Visualizing AVAZ Parameter Estimates and Uncertainty

Jon Downton, Dave Gray, and Torre Zuk
CGGVeritas, Calgary, AB, Canada
Jon.Downton@CGGVeritas.com

Abstract/Excerpt

We present a technique to estimate and visualize uncertainty due to random noise for azimuthal AVO attributes in HTI media. With this technique, uncertainty can be efficiently calculated as a byproduct of the AVAZ inversion. The visualization technique allows the interpreter to view simultaneously the anisotropic gradient, HTI orientation, and uncertainty.

The uncertainty is proportional to the noise level, is dependent on the geology and is influenced by the acquisition geometry. Because of the nonlinearity of the inversion problem, azimuthal AVO inversion will always produce a positive estimate of the anisotropy gradient even if the media is isotropic; thus it is important that this attribute be examined along with its uncertainty. The interpreter must be confident that any potential anomaly is much larger than its uncertainty. Using this approach, legitimate anomalies due to geology may be distinguished from those due to noise and/or insufficient data.

The uncertainty is calculated following a Bayesian methodology. Although an approximation is required, the method is quite accurate for most situations of interest to the explorationist. By making this approximation, it is possible to calculate the uncertainty as part of the AVAZ inversion, making the whole analysis quite efficient.