TPG4190 Seismic data acquisition and processing

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Trondheim fall 2024

Information

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Learning objectives

- **Know** basic theory and principles of seismic data acquisition
- **Know** key steps in seismic processing
- **Know** how to derive and apply basic equations that are used in acquisition and processing of seismic data.
- **Know** how to perform simple seismic processing of seismic field data.

Schedule

- **Lecture** Every Tuesday 08:15-10:00 PTS1 room P10)
- **Lecture** Every Wednesday 09:15-11:00 (PTS1 room P13)
- **Exercise**Every Wednesday 12:15-12:00 (PTS1 room P13)

Material

- Lecture slides 1-20
- Lecture notes (Martin Landrø)

Exercises

- No obligatory exercises
- Exercises (and solutions) provided

Project

- Obligatory project
- Processing of Regional Seismic data set from the Pacific
- Sherwater Reveal processing software
- Takes place in in the computerlab room 4, PTS1
- Deliver report by 15. November

Exam

- School exam
- No aids allowed
- Grade A-F
- Project have to be approved

Content

1. Acquisition of seismic data
2. Modeling of seismic data
3. Preprocessing and Noise
4. Imaging of seismic data
5. Multiple removal
6. Tomography
7. Full Waveform Inversion
8. Exam

Acquisition of seismic data

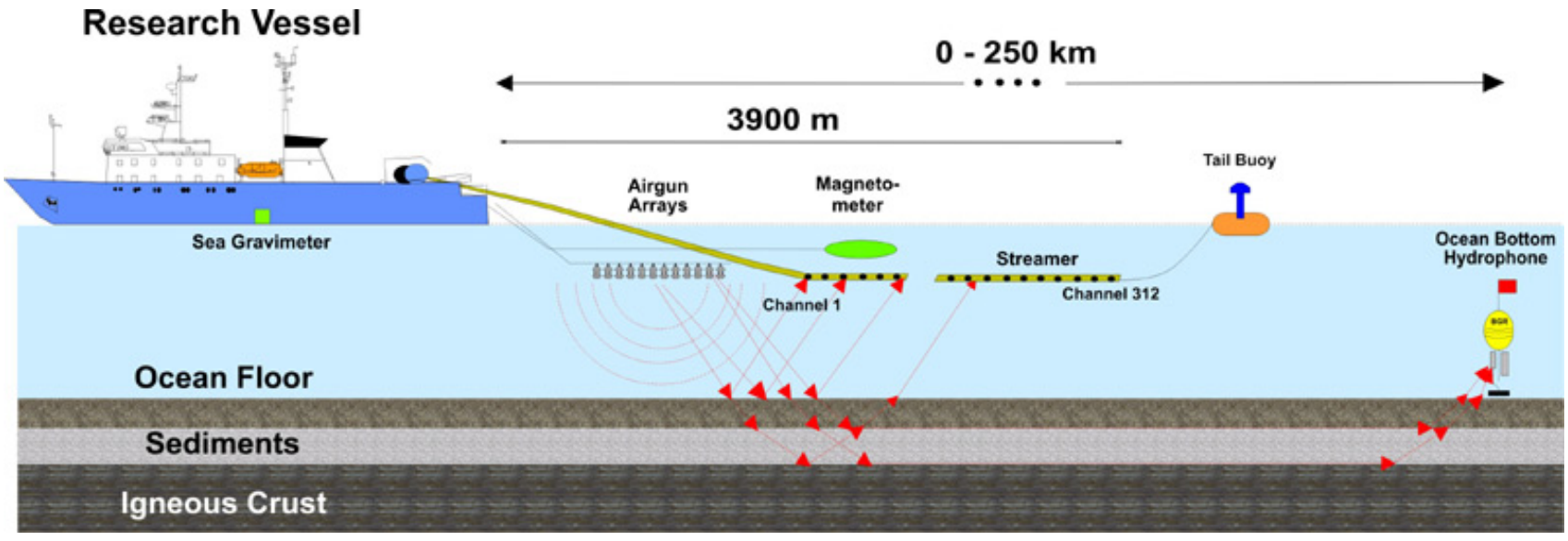


Figure: Seismic ship

Modeling of seismic data

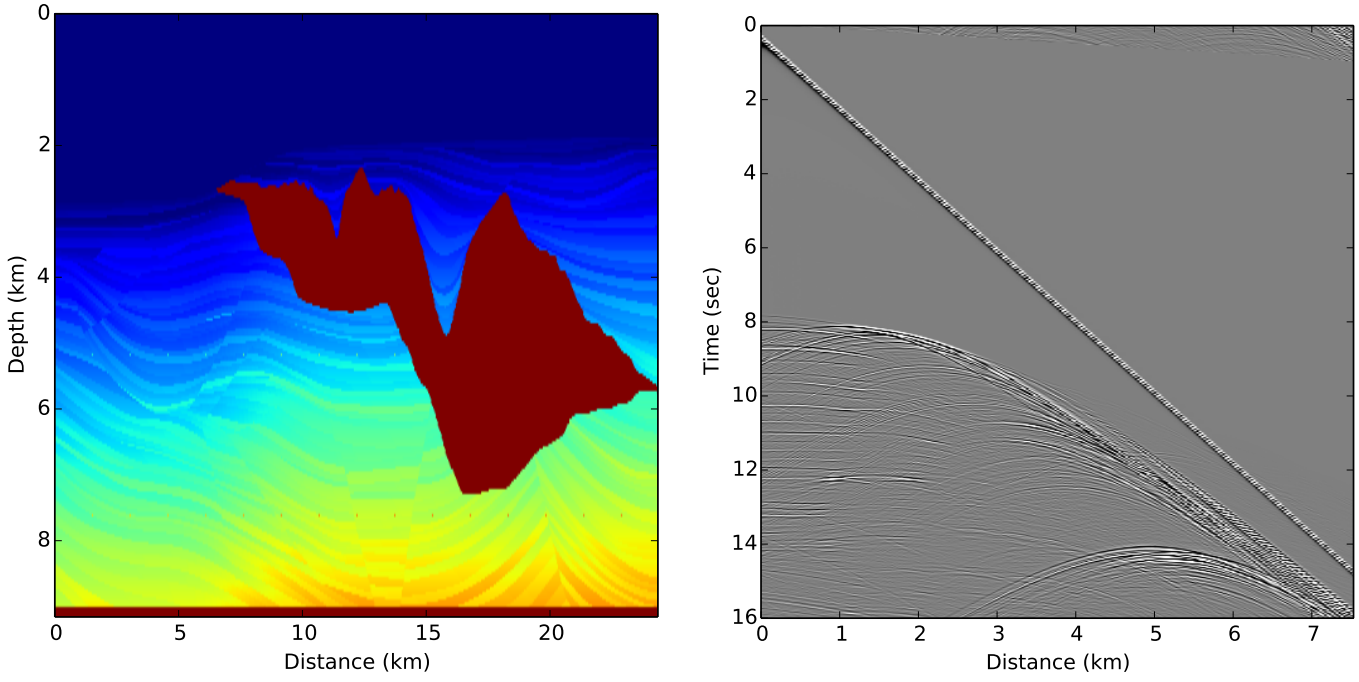
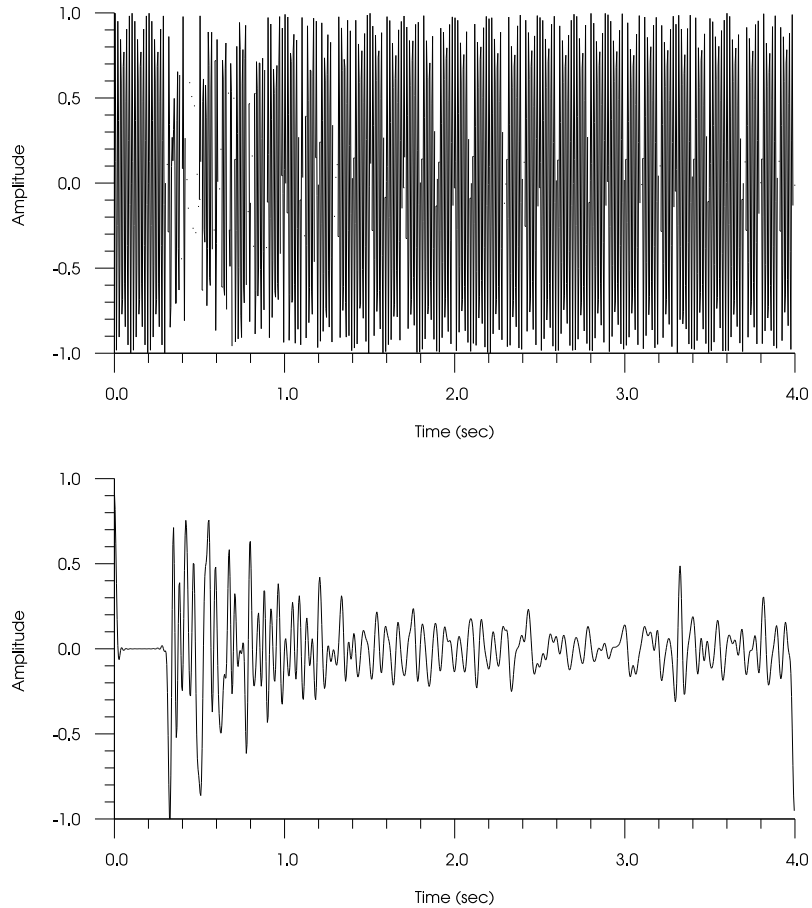


