15th Munich Earth Skience School

ObsPy goes Downtown: Seismology in Cities

DAS Practical
Fiber in cities.

24 February 2025

Istanbul

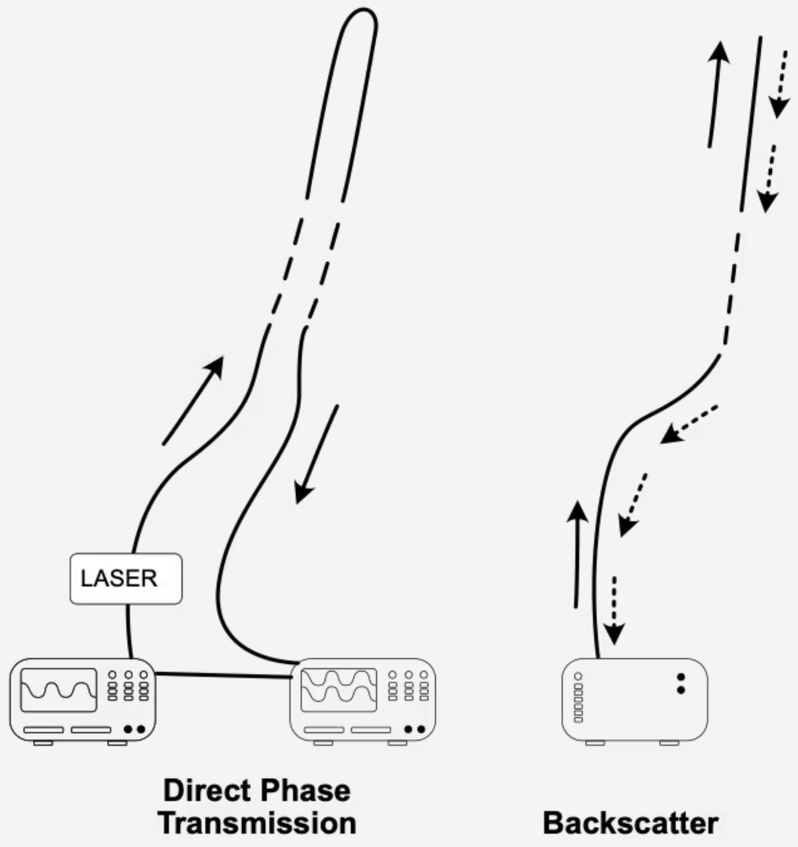
Bern. Smolinski et. al 2024

Credit: Jonas Igel

Athens

First: A bonus comment.

DAS is not the only "emerging" fiber method.
(also aside from 6C)



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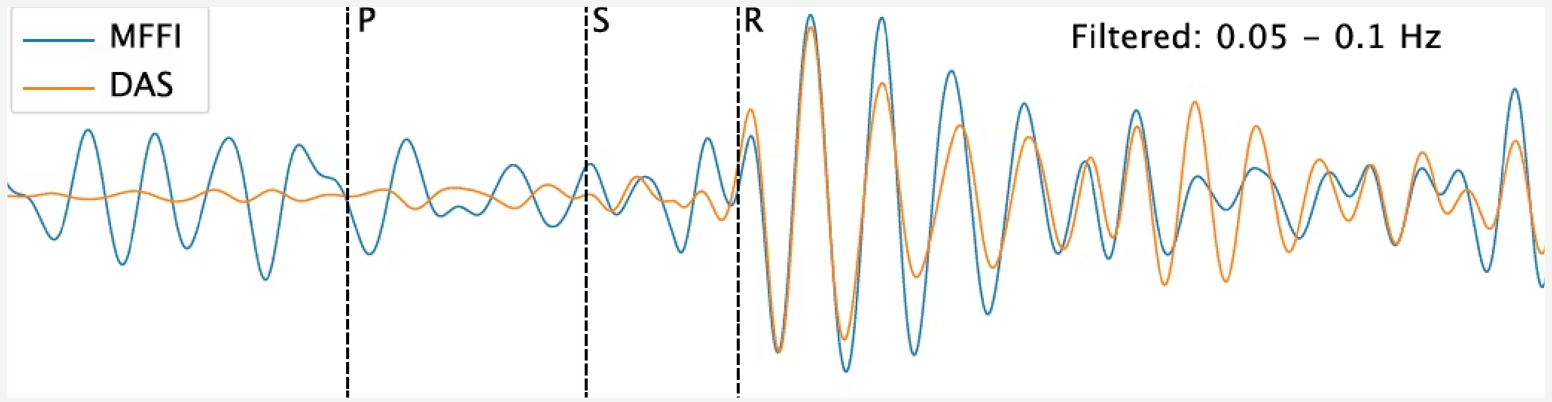
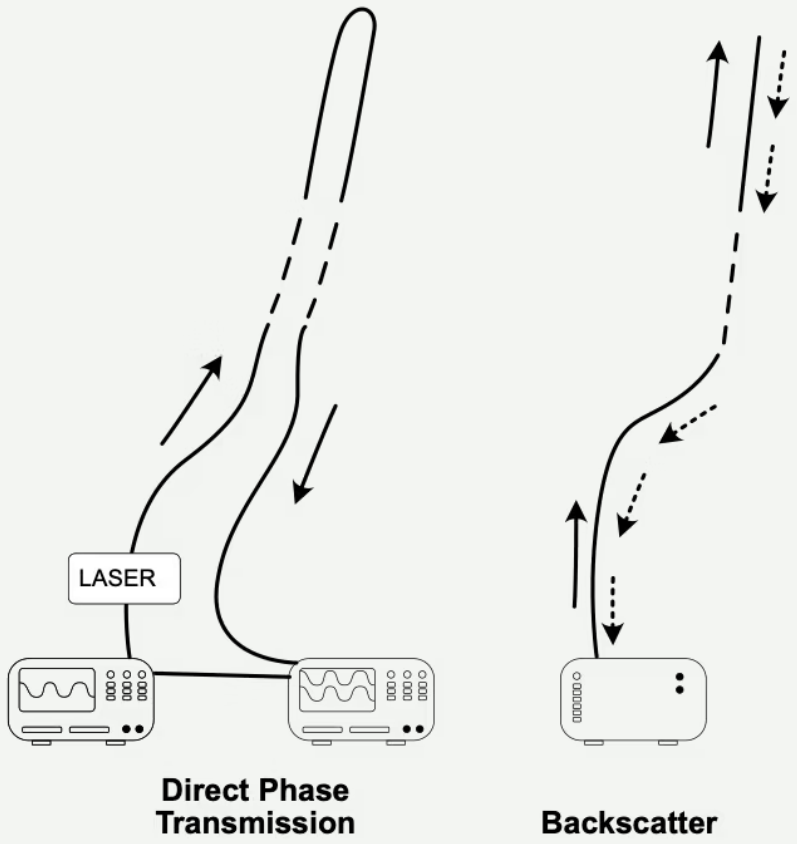
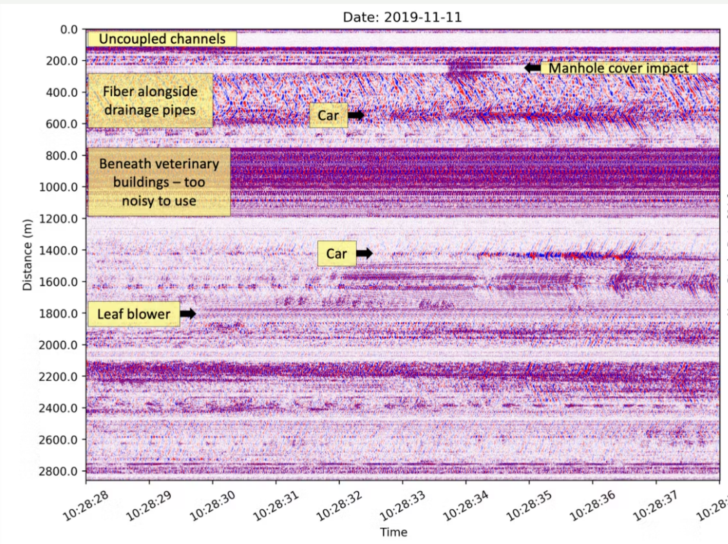




