

Display material for EGU21-3197 vPICO presentation

First step towards an integrated geophysical-geological model of the W-Alps: A new Vs model from transdimensional ambient-noise tomography

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Nouibat et al., submitted to Geophysical Journal International

We use four years of continuous vertical seismic noise records to compute noise correlations between more than 950 permanent broadband stations complemented by ~600 temporary stations from the AlpArray sea-land seismic network and the Cifalps and EASI linear arrays.

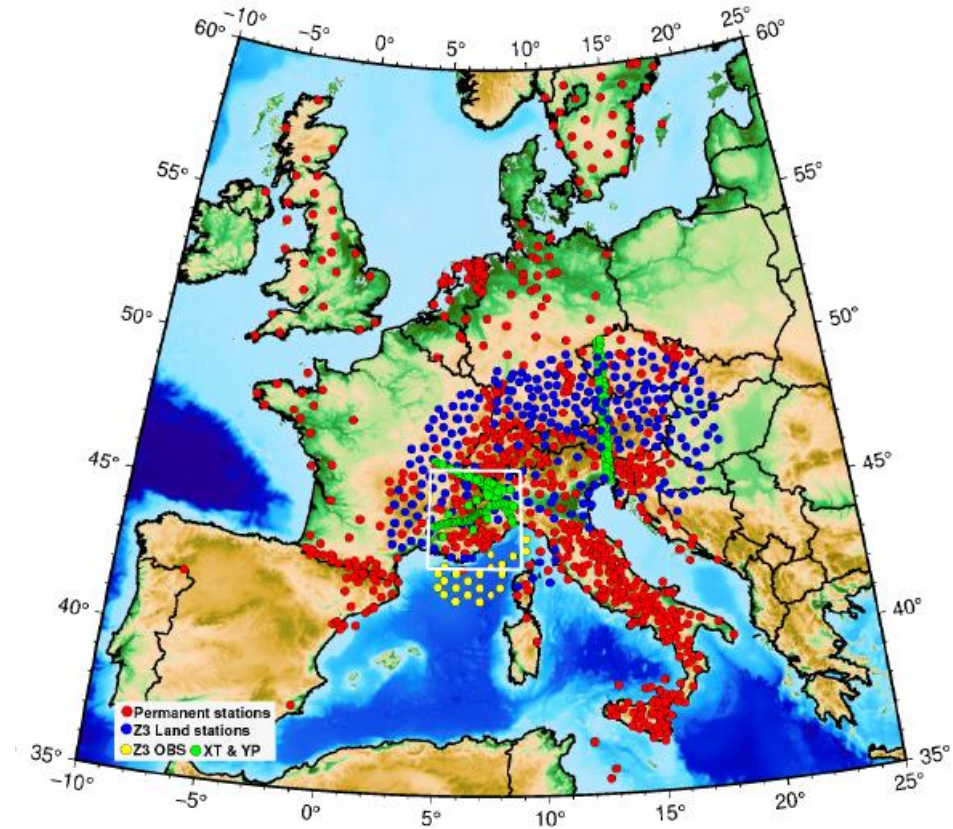
- Z3: AlpArray Seismic Network (2015)
- Z3 OBS: Ocean-Bottom-Seismometers of the AlpArray Seismic Network
- Cifalps (YP network, Zhao et al., 2016, and XT network, Zhao et al., 2018)
- EASI (XT network, AlpArray seismic network, 2014)

AlpArray Seismic Network, 2014. Eastern Alpine Seismic Investigation (EASI) - AlpArray Complimentary Experiment.

AlpArray Seismic Network, 2015. AlpArray Seismic Network (AASN) temporary component.

Zhao, L., Paul, A., Solarino, S., & RESIF, 2016. Seismic network YP: CIFALPS temporary experiment (China-Italy-France Alps seismic transect).

Zhao, L., Paul, A., Solarino, S., & RESIF, 2018. Seismic network XT: CIFALPS temporary experiment (China-Italy-France Alps seismic transect).

