

Extracting and Utilizing Azimuthal Anisotropy through Depth Imaging

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ABSTRACT

Reservoir model building in the UAE has historically utilized well-log derived measurements of Acoustic Impedance, V_p/V_s & Density to build rock physics property volumes that can be utilized for reservoir characterization and mechanical earth model building. Typically, the inter-well space was interpolated and contributed from conventionally acquired and processed surface seismic with low detail velocity model to constrain the reservoir model interpolation. A workflow we present will demonstrate the value of enhancing full-azimuth single-sensor, single-source (S4) data by regularizing to discrete offsets and azimuths and use it for depth imaging together with proposed novel methods for near surface velocity model building and statics handling based on several UAE data examples. Application of these new processing workflows to point-receiver, point-source UniQ 3D land seismic data also highlighted the presence of previously undescribed azimuthal anisotropy, seemingly prevalent in the majority of UAE's geological fields. It is essential to have an accurate subsurface velocity model and depth imaging before proceeding with any azimuthal analysis and estimation of azimuthal anisotropy. The ability to record, process, characterize & correct for azimuthal anisotropy improves the fidelity of seismically derived rock physics properties, opens the opportunity for new fracture characterization & modelling workflows, and thus more accurate reservoir models. Sometimes, even in a geologically less complex environment, conventional methods and procedures used for near surface velocity modeling, static handling and depth imaging may still not be adequate to fully uncover the true geological structure. This has been the motivation for developing improvements to pre-existing workflows, practices and procedures. The described workflow is designed to maximize value extraction from newly acquired UniQ surface seismic data by meeting & surpassing the clients expectations for information & attributes that can be derived & utilized for subsequent reservoir modelling and thus highlighting the ability to improve well & reservoir planning & reduced risk for achieving stable or higher production.