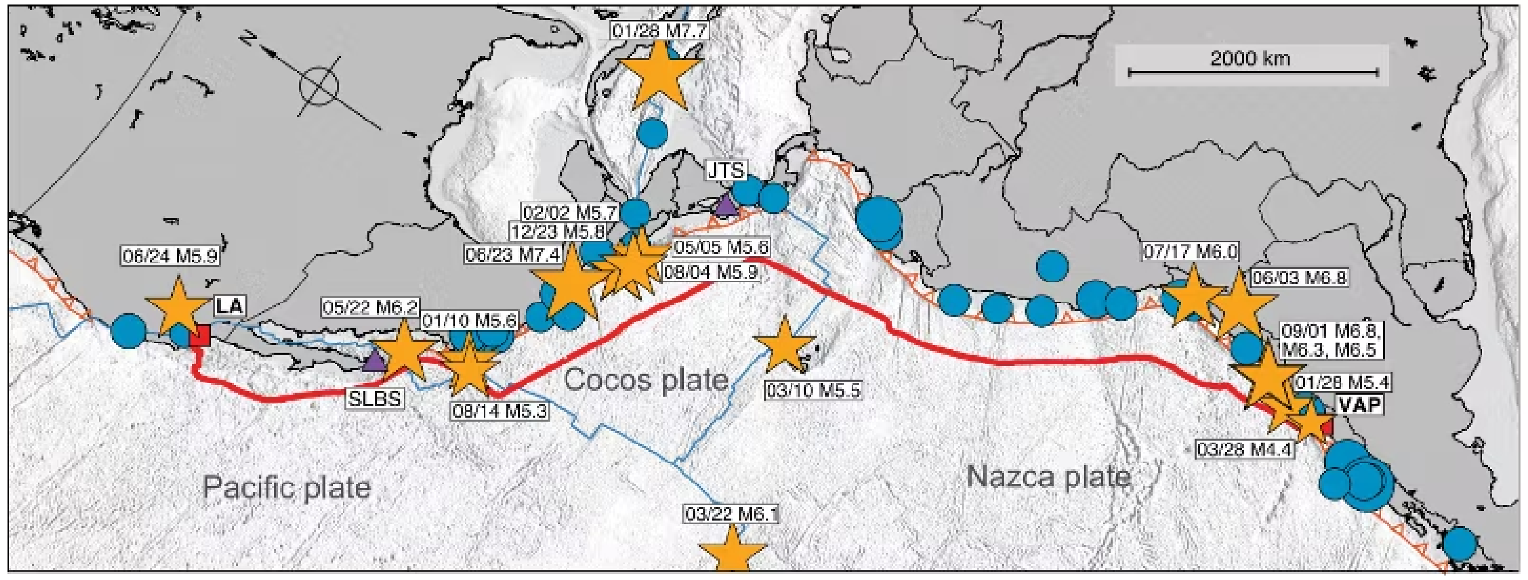


REPORT

GEOPHYSICS

Optical polarization–based seismic and water wave sensing on transoceanic cables

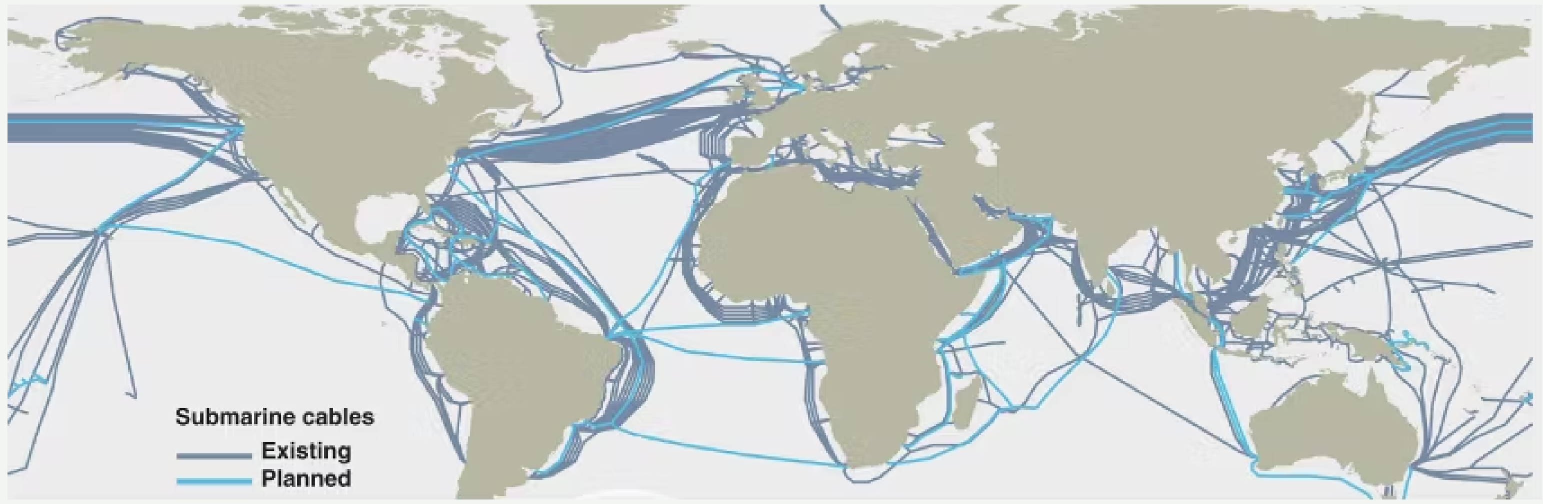
Zhongwen Zhan[1*], Mattia Cantono[2], Valey Kamalov[2], Antonio Mecozzi[3], Rafael Müller[2], Shuang Yin[2], Jorge C. Castellanos[1]



OPTICAL SEISMOLOGY

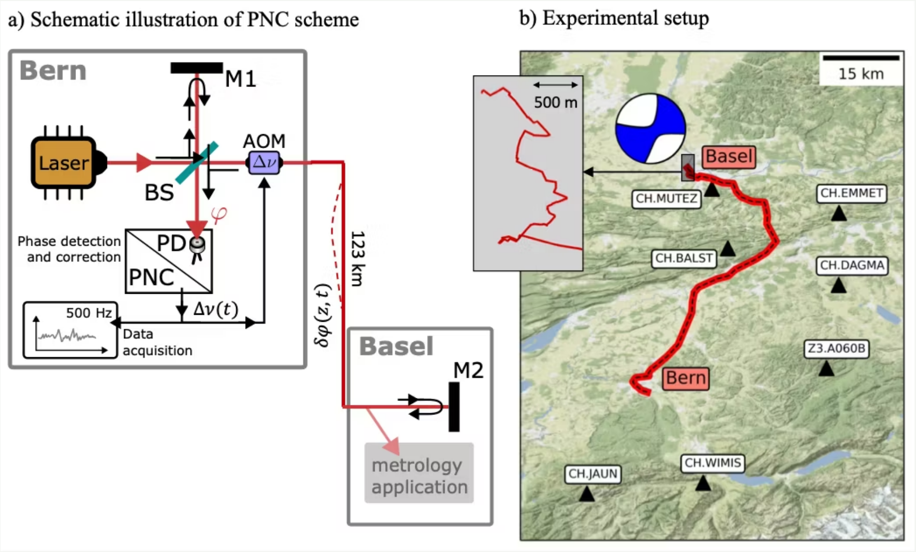
Ultrastable laser interferometry for earthquake detection with terrestrial and submarine cables

