NTNU – Trondheim
Norwegian University of
Science and Technology

Research plans

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Seismic Properties of Heavy Oil Reservoirs

Sandra Witsker

Under the supervision of Professor Martin Landrø

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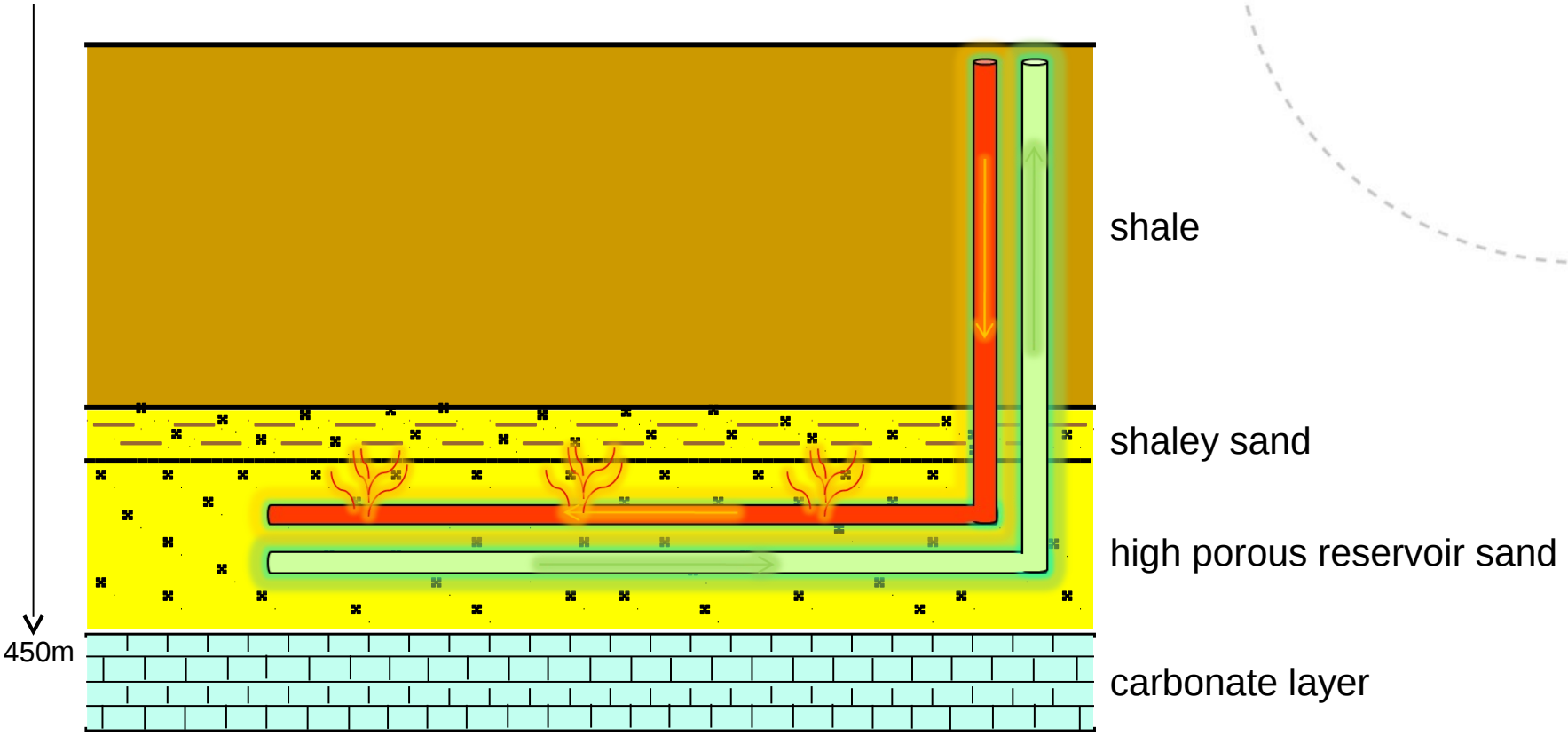
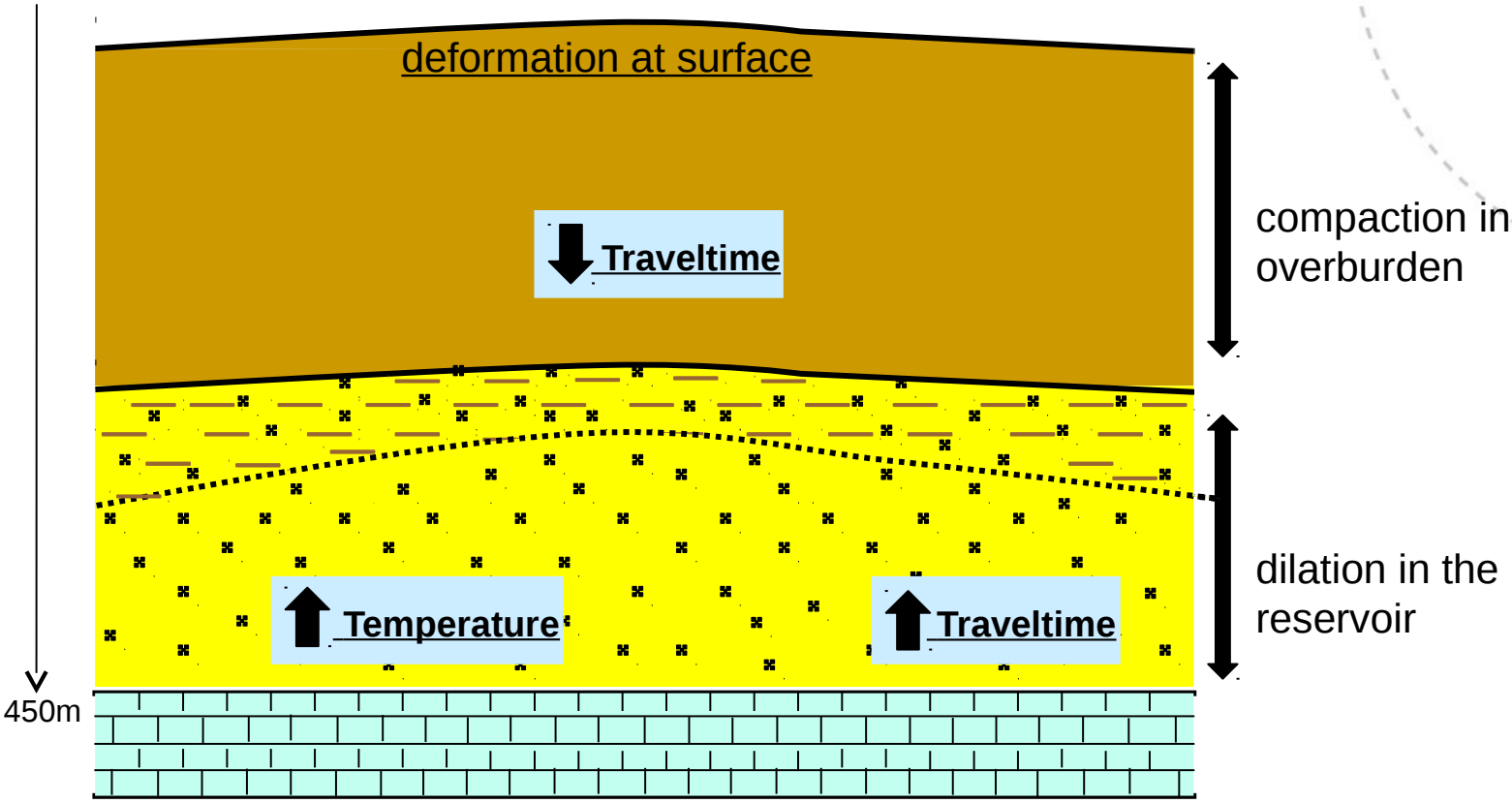
Norwegian University of Science and Technology

