Prestack 3-D TAU migration and Velocity Analysis : Focusing 3-D data from offshore Abu Dhabi

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The 3-D data set from offshore Abu Dhabi has suffered from shallow velocity anomalies concentrated in center of the surveyed region and above the critical reservoirs area. Previous processing results, that mainly ignored such anomalies, produced images that lacked reflection signatures in that middle critical region. Even those processing methods that have tried to predict the anomaly, but are based on prestack depth migration concept, have failed to focus the image at the center. Thus, we use the inherent stability features of representing the image and all processes prior in the TAU instead of the depth domain to estimate the interval velocity model for this 3-D data set. The process is based on prestack 3-D migration velocity analysis and thus honors the complex inhomogeniety up shallow in that region. The final estimated interval velocity model in the TAU domain provided low residuals in the imaged sections from different offsets and agreed well with the four wells located in the area. This velocity model also encompassed all the main features of the region like the low velocity zone up shallow and the major fault present in the middle of the region. Using the velocity model we applied 3-D prestack TAU migration to the full data as opposed to subsets of the data as done in the velocity development stage. As a result of using the TAU domain, we managed focus the image far better than in previous attempts. Using the new images, we managed to identify the location of the major sealing fault, and recognize major structures in the central zone.