A beamforming toolbox for 3-component ambient noise

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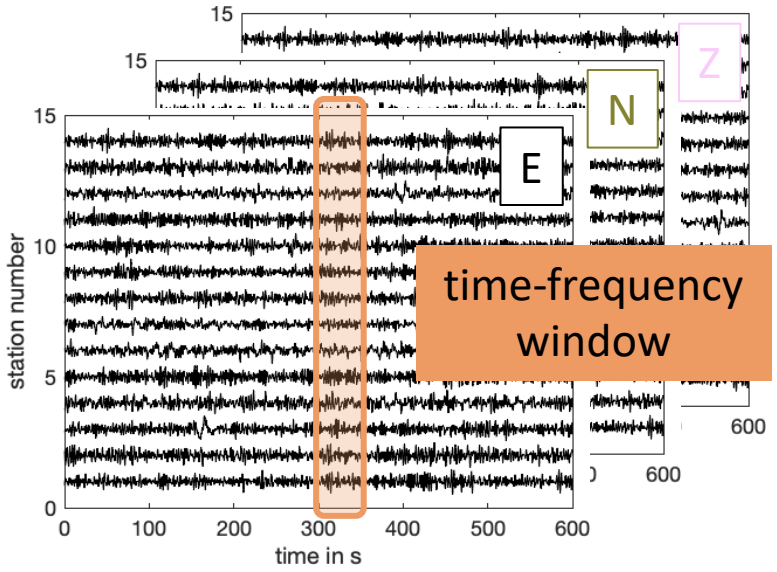
Beam…what?

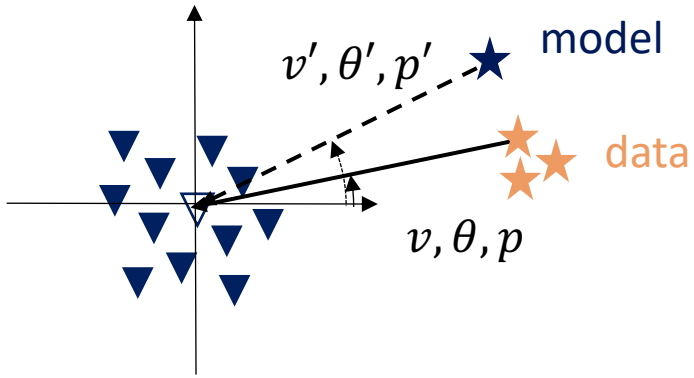
github.com/katrinloer/B3AM
github.com/cl-finger/B3AMpy

Three-component **array** noise data

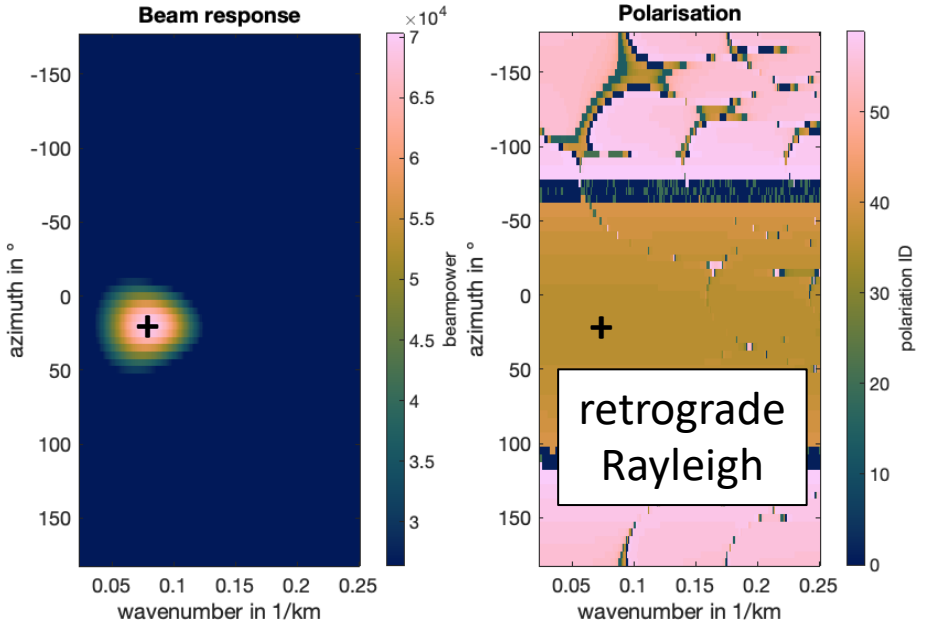


- wave type (p)?
- azimuth (θ)?
- velocity (v)?

"Delay-and-sum"



Match between data and model



wavefield composition
direction of arrival
dispersion curves

Why?