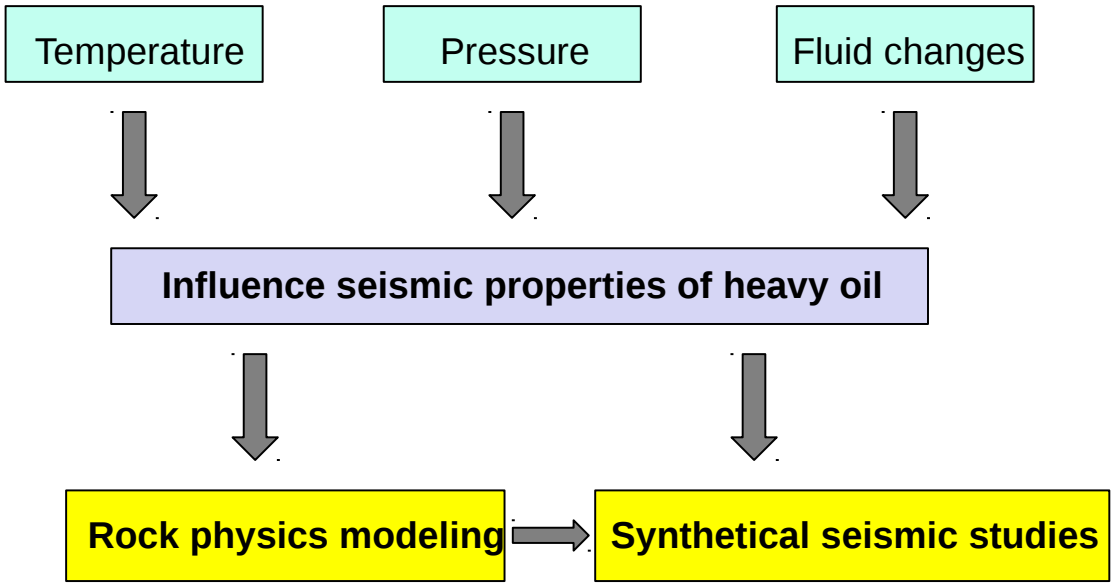
Geological Setting



Subsurface Changes due to Steam Injection



Aim of Study


Temperature
Pressure
Fluid changes
Influence seismic properties of heavy oil
Rock physics modeling
Synthetical seismic studies

Time Lapse pressure-saturation discrimination for CO_2 storage at the Snøhvit Field.

