

VSP MIGRATION BY SINGLE SHOT RECORD INVERSION (D-43)

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Vertical Seismic Profiling (VSP) can be seen as a special case of pre-stack data acquisition. Therefore, the development of VSP migration schemes should be based on existing pre-stack migration philosophies for surface data. Single shot record inversion, as proposed by Berkhou, is the most suitable approach to VSP migration, because it allows any data acquisition configuration. Two important complications to be dealt with in VSP migration are the propagation velocity variations along the borehole and the deviations of the borehole from the vertical. Therefore, as in surface data pre-stack migration, we propose to make use of recursive vertical wavefield extrapolation which can handle any vertical velocity variations. In the case of single shot VSP data, this means that horizontal profiles must be constructed at each detector depth level. For multi-shot VSP data an interesting alternative approach is migration by single detector record inversion, based on the principle of reciprocity. Again vertical velocity variations and borehole deviations can be properly handled, while a good spatial resolution is obtained. The performance of the schemes will be demonstrated for various synthetic geological subsurface structures. Also a multi-shot, multi-well experiment will be discussed (seismic tomography).

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