

Creating virtual sources inside an unknown 3D medium from reflection data: a new approach to internal multiple elimination

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It has recently been shown that the response to a virtual source in the subsurface can be derived from reflection data at the surface and an estimate of the direct arrivals between the virtual source and the surface. Hence, unlike for seismic interferometry, no receivers are needed inside the medium. This new method recovers the complete wavefield of a virtual source, including all internal multiple scattering. Because no actual receivers are needed in the medium, the virtual source can be placed anywhere in the subsurface. With some additional processing steps (decomposition and multidimensional deconvolution) it is possible to obtain a redatumed reflection response at any depth level in the subsurface, from which all the overburden effects are eliminated. By applying standard migration between these depth levels, a true amplitude image of the subsurface can be obtained, free from ghosts due to internal multiples. The method is non-recursive and therefore does not suffer from error propagation. Moreover, the internal multiples are eliminated by deconvolution, hence no adaptive prediction and subtraction is required.

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