

Seismic Petrophysics

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Determining the in-situ (uninvaded or native) acoustic properties of rock is usually defined as “Rock Physics.” Seismic Petrophysics is defined as using these properties to determine an ideal seismic response, both a compressional wave response and a shear wave response. Once a Xu-White-Keys seismic petrophysics acoustic velocity model is created, one can vary the porosity and fluid saturations in the rock and see how these changes affect the ideal seismic response.

When the geophysicist has a processed seismic volume he can extract key parameters from the volume, like the wavelet shape, polarity, the time to depth conversion, etc. and the seismic petrophysicist can use these parameters to tailor his model to the volume. This allows the petrophysicist and the geophysicist to investigate anomalies in the seismic volume and determine what they might be and if they are significant or not.

Once the model is finished and tied to a volume the team can determine what they can see in the volume, what they cannot see and compare the response in areas with good wells and poor wells. One often stops developing a well to seismic tie once the depth tie is complete, but it can be taken further than this resulting in a significant reduction in drilling risk.