Sissel Grude

Under the supervision of Professor Martin Landrø

NTNU – Trondheim
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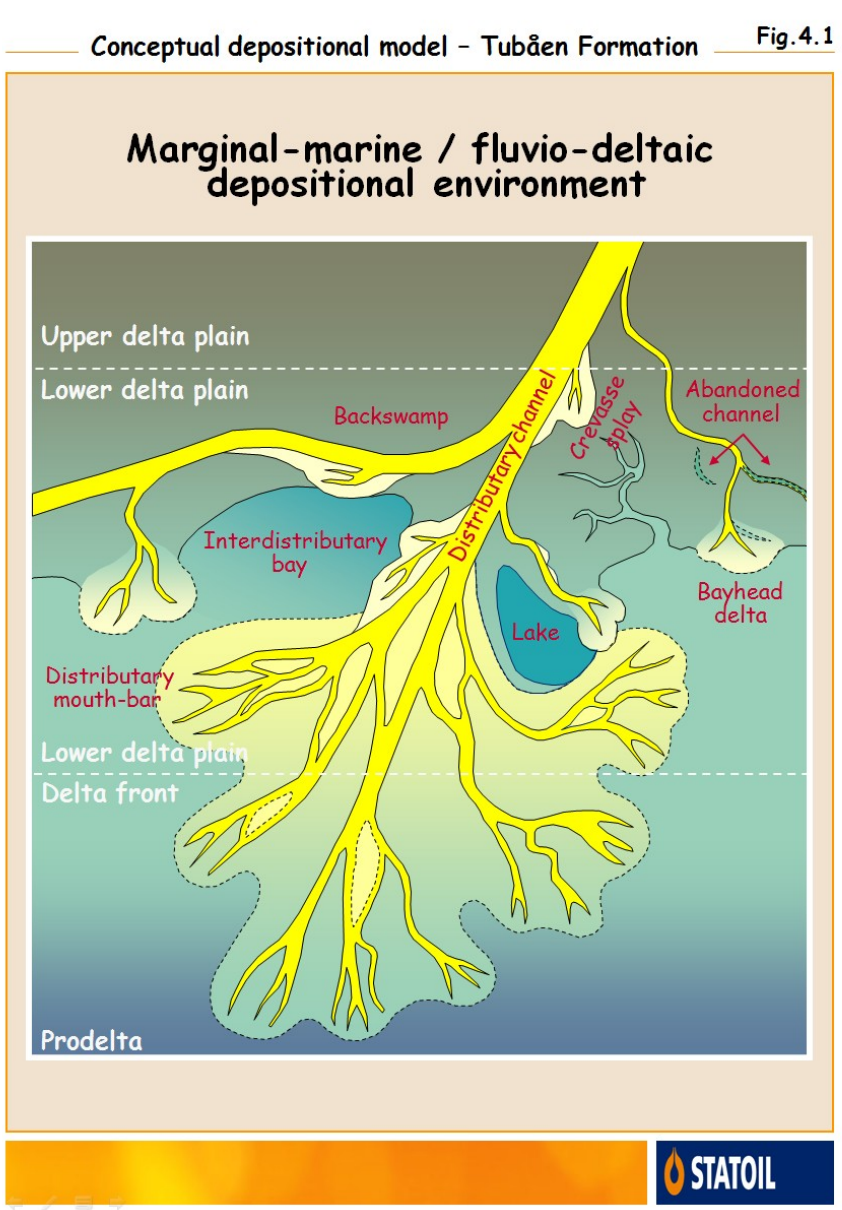
Objective

- Understand CO_2 movement inside the reservoir
- Link timeshift and amplitude changes observed on the time lapse seismic data to pressure and saturation changes by
  - Time lapse seismic AVO analysis
  - Rock physics
  - Finite difference modeling

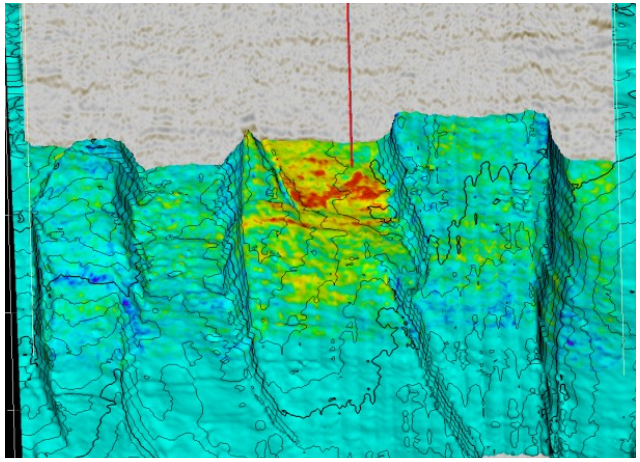
Geological Setting



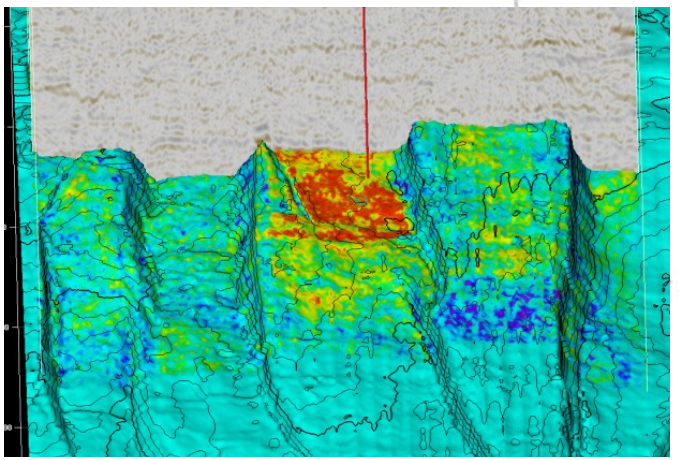
Reservoir zone
Tubåen formation

Permission from Statoil to use their picture.

