The Use of Cable-Less Multi-Component Seismic Acquisition Systems for Improved Reservoir Characterisation

Brian Donnelly
Input/Output Inc.

We discuss how recent developments in seismic recording techniques can be used to dramatically improve operational efficiency and geophysical data quality in land seismic acquisition. Key aspects of the techniques are GPS satellite surveying and LIDAR laser altimetry; readily-deployable portable field acquisition units; cellular radio communications: wide-azimuth survey configurations; and single-point multicomponent MEMS sensors.

Employing wireless technology allows for unrestricted fully- configurable survey geometries, making super-high fold recording a practical proposition. This technique has significant implications in terms of operational efficiency and enhanced QHSE exposure. Further, the wireless recording system is married with the use of high fidelity single-point multicomponent MEMS sensors. These record all components of the seismic wave-field, enabling accurate determination of anisotropic and AVO characteristics of the reservoir. Recording shear wave data allows for direct calculation of reservoir properties, for instance Vp/Vs and fracture orientation.

The optimised orthogonal survey spread lends itself to the use of cross-spreads concepts and Offset Vector Tiling methods for geometry regularisation and enhanced seismic data processing. This means that ‘true’ 3D seismic processing techniques can be used for noise attenuation and image enhancement.