

Instrumentation: Forward Modelling for a Phase Transmission Fiber Optic Cable

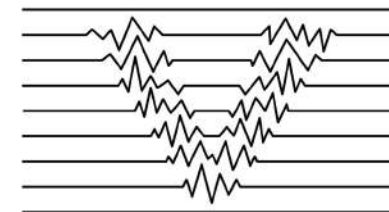
Sebastian Noe¹, Nils Müller¹, Dominik Husmann²,
Andreas Fichtner¹

1 ETH Zurich

2 METAS – Swiss Federal Institute of Metrology



Funded by the European Union's Horizon 2020 research and innovation programme
under the Marie Skłodowska-Curie grant agreement No. 955515.



SPIN

MONITORING A
RESTLESS EARTH

Erdbeben der Stärke 4,7 erschüttert die Schweiz

Neue Zürcher Zeitung

11.09.2022, 14.18 Uhr



Hören



Merken



Drucken



Teilen

L'ALSACE

Séisme

Depuis Kembs, un tremblement de terre de magnitude 4,8 secoue l'Alsace

À 17 h 58 ce samedi, un séisme de magnitude 4,8 s'est déclenché depuis la région des Trois Frontières. L'épicentre a été localisé à 3 km de Kembs. Mais il a été ressenti jusqu'au nord de l'Alsace, en Allemagne, en Lorraine et en Franche-Comté. Sans faire de dégâts, cependant.

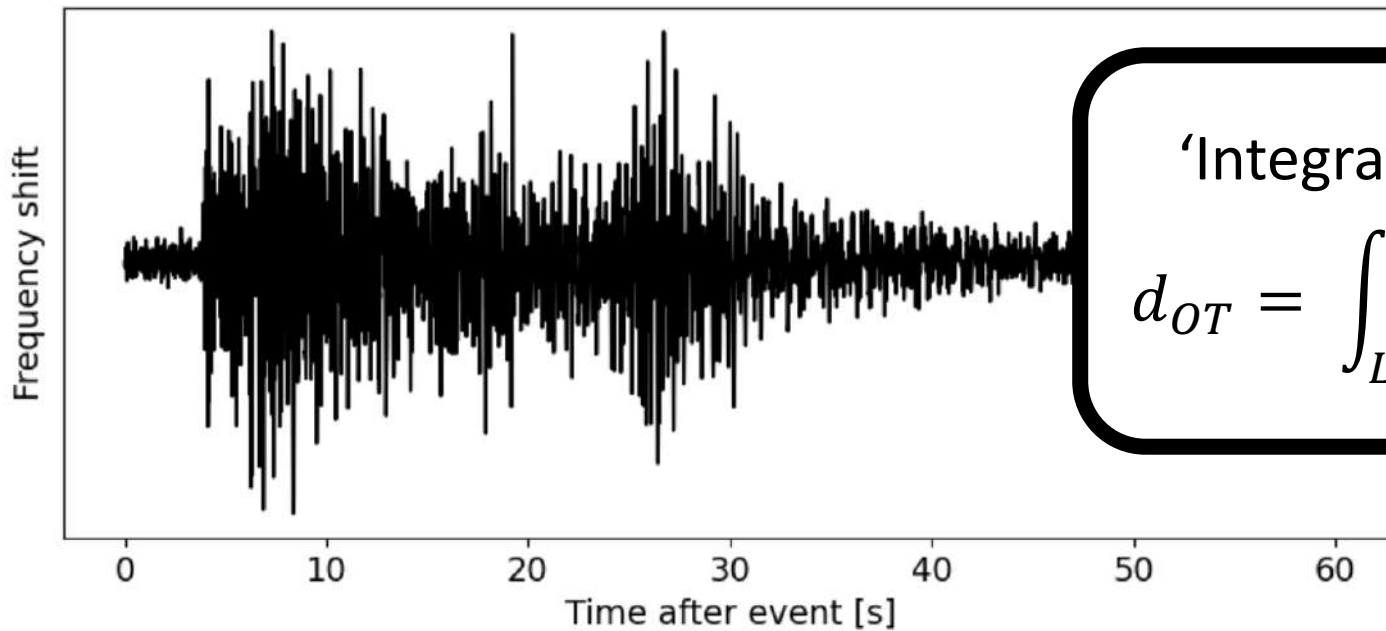
Karine FRELIN, avec Jean-Frédéric TUEFFERD et Alain CHEVAL - 11 sept. 2022 à 06:00 | mis à jour le 22 déc. 2022 à 18:00 - Temps de lecture : 3 min