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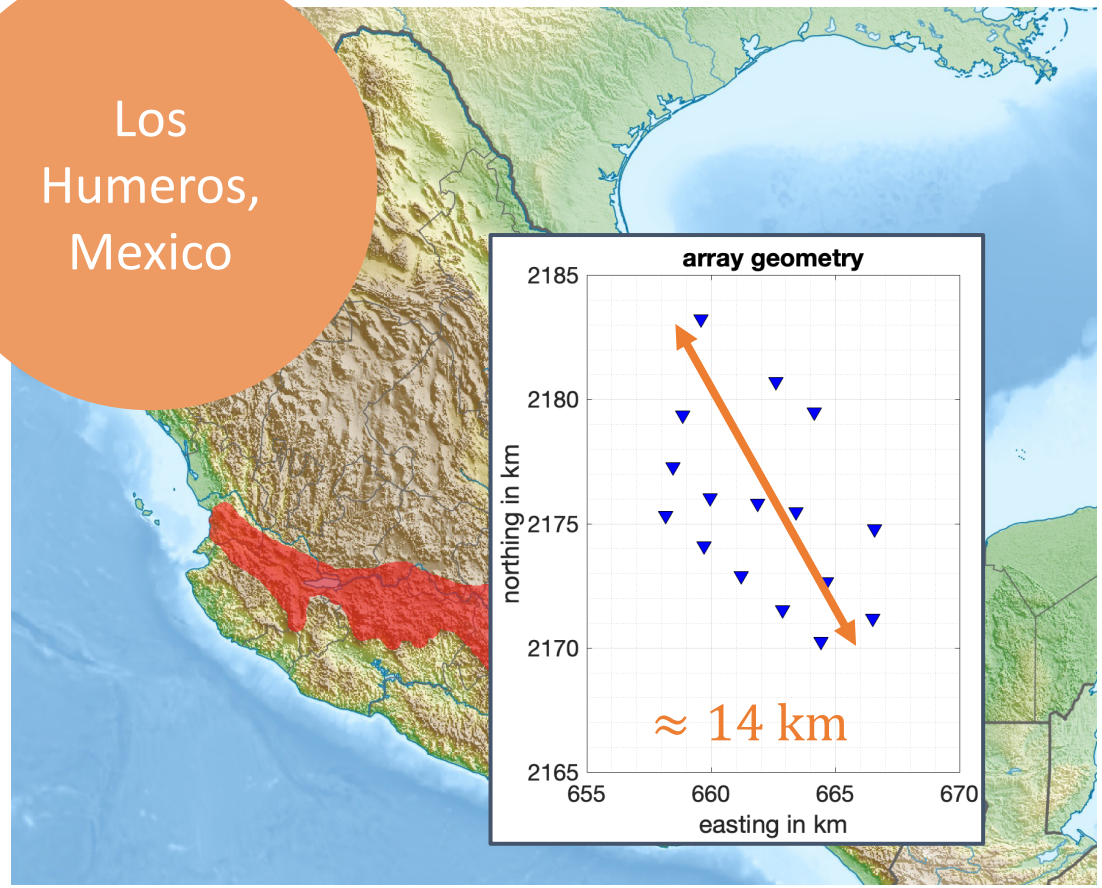
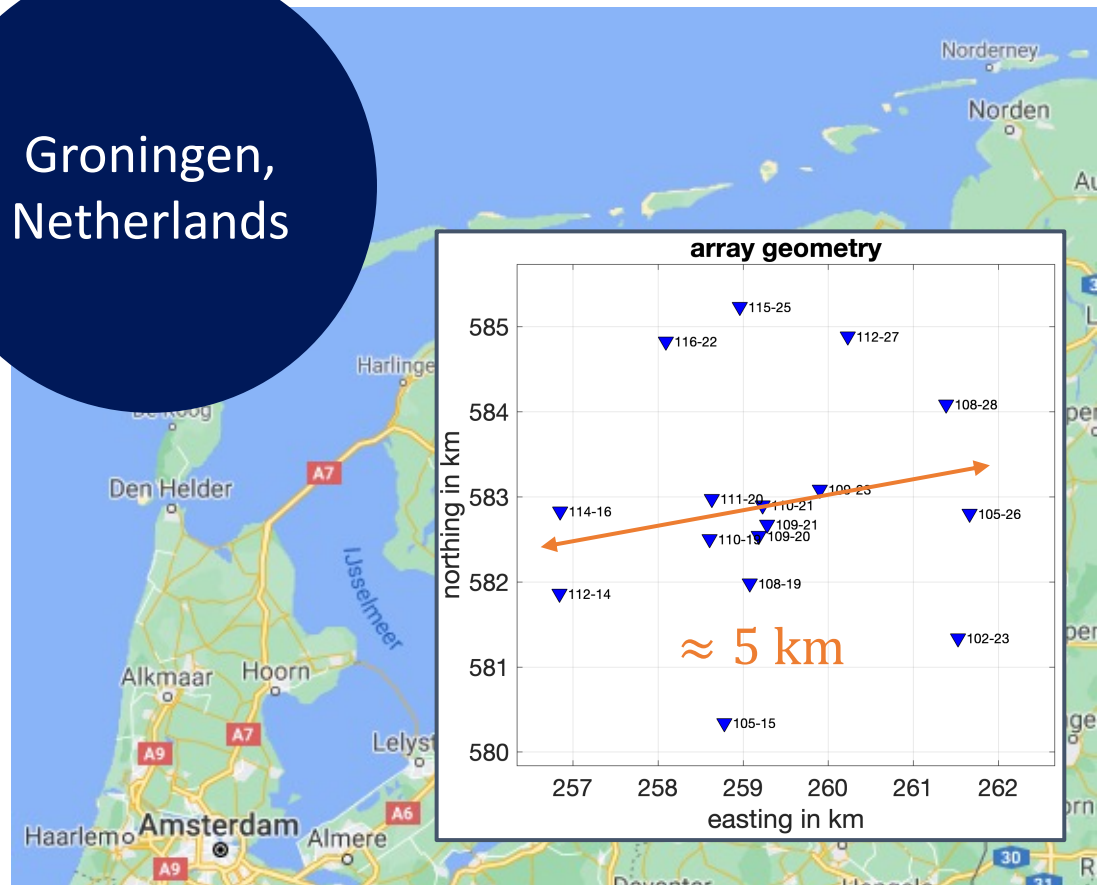
Los Humeros, Mexico



