Velocity Analysis Using Diffraction Focusing

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Project goals

diffraction focusing
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diffraction focusing

wavefield tomography
Waveform inversion

\[ J = \frac{1}{2} \left\| d_{obs}(x_r, t) - d_{pre}(x_r, t) \right\|_{x_r, t}^2 \]
Source focusing

\[ J = \frac{1}{2} \| P(x)R(x) \|_x^2 \]
Diffraction focusing

\[ J = \frac{1}{2} \| P(x) R(x) \|_{x}^{2} \]
Correct
Diffraction focusing

\[ J = \frac{1}{2} \| P(x)R(x) \|_x^2 \]
Gradient of objective function

Waveform inversion

\[ Lu = f \]

Diffraction focusing

\[ L^* u = f \]
Gradient of objective function

Waveform inversion

\[ L u = f \]

\[ d_{\text{obs}} - d_{\text{pre}} \]

Diffraction focusing

\[ L^* u = f \]

\[ PR \]
Gradient of objective function

Waveform inversion

\[ Lu = f \]
\[ d_{\text{obs}} - d_{\text{pre}} \]
\[ L^*a = g \]

Diffraction focusing

\[ L^*u = f \]
\[ PR \]
\[ La = g \]
Gradient of objective function

Waveform inversion

\[ \mathbf{L} u = f \]
\[ d_{\text{obs}} - d_{\text{pre}} \]
\[ \mathbf{L}^* a = g \]
\[ \nabla J = \sum_{\omega} \omega^2 \bar{a} u \]

Diffraction focusing

\[ \mathbf{L}^* u = f \]
\[ \mathbf{P} \mathbf{R} \]
\[ \mathbf{L} a = g \]
\[ \nabla J = \sum_{\omega} \omega^2 \bar{a} u \]
Example
Data
Research questions

focusing measures?

wavefield information?

diffraction interference?