Vu 68742 fois

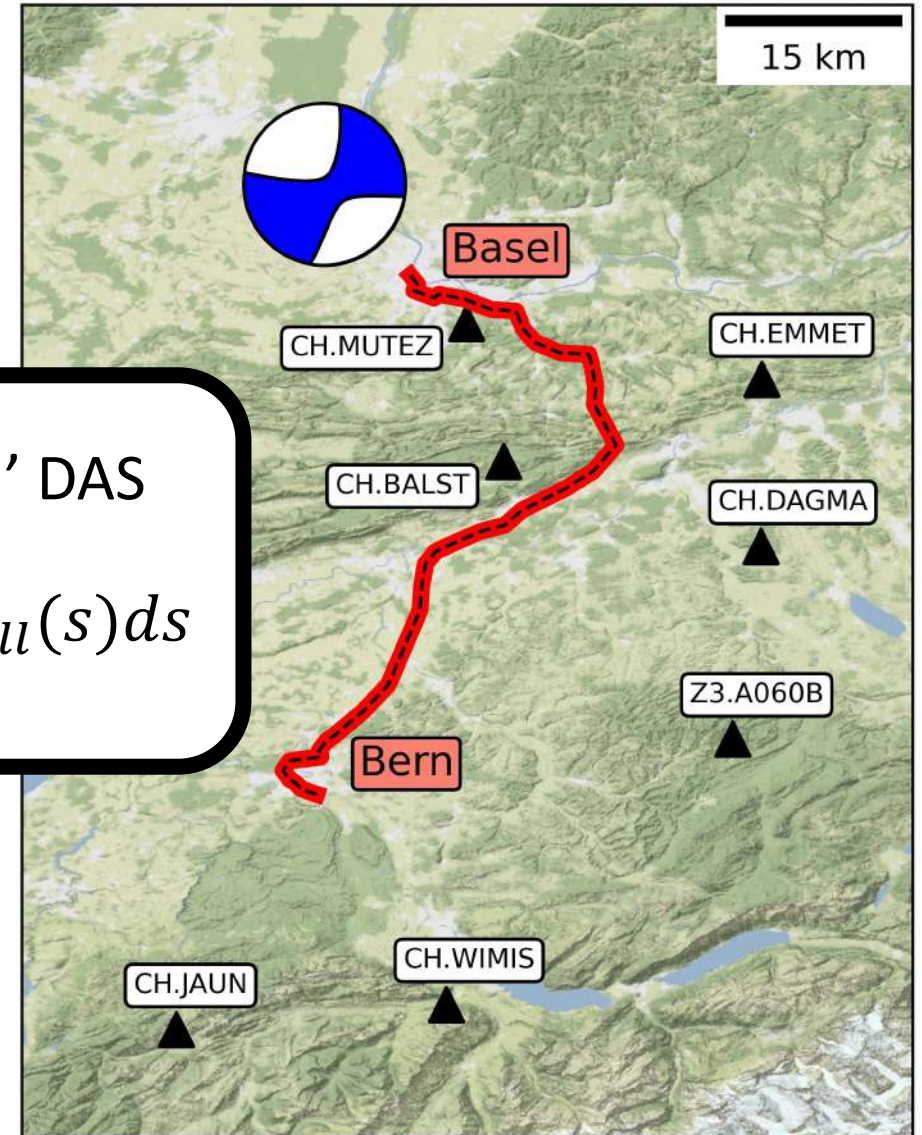
Earthquake measured by METAS