Giuseppe Marra[1*], Cecilia Clivati[2], Richard Luckett[3], Anna Tampellini[2,4], Jochen Kronjäger[1], Louise Wright[1], Alberto Mura[2], Filippo Levi[2], Stephen Robinson[1], André Xuereb[5], Brian Baptie[3], Davide Calonico[2]

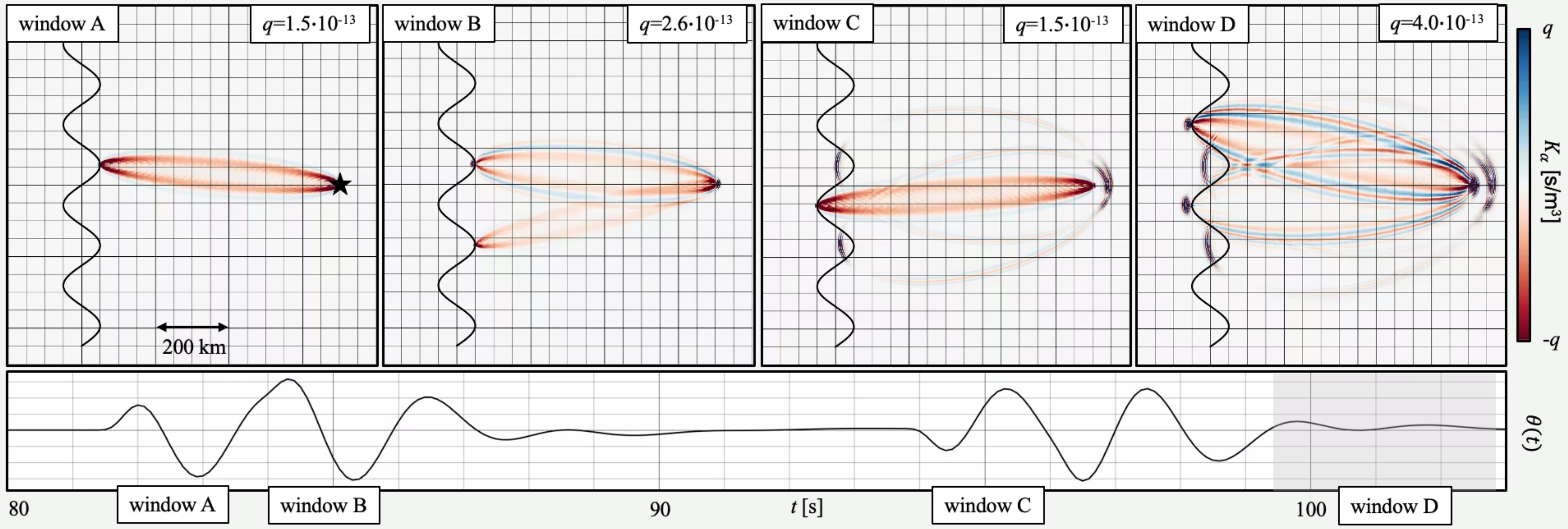


Measurement:
single **Integrated Strain** timeseries.

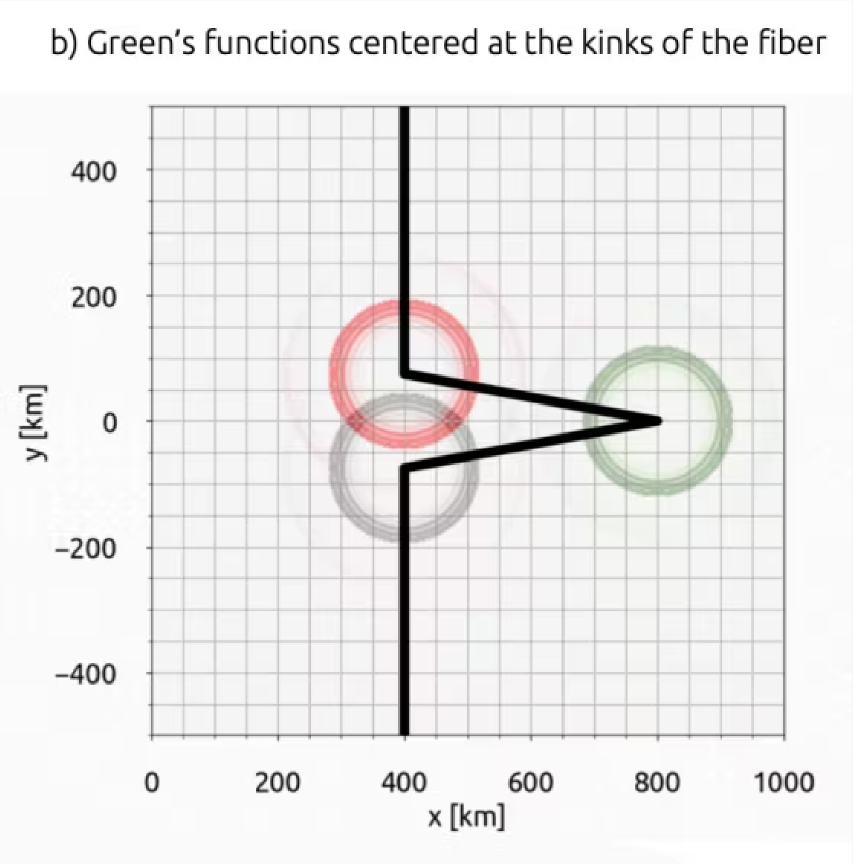
Useful? More than you might think.
Space-time distribution is still very rich.



Sebastian Noe



Andreas Fichtner



Sixtine Dromigny

Try Pitch

Measurement:
single **Integrated Strain** timeseries.

Compared to DAS:

-Less spatial information (or at least: requires reformulating methods)

+cheaper
+fibers can be longer
+fibers can be "live"

OK. Back to DAS.

