

EAGE

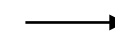
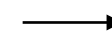
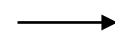
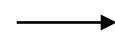
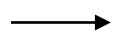
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Raspberry Shake sensor field tests for unstable rock monitoring



Marco Taruselli, Diego Arosio, Laura Longoni,
Monica Papini, Luigi Zanzi

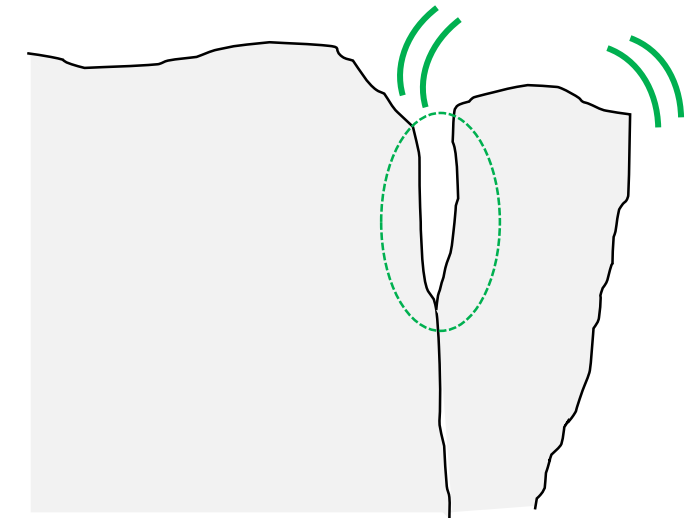


Goal → Is the RaspberryShake 3D seismometer a valuable sensor for monitoring unstable rock compartments?

1. What is the RaspberryShake ?

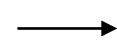
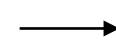
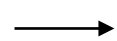
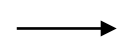
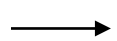


2. How did we use it to monitor the unstable rock compartment?



3. How did we evaluate the reliability of this sensor?

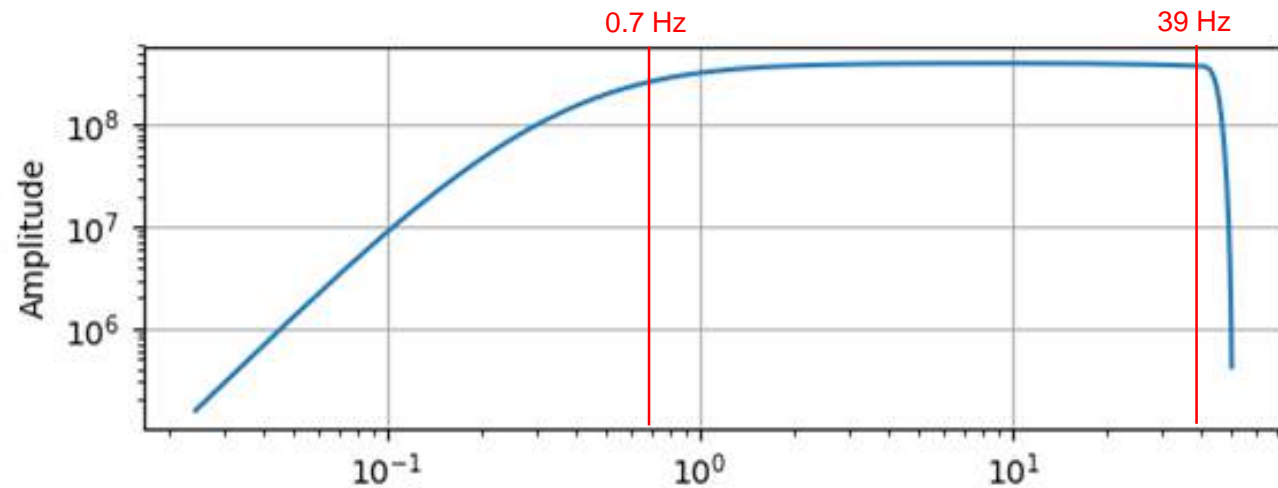


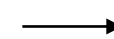
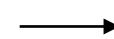
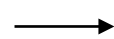
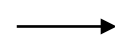
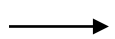