123 km phase-transmission fiber optics



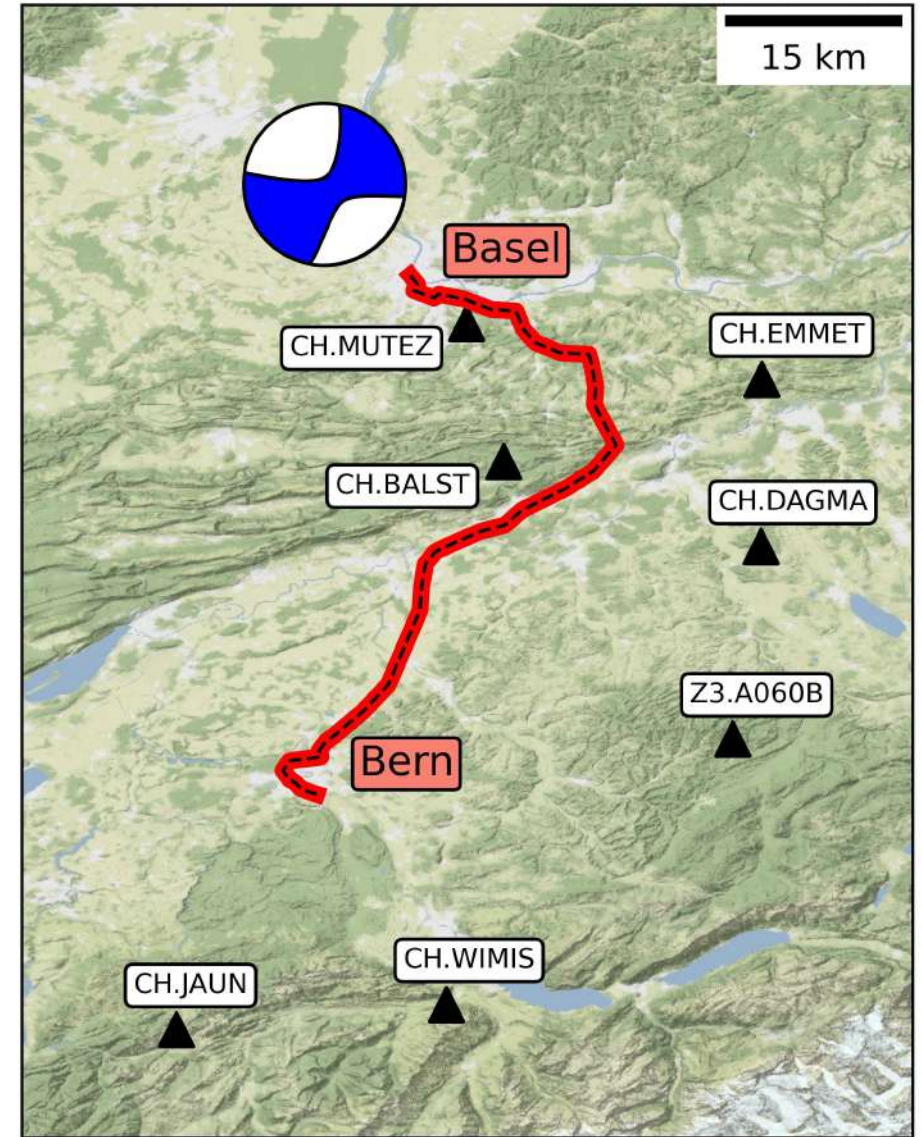