Groningen, Netherlands



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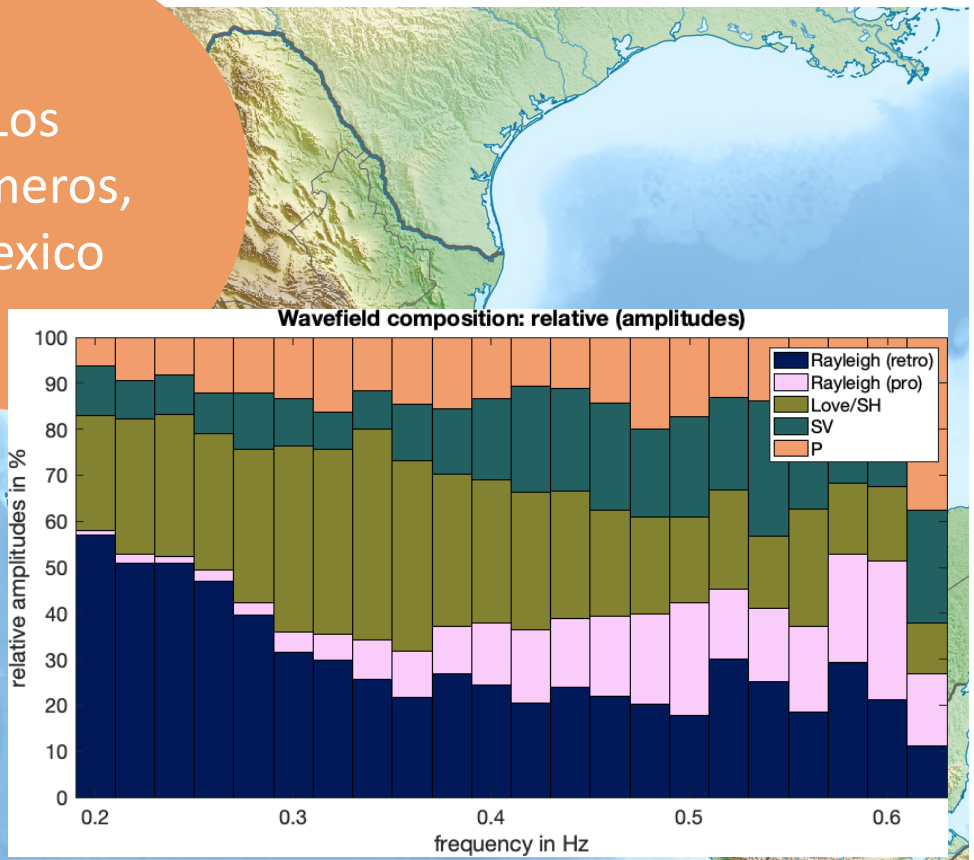

