Tomography

“A specific type of inversion process”

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Tomography itself means a way to describe the structure of an object by using a set of slices passing through that object (Jones, 2010).

In seismic, tomography is an inversion process to construct subsurface velocity model by using recorded seismic reflector information such as travel time (or depth), amplitude, phase, and perhaps some geological constraints.

In practice, we never have sufficient observed information for the tomography to build a true and unique velocity model. However, there is no tomography method that uses all the observed information that we already have to estimate a velocity model. Tomography methods are classified into different types based on different information they use.

	Data domain	Image (migrated) domain
Ray based (kinematic)	Reflection travel time tomography Cross-well transmission tomography Refraction tomography	Prestack time migration tomography Prestack depth migration tomography
Waveform based (dynamic)	Full waveform inversion (also known as waveform tomography, wave equation tomography, and diffraction tomography)	Wave-equation migration velocity analysis (WEM-VA) Wavepath tomography

Table 1 *Types and domains of tomography for velocity estimation.*

(From Jones, 2010)

Reference:

Díaz, Esteban, Paul Sava, and Tongning Yang. "Data-domain and image-domain wavefield tomography." The Leading Edge 32.9 (2013): 1064-1072.
Jones, Ian F. "Tutorial: Velocity estimation via ray-based tomography." first break 28.2 (2010).