

INTEGRATED PASSIVE AND ACTIVE GEOPHYSICAL PROSPECTIONS FOR SEISMIC SITES CHARACTERIZATION

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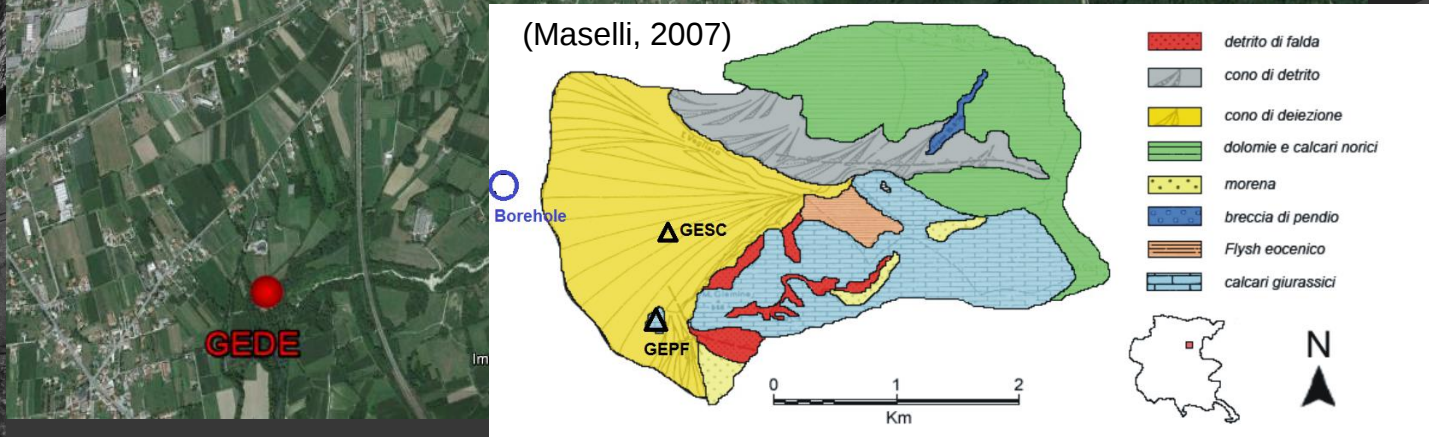
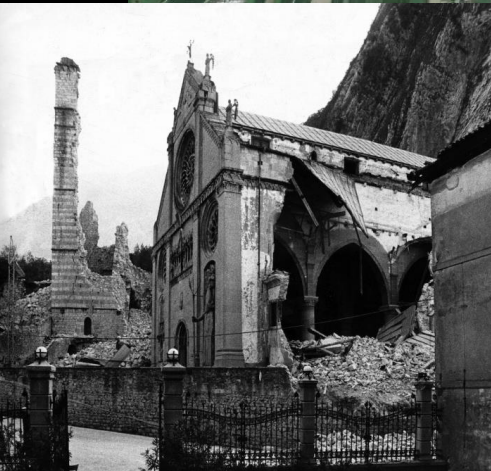
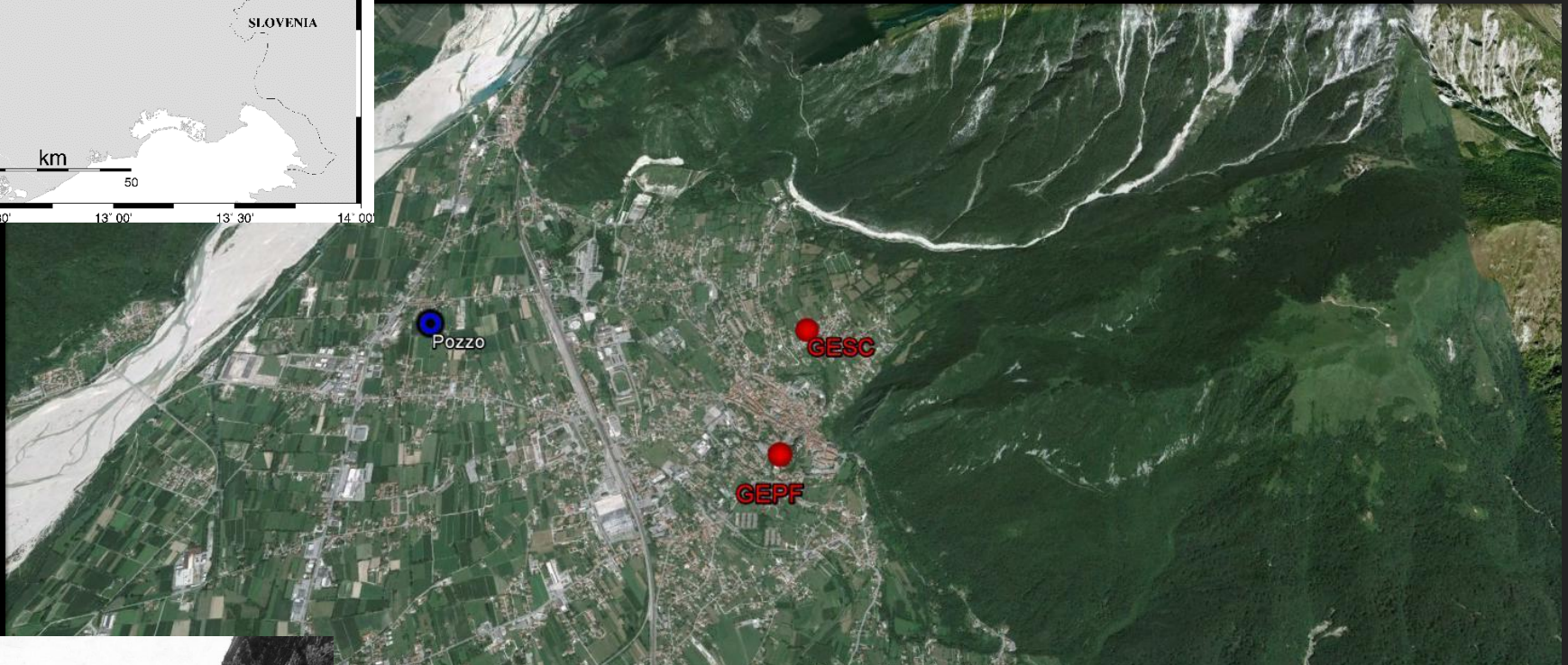
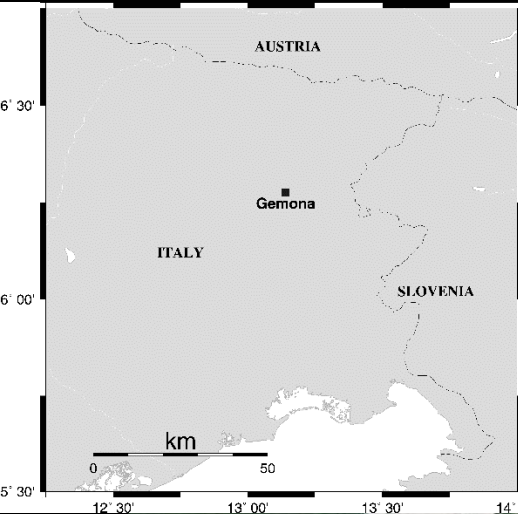
2 Istituto Scienze Marittime (ISMAR-CNR), Bologna

Obiettivi e metodi

Caratterizzazione di sito al fine di conoscere la struttura, le amplificazioni e i fenomeni di risonanza:

- Sismica passiva
 - Rapporti spettrali H/V
 - Analisi F-K
- Sismica attiva
 - Sismica a rifrazione

