The Long and Short Solutions of Near-Surface Anomalies

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ABSTRACT

Saudi Arabia does not have a unique surface topography. The salt flats, sand dunes, gravel plains, and rugged gorges can be found in many countries with arid environments. The challenges originate by the juxtaposition of the diverse surface topographies surmounting a variable geologic sub-surface.

Modeling the near-surface depth/velocity diversity can be classified as direct measurement by upholes or analysis of source gathers. The models may illuminate the geologic horizons in the time section, but pose additional complications when tying them at 2D line or 3D survey intersections. Each modeling method has its own strengths and weaknesses in solving for the long and short wavelength components. This presentation outlines the source of the difficulties caused by geology, followed by some methods and specific challenges to resolve the anomalies.

Not a single method works everywhere. The plethora of methods generates statics that do give the desired short wavelength time image but do not tie. The long wavelength structural solution is not unique. The challenge in resolving the long and short wavelengths is possible with the inversion of statics and application of geostatistics.