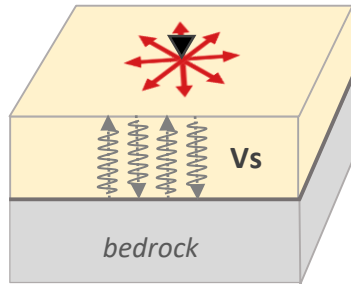


1D resonance

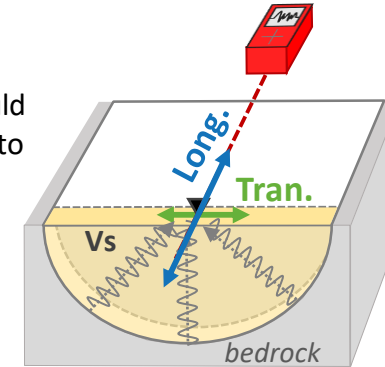
FEATURES ON SINGLE MEASUREMENT

2D resonance



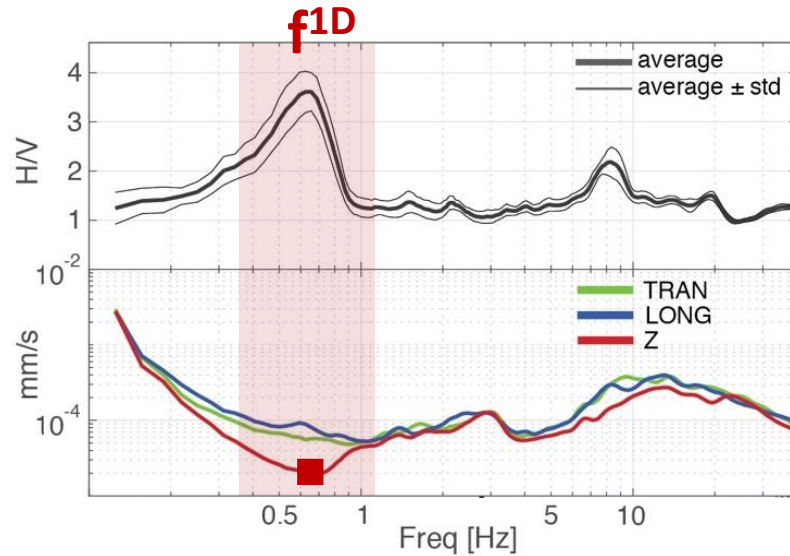
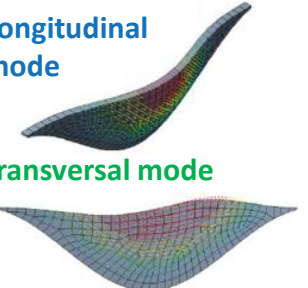
Ground motion is the same along any horizontal direction

