

Deciphering the Whisper of Volcanoes



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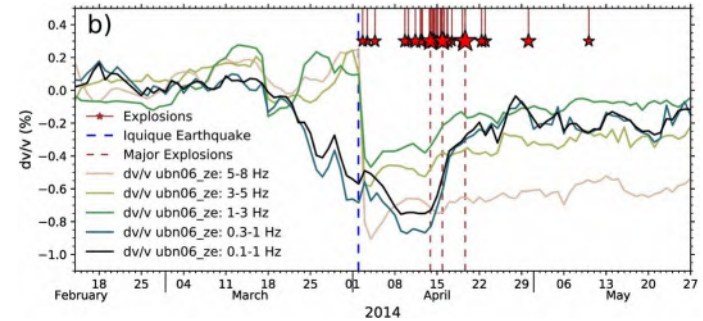
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Motivation: Improve Reliability of Eruption Forecasts

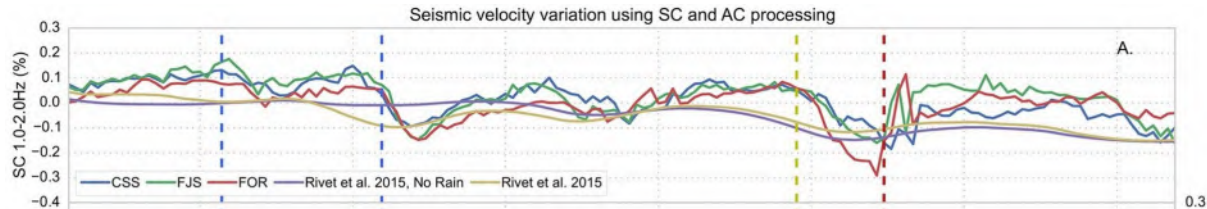
Precursors for eruptions:

More recently:

- Volcanic inflation / ground deformation
- Change in seismic velocity (dv/v)
- Temporal variations of gas emissions (e.g., chemical)



