

## **Influence of the source type on the 3-D crosshole tomography**

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**Abstract:** A problem which hinders 3-D seismic tomography using the crosshole technique is observed, identified, and theoretically explained. The problem relates to the phenomenon that the amplitude and phase of the shear wave are not consistent over a horizontal plane crossing the wavefront. These variations in amplitude and phase are explained based on the theory of shallow earthquakes, which confirms that this phenomenon is directly related to the  $n$ -value of the source used in the crosshole measurements. Polar diagrams are presented for sources with various  $n$ -values. Examples are also provided for the variation of time records due to the source orientation. Furthermore, a procedure is proposed for the determination of the  $n$ -value of the source.