Complex Near-Surface Problems Management Using the CFP Technology: Part 1 – Principles

E. Verschuur *and M. N. Al-Ali. Applied Physics, Delft University of Technology, Lorentzweg 1, Delft, 2600 GA, Netherlands, phone: +31152786105, D.J.Verschuur@tnw.tudelft.nl*

The Common Focus Point (CFP) technology provides a unique solution to imaging challenges attributed to the complex near-surface. This solution is based on a wavefield propagation approach aiming at determining one-way focusing operators from the data itself via an iterative updating process. In other words, this is obtained without deriving a complex near-surface velocity model. The latter can be determined subsequently by tomographic inversion of the focusing operators.

The CFP technique aims at simulating a walk-away VSP experiment where the receiver is positioned at the subsurface gridpoint under consideration and the sources are located at the acquisition surface. Via an updating procedure a set of one-way focusing operators is obtained, describing the wave propagation between the surface locations and points at a chosen target reflector below the complex near surface.

In part one of this paper, two different approaches of how to estimate the focusing operators will be described, being the automatic modelling approach and the focusing approach. The latter assumes subsurface consistency while the automatic approach assumes surface consistency. The automatic approach is based on parameterization of the one-way focusing operators and can be used as a good initial estimate for the focusing approach. One important aspect of the focusing approach is that picking of events is done after inverse wave field extrapolation which gains a great deal from the summation processes involved, and hence, resulting in an improved the signal to noise ratio. The two approaches will be illustrated using 2D land seismic data.