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MULTIPLE AND NOISE ATTENUATION WITH TAU-P SEISMIC DATA PROCESSING

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New techniques for the solution of inverse problems in seismic signal processing are required by the petroleum industry in the search for latent reserves. The Radon transform, or Tau-p transform as is commonly known provides an alternative domain to conventional methods for filtering, velocity analysis, and imaging. Data in the (x,t) plane is mapped onto a domain defined by the slowness (reciprocal of horizontal phase velocity) or ray parameter (p) and the intercept time (T).

The projection slice theorem provides a method for computing the T-p transfrom from the 2-D Fourier transform. Compared to conventional processing in the (x, t) plane, the T-p domain has several advantages. This study examines some examples and advantages of sea bottom multiple suppression and non-coherent signal reduction in the T-p domain from considerations of path geometry and noise characteristics.

In an original shot gather, multiples are not periodic in time for all non-zero offsets. The T-p transform separates out events which interfere with one another: reflection hyperbolas transform into ellipses, linear refractions direct arrivals and ground roll transform to points or small regions about a point. Multiples are removed by selective muting and predictive deconvolution.

Coherency filtering of CDP stacks along ray parameters with semblance reduces non-coherent noise and suppresses spatial aliasing. This is desirable for poor quality data with low S/N ratios. Substantial improvement has been found from stacked sections with T-p filtering. Depending on the application further understanding is required on amplitude and waveform distortion for "true" amplitude measurements.