

REPORT DELLE INDAGINI GEOFISICHE E GEOGNOSTICHE

HVSR1

DATE 16.02.2016		HOUR 9.10		PLACE Sant'Alberto																																				
OPERATOR Geologica Toscana - Prospezioni Geofisiche S.n.c.			GPS TYPE and #																																					
GAUSS-BOAGA LATITUDE 4936438		GAUSS-BOAGA LONGITUDE 2293599		ALTITUDE 1,0 m slm																																				
STATION TYPE PASI 16SG24-N		SENSOR TYPE SENSHE 3D - 4,5 Hz																																						
STATION #		SENSOR #		DISK #																																				
FILE NAME RAHVSR1_.saf				POINT #																																				
GAIN 15000		SAMPL. FREQ 500 Hz		REC. DURATION 27 min 18,4 sec minutes seconds																																				
WEATHER		WIND <input checked="" type="checkbox"/> none <input type="checkbox"/> weak (5m/s) <input type="checkbox"/> medium <input type="checkbox"/> strong		Measurement (if any):																																				
CONDITIONS		RAIN <input checked="" type="checkbox"/> none <input type="checkbox"/> weak <input type="checkbox"/> medium <input type="checkbox"/> strong		Measurement (if any):																																				
Temperature (approx): 8		Remarks																																						
GROUND		<input checked="" type="checkbox"/> earth (<input type="checkbox"/> hard <input checked="" type="checkbox"/> soft) <input type="checkbox"/> gravel <input type="checkbox"/> sand <input type="checkbox"/> rock <input type="checkbox"/> grass = (<input type="checkbox"/> short <input type="checkbox"/> tall)																																						
TYPE		<input type="checkbox"/> asphalt <input type="checkbox"/> cement <input type="checkbox"/> concrete <input type="checkbox"/> paved <input type="checkbox"/> other <input type="checkbox"/> dry soil <input checked="" type="checkbox"/> wet soil Remarks																																						
ARTIFICIAL GROUND-SENSOR COUPLING <input type="checkbox"/> no <input checked="" type="checkbox"/> yes, type Infissione																																								
BUILDING DENSITY <input type="checkbox"/> none <input checked="" type="checkbox"/> scattered <input type="checkbox"/> dense <input type="checkbox"/> other, type																																								
TRANSIENTS		MONOCHROMATIC NOISE SOURCES (factories, works, pumps, rivers...)																																						
		<input checked="" type="checkbox"/> no <input type="checkbox"/> yes, type																																						
<table border="1"> <thead> <tr> <th></th> <th>none</th> <th>few</th> <th>moderate</th> <th>many</th> <th>very dense</th> <th>distance</th> </tr> </thead> <tbody> <tr> <td>cars</td> <td></td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>trucks</td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>pedestrians</td> <td></td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>other</td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>			none	few	moderate	many	very dense	distance	cars		<input checked="" type="checkbox"/>					trucks	<input checked="" type="checkbox"/>						pedestrians		<input checked="" type="checkbox"/>					other	<input checked="" type="checkbox"/>						NEARBY STRUCTURES (description, height, distance) (trees, polls, buildings, bridges, underground structures,...) Trees, Buildings			
	none	few	moderate	many	very dense	distance																																		
cars		<input checked="" type="checkbox"/>																																						
trucks	<input checked="" type="checkbox"/>																																							
pedestrians		<input checked="" type="checkbox"/>																																						
other	<input checked="" type="checkbox"/>																																							
OBSERVATIONS				FREQUENCY: Hz (if computed in the field)																																				

**Qualità della misura:**

Durata: rispettata
 Stazionarietà: rispettata
 Isotropia: rispettata
 Assenza di disturbi: rispettata
 Plausibilità fisica: rispettata
 Robustezza statistica: rispettata

MISURA TIPO A2**HVSR1**

Peak frequency (Hz): 1.7 (± 4.8)

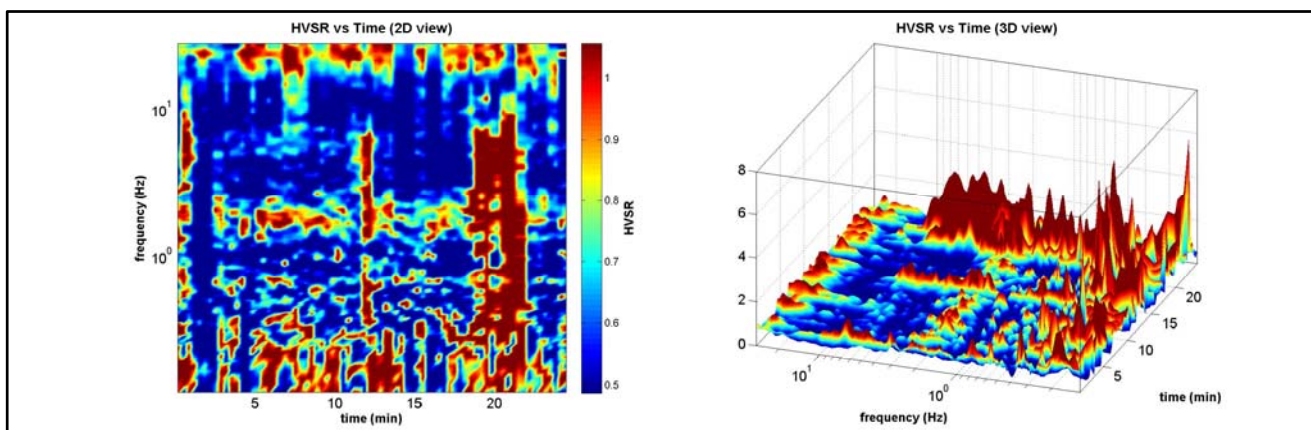
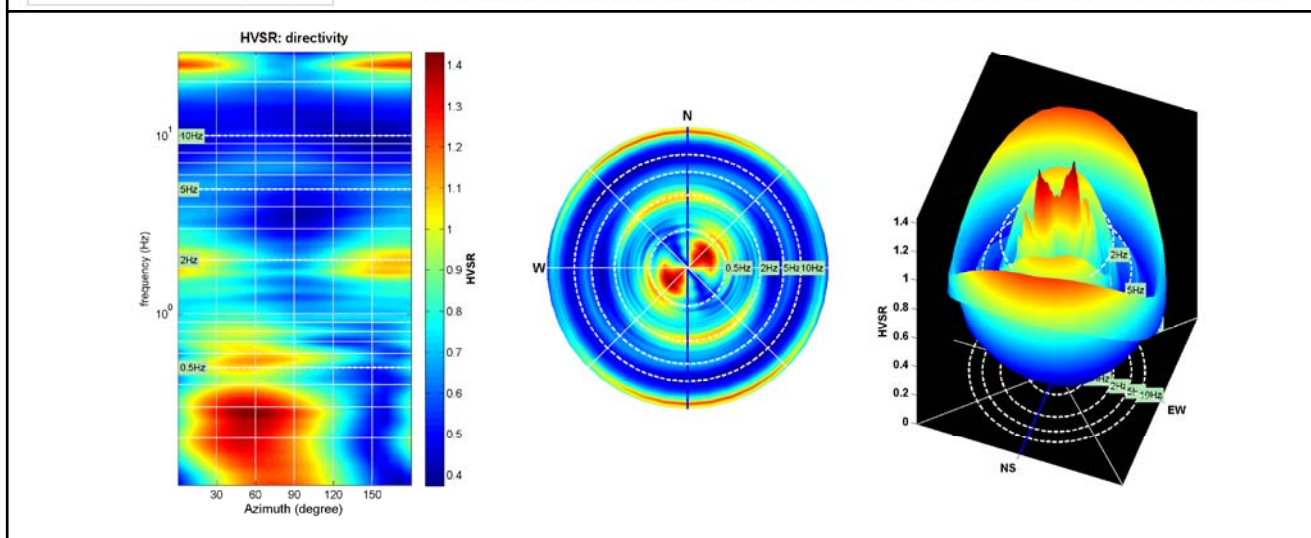
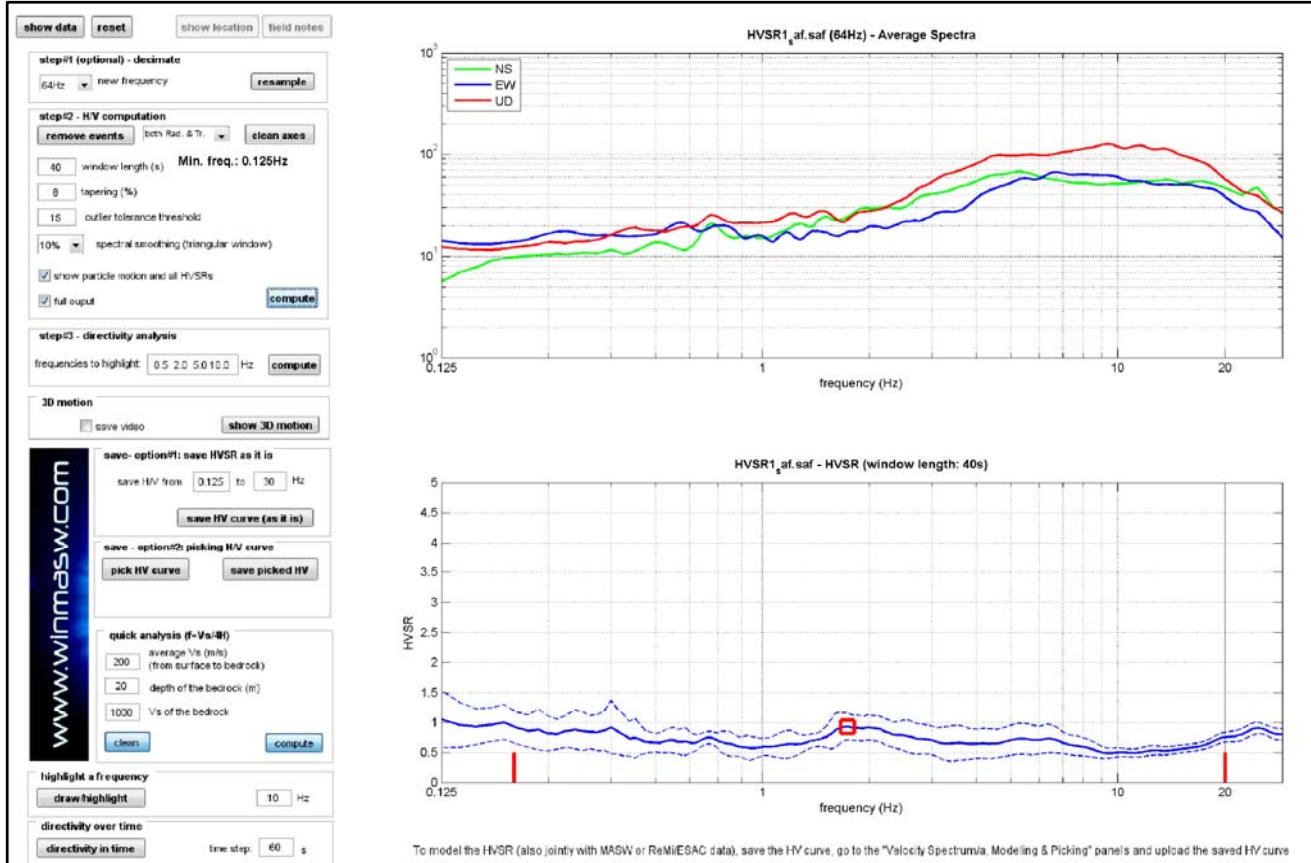
Peak HVSR value: 0.9 (± 0.2)

=== Criteria for a reliable H/V curve ===

- #1. $[f_0 > 10/Lw]$: $1.735 > 0.25$ (OK)
- #2. $[nc > 200]$: $5136 > 200$ (OK)
- #3. $[f_0 > 0.5\text{Hz}; \sigma_A(f) < 2 \text{ for } 0.5f_0 < f < 2f_0]$ (OK)

=== Criteria for a clear H/V peak (at least 5 should be fulfilled) ===

- #1. [exists f^- in the range $[f_0/4, f_0]$ | $AH/V(f^-) < A_0/2$]: yes (considering standard deviations), at frequency 0.5Hz (OK)
- #2. [exists f^+ in the range $[f_0, 4f_0]$ | $AH/V(f^+) < A_0/2$]: yes (considering standard deviations), at frequency Hz (OK)
- #3. $[A_0 > 2]$: $0.9 < 2$ (NO)
- #4. $[f_{\text{peak}}[Ah/v(f) \pm \sigma_A(f)] = f_0 \pm 5\%]$: (NO)
- #5. $[\sigma_{\text{mf}} < \epsilon(f_0)]$: $4.758 > 0.174$ (NO)
- #6. $[\sigma_A(f_0) < \theta(f_0)]$: $0.229 < 1.78$ (OK)



HVSR2

DATE 16.02.2016		HOUR 10.10		PLACE Savarna																																				
OPERATOR Geologica Toscana - Prospezioni Geofisiche S.n.c.			GPS TYPE and #																																					
GAUSS-BOAGA LATITUDE 4932448		GAUSS-BOAGA LONGITUDE 2290296		ALTITUDE 2,3 m slm																																				
STATION TYPE PASI 16SG24-N		SENSOR TYPE SENSHE 3D - 4,5 Hz																																						
STATION #		SENSOR #		DISK #																																				
FILE NAME RAHVSR2_.saf				POINT #																																				
GAIN 15000		SAMPL. FREQ 500 Hz		REC. DURATION 27 min 18,4 sec minutes seconds																																				
WEATHER		WIND <input checked="" type="checkbox"/> none <input type="checkbox"/> weak (5m/s) <input type="checkbox"/> medium <input type="checkbox"/> strong		Measurement (if any): _____																																				
CONDITIONS		RAIN <input checked="" type="checkbox"/> none <input type="checkbox"/> weak <input type="checkbox"/> medium <input type="checkbox"/> strong		Measurement (if any): _____																																				
Temperature (approx): 8		Remarks _____																																						
GROUND		<input checked="" type="checkbox"/> earth (<input type="checkbox"/> hard <input checked="" type="checkbox"/> soft) <input type="checkbox"/> gravel <input type="checkbox"/> sand <input type="checkbox"/> rock <input type="checkbox"/> grass = (<input type="checkbox"/> short <input type="checkbox"/> tall)																																						
TYPE		<input type="checkbox"/> asphalt <input type="checkbox"/> cement <input type="checkbox"/> concrete <input type="checkbox"/> paved <input type="checkbox"/> other _____ <input type="checkbox"/> dry soil <input checked="" type="checkbox"/> wet soil Remarks _____																																						
ARTIFICIAL GROUND-SENSOR COUPLING <input type="checkbox"/> no <input checked="" type="checkbox"/> yes, type Infissione																																								
BUILDING DENSITY <input type="checkbox"/> none <input checked="" type="checkbox"/> scattered <input type="checkbox"/> dense <input type="checkbox"/> other, type _____																																								
TRANSIENTS		<table border="1"> <thead> <tr> <th></th> <th>none</th> <th>few</th> <th>moderate</th> <th>many</th> <th>very dense</th> <th>distance</th> </tr> </thead> <tbody> <tr> <td>cars</td> <td></td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>trucks</td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>pedestrians</td> <td></td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>other</td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>					none	few	moderate	many	very dense	distance	cars		<input checked="" type="checkbox"/>					trucks	<input checked="" type="checkbox"/>						pedestrians		<input checked="" type="checkbox"/>					other	<input checked="" type="checkbox"/>					
	none	few	moderate	many	very dense	distance																																		
cars		<input checked="" type="checkbox"/>																																						
trucks	<input checked="" type="checkbox"/>																																							
pedestrians		<input checked="" type="checkbox"/>																																						
other	<input checked="" type="checkbox"/>																																							
		MONOCHROMATIC NOISE SOURCES (factories, works, pumps, rivers...) <input checked="" type="checkbox"/> no <input type="checkbox"/> yes, type _____																																						
		NEARBY STRUCTURES (description, height, distance) (trees, polls, buildings, bridges, underground structures,...) Trees, Buildings																																						
OBSERVATIONS				FREQUENCY: _____ Hz (if computed in the field)																																				

**Qualità della misura:**

Durata: rispettata
 Stazionarietà: rispettata
 Isotropia: rispettata
 Assenza di disturbi: rispettata
 Plausibilità fisica: rispettata
 Robustezza statistica: rispettata

MISURA TIPO A2**HVSR2**

Peak frequency (Hz): 20.0 (±7.9)

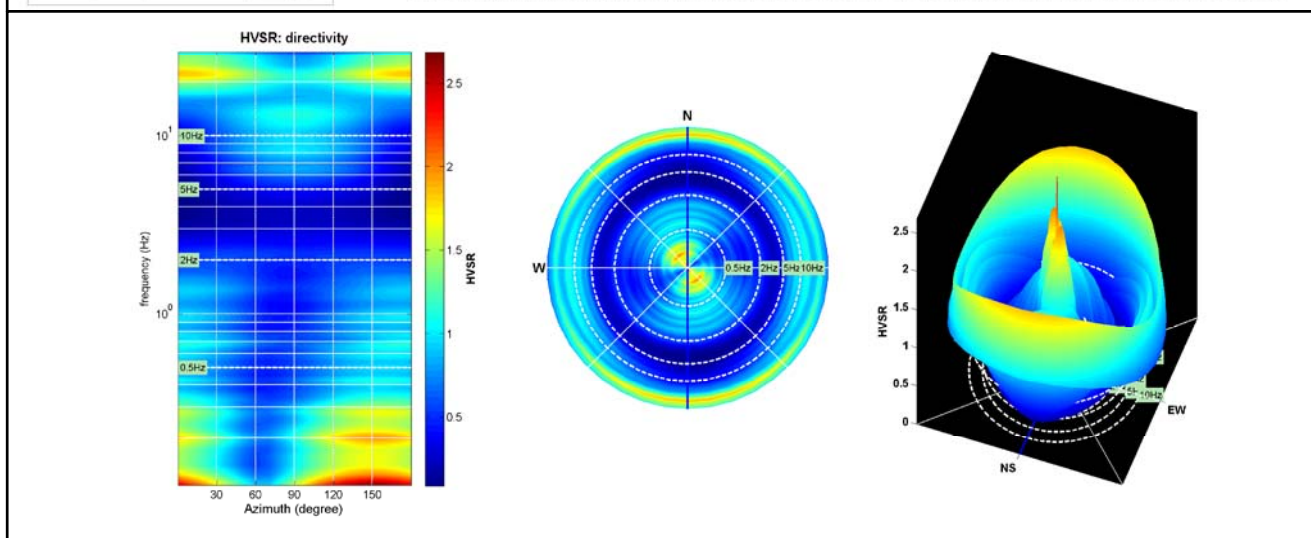
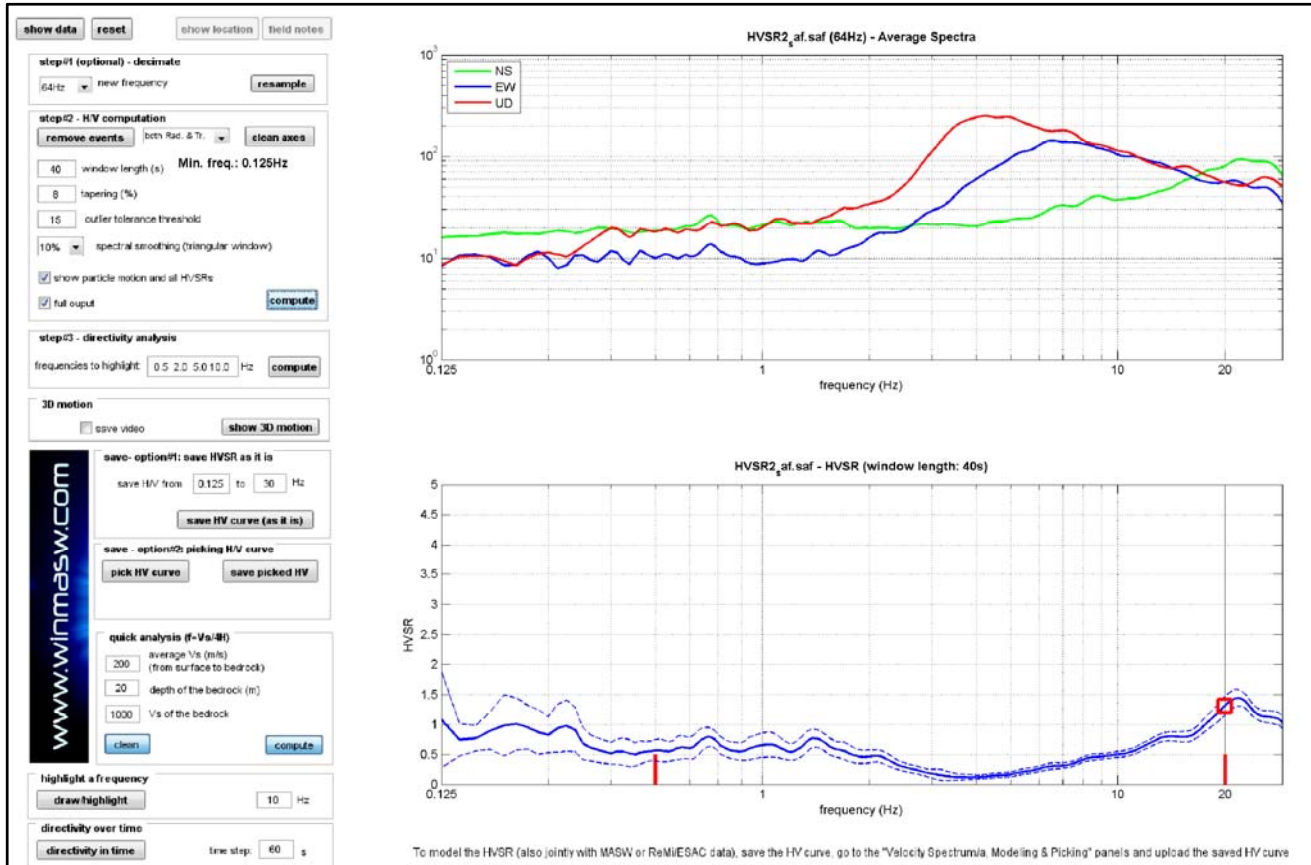
Peak HVSR value: 1.3 (±0.2)

=== Criteria for a reliable H/V curve ===

- #1. $[f_0 > 10/Lw]$: $19.994 > 0.25$ (OK)
- #2. $[nc > 200]$: $55184 > 200$ (OK)
- #3. $[f_0 > 0.5\text{Hz}; \sigma_A(f) < 2 \text{ for } 0.5f_0 < f < 2f_0]$ (OK)

=== Criteria for a clear H/V peak (at least 5 should be fulfilled) ===

- #1. $[\text{exists } f^- \text{ in the range } [f_0/4, f_0] \mid AH/V(f^-) < A_0/2]$: yes, at frequency 5.0Hz (OK)
- #2. $[\text{exists } f^+ \text{ in the range } [f_0, 4f_0] \mid AH/V(f^+) < A_0/2]$: (NO)
- #3. $[A_0 > 2]$: $1.3 < 2$ (NO)
- #4. $[f_{\text{peak}}[Ah/v(f) \pm \sigma_A(f)] = f_0 \pm 5\%]$: (OK)
- #5. $[\sigma_{\text{mf}} < \epsilon(f_0)]$: $7.858 > 1.000$ (NO)
- #6. $[\sigma_A(f_0) < \theta(f_0)]$: $0.155 < 1.58$ (OK)



HVSR3

DATE 16.02.2016		HOUR 13.50		PLACE Roncalceci																																				
OPERATOR Geologica Toscana - Prospezioni Geofisiche S.n.c.			GPS TYPE and #																																					
GAUSS-BOAGA LATITUDE 4914802		GAUSS-BOAGA LONGITUDE 2290476		ALTITUDE 7,0 m slm																																				
STATION TYPE PASI 16SG24-N		SENSOR TYPE SENSHE 3D - 4,5 Hz																																						
STATION #		SENSOR #		DISK #																																				
FILE NAME RAHVSR3_.saf				POINT #																																				
GAIN 15000		SAMPL. FREQ 500 Hz		REC. DURATION 27 min 18,4 sec minutes seconds																																				
WEATHER		WIND <input checked="" type="radio"/> none <input type="radio"/> weak (5m/s) <input type="radio"/> medium <input type="radio"/> strong		Measurement (if any): _____																																				
CONDITIONS		RAIN <input type="radio"/> none <input type="radio"/> weak <input checked="" type="radio"/> medium <input type="radio"/> strong		Measurement (if any): _____																																				
Temperature (approx): 8		Remarks _____																																						
GROUND		<input checked="" type="radio"/> earth (<input type="checkbox"/> hard <input checked="" type="radio"/> soft) <input type="radio"/> gravel <input type="radio"/> sand <input type="radio"/> rock <input type="radio"/> grass = (<input type="checkbox"/> short <input type="checkbox"/> tall)																																						
TYPE		<input type="checkbox"/> asphalt <input type="checkbox"/> cement <input type="checkbox"/> concrete <input type="checkbox"/> paved <input type="checkbox"/> other _____ <input type="checkbox"/> dry soil <input checked="" type="radio"/> wet soil Remarks _____																																						
ARTIFICIAL GROUND-SENSOR COUPLING <input type="checkbox"/> no <input checked="" type="radio"/> yes, type Infissione																																								
BUILDING DENSITY <input type="checkbox"/> none <input checked="" type="radio"/> scattered <input type="checkbox"/> dense <input type="checkbox"/> other, type _____																																								
TRANSIENTS		MONOCHROMATIC NOISE SOURCES (factories, works, pumps, rivers...)																																						
<table border="1"> <thead> <tr> <th></th> <th>none</th> <th>few</th> <th>moderate</th> <th>many</th> <th>very dense</th> <th>distance</th> </tr> </thead> <tbody> <tr> <td>cars</td> <td></td> <td></td> <td><input checked="" type="radio"/></td> <td></td> <td></td> <td></td> </tr> <tr> <td>trucks</td> <td></td> <td><input checked="" type="radio"/></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>pedestrians</td> <td><input checked="" type="radio"/></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>other</td> <td><input checked="" type="radio"/></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>			none	few	moderate	many	very dense	distance	cars			<input checked="" type="radio"/>				trucks		<input checked="" type="radio"/>					pedestrians	<input checked="" type="radio"/>						other	<input checked="" type="radio"/>						<input checked="" type="radio"/> no <input type="checkbox"/> yes, type _____ NEARBY STRUCTURES (description, height, distance) (trees, polls, buildings, bridges, underground structures,...) Trees, Buildings			
	none	few	moderate	many	very dense	distance																																		
cars			<input checked="" type="radio"/>																																					
trucks		<input checked="" type="radio"/>																																						
pedestrians	<input checked="" type="radio"/>																																							
other	<input checked="" type="radio"/>																																							
OBSERVATIONS				FREQUENCY: _____ Hz (if computed in the field)																																				

**Qualità della misura:**

Durata: rispettata
 Stazionarietà: rispettata
 Isotropia: rispettata
 Assenza di disturbi: rispettata
 Plausibilità fisica: rispettata
 Robustezza statistica: rispettata

MISURA TIPO C**HVSR3**

Peak frequency (Hz): 0.3 (± 4.5)

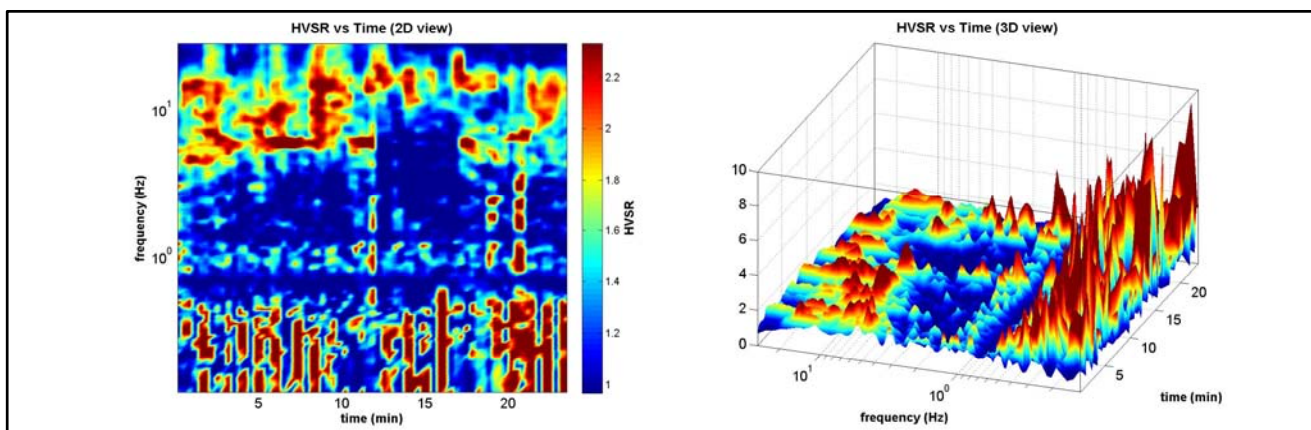
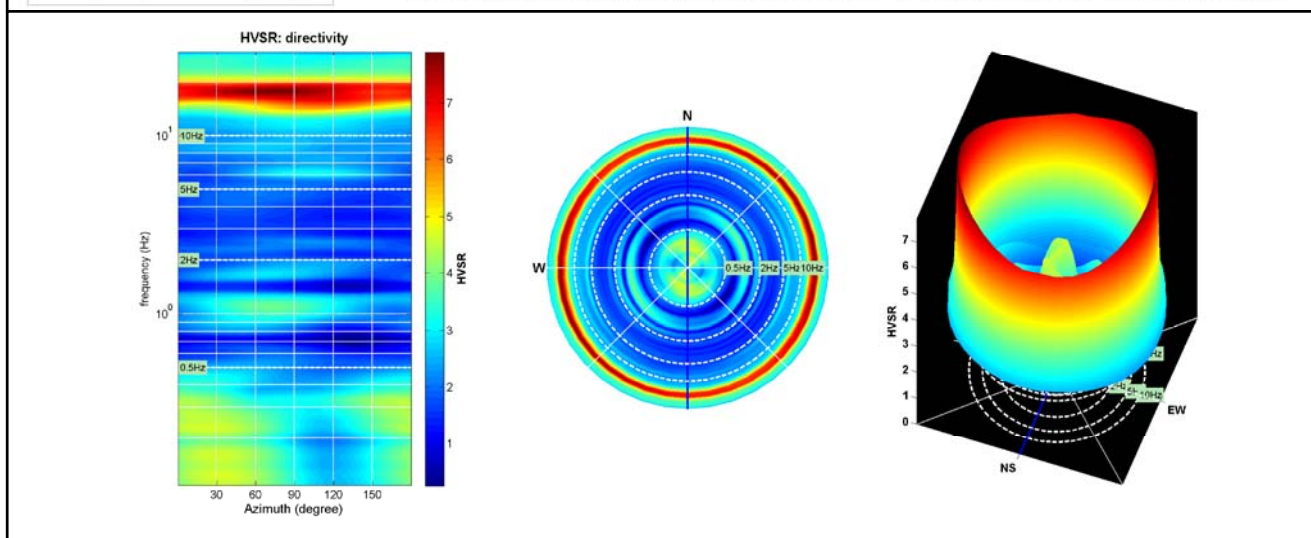
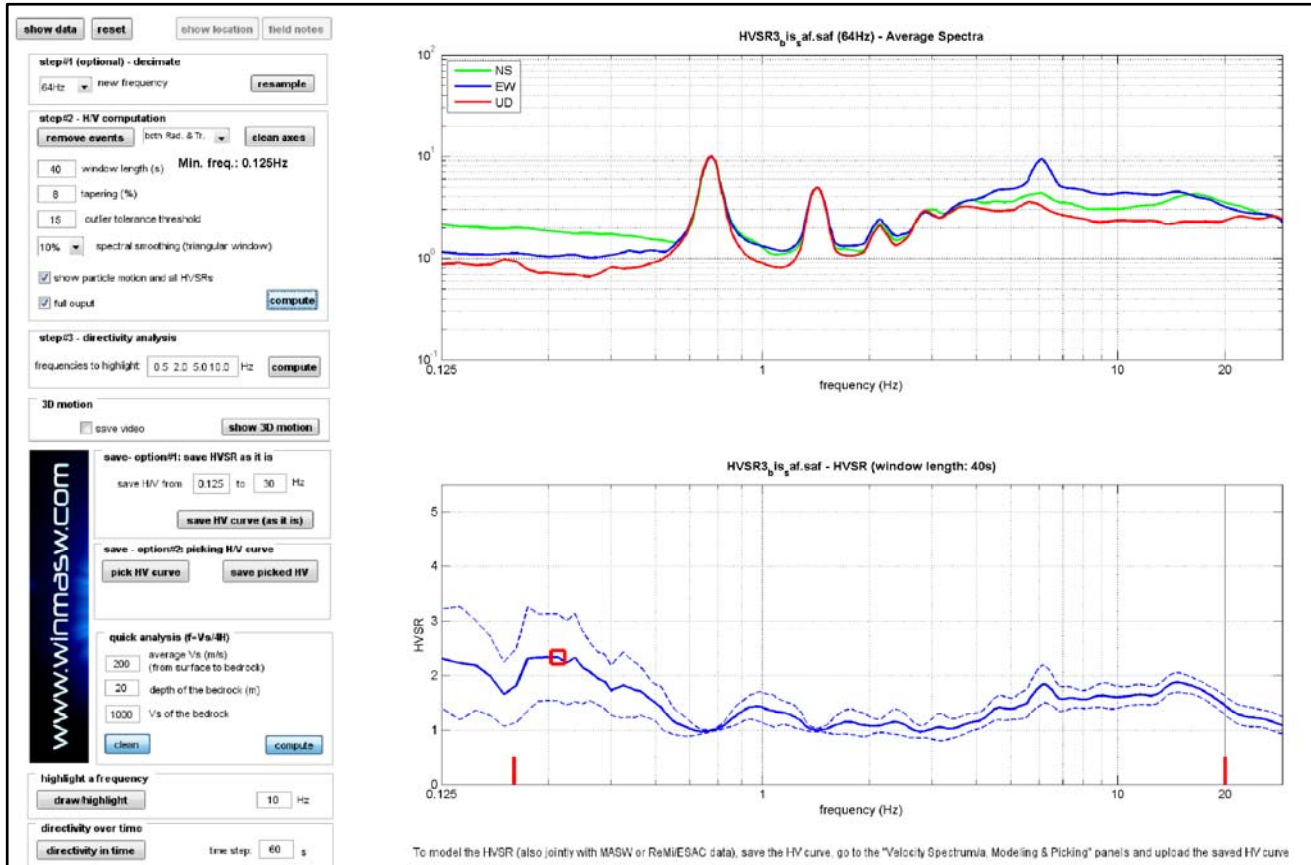
Peak HVSR value: 2.3 (± 0.8)

=== Criteria for a reliable H/V curve ===

- #1. $[f_0 > 10/Lw]$: $0.266 > 0.25$ (OK)
- #2. $[nc > 200]$: $755 > 200$ (OK)
- #3. $[f_0 < 0.5\text{Hz}; \sigma_A(f) < 3 \text{ for } 0.5f_0 < f < 2f_0]$ (OK)

=== Criteria for a clear H/V peak (at least 5 should be fulfilled) ===

- #1. [exists f^- in the range $[f_0/4, f_0]$ | $AH/V(f^-) < A_0/2$]: yes (considering standard deviations), at frequency 0.2Hz (OK)
- #2. [exists f^+ in the range $[f_0, 4f_0]$ | $AH/V(f^+) < A_0/2$]: yes, at frequency 0.6Hz (OK)
- #3. $[A_0 > 2]$: $2.3 > 2$ (OK)
- #4. $[f_{\text{peak}}[Ah/v(f) \pm \sigma_A(f)] = f_0 \pm 5\%]$: (NO)
- #5. $[\sigma_{\text{mf}} < \epsilon(f_0)]$: $4.547 > 0.053$ (NO)
- #6. $[\sigma_A(f_0) < \theta(f_0)]$: $0.795 < 2.5$ (OK)



HVSR4

DATE 16.02.2016		HOUR 14.33		PLACE Filetto																																				
OPERATOR Geologica Toscana - Prospezioni Geofisiche S.n.c.			GPS TYPE and #																																					
GAUSS-BOAGA LATITUDE 4913379		GAUSS-BOAGA LONGITUDE 2287036		ALTITUDE 9,5 m slm																																				
STATION TYPE PASI 16SG24-N		SENSOR TYPE SENSHE 3D - 4,5 Hz																																						
STATION #		SENSOR #		DISK #																																				
FILE NAME RAHVSR4_.saf				POINT #																																				
GAIN 15000		SAMPL. FREQ 500 Hz		REC. DURATION 27 min 18,4 sec minutes seconds																																				
WEATHER		WIND <input checked="" type="checkbox"/> none <input type="checkbox"/> weak (5m/s) <input type="checkbox"/> medium <input type="checkbox"/> strong		Measurement (if any): _____																																				
CONDITIONS		RAIN <input type="checkbox"/> none <input type="checkbox"/> weak <input checked="" type="checkbox"/> medium <input type="checkbox"/> strong		Measurement (if any): _____																																				
Temperature (approx): 8		Remarks _____																																						
GROUND		<input checked="" type="checkbox"/> earth (<input type="checkbox"/> hard <input checked="" type="checkbox"/> soft) <input type="checkbox"/> gravel <input type="checkbox"/> sand <input type="checkbox"/> rock <input type="checkbox"/> grass = (<input type="checkbox"/> short <input type="checkbox"/> tall)																																						
TYPE		<input type="checkbox"/> asphalt <input type="checkbox"/> cement <input type="checkbox"/> concrete <input type="checkbox"/> paved <input type="checkbox"/> other _____ <input type="checkbox"/> dry soil <input checked="" type="checkbox"/> wet soil Remarks _____																																						
ARTIFICIAL GROUND-SENSOR COUPLING <input type="checkbox"/> no <input checked="" type="checkbox"/> yes, type Infissione																																								
BUILDING DENSITY <input type="checkbox"/> none <input checked="" type="checkbox"/> scattered <input type="checkbox"/> dense <input type="checkbox"/> other, type _____																																								
TRANSIENTS		<table border="1"> <thead> <tr> <th></th> <th>none</th> <th>few</th> <th>moderate</th> <th>many</th> <th>very dense</th> <th>distance</th> </tr> </thead> <tbody> <tr> <td>cars</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>trucks</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>pedestrians</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>other</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>					none	few	moderate	many	very dense	distance	cars							trucks							pedestrians							other						
	none	few	moderate	many	very dense	distance																																		
cars																																								
trucks																																								
pedestrians																																								
other																																								
		MONOCHROMATIC NOISE SOURCES (factories, works, pumps, rivers...) <input checked="" type="checkbox"/> no <input type="checkbox"/> yes, type _____																																						
		NEARBY STRUCTURES (description, height, distance) (trees, polls, buildings, bridges, underground structures,...) Trees																																						
OBSERVATIONS				FREQUENCY: _____ Hz (if computed in the field)																																				

**Qualità della misura:**

Durata: rispettata
 Stazionarietà: rispettata
 Isotropia: non rispettata
 Assenza di disturbi: rispettata
 Plausibilità fisica: rispettata
 Robustezza statistica: rispettata

MISURA TIPO B1**HVSR4**

Peak frequency (Hz): 1.2 (± 3.7)

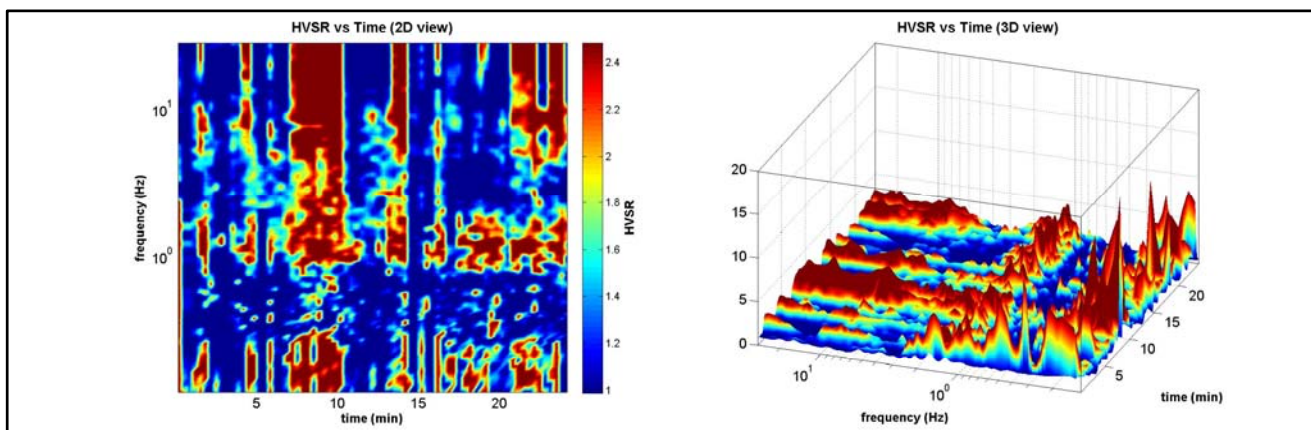
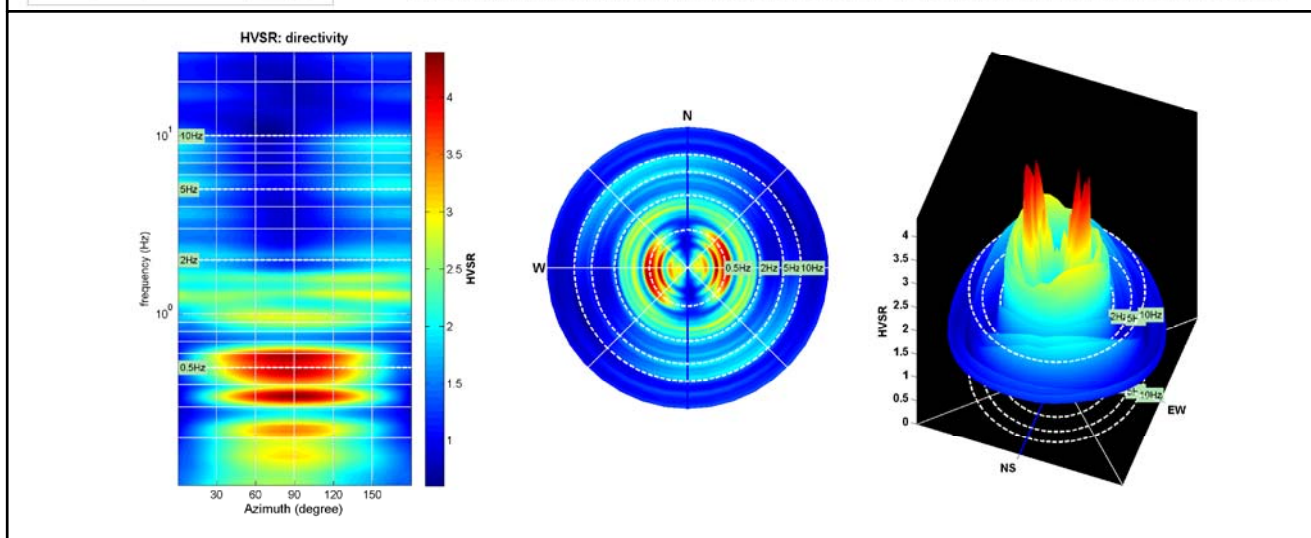
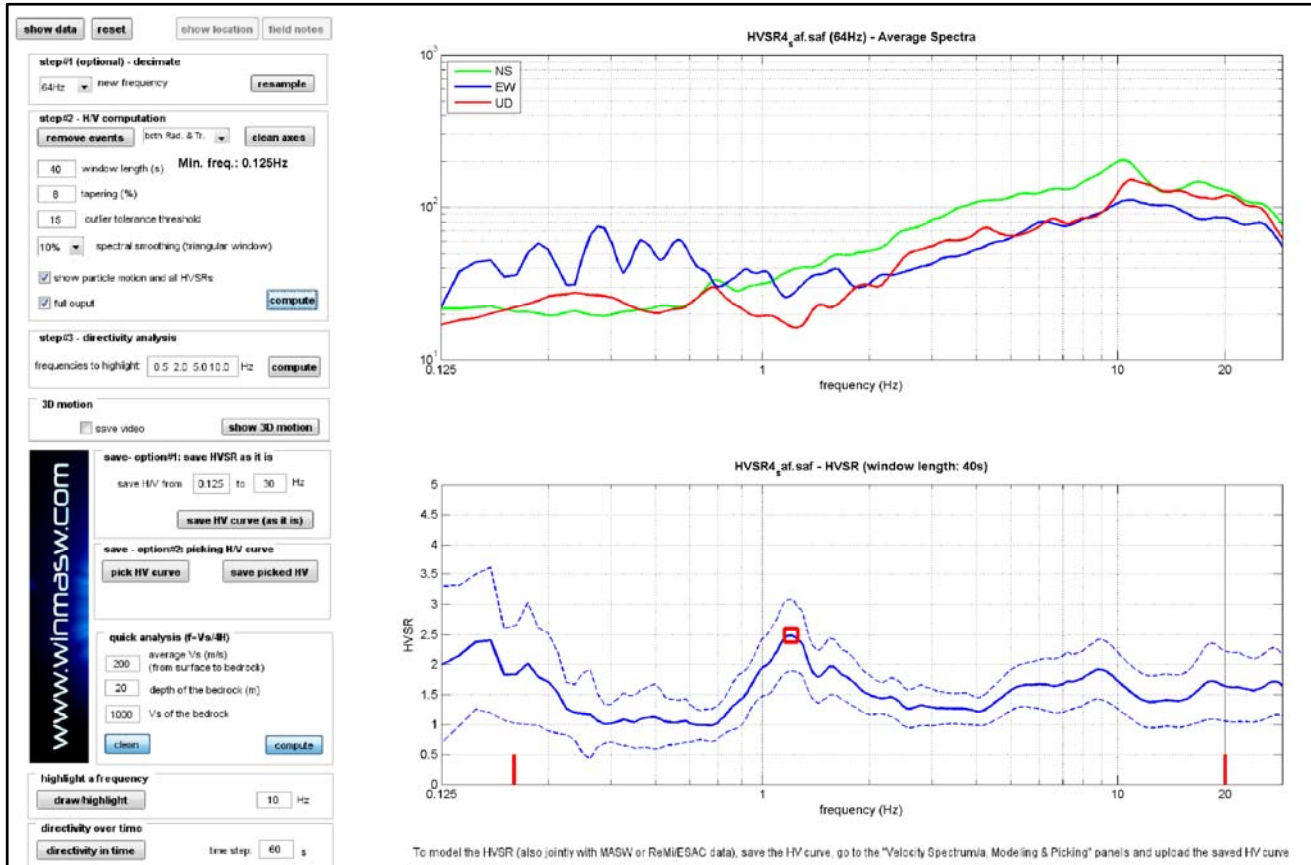
Peak HVSR value: 2.5 (± 0.6)

==== **Criteria for a reliable H/V curve** =====

- #1. $[f_0 > 10/L_w]$: $1.204 > 0.25$ (OK)
- #2. $[n_c > 200]$: $3515 > 200$ (OK)
- #3. $[f_0 > 0.5\text{Hz}; \sigma_A(f) < 2 \text{ for } 0.5f_0 < f < 2f_0]$ (OK)

==== **Criteria for a clear H/V peak (at least 5 should be fulfilled)** =====

- #1. [exists f^- in the range $[f_0/4, f_0]$ | $AH/V(f^-) < A_0/2$]: yes, at frequency 0.3Hz (OK)
- #2. [exists f^+ in the range $[f_0, 4f_0]$ | $AH/V(f^+) < A_0/2$]: yes, at frequency 3.9Hz (OK)
- #3. $[A_0 > 2]$: $2.5 > 2$ (OK)
- #4. $[f_{\text{peak}}[A_h/v(f) \pm \sigma_A(f)] = f_0 \pm 5\%]$: (OK)
- #5. $[\sigma_{\text{mf}} < \epsilon(f_0)]$: $3.659 > 0.120$ (NO)
- #6. $[\sigma_A(f_0) < \theta(f_0)]$: $0.596 < 1.78$ (OK)



HVSR5

DATE 16.02.2016		HOUR 15.18		PLACE San Pietro in Trento																																				
OPERATOR Geologica Toscana - Prospezioni Geofisiche S.n.c.			GPS TYPE and #																																					
GAUSS-BOAGA LATITUDE 4911481		GAUSS-BOAGA LONGITUDE 2287491		ALTITUDE 9,7 m slm																																				
STATION TYPE PASI 16SG24-N		SENSOR TYPE SENSHE 3D - 4,5 Hz																																						
STATION #		SENSOR #		DISK #																																				
FILE NAME RAHVSR5_.saf				POINT #																																				
GAIN 15000		SAMPL. FREQ 500 Hz		REC. DURATION 27 min 18,4 sec minutes seconds																																				
WEATHER		WIND <input checked="" type="checkbox"/> none <input type="checkbox"/> weak (5m/s) <input type="checkbox"/> medium <input type="checkbox"/> strong		Measurement (if any): _____																																				
CONDITIONS		RAIN <input type="checkbox"/> none <input type="checkbox"/> weak <input checked="" type="checkbox"/> medium <input type="checkbox"/> strong		Measurement (if any): _____																																				
Temperature (approx): 9		Remarks _____																																						
GROUND		<input checked="" type="checkbox"/> earth (<input type="checkbox"/> hard <input checked="" type="checkbox"/> soft) <input type="checkbox"/> gravel <input type="checkbox"/> sand <input type="checkbox"/> rock <input type="checkbox"/> grass = (<input type="checkbox"/> short <input type="checkbox"/> tall)																																						
TYPE		<input type="checkbox"/> asphalt <input type="checkbox"/> cement <input type="checkbox"/> concrete <input type="checkbox"/> paved <input type="checkbox"/> other _____ <input type="checkbox"/> dry soil <input checked="" type="checkbox"/> wet soil Remarks _____																																						
ARTIFICIAL GROUND-SENSOR COUPLING <input type="checkbox"/> no <input checked="" type="checkbox"/> yes, type Infissione																																								
BUILDING DENSITY <input type="checkbox"/> none <input checked="" type="checkbox"/> scattered <input type="checkbox"/> dense <input type="checkbox"/> other, type _____																																								
TRANSIENTS		MONOCHROMATIC NOISE SOURCES (factories, works, pumps, rivers...) <input checked="" type="checkbox"/> no <input type="checkbox"/> yes, type _____																																						
<table border="1"> <thead> <tr> <th></th> <th>none</th> <th>few</th> <th>moderate</th> <th>many</th> <th>very dense</th> <th>distance</th> </tr> </thead> <tbody> <tr> <td>cars</td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>trucks</td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>pedestrians</td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>other</td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>			none	few	moderate	many	very dense	distance	cars	<input checked="" type="checkbox"/>						trucks	<input checked="" type="checkbox"/>						pedestrians	<input checked="" type="checkbox"/>						other	<input checked="" type="checkbox"/>						NEARBY STRUCTURES (description, height, distance) (trees, polls, buildings, bridges, underground structures,...) Trees			
	none	few	moderate	many	very dense	distance																																		
cars	<input checked="" type="checkbox"/>																																							
trucks	<input checked="" type="checkbox"/>																																							
pedestrians	<input checked="" type="checkbox"/>																																							
other	<input checked="" type="checkbox"/>																																							
OBSERVATIONS				FREQUENCY: _____ Hz (if computed in the field)																																				

**Qualità della misura:**

Durata: rispettata
 Stazionarietà: rispettata
 Isotropia: rispettata
 Assenza di disturbi: rispettata
 Plausibilità fisica: rispettata
 Robustezza statistica: rispettata

MISURA TIPO A2**HVSR5**

Peak frequency (Hz): 0.2 (± 2.9)

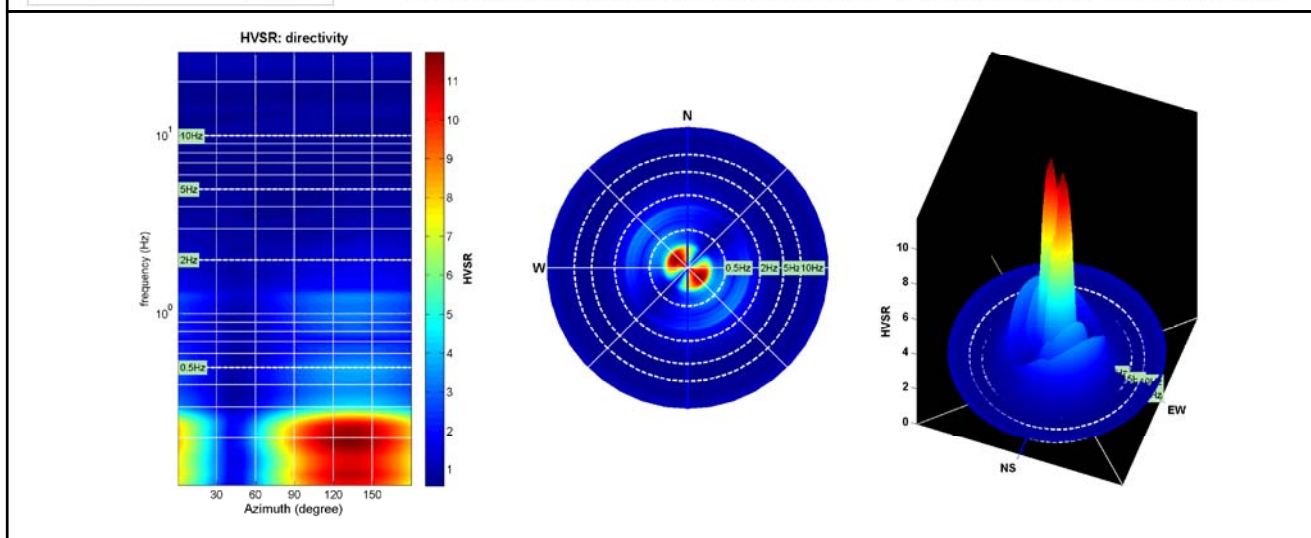
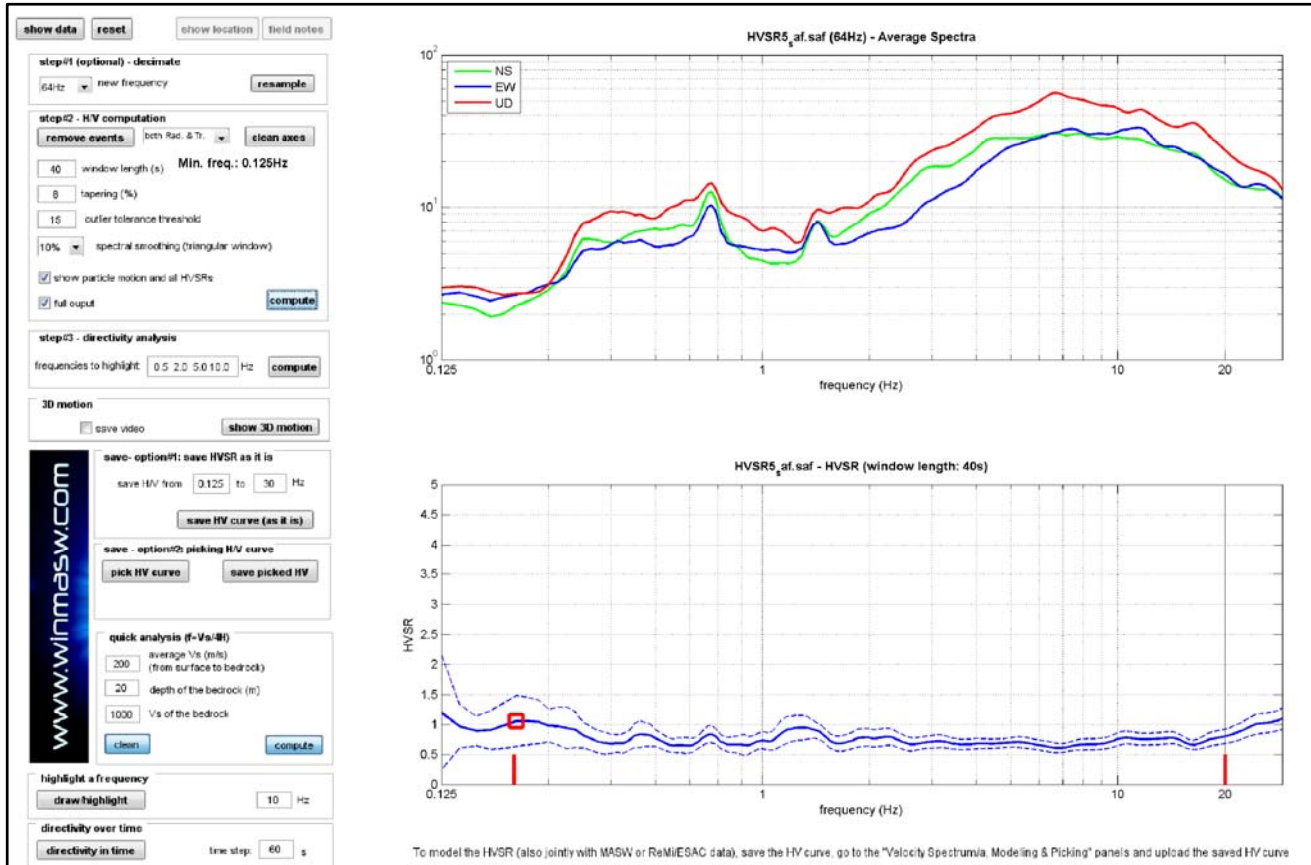
Peak HVSR value: 1.1 (± 0.4)

=== Criteria for a reliable H/V curve ===

- #1. $[f_0 > 10/Lw]$: $0.203 < 0.25$ (NO)
- #2. $[nc > 200]$: $585 > 200$ (OK)
- #3. $[f_0 < 0.5\text{Hz}; \sigma_A(f) < 3 \text{ for } 0.5f_0 < f < 2f_0]$ (OK)

=== Criteria for a clear H/V peak (at least 5 should be fulfilled) ===

- #1. $[\text{exists } f^- \text{ in the range } [f_0/4, f_0] \mid AH/V(f^-) < A_0/2]$: (NO)
- #2. $[\text{exists } f^+ \text{ in the range } [f_0, 4f_0] \mid AH/V(f^+) < A_0/2]$: yes (considering standard deviations), at frequency Hz (OK)
- #3. $[A_0 > 2]$: $1.1 < 2$ (NO)
- #4. $[f_{\text{peak}}[Ah/v(f) \pm \sigma_A(f)] = f_0 \pm 5\%]$: (NO)
- #5. $[\sigma_A(f) < \epsilon(f_0)]$: $2.881 > 0.041$ (NO)
- #6. $[\sigma_A(f_0) < \theta(f_0)]$: $0.424 < 2.5$ (OK)



HVSR6

DATE 16.02.2016		HOUR 16.13		PLACE San Pietro in Vincoli																																				
OPERATOR Geologica Toscana - Prospezioni Geofisiche S.n.c.			GPS TYPE and #																																					
GAUSS-BOAGA LATITUDE 4909592		GAUSS-BOAGA LONGITUDE 2292799		ALTITUDE 8,4 m slm																																				
STATION TYPE PASI 16SG24-N		SENSOR TYPE SENSHE 3D - 4,5 Hz																																						
STATION #		SENSOR #		DISK #																																				
FILE NAME RAHVSR6_.saf				POINT #																																				
GAIN 15000		SAMPL. FREQ 500 Hz		REC. DURATION 27 min 18,4 sec minutes seconds																																				
WEATHER		WIND <input checked="" type="checkbox"/> none <input type="checkbox"/> weak (5m/s) <input type="checkbox"/> medium <input type="checkbox"/> strong Measurement (if any):																																						
CONDITIONS		RAIN <input type="checkbox"/> none <input type="checkbox"/> weak <input checked="" type="checkbox"/> medium <input type="checkbox"/> strong Measurement (if any):																																						
Temperature (approx): 8		Remarks																																						
GROUND		<input checked="" type="checkbox"/> earth (<input type="checkbox"/> hard <input checked="" type="checkbox"/> soft) <input type="checkbox"/> gravel <input type="checkbox"/> sand <input type="checkbox"/> rock <input type="checkbox"/> grass = (<input type="checkbox"/> short <input type="checkbox"/> tall)																																						
TYPE		<input type="checkbox"/> asphalt <input type="checkbox"/> cement <input type="checkbox"/> concrete <input type="checkbox"/> paved <input type="checkbox"/> other _____ <input type="checkbox"/> dry soil <input checked="" type="checkbox"/> wet soil Remarks																																						
ARTIFICIAL GROUND-SENSOR COUPLING <input type="checkbox"/> no <input checked="" type="checkbox"/> yes, type Infissione																																								
BUILDING DENSITY <input type="checkbox"/> none <input checked="" type="checkbox"/> scattered <input type="checkbox"/> dense <input type="checkbox"/> other, type																																								
TRANSIENTS		MONOCHROMATIC NOISE SOURCES (factories, works, pumps, rivers...)																																						
<table border="1"> <thead> <tr> <th></th> <th>none</th> <th>few</th> <th>moderate</th> <th>many</th> <th>very dense</th> <th>distance</th> </tr> </thead> <tbody> <tr> <td>cars</td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>trucks</td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>pedestrians</td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>other</td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>			none	few	moderate	many	very dense	distance	cars	<input checked="" type="checkbox"/>						trucks	<input checked="" type="checkbox"/>						pedestrians	<input checked="" type="checkbox"/>						other	<input checked="" type="checkbox"/>						<input checked="" type="checkbox"/> no <input type="checkbox"/> yes, type _____ NEARBY STRUCTURES (description, height, distance) (trees, polls, buildings, bridges, underground structures,...) Trees			
	none	few	moderate	many	very dense	distance																																		
cars	<input checked="" type="checkbox"/>																																							
trucks	<input checked="" type="checkbox"/>																																							
pedestrians	<input checked="" type="checkbox"/>																																							
other	<input checked="" type="checkbox"/>																																							
OBSERVATIONS				FREQUENCY: _____ Hz (if computed in the field)																																				

**Qualità della misura:**

Durata: rispettata
 Stazionarietà: rispettata
 Isotropia: rispettata
 Assenza di disturbi: rispettata
 Plausibilità fisica: rispettata
 Robustezza statistica: rispettata

MISURA TIPO A2**HVSR6**

Peak frequency (Hz): 20.0 (±9.0)

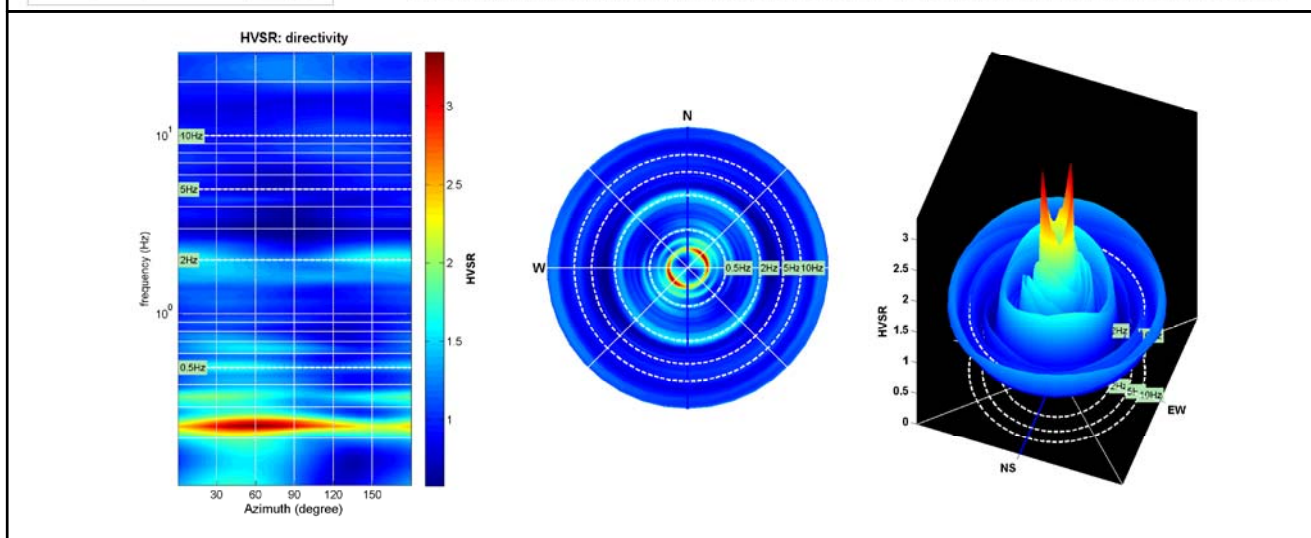
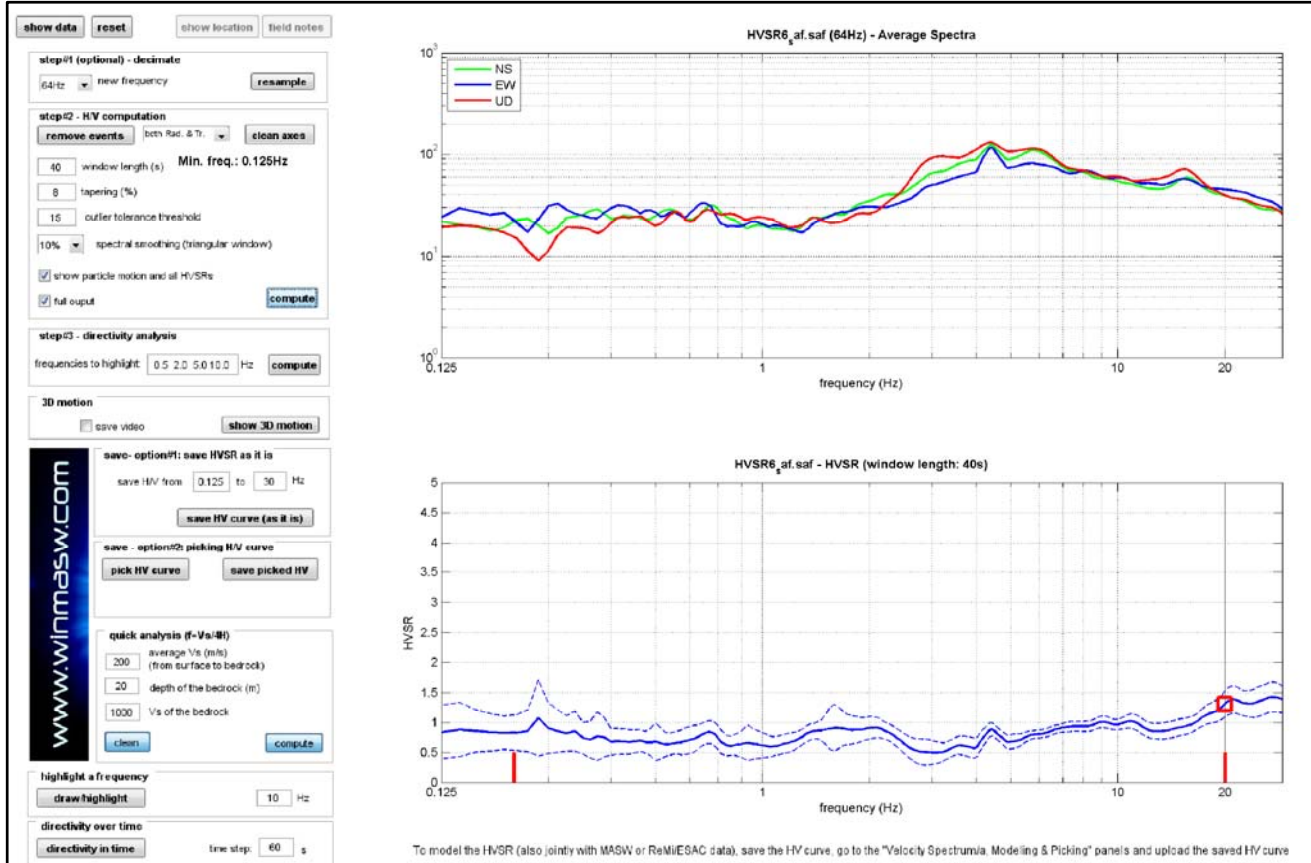
Peak HVSR value: 1.3 (±0.2)

=== Criteria for a reliable H/V curve ===

- #1. $[f_0 > 10/Lw]$: $19.994 > 0.25$ (OK)
- #2. $[nc > 200]$: $61582 > 200$ (OK)
- #3. $[f_0 > 0.5\text{Hz}; \sigma_A(f) < 2 \text{ for } 0.5f_0 < f < 2f_0]$ (OK)

=== Criteria for a clear H/V peak (at least 5 should be fulfilled) ===

- #1. $[\text{exists } f^- \text{ in the range } [f_0/4, f_0] \mid AH/V(f^-) < A_0/2]$: yes (considering standard deviations), at frequency 5.0Hz (OK)
- #2. $[\text{exists } f^+ \text{ in the range } [f_0, 4f_0] \mid AH/V(f^+) < A_0/2]$: (NO)
- #3. $[A_0 > 2]$: $1.3 < 2$ (NO)
- #4. $[f_{\text{peak}}[Ah/v(f) \pm \sigma_A(f)] = f_0 \pm 5\%]$: (NO)
- #5. $[\sigma_{\text{mf}} < \epsilon(f_0)]$: $9.014 > 1.000$ (NO)
- #6. $[\sigma_A(f_0) < \theta(f_0)]$: $0.214 < 1.58$ (OK)



HVSR7

DATE 16.02.2016		HOUR 16.53		PLACE Gambellara																																				
OPERATOR Geologica Toscana - Prospezioni Geofisiche S.n.c.			GPS TYPE and #																																					
GAUSS-BOAGA LATITUDE 4912498		GAUSS-BOAGA LONGITUDE 2291694		ALTITUDE 7,0 m slm																																				
STATION TYPE PASI 16SG24-N		SENSOR TYPE SENSHE 3D - 4,5 Hz																																						
STATION #		SENSOR #		DISK #																																				
FILE NAME RAHVSR7_.saf				POINT #																																				
GAIN 15000		SAMPL. FREQ 500 Hz		REC. DURATION 27 min 18,4 sec minutes seconds																																				
WEATHER		WIND <input checked="" type="checkbox"/> none <input type="checkbox"/> weak (5m/s) <input type="checkbox"/> medium <input type="checkbox"/> strong		Measurement (if any): _____																																				
CONDITIONS		RAIN <input type="checkbox"/> none <input type="checkbox"/> weak <input checked="" type="checkbox"/> medium <input type="checkbox"/> strong		Measurement (if any): _____																																				
Temperature (approx): 8		Remarks _____																																						
GROUND		<input checked="" type="checkbox"/> earth (<input type="checkbox"/> hard <input checked="" type="checkbox"/> soft) <input type="checkbox"/> gravel <input type="checkbox"/> sand <input type="checkbox"/> rock <input type="checkbox"/> grass = (<input type="checkbox"/> short <input type="checkbox"/> tall)																																						
TYPE		<input type="checkbox"/> asphalt <input type="checkbox"/> cement <input type="checkbox"/> concrete <input type="checkbox"/> paved <input type="checkbox"/> other _____ <input type="checkbox"/> dry soil <input checked="" type="checkbox"/> wet soil Remarks _____																																						
ARTIFICIAL GROUND-SENSOR COUPLING <input type="checkbox"/> no <input checked="" type="checkbox"/> yes, type Infissione																																								
BUILDING DENSITY <input type="checkbox"/> none <input checked="" type="checkbox"/> scattered <input type="checkbox"/> dense <input type="checkbox"/> other, type _____																																								
TRANSIENTS		MONOCHROMATIC NOISE SOURCES (factories, works, pumps, rivers...) <input checked="" type="checkbox"/> no <input type="checkbox"/> yes, type _____																																						
<table border="1"> <thead> <tr> <th></th> <th>none</th> <th>few</th> <th>moderate</th> <th>many</th> <th>very dense</th> <th>distance</th> </tr> </thead> <tbody> <tr> <td>cars</td> <td></td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>trucks</td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>pedestrians</td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>other</td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>			none	few	moderate	many	very dense	distance	cars		<input checked="" type="checkbox"/>					trucks	<input checked="" type="checkbox"/>						pedestrians	<input checked="" type="checkbox"/>						other	<input checked="" type="checkbox"/>						NEARBY STRUCTURES (description, height, distance) (trees, polls, buildings, bridges, underground structures,...) Trees, Buildings			
	none	few	moderate	many	very dense	distance																																		
cars		<input checked="" type="checkbox"/>																																						
trucks	<input checked="" type="checkbox"/>																																							
pedestrians	<input checked="" type="checkbox"/>																																							
other	<input checked="" type="checkbox"/>																																							
OBSERVATIONS				FREQUENCY: _____ Hz (if computed in the field)																																				

**Qualità della misura:**

Durata: rispettata
 Stazionarietà: rispettata
 Isotropia: rispettata
 Assenza di disturbi: rispettata
 Plausibilità fisica: rispettata
 Robustezza statistica: rispettata

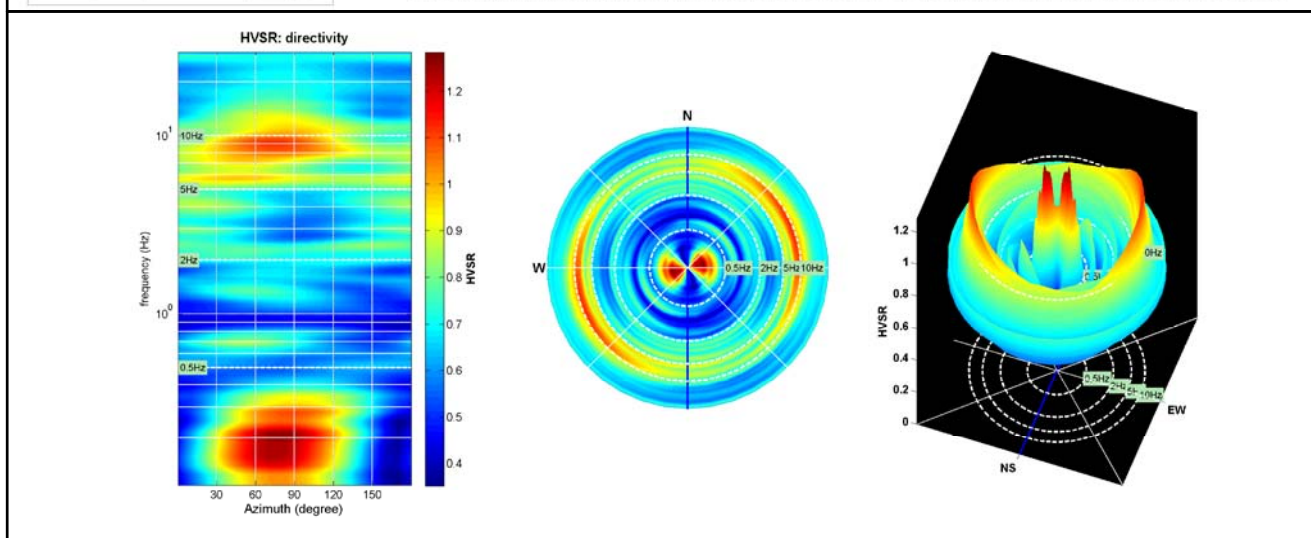
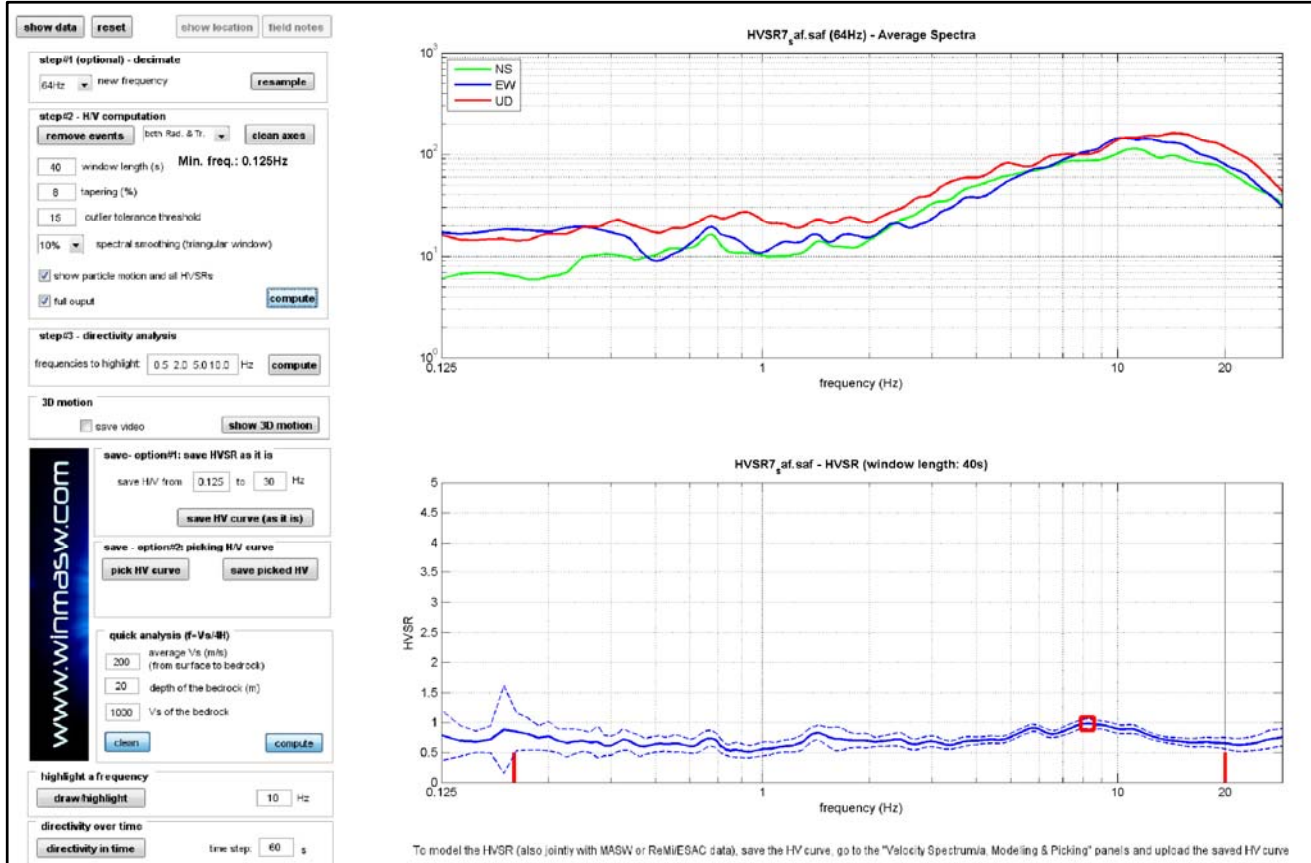
MISURA TIPO A2**HVSR7**Peak frequency (Hz): 8.2 (± 2.9)Peak HVSR value: 1.0 (± 0.1)

==== **Criteria for a reliable H/V curve** =====

- #1. $[f_0 > 10/Lw]$: $8.223 > 0.25$ (OK)
 #2. $[nc > 200]$: $24339 > 200$ (OK)
 #3. $[f_0 > 0.5\text{Hz}; \sigma_A(f) < 2 \text{ for } 0.5f_0 < f < 2f_0]$ (OK)

==== **Criteria for a clear H/V peak (at least 5 should be fulfilled)** =====

- #1. $[\text{exists } f^- \text{ in the range } [f_0/4, f_0] \mid AH/V(f^-) < A_0/2]$: (NO)
 #2. $[\text{exists } f^+ \text{ in the range } [f_0, 4f_0] \mid AH/V(f^+) < A_0/2]$: (NO)
 #3. $[A_0 > 2]$: $1.0 < 2$ (NO)
 #4. $[f_{\text{peak}}[Ah/v(f) \pm \sigma_A(f)] = f_0 \pm 5\%]$: (NO)
 #5. $[\sigma_A < \epsilon(f_0)]$: $2.904 > 0.411$ (NO)
 #6. $[\sigma_A(f_0) < \theta(f_0)]$: $0.083 < 1.58$ (OK)



HVSR8

DATE 17.02.2016		HOUR 8.10		PLACE Ravenna Centro - Darsena																																				
OPERATOR Geologica Toscana - Prospezioni Geofisiche S.n.c.			GPS TYPE and #																																					
GAUSS-BOAGA LATITUDE 4923006		GAUSS-BOAGA LONGITUDE 2298895		ALTITUDE 0,5 m slm																																				
STATION TYPE PASI 16SG24-N		SENSOR TYPE SENSHE 3D - 4,5 Hz																																						
STATION #		SENSOR #		DISK #																																				
FILE NAME RAHVSR8_.saf				POINT #																																				
GAIN 15000		SAMPL. FREQ 500 Hz		REC. DURATION 27 min 18,4 sec minutes seconds																																				
WEATHER		WIND <input checked="" type="checkbox"/> none <input type="checkbox"/> weak (5m/s) <input type="checkbox"/> medium <input type="checkbox"/> strong		Measurement (if any):																																				
CONDITIONS		RAIN <input checked="" type="checkbox"/> none <input type="checkbox"/> weak <input type="checkbox"/> medium <input type="checkbox"/> strong		Measurement (if any):																																				
Temperature (approx): 6		Remarks																																						
GROUND		<input checked="" type="checkbox"/> earth (<input type="checkbox"/> hard <input checked="" type="checkbox"/> soft) <input type="checkbox"/> gravel <input type="checkbox"/> sand <input type="checkbox"/> rock <input type="checkbox"/> grass = (<input type="checkbox"/> short <input type="checkbox"/> tall)																																						
TYPE		<input type="checkbox"/> asphalt <input type="checkbox"/> cement <input type="checkbox"/> concrete <input type="checkbox"/> paved <input type="checkbox"/> other _____ <input type="checkbox"/> dry soil <input checked="" type="checkbox"/> wet soil Remarks																																						
ARTIFICIAL GROUND-SENSOR COUPLING <input type="checkbox"/> no <input checked="" type="checkbox"/> yes, type Infissione																																								
BUILDING DENSITY <input type="checkbox"/> none <input type="checkbox"/> scattered <input checked="" type="checkbox"/> dense <input type="checkbox"/> other, type																																								
TRANSIENTS		MONOCHROMATIC NOISE SOURCES (factories, works, pumps, rivers...)																																						
		<input checked="" type="checkbox"/> no <input type="checkbox"/> yes, type																																						
<table border="1"> <thead> <tr> <th></th> <th>none</th> <th>few</th> <th>moderate</th> <th>many</th> <th>very dense</th> <th>distance</th> </tr> </thead> <tbody> <tr> <td>cars</td> <td></td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>trucks</td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>pedestrians</td> <td></td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>other</td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>			none	few	moderate	many	very dense	distance	cars		<input checked="" type="checkbox"/>					trucks	<input checked="" type="checkbox"/>						pedestrians		<input checked="" type="checkbox"/>					other	<input checked="" type="checkbox"/>						NEARBY STRUCTURES (description, height, distance) (trees, polls, buildings, bridges, underground structures,...) Trees, Buildings			
	none	few	moderate	many	very dense	distance																																		
cars		<input checked="" type="checkbox"/>																																						
trucks	<input checked="" type="checkbox"/>																																							
pedestrians		<input checked="" type="checkbox"/>																																						
other	<input checked="" type="checkbox"/>																																							
OBSERVATIONS				FREQUENCY: _____ Hz (if computed in the field)																																				

**Qualità della misura:**

Durata: rispettata
 Stazionarietà: rispettata
 Isotropia: rispettata
 Assenza di disturbi: rispettata
 Plausibilità fisica: rispettata
 Robustezza statistica: rispettata

MISURA TIPO A2**HVSR8**

Peak frequency (Hz): 1.9 (± 4.5)

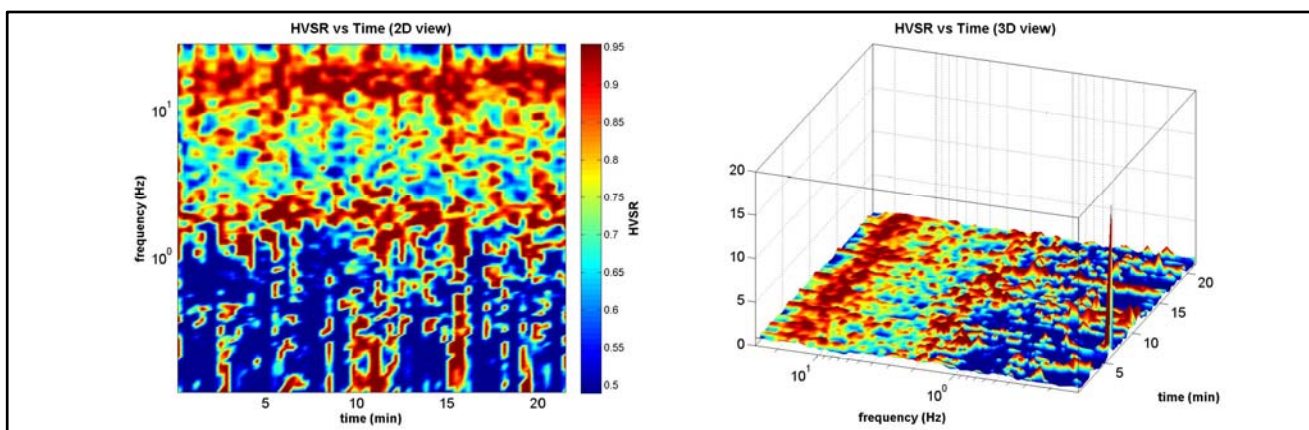
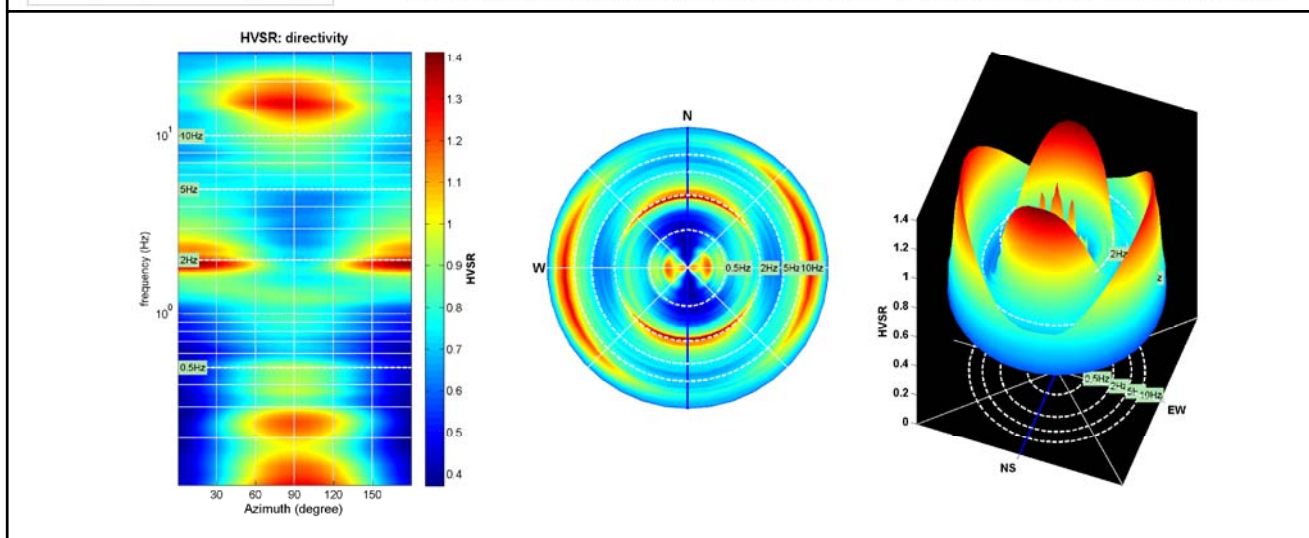
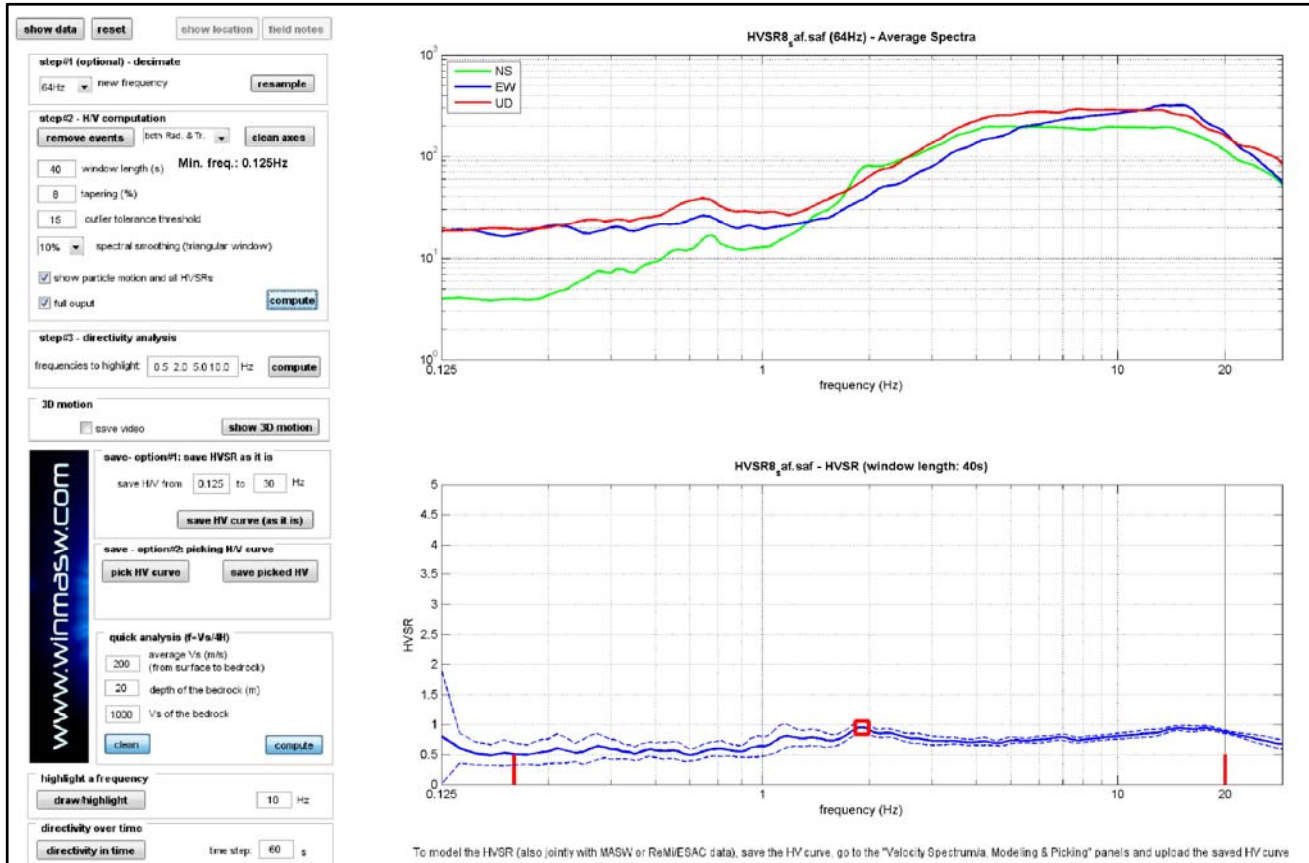
Peak HVSR value: 1.0 (± 0.1)

=== Criteria for a reliable H/V curve ===

- #1. $[f_0 > 10/L_w]$: $1.907 > 0.25$ (OK)
- #2. $[n_c > 200]$: $4959 > 200$ (OK)
- #3. $[f_0 > 0.5\text{Hz}; \sigma_A(f) < 2 \text{ for } 0.5f_0 < f < 2f_0]$ (OK)

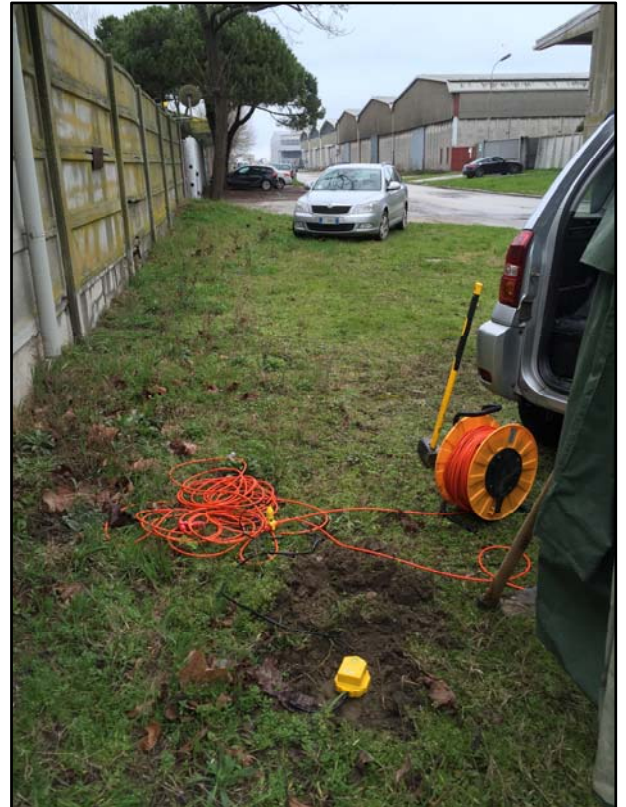
=== Criteria for a clear H/V peak (at least 5 should be fulfilled) ===

- #1. [exists f^- in the range $[f_0/4, f_0]$ | $AH/V(f^-) < A_0/2$]: yes (considering standard deviations), at frequency 0.5Hz (OK)
- #2. [exists f^+ in the range $[f_0, 4f_0]$ | $AH/V(f^+) < A_0/2$]: (NO)
- #3. $[A_0 > 2]$: $1.0 < 2$ (NO)
- #4. $[f_{\text{peak}}[A_h/v(f) \pm \sigma_A(f)] = f_0 \pm 5\%]$: (NO)
- #5. $[\sigma_{\text{mf}} < \epsilon(f_0)]$: $4.457 > 0.191$ (NO)
- #6. $[\sigma_A(f_0) < \theta(f_0)]$: $0.100 < 1.78$ (OK)



HVSR9

DATE 17.02.2016		HOUR 9.01		PLACE Zona Industriale Portuale	
OPERATOR Geologica Toscana - Prospezioni Geofisiche S.n.c.			GPS TYPE and #		
GAUSS-BOAGA LATITUDE 4925403		GAUSS-BOAGA LONGITUDE 2301715		ALTITUDE 0,7 m slm	
STATION TYPE PASI 16SG24-N		SENSOR TYPE SENSHE 3D - 4,5 Hz			
STATION #		SENSOR #		DISK #	
FILE NAME RAHVSR9_.saf				POINT #	
GAIN 15000		SAMPL. FREQ 500 Hz		REC. DURATION 27 min 18,4 sec minutes seconds	
WEATHER		WIND <input type="checkbox"/> none <input checked="" type="checkbox"/> weak (5m/s) <input type="checkbox"/> medium <input type="checkbox"/> strong		Measurement (if any):	
CONDITIONS		RAIN <input checked="" type="checkbox"/> none <input type="checkbox"/> weak <input type="checkbox"/> medium <input type="checkbox"/> strong		Measurement (if any):	
Temperature (approx): 6		Remarks			
GROUND		<input checked="" type="checkbox"/> earth (<input type="checkbox"/> hard <input checked="" type="checkbox"/> soft) <input type="checkbox"/> gravel <input type="checkbox"/> sand <input type="checkbox"/> rock <input type="checkbox"/> grass = (<input type="checkbox"/> short <input type="checkbox"/> tall)			
TYPE		<input type="checkbox"/> asphalt <input type="checkbox"/> cement <input type="checkbox"/> concrete <input type="checkbox"/> paved <input type="checkbox"/> other			
		<input type="checkbox"/> dry soil <input checked="" type="checkbox"/> wet soil Remarks			
ARTIFICIAL GROUND-SENSOR COUPLING <input type="checkbox"/> no <input checked="" type="checkbox"/> yes, type Infissione					
BUILDING DENSITY <input type="checkbox"/> none <input type="checkbox"/> scattered <input checked="" type="checkbox"/> dense <input type="checkbox"/> other, type					
TRANSIENTS		MONOCHROMATIC NOISE SOURCES (factories, works, pumps, rivers...)			
		<input type="checkbox"/> no <input checked="" type="checkbox"/> yes, type Factories			
cars		NEARBY STRUCTURES (description, height, distance) (trees, polls, buildings, bridges, underground structures,...)			
trucks		Trees, Buildings			
pedestrians					
other					
OBSERVATIONS				FREQUENCY: Hz (if computed in the field)	

**Qualità della misura:**

Durata: rispettata
 Stazionarietà: rispettata
 Isotropia: rispettata
 Assenza di disturbi: non rispettata
 Plausibilità fisica: rispettata
 Robustezza statistica: rispettata

MISURA TIPO B2**HVSR9**

Peak frequency (Hz): 9.2 (± 2.9)

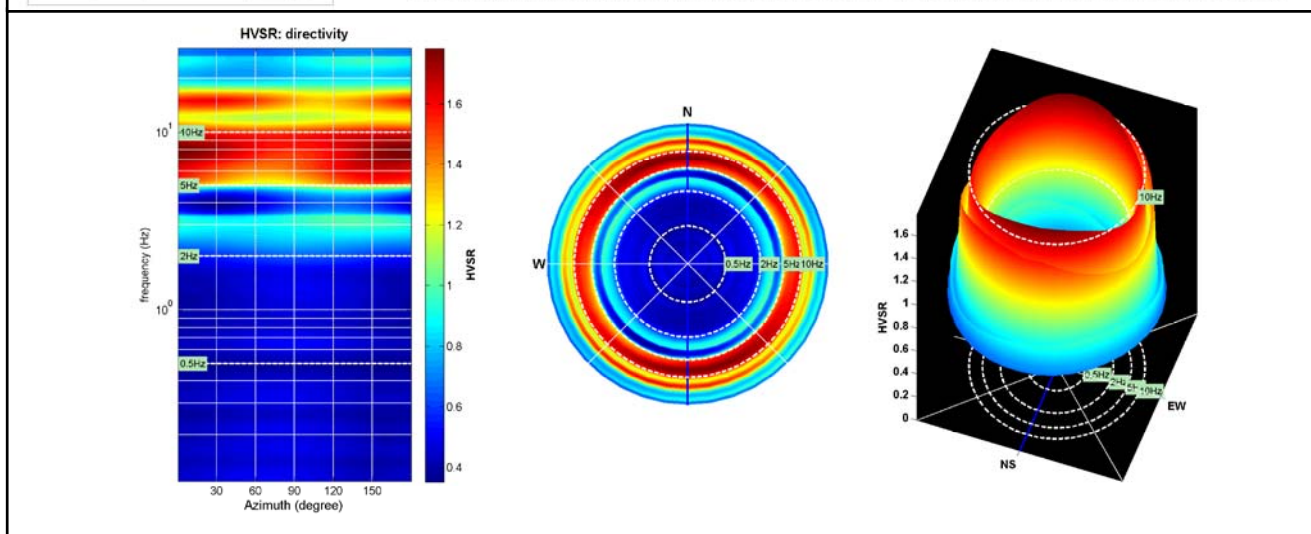
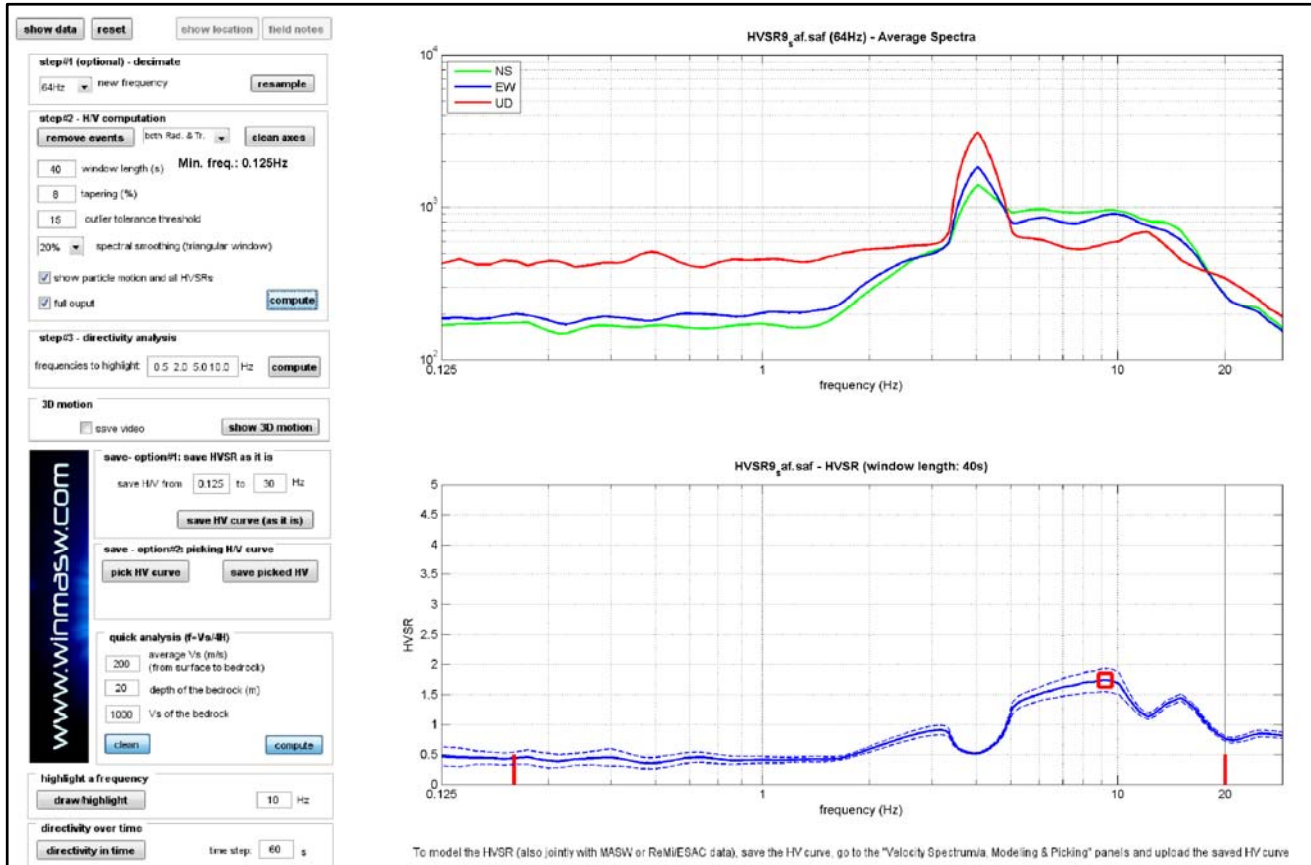
Peak HVSR value: 1.7 (± 0.2)

==== **Criteria for a reliable H/V curve** =====

- #1. $[f_0 > 10/Lw]$: $9.208 > 0.25$ (OK)
- #2. $[nc > 200]$: $28728 > 200$ (OK)
- #3. $[f_0 > 0.5\text{Hz}; \sigma_A(f) < 2 \text{ for } 0.5f_0 < f < 2f_0]$ (OK)

==== **Criteria for a clear H/V peak (at least 5 should be fulfilled)** =====

- #1. [exists f^- in the range $[f_0/4, f_0]$ | $AH/V(f^-) < A_0/2$]: yes, at frequency 2.3Hz (OK)
- #2. [exists f^+ in the range $[f_0, 4f_0]$ | $AH/V(f^+) < A_0/2$]: yes, at frequency 18.8Hz (OK)
- #3. $[A_0 > 2]$: $1.7 < 2$ (NO)
- #4. $[f_{\text{peak}}[Ah/v(f) \pm \sigma_A(f)] = f_0 \pm 5\%]$: (OK)
- #5. $[\sigma_A(f) < \epsilon(f_0)]$: $2.937 > 0.460$ (NO)
- #6. $[\sigma_A(f_0) < \theta(f_0)]$: $0.193 < 1.58$ (OK)



HVSR10

DATE 17.02.2016		HOUR 9.45		PLACE Punta Marina Terme																																				
OPERATOR Geologica Toscana - Prospezioni Geofisiche S.n.c.			GPS TYPE and #																																					
GAUSS-BOAGA LATITUDE 4924683		GAUSS-BOAGA LONGITUDE 2304165		ALTITUDE 1,8 m slm																																				
STATION TYPE PASI 16SG24-N		SENSOR TYPE SENSHE 3D - 4,5 Hz																																						
STATION #		SENSOR #		DISK #																																				
FILE NAME RAHVSR10_.saf				POINT #																																				
GAIN 15000		SAMPL. FREQ 500 Hz		REC. DURATION 27 min 18,4 sec minutes seconds																																				
WEATHER		WIND <input checked="" type="checkbox"/> none <input type="checkbox"/> weak (5m/s) <input type="checkbox"/> medium <input type="checkbox"/> strong Measurement (if any): _____																																						
CONDITIONS		RAIN <input checked="" type="checkbox"/> none <input type="checkbox"/> weak <input type="checkbox"/> medium <input type="checkbox"/> strong Measurement (if any): _____																																						
Temperature (approx): 6		Remarks _____																																						
GROUND		<input checked="" type="checkbox"/> earth (<input type="checkbox"/> hard <input checked="" type="checkbox"/> soft) <input type="checkbox"/> gravel <input type="checkbox"/> sand <input type="checkbox"/> rock <input type="checkbox"/> grass = (<input type="checkbox"/> short <input type="checkbox"/> tall)																																						
TYPE		<input type="checkbox"/> asphalt <input type="checkbox"/> cement <input type="checkbox"/> concrete <input type="checkbox"/> paved <input type="checkbox"/> other _____ <input type="checkbox"/> dry soil <input checked="" type="checkbox"/> wet soil Remarks _____																																						
ARTIFICIAL GROUND-SENSOR COUPLING <input type="checkbox"/> no <input checked="" type="checkbox"/> yes, type Infissione																																								
BUILDING DENSITY <input type="checkbox"/> none <input type="checkbox"/> scattered <input checked="" type="checkbox"/> dense <input type="checkbox"/> other, type _____																																								
TRANSIENTS		MONOCHROMATIC NOISE SOURCES (factories, works, pumps, rivers...)																																						
		<input checked="" type="checkbox"/> no <input type="checkbox"/> yes, type _____																																						
<table border="1"> <thead> <tr> <th></th> <th>none</th> <th>few</th> <th>moderate</th> <th>many</th> <th>very dense</th> <th>distance</th> </tr> </thead> <tbody> <tr> <td>cars</td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>trucks</td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>pedestrians</td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>other</td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>			none	few	moderate	many	very dense	distance	cars	<input checked="" type="checkbox"/>						trucks	<input checked="" type="checkbox"/>						pedestrians	<input checked="" type="checkbox"/>						other	<input checked="" type="checkbox"/>						NEARBY STRUCTURES (description, height, distance) (trees, polls, buildings, bridges, underground structures,...) Trees, Buildings			
	none	few	moderate	many	very dense	distance																																		
cars	<input checked="" type="checkbox"/>																																							
trucks	<input checked="" type="checkbox"/>																																							
pedestrians	<input checked="" type="checkbox"/>																																							
other	<input checked="" type="checkbox"/>																																							
OBSERVATIONS				FREQUENCY: _____ Hz (if computed in the field)																																				

**Qualità della misura:**

Durata: rispettata
 Stazionarietà: rispettata
 Isotropia: rispettata
 Assenza di disturbi: rispettata
 Plausibilità fisica: rispettata
 Robustezza statistica: rispettata

MISURA TIPO A2**HVSR10**

Peak frequency (Hz): 20.0 (± 7.5)

Peak HVSR value: 1.3 (± 0.1)

=== Criteria for a reliable H/V curve ===

- #1. $[f_0 > 10/L_w]$: $19.994 > 0.25$ (OK)
- #2. $[n_c > 200]$: $56783 > 200$ (OK)
- #3. $[f_0 > 0.5\text{Hz}; \sigma_A(f) < 2 \text{ for } 0.5f_0 < f < 2f_0]$ (OK)

=== Criteria for a clear H/V peak (at least 5 should be fulfilled) ===

- #1. [exists f^- in the range $[f_0/4, f_0]$ | $AH/V(f^-) < A_0/2$]: (NO)
- #2. [exists f^+ in the range $[f_0, 4f_0]$ | $AH/V(f^+) < A_0/2$]: (NO)
- #3. $[A_0 > 2]$: $1.3 < 2$ (NO)
- #4. $[f_{\text{peak}}[A_h/v(f) \pm \sigma_A(f)] = f_0 \pm 5\%]$: (NO)
- #5. $[\sigma_{\text{mf}} < \epsilon(f_0)]$: $7.496 > 1.000$ (NO)
- #6. $[\sigma_A(f_0) < \theta(f_0)]$: $0.101 < 1.58$ (OK)

show data reset show location field notes

step1 (optional) - decimate
 64Hz new frequency resample

step2 - HV computation
 remove events both Rad. & Tr. clean axes
 40 window length (s) Min. freq.: 0.125Hz
 8 tapering (%)
 15 outlier tolerance threshold
 10% spectral smoothing (triangular window)
☒ show particle motion and all HVSRs
☒ full output compute

step3 - directivity analysis
 frequencies to highlight: 0.5 2.0 5.0 10.0 Hz compute

3D motion
☐ save video show 3D motion

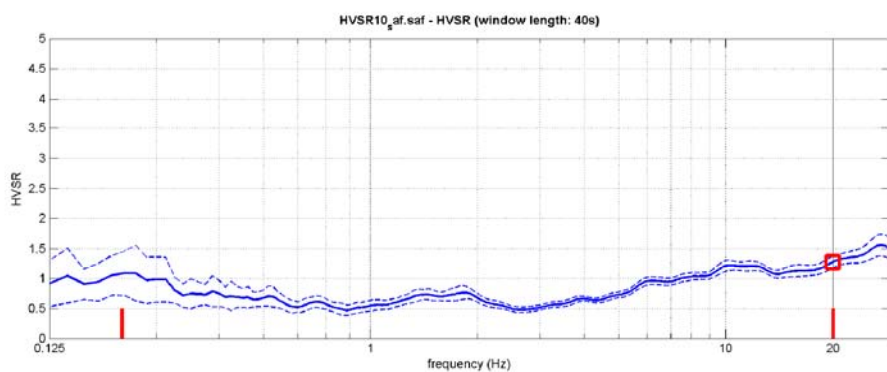
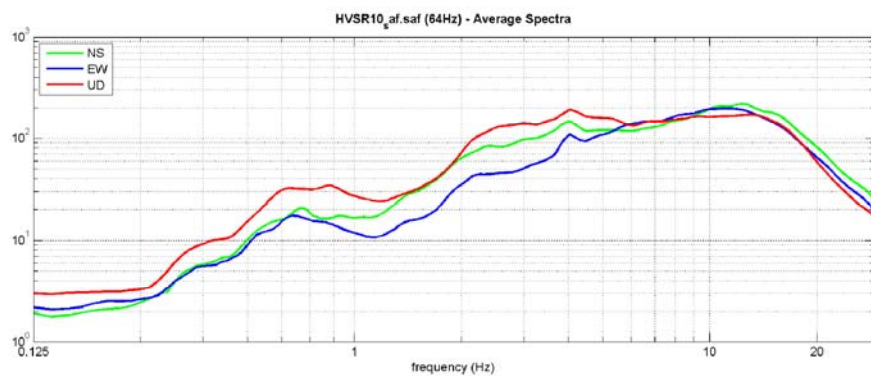
save - optional1: save HVSR as it is
 save HV from 0.125 to 30 Hz
 save HV curve (as it is)

save - optional2: picking HV curve
 pick HV curve save picked HV

quick analysis (f-Vs-Bt)
 200 average Vs (m/s) (from surface to bedrock)
 20 depth of the bedrock (m)
 1000 Vs of the bedrock
 clean compute

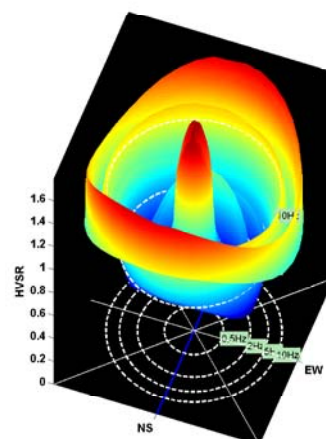
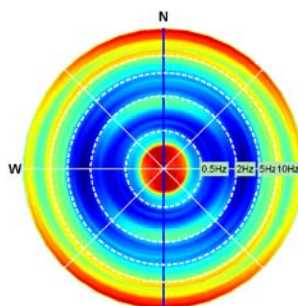
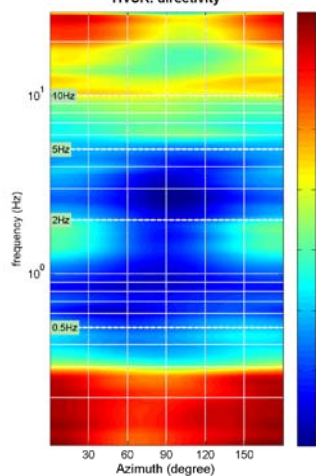
highlight a frequency
 draw highlight 10 Hz

directivity over time
 directivity in time time step: 60 s

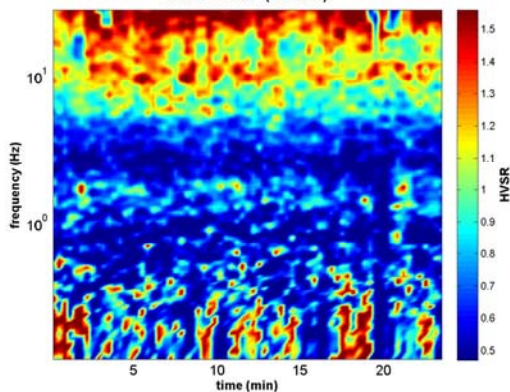


To model the HVSR (also jointly with MASW or ReMiESAC data), save the HV curve, go to the "Velocity Spectrogram, Modeling & Picking" panels and upload the saved HV curve

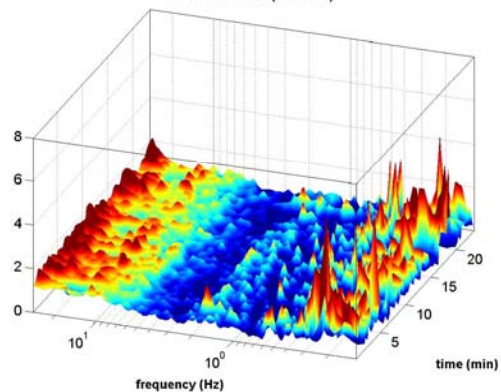
HVSR: directivity



HVSR vs Time (2D view)



HVSR vs Time (3D view)



HVSR11

DATE 17.02.2016		HOUR 10.46		PLACE Porto Fuori	
OPERATOR Geologica Toscana - Prospezioni Geofisiche S.n.c.			GPS TYPE and #		
GAUSS-BOAGA LATITUDE 4920763		GAUSS-BOAGA LONGITUDE 2300963		ALTITUDE 0,7 m slm	
STATION TYPE PASI 16SG24-N		SENSOR TYPE SENSHE 3D - 4,5 Hz			
STATION #		SENSOR #		DISK #	
FILE NAME RAHVSR11_.saf				POINT #	
GAIN 15000		SAMPL. FREQ 500 Hz		REC. DURATION 27 min 18,4 sec minutes seconds	
WEATHER		WIND <input checked="" type="checkbox"/> none <input type="checkbox"/> weak (5m/s) <input type="checkbox"/> medium <input type="checkbox"/> strong		Measurement (if any): _____	
CONDITIONS		RAIN <input checked="" type="checkbox"/> none <input type="checkbox"/> weak <input type="checkbox"/> medium <input type="checkbox"/> strong		Measurement (if any): _____	
Temperature (approx): 7		Remarks _____			
GROUND		<input checked="" type="checkbox"/> earth (<input type="checkbox"/> hard <input checked="" type="checkbox"/> soft) <input type="checkbox"/> gravel <input type="checkbox"/> sand <input type="checkbox"/> rock <input type="checkbox"/> grass = (<input type="checkbox"/> short <input type="checkbox"/> tall)			
TYPE		<input type="checkbox"/> asphalt <input type="checkbox"/> cement <input type="checkbox"/> concrete <input type="checkbox"/> paved <input type="checkbox"/> other _____ <input type="checkbox"/> dry soil <input checked="" type="checkbox"/> wet soil Remarks _____			
ARTIFICIAL GROUND-SENSOR COUPLING <input type="checkbox"/> no <input checked="" type="checkbox"/> yes, type Infissione					
BUILDING DENSITY <input type="checkbox"/> none <input type="checkbox"/> scattered <input checked="" type="checkbox"/> dense <input type="checkbox"/> other, type _____					
TRANSIENTS		none few moderate many very dense distance cars <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> trucks <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> pedestrians <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> other <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>			
		MONOCHROMATIC NOISE SOURCES (factories, works, pumps, rivers...) <input checked="" type="checkbox"/> no <input type="checkbox"/> yes, type _____ NEARBY STRUCTURES (description, height, distance) (trees, polls, buildings, bridges, underground structures,...) Trees, Buildings			
OBSERVATIONS				FREQUENCY: _____ Hz (if computed in the field)	

**Qualità della misura:**

Durata: rispettata
 Stazionarietà: rispettata
 Isotropia: rispettata
 Assenza di disturbi: rispettata
 Plausibilità fisica: rispettata
 Robustezza statistica: rispettata

MISURA TIPO A2**HVSR11**

Peak frequency (Hz): 13.4 (±2.8)

Peak HVSR value: 1.1 (±0.1)

=== Criteria for a reliable H/V curve ===

- #1. $[f_0 > 10/L_w]$: $13.428 > 0.25$ (OK)
- #2. $[n_c > 200]$: $36525 > 200$ (OK)
- #3. $[f_0 > 0.5\text{Hz}; \sigma_A(f) < 2 \text{ for } 0.5f_0 < f < 2f_0]$ (OK)

=== Criteria for a clear H/V peak (at least 5 should be fulfilled) ===

- #1. [exists f^- in the range $[f_0/4, f_0]$ | $AH/V(f^-) < A_0/2$]: yes, at frequency 3.4Hz (OK)
- #2. [exists f^+ in the range $[f_0, 4f_0]$ | $AH/V(f^+) < A_0/2$]: (NO)
- #3. $[A_0 > 2]$: $1.1 < 2$ (NO)
- #4. $[f_{\text{peak}}[A_h/v(f) \pm \sigma_A(f)] = f_0 \pm 5\%]$: (NO)
- #5. $[\sigma_A(f) < \epsilon(f_0)]$: $2.761 > 0.671$ (NO)
- #6. $[\sigma_A(f_0) < \theta(f_0)]$: $0.081 < 1.58$ (OK)

show data reset show location field notes

step1 (optional) - decimate
 64-bit new frequency resample

step2 - HV computation
 remove events (both Rad. & Tr.) clean axes
 40 window length (s) Min. freq.: 0.125Hz
 8 tapering (%)
 15 outlier tolerance threshold
 10% spectral smoothing (triangular window)
☒ show particle motion and all HVSRs
☒ full output compute

step3 - directivity analysis
 frequencies to highlight: 0.5 2.0 5.0 10.0 Hz compute

3D motion
☐ save video show 3D motion

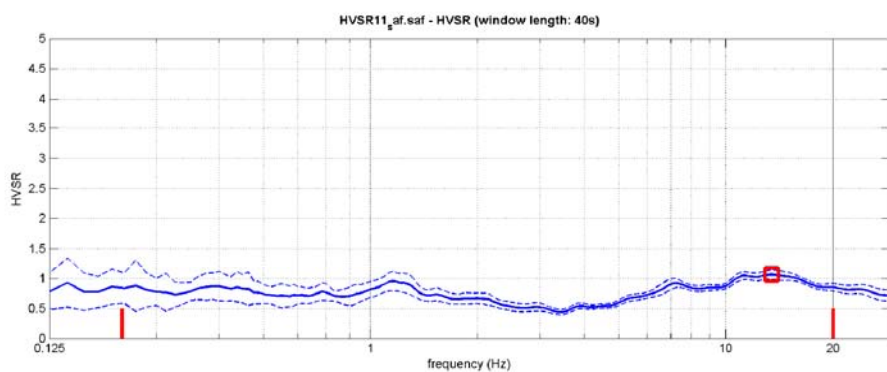
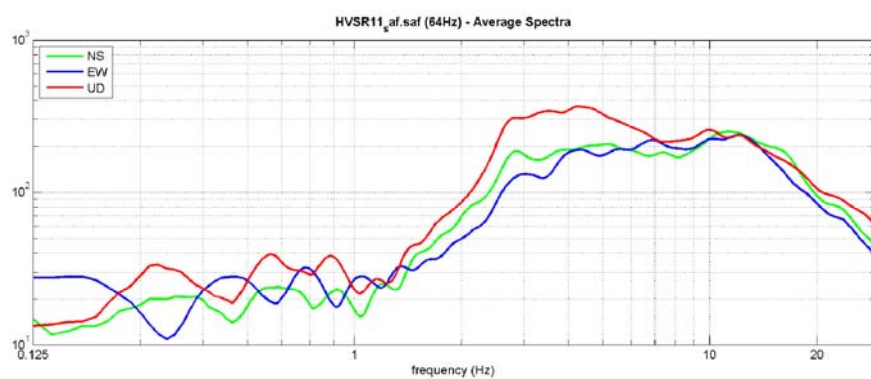
save - optional1: save HVSR as it is
 save HV from 0.125 to 30 Hz
 save HV curve (as it is)

save - optional2: picking HV curve
 pick HV curve save picked HV

quick analysis (f-Vs-Bt)
 200 average Vs (m/s) (from surface to bedrock)
 20 depth of the bedrock (m)
 1000 Vs of the bedrock
 clean compute

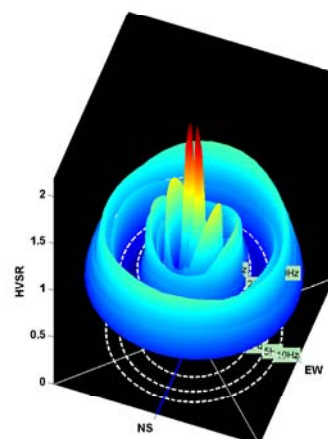
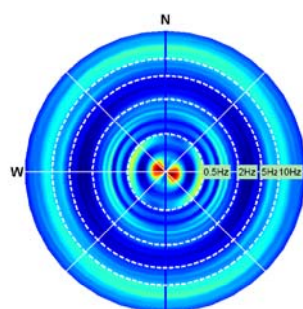
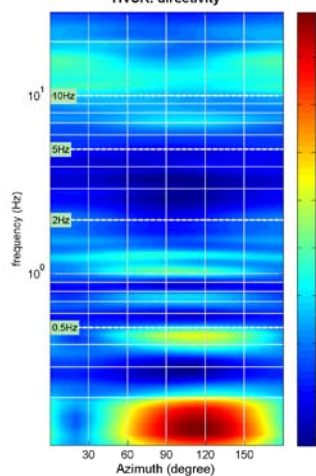
highlight a frequency
 draw highlight 10 Hz

directivity over time
 directivity in time time step: 60 s

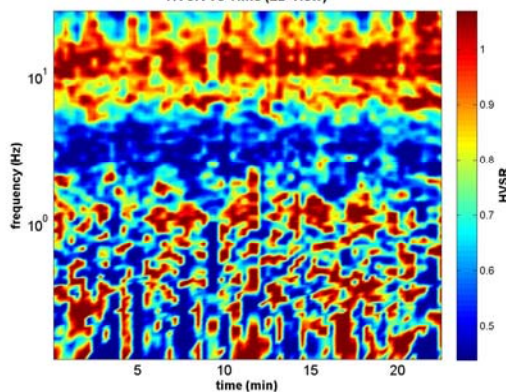


To model the HVSR (also jointly with MASW or ReMiESAC data), save the HV curve, go to the "Velocity Spectrometry Modeling & Picking" panels and upload the saved HV curve

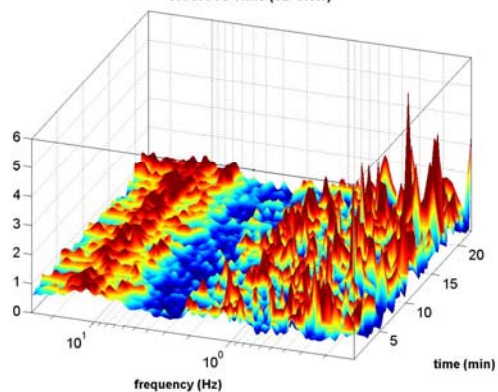
HVSR: directivity



HVSR vs Time (2D view)



HVSR vs Time (3D view)



HVSR12

DATE 17.02.2016		HOUR 11.38		PLACE San Bartolo																																				
OPERATOR Geologica Toscana - Prospezioni Geofisiche S.n.c.			GPS TYPE and #																																					
GAUSS-BOAGA LATITUDE 4916101		GAUSS-BOAGA LONGITUDE 2295303		ALTITUDE 5,6 m slm																																				
STATION TYPE PASI 16SG24-N		SENSOR TYPE SENSHE 3D - 4,5 Hz																																						
STATION #		SENSOR #		DISK #																																				
FILE NAME RAHVSR12_.saf				POINT #																																				
GAIN 15000		SAMPL. FREQ 500 Hz		REC. DURATION 27 min 18,4 sec minutes seconds																																				
WEATHER		WIND <input type="checkbox"/> none <input checked="" type="checkbox"/> weak (5m/s) <input type="checkbox"/> medium <input type="checkbox"/> strong		Measurement (if any):																																				
CONDITIONS		RAIN <input checked="" type="checkbox"/> none <input type="checkbox"/> weak <input type="checkbox"/> medium <input type="checkbox"/> strong		Measurement (if any):																																				
Temperature (approx): 7		Remarks																																						
GROUND		<input checked="" type="checkbox"/> earth (<input type="checkbox"/> hard <input checked="" type="checkbox"/> soft) <input type="checkbox"/> gravel <input type="checkbox"/> sand <input type="checkbox"/> rock <input type="checkbox"/> grass = (<input type="checkbox"/> short <input type="checkbox"/> tall)																																						
TYPE		<input type="checkbox"/> asphalt <input type="checkbox"/> cement <input type="checkbox"/> concrete <input type="checkbox"/> paved <input type="checkbox"/> other _____ <input type="checkbox"/> dry soil <input checked="" type="checkbox"/> wet soil Remarks																																						
ARTIFICIAL GROUND-SENSOR COUPLING <input type="checkbox"/> no <input checked="" type="checkbox"/> yes, type Infissione																																								
BUILDING DENSITY <input type="checkbox"/> none <input checked="" type="checkbox"/> scattered <input type="checkbox"/> dense <input type="checkbox"/> other, type																																								
TRANSIENTS		MONOCHROMATIC NOISE SOURCES (factories, works, pumps, rivers...)																																						
<table border="1"> <thead> <tr> <th></th> <th>none</th> <th>few</th> <th>moderate</th> <th>many</th> <th>very dense</th> <th>distance</th> </tr> </thead> <tbody> <tr> <td>cars</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>trucks</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>pedestrians</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>other</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>			none	few	moderate	many	very dense	distance	cars							trucks							pedestrians							other							<input checked="" type="checkbox"/> no <input type="checkbox"/> yes, type _____ NEARBY STRUCTURES (description, height, distance) (trees, polls, buildings, bridges, underground structures,...) Trees			
	none	few	moderate	many	very dense	distance																																		
cars																																								
trucks																																								
pedestrians																																								
other																																								
OBSERVATIONS				FREQUENCY: _____ Hz (if computed in the field)																																				

**Qualità della misura:**

Durata: rispettata
 Stazionarietà: rispettata
 Isotropia: rispettata
 Assenza di disturbi: rispettata
 Plausibilità fisica: rispettata
 Robustezza statistica: rispettata

MISURA TIPO B1**HVSR12**

Peak frequency (Hz): 1.0 (± 7.2)

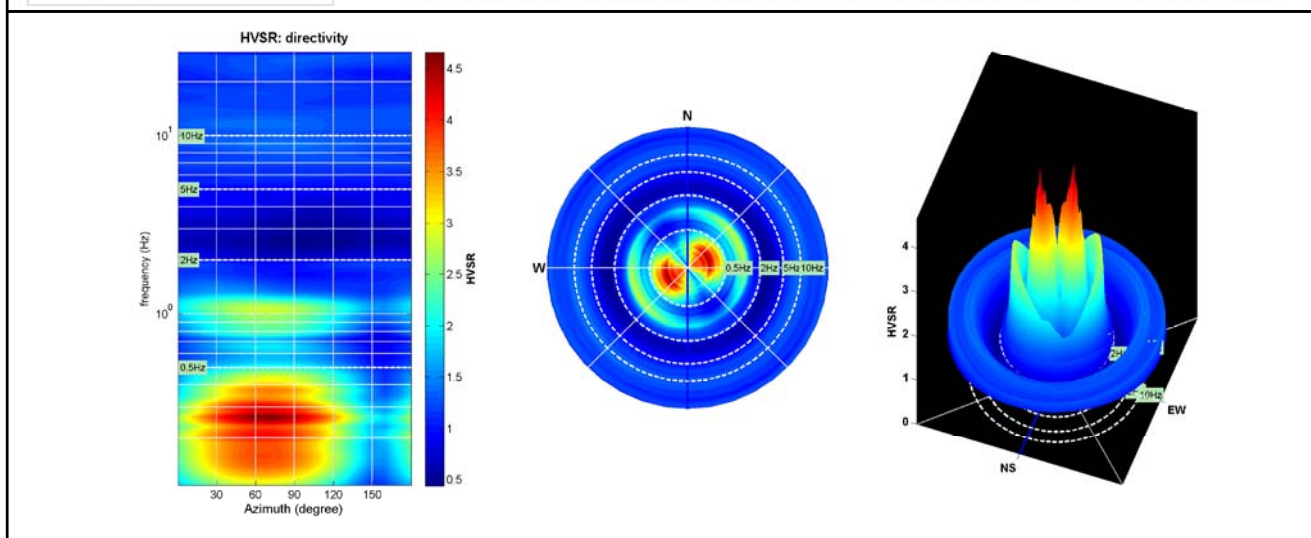
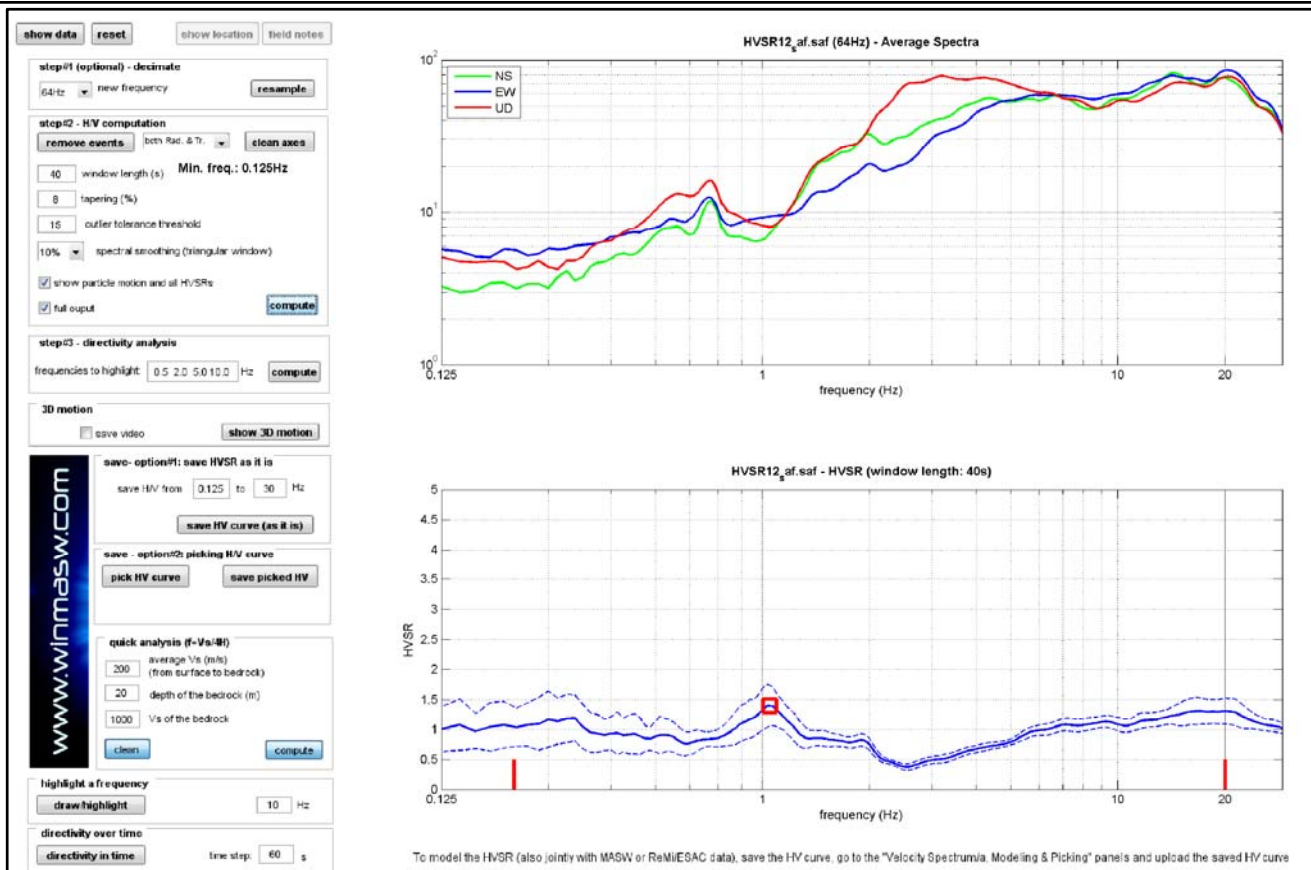
Peak HVSR value: 1.4 (± 0.3)

=== Criteria for a reliable H/V curve ===

- #1. $[f_0 > 10/Lw]$: $1.047 > 0.25$ (OK)
- #2. $[nc > 200]$: $2849 > 200$ (OK)
- #3. $[f_0 > 0.5\text{Hz}; \sigma_A(f) < 2 \text{ for } 0.5f_0 < f < 2f_0]$ (OK)

=== Criteria for a clear H/V peak (at least 5 should be fulfilled) ===

- #1. [exists f^- in the range $[f_0/4, f_0]$ | $AH/V(f^-) < A_0/2$]: yes (considering standard deviations), at frequency 0.3Hz (OK)
- #2. [exists f^+ in the range $[f_0, 4f_0]$ | $AH/V(f^+) < A_0/2$]: yes, at frequency 2.0Hz (OK)
- #3. $[A_0 > 2]$: $1.4 < 2$ (NO)
- #4. $[f_{\text{peak}}[Ah/v(f) \pm \sigma_A(f)] = f_0 \pm 5\%]$: (NO)
- #5. $[\sigma_A(f) < \epsilon(f_0)]$: $7.178 > 0.105$ (NO)
- #6. $[\sigma_A(f_0) < \theta(f_0)]$: $0.345 < 1.78$ (OK)



HVSR13

DATE 17.02.2016		HOUR 12.23		PLACE Fosso Ghiaia																																				
OPERATOR Geologica Toscana - Prospezioni Geofisiche S.n.c.			GPS TYPE and #																																					
GAUSS-BOAGA LATITUDE 4915226		GAUSS-BOAGA LONGITUDE 2301387		ALTITUDE 1,6 m slm																																				
STATION TYPE PASI 16SG24-N		SENSOR TYPE SENSHE 3D - 4,5 Hz																																						
STATION #		SENSOR #		DISK #																																				
FILE NAME RAHVSR13_.saf				POINT #																																				
GAIN 15000		SAMPL. FREQ 500 Hz		REC. DURATION 27 min 18,4 sec minutes seconds																																				
WEATHER		WIND <input checked="" type="checkbox"/> none <input type="checkbox"/> weak (5m/s) <input type="checkbox"/> medium <input type="checkbox"/> strong Measurement (if any):																																						
CONDITIONS		RAIN <input checked="" type="checkbox"/> none <input type="checkbox"/> weak <input type="checkbox"/> medium <input type="checkbox"/> strong Measurement (if any):																																						
		Temperature (approx): 7 Remarks																																						
GROUND		<input checked="" type="checkbox"/> earth (<input type="checkbox"/> hard <input checked="" type="checkbox"/> soft) <input type="checkbox"/> gravel <input type="checkbox"/> sand <input type="checkbox"/> rock <input type="checkbox"/> grass = (<input type="checkbox"/> short <input type="checkbox"/> tall)																																						
TYPE		<input type="checkbox"/> asphalt <input type="checkbox"/> cement <input type="checkbox"/> concrete <input type="checkbox"/> paved <input type="checkbox"/> other <input type="checkbox"/> dry soil <input checked="" type="checkbox"/> wet soil Remarks																																						
ARTIFICIAL GROUND-SENSOR COUPLING <input type="checkbox"/> no <input checked="" type="checkbox"/> yes, type Infissione																																								
BUILDING DENSITY <input type="checkbox"/> none <input checked="" type="checkbox"/> scattered <input type="checkbox"/> dense <input type="checkbox"/> other, type																																								
TRANSIENTS		MONOCHROMATIC NOISE SOURCES (factories, works, pumps, rivers...)																																						
		<input checked="" type="checkbox"/> no <input type="checkbox"/> yes, type																																						
<table border="1"> <thead> <tr> <th></th> <th>none</th> <th>few</th> <th>moderate</th> <th>many</th> <th>very dense</th> <th>distance</th> </tr> </thead> <tbody> <tr> <td>cars</td> <td></td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>trucks</td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>pedestrians</td> <td></td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>other</td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>			none	few	moderate	many	very dense	distance	cars		<input checked="" type="checkbox"/>					trucks	<input checked="" type="checkbox"/>						pedestrians		<input checked="" type="checkbox"/>					other	<input checked="" type="checkbox"/>						NEARBY STRUCTURES (description, height, distance) (trees, polls, buildings, bridges, underground structures,...) Buildings			
	none	few	moderate	many	very dense	distance																																		
cars		<input checked="" type="checkbox"/>																																						
trucks	<input checked="" type="checkbox"/>																																							
pedestrians		<input checked="" type="checkbox"/>																																						
other	<input checked="" type="checkbox"/>																																							
OBSERVATIONS				FREQUENCY: Hz (if computed in the field)																																				

**Qualità della misura:**

Durata: rispettata
 Stazionarietà: rispettata
 Isotropia: rispettata
 Assenza di disturbi: rispettata
 Plausibilità fisica: rispettata
 Robustezza statistica: rispettata

MISURA TIPO A2**HVSR13**

Peak frequency (Hz): 0.7 (± 1.3)

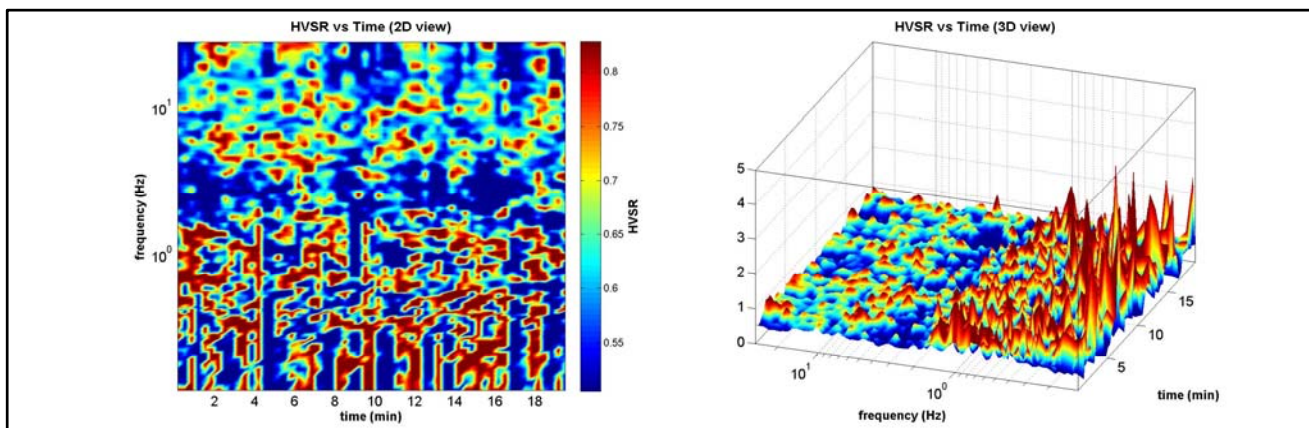
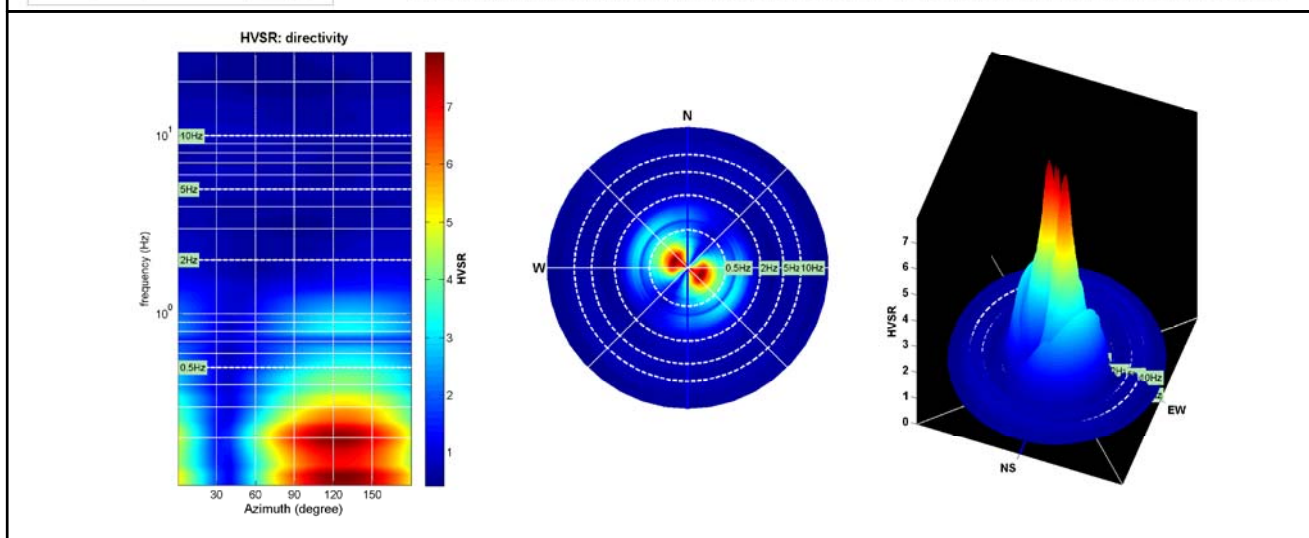
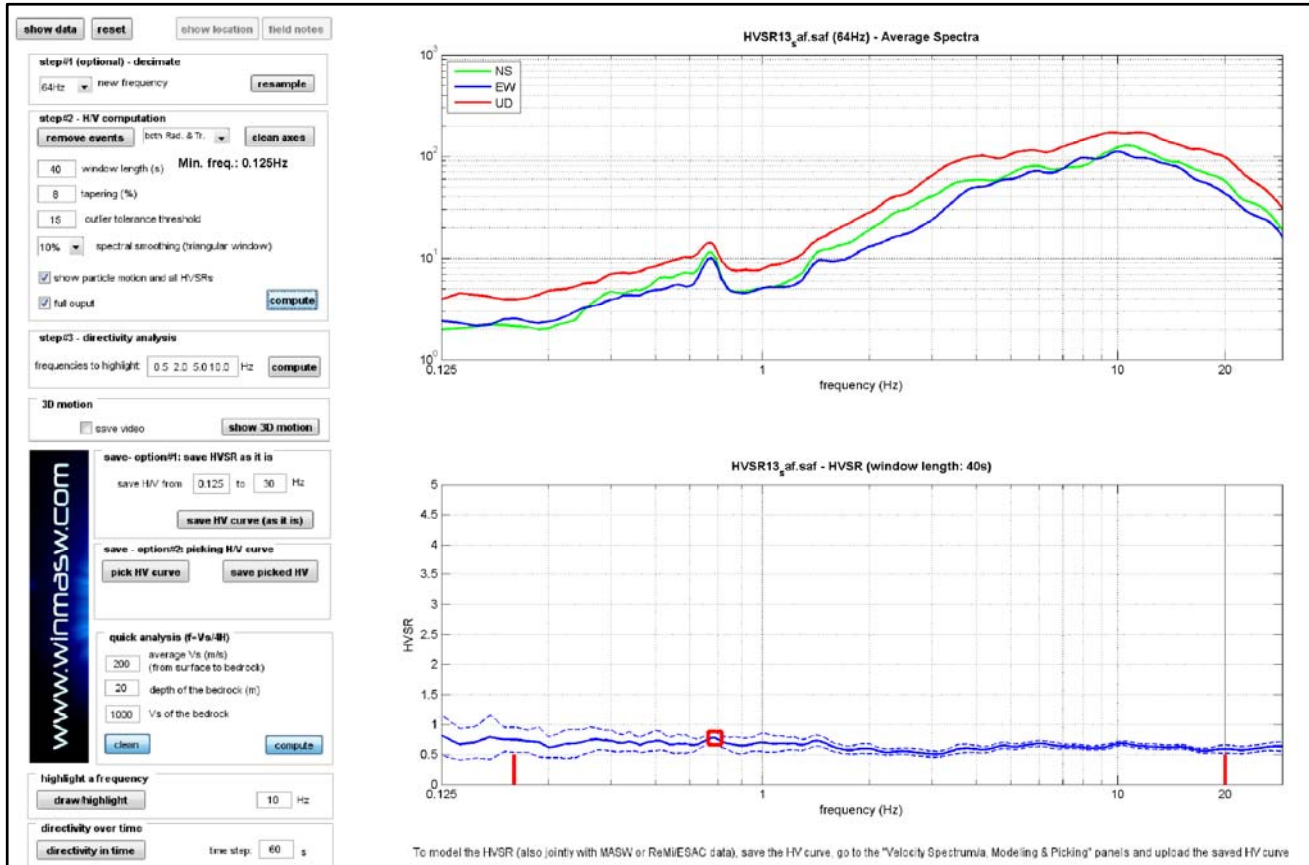
Peak HVSR value: 0.8 (± 0.1)

=== Criteria for a reliable H/V curve ===

- #1. $[f_0 > 10/Lw]$: $0.735 > 0.25$ (OK)
- #2. $[nc > 200]$: $1734 > 200$ (OK)
- #3. $[f_0 > 0.5\text{Hz}; \sigma_A(f) < 2 \text{ for } 0.5f_0 < f < 2f_0]$ (OK)

=== Criteria for a clear H/V peak (at least 5 should be fulfilled) ===

- #1. $[\text{exists } f^- \text{ in the range } [f_0/4, f_0] \mid AH/V(f^-) < A_0/2]$: (NO)
- #2. $[\text{exists } f^+ \text{ in the range } [f_0, 4f_0] \mid AH/V(f^+) < A_0/2]$: (NO)
- #3. $[A_0 > 2]$: $0.8 < 2$ (NO)
- #4. $[f_{\text{peak}}[Ah/v(f) \pm \sigma_A(f)] = f_0 \pm 5\%]$: (NO)
- #5. $[\sigma_{\text{mf}} < \epsilon(f_0)]$: $1.265 > 0.110$ (NO)
- #6. $[\sigma_A(f_0) < \theta(f_0)]$: $0.097 < 2$ (OK)



HVSR14

DATE 17.02.2016		HOUR 13.18		PLACE Lido di Classe																																				
OPERATOR Geologica Toscana - Prospezioni Geofisiche S.n.c.			GPS TYPE and #																																					
GAUSS-BOAGA LATITUDE 4911744		GAUSS-BOAGA LONGITUDE 2307480		ALTITUDE 1,0 m slm																																				
STATION TYPE PASI 16SG24-N		SENSOR TYPE SENSHE 3D - 4,5 Hz																																						
STATION #		SENSOR #		DISK #																																				
FILE NAME RAHVSR14_.saf				POINT #																																				
GAIN 15000		SAMPL. FREQ 500 Hz		REC. DURATION 27 min 18,4 sec minutes seconds																																				
WEATHER		WIND <input checked="" type="checkbox"/> none <input type="checkbox"/> weak (5m/s) <input type="checkbox"/> medium <input type="checkbox"/> strong		Measurement (if any): _____																																				
CONDITIONS		RAIN <input checked="" type="checkbox"/> none <input type="checkbox"/> weak <input type="checkbox"/> medium <input type="checkbox"/> strong		Measurement (if any): _____																																				
Temperature (approx): 8		Remarks _____																																						
GROUND		<input checked="" type="checkbox"/> earth (<input type="checkbox"/> hard <input checked="" type="checkbox"/> soft) <input type="checkbox"/> gravel <input type="checkbox"/> sand <input type="checkbox"/> rock <input type="checkbox"/> grass = (<input type="checkbox"/> short <input type="checkbox"/> tall)																																						
TYPE		<input type="checkbox"/> asphalt <input type="checkbox"/> cement <input type="checkbox"/> concrete <input type="checkbox"/> paved <input type="checkbox"/> other _____ <input type="checkbox"/> dry soil <input checked="" type="checkbox"/> wet soil Remarks _____																																						
ARTIFICIAL GROUND-SENSOR COUPLING <input type="checkbox"/> no <input checked="" type="checkbox"/> yes, type Infissione																																								
BUILDING DENSITY <input type="checkbox"/> none <input checked="" type="checkbox"/> scattered <input type="checkbox"/> dense <input type="checkbox"/> other, type _____																																								
TRANSIENTS		<table border="1"> <thead> <tr> <th></th> <th>none</th> <th>few</th> <th>moderate</th> <th>many</th> <th>very dense</th> <th>distance</th> </tr> </thead> <tbody> <tr> <td>cars</td> <td></td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>trucks</td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>pedestrians</td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>other</td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>					none	few	moderate	many	very dense	distance	cars		<input checked="" type="checkbox"/>					trucks	<input checked="" type="checkbox"/>						pedestrians	<input checked="" type="checkbox"/>						other	<input checked="" type="checkbox"/>					
	none	few	moderate	many	very dense	distance																																		
cars		<input checked="" type="checkbox"/>																																						
trucks	<input checked="" type="checkbox"/>																																							
pedestrians	<input checked="" type="checkbox"/>																																							
other	<input checked="" type="checkbox"/>																																							
		MONOCHROMATIC NOISE SOURCES (factories, works, pumps, rivers...) <input checked="" type="checkbox"/> no <input type="checkbox"/> yes, type _____																																						
		NEARBY STRUCTURES (description, height, distance) (trees, polls, buildings, bridges, underground structures...) Trees, Buildings																																						
OBSERVATIONS				FREQUENCY: _____ Hz (if computed in the field)																																				

**Qualità della misura:**

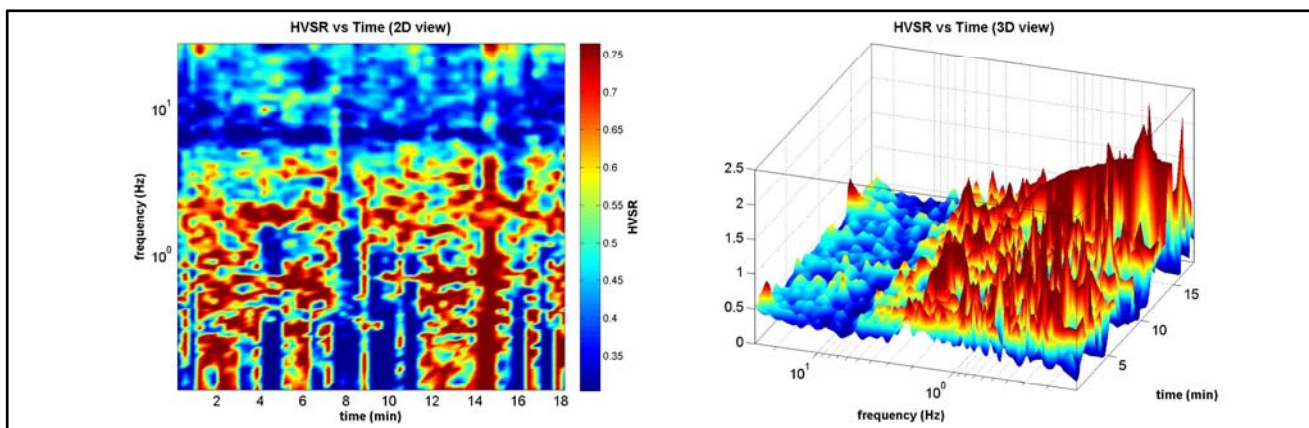
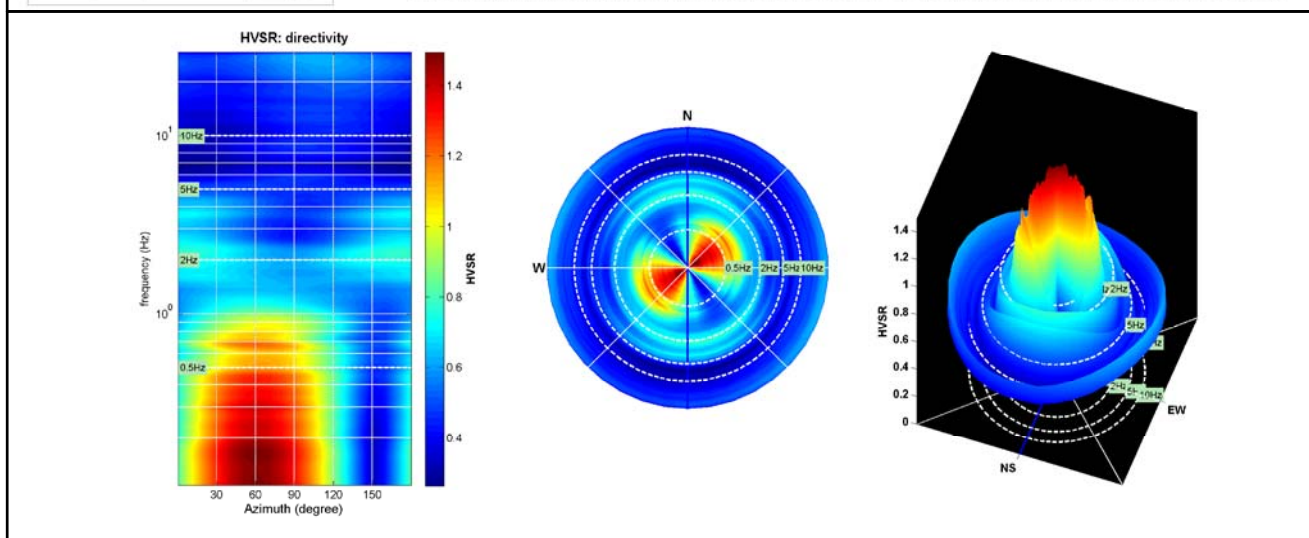
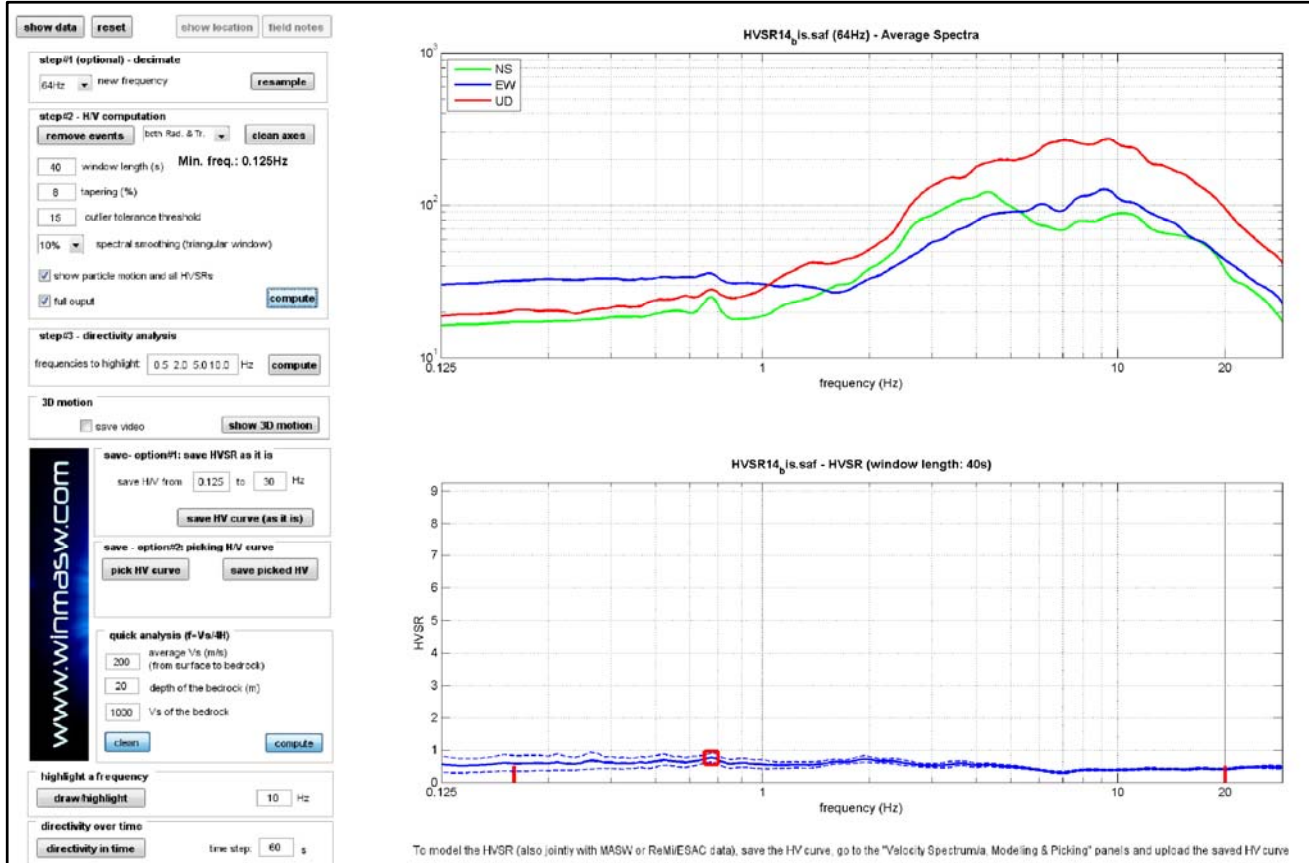
Durata: rispettata
Stazionarietà: rispettata
Isotropia: rispettata
Assenza di disturbi: rispettata
Plausibilità fisica: rispettata
Robustezza statistica: rispettata

MISURA TIPO A2**HVSR14**Peak frequency (Hz): 0.7 (± 0.8)Peak HVSR value: 0.8 (± 0.1)**Criteria for a reliable H/V curve**

- #1. $[f_0 > 10/Lw]$: $0.719 > 0.25$ (OK)
#2. $[nc > 200]$: $1582 > 200$ (OK)
#3. $[f_0 > 0.5\text{Hz}; \sigma_A(f) < 2 \text{ for } 0.5f_0 < f < 2f_0]$ (OK)

Criteria for a clear H/V peak (at least 5 should be fulfilled)

- #1. [exists f^- in the range $[f_0/4, f_0]$ | $AH/V(f^-) < A_0/2$]: yes (considering standard deviations), at frequency 0.2Hz (OK)
#2. [exists f^+ in the range $[f_0, 4f_0]$ | $AH/V(f^+) < A_0/2$]: (NO)
#3. $[A_0 > 2]$: $0.8 < 2$ (NO)
#4. $[f_{\text{peak}}[Ah/v(f) \pm \sigma_A(f)] = f_0 \pm 5\%]$: (NO)
#5. $[\sigma_{\text{mf}} < \epsilon(f_0)]$: $0.839 > 0.108$ (NO)
#6. $[\sigma_A(f_0) < \theta(f_0)]$: $0.134 < 2$ (OK)



HVSR15

DATE 17.02.2016		HOUR 14.20		PLACE Ravenna Centro	
OPERATOR Geologica Toscana - Prospezioni Geofisiche S.n.c.			GPS TYPE and #		
GAUSS-BOAGA LATITUDE 4922954		GAUSS-BOAGA LONGITUDE 2295638		ALTITUDE 1,8 m slm	
STATION TYPE PASI 16SG24-N		SENSOR TYPE SENSHE 3D - 4,5 Hz			
STATION #		SENSOR #		DISK #	
FILE NAME RAHVSR15_.saf				POINT #	
GAIN 15000		SAMPL. FREQ 500 Hz		REC. DURATION 27 min 18,4 sec minutes seconds	
WEATHER		WIND <input checked="" type="checkbox"/> none <input type="checkbox"/> weak (5m/s) <input type="checkbox"/> medium <input type="checkbox"/> strong		Measurement (if any): _____	
CONDITIONS		RAIN <input type="checkbox"/> none <input checked="" type="checkbox"/> weak <input type="checkbox"/> medium <input type="checkbox"/> strong		Measurement (if any): _____	
		Temperature (approx): 8		Remarks _____	
GROUND		<input checked="" type="checkbox"/> earth (<input type="checkbox"/> hard <input checked="" type="checkbox"/> soft) <input type="checkbox"/> gravel <input type="checkbox"/> sand <input type="checkbox"/> rock <input type="checkbox"/> grass = (<input type="checkbox"/> short <input type="checkbox"/> tall)			
TYPE		<input type="checkbox"/> asphalt <input type="checkbox"/> cement <input type="checkbox"/> concrete <input type="checkbox"/> paved <input type="checkbox"/> other _____ <input type="checkbox"/> dry soil <input checked="" type="checkbox"/> wet soil Remarks _____			
ARTIFICIAL GROUND-SENSOR COUPLING <input type="checkbox"/> no <input checked="" type="checkbox"/> yes, type Infissione					
BUILDING DENSITY <input type="checkbox"/> none <input checked="" type="checkbox"/> scattered <input type="checkbox"/> dense <input type="checkbox"/> other, type _____					
TRANSIENTS		MONOCHROMATIC NOISE SOURCES (factories, works, pumps, rivers...)			
		<input checked="" type="checkbox"/> no <input type="checkbox"/> yes, type _____			
cars		NEARBY STRUCTURES (trees, polls, buildings, bridges, underground structures,...)			
trucks		Trees			
pedestrians					
other					
OBSERVATIONS				FREQUENCY: _____ Hz (if computed in the field)	

**Qualità della misura:**

Durata: rispettata
 Stazionarietà: rispettata
 Isotropia: rispettata
 Assenza di disturbi: rispettata
 Plausibilità fisica: rispettata
 Robustezza statistica: rispettata

MISURA TIPO A2**HVSR15**

Peak frequency (Hz): 20.0 (±6.3)

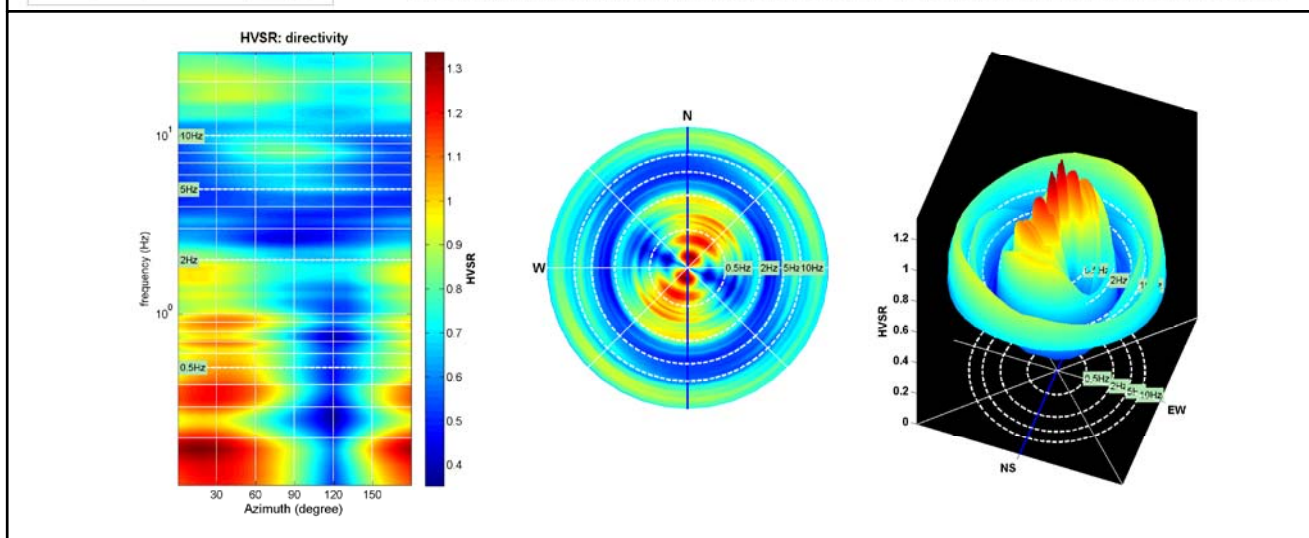
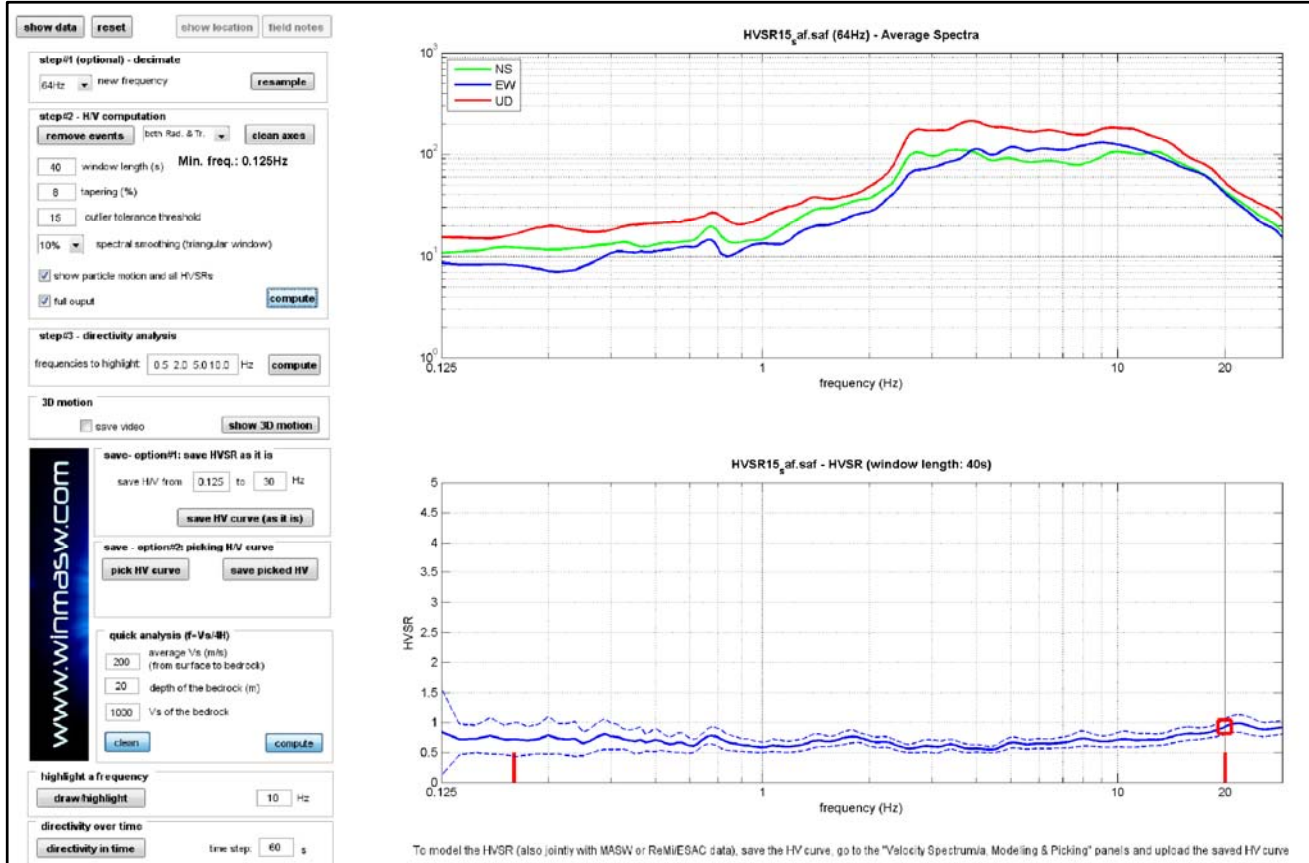
Peak HVSR value: 0.9 (±0.1)

Criteria for a reliable H/V curve

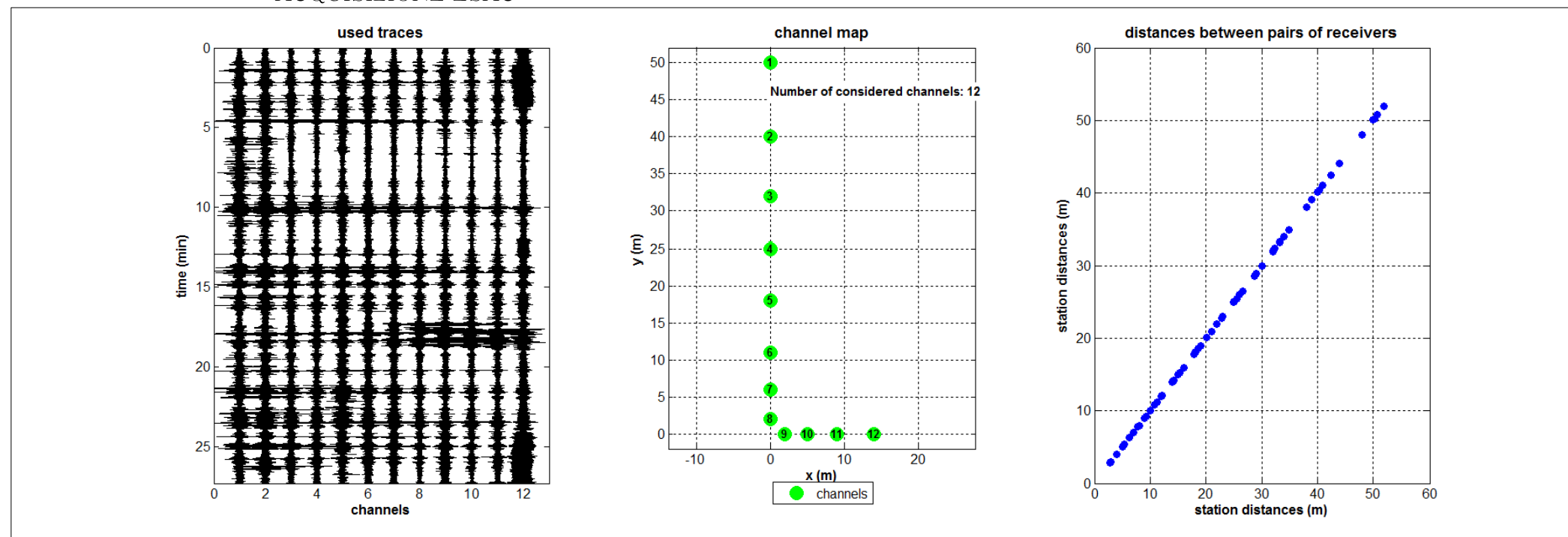
- #1. $[f_0 > 10/Lw]$: $19.994 > 0.25$ (OK)
 #2. $[nc > 200]$: $62382 > 200$ (OK)
 #3. $[f_0 > 0.5\text{Hz}; \sigma_A(f) < 2 \text{ for } 0.5f_0 < f < 2f_0]$ (OK)

Criteria for a clear H/V peak (at least 5 should be fulfilled)

- #1. [exists f^- in the range $[f_0/4, f_0]$ | $AH/V(f^-) < A_0/2$]: (NO)
 #2. [exists f^+ in the range $[f_0, 4f_0]$ | $AH/V(f^+) < A_0/2$]: (NO)
 #3. $[A_0 > 2]$: $0.9 < 2$ (NO)
 #4. $[f_{\text{peak}}[Ah/v(f) \pm \sigma_A(f)] = f_0 \pm 5\%]$: (NO)
 #5. $[\sigma_{\text{mf}} < \epsilon(f_0)]$: $6.342 > 1.000$ (NO)
 #6. $[\sigma_A(f_0) < \theta(f_0)]$: $0.128 < 1.58$ (OK)



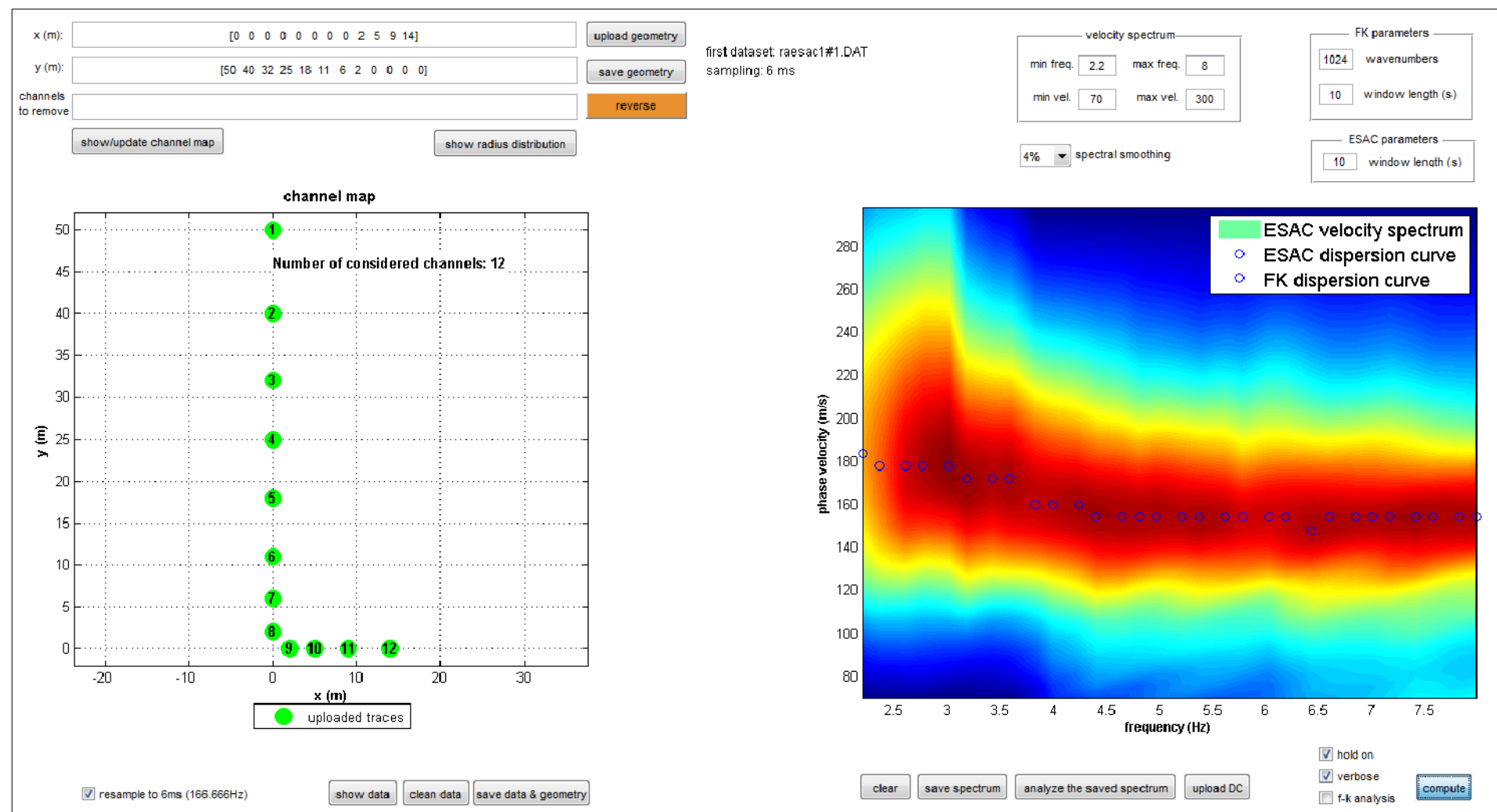
ACQUISIZIONE ESAC



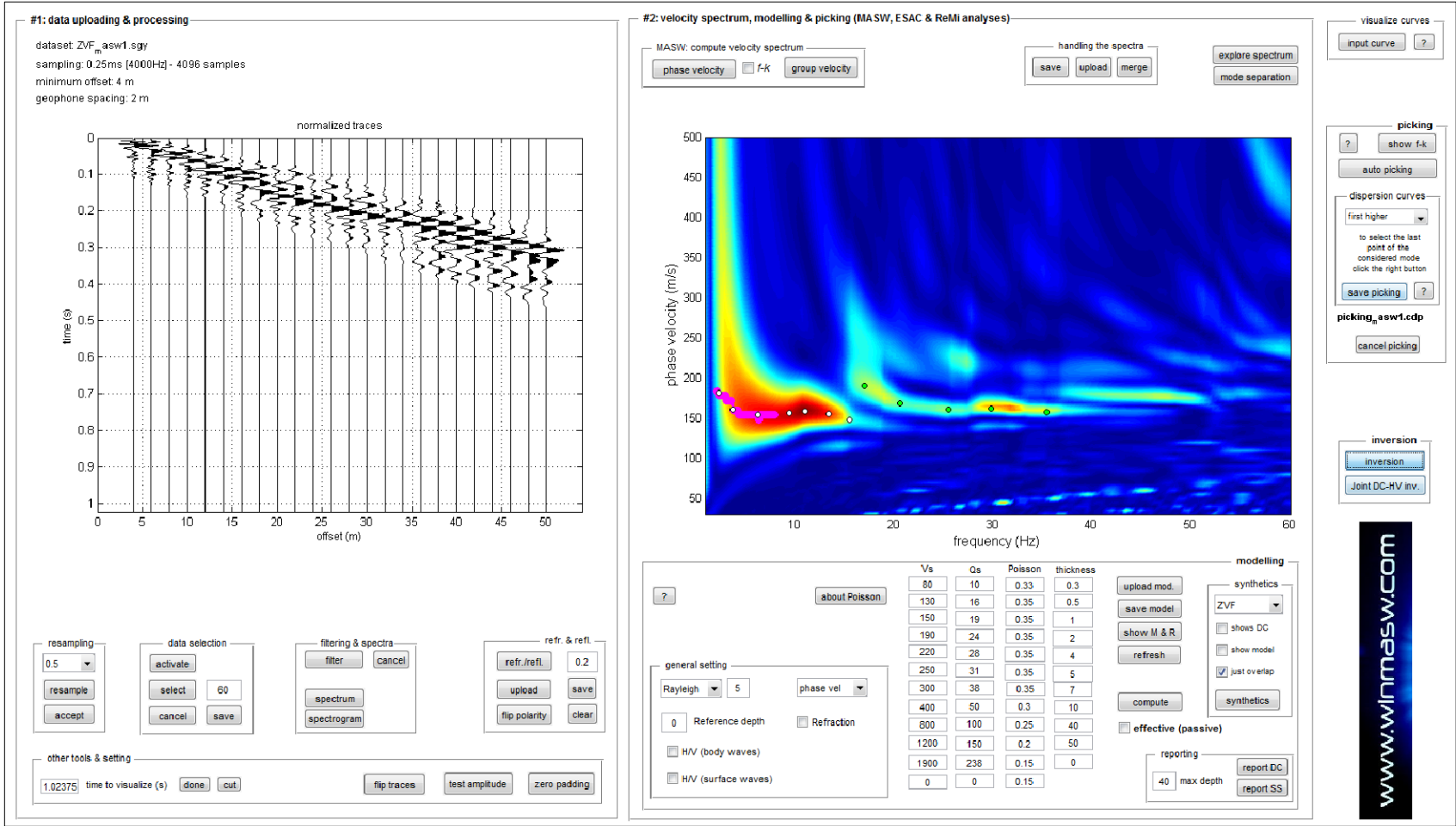
Stendimento ESAC



SPETTRO DI VELOCITA' ESAC E CURVA DI DISPERSIONE EFFETTIVA



SISMOGRAMMI, SPETTRO DI VELOCITA' E CURVA DI DISPERIONE EFFETTIVA DA ESAC

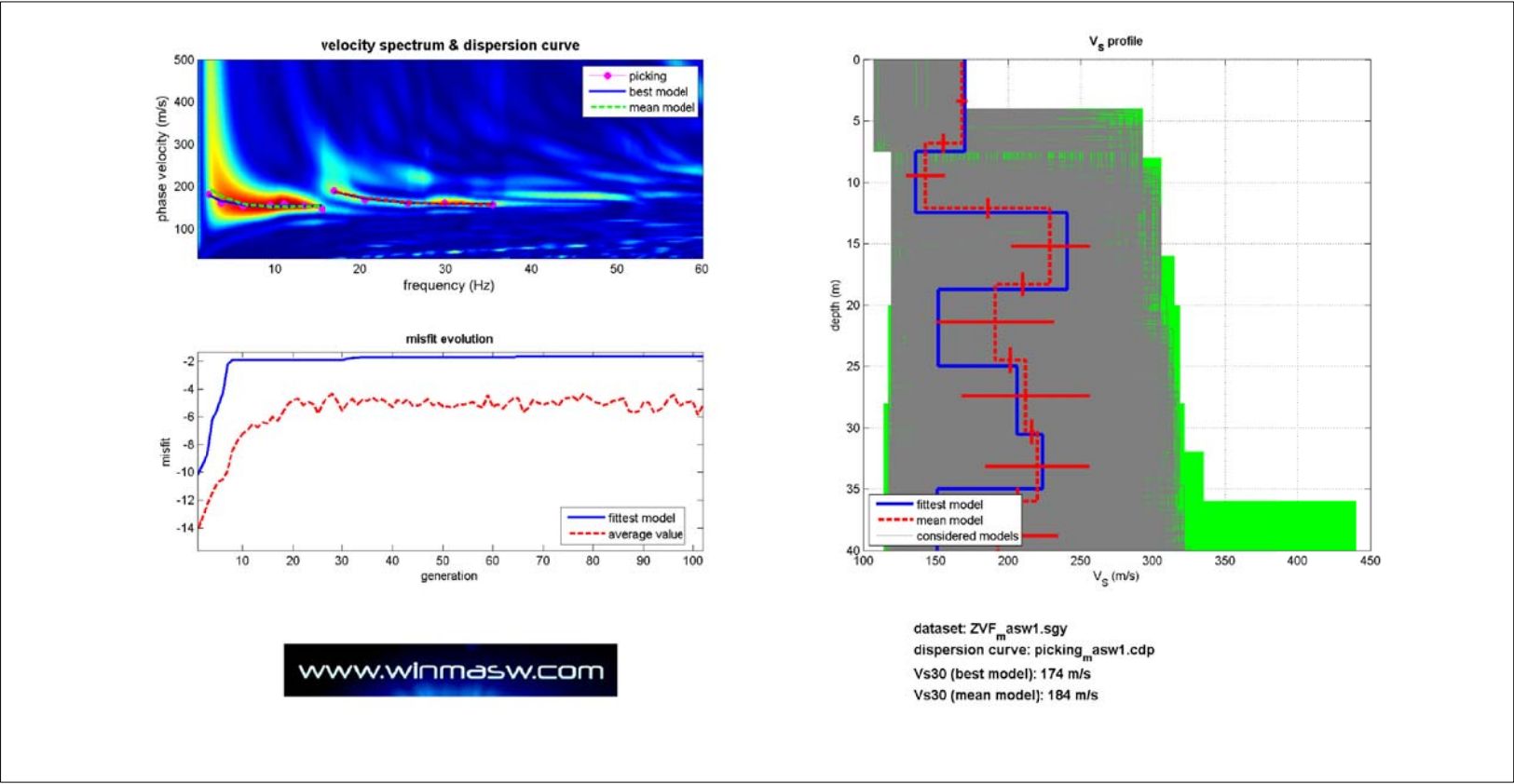


Stendimento MASW

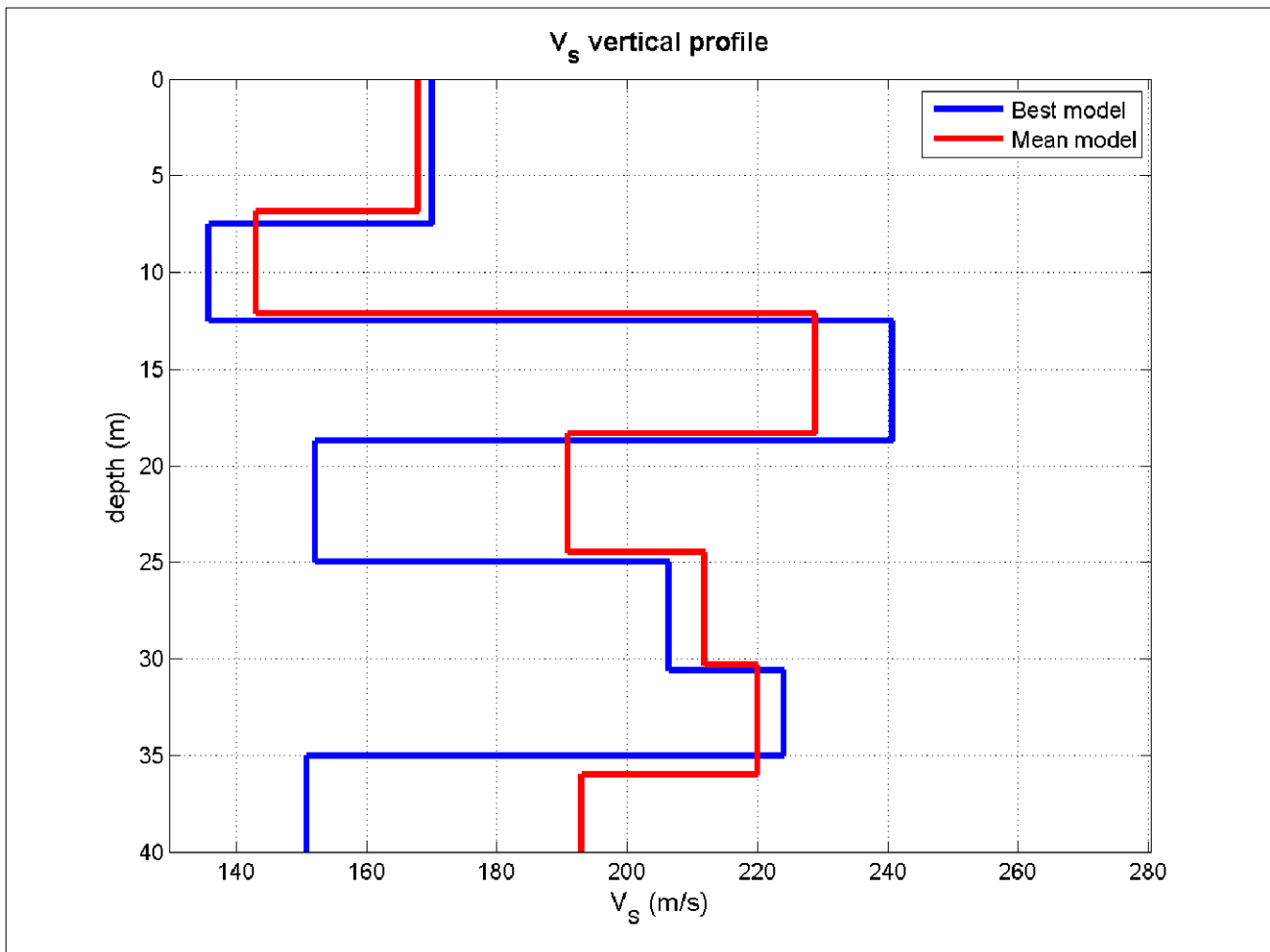


RISULTANZE DELL'ANALISI SISMICA CONGIUNTA MASW - ESAC 01 SAVARNA

INVERSIONE CONGIUNTA MASW - ESAC E PROFILO DI VELOCITA'



PROFILO DI VELOCITA' MASW - ESAC 01



Mean model

Vs (m/s): 168, 143, 229, 191, 212, 220, 193, 240, 218, 288

Thickness (m): 6.8, 5.3, 6.2, 6.2, 5.8, 5.7, 5.7, 6.3, 6.1, 5.9

Density (gr/cm³) (approximate values): 1.80 1.77 1.87 1.84 1.83 1.84 1.81 1.84 1.81 1.88

Seismic/Dynamic Shear modulus (MPa) (approximate values): 51 36 98 67 82 89 67 106 86 156

Analysis: Rayleigh Waves

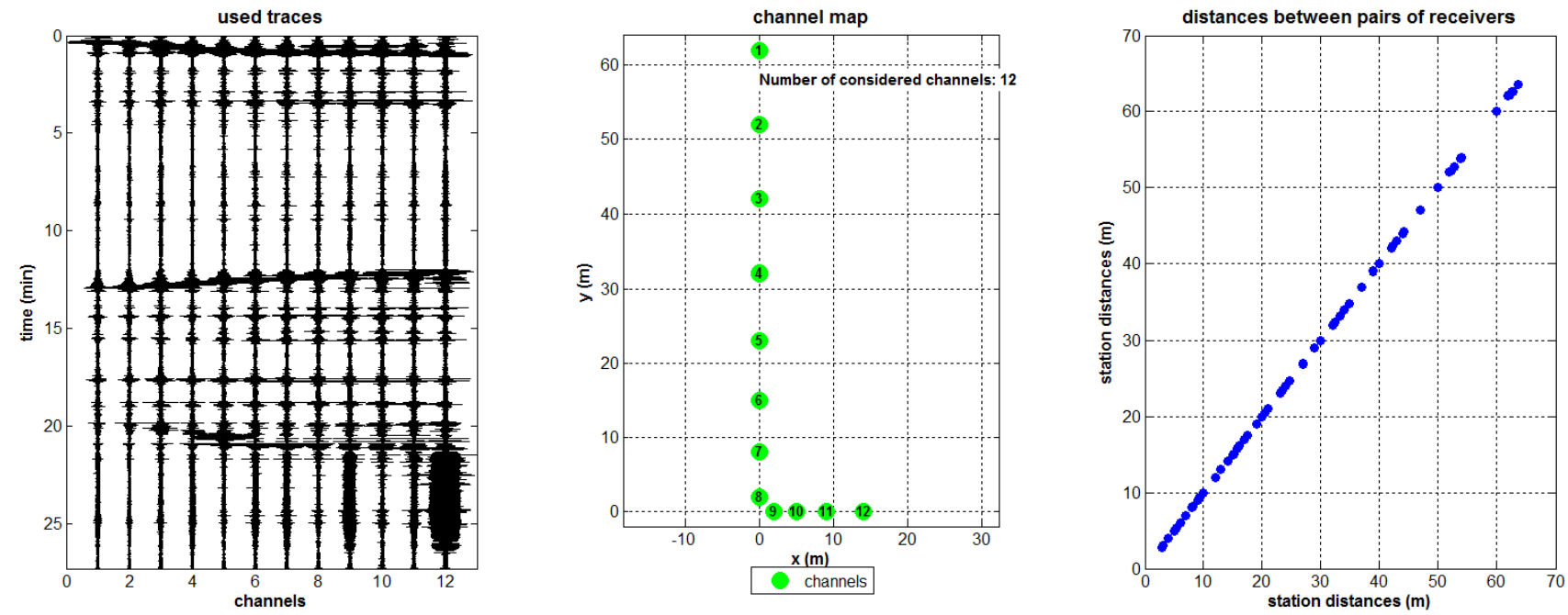
Approximate values for Vp and Poisson

Vp (m/s): 353 307 472 411 403 408 367 418 372 481

Poisson: 0.35 0.36 0.35 0.36 0.31 0.30 0.31 0.25 0.24 0.22

Vs30 (m/s): 184

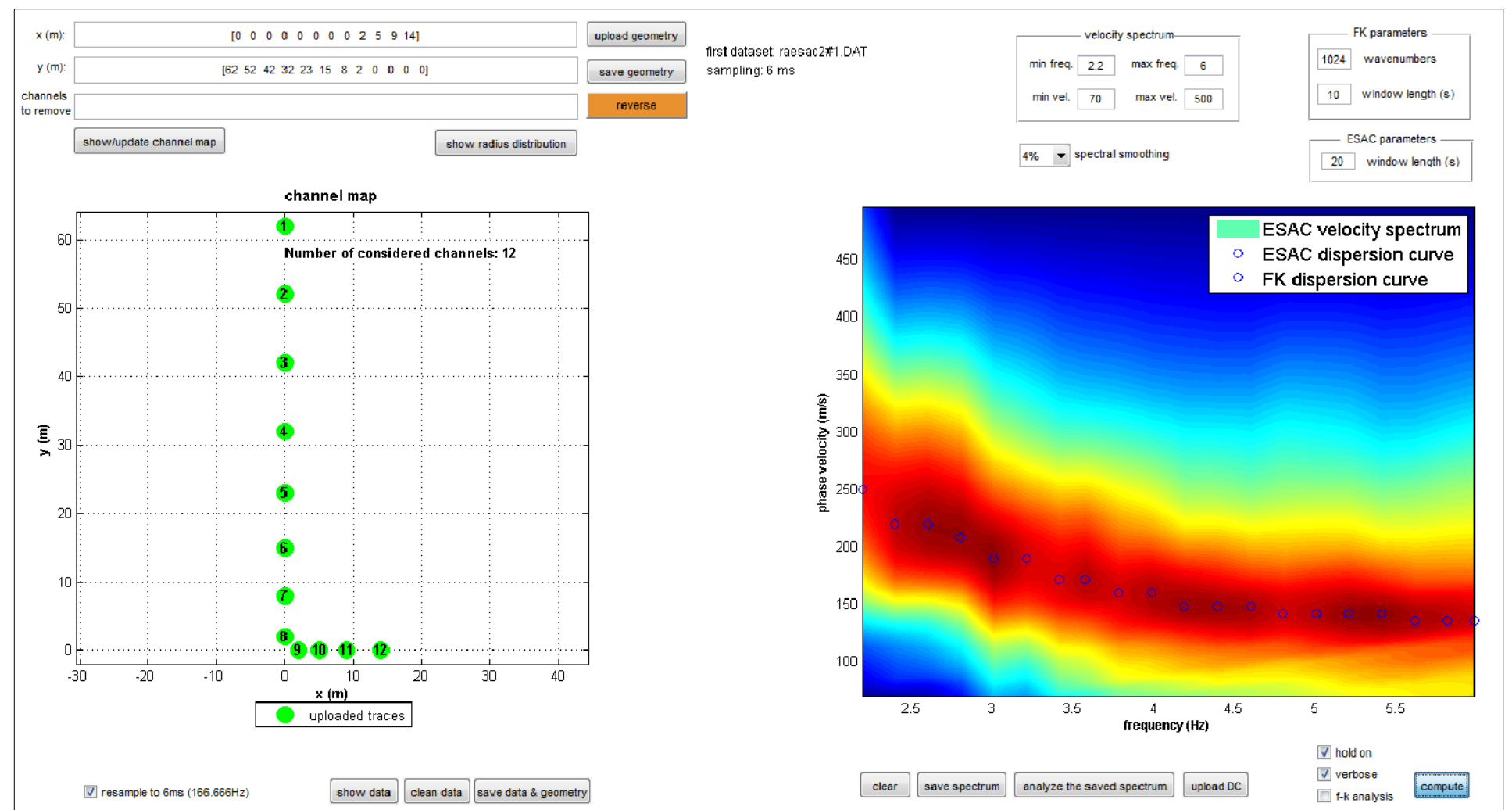
ACQUISIZIONE ESAC



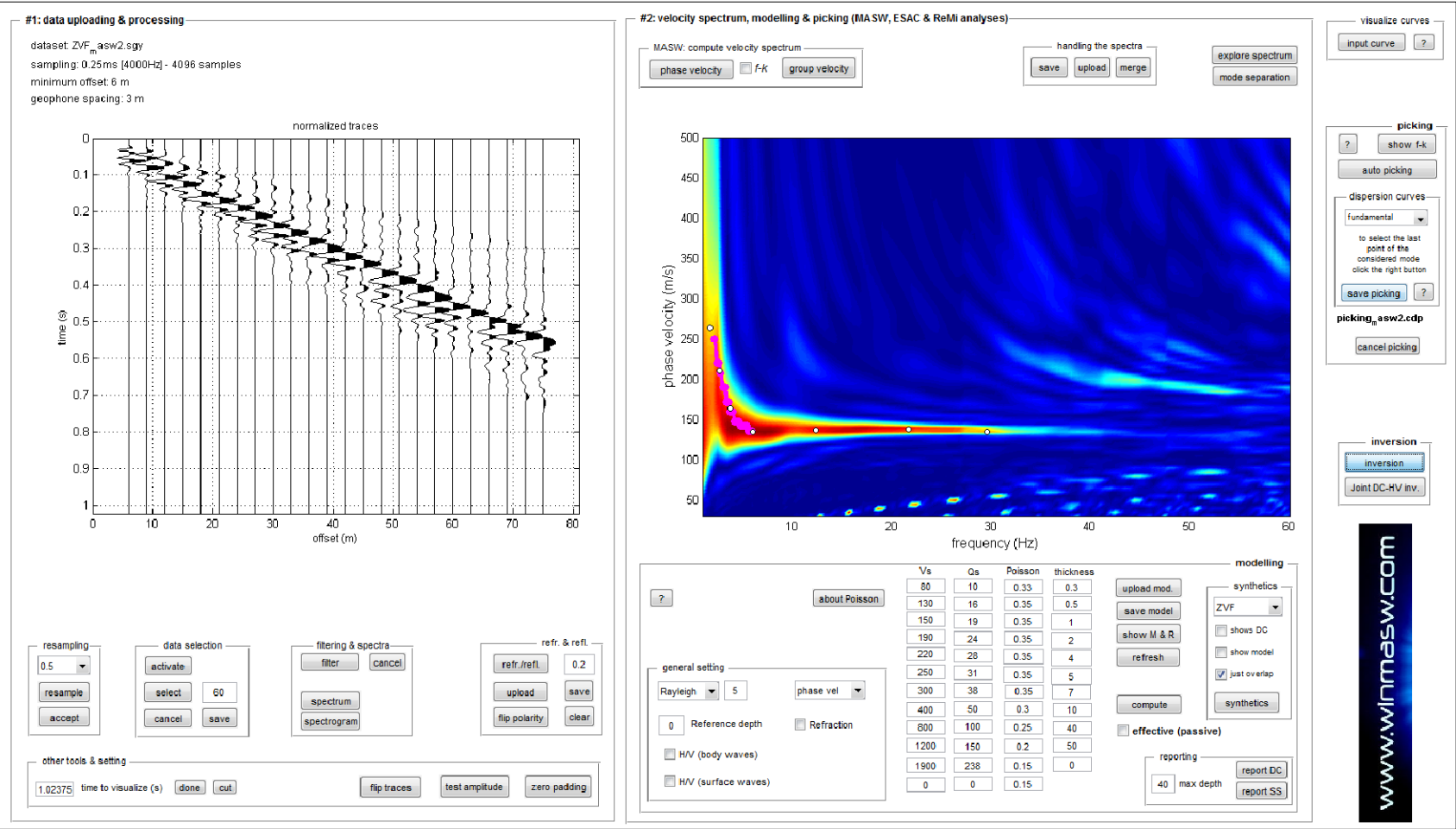
Stendimento ESAC



SPETTRO DI VELOCITA' ESAC E CURVA DI DISPERSIONE EFFETTIVA



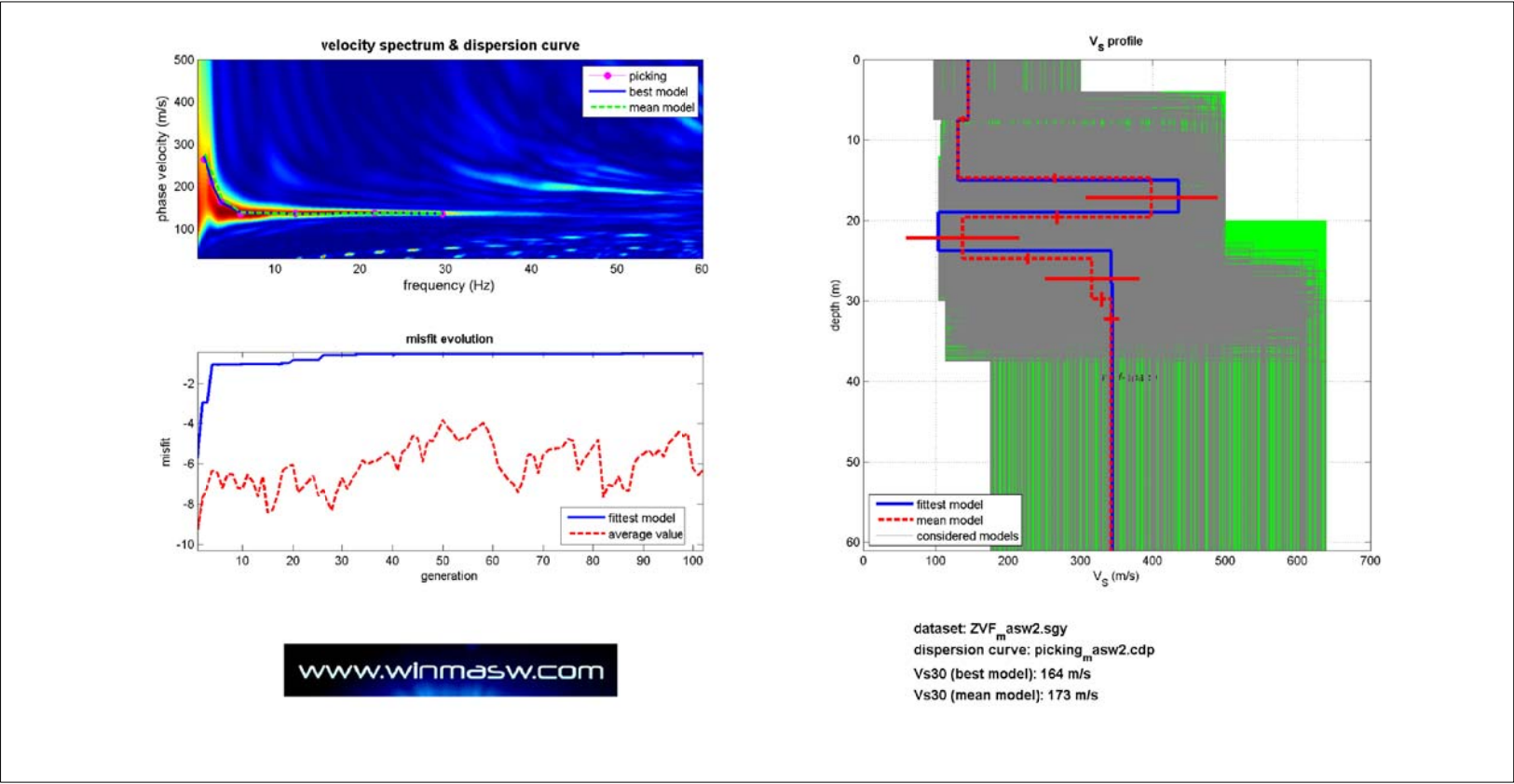
SISMOGRAMMI, SPETTRO DI VELOCITA' E CURVA DI DISPERIONE EFFETTIVA DA ESAC



Stendimento MASW

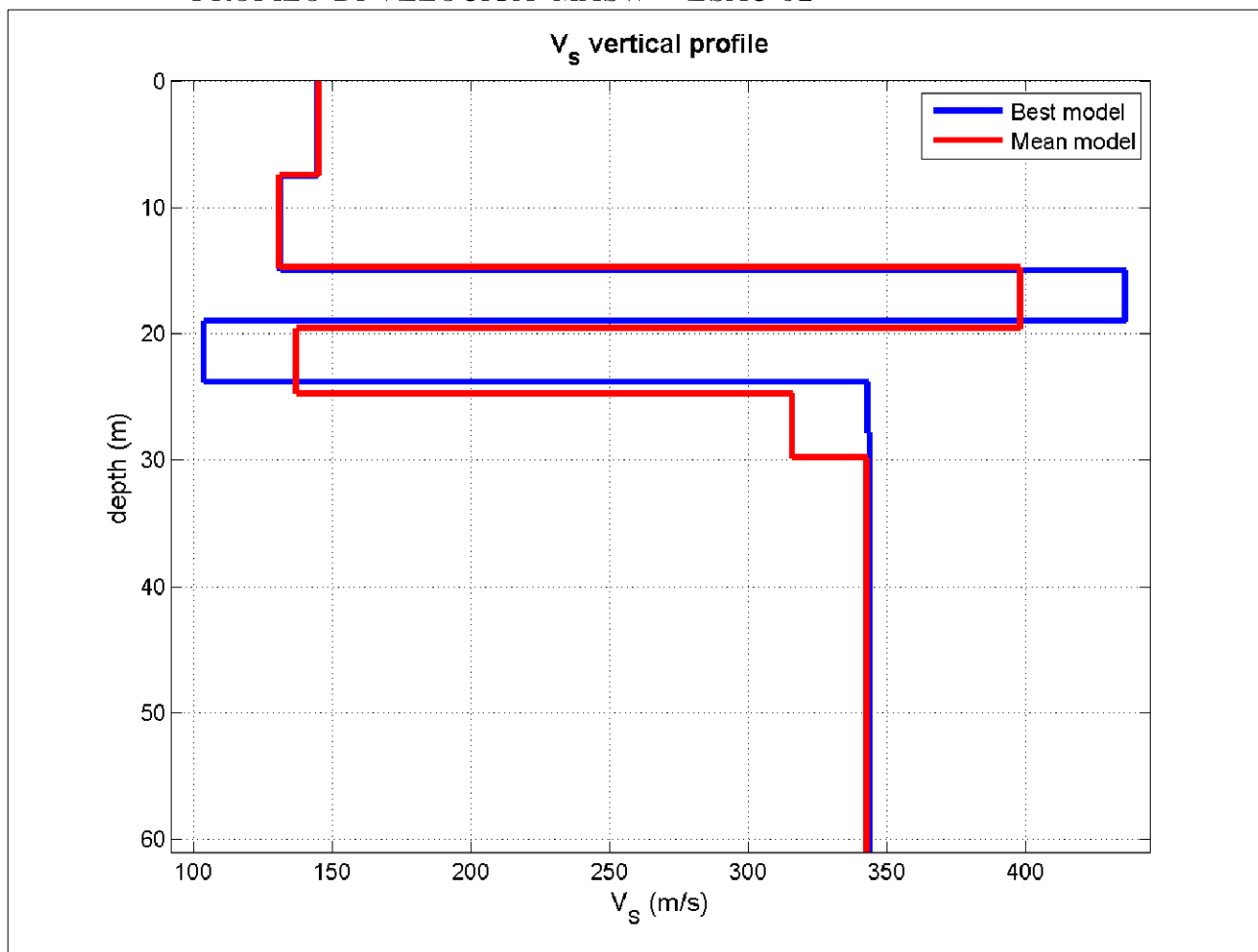


INVERSIONE CONGIUNTA MASW – ESAC E PROFILO DI VELOCITA'



RISULTANZE DELL'ANALISI SISMICA CONGIUNTA MASW - ESAC 02
SANTERNO

PROFILO DI VELOCITA' MASW - ESAC 02



Mean model

Vs (m/s): 145, 131, 398, 137, 316, 343

Thickness (m): 7.4, 7.3, 4.9, 5.1, 5.0, 30.3

Density (gr/cm³) (approximate values): 1.84 1.76 1.99 1.75 1.92 1.94

Seismic/Dynamic Shear modulus (MPa) (approximate values): 39 30 315 33 192 228

Analysis: Rayleigh Waves

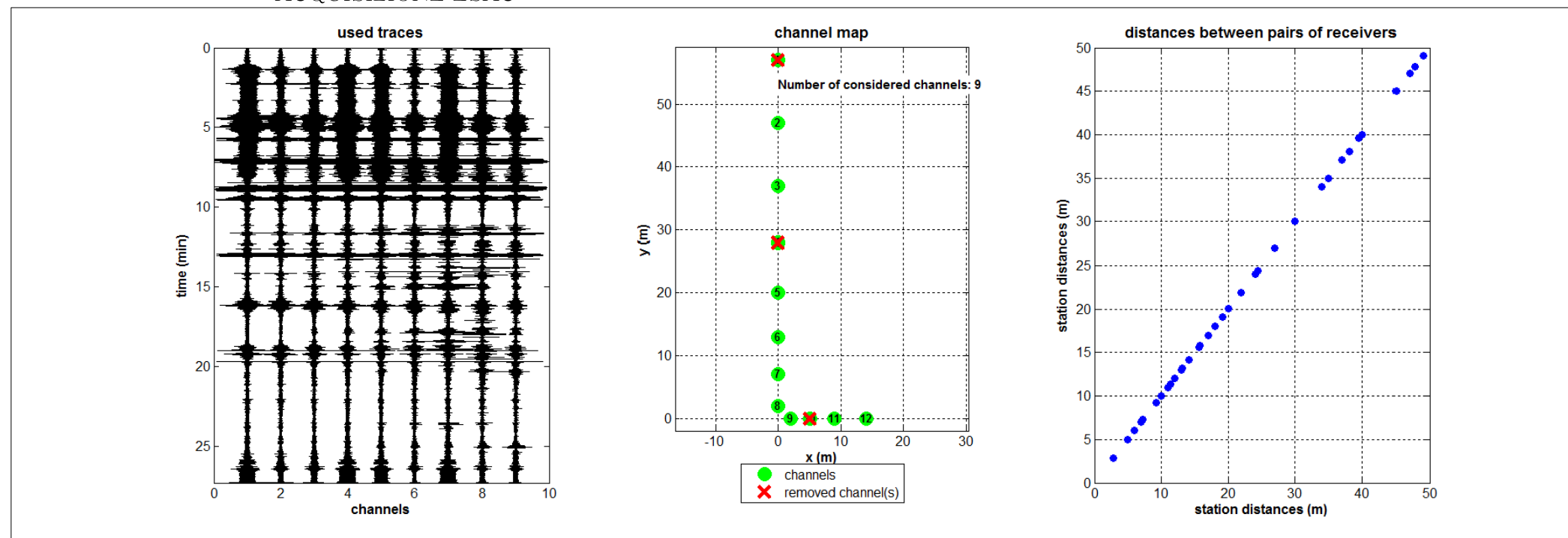
Approximate values for Vp and Poisson

Vp (m/s): 406 298 772 284 578 625

Poisson: 0.43 0.38 0.32 0.35 0.29 0.28

Vs30 (m/s): 173

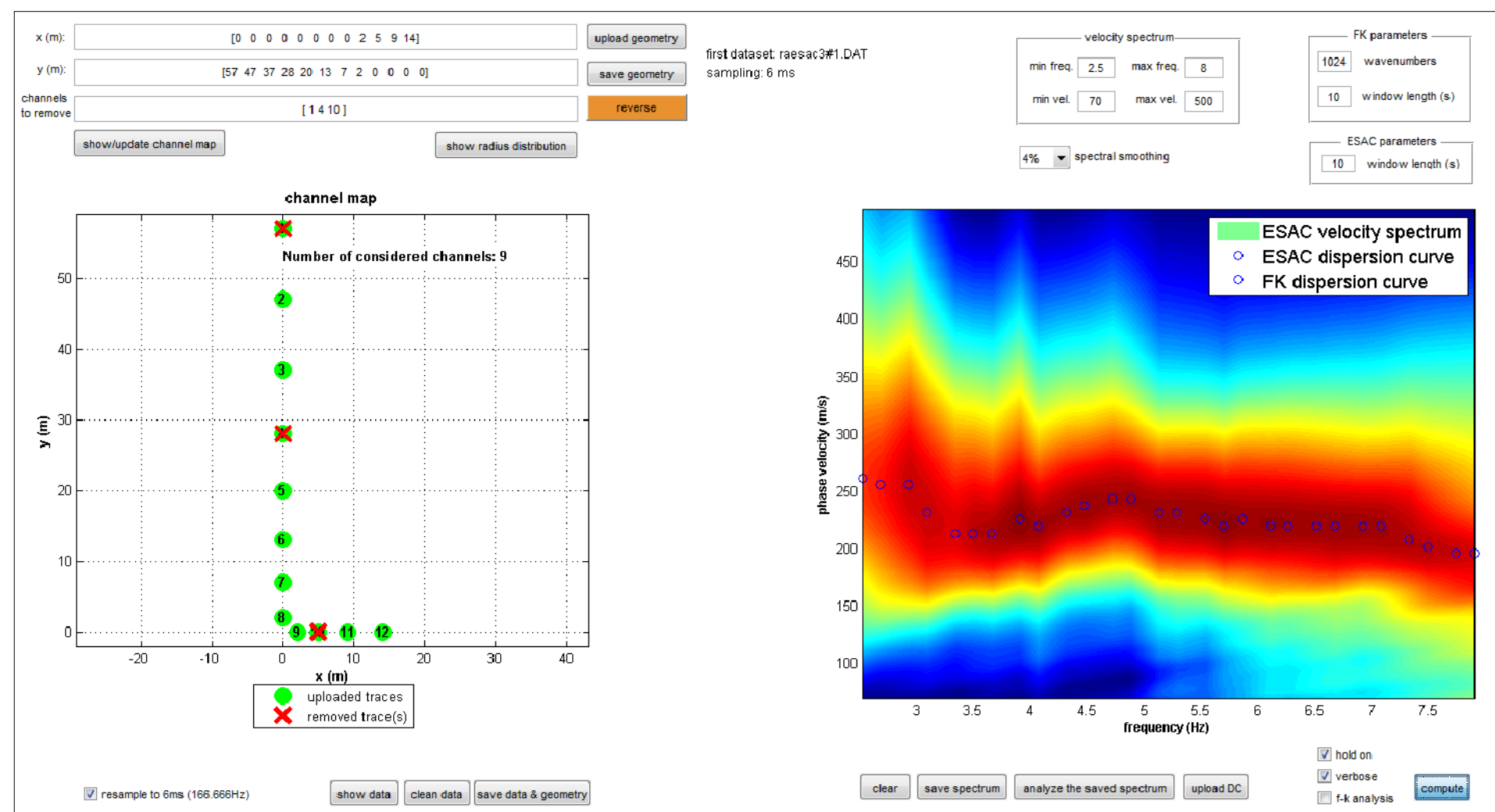
ACQUISIZIONE ESAC