Figure: Input model (left) and Output data (right)

Movie file: snp.mp4

Preprocessing and Noise



Imaging of Seismic data

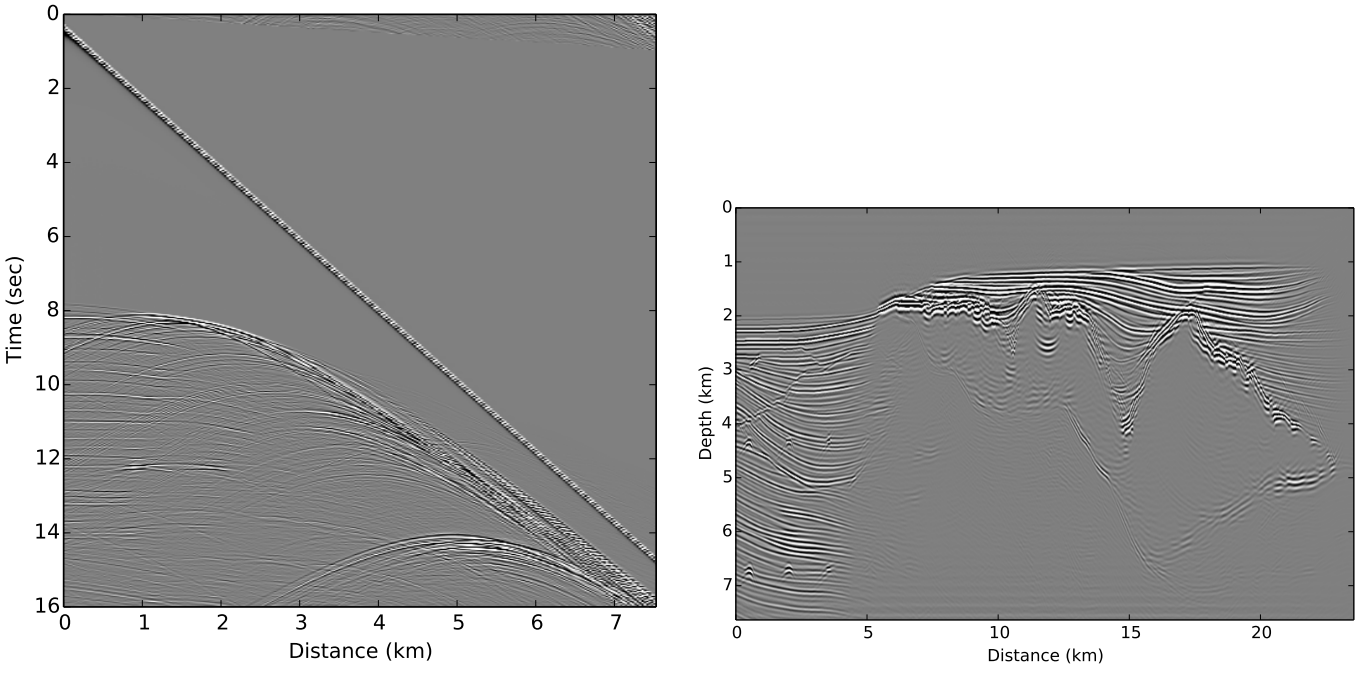