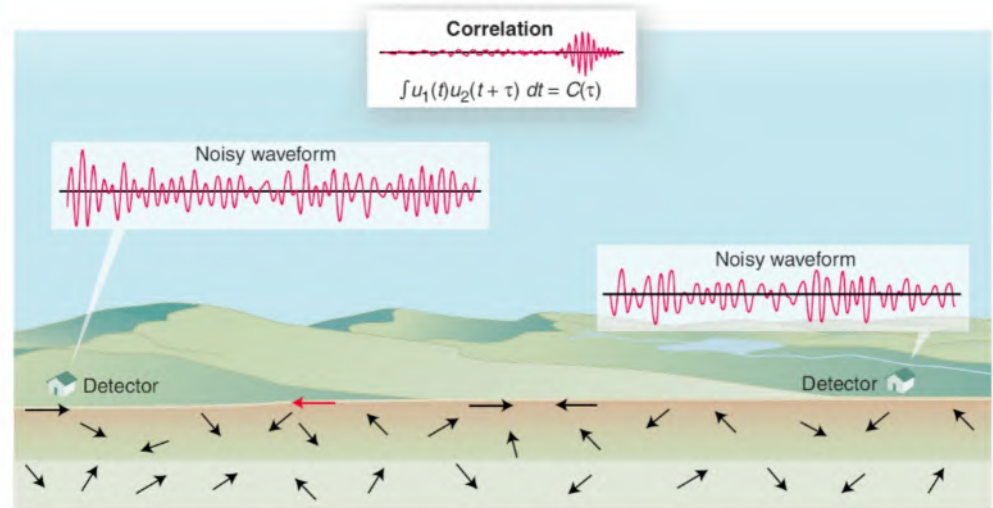
Machacca-Puma, et al., 2019



De Plaen, et al., 2016

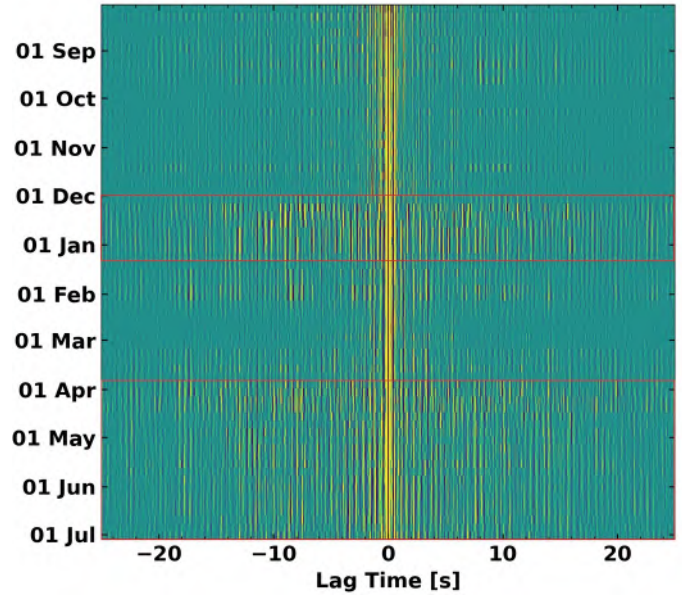
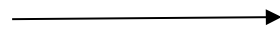
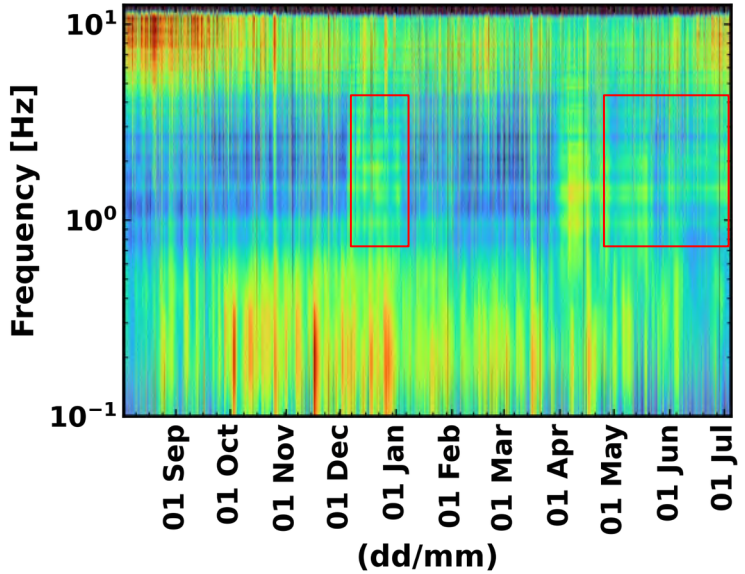
Retrieving dv/v from Ambient Noise

- ❖ **Assumption:** Correlation of noise equals the medium's Green's function $G(\tau)$
 - We examine the change of the Correlations
- ❖ Stretch of correlations' time domain $\propto -dv/v$ (Se Schönfelder, et al., 2006)



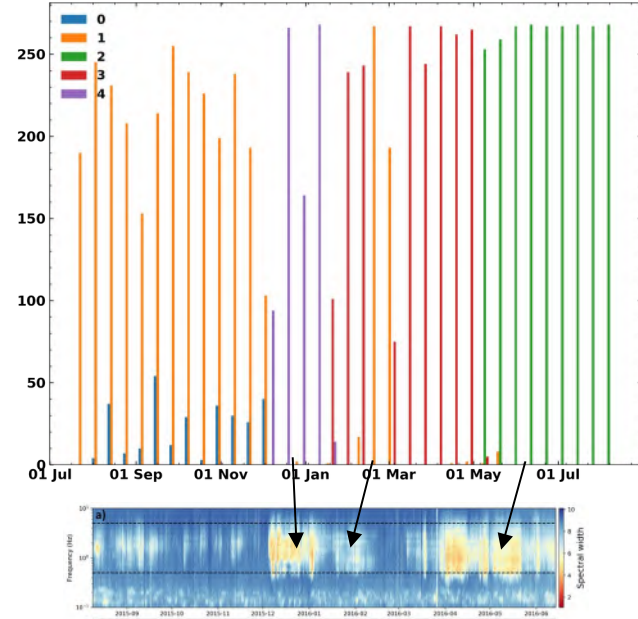
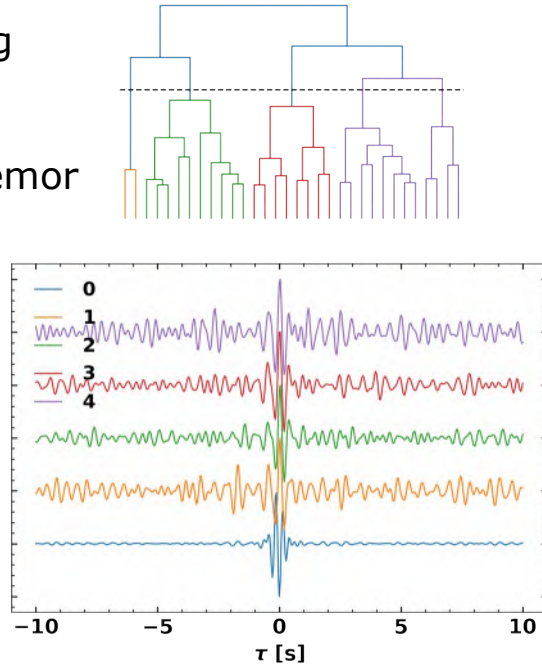
(image courtesy of ISTerre, Grenoble)

