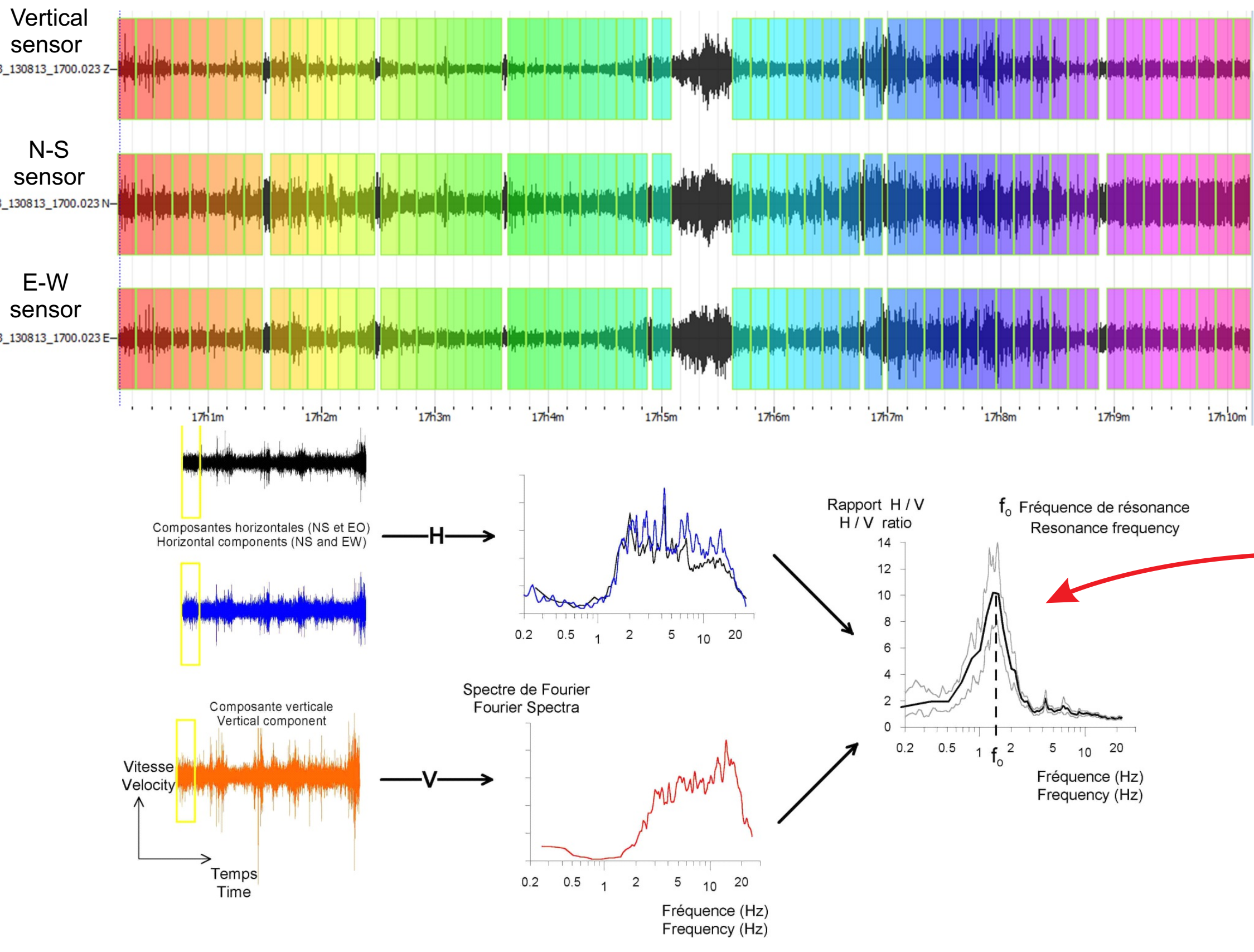


## THE TECHNIQUE: HORIZONTAL/VERTICAL SPECTRAL RATIO OF AMBIENT SEISMIC NOISE



- ☑ Min. 1h record of ambient noise
- ☑ Record divided in 60s windows
- ☑ Fourier spectrum analysis
- ☑ Dividing the Horizontal over Vertical spectra

-> Corresponding peak = Resonance frequency

Sensitive to impedance contrasts and able to detect the thickness of soft sediments over bedrock