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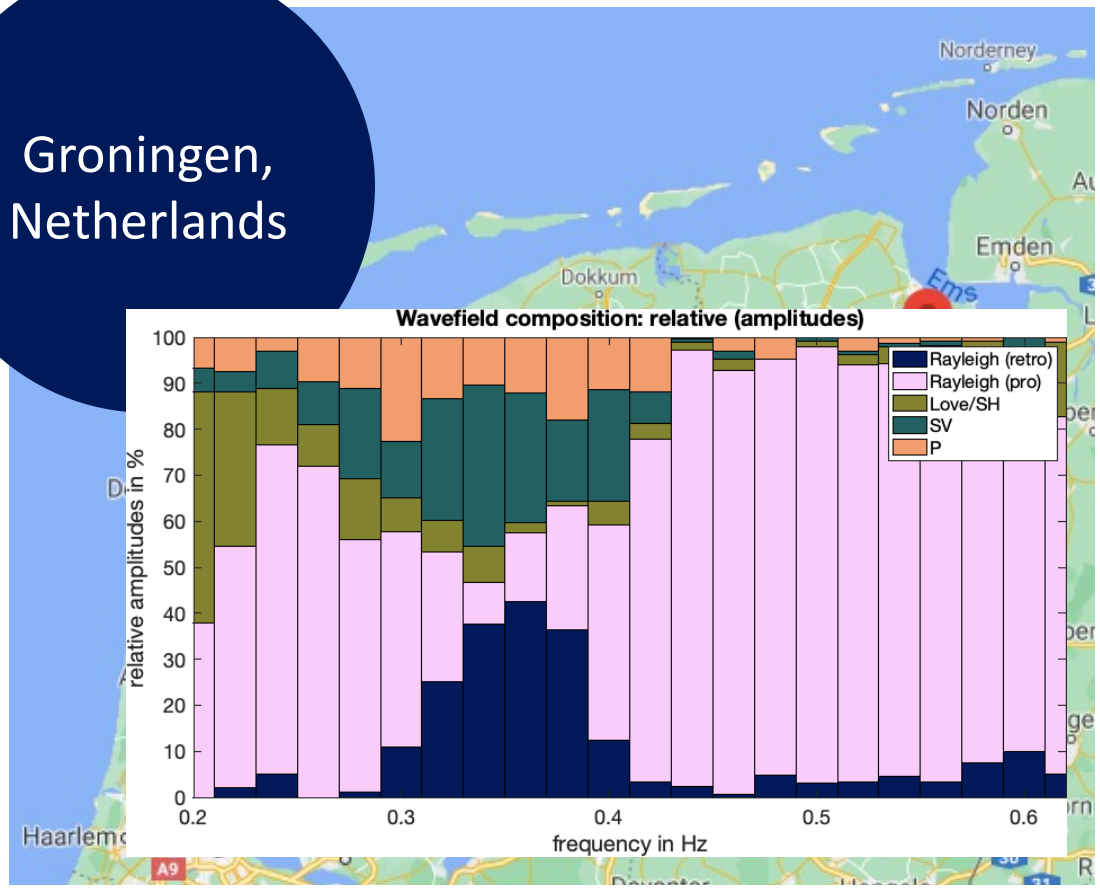
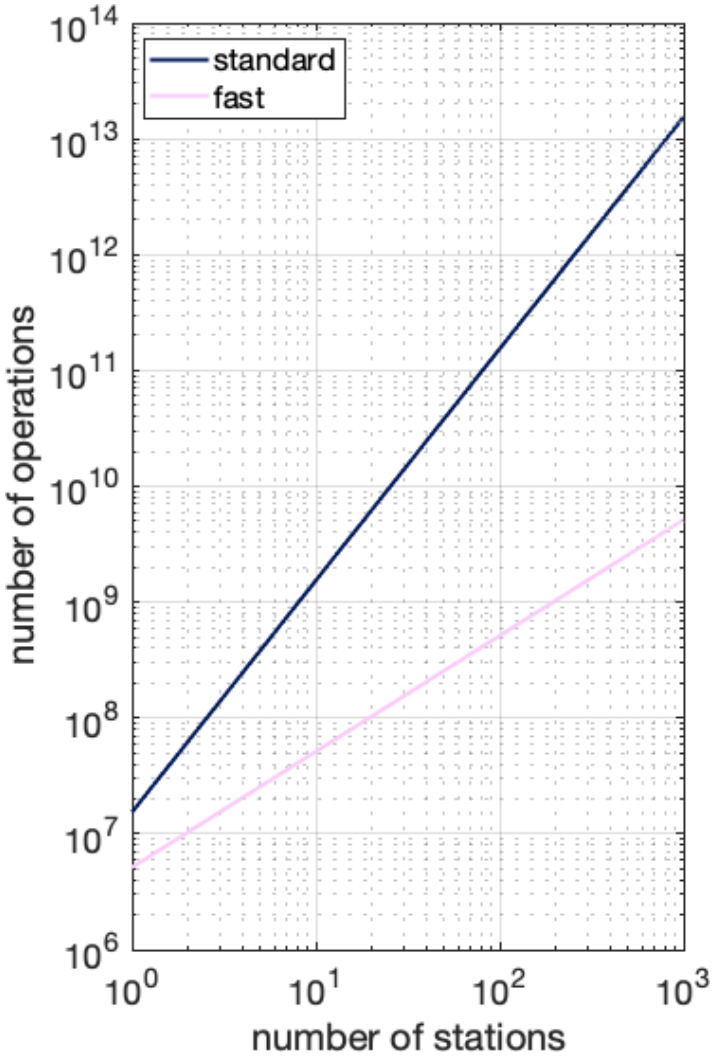