Ground motion should be analyzed parallel to axes of investigated structure

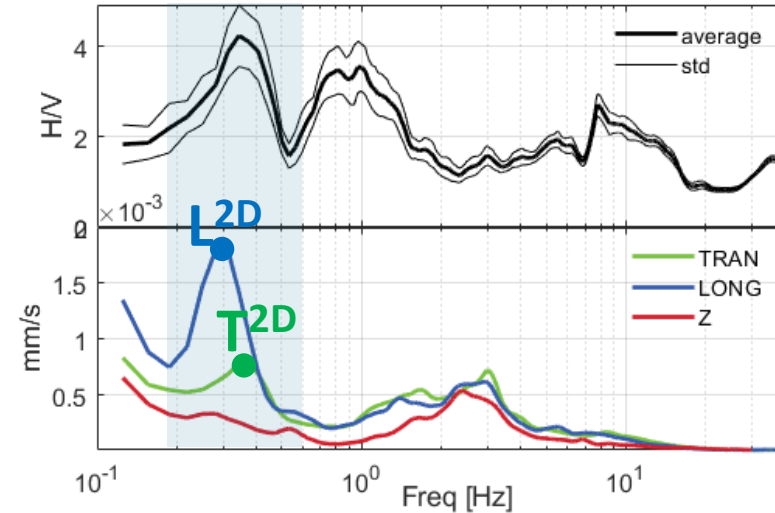


L^{2D} Longitudinal mode

T^{2D} Transversal mode



f_{1D} local minimum on Z component, horizontal components overlapped



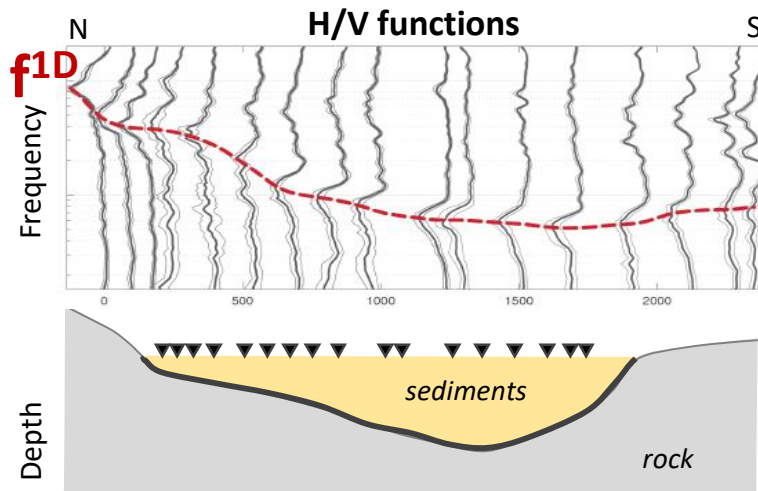
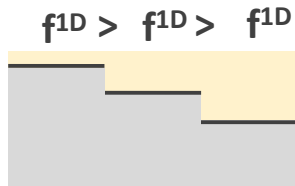
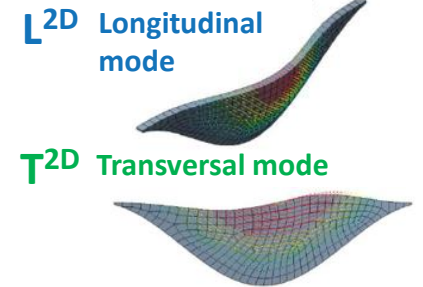
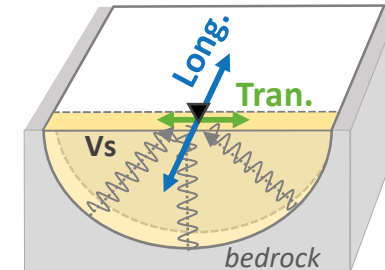
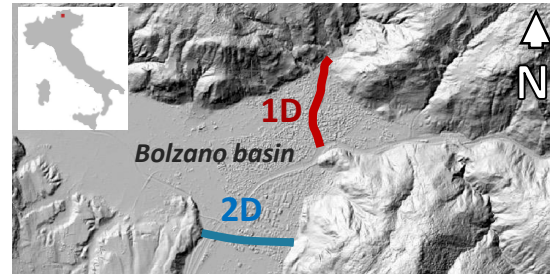
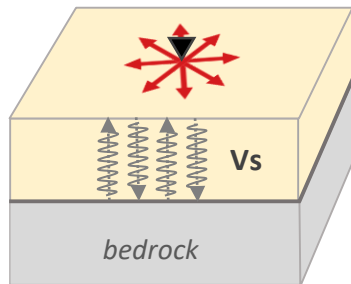
L^{2D} and **T^{2D}** have different frequencies (and amplitudes, in most cases)



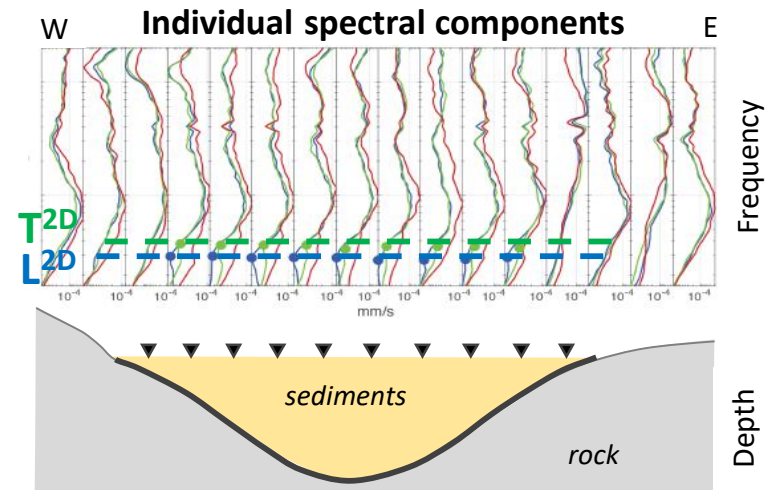
1D resonance

FEATURES ON MULTIPLE MEASUREMENTS
[acquired along valley cross-section]

2D resonance



f^{1D} changes from site to site

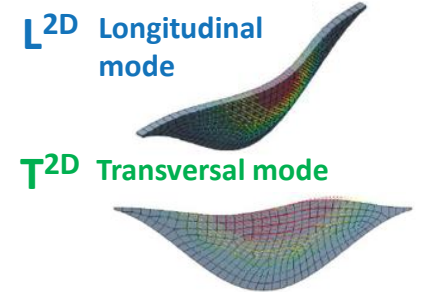
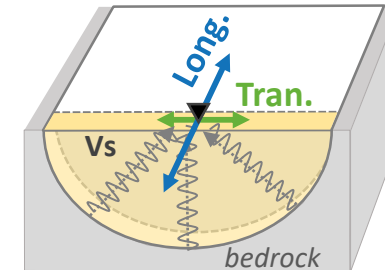
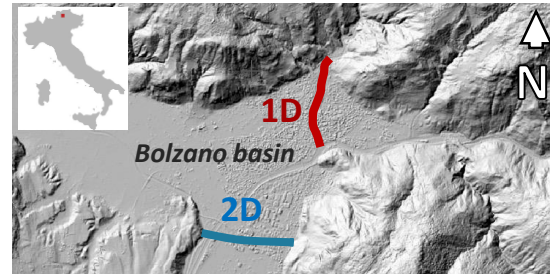
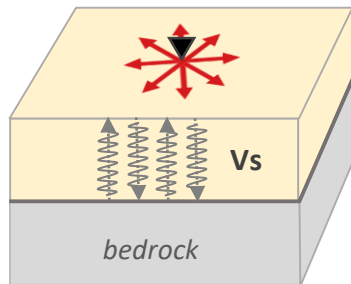