## THE ACTORS: SMARTSOLO IGU-16HR 3C AND IGU-BD3C-5 GEOPHONES



## THE SITES: BOREHOLES AND NEAR BUILDINGS WITH GEOTHERMAL INTEREST

Borehole P2, Abatoir, Anderlecht  
71 m depth,  $f_0$  : 1.08 Hz

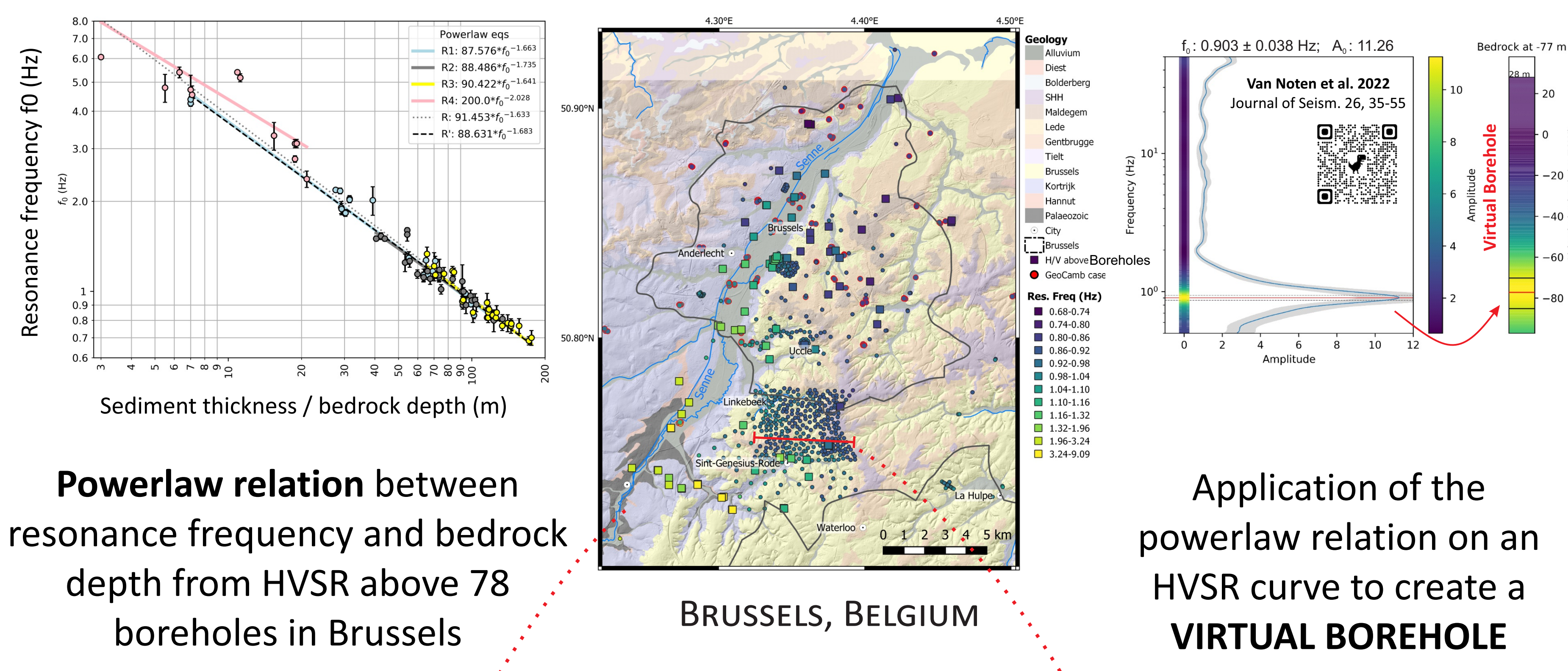
Boreholes I03 & I07, Clinic St-Pierre, Wavre  
57.5 m depth,  $f_0$  : 1.46 Hz