Why?

fast



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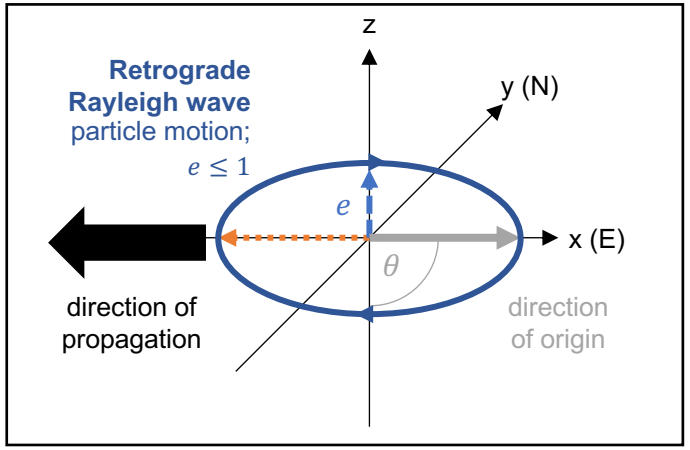
fast

three-component analysis



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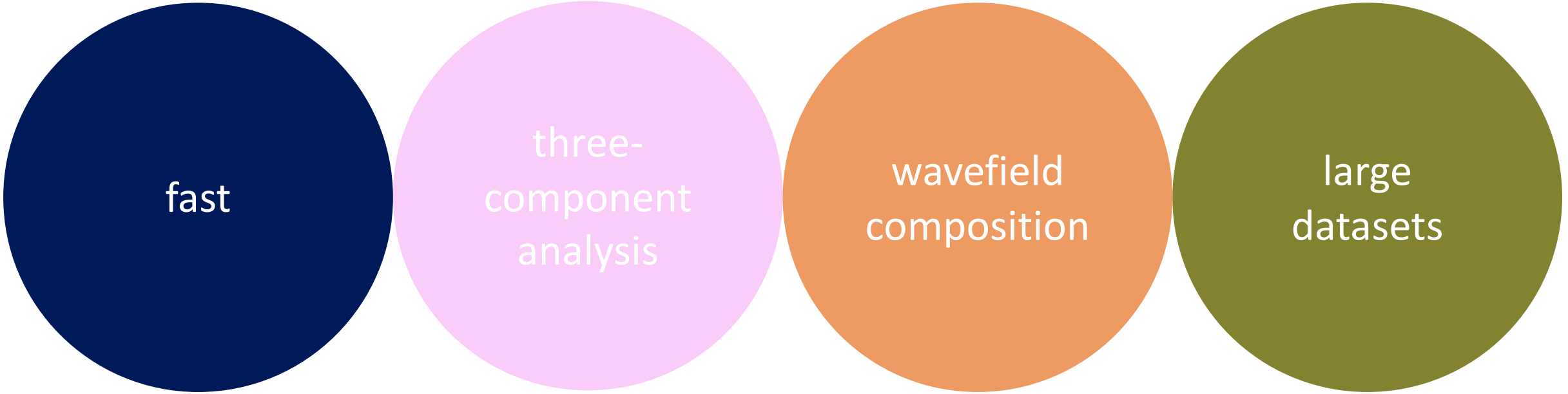

