

Improving the efficiency of 3d seismic surveys using elevation data from satellite imagery

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The cost, efficiency and environmental impact of seismic surveys can be reduced using remote sensing imagery and derived products. Widely available Digital Elevation Models (DEM), including the near global coverage from the Shuttle Radar Topography Mission (SRTM) and low cost elevation models from SPOT stereo satellite images, are used to plan the layout of seismic survey lines. Areas of high relief where vibroseis access may be difficult can be identified in the early stages of survey planning, and the gradient of planned lines can be measured.

During execution of surveys 1m posted DEM from 50cm WorldView-2 stereo satellite imagery were initially used to check the accuracy of positioning measurements from GPS. Subsequently, elevation measurements were used to complement field survey measurements, reducing both the size of survey crews and the man-hours spent in field operations. Using the advanced satellite DEM reduced scouting time by ~ 80%.

Comparison between the standard deviation and mean differences between seismic source points measured in the field and elevations measured from the WorldView-2 satellite DEM indicate correlations with a standard deviation of between 28cm and 30cm and mean differences of between 5cm and 8cm in elevation were achieved. By using stereo satellite elevations to complement an ongoing seismic survey the client could improve the efficiency of their resource management and gained increased confidence in both datasets.