Borehole F3 & F3bis, Beaulieu, Anderlecht  
99.5 m depth,  $f_0$  : 0.89 Hz

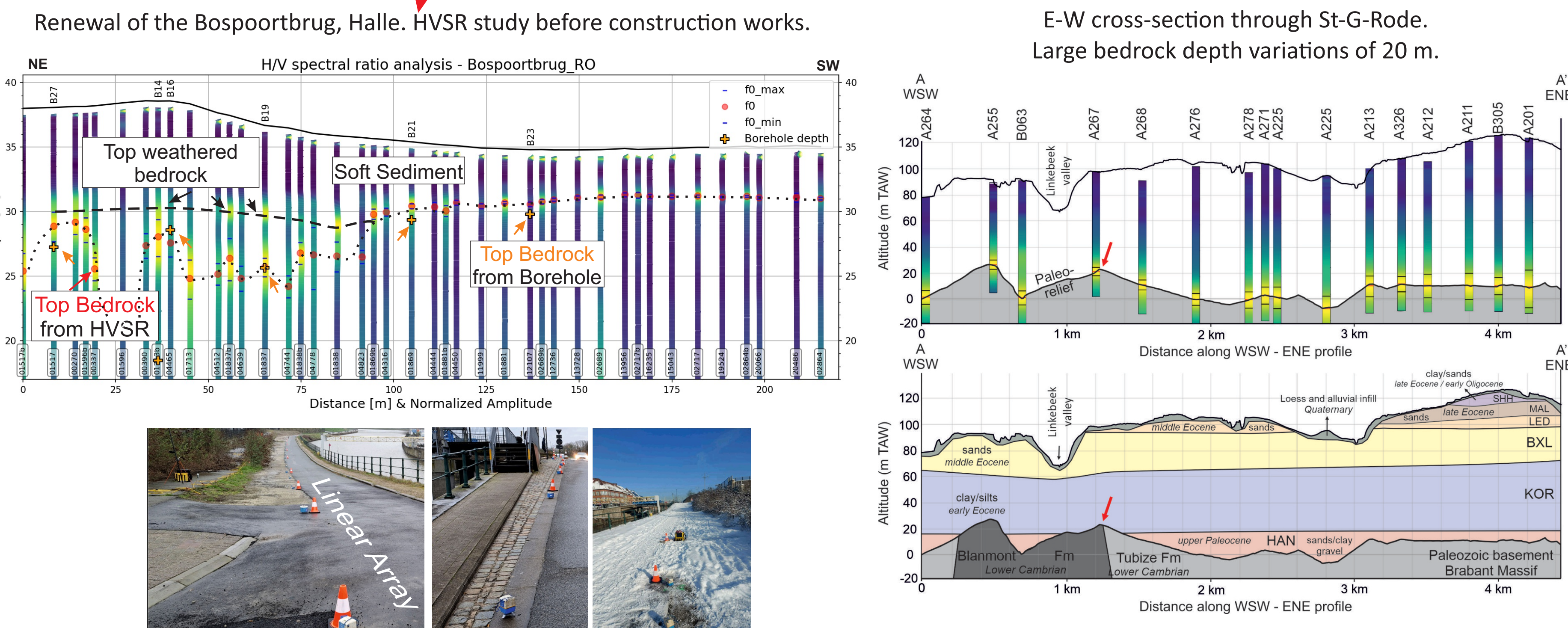
Borehole B1, brewery Trois Fontaines, Lot  
14 m depth,  $f_0$  : 4.16 Hz

