

Structural Delineation with VSPs

Muhammad Idrees¹ and Zahia Djebbar²

¹ Schlumberger North Africa Geomarket, Algeria

² Sonatrach, Algeria

Structural features such as faults and pinchout play an important role in evaluating and understanding the extent of a reservoir and the further development of the field. Due to various factors related to resolution limitation on surface seismic, these features may not necessarily be clear enough to map. However, borehole seismic (VSP) survey can be designed/processed and interpreted for high resolution imaging, providing delineation of subsurface structure and characterization of the physical properties of the reservoir surrounding the well. It can help provide answers to questions and interpretation challenges which are critical and important in exploration or development phase of a field:

- What is the location of the well with respect to nearby faults?
- What are the orientations and types of faults (normal or reverse)?
- At what depth should the next casing string be set?
- What is the best direction and reach for sidetrack or next well?
- Is the reservoir fractured, and what is the fracture orientation?
- What is the optimum placement for the next well?

Advanced and new borehole seismic acquisition tools and processing techniques have been deployed in Algeria for better understanding and revealing complex structural picture in the vicinity of the well. This paper discusses the case studies (reported in Sonatrach-Schlumberger Well Evaluation Conference Algeria 2007 book) where high fidelity VSP data acquired with multi-levels 3-components VSI (Versatile Seismic Imager) tool and, processed using advanced 3C processing techniques delineates confident structural imaging of faults and characterization of natural fractures.