Gemona del Friuli



Gemona del Friuli: GEMO e GESC

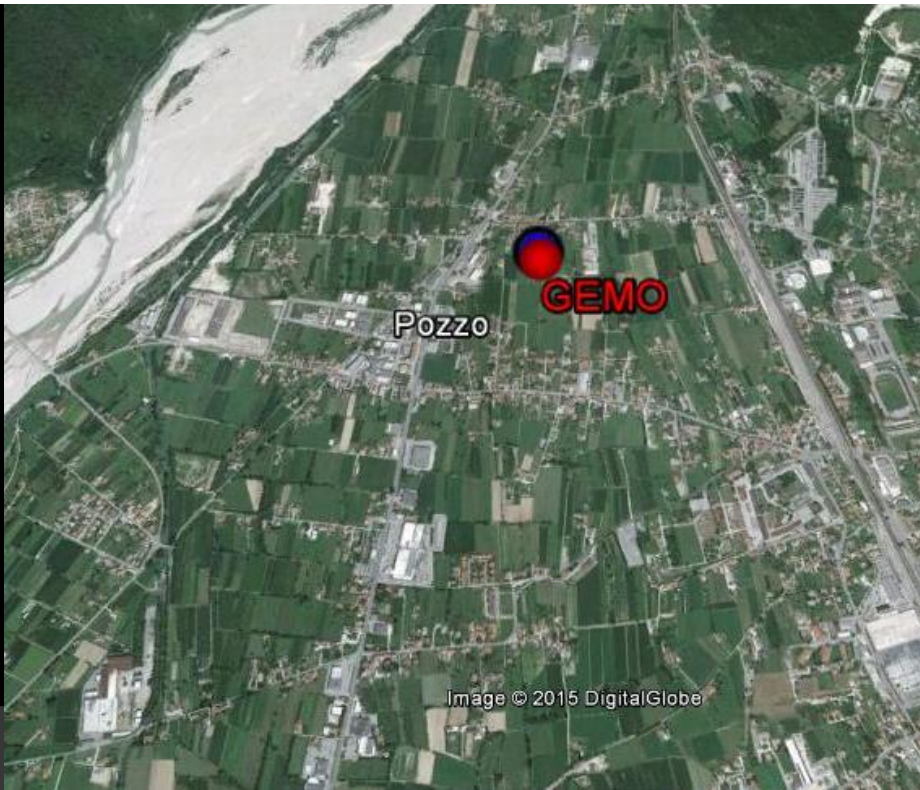
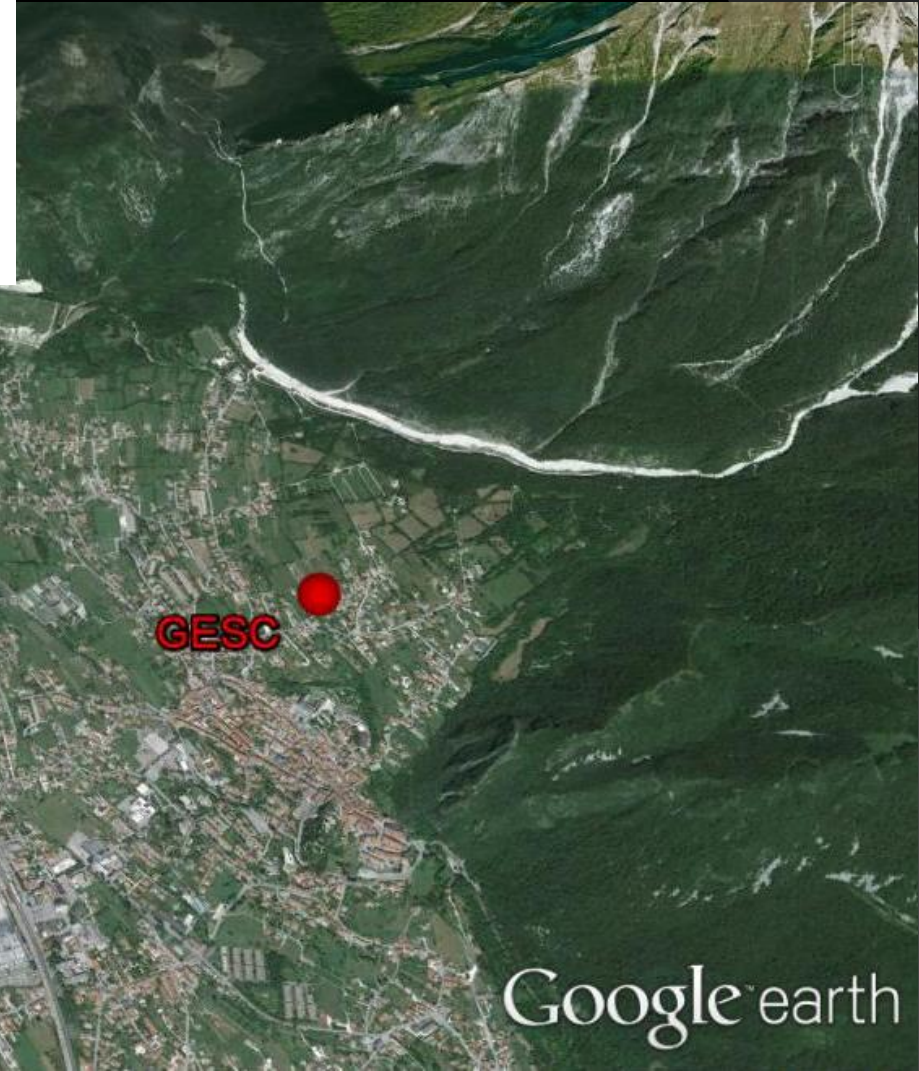
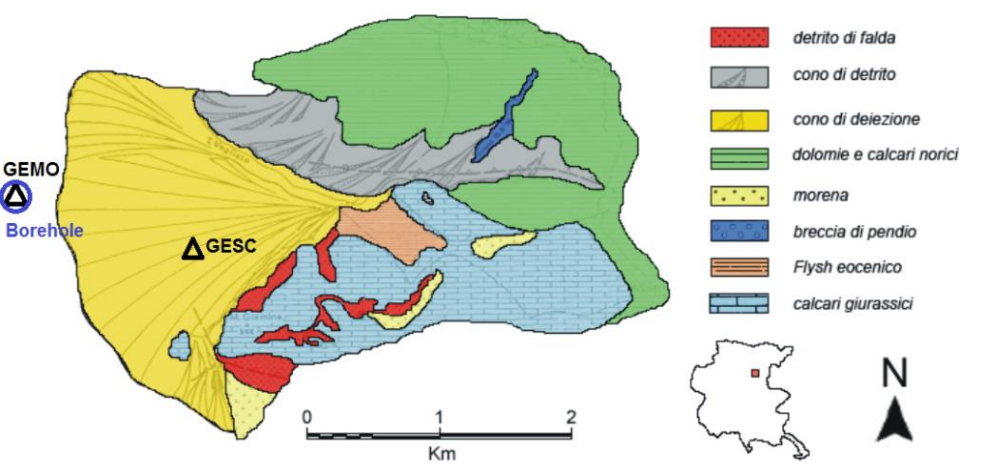


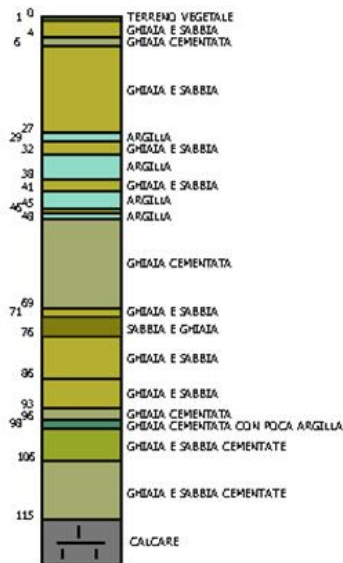
Image © 2015 DigitalGlobe

Google earth

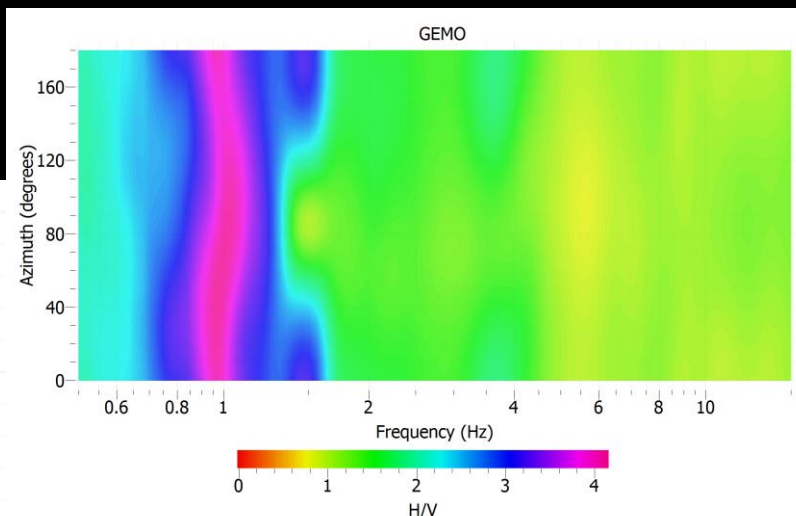
GEMO

- ◉ Stazione singola (H/V)
 - ◉ Array (F-K)

STRATIGRAFIA POZZO N. 382 (in metri)