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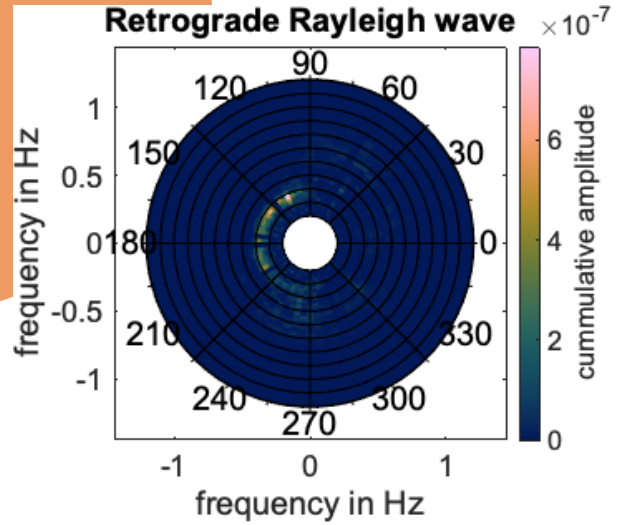
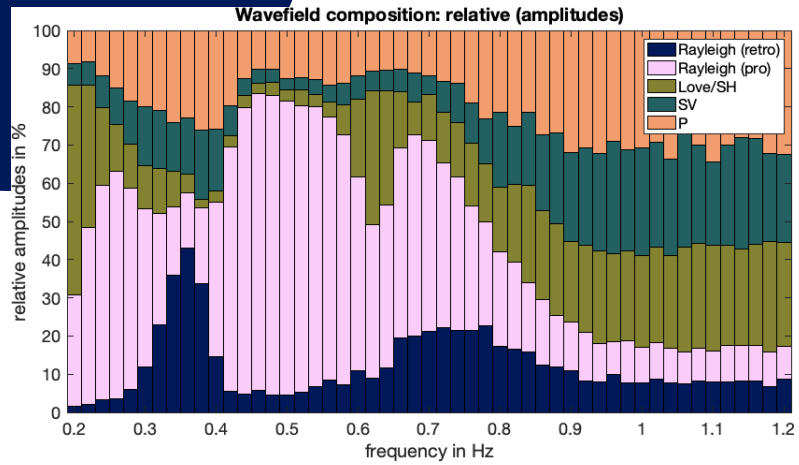
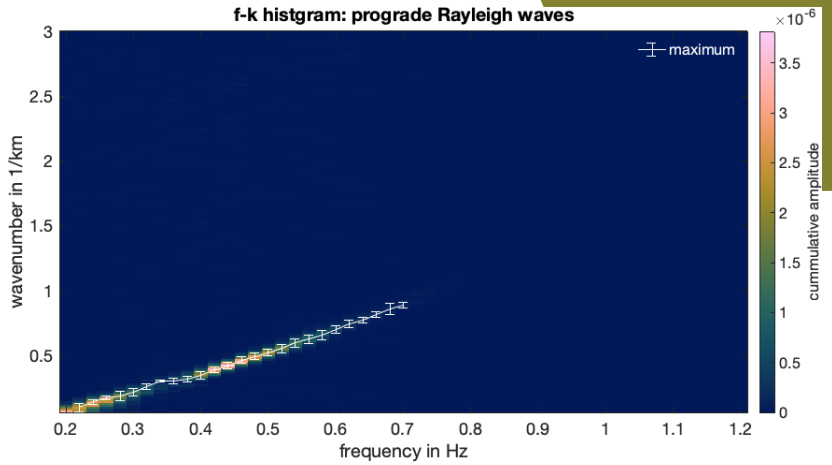
Direction of arrival



Wavefield composition



Dispersion curves



What else?

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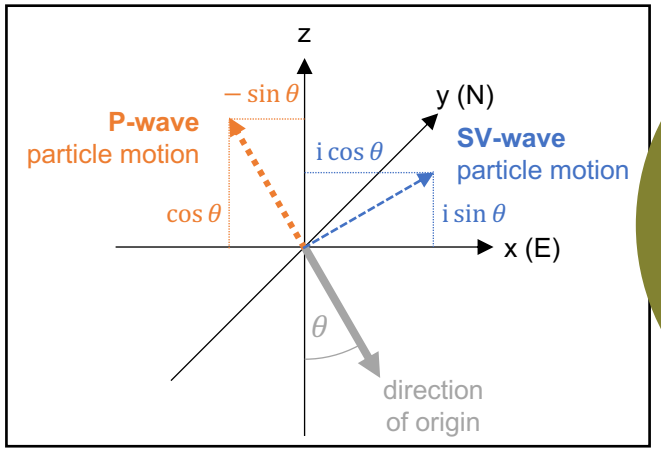
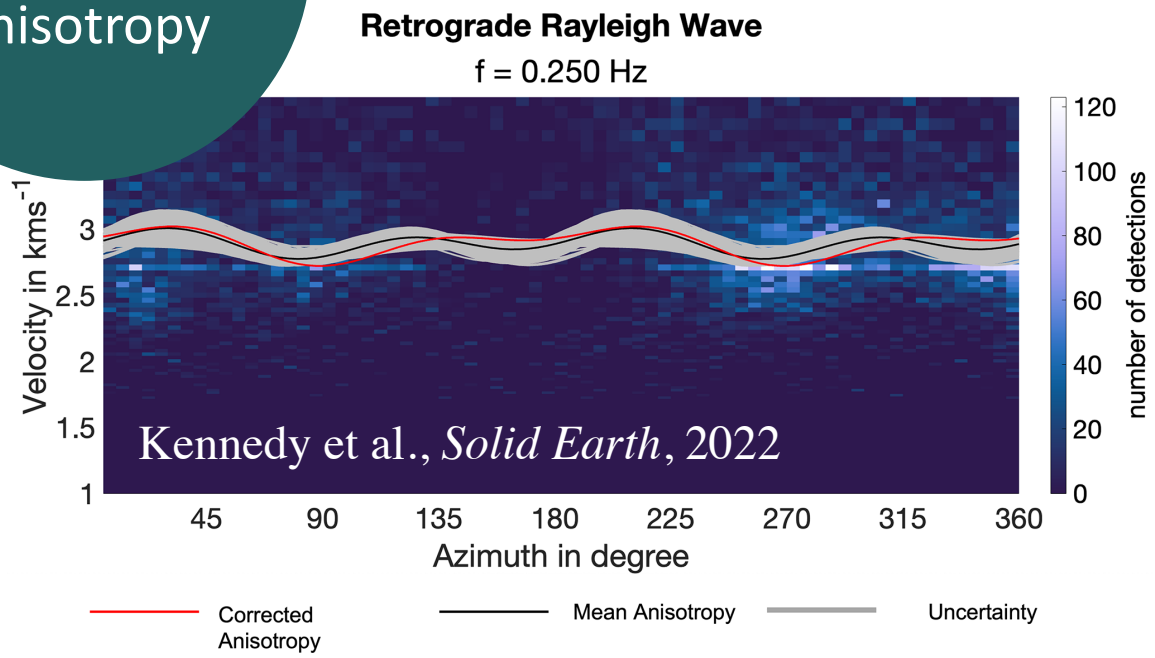
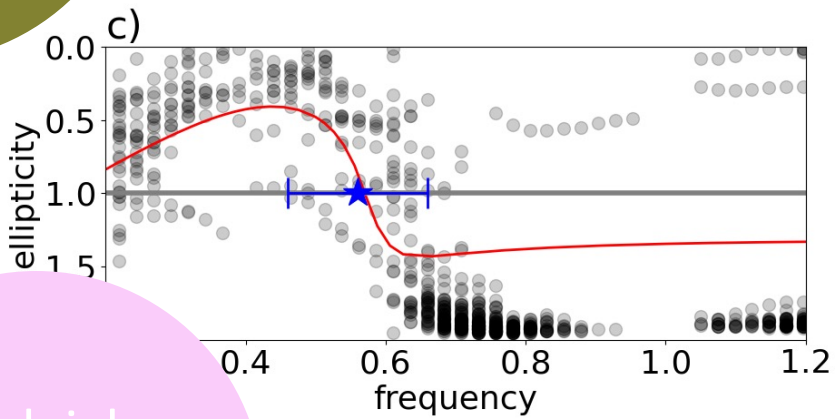