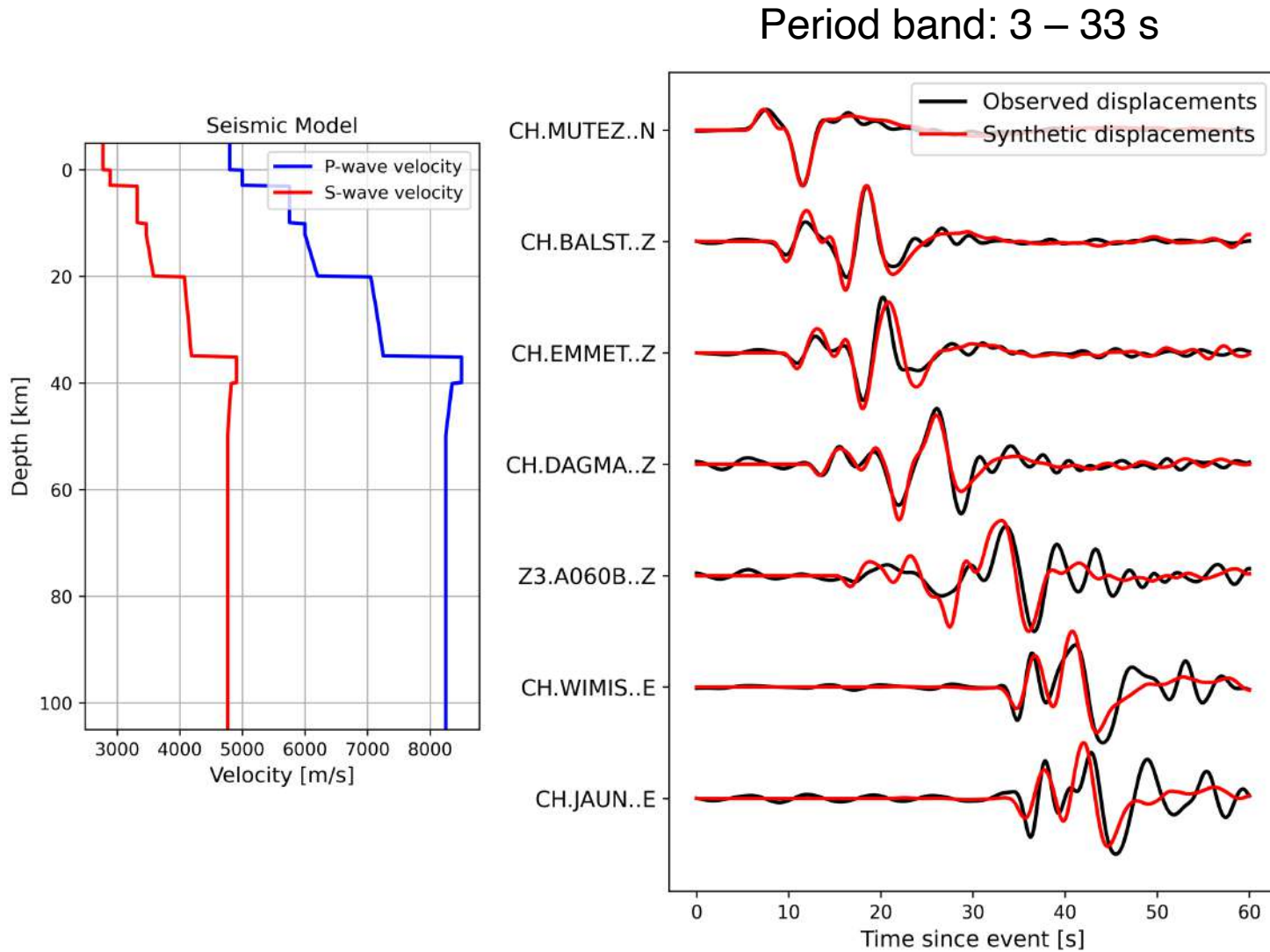
'Integrated' DAS

