



A Practical Approach to Applying Sonic Velocities in the Time to Depth Conversion Process

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Abstract

LookBack Exploration Ltd has developed a processing routine can provide a reliable source of stable, geologically sensitive velocity data from sonic log data. Such data is applied in the process of converting seismic time data to depth. This project recognizes the need to create depth maps in the depth domain. The log data are processed to neutralize the effect that borehole conditions and logging tool travel speed have on the recorded data. This project is supported by several case history studies.

The Sonic Logging tool; like the check-shot and the seismic survey tools, is a geophysical tool that was designed to record interval transit times. Such interval transit times reflect the inverse of vector velocity. Vector velocity is an independent vector quantity that is independent of the other variables in the equation: $\text{Depth} = \text{Velocity} * \text{Time}$. True vector velocity data are acquired only from check-shot surveys or sonic logs. In areas where check-shot survey data are either nonexistent or inaccessible the sonic log data represents a virtually untouched source of critical velocity information.

The process thus derived recognizes that while geology is a depth domain operation and that geophysics is a time domain operation. The process provides a means of merging the time domain data with depth domain data so as to provide geology with the ability to create multi-dimensional cross section that contain the inter-well geological information that only seismic data can provide. The process resolves the mathematical and technological compromises that are prevalent in modern day depth maps.

Common interpretation software promotes a conversion process that compromises the mathematical and technological precepts of converting seismic 2WT data to contoured depth maps. Processes that utilize known well data to supplement seismic 2WT data; resolve the mathematical problem yet compromise the technical application of the data. As a result; depth maps are almost exclusively being created in the time domain. All compromises are resolved when the time domain data are made supplementary to known data in the depth domain.