1. What is the RaspberryShake 3D?



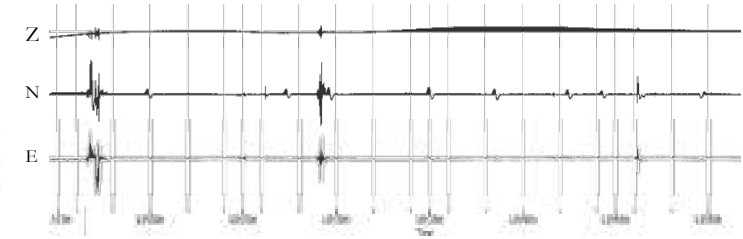
Cost	\$ 1300 USD
Dimensions	140x130x60 mm x 0.6 kg
Storage Device	• 8 Gb or + micro SD card
Timing	NTP or GPS
Geophones	3-component - 4.5 Hz
Samples per second	100
Bandwidth	-3dB points at 0.7 to 39 Hz



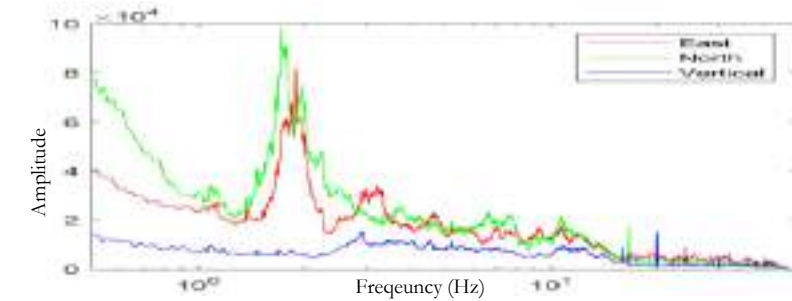


2. How did we use it to monitor the unstable rock compartment?

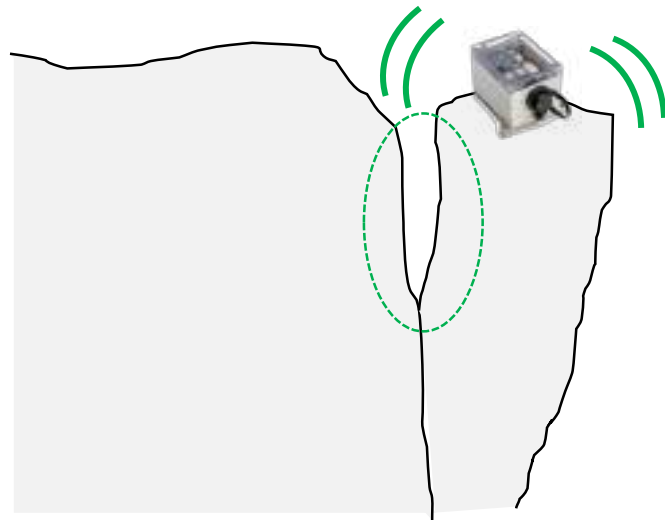
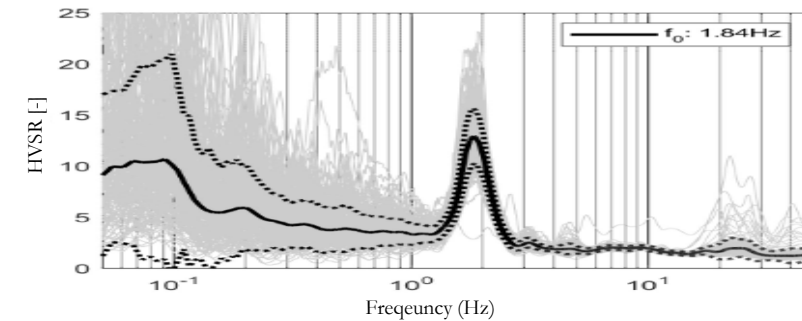
1) Record ambient seismic noise

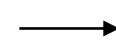
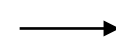
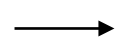
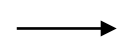
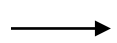