Borehole P2, USquare, Elsenne  
123 m depth  
 $f_0$  : 0.84 Hz

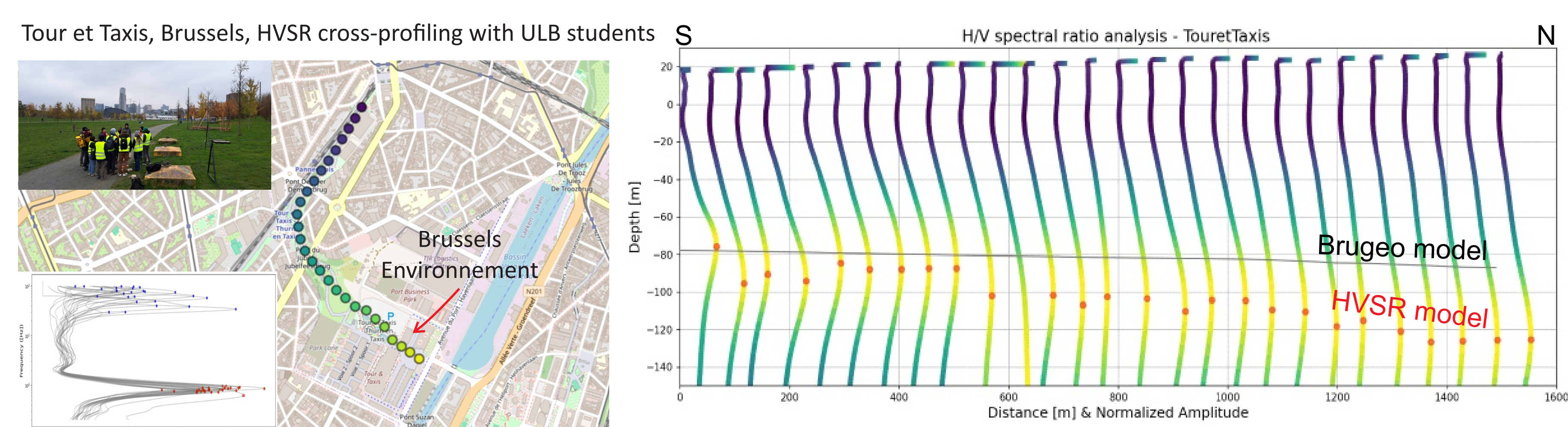
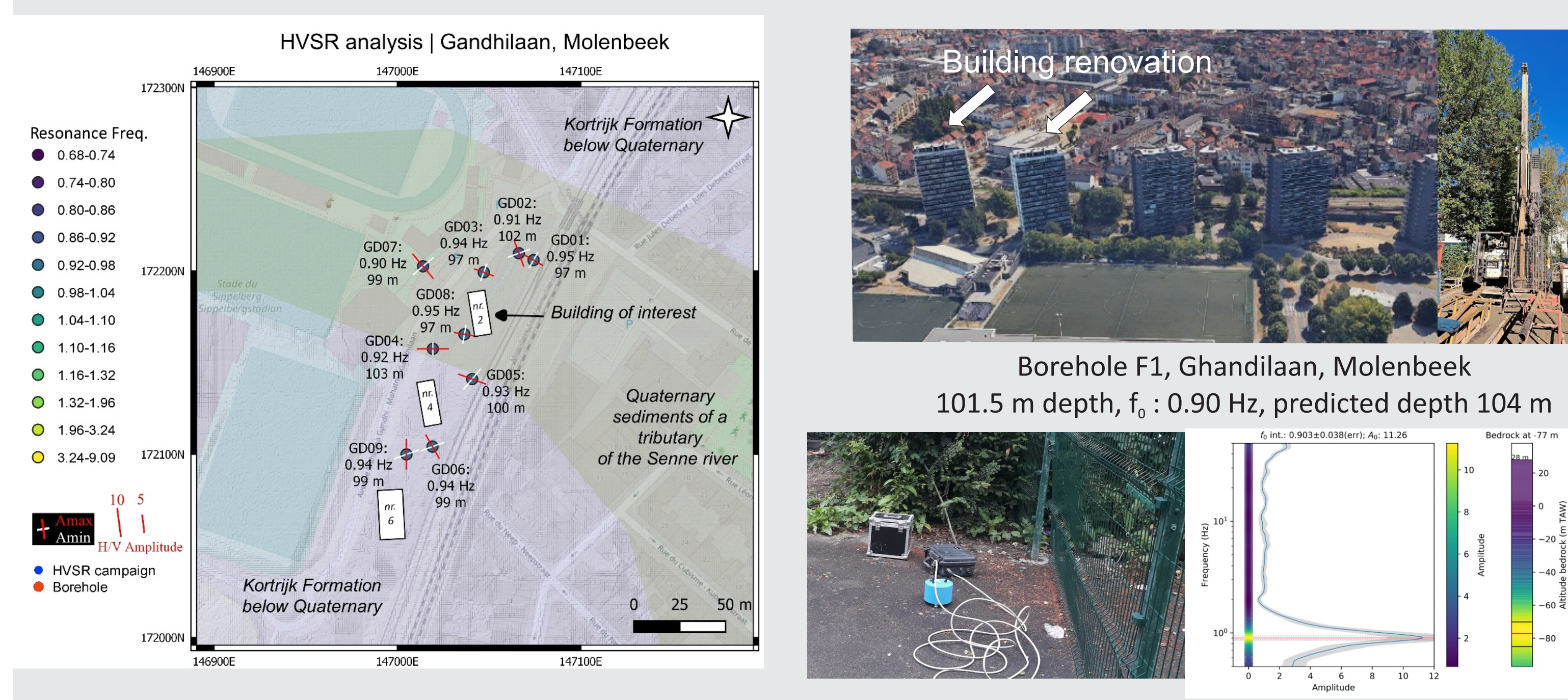
## THE CALIBRATION: RELATION BETWEEN DEPTH AND RESONANCE FREQUENCY