Example 10 seconds, from Bern Switzerland

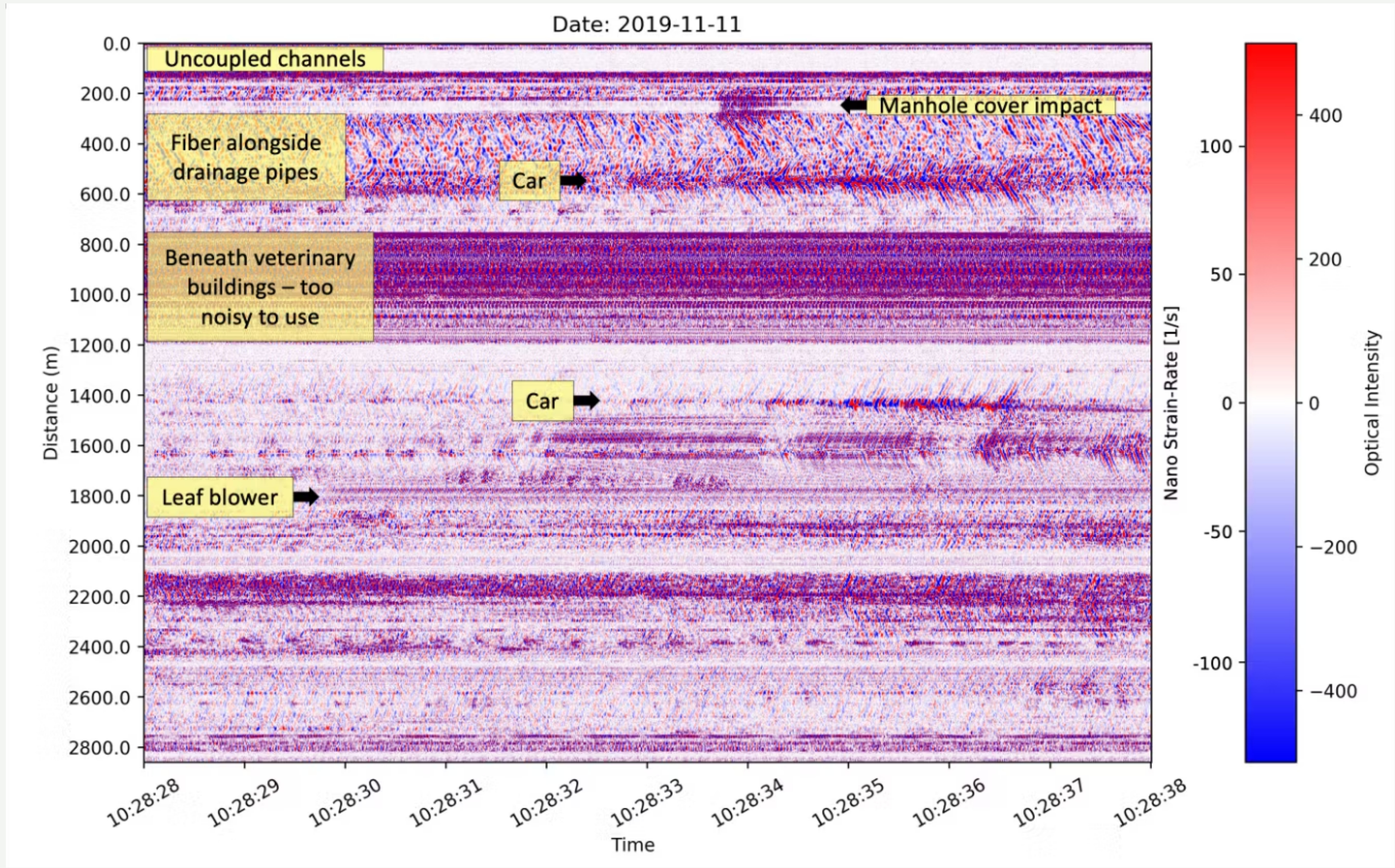
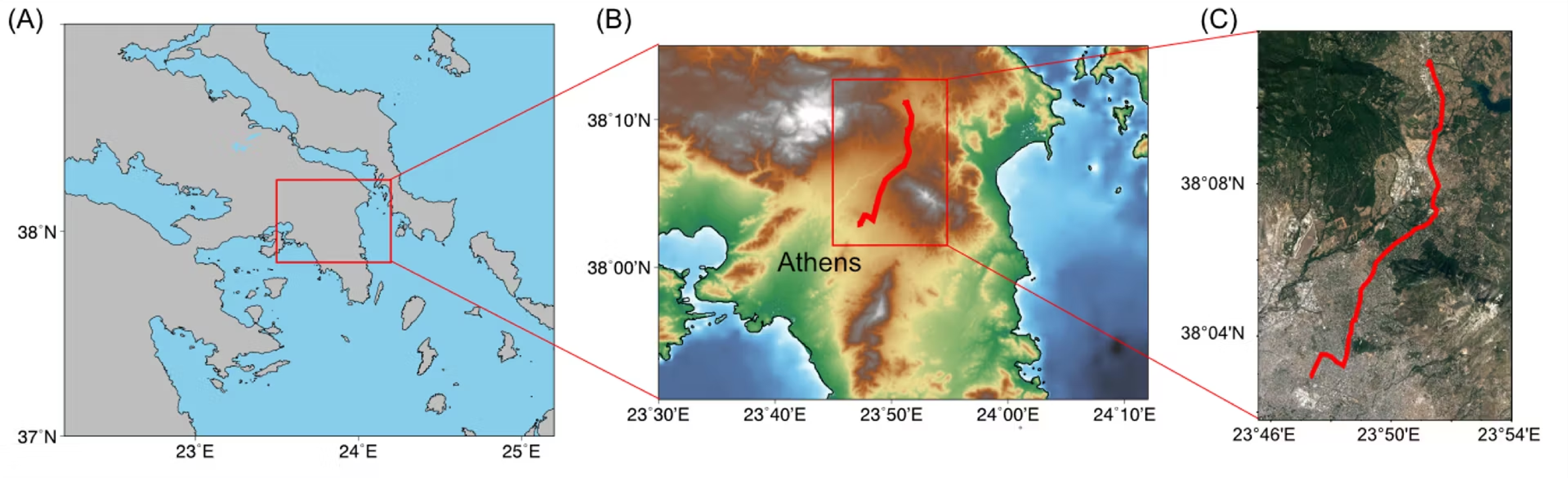