2) Compute amplitude spectra



3) Compute HVSR



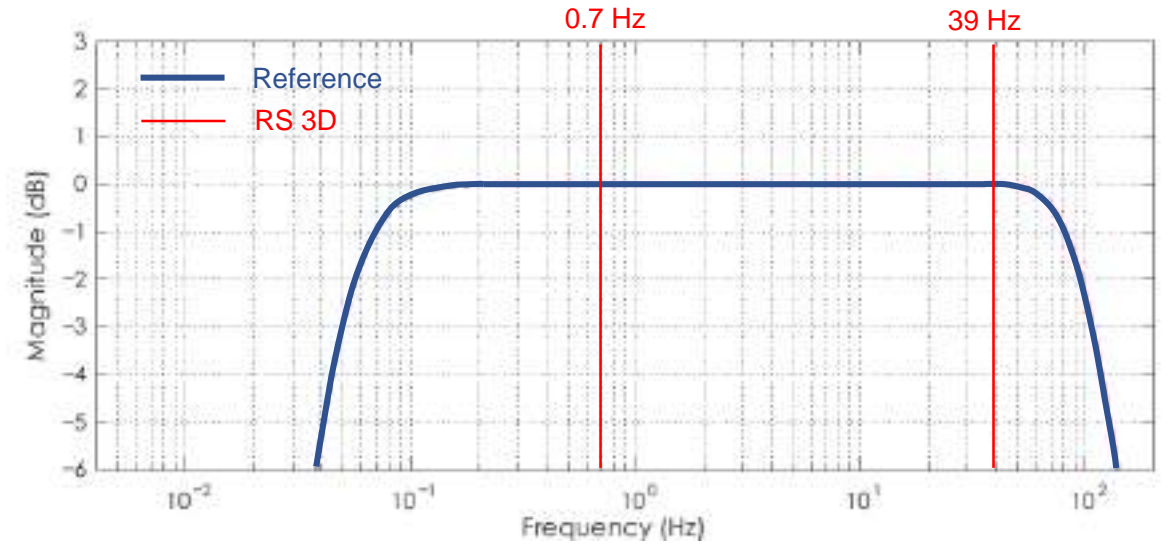


3. How did we evaluate the reliability of this sensor?

Reference



RS 3D



- FRF Laboratory test
- Field Comparison:
 1. HV curves
 2. Spectral ratios





Laboratory test

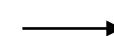
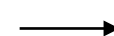
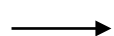
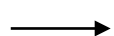
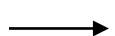


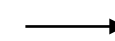
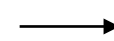
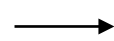
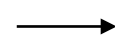
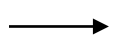
Trillium