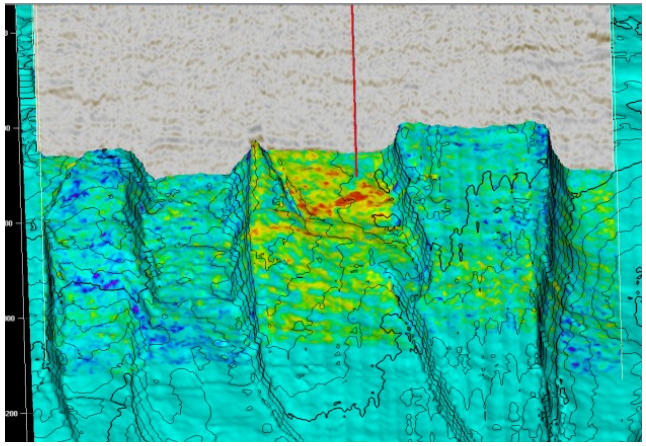
Time lapse seismic difference in amplitude, top fruholmen formation.



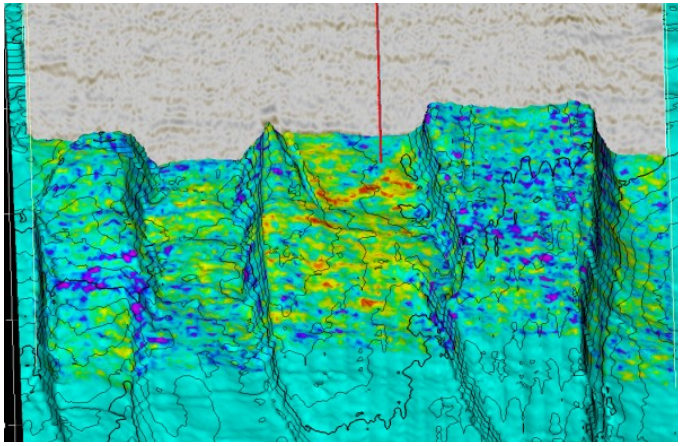
fullstack



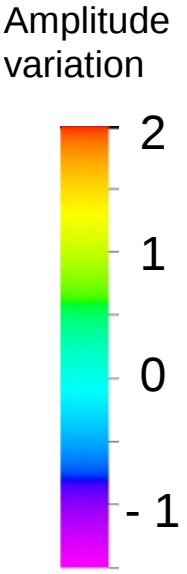
nearstack



midstack



farstack



Comparison of seismic diffraction modeling methods

Anastasiya Tantsereva

under the supervision of Professor Bjørn Ursin

and the co-supervision of Professor Arkady Aizenberg