Figure from Krystyna Smolinski

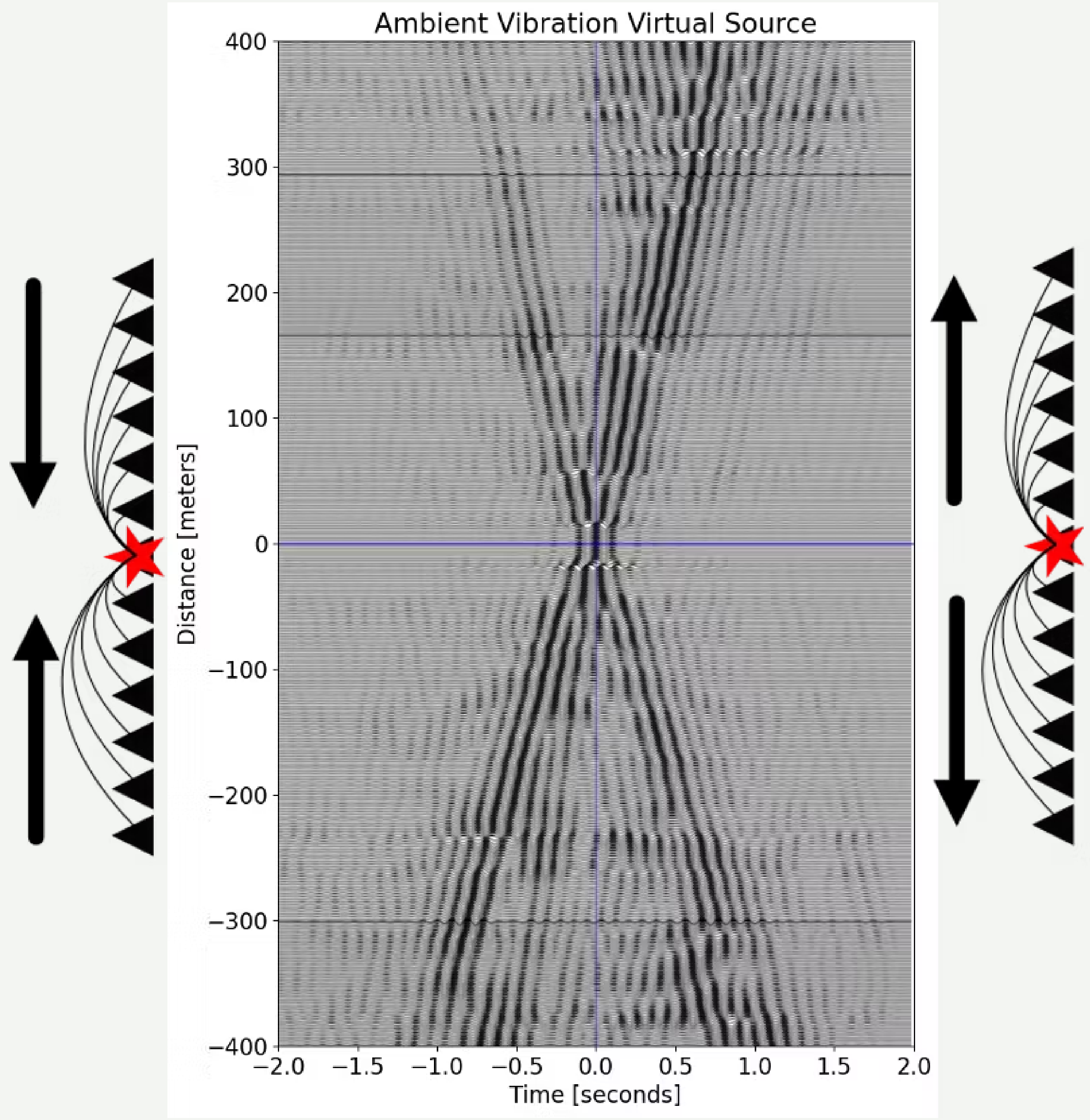
We'll use data from Athens, recorded in 2022.

We will focus on earthquake events.