L^{2D} and T^{2D} remain constant

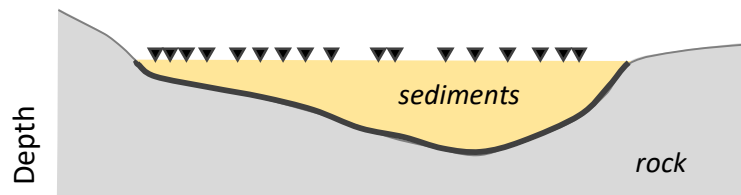
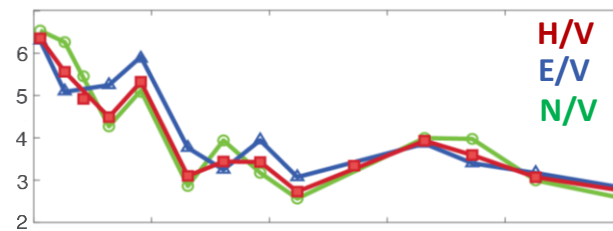
1D resonance

FEATURES ON MULTIPLE MEASUREMENTS
[acquired along valley cross-section]

2D resonance

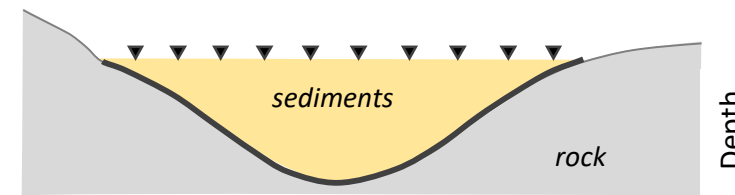
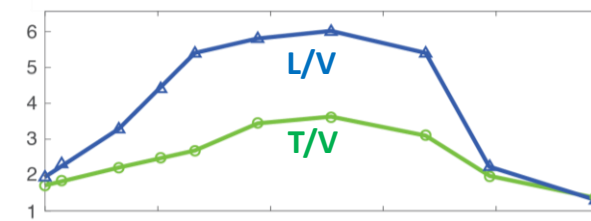


Peak amplitudes



H/V, **E/V** and **N/V** peak amplitudes do not differ and depend on impedance contrast (and other factors, e.g. wavefield)

Peak amplitudes

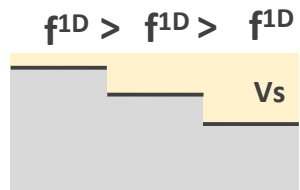
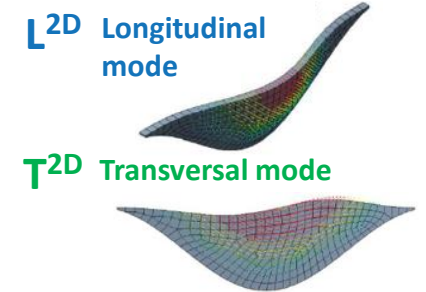
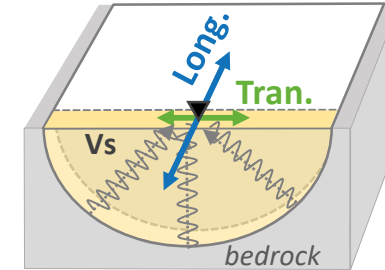
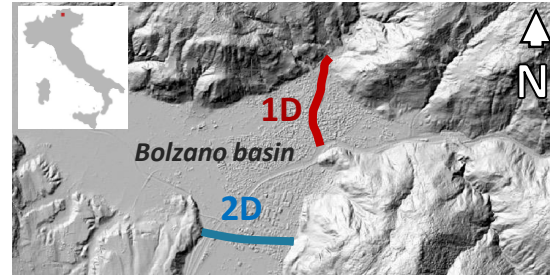
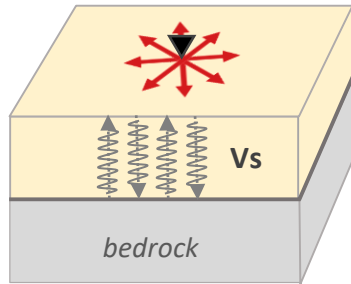