RS 3D

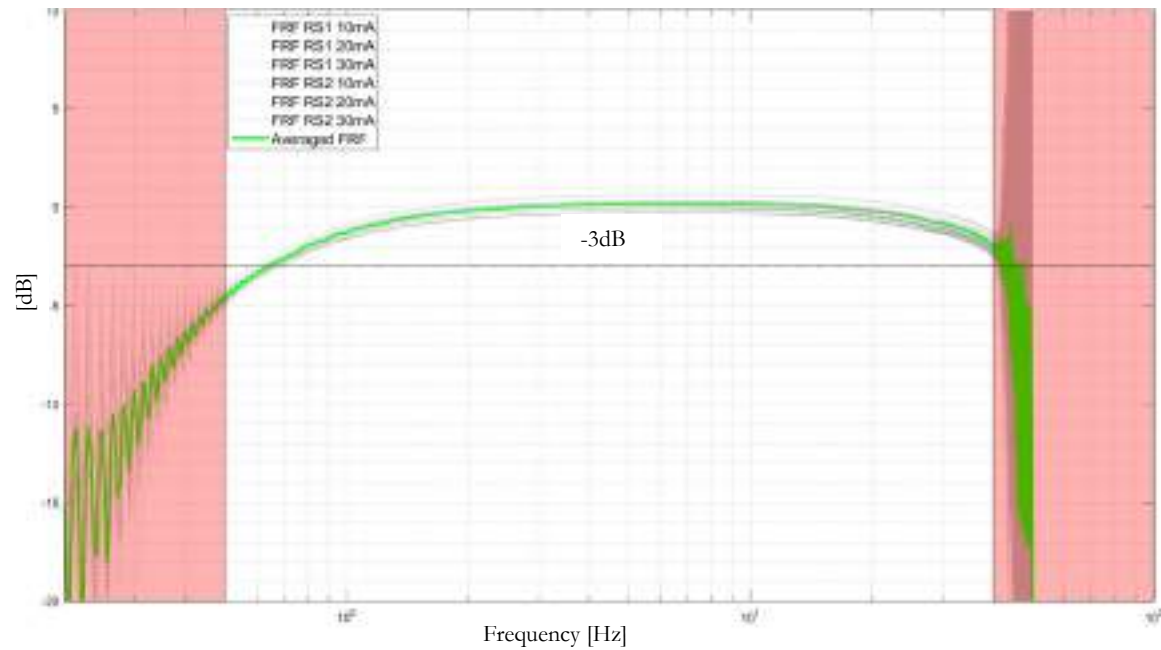




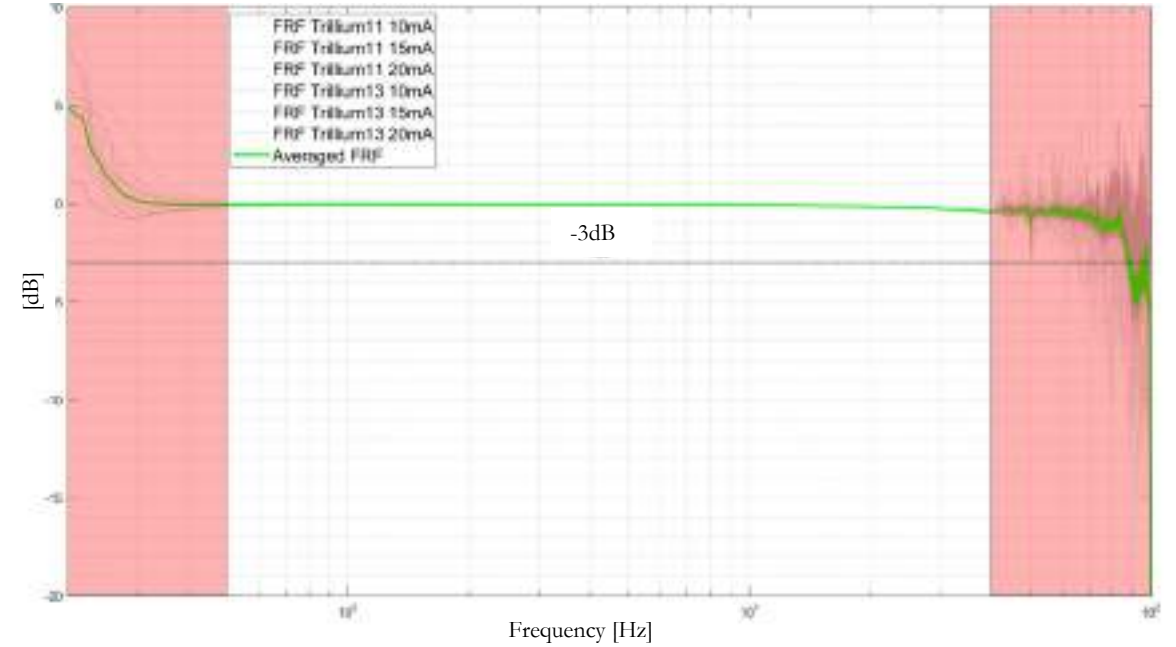


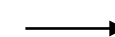
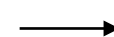
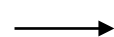
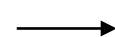
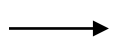
Laboratory Test