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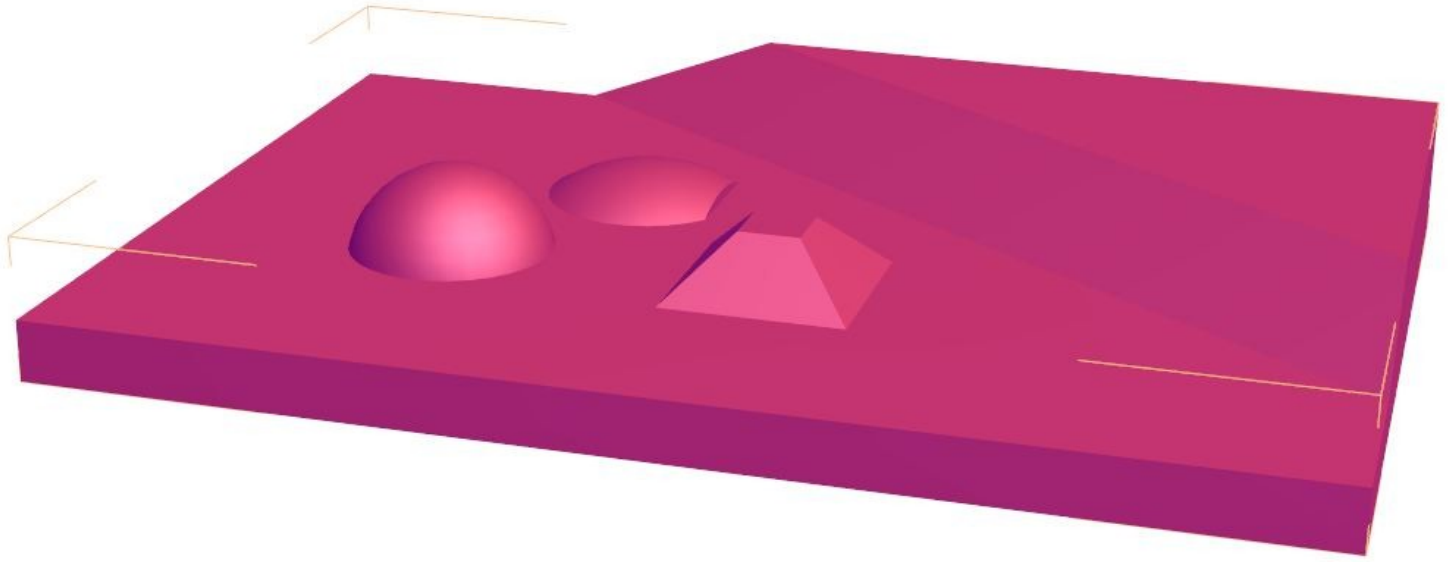
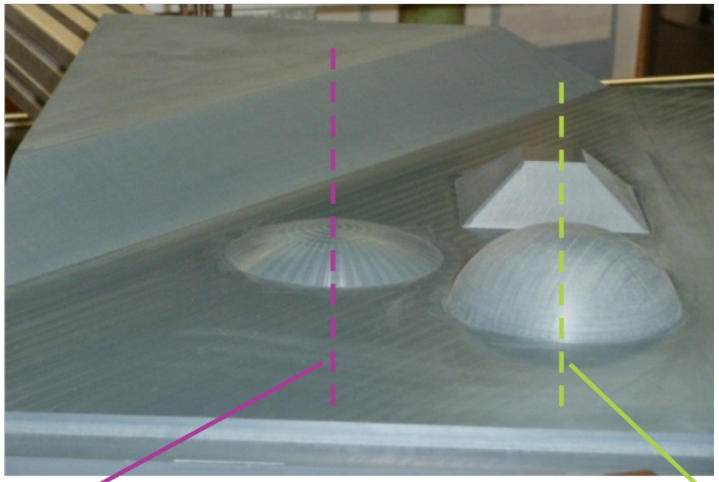
Marseille model



Methods

- The tip-wave superposition method (Ayzenberg et al, 2007, 2009)
- The reciprocal plane-wave expansion method (Ursin, 2008)
- The surface integral methods (Ursin and Tygel, 1997)
- Finite element method (cooperation with D. Komatitsch)

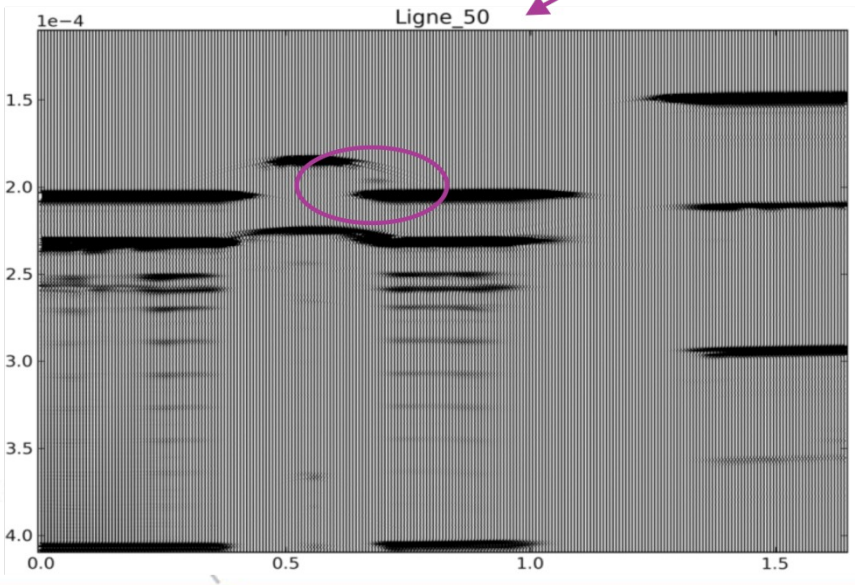
Marseille model: results

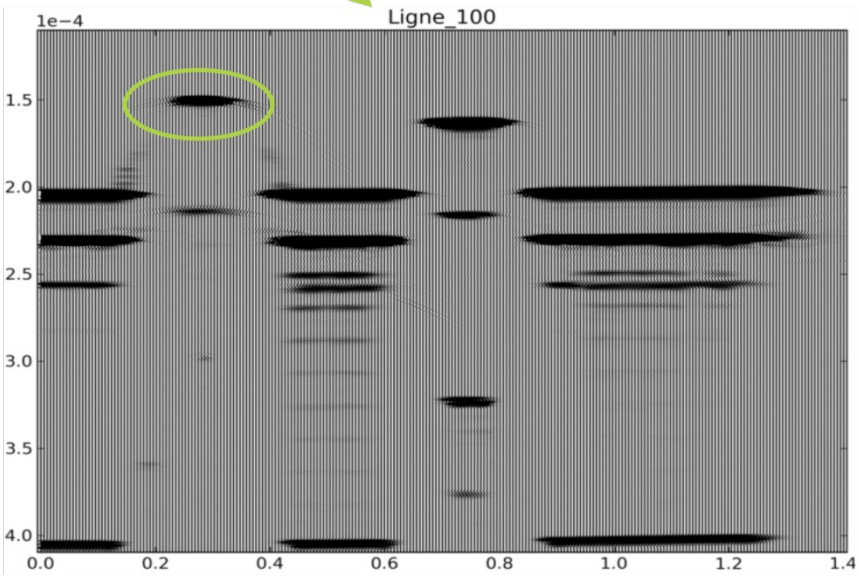


Zero-offset acquisition

500 kHz , $\lambda_{water} \approx 3$ mm

Distance transducer/interface =15 cm





Full waveform inversion on ocean-bottom cable data.

Olena Silinska

Under the supervision of Professor Børge Arntsen

NTNU – Trondheim
Norwegian University of
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Future work includes:

- Use 4C ocean-bottom cable data
- Estimate P- and S-velocities simultaneously and also anisotropy parameters
- Extend this method to the 3D case
- Computation efficiency

Life Of Field Seismic (LoFS)/ Permanent 4-D seismic on Ekofisk Chalk Field

Tuhin BHAKTA

Under the supervision of Professor Martin Landrø

NTNU – Trondheim
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Work Flow of PhD Project

The PhD work plan can be divided into three main parts :--

Modify the rock physics model for compacting reservoir

↓

Develop discrimination methods between fluid-pressure and compaction

↓

4D petro-physical parameters inversion

Rock Physics Model for compacting reservoir--- some issues

- Ekofisk field is compacting reservoir i.e. porosity is not constant throughout the reservoir life.
- Ekofisk is a fractured chalk reservoir. Fractures are highly anisotropic in nature.
- Porosity and permeability are not consistent throughout the Ekofisk field.

Thank you!

Acknowledgements

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- Sissel thanksProf. Martin Landrø for supervision, Statoil and their partners Petoro, Total E&P Norge, GDF SUEZ E&P Norge, Hess Norge and RWE Dea Norge for permission to use their Snøhvit data. Bård Osdal for help and information regarding the Snøhvit field, and permission to use his interpretations.
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- Olena thanks Prof. Børge Arntsen for supervision and also Yuriy Tyapkin for invaluable help.
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