# Urban Exploration and Monitoring Along Fibre Optics Infrastructure

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# Urban Exploration along Fibre Optics Infrastructure

- Motivation
  - Large-scale seismic surveys in densely populated areas are challenging to carry out due to the effort required to

install the receivers: alternative to receivers is DAS (fibre optic cable)

  - Carrying out active measurment in urban areas: passive seismic, ambient noise
- Measurements in Berlin-Adlershof
  - Pre-existing cable (dark fibre cable): Along Telecommunication Infrastructure (Adlergestell)
  - Installed fibre cable: During Construction of a Geothermal Well (BTB) in 2D

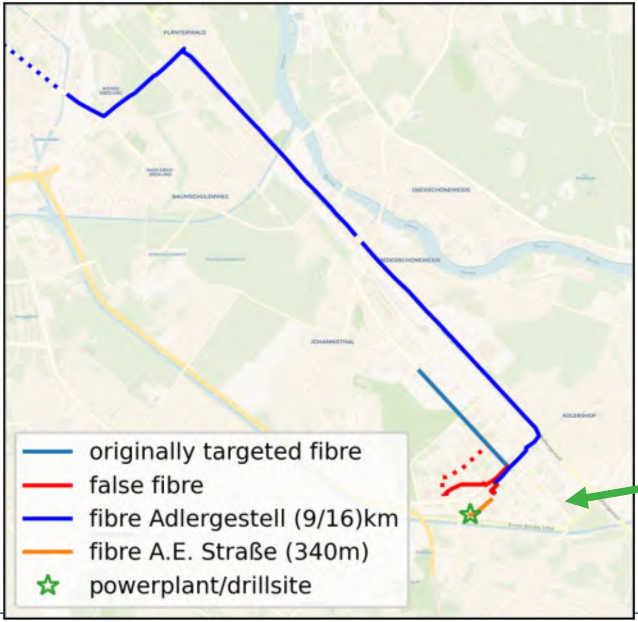
# Measurements: Berlin-Adlershof

## Adlergestell

- Contractor 1&1 Company
- Telecom. dark fibre
- Timeperiod: April-March

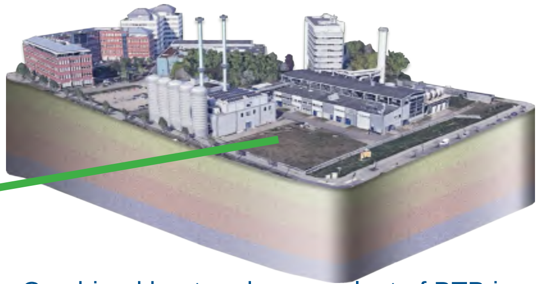
| duration | length | sampling |
|---|---|---|
| 14 days | 5km | 2m |
| 14 days | 16km | 8m |