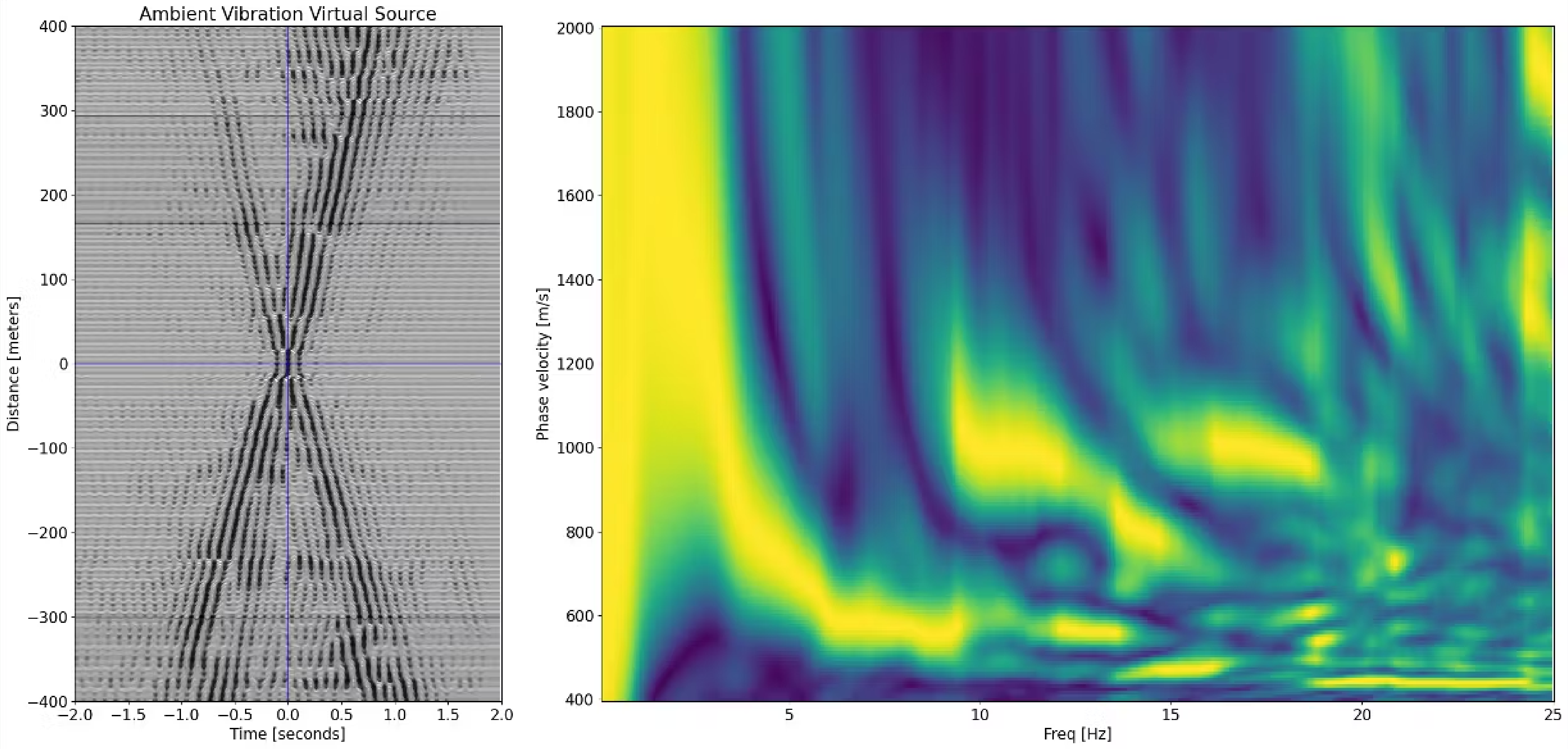


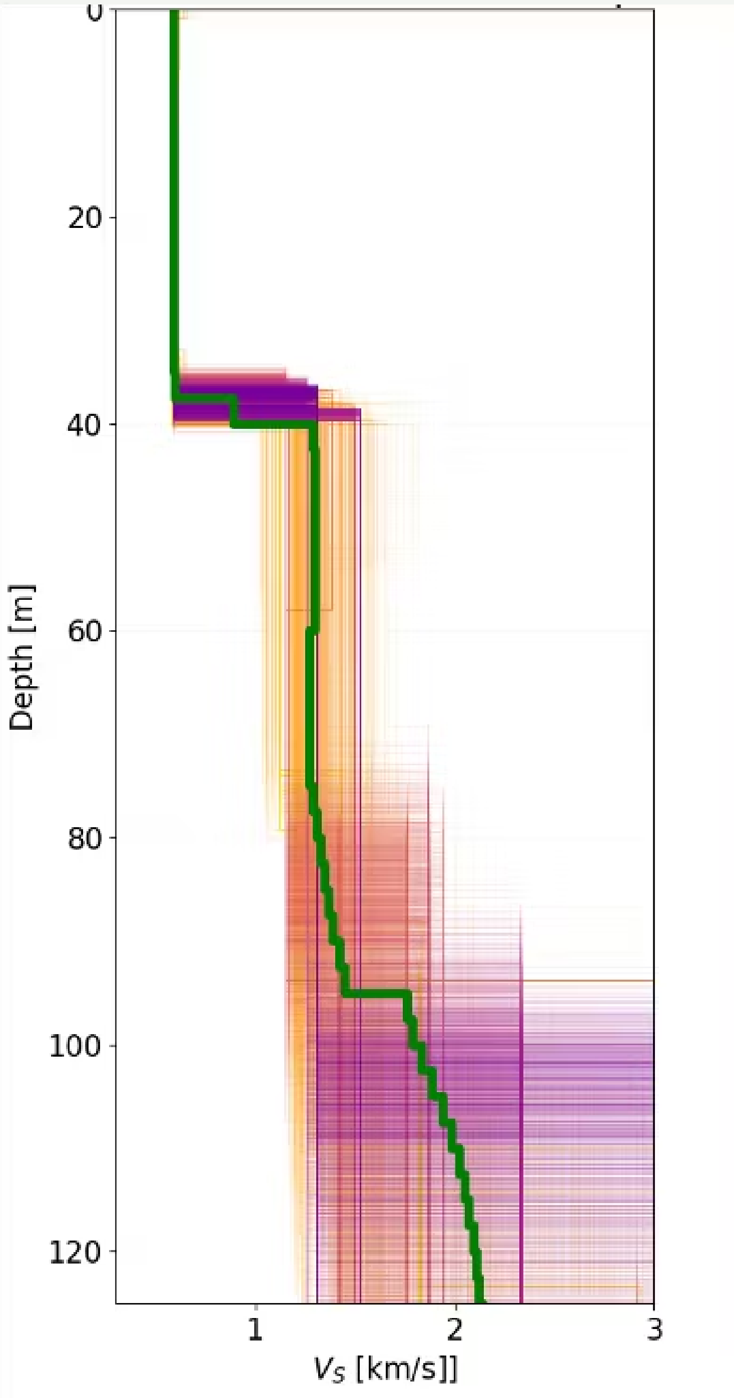
Side note #2:

Noise correlation is also possible

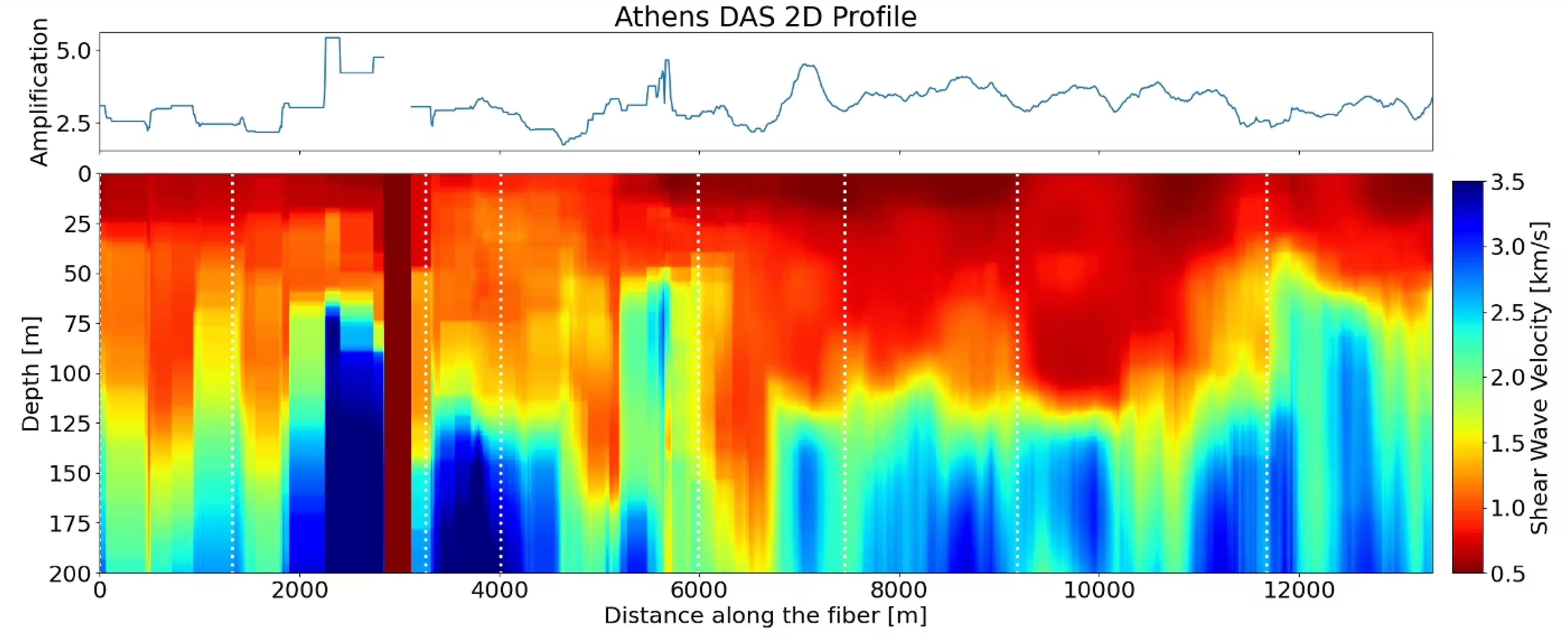


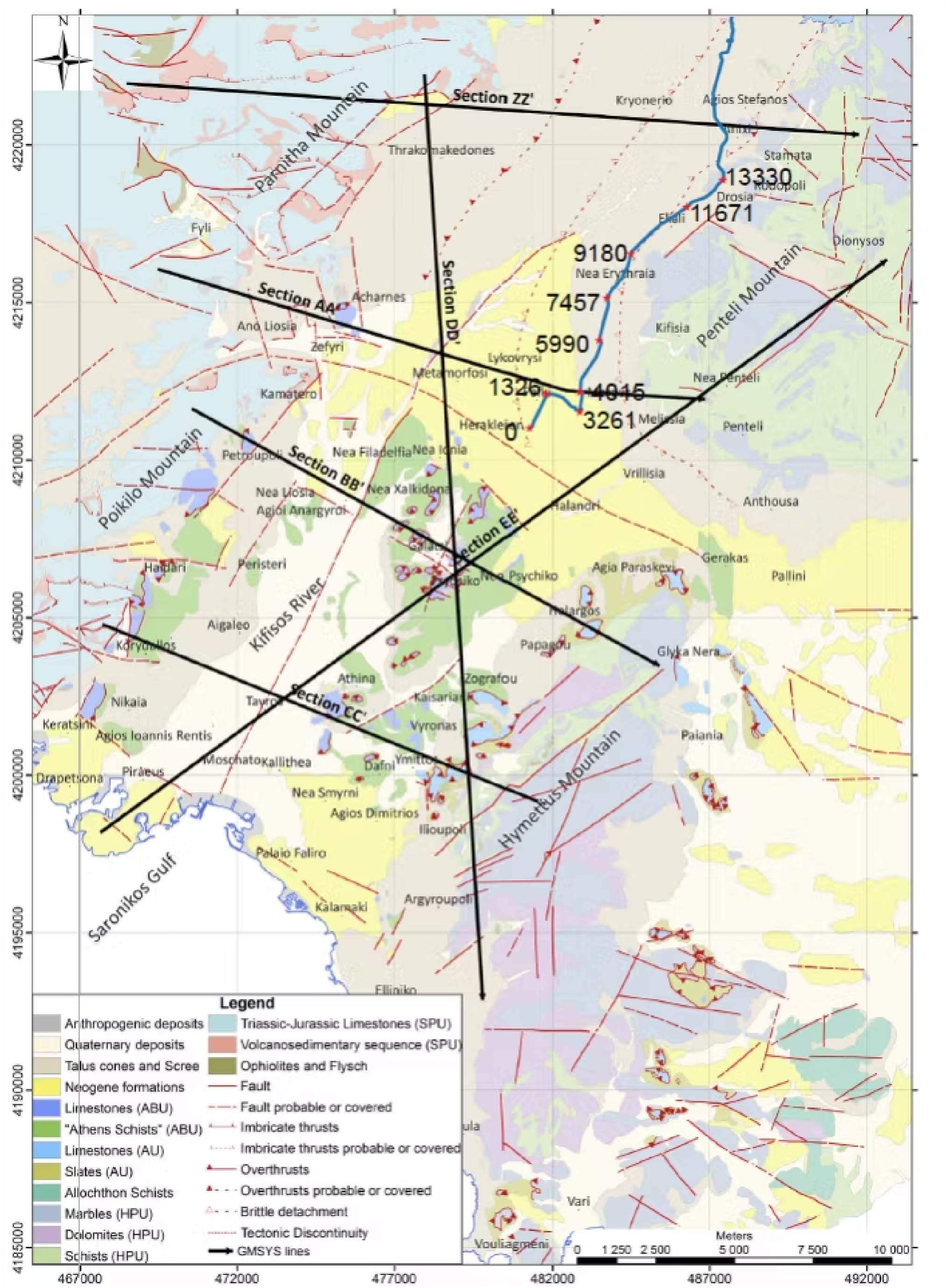
Noise correlations → Dispersion Curve → 1D Profile