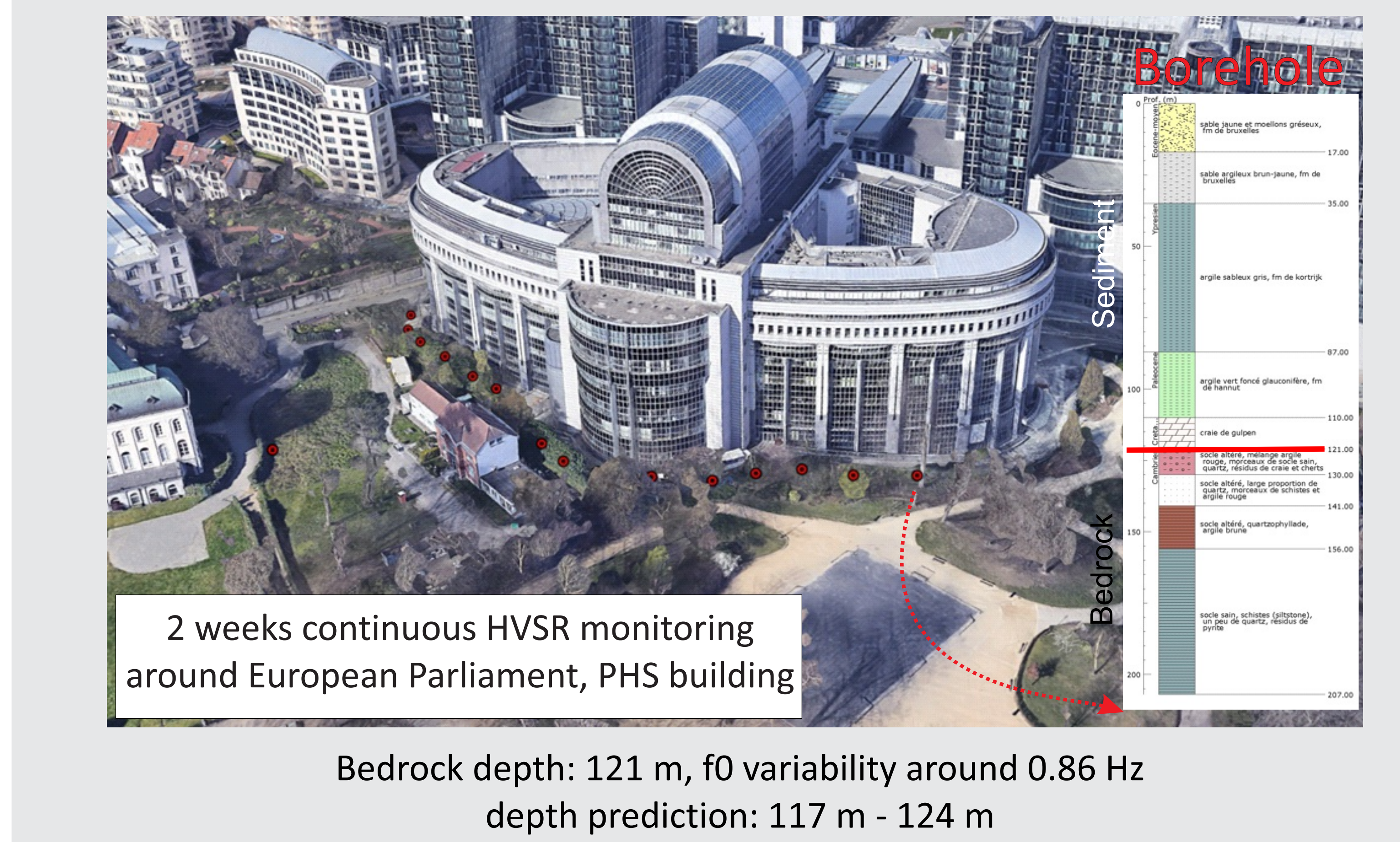
## VARIABILITY OF THE TOP OF THE BRABANT MASSIF



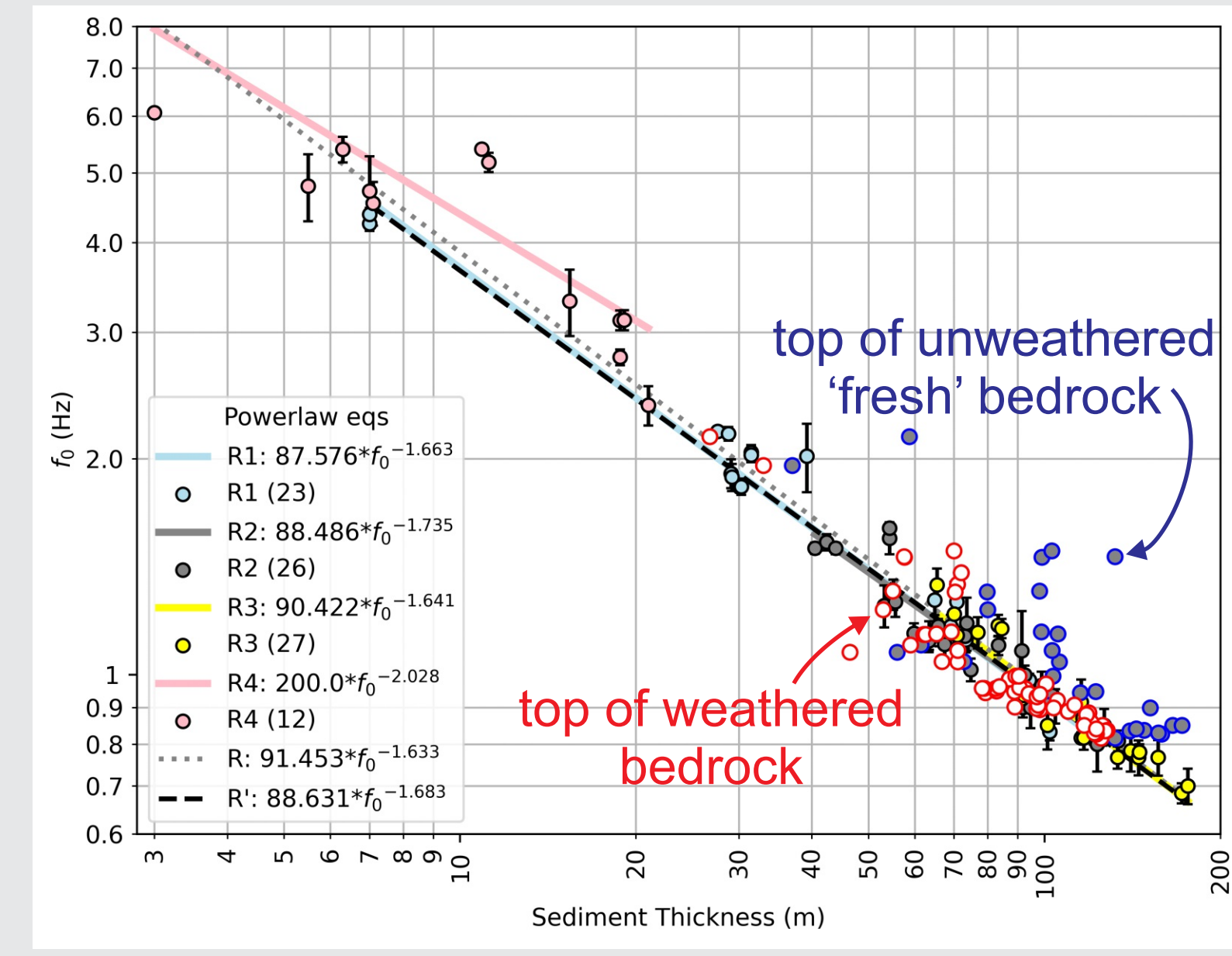
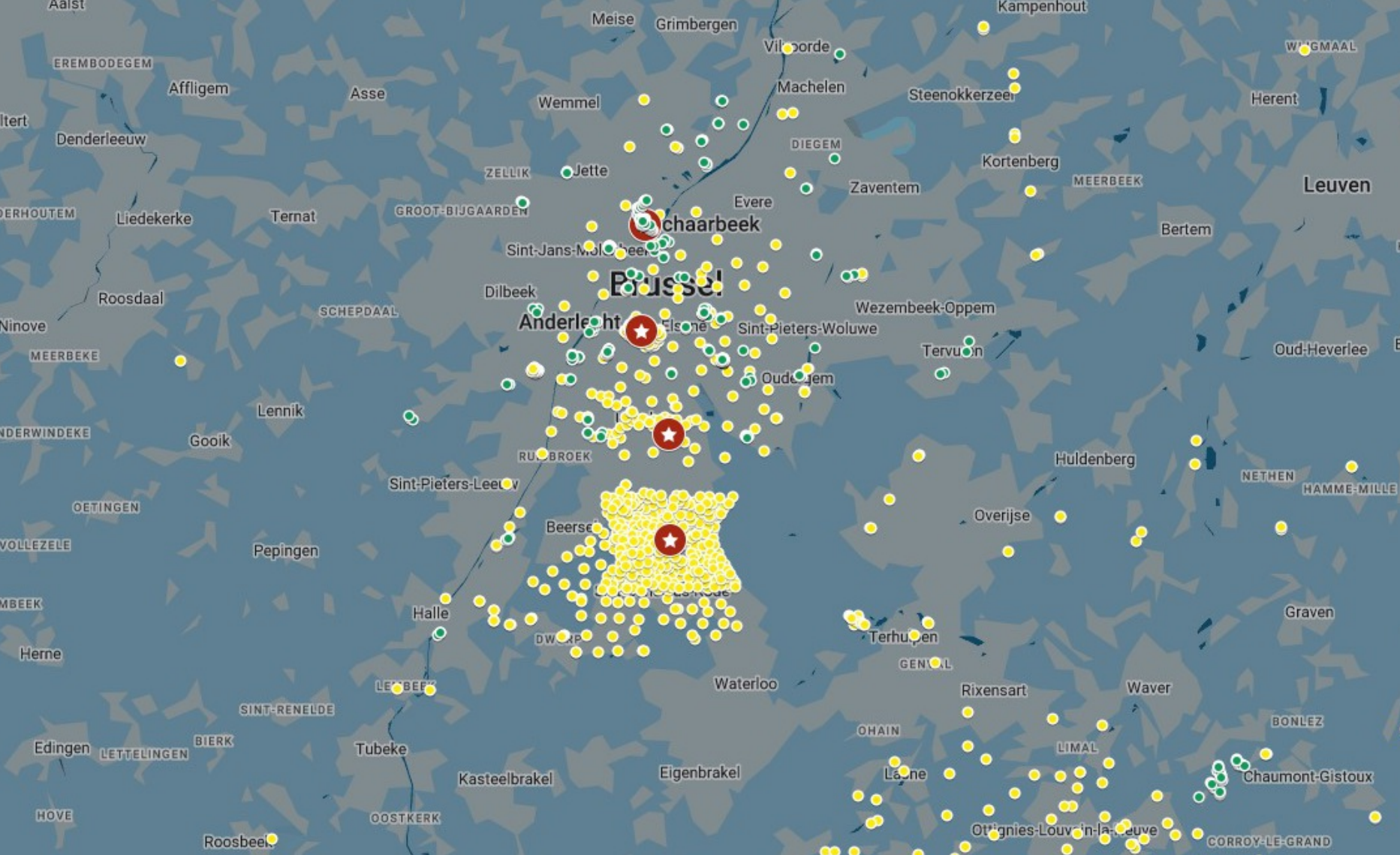
## BUILDING LOGEMENT MOLENBEEKS, GANDHILAN, MOLENBEEK



## BUILDING PHS, EUROPEAN PARLIAMENT, BRUSSELS



## CONCLUSION



- ☑ HVSR predicts bedrock depth
- ☑ Quick method
- ☑ Use it BEFORE making a drilling tender
- ☑ Integrate HVSR in 3D geological models
- ☑ Future = Open HVSR database for Belgium

HVSR cannot see the thickness of weathering of the bedrock