L^{2D} and **T^{2D}** peak amplitudes depend on modal shapes

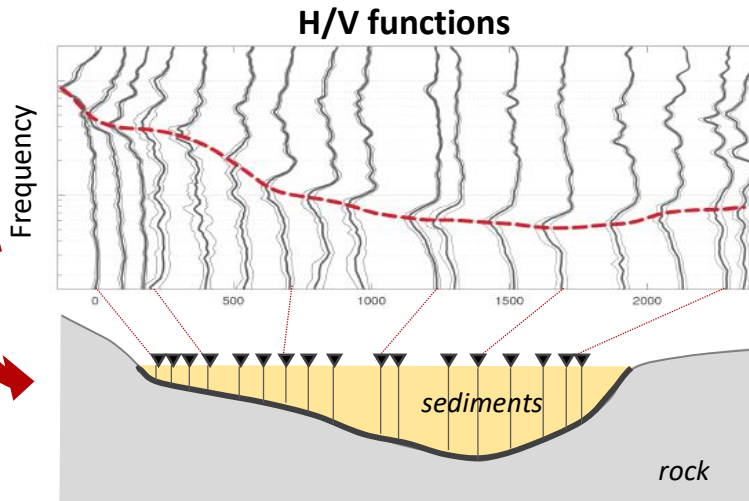
1D resonance

STRATIGRAPHIC INTERPRETATION

2D resonance

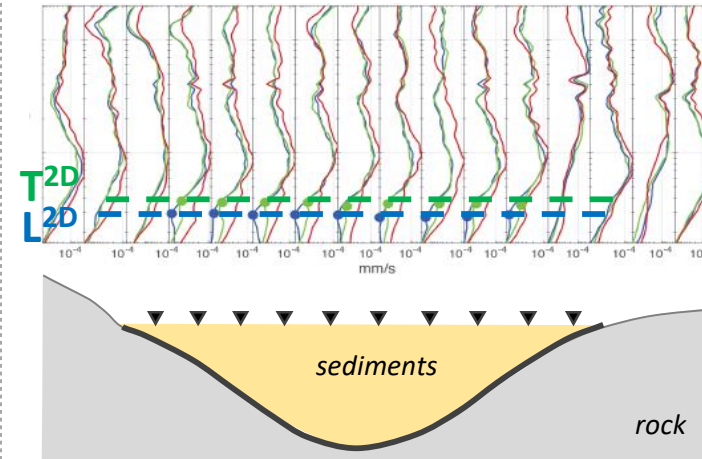


$$f_{1D} = \frac{V_s}{4H}$$



f_{1D} correlates with local stratigraphy below measurement site

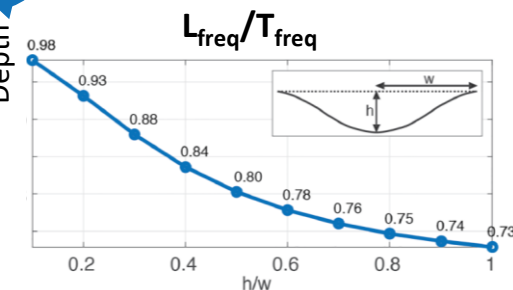
Individual spectral components



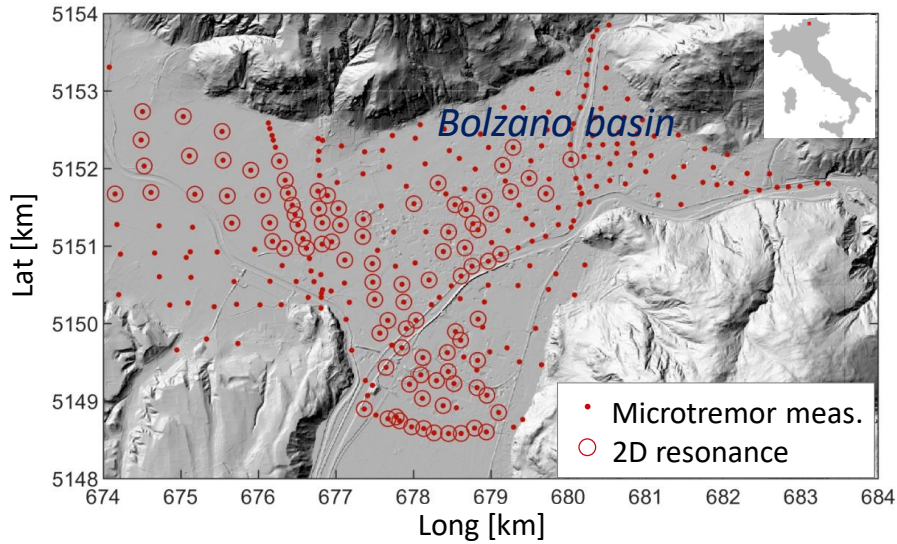
L^{2D}/T^{2D} frequency ratio depends on whole cross-section geometry