Stitch together many such 1D models:





Advantage: 1 interrogator, ~2-3 days of setup = 14 km of 2D profile.

Disadvantage: 1-C, weeks of stacking, 40TB of data, lots of manual effort (dispersion picking). Quantity vs. quality.

Disadvantage: Getting access to the telecom fibers can be difficult. Need to figure out the business model.

This afternoon's goals:

- Load data.
- Signal Processing.
- Find earthquakes.

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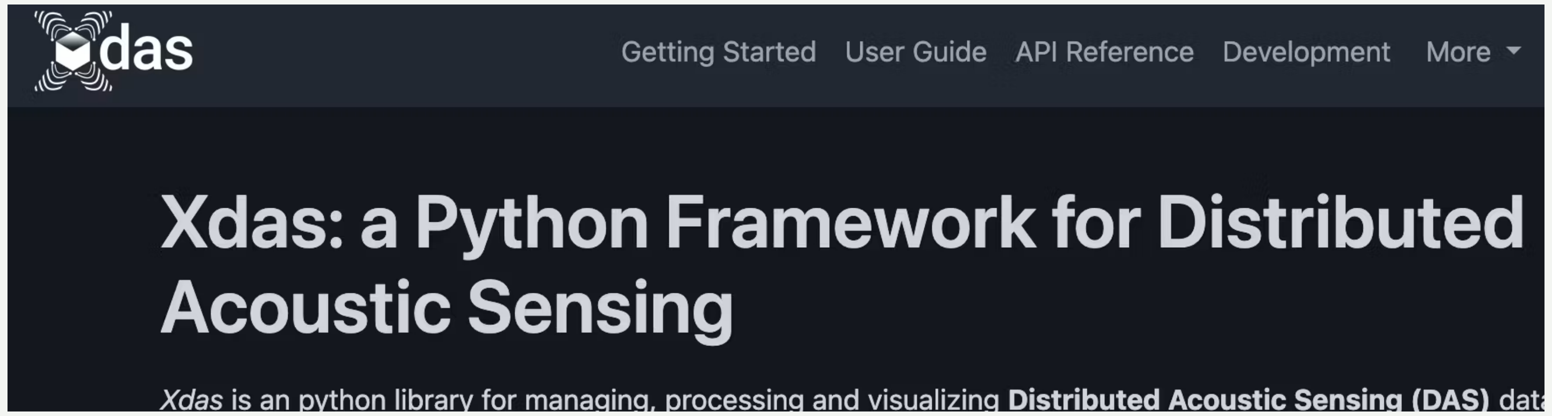
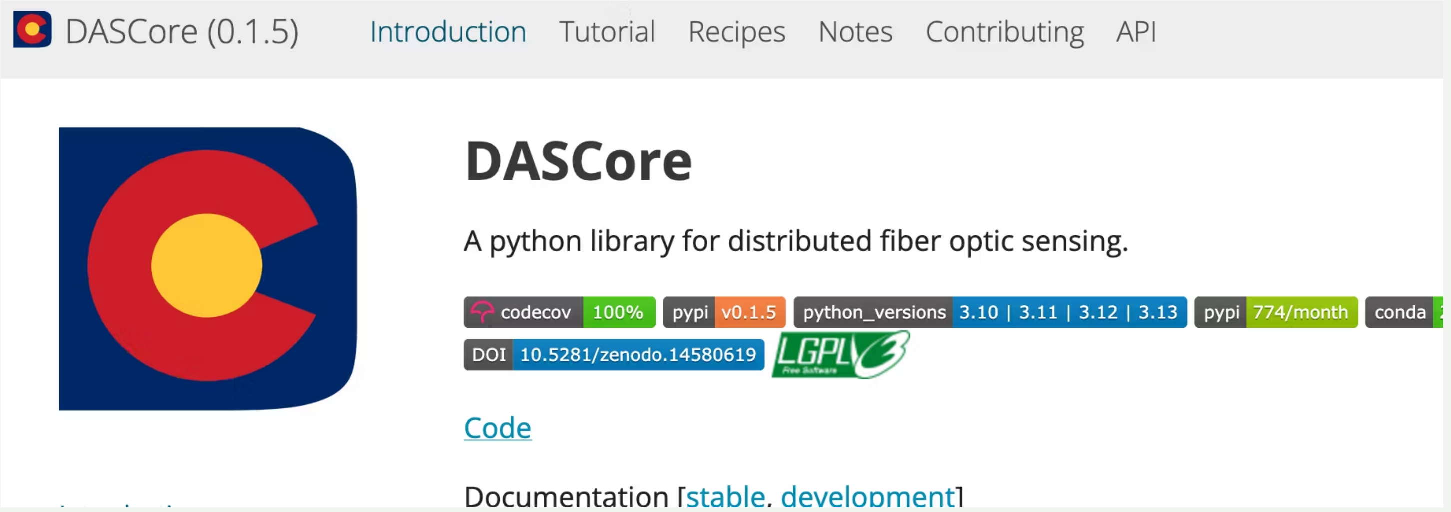
Software??