$$d_{OT} = \int_L \dot{\epsilon}_{ll}(s) ds$$

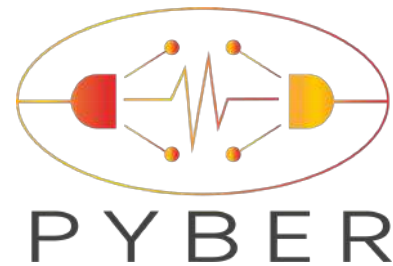
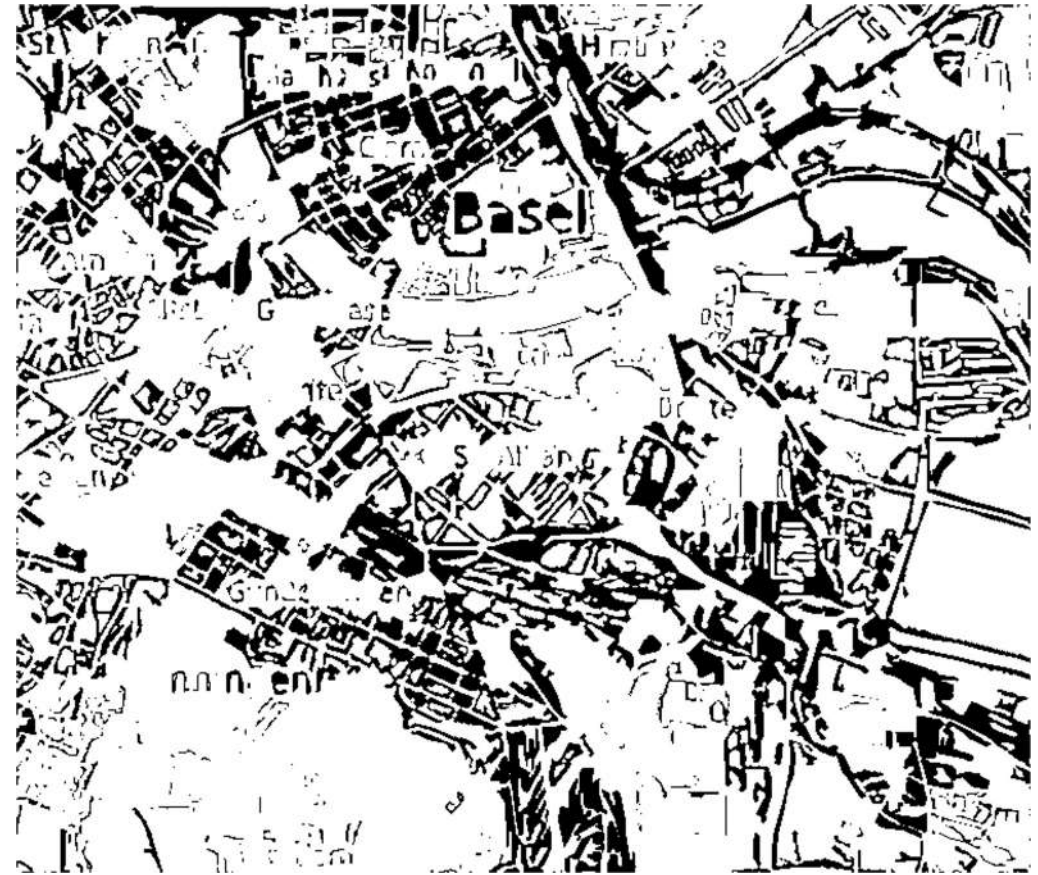
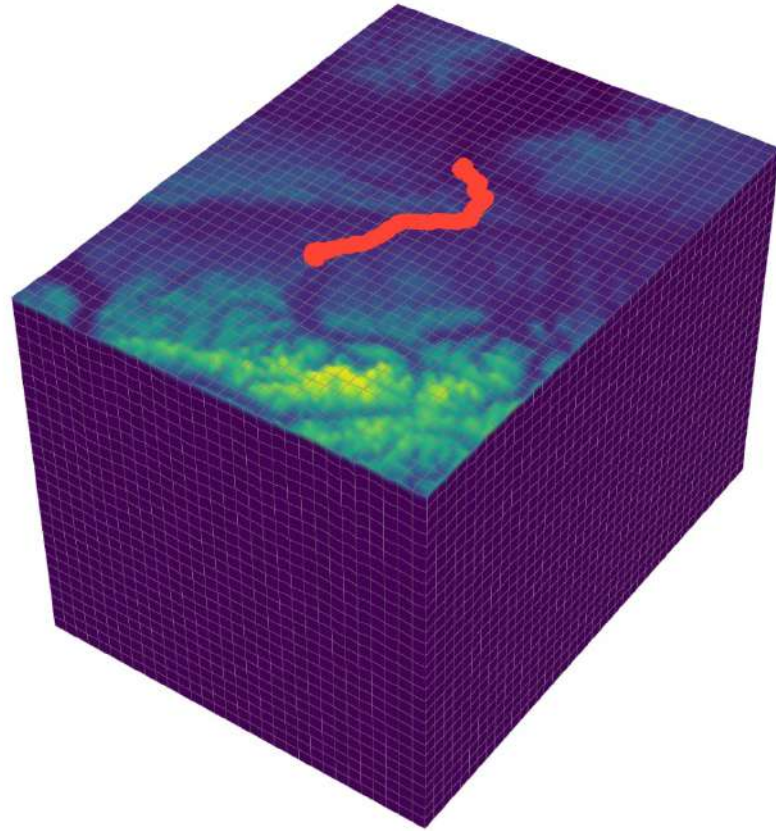