Frequency
Depth

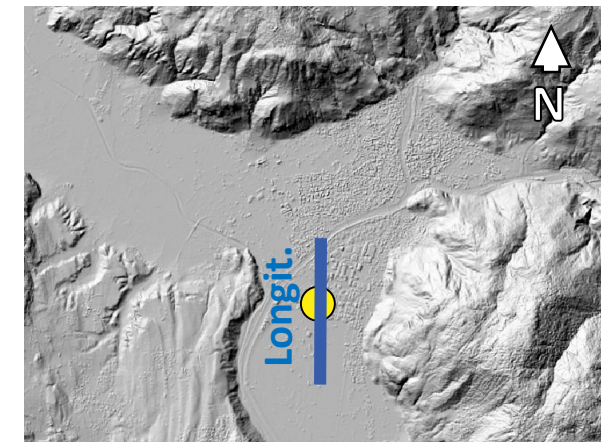
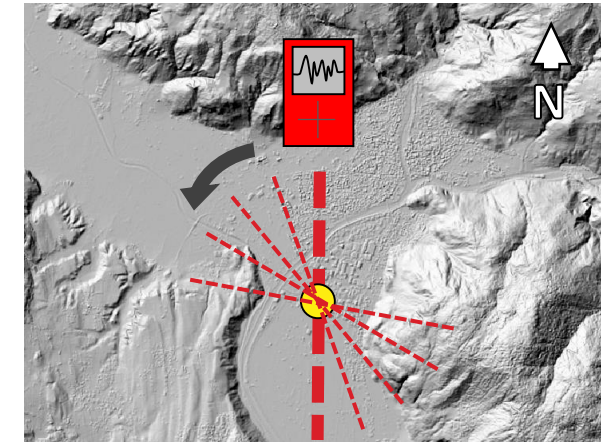
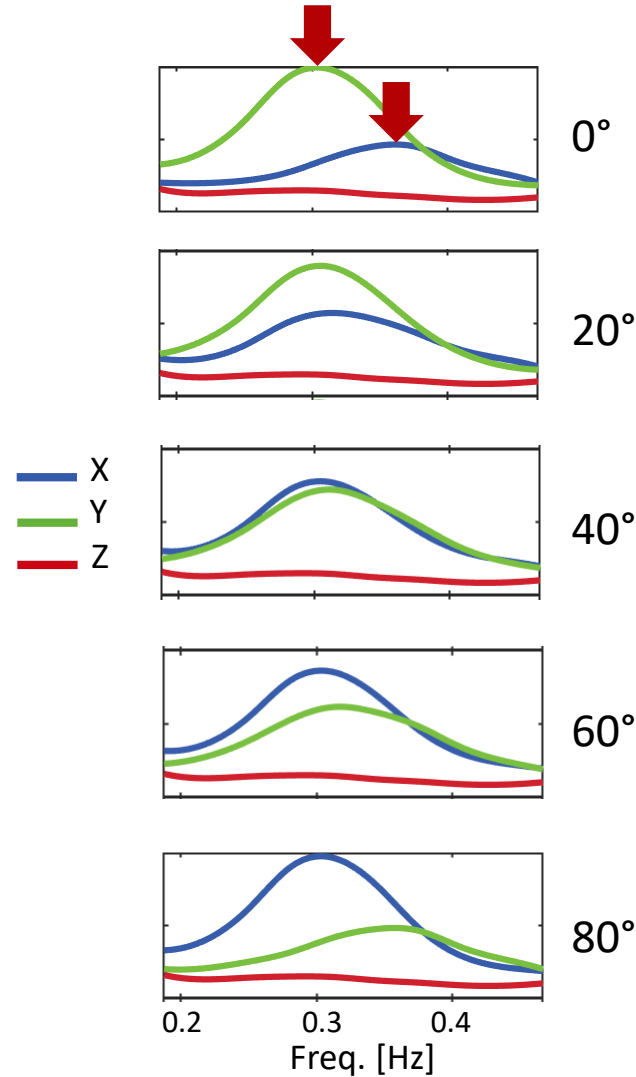
MODELS



The directionality of 2D resonances

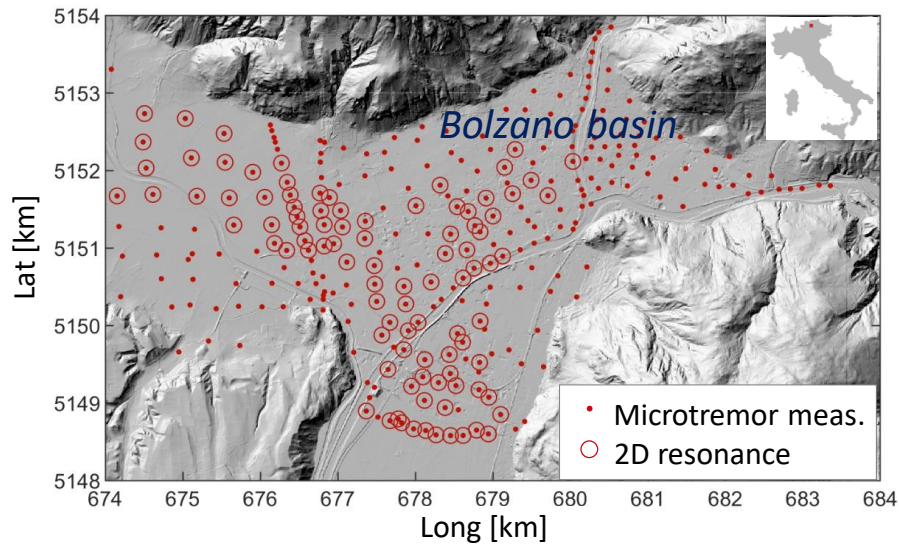


Sgattoni, G., Lattanzi, G. & Castellaro, S. **Anatomy of 2D resonances in a sedimentary basin.**
In preparation

