Azimuth and Offset: A Survey Design Perspective

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Overall, the best 3-D survey is not necessarily the one with the best-quality data. Nor does it have to be the one with long offset data from all azimuths. The best survey really depends on balancing a combination of factors—in particular, subsurface geology and economic objectives. For some projects, wide-azimuth data is a necessity; for others, it can be more of a liability than an asset The critical thing is to record seismic data that is "good enough" to image the geology and still meet the economic requirements of the user. This is accomplished by recognizing the important role of survey design in the planning process.

By comparing offset distribution plots and offset-limited fold plots from several different wide-azimuth designs to similar plots for a typical narrow-azimuth design, we can better appreciate the potentially adverse effects that may result from wide-azimuth shooting. The point of this analysis is not to suggest that wide-azimuth designs are necessarily better, or worse, than narrow ones. Instead, it's to call attention to the fact that those extra azimuths are going to cost you in one way or another—particularly for deep objectives. Either the price of your seismic survey will go up or the offset distribution, acquisition footprint, and shallow imaging will deteriorate, or both. Therefore, you must carefully weigh the pluses against the minuses. What are you getting, what are you losing, and what will it cost?