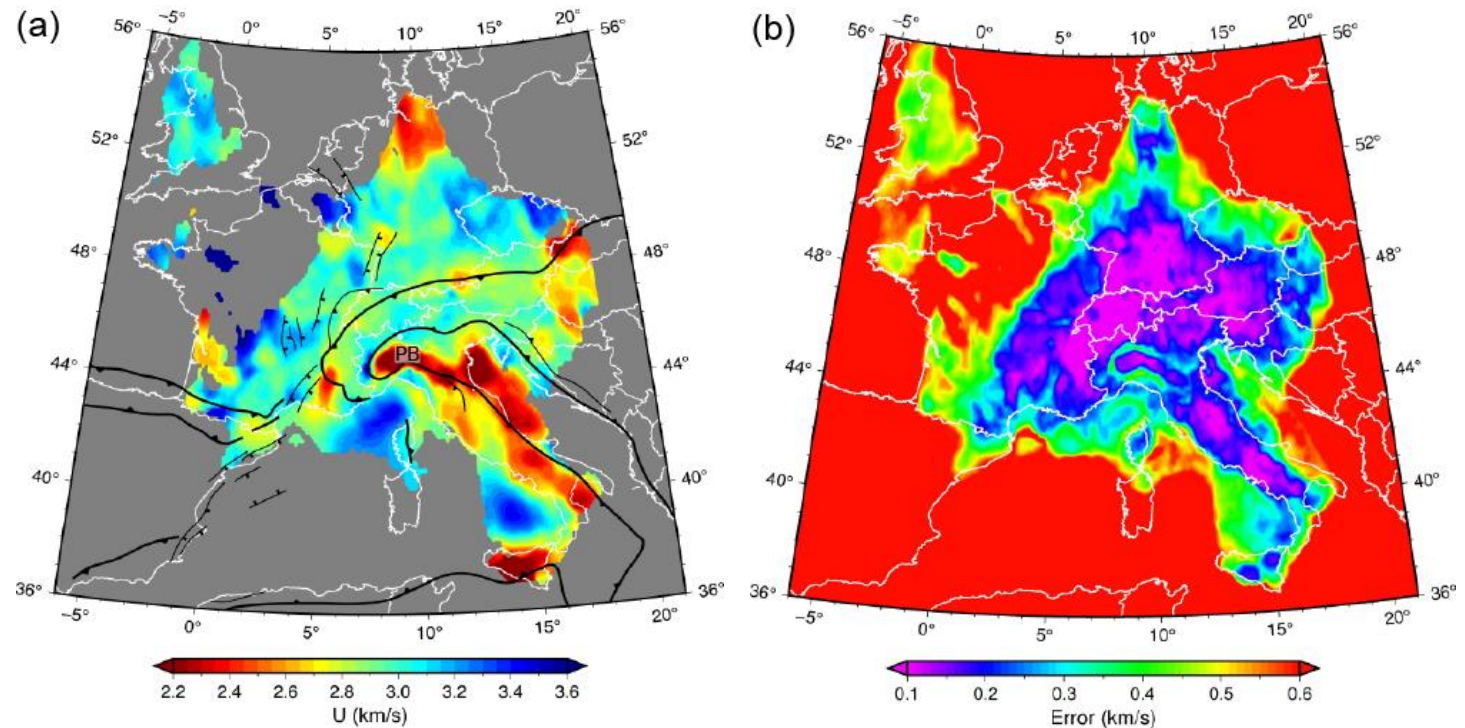


We performed a 2-D transdimensional inversion (rj-McMC, Bodin et al., 2012) of the travel times of Rayleigh waves to compute group-velocity maps from 4 to 150 s:

- Data noise level treated as an extra parameter of the inversion.
- Raypath geometry updated using Fast Marching Eikonal solver (Rawlinson & Sambridge., 2005).

(a) Group velocity map at 15 s

(b) Estimated error map



Bodin, T., Sambridge, M., Rawlinson, N., & Arroucau, P., 2012. Transdimensional tomography with unknown data noise, *Geophysical Journal International*, 189(3), 1536–1556.

Rawlinson, N. & Sambridge, M., 2004. Wave front evolution in strongly heterogeneous layered media using the fast marching method, *Geophysical Journal International*, 156(3), 631–647.