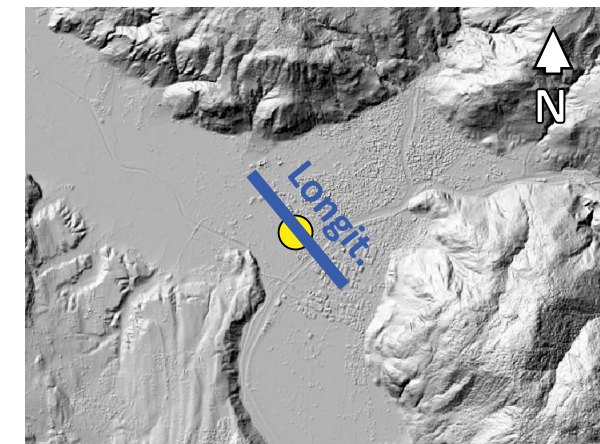
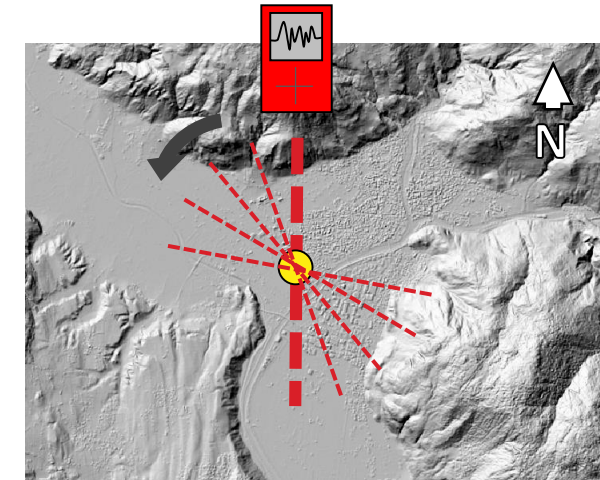
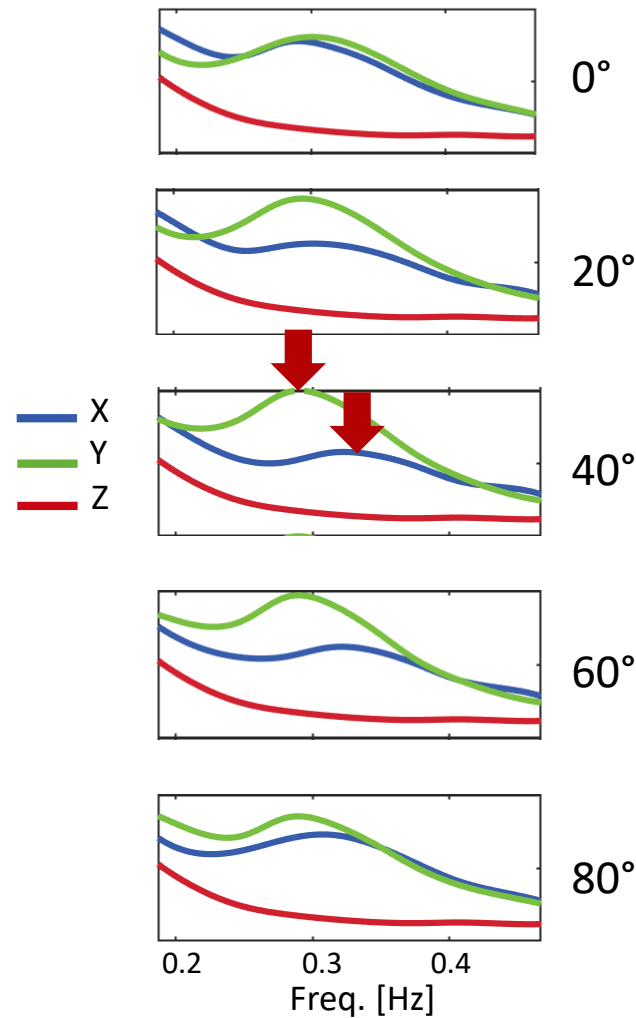