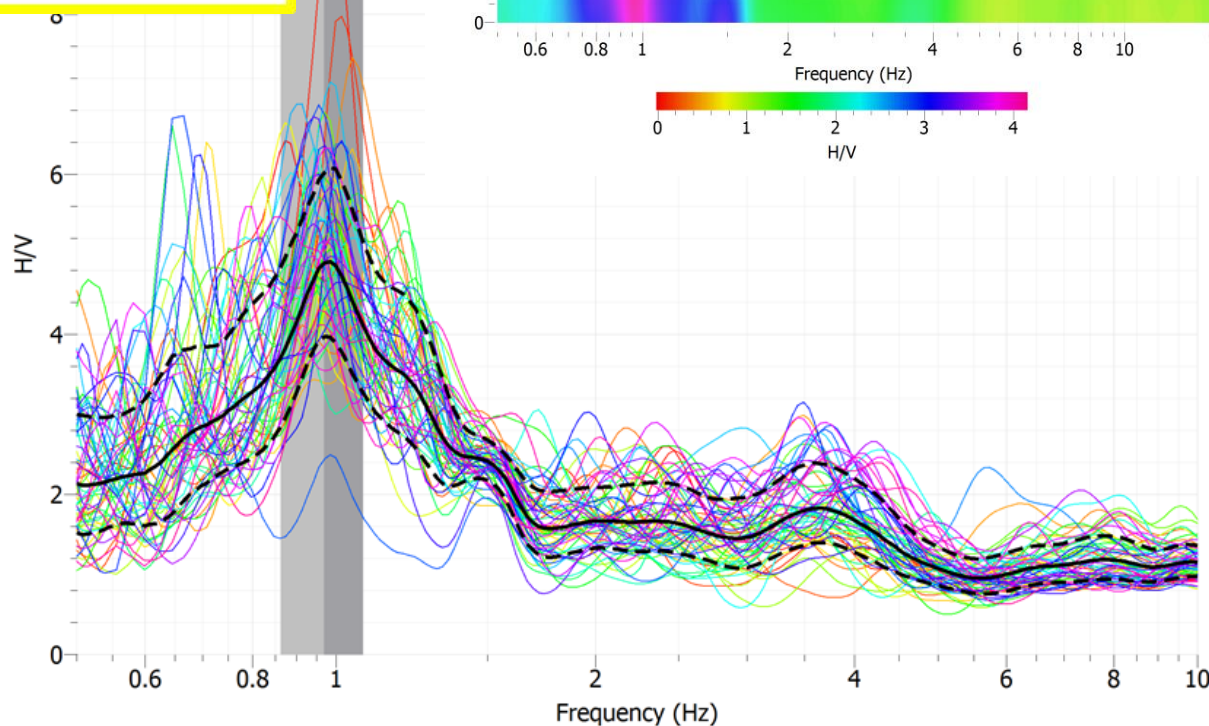
GEMO: H/V



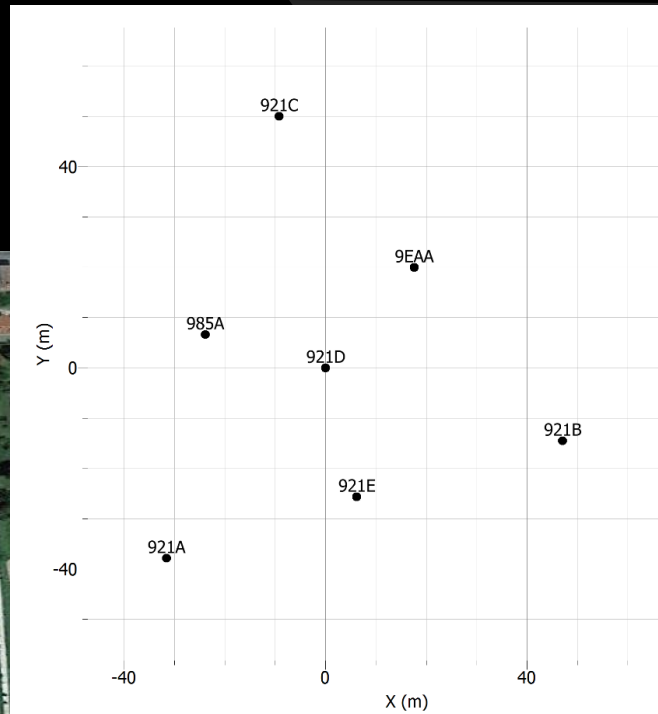
- Frequenza di risonanza: 0.97 Hz
- Profondità bedrock: 115 m (pozzo)

$$V_s = H \cdot 4f_0$$

- Velocità onde S: 450 m/s

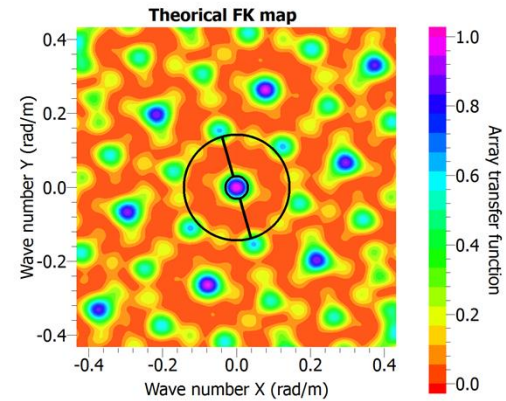
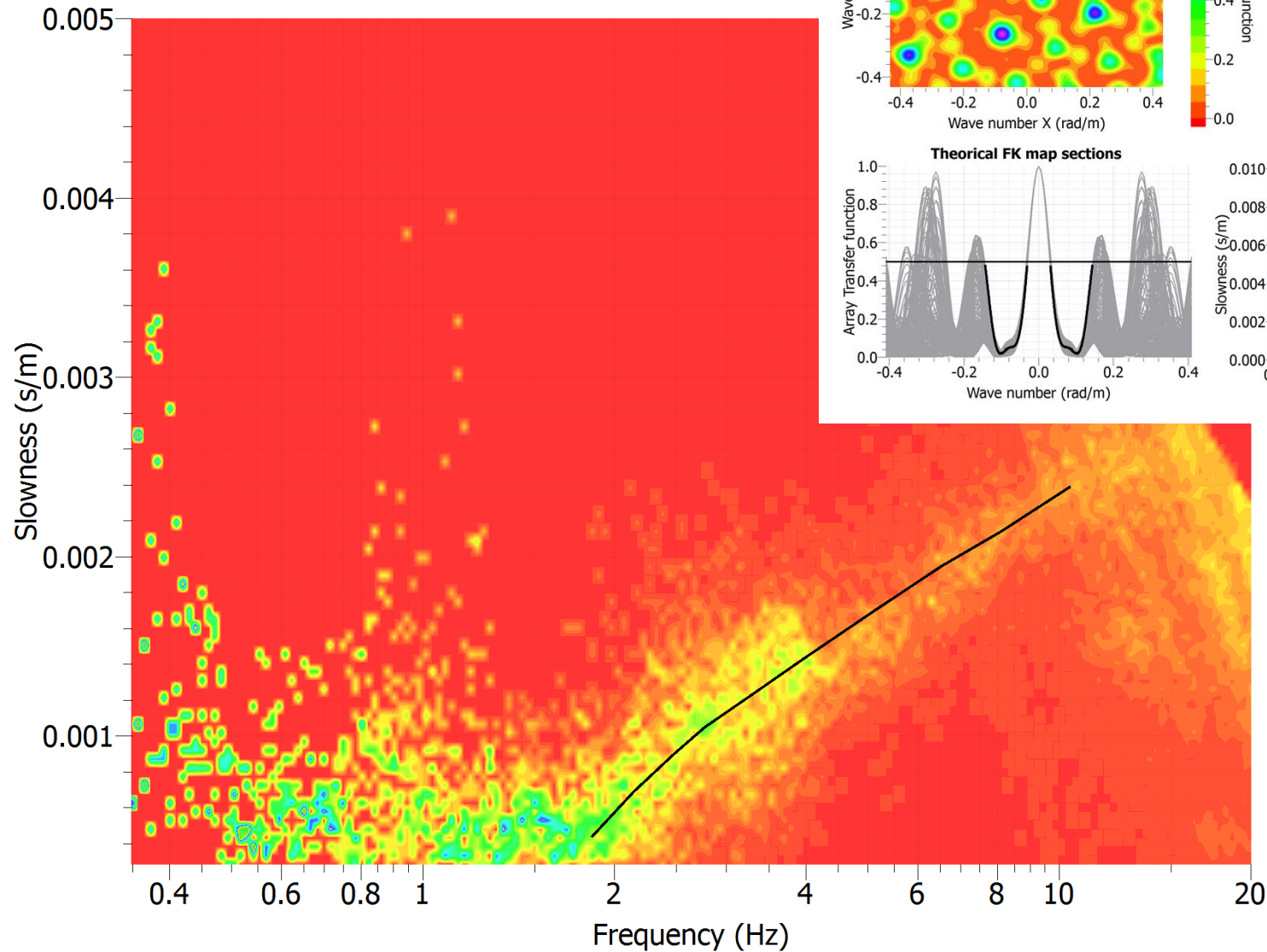


GEMO: array

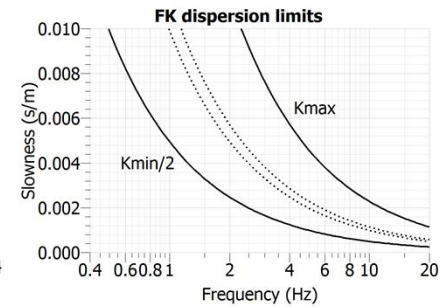
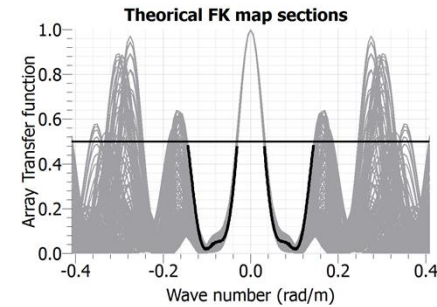