We set up a new formulation of the 1-D shear-wave velocity probabilistic approach proposed by Lu et al (2018) to include group velocity uncertainties:

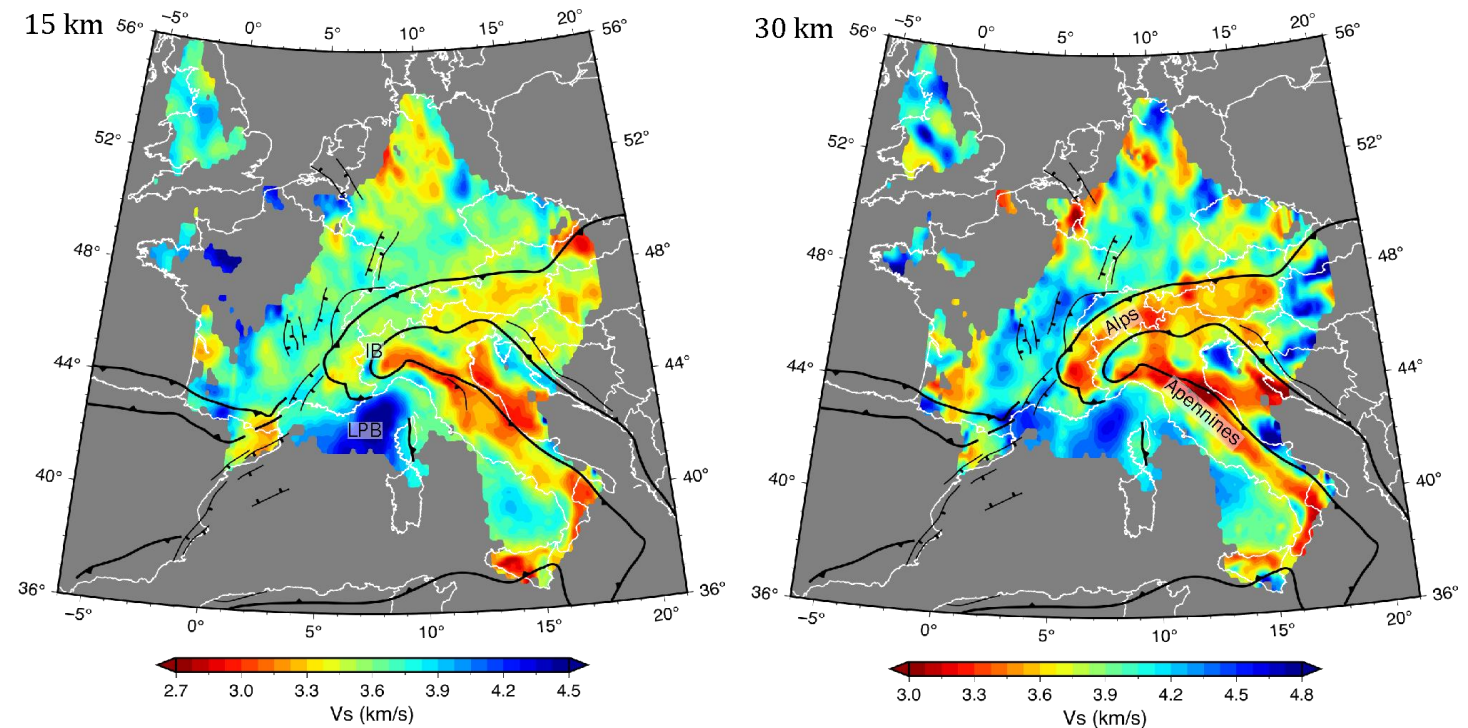
- Posterior probability distributions on Vs and interfaces.
- The Bayesian model is refined using a linearized inversion.

$$p(\mathbf{d}|\mathbf{m}) = \frac{1}{\sqrt{(2\pi)^N |\mathbf{C}|}} \times \exp\left(\frac{-\phi(\mathbf{m})}{2}\right)$$

C Covariance matrix of data errors

$\phi(\mathbf{m})$ Misfit function

Lu, Y., Stehly, L., Paul, A., & AlpArray Working Group, 2018. High-resolution surface wave tomography of the European crust and uppermost mantle from ambient seismic noise, *Geophysical Journal International*, 214(2), 1136–1150.



Depth slices in the Vs model

Perspectives

