

Oral Session Abstracts

Seismic Survey Design Criteria: A Case Study Using Colville Foreland Basin Data

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How does one select seismic acquisition parameters in the face of incomplete knowledge of the subsurface? Determining design parameters is often something of a chicken and egg problem, particularly in structurally complex frontier regions. To calculate them by forward modeling requires that items such as noise train geometries, maximum expected dip values, and frequency requirements are known in advance. Another technique would be to field test a variety of acquisition geometries; however, this is expensive, and the test location may not be representative of the full range of geophysical issues.

During 2002 acquisition season, PGS Onshore, Inc. took a different approach to this problem when it acquired 2D vibroseis data located approximately 125 km south of Prudhoe Bay in the Colville Foreland Basin, North Slope of Alaska. The data were acquired using finely sampled source and receiver intervals. The geometry resulted in a 144 fold dataset with 27.5 ft. CDP spacing using a single sweep per VP. From these data, alternate acquisition geometries were simulated by summing adjacent shots and receivers (i.e., array forming) to form datasets with 110 ft. and 220 ft. source arrays and a 220 ft. receiver array (with corresponding changes to the CDP interval).

This presentation includes examples of array formed datasets that demonstrate the benefit of fine spatial sampling and have implications for 3D survey design. The problem of designing a survey around unknown criteria (e.g., spatial sampling) is addressed by recording a finely sampled dataset and allowing data processing to handle noise issues with conventional algorithms and array forming processes. Because the technique involves redistributing source energy, acquisition costs are comparable to surveys designed with conventional parameters.