South-East of Berlin




## BTB powerplant

- 300m of fibre layed out in a heating tunnel
- 10 Geofones
- Start: November

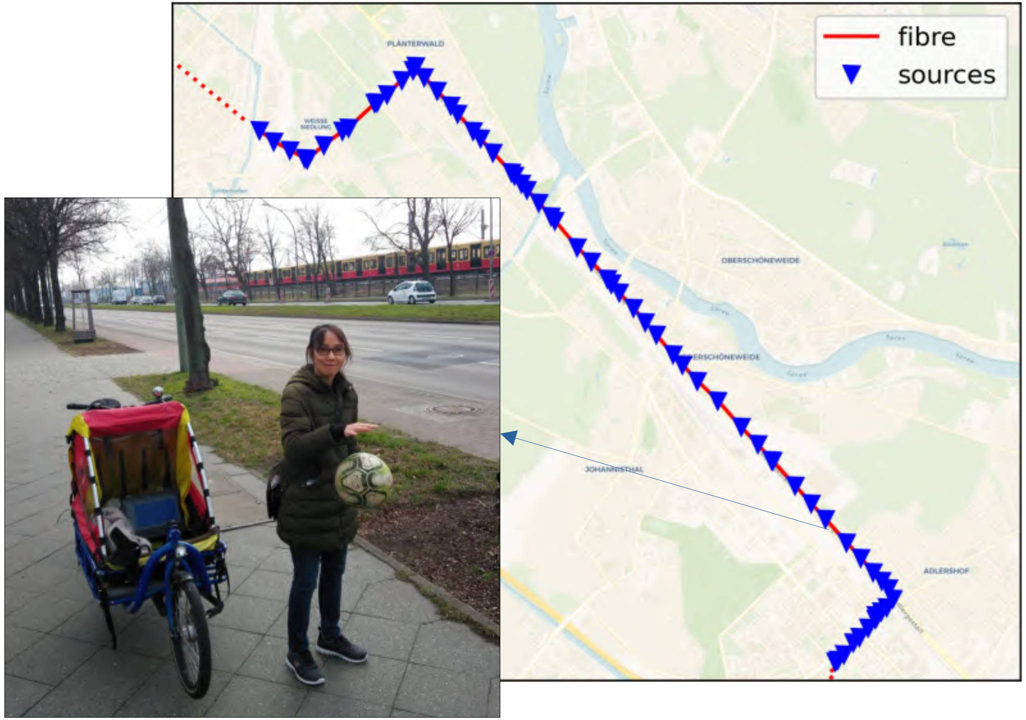


Combined heat and power plant of BTB in Adlershof, Berlin (Guido Blöcher, GFZ)

# Measurements Along Telecommunication Infrastructure

## Adlergestell, South-East Berlin

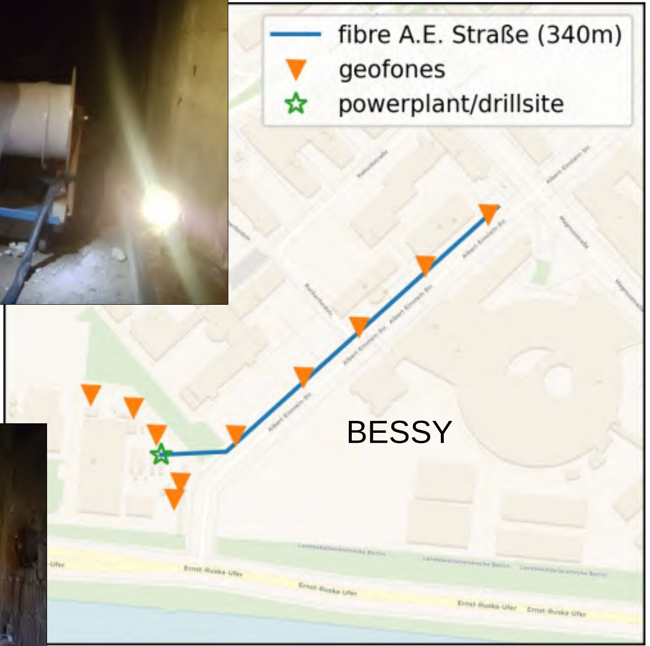
- From Adlershof towards the City-Center
- 9 km of geo-referenced fibre
- 6 km of straight fibre along main street with cars and trains
  - 3 km of which were probed for 4 weeks @ 8 m spacing
- Geo-referenced @ 64 locations