Google earth

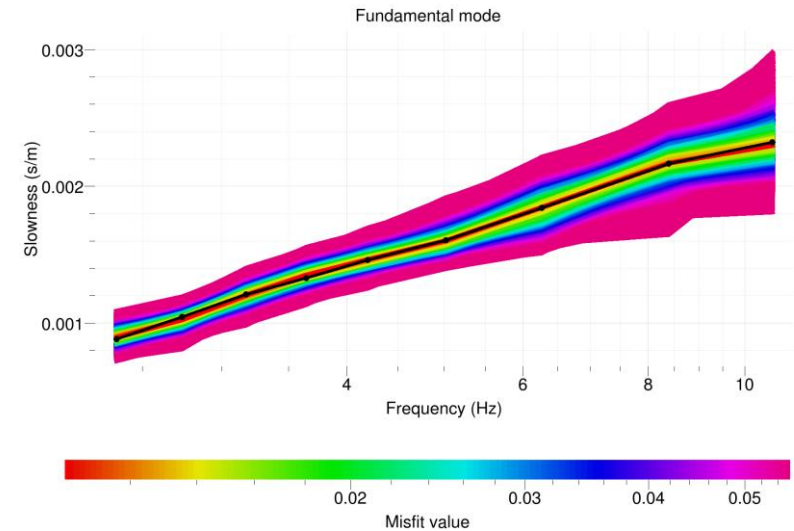
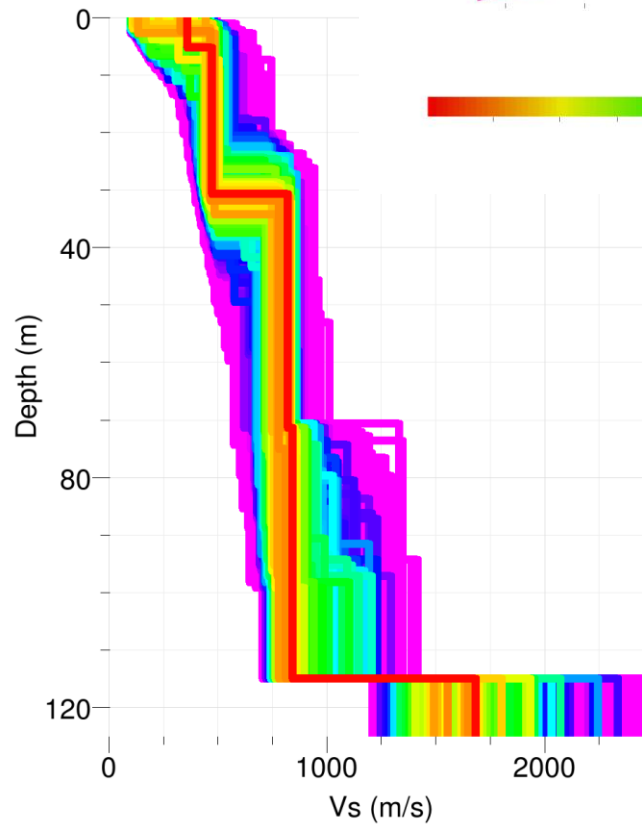
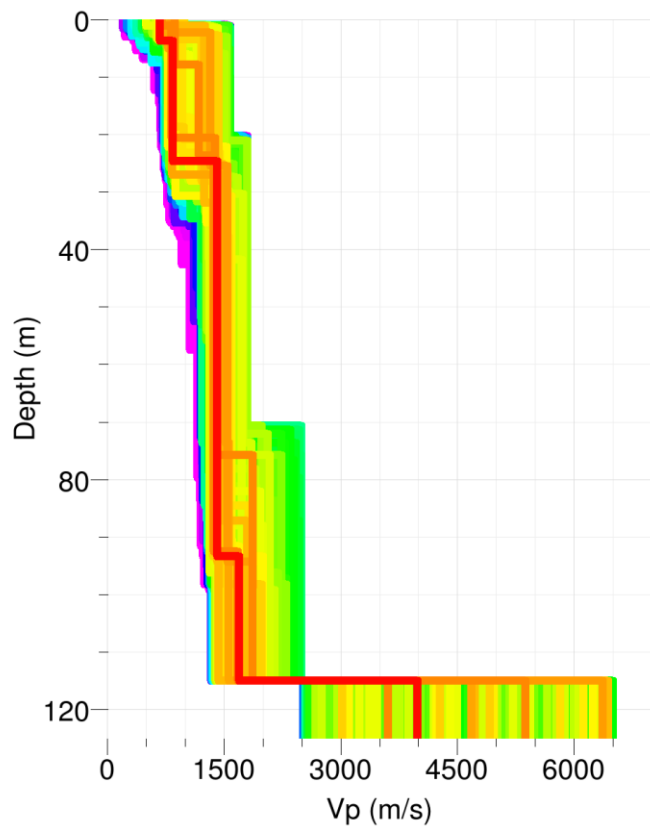
GEMO: F-K analisi



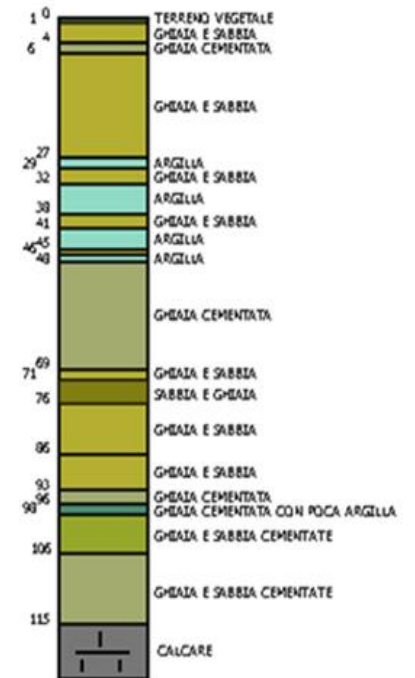
kmin: 0.0671978 rad/m
kmax: 0.144602 rad/m
ground level: 0.0619314
kmax-kmin: 0.0774039 rad/m
kaverage: 0.1059 rad/m



GEMO: inversione



STRATIGRAFIA POZZO N. 382 (in metri)



GESC

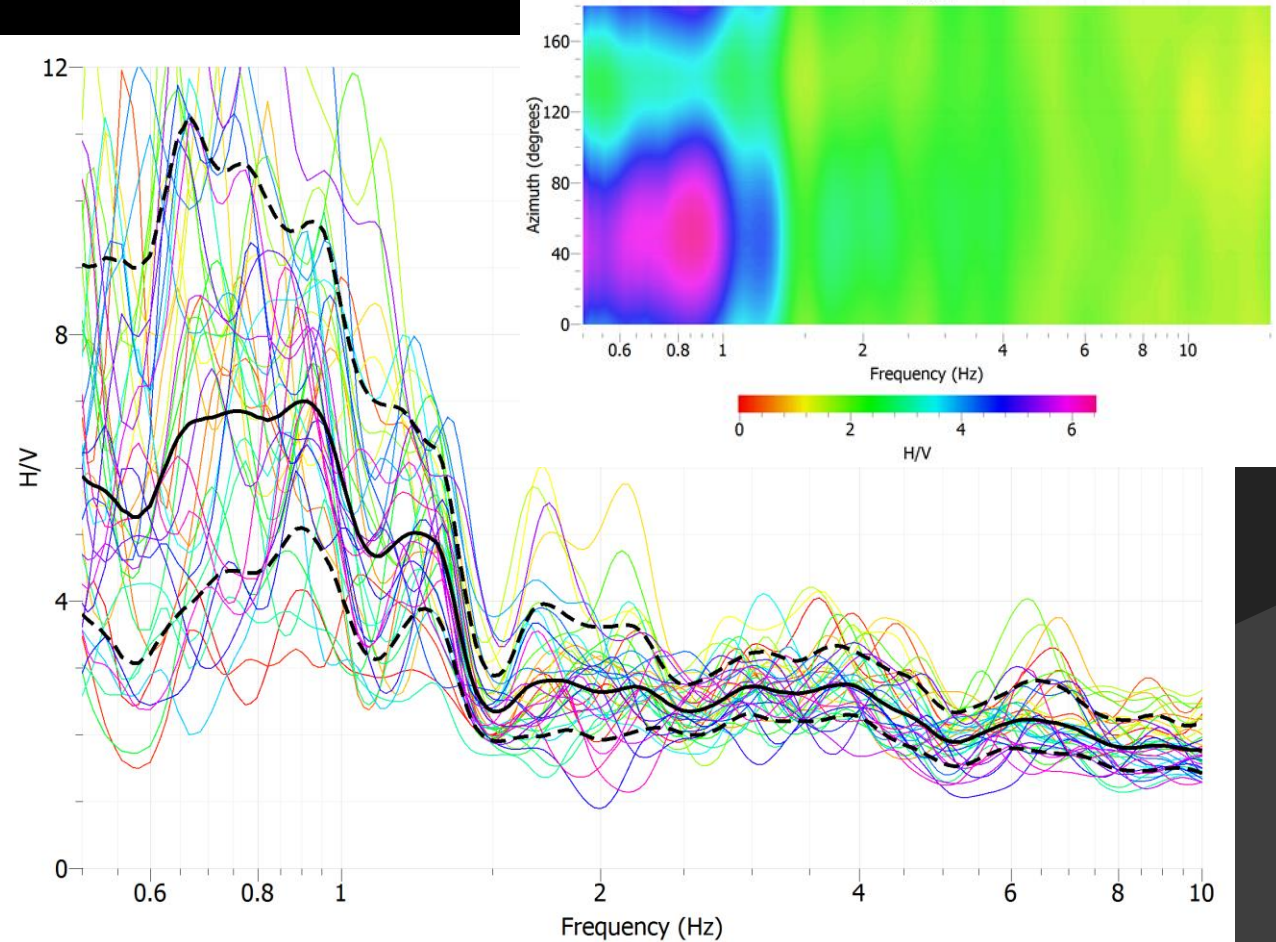
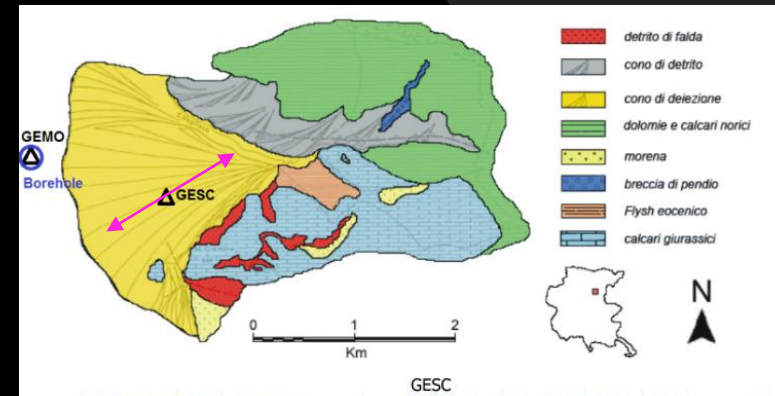
- ◉ Stazione singola (H/V)
 - ◉ Array (F-K)
- ◉ Sismica a rifrazione