Measurements comparable to *Marra et al., Science 361, 486–490 (2018)* and *Marra et al., Science 376, 874–879 (2022)*

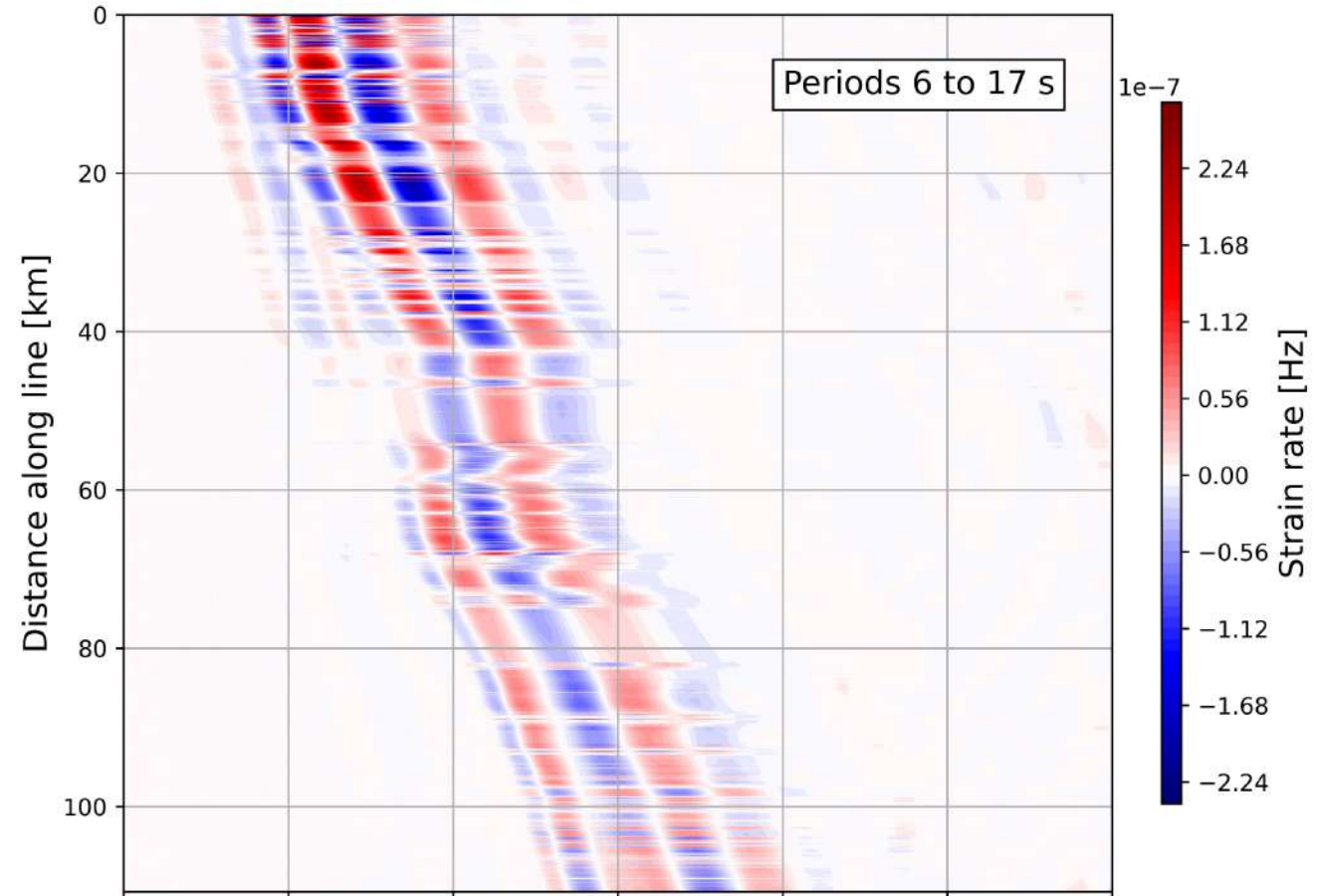
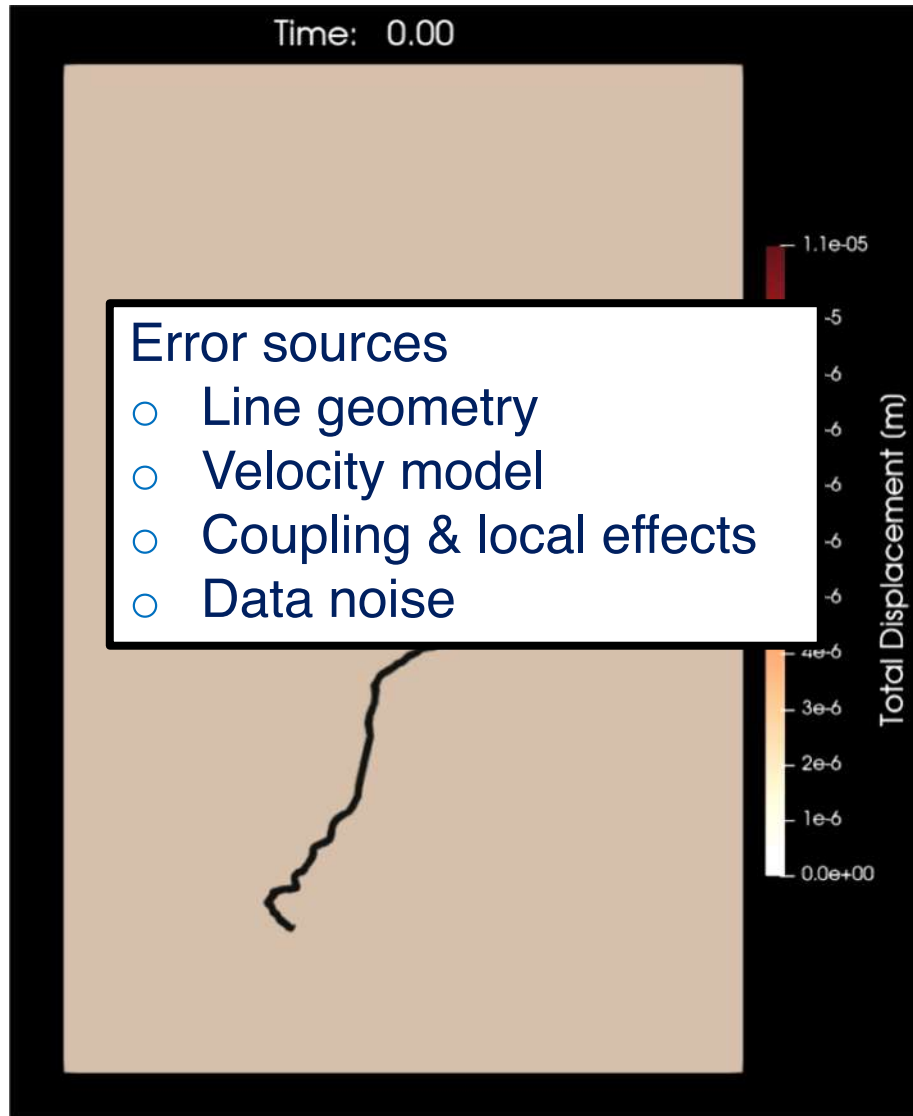
Waveform fits on seismic stations