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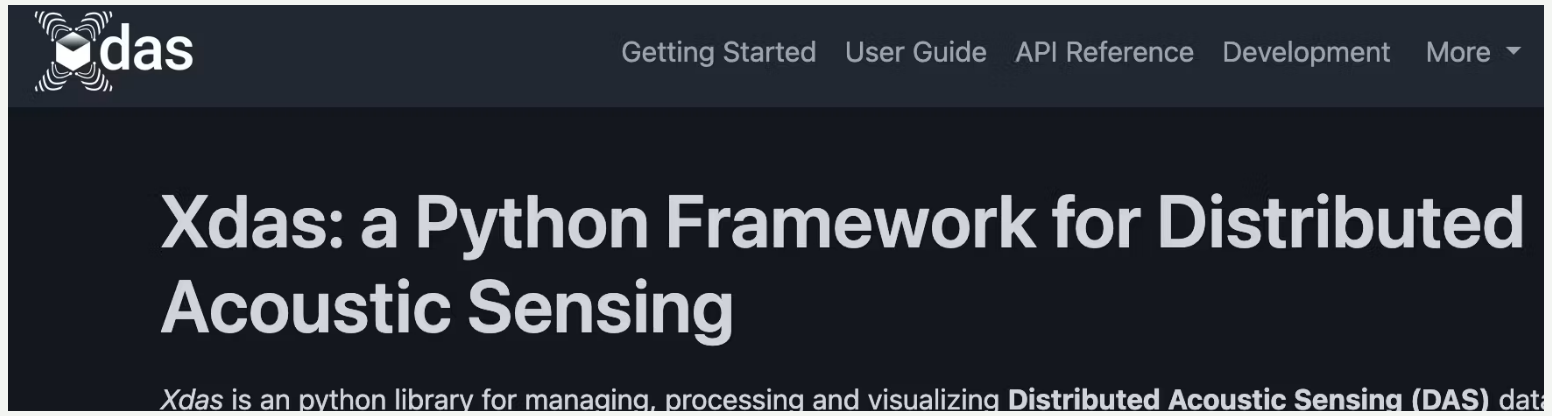
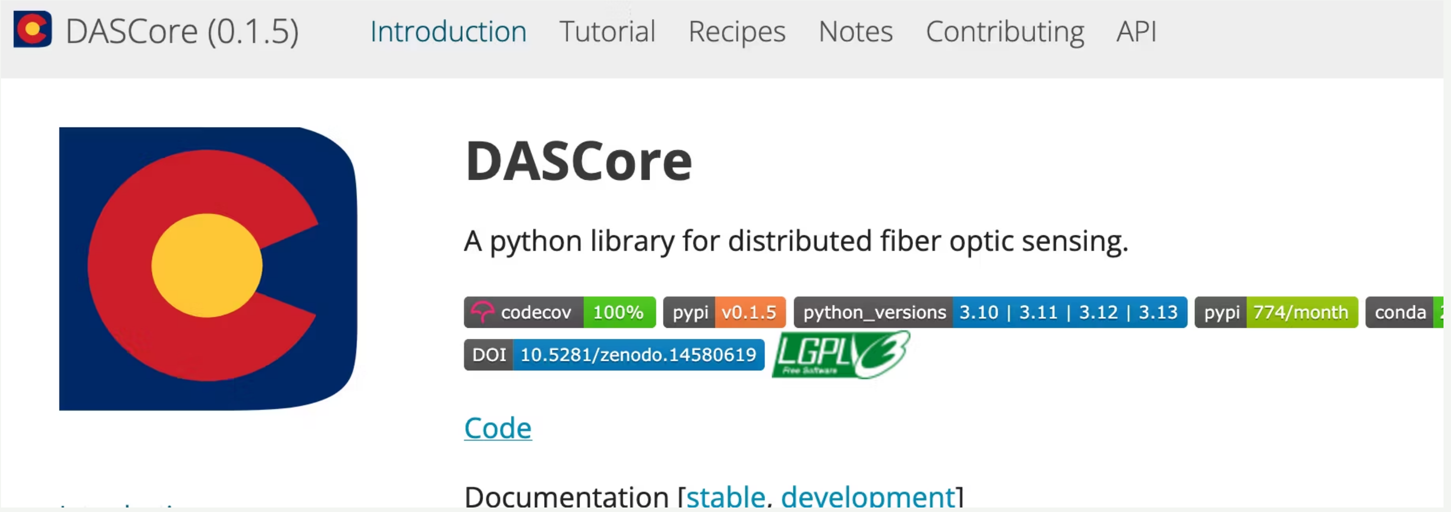
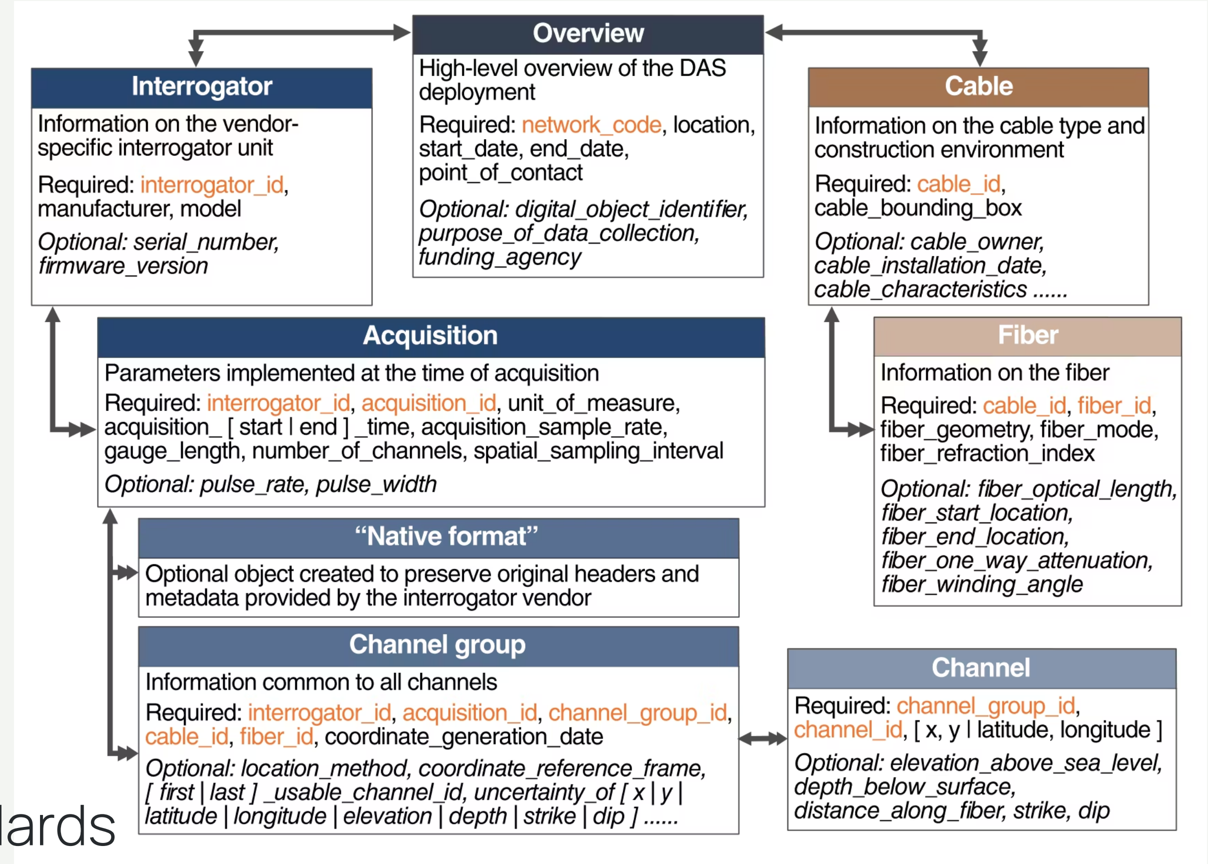
Software??
Standards??







Hui-Lai et al 2024 - IRIS working group on defining standards