GESC: H/V

- Frequenza di risonanza: 0.90 Hz
- Velocità onde S: 450 m/s

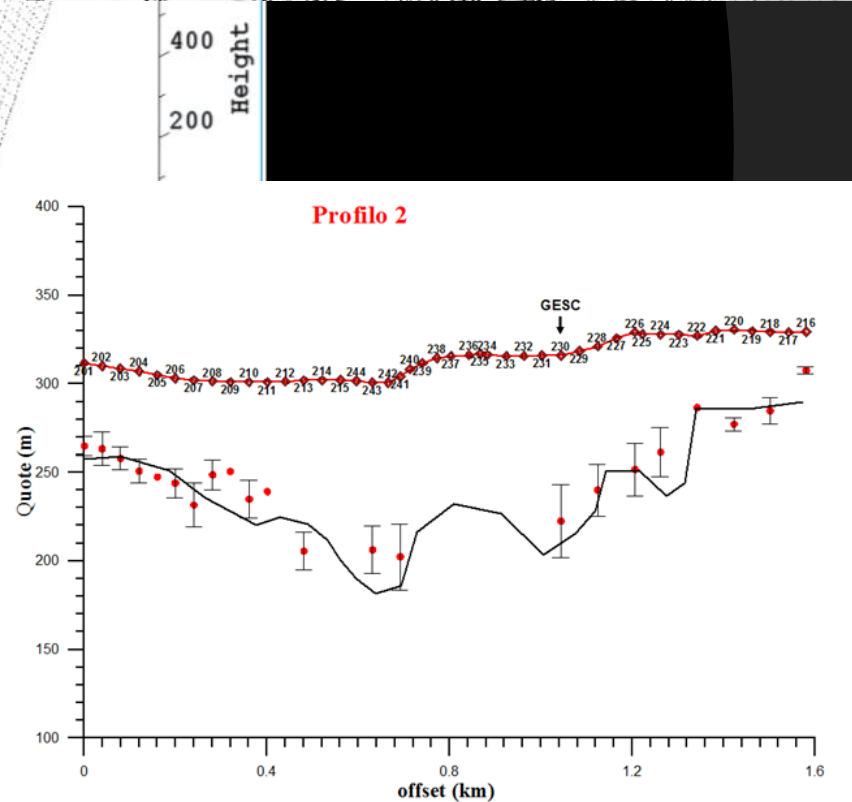
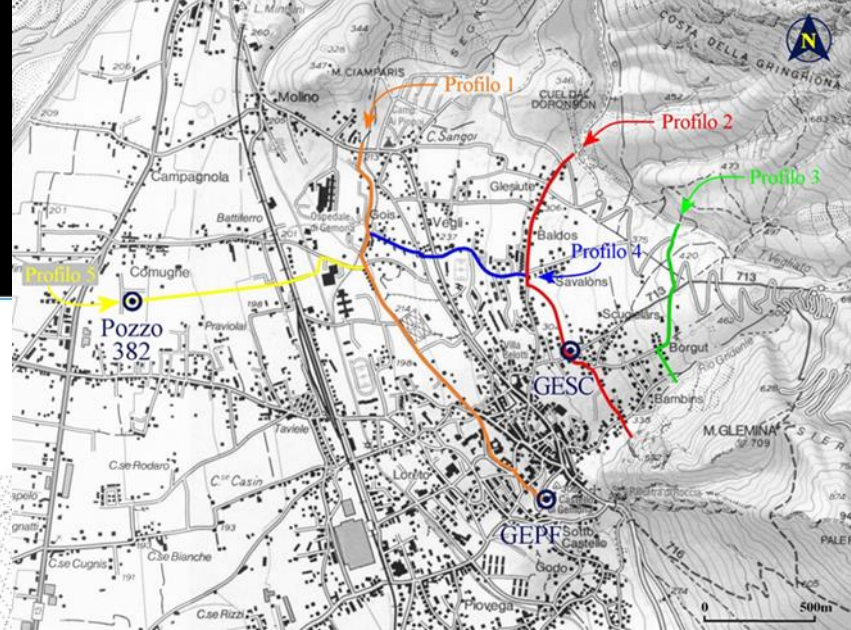
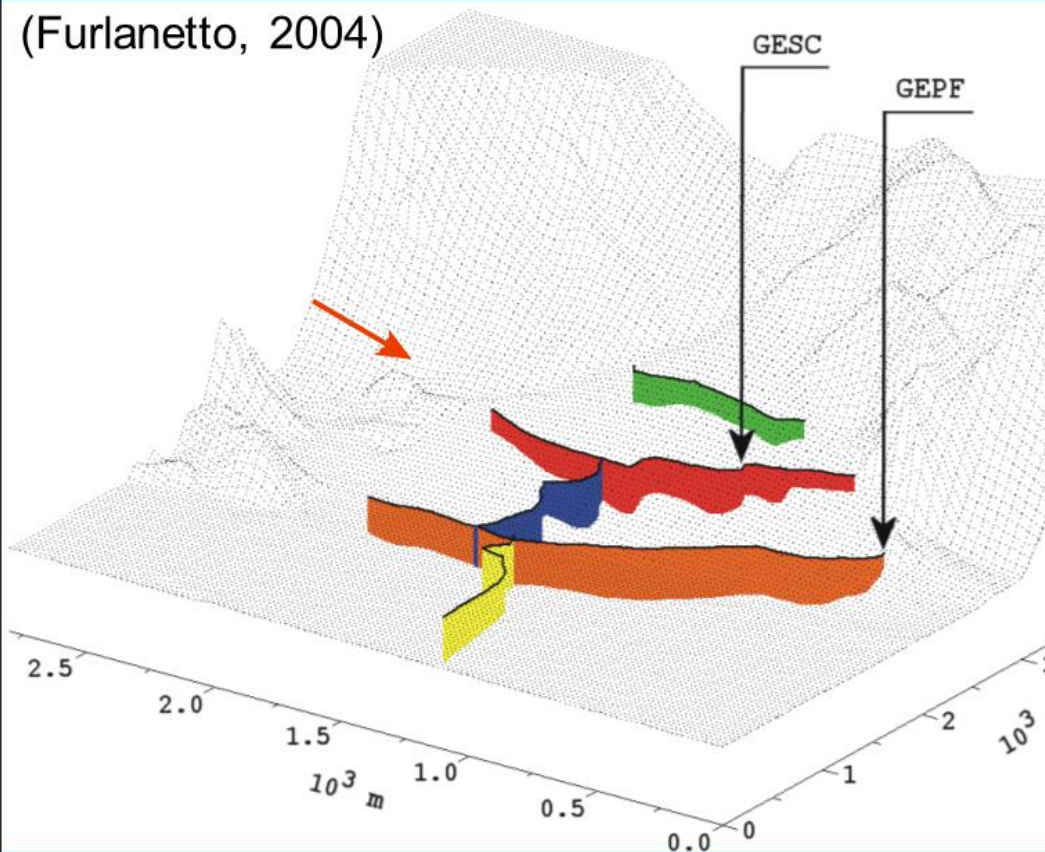
$$H=V_s/4f_0$$

- Profondità bedrock: 125 m

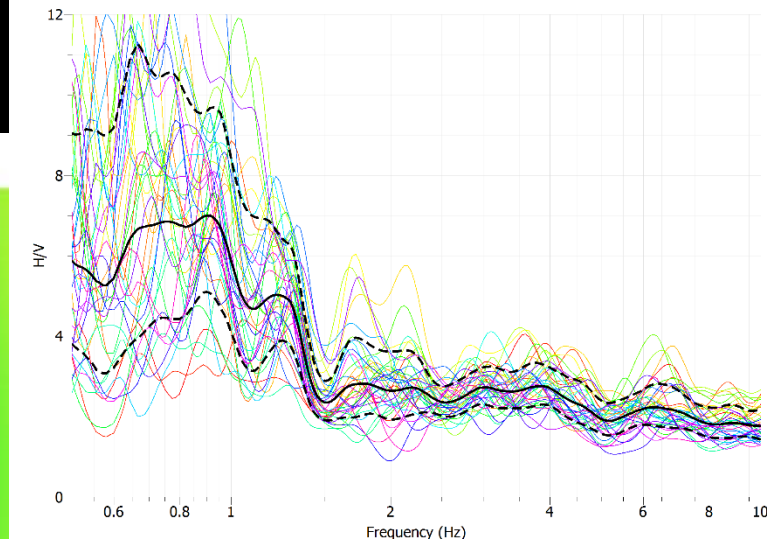
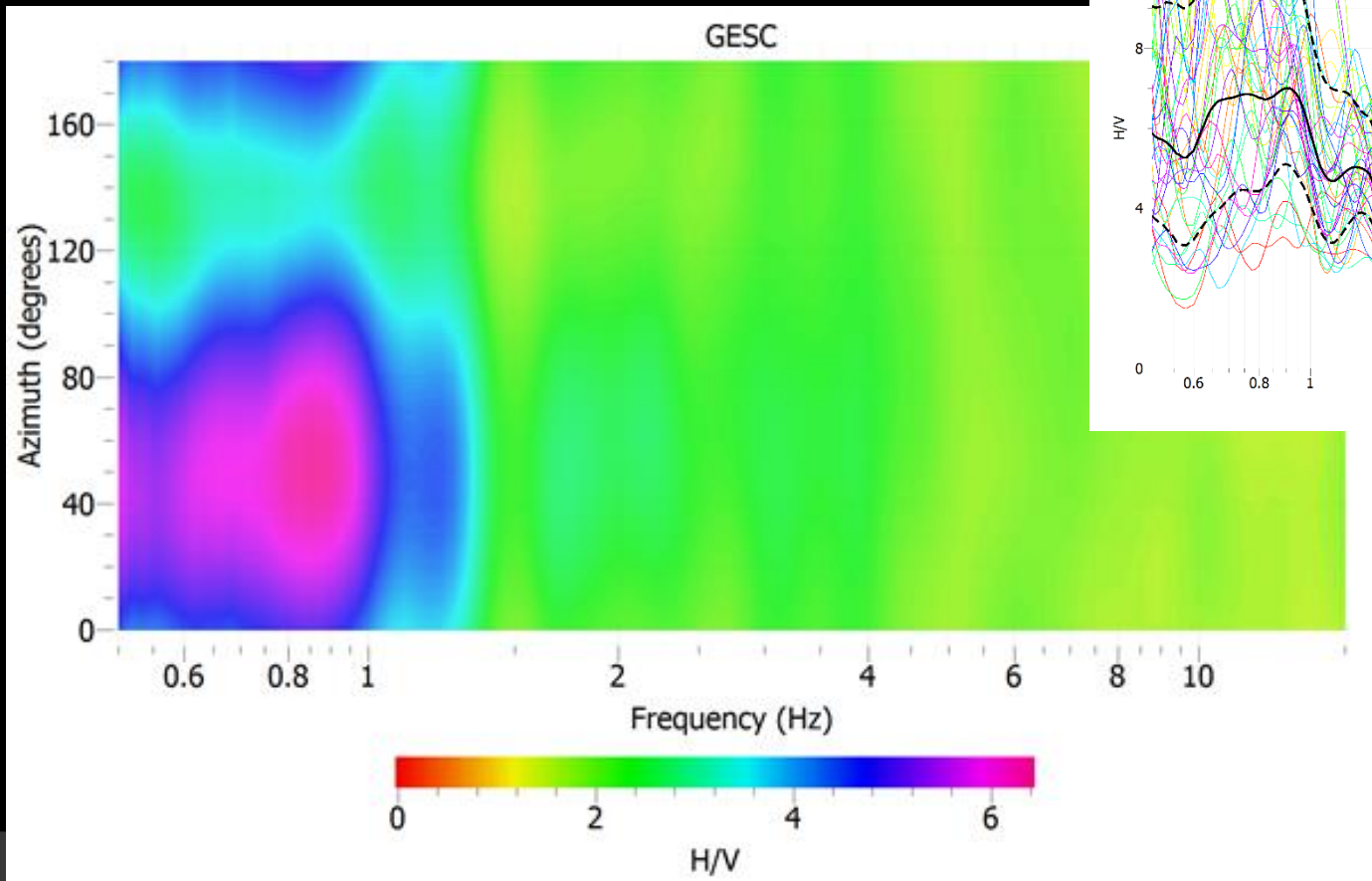
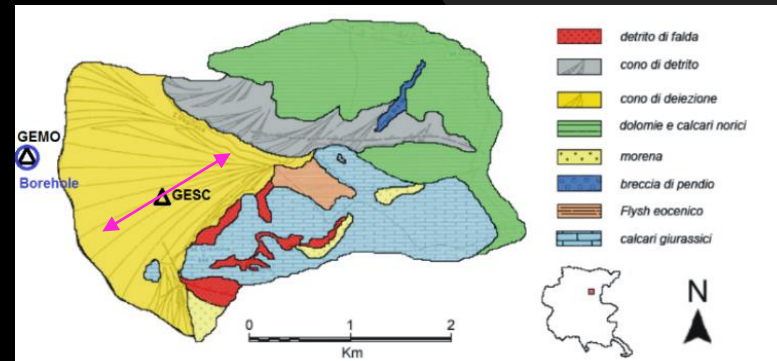


Gravimetria

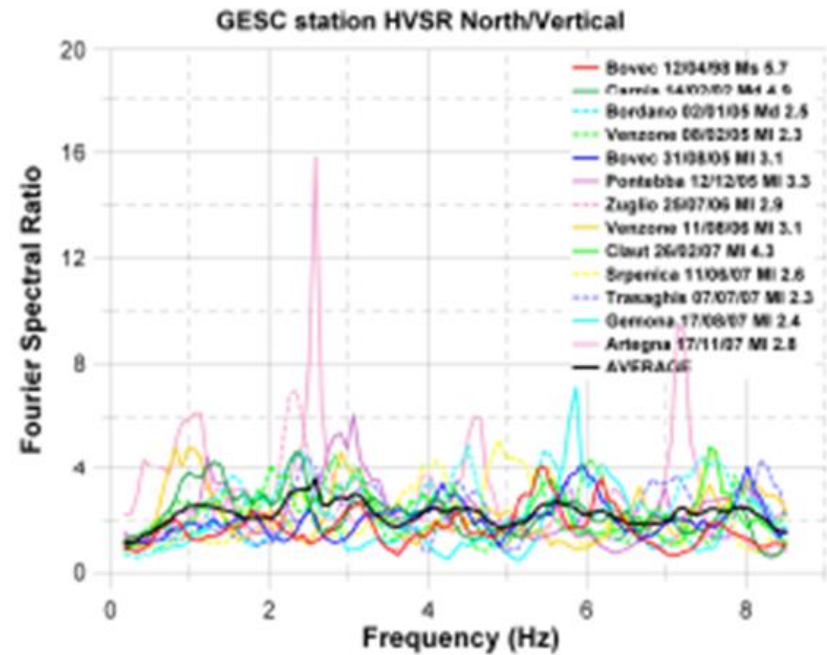
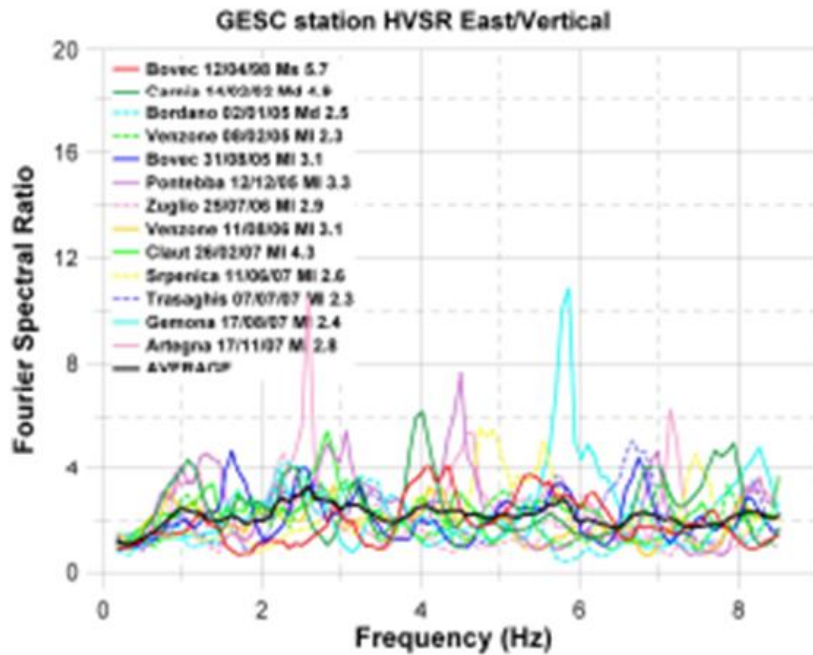
(Furlanetto, 2004)



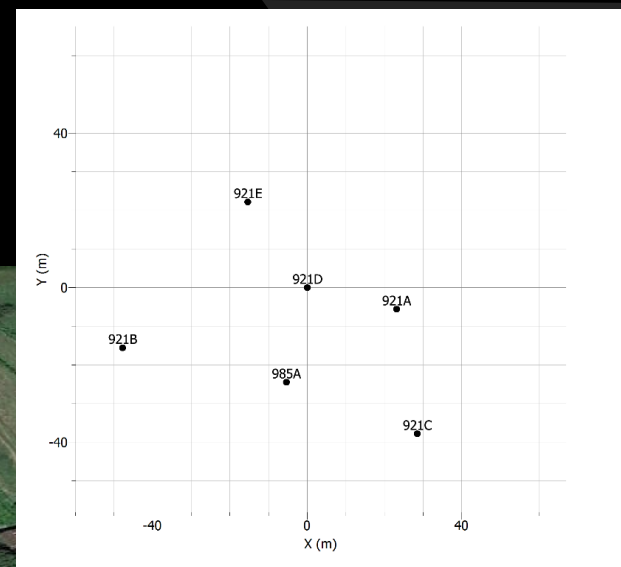
GESC: H/V



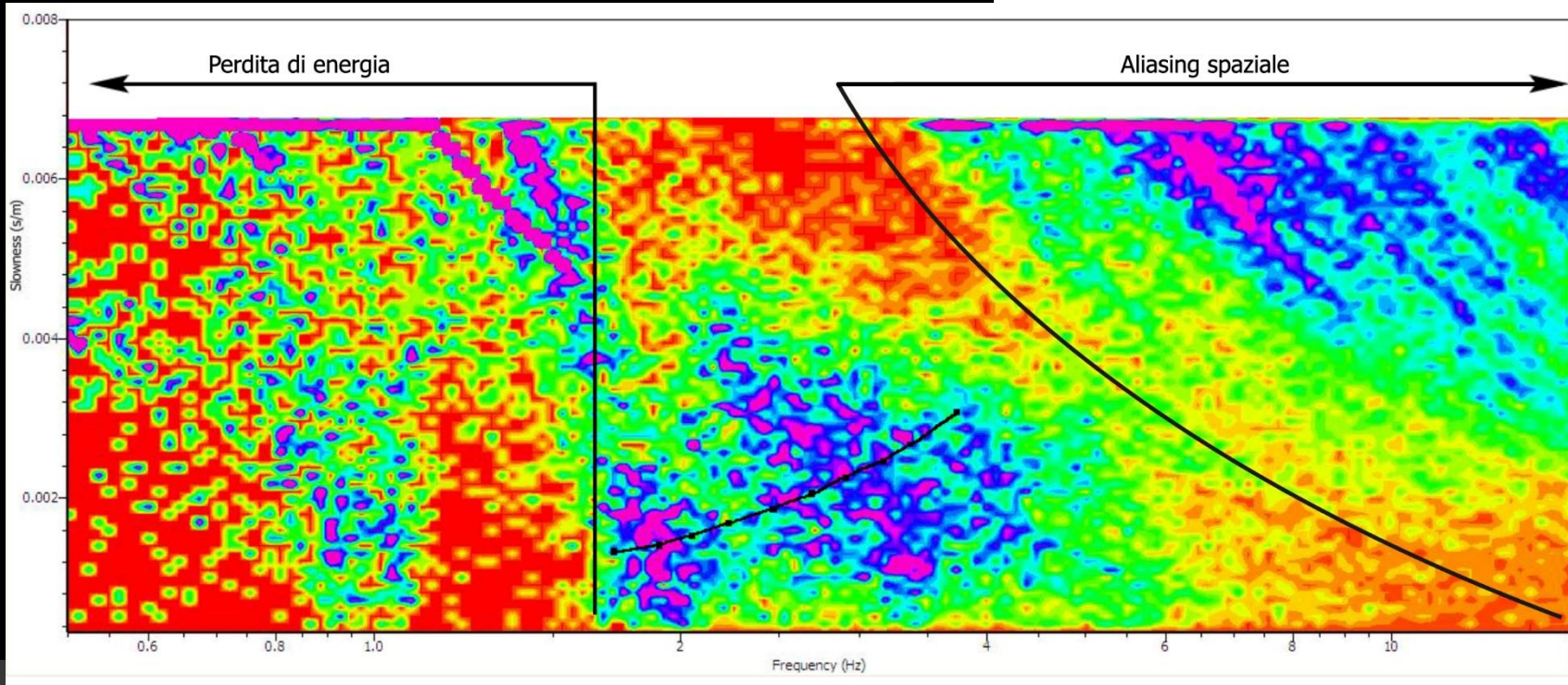
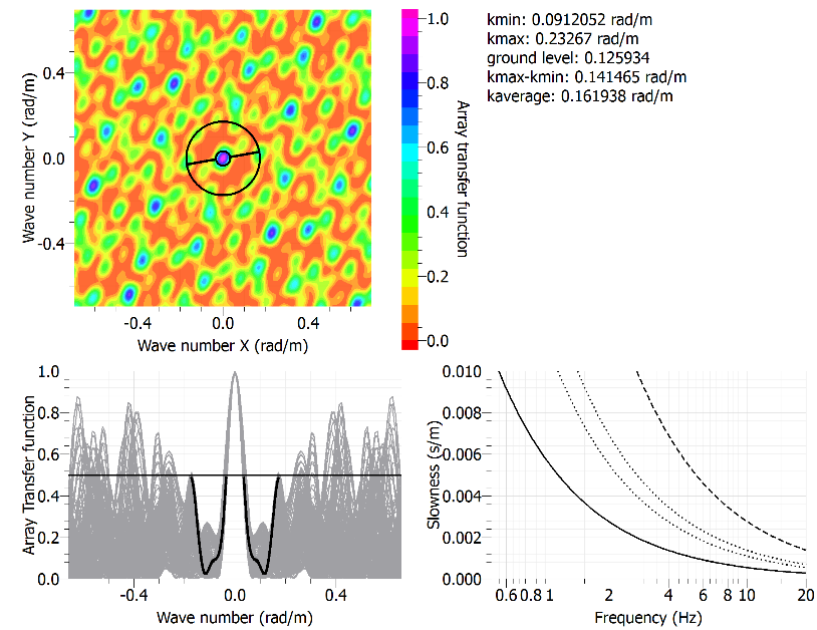
Effetto di sito



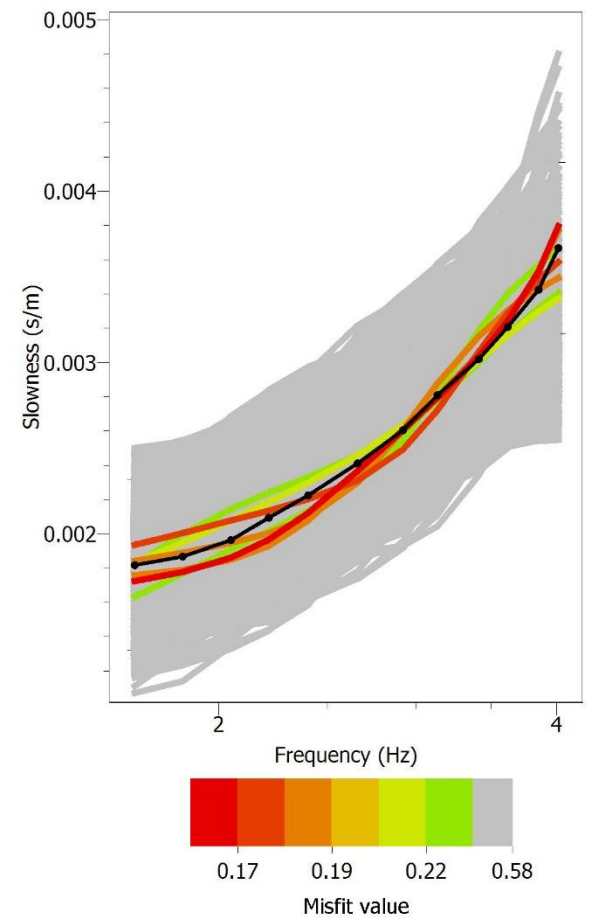
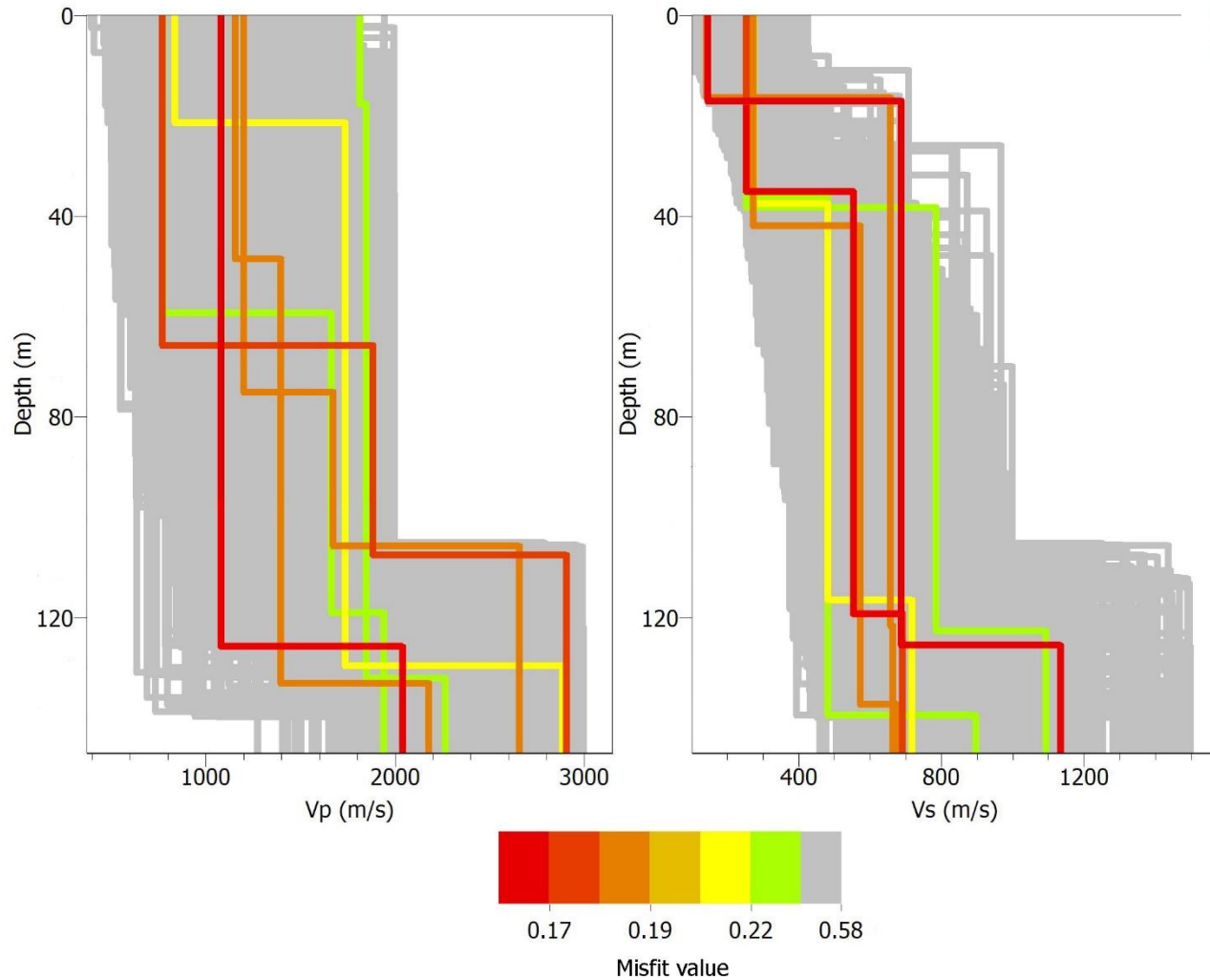
GESC: array



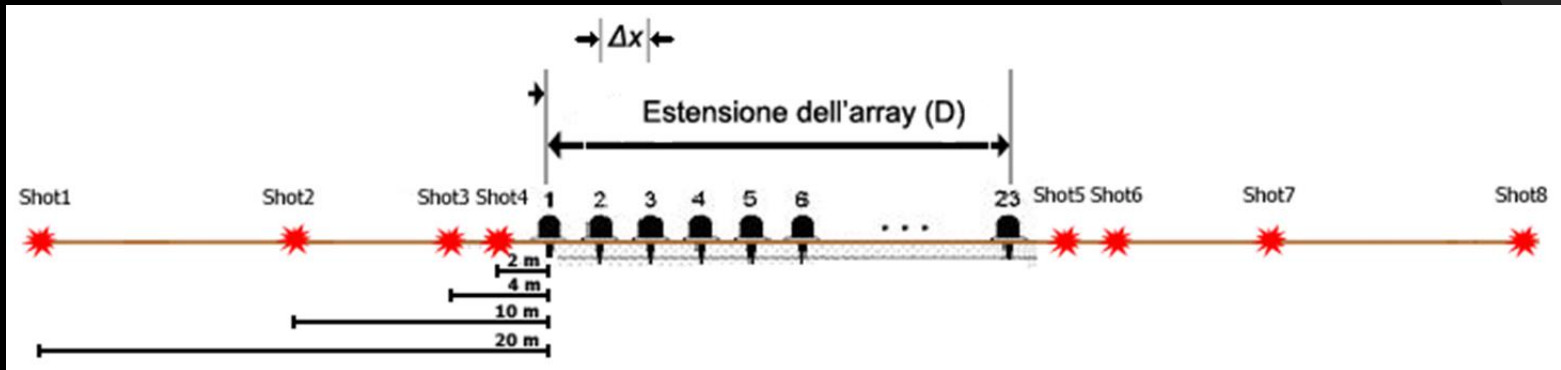
GESC: F-K analisi



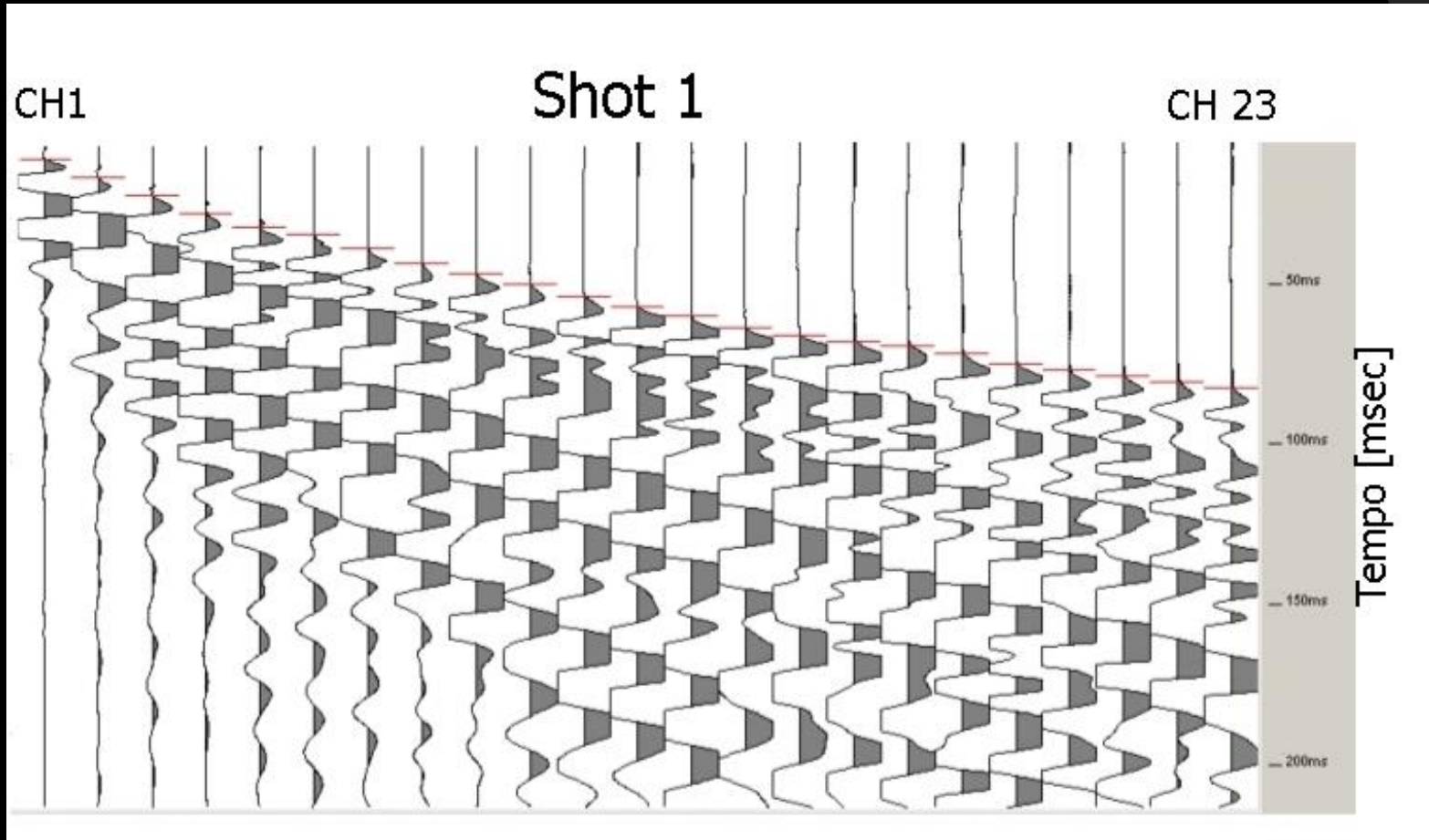
GESC: inversion



Sismica a rifrazione



Sismica a rifrazione: First Break picking



Interpretazione con metodo del Reciproco Generalizzato (Palmer, 1980)

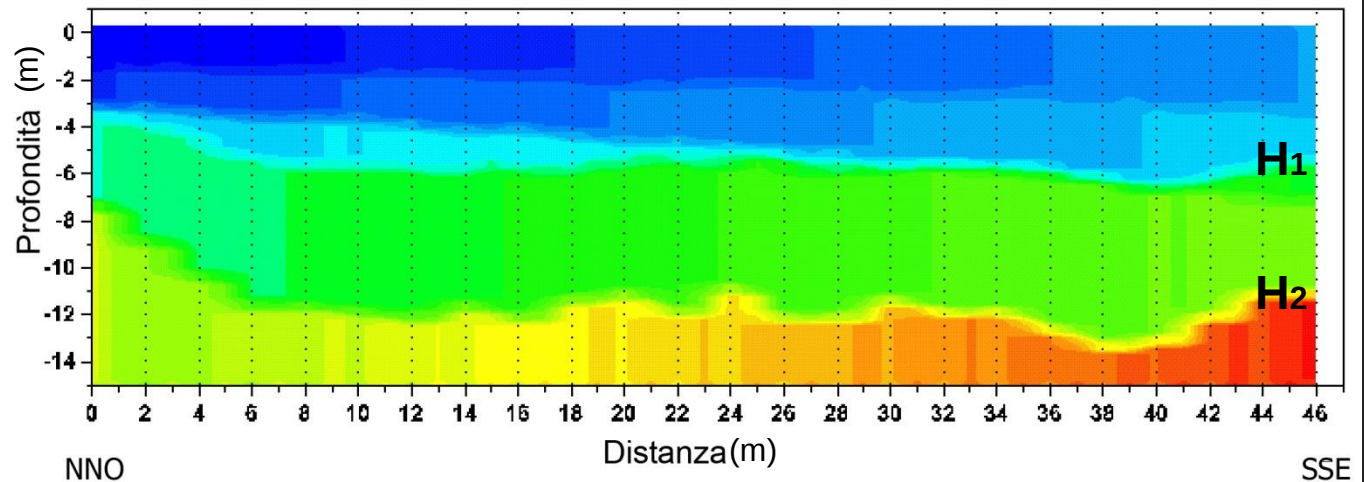
Sismica a rifrazione: onde P

Velocità m/s



1049
1024
999
974
950
925
900
875
850
826
801
776
751
726
701
677
652
627
602
577
553
528
503
478
453
429
404

Profilo di velocità onde P



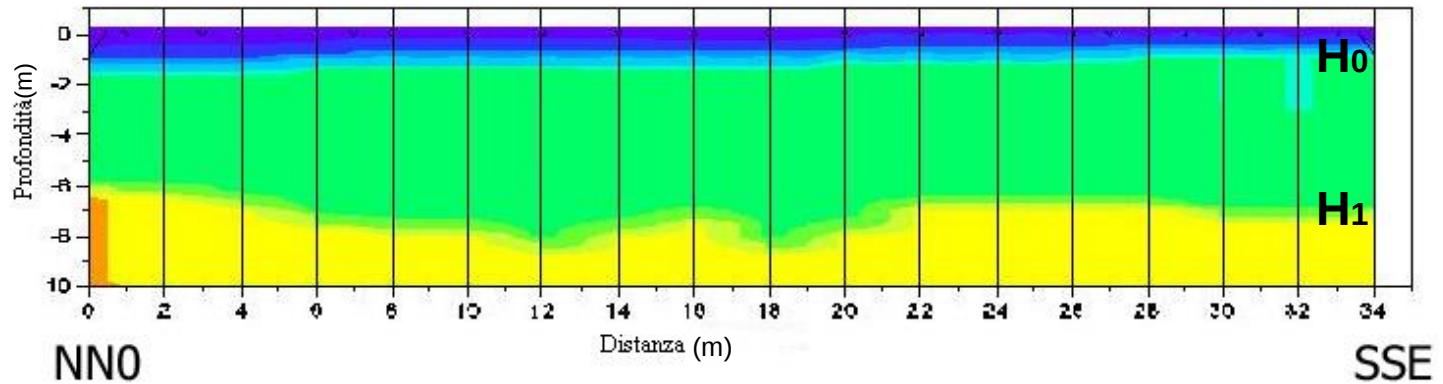
Sismica a rifrazione: onde S

Velocità m/s



400
375
350
325
300
275
250
225
200
175
150
125
113

Profilo di velocità onde S



Conclusioni

- ◎ La presenza di un sito di riferimento dove era disponibile la stratigrafia di un pozzo ha rappresentato un importante punto di calibrazione, permettendo di verificare i risultati ottenuti con le diverse tecniche
- ◎ L'integrazione dei risultati ottenuti con le investigazioni di sismica passiva e attiva ha permesso di migliorare la conoscenza della struttura di Gemona del Friuli. I risultati ottenuti con le varie metodologie sono ben correlati tra loro

Conclusioni

- ◎ La conoscenza della struttura, delle amplificazioni e dei fenomeni di risonanza presso le stazioni sismiche è fondamentale per la caratterizzazione di sito e per la definizione della classe di sito.
- ◎ Si stanno applicando queste metodologie alla caratterizzazione delle diverse stazioni accelerometriche della RAF e RAN che si trovano in Friuli Venezia Giulia

Grazie per l'attenzione