

Elastic imaging conditions based on Helmholtz decomposition

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Wavefield Helmholtz decomposition

- Similar to the Helmholtz decomposition of displacement or body force, particle velocity wavefield can be separated into P and S modes as well.
- Here Helmholtz decomposition is performed on particle velocity wavefields with a staggered-grid FD scheme.

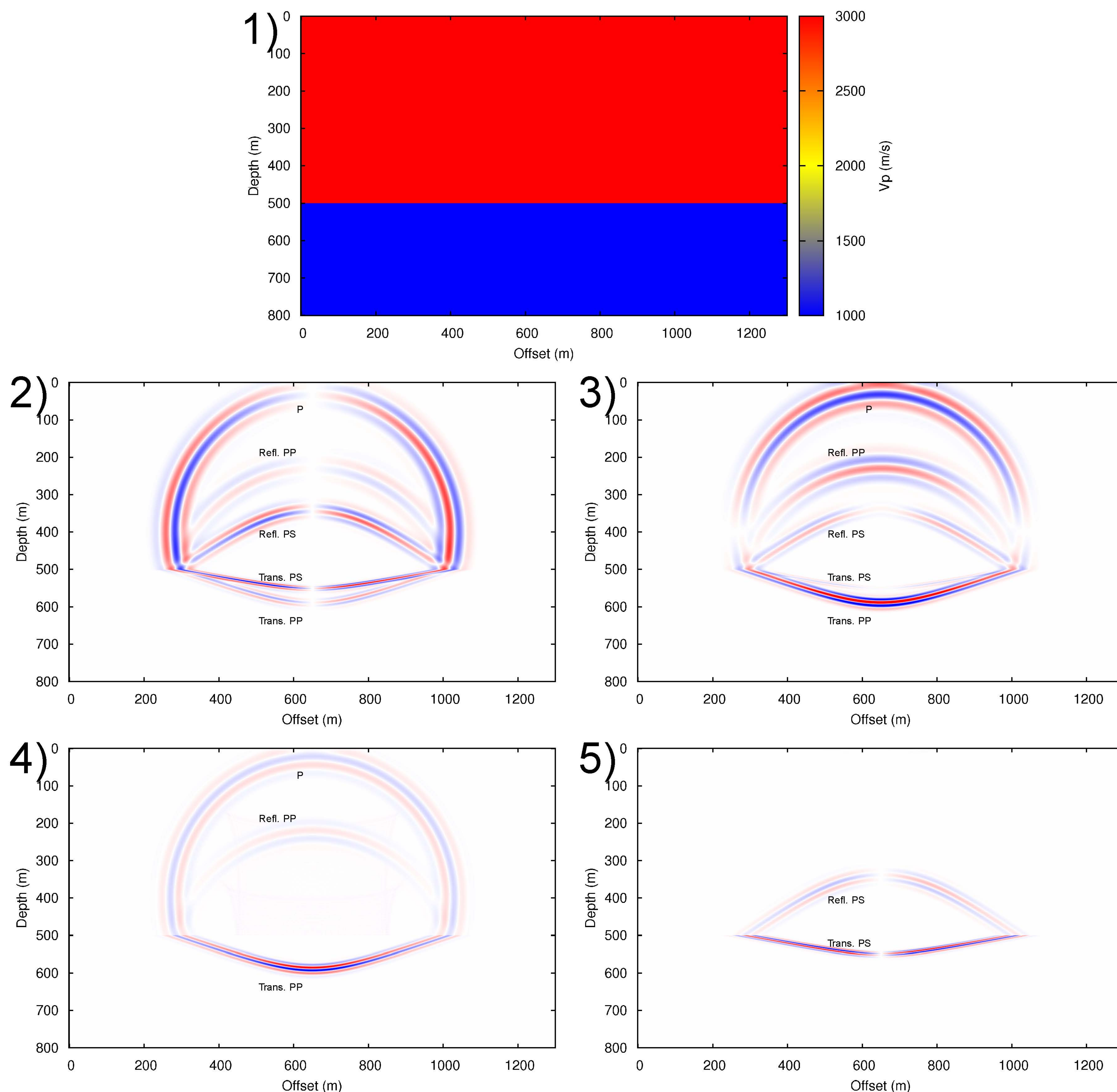


Figure: Wave decomposition. 1) P-wave of a two-layer elastic subsurface, seismic energy source is placed at (650m, 300m). 2) Horizontal component modelled. 3) Vertical component modelled. 4) P-mode decomposed from the two components. 5) S-mode decomposed from the two components.