Local longitudinal direction

The directionality of 2D resonances

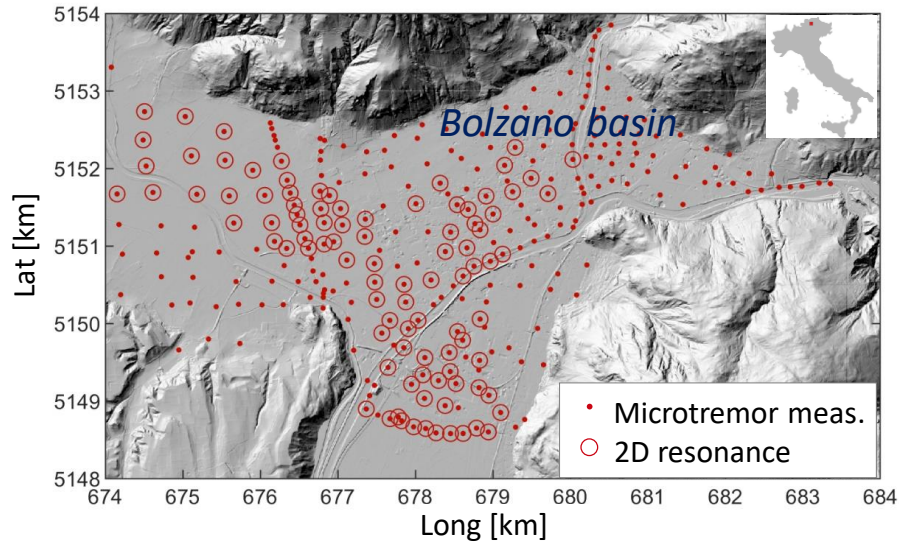


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In preparation

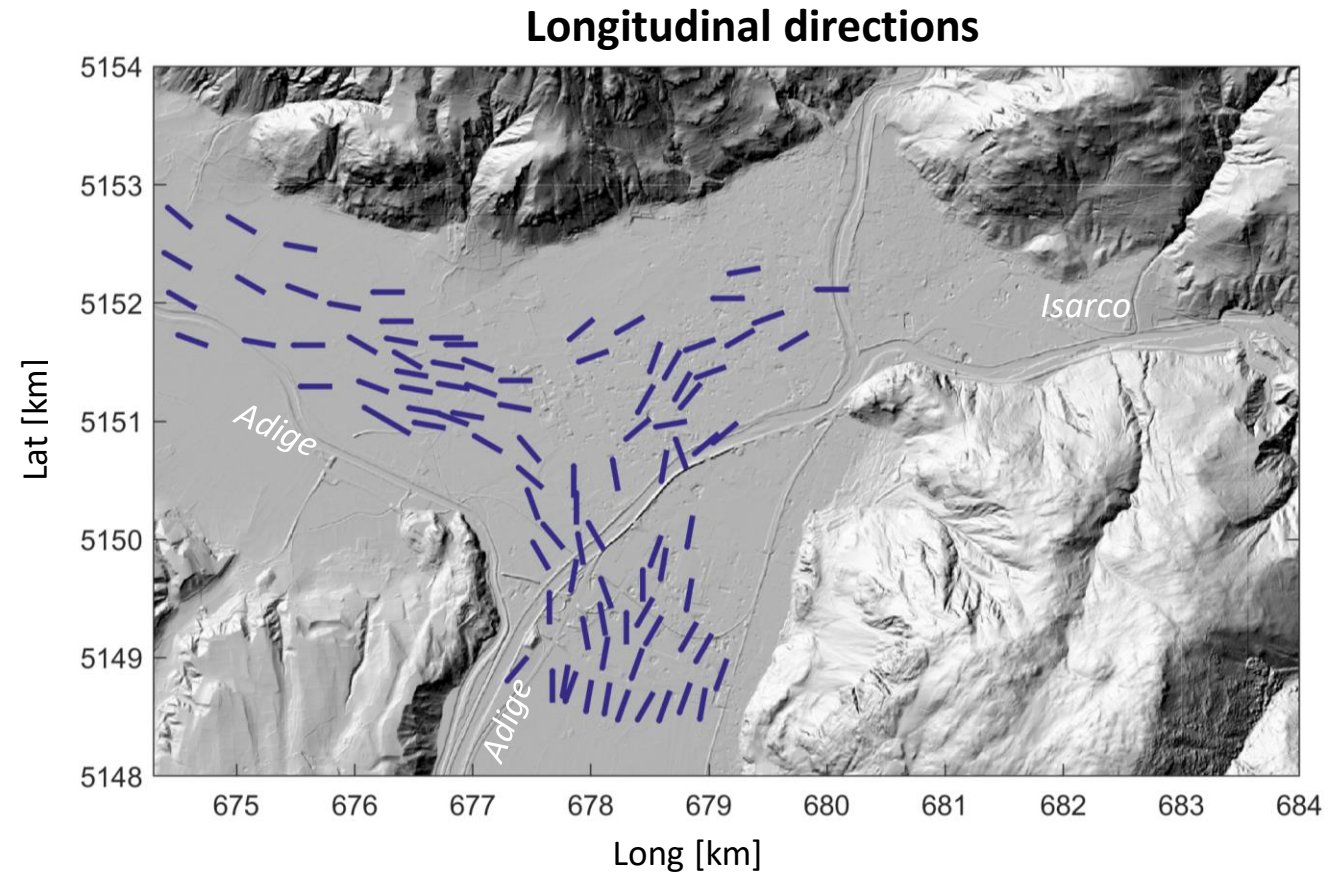


Local longitudinal direction

The directionality of 2D resonances

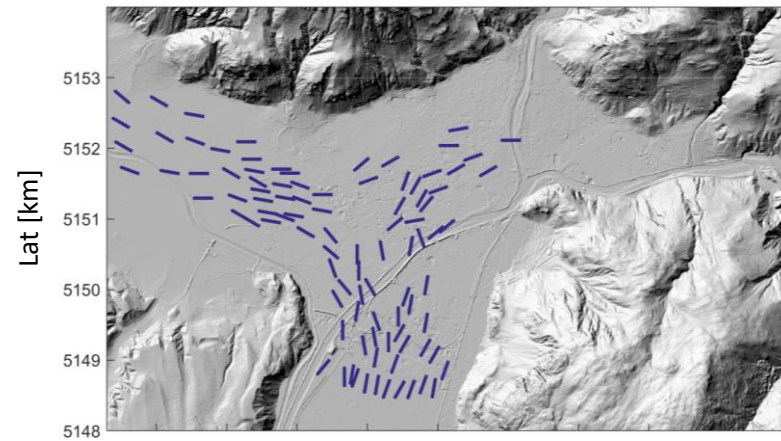


Sgattoni, G., Lattanzi, G. & Castellaro, S. ***Anatomy of 2D resonances in a sedimentary basin.***
In preparation