# Measurements during the Construction of a Geothermal Well

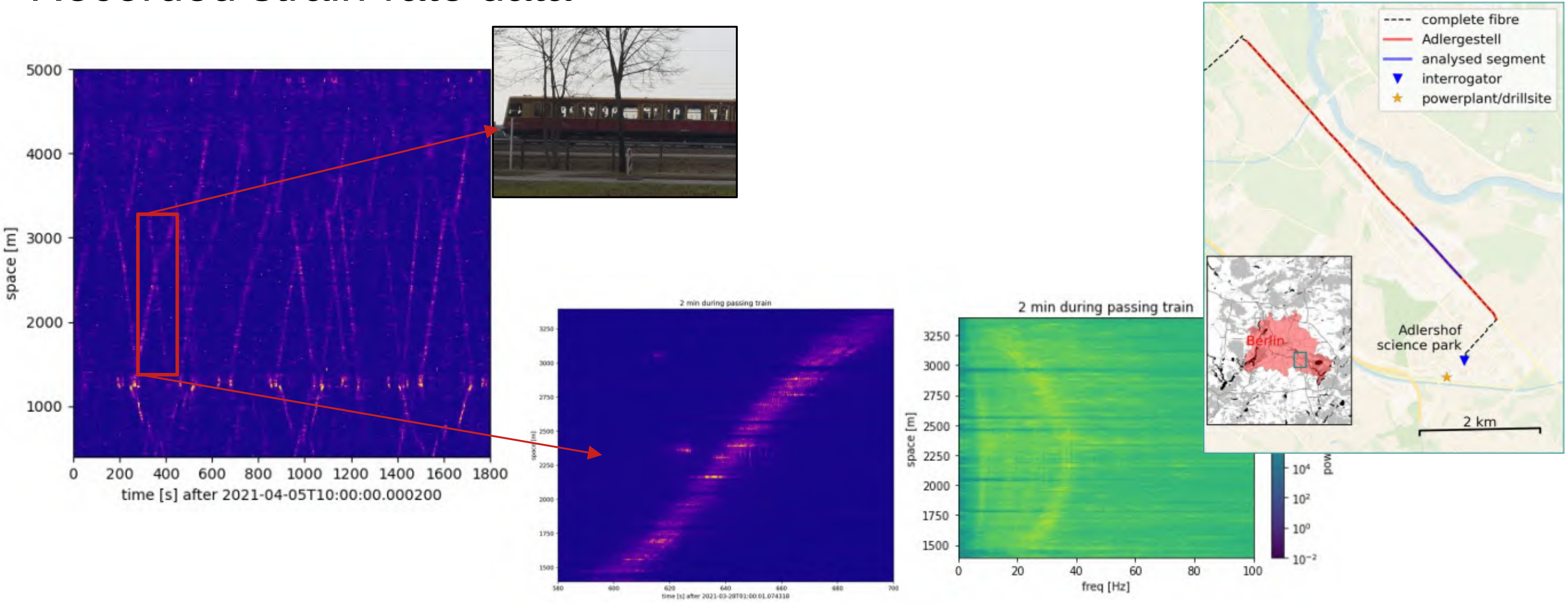
## Horizontal fibre in heating tunnel (300m)

- 240m straight fibre are short
- Opportunity to learn
  - about the coupling,
  - noise sources (e.g. ducts),
  - Effects from local infrastructure




# Measurements Along Telecommunication Infrastructure

## Recorded strain-rate data

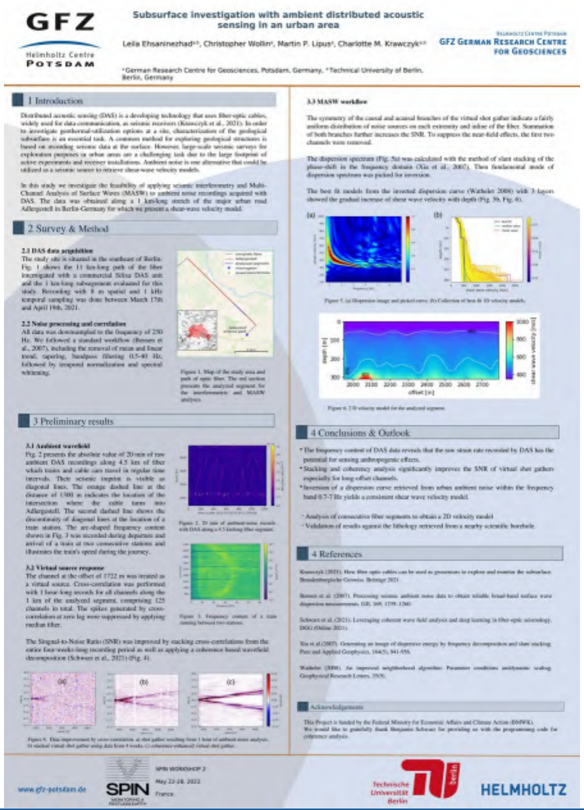


# Measurements Along Telecommunication Infrastructure

workflow of ambient noise tomography

Future work:

- Validation of results against the lithology retrieved from a nearby scientific borehole
- Improve the frequency range of dispersion
- The detection of micro-earthquakes
- Planning new set of active and passive measurments in 2D for monitoring



Thank you for your attention.