FRF Raspberry Shake

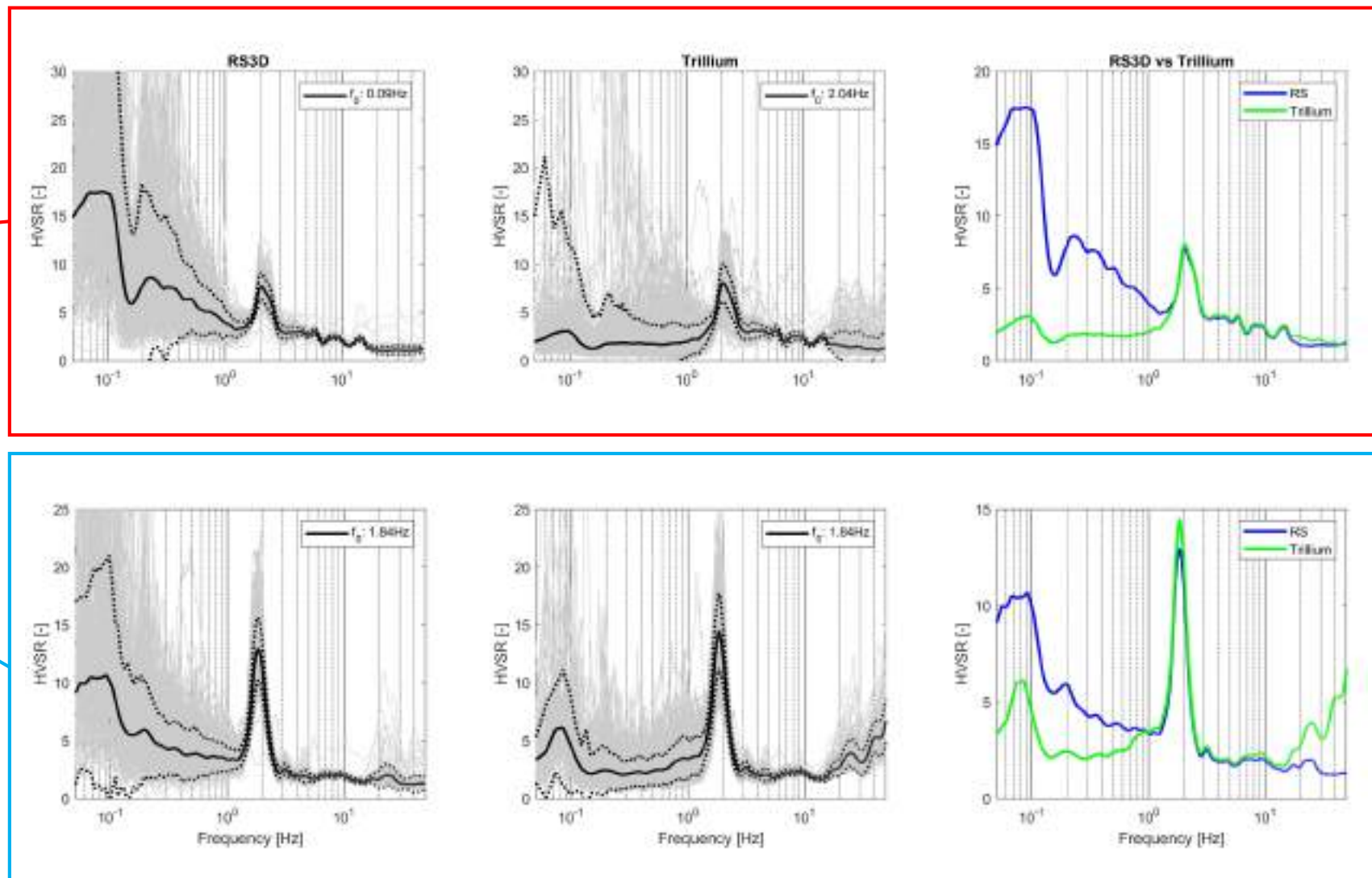


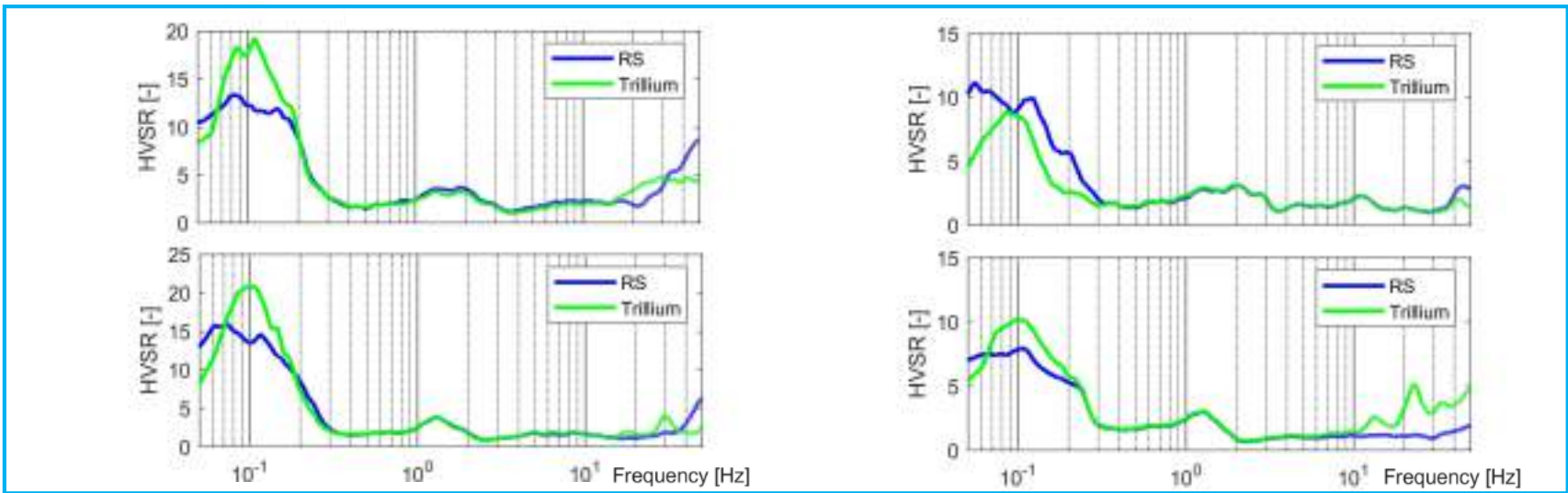
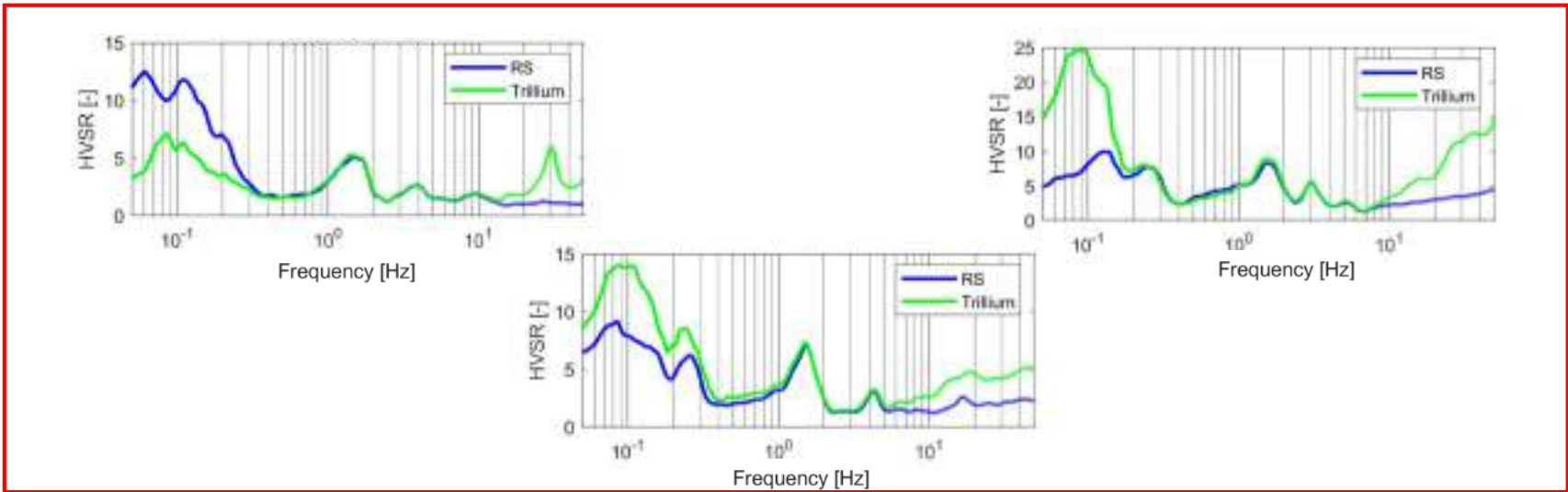
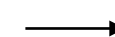
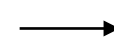
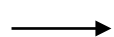
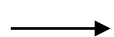
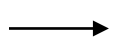
FRF Trillium

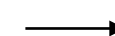
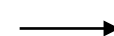
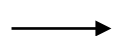
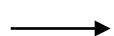
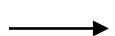




