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Comparison of Low-Energy Seismic Sources in Till

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Implementation of the method described by Canales was vague until incorporating information from an article by Treitel (1974) describing the complex Wiener filter. The combination of Canales' idea and Treitel's theory produced the implementation of f - x decon described in this paper. FXDECON described herein was tested on synthetic data for algorithm validity and then applied to real seismic data. It proved effective in removing spurious data, ground roll, random noise and even diffractions from stacked data. There are two outputs from the process: a "signal" section with the noise removed, and a "noise" section which shows exactly what was removed. If the noise section and the signal section are recombined, the result is the input section. The main points in the implementation will be tied to Treitel's theory and a limiting case presented. Real data cases will also be presented.

fold due to the fact that extra data channels are required to record the buried geophone.

Simultaneous Recording of Reflection and Refraction Data Using Vibrators

POS 2.11

R. Garotta, CGG, France

In some areas, reflection seismic does not show the deeper geologic targets. The depth of the basement may not be known because of weak impedance contrast, or because of multiple reflections from the overburden. Refraction seismic can in most cases supplement the reflection survey in this respect. When vibrators are used, it is possible to collect reflection and refraction data simultaneously, using the same geophone spread and without disturbing reflection operation. As optimum frequency domains do not coincide for reflection and refraction, different pilot signals are used. Data can be recovered in the processing center by correlating the records twice, with respect to each pilot signal. They can also be obtained from field correlation, provided that suitable equipment is used: each field trace is correlated in real time by both reflection and refraction pilot signals. Case studies show that useful refraction information can be obtained from a single vibrator operating together with the reflection vibrator set. Likewise, coding techniques make it possible to operate the reflection set and two refraction vibrators simultaneously (one on each side of the spread) in order to provide forward and reverse refraction coverage.

Differenced Geophone Processing Techniques

POS 2.12

Ralph W. Knapp, Kansas Geological Survey

Geophone differencing (subtracting the output of two geophones separated vertically by a small distance) is a technique previously described by this author to attenuate horizontally propagating noise and enhance vertically propagating signal. It is alternative to the use of conventional horizontal arrays and does not adversely affect the high frequency content of the reflection signal. In fact, it enhances high frequencies slightly.

Initial descriptions of geophone differencing relied on elementary aspects of data processing and concentrated on analog or analog-modeled methods. However, multitrace dynamic processing is found to increase both the attenuation of noise and enhancement of reflection signal by optimizing the effectiveness of each of these tasks. The improvement in overall data quality might be sufficient to more than compensate for the loss in CDP

Comparison of Low-Energy Seismic Sources in Till

POS 2.13

Paul J. Wolfe, B. H. Richard, Dale V. Dailey, and James R. Plomer, Wright State University.

Low-energy sources were field tested in a region of glacial till in southwestern Ohio. A 12-fold CDP line was run using the Mini-Sosie method with three sizes of earth tampers. A portion of the same line was shot using three explosive types in shallow holes. Two of the explosive types were 0.15 kg and 0.23 kg conventional two-component mixtures. The third used 0.23 kg of the same mixture but it was formed into a shaped charge by placing a copper cone in the bottom of the bottle containing the explosive. The Mini-Sosie sections were similar but the smallest tamper gave the best signal-to-noise ratio and reflection continuity. The explosive sections were similar to each other but different from the Mini-Sosie records due to processing differences. The best section by any of the methods was obtained with the shaped charges. The reason is better high-frequency penetration through the till into the rock and less surface wave generation.

Varisweep Modeling and Specialized Sweep Design Field Technique and Results

POS 2.14

Brian Rhodes, Geo Systems Pty. Ltd., Australia

Exponential, logarithmic, and linear sweeps have been employed with varied success for many years. These sweeps are constrained by their basic functions which offer a high, low, or even frequency weighting for Vibroseis® source generation. These strictly defined sweep functions provide a small number of simplified solutions to invariably complex geologic conditions which regulate sonic frequency absorption, transmission, and noise generation. Varisweep™ modeling is an interactive field technique by which Vibroseis source spectra are modeled to compensate for observed seismic signal frequency attenuation characteristics within a given geologic regime and seismic recording system. The objectives are to broaden and whiten the effective signal bandwidth as received at the geophone while reducing ground roll generation at the seismic source. The flexibility and interactive nature of the technique allows the acquisition geophysicist to design a sweep set rapidly during parameter testing which can compensate for inherent system and earth filtering effects without prior knowledge of their specific characteristics.

Comparison of Conventional and Sign-Bit Seismic Recording Systems

POS 2.15

Daniel D. Hollis, Geophysical Systems Corp.; and Randy Givens, Professional Geophysics, Inc.

A Vibroseis® line was repeatedly shot in Andrews County, Texas. The line was first shot with a DFS-V conventional (16-bit) recording system using parameters optimized for that particular recording system and subsurface geology. The same line was

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