
Integrated Crosswell Seismic – An Advanced Technology to Improve Reservoir Description - Case Histories

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This paper describes the results achieved in applying the Integrated Crosswell Seismic (ICS) technology in several Oil Fields worldwide. ICS is an innovative methodology to improve the description of the internal geometries of the reservoir between two or more wells, which has evolved from being primarily an exploration tool, to a development and reservoir management tool. ICS requires the joint measurement and interpretation of two different seismic events: a) Direct arrivals for tomographic inversion; b) Reflection arrivals for reflection mapping; This new approach yields several practical advantages: • Extremely high resolution (2'-3' vertically) of the geology and structural imaging (10 to 100 times better than that achievable with surface seismic); • Measurements directly referenced in depth; • Near surface effects (topography, weathering or gas sands, etc.) entirely bypassed; • Seismic, log and core data integration.

This technique can allow the imaging of the interwell fluid movement if applied in time-lapse mode. In fact, it can be sensitive to variations - induced by the production operations - as little as 1% in velocities. In the last two years Crosswell Seismic Data were acquired in several oil Fields as part of a reservoir characterization project being conducted by Eni E&P on Italian and overseas fields. The case histories were collected from fields with different reservoir lithologies and related to different geological frameworks. The selected case histories show the high flexibility and applicability of the methodology in the reservoir management activities for different type of challenges: • Higher resolution structural & stratigraphic imaging; • Geological model building and validation; • Petrophysical properties estimation; • Identification of "infill" drilling targets; • Time lapse interwell monitoring and fluid flow imaging.
