State-of-the-Art of 3-D Seismic Technology—Integrated Multicomponent Characterization of Carbonate and Clastic Reservoirs

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Three-dimensional multicomponent (3-D, 3-C) reflection seismology is the technology of the future for reservoir characterization. Applications of this emerging technology provide quantitative solutions for porosity and permeability determinations within both clastic and carbonate reservoirs that are unattainable from compressional-wave seismic data alone. A 3-D, 3-C seismic survey over a clastic valley-fill reservoir in the Pennsylvanian Morrow Formation at Sorrento field, southeastern Colorado, U.S.A., demonstrates the application of this technology to identify and characterize a sandstone reservoir. At Joffre field, Alberta, Canada, multicomponent 3-D seismic data characterize carbonate intervals in the Devonian Nisku and Leduc Formations. Those two recent studies mark a major turning point in the use of seismic technology for reservoir characterization. Today, time-lapse monitoring of petroleum reservoirs, using new 3-D multicomponent technology, emerges as the next seismic frontier.

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