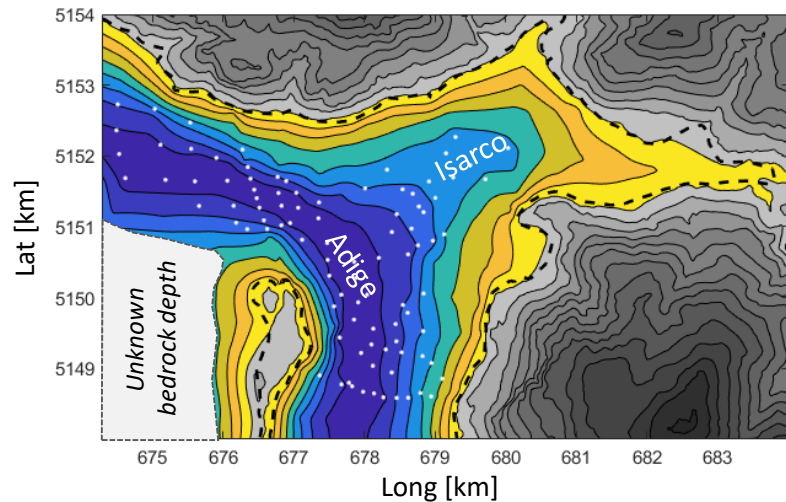


Anatomy of 2D resonances in the Bolzano basin

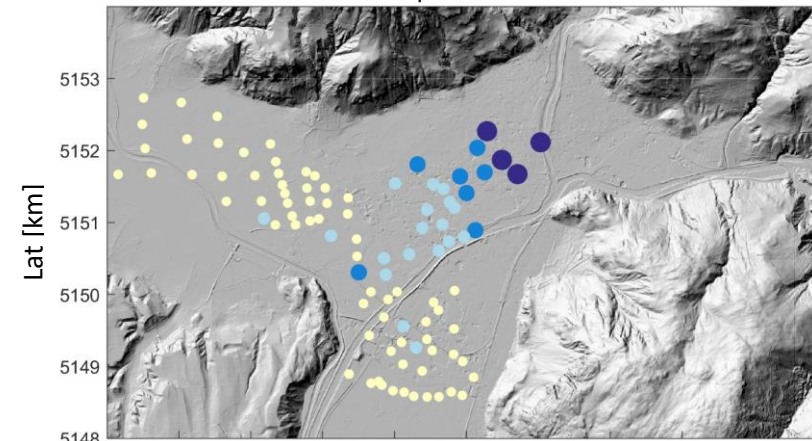
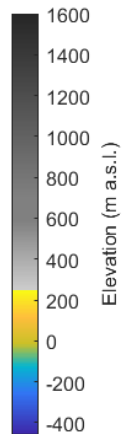
Sgattoni, G., Lattanzi, G. & Castellaro, S. *Anatomy of 2D resonances in a sedimentary basin*. In preparation



Longitudinal directions

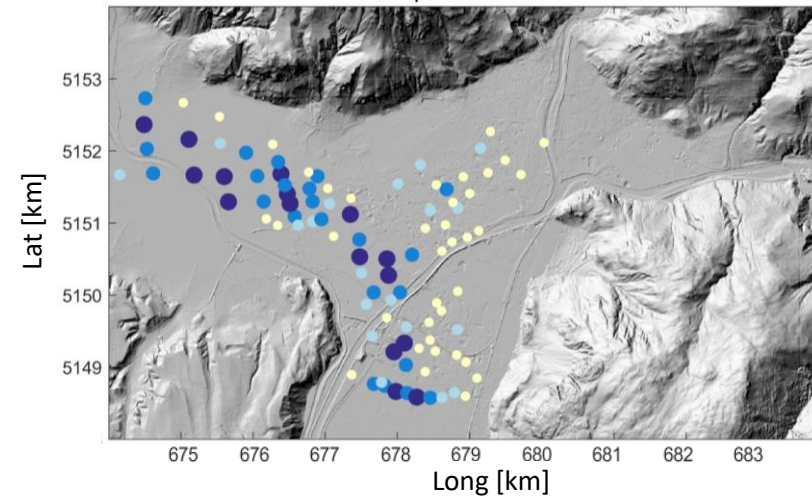


Bedrock model
(Sgattoni & Castellaro, 2021*)



L_0 Frequency

- $L_0 \geq 0.4$ Hz
- $0.35 \leq L_0 < 0.4$ Hz
- $0.3 < L_0 < 0.35$ Hz
- $L_0 \leq 0.3$ Hz



L_0/Z Peak amplitude

- $L_0/Z > 7$
- $6 \leq L_0/Z \leq 7$
- $5 \leq L_0/Z < 6$
- $L_0/Z < 5$

*Sgattoni, G. & Castellaro, S., 2021. Combining single-station microtremor and gravity surveys for deep stratigraphic mapping. *Geophysics*, under review