Elastic RTM based on Helmholtz decomposition

- Helmholtz decomposition is used in elastic reverse-time migration, and PP, PS, SP, and SS images are obtained.

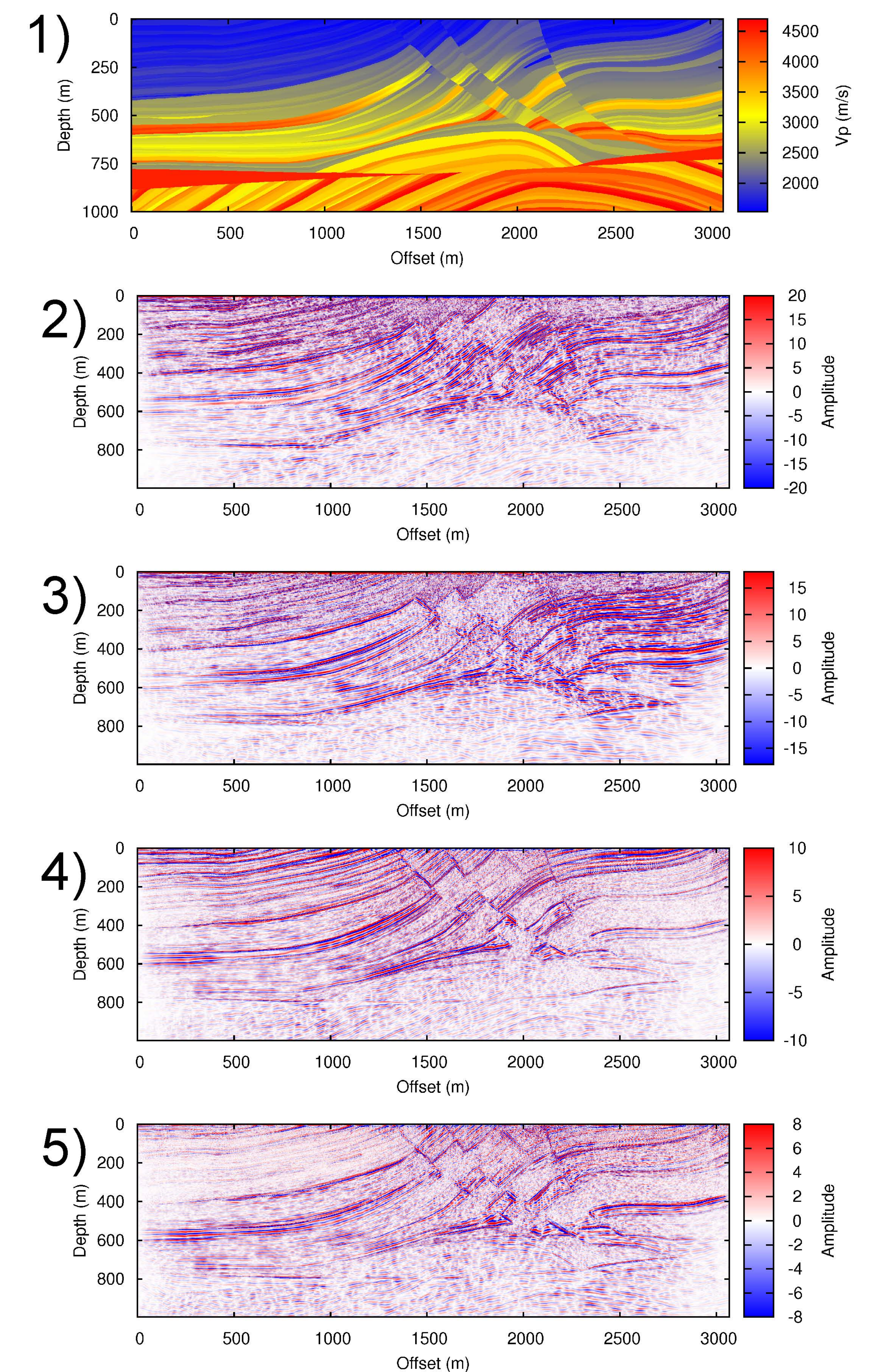


Figure: Elastic RTM based on wave decomposition. 1) P-wave of shrunk Marmousi2. 2) PP imaging. 3) PS imaging. 4) SP imaging. 5) SS imaging.