Kamchatka: A Fluctuating Noise Field



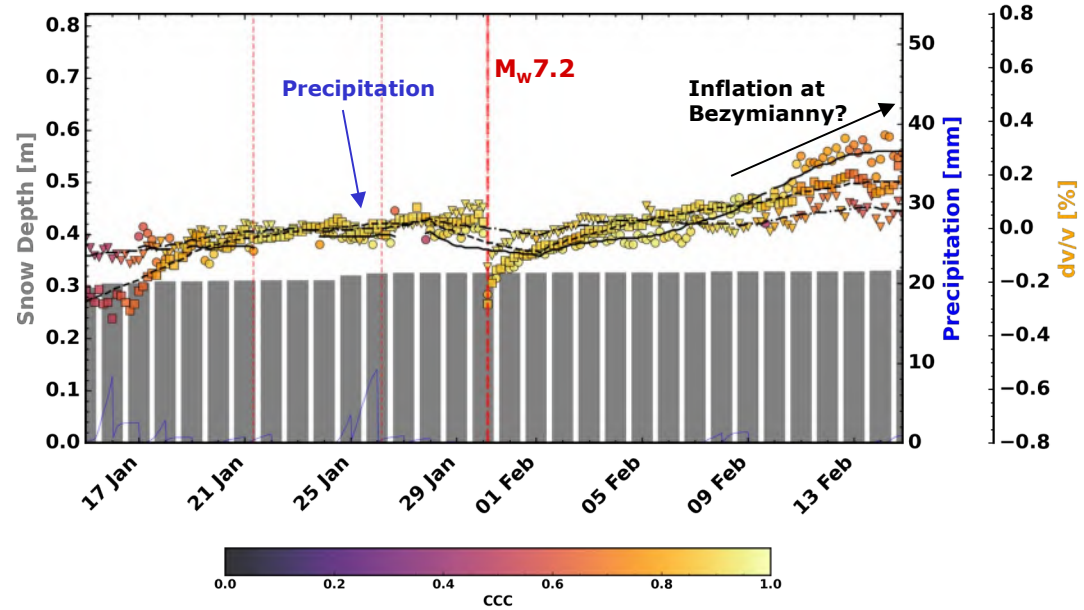
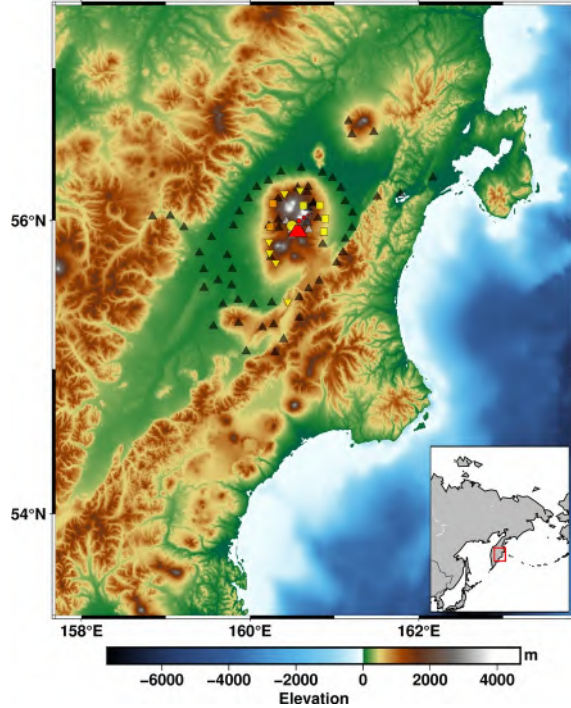
Solution: Separate Monitoring for Similar Green's Function Estimates

- Hierarchical clustering
- Clusters: different tremor activities



Journeau, et al., 2022

Results



Conclusions & Outlook

- Stable, high-res dv/v estimates can be retrieved
 - By using high-energy time windows & spatial stacking
- Responses to seismic & environmental factors
- Inflation at Bezymianny visible?

- dv/v responses vary with geological and geographical setting
- A new python software suite for interferometry (open source, openly available -also for your projects)

detailed discussion
on my **POSTER** or
in the **EGU**
UPLOAD
MATERIAL

