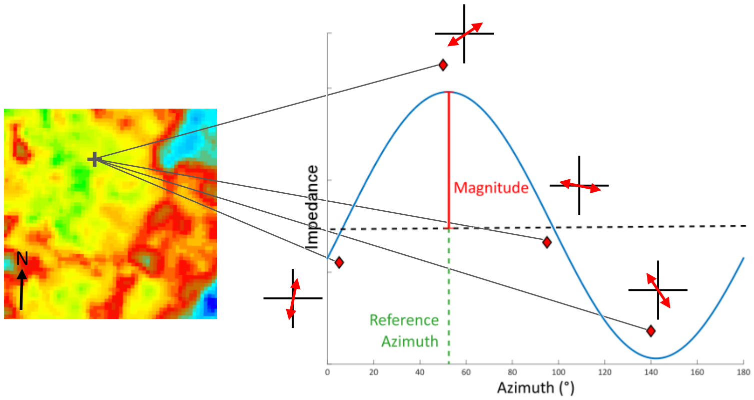
Scale

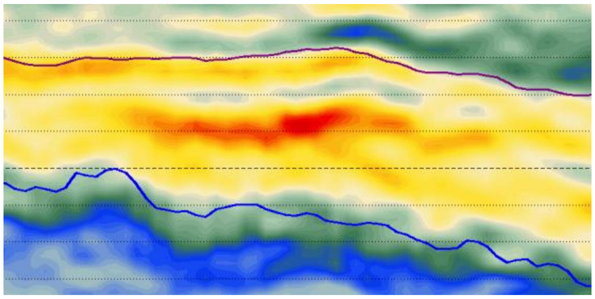
The largest scale of fractures, or faults, can be identified through conventional seismic interpretation or with the aid of geometric attributes such as coherence and curvature. Smaller-scale fractures, though not resolved as a seismic discontinuity, can still have a profound influence on the bulk properties of the seismic response. These effects include changes in anisotropy, elastic properties, and more. Sound QI offers a number of solutions to identify these changes.

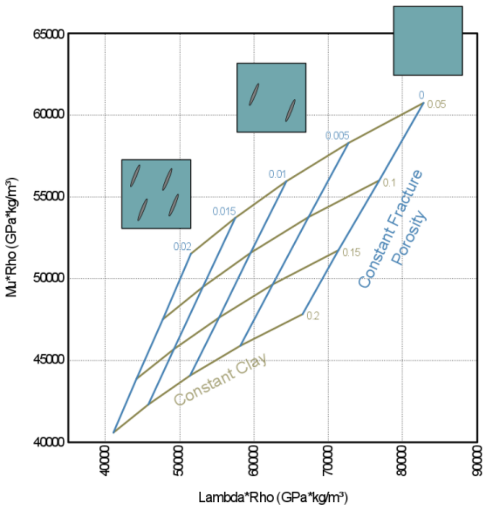


Azimuthal Analysis

Anisotropy is a variability in properties depending on the direction of measurement, and can be caused by aligned fractures. Azimuthal AVO, or AVAz, is a tool to investigate this effect on seismic amplitudes at reflections either bounding or within the reservoir. Alternatively, inversion produces a 3D model of elastic properties and can be performed on seismic data that is restricted to a certain azimuthal range. By repeating the inversion for all azimuths, the magnitude and dominant direction of anisotropy can be determined.







Bulk Properties

The presence of fractures can change the bulk properties of the rock, either through an increase in porosity, or by changing the rock's stiffness. Sound QI's Inversion and classification process can help identify changes in these mechanical properties.

Modelling

Through analysis of well data or modelling using principles of rock physics, Sound QI can investigate the feasibility of detecting fractures in the zone of interest. The constructed templates relate the observed changes in elastic properties to expected geological conditions. Incorporating the available geological knowledge is the means by which seismic properties are translated into meaningful properties for reservoir development.

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