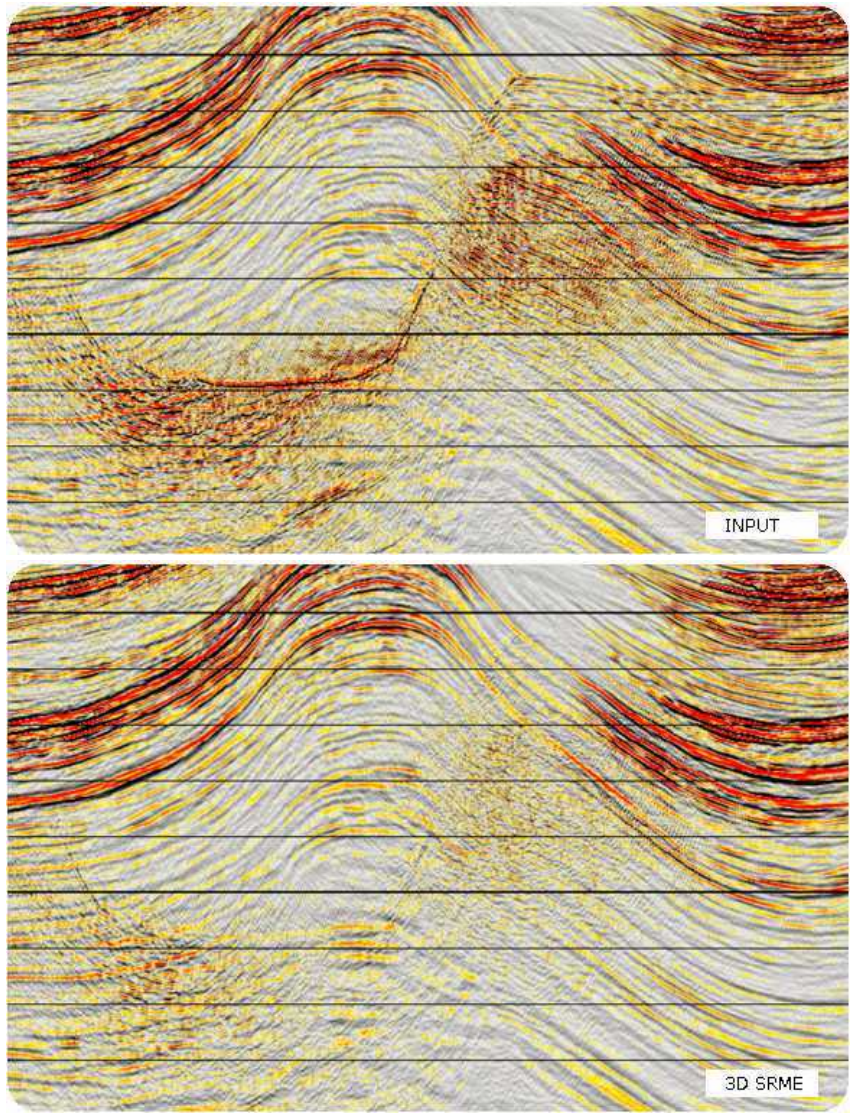
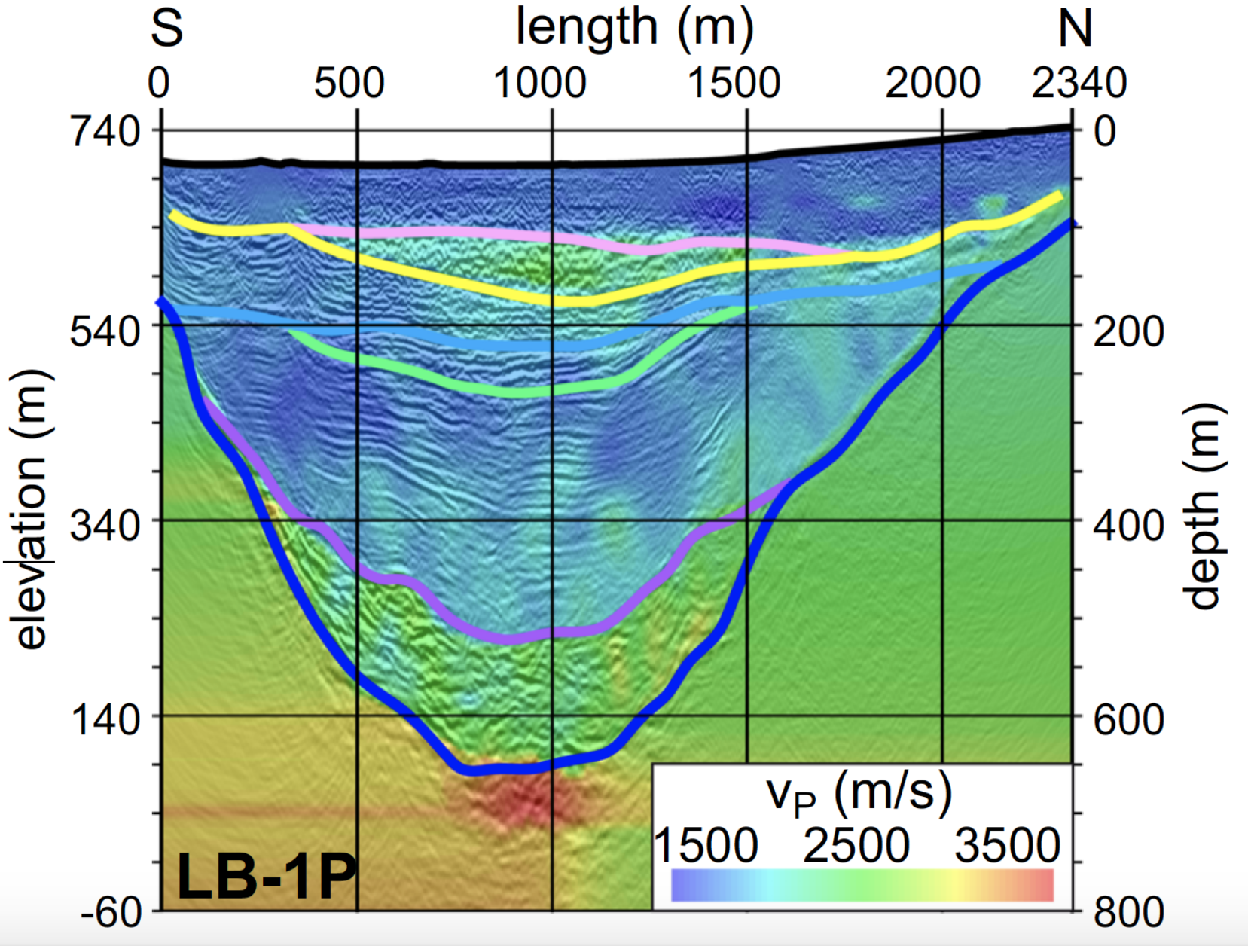