Body wave incidence angle

Surface wave anisotropy





Finger & Löer, *DGG 2023*

Rayleigh wave ellipticity

Applications

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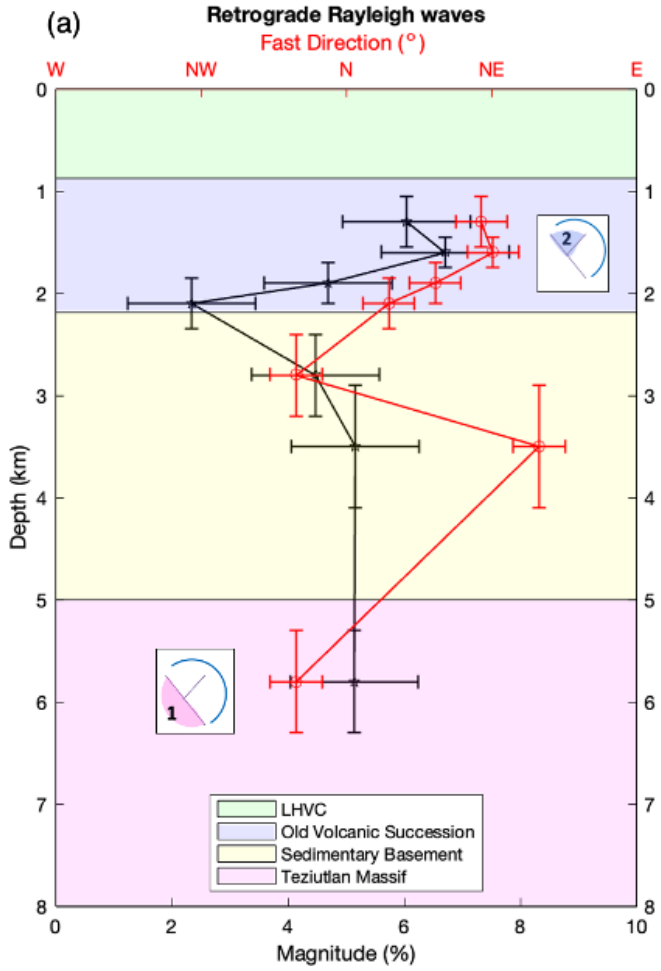
- EGU 2023 | Today, 9:25, TS2.1, Heather Kennedy: Characterising faults in geothermal fields using surface waves: a numerical study



