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Robust Workflows for Seismic Reservoir Characterization

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Over the past two decades, BP has developed workflows to make predictions about lithology and fluid from seismic amplitudes. Their current form, which has stabilized in recent years, is based around a few fairly simple steps: two-term AVO coordinate rotations, spectral shaping derived from a power-law Earth spectrum model, and map-based detuning and calibration. These are underpinned by careful conditioning of the seismic and by close integration with petrophysical rock property analysis.

These processes have evolved to meet a number of criteria: (1) robustness and repeatability, (2) avoiding parallel workflows by integrating within existing practices, and (3) allowing most steps to be carried out by nonspecialist geophysicists.

Achieving robustness is also a prerequisite for making uncertainty estimates, which has many potential benefits: ranking the sources of uncertainty; validating our prediction models; providing a framework for integrating with other data types; and helping to understand the theoretical limits of seismic prediction.

In this talk, I'll outline the concepts behind the main steps in the seismic characterization workflow and discuss approaches to uncertainty estimation.

Biography

Patrick Connolly graduated from Birmingham University with a BSc in physics in 1977 and joined Seismograph Service Ltd as a data processor. After working in Oman, New Zealand, Pakistan, and London, he moved to Britoil in Glasgow in 1982 and worked as a seismic programmer until the company was acquired by BP in 1989.

Connolly has remained with BP as a seismic analyst and occasional interpreter in Aberdeen, Houston, and London. He has been a member of a number of exploration and appraisal teams: Foinaven and Schiehallion (West of Shetland), Holstein (Gulf of Mexico), and Greater Plutonio (offshore Angola). Since 2001, he has worked in BP's E&P Technology division and currently is manager, Seismic Reservoir Characterization and Surveillance R&D.

Patrick was awarded the SEG Virgil Kauffman Gold Medal in 2001 for his development of elastic impedance technology. He was an EAGE distinguished lecturer in 2007.