Blended acquisition: increased information density per shot record

Gerrit Blacquiere and Eric Verschuur, TU Delft

In traditional seismic surveys the firing time between shots is such that the shot records do not interfere in time. However, in the concept of blended acquisition the records do overlap, allowing denser source sampling and wider azimuths in an economic way. A denser shot sampling and wider azimuths make that each subsurface gridpoint is illuminated from a larger number of angles, and will therefore improve the image quality in terms of signal-to-noise ratio and spatial resolution.

We show that – even with very simple blending parameters like time delays – the incident wavefield at a specific subsurface gridpoint represents a dispersed time series with a 'complex code'. In deblending, this time series is decomposed in the individual source contributions. In blended shot record migration, however, this time series is not decomposed but the complete series is inverted for in a wavefield deconvolution process.

We also show that the information density of shot records can be further increased by considering surface-related multiples as signal, using the double illumination concept. This means that these multiples can be exploited, leading to improvements in the angle range of the incident wavefield at each gridpoint. In this way the energy contained in the multiples now contributes to the image, rather than decreasing its quality. This important property will be illustrated by examples.