Kennedy et al., *Solid Earth*, 2022

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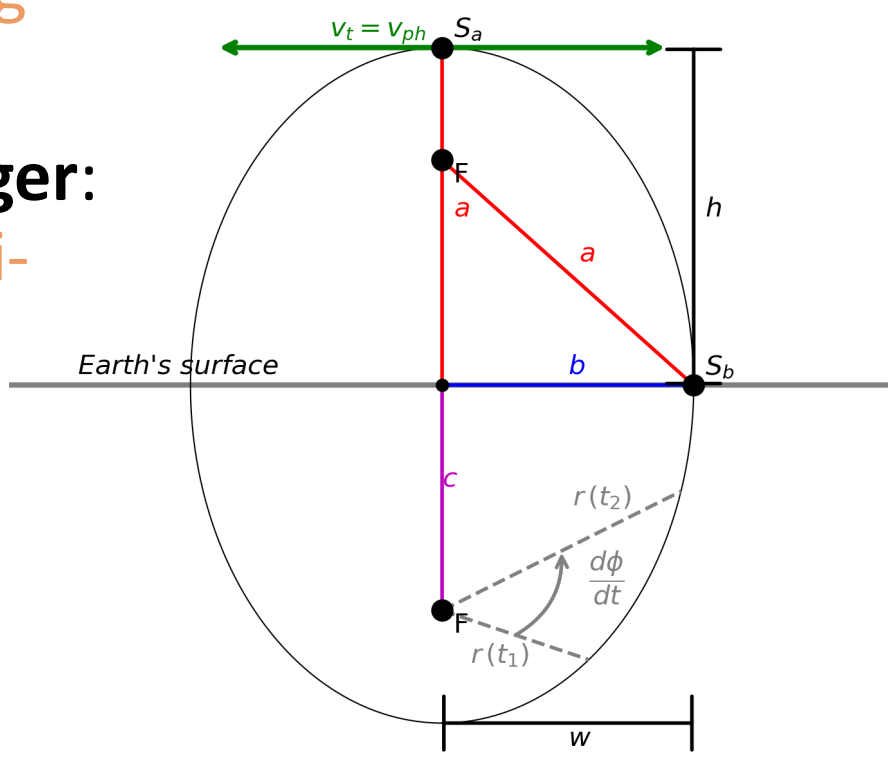

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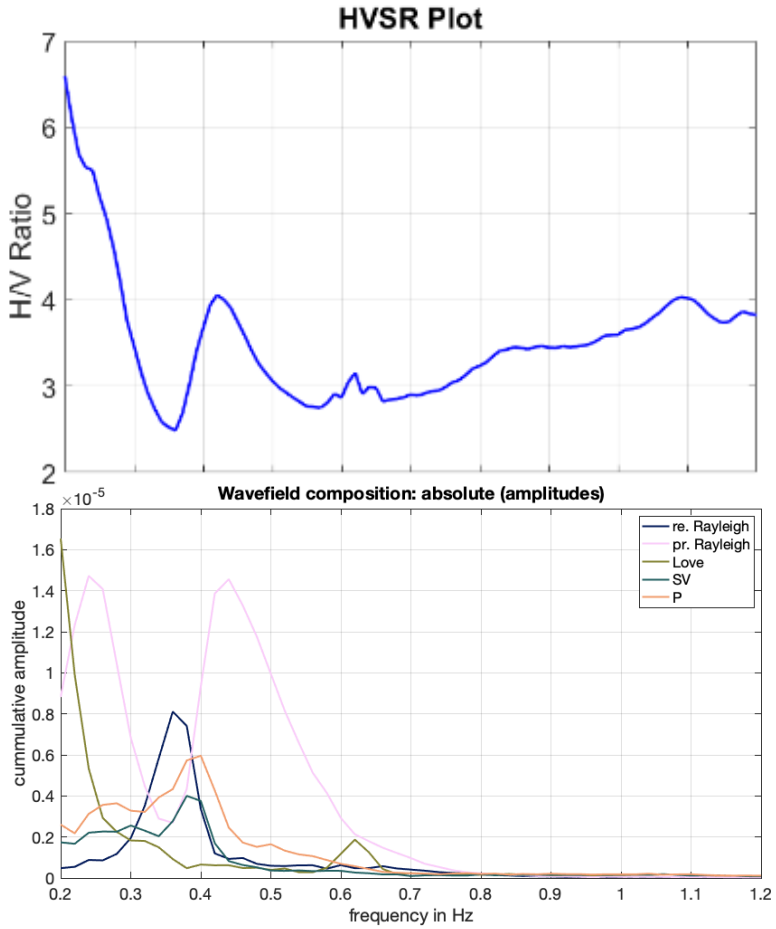

Thank you!

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Please test and give feedback!

Credits & References

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- Finger, C., & Löer, K. (2023). Depth of sudden velocity increases from multi-mode Rayleigh waves derived with three-component ambient noise beamforming (No. EGU23-12396). Copernicus Meetings.
- Kennedy, H., Löer, K., & Gilligan, A. (2022). Constraints on fracture distribution in the Los Humeros geothermal field from beamforming of ambient seismic noise. Solid Earth, 13(12), 1843-1858.
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- Presentation colour scheme after Crameri (“batlow”): https://www.fabiocrameri.ch/colourmaps/