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## Depth Imaging a 2-D Saudi Aramco Seismic Line

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### Abstract

The near surface of certain parts of Saudi Arabia presents severe challenges for seismic exploration. This paper investigates various issues involved in performing pre-stack depth migration (PreSDM) of a Saudi Aramco 2D line from a difficult area.

Prior to depth imaging it is important to perform pre-conditioning of the data. This particular data contains quite severe surface wave energy that obscures the signal. The application of a filtering technique that successfully attenuates this is demonstrated. It is also very important to obtain a good near surface velocity model prior to depth migration. A successful application of refraction tomography will be shown. This technique is strongly dependent on the timing accuracy of the first arrivals. Picking of first arrivals in this data is difficult; an approach to displaying these for both picking and quality control will be described.

The seismic resolution is enhanced within the Vibroseis signal bandwidth using a novel deconvolution technique.

PreSDM is then performed on the conditioned seismic data. The most important aspect of PreSDM is building an accurate interval velocity depth model. Several techniques will be shown to obtain this model using both layered and gridded approaches. The advantages and disadvantages of these techniques will be demonstrated. It will also be shown how these techniques may be used together to build the interval velocity in an optimal manner. The effects of performing constrained tomographic inversion in the depth domain will be demonstrated. Finally the effects of parameterisation of the migration will be shown as will results from different migration algorithms.

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