Figure: Input data (left) and Output migration (right)

Multiples



Tomography


S
length (m)
N
0
500
1000
1500
2000
2340
740
540
340
140
-60
0
200
400
600
800
elevation (m)
depth (m)
LB-1P
v_P (m/s)
1500
2500
3500

Inversion

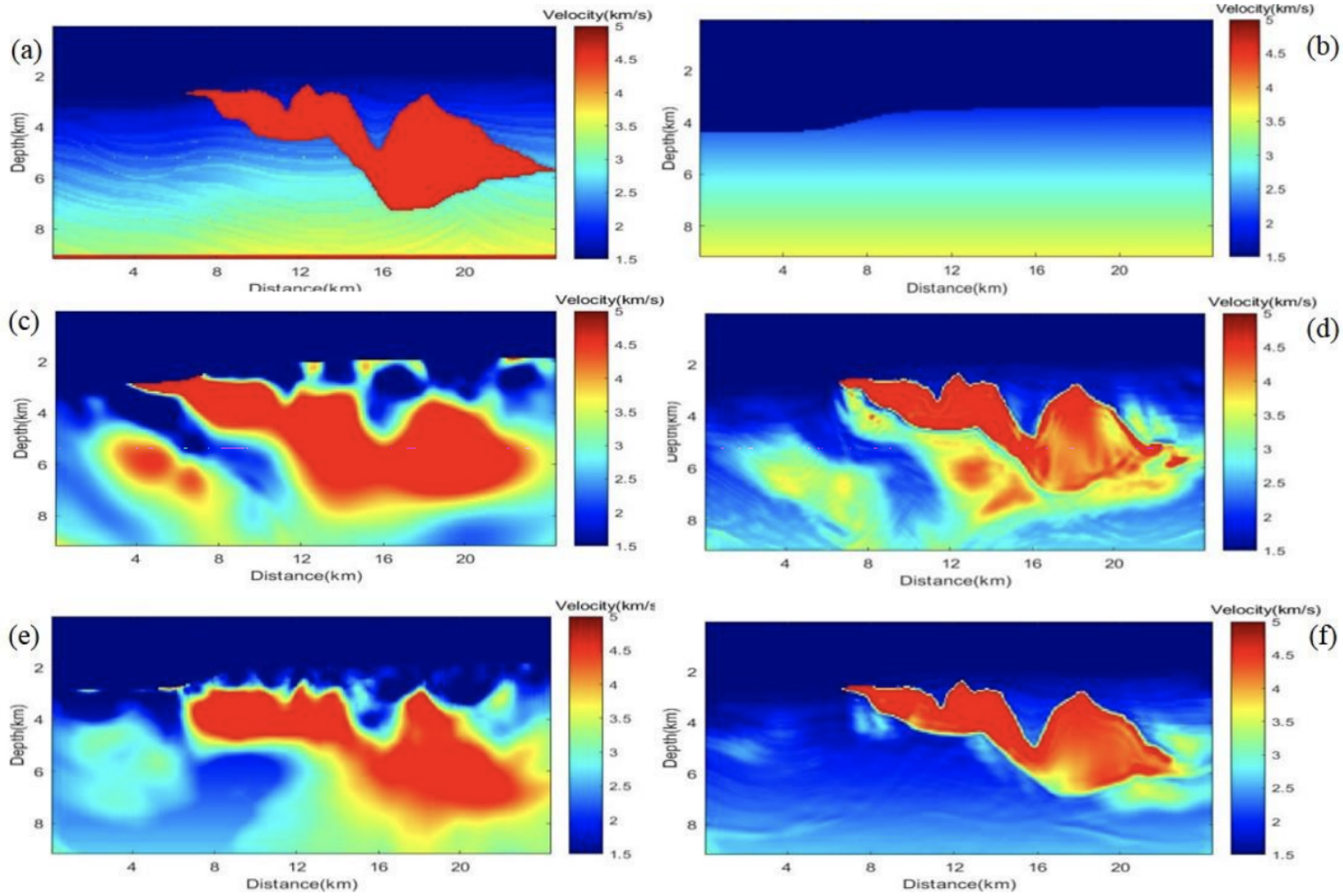


Figure 3. *(a) Sigsbee2A model; (b) Initial model; (c) Inversion result of MSDEI; (d) Inversion result of MSDEI+FWI; (e) Inversion result of S-MSDEI ; (f) Inversion result of S-MSDEI+FWI.*

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Inversion

Inversion

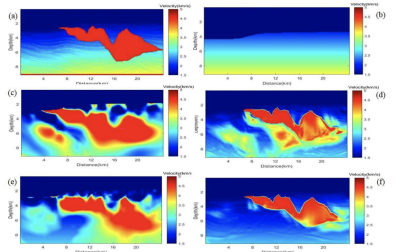

Figure 3. (a) Sigsbee2A model; (b) Initial model; (c) Inversion result of MSDEI; (d) Inversion result of MSDEI+FWI; (e) Inversion result of S-MSDEI ; (f) Inversion result of S-MSDEI+FWI.

Full waveform inversion of the Sigsbee test model