TECHNOLOGY APPLICATIONS

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Tomographic Velocity Inversion—Geotrace has developed its MultiScale, MultiParameter Simultaneous Inversion Tomography technology—MuST—to obtain 3D images of geologically complex areas. The subsurface contains many objects of many different sizes and shapes. To represent the Earth inside a computer, it is convenient to use a grid, such as a regular mesh of fixed-sized cells, on which all calculation and equations are solved. The single-cell-size representation of the Earth is a convenient way to do calculations. However, when high resolution is required, small-size cells also are required, and the inversion becomes unstable. High-resolution readings are needed in some places, but not everywhere. This technology uses a multigrid representation of the velocity model. The grids have different cell sizes, which normally are multiples of each other. The multiple velocity models have common gridpoints wherever the grids cross. As long as the velocity models for these different grids agree at the crossing points, the solution is valid. This solution can perform inversions for all the grids simultaneously in a consistent manner. The multigrid approach yields an Earth representation that has different scales in various regions. As shown in **Fig. 1,** the optimal representation is such that the dominant scale is the natural (red) grid-cell size (Scale 1). At a certain depth, the dominant scale becomes larger (yellow) allowing a coarser representation (Scale 2), but around the fault there is a need for higher resolution, so the dominant scale is reduced to the smaller (white) grid cell (Scale 3). Finer grids are used in areas where the geology is expected to exhibit significant spatial variations, and coarser grid in simpler sedimentary areas. **JPT**

For additional information, visit www.geotrace.com

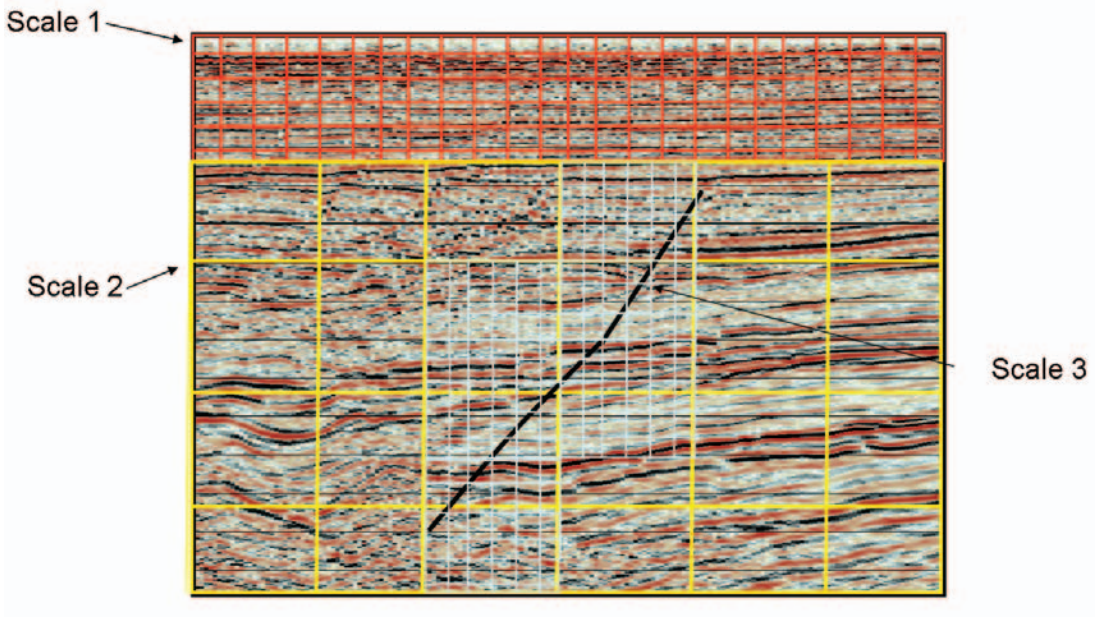

Fig. 1—In the Geotrace MuST technology, the grids receive different weights depending on the underlying geology.

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