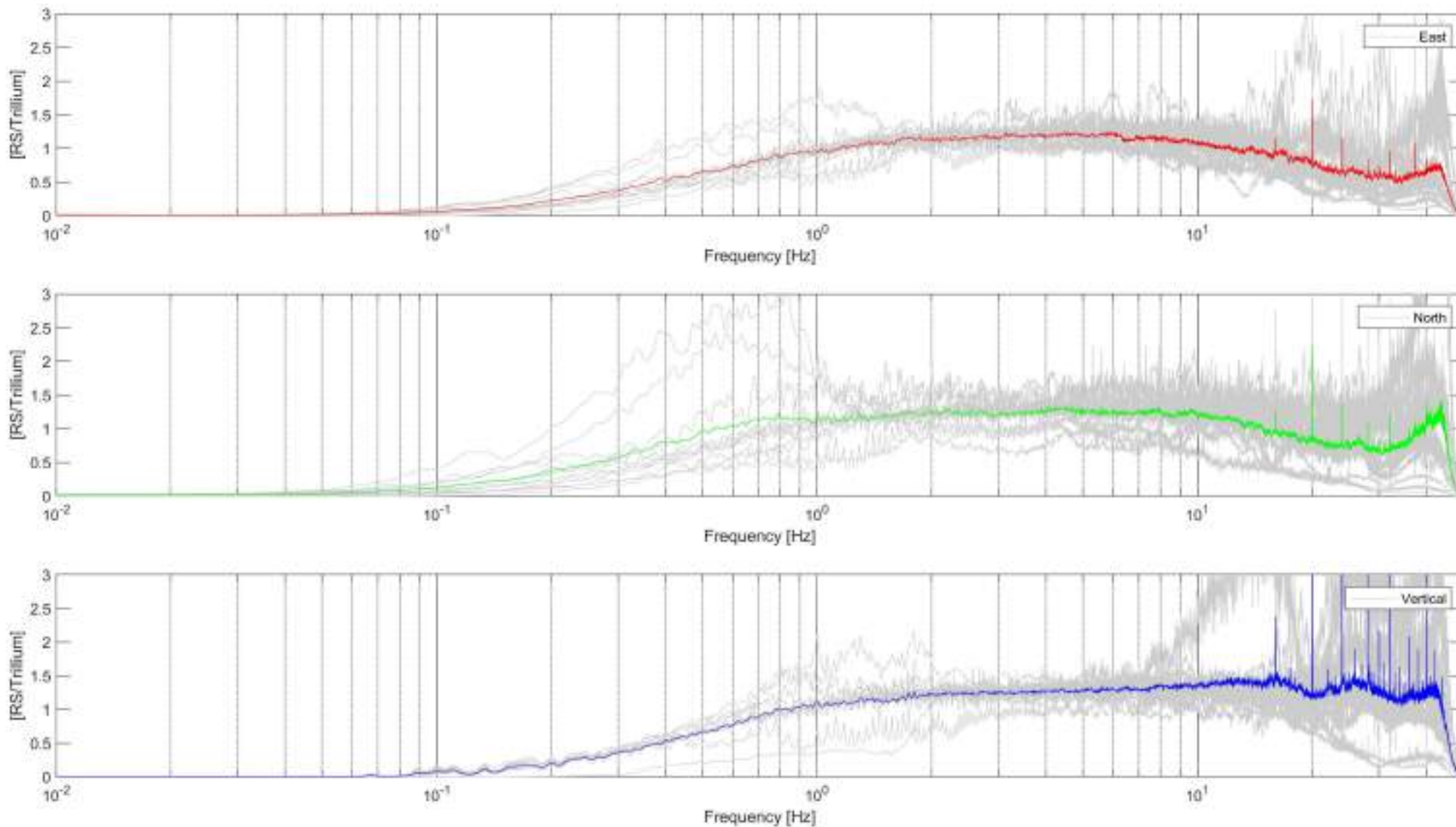
Field Tests

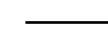
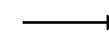
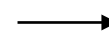
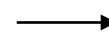
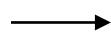






RS/Trillium





Goal → Is the RaspberryShake 3D seismometer a valuable sensor for monitoring unstable rock compartments?

→ RS-3D performs according to the vendor specifications

→ HVSR: the RS correctly estimates the resonance frequency of unstable rock blocks

→ Outside the RS bandwidth of the Raspberry Shake, it underestimates/overestimates the amplitude ground motion with respect to the reference





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