Place line on spectral element mesh



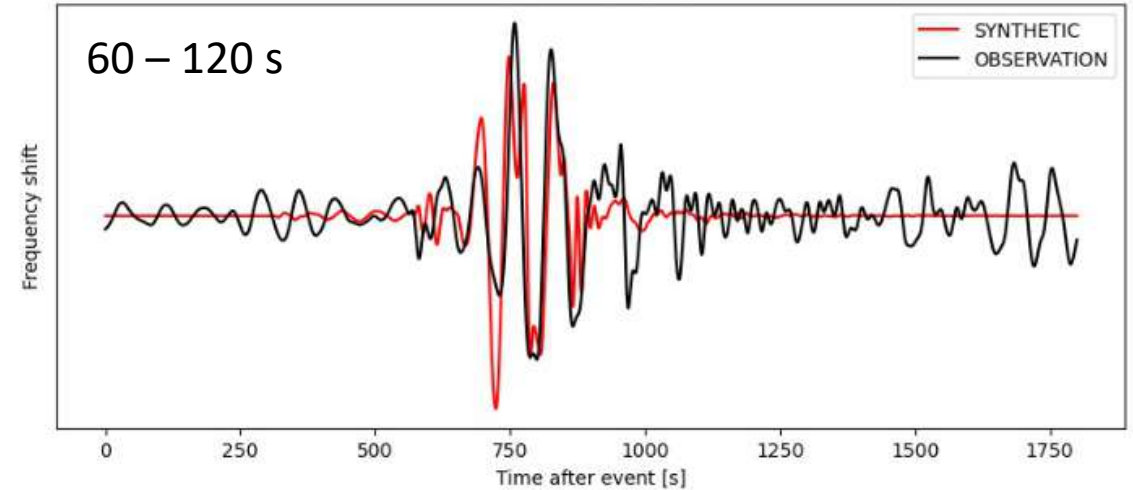
Running the simulation



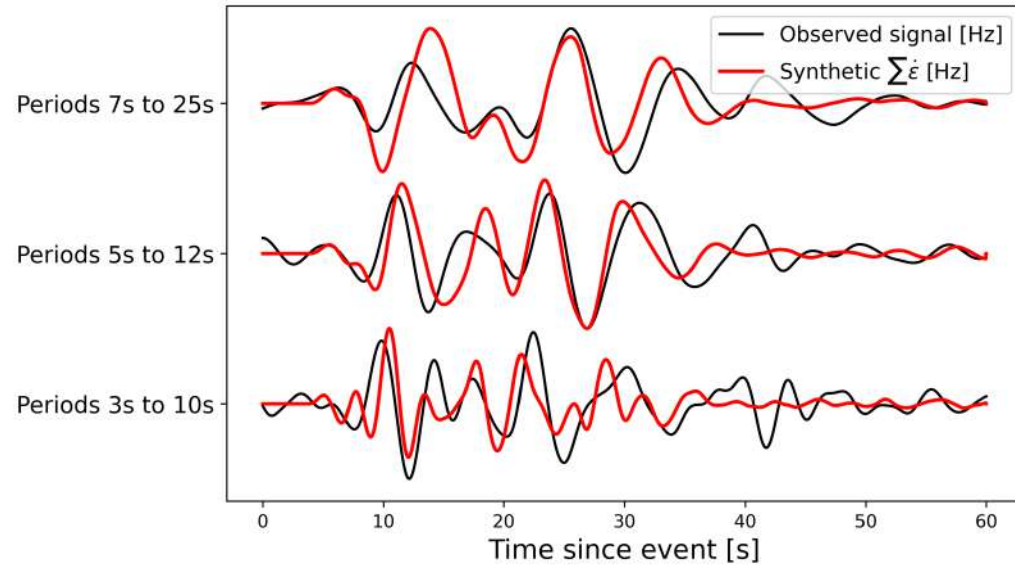
Conclusions & Outlook

- Utilizing **existing** communication infrastructure for seismic measurements
- Due to spatial extent of cable **a lot to learn** from the data
- Source parameter inversion?
- Simulations for non-local events?
- Transoceanic telecommunication cables?

Turkey M7.8 Earthquake, 06.02.2023



Running the simulation



Error sources

- Line geometry
- Velocity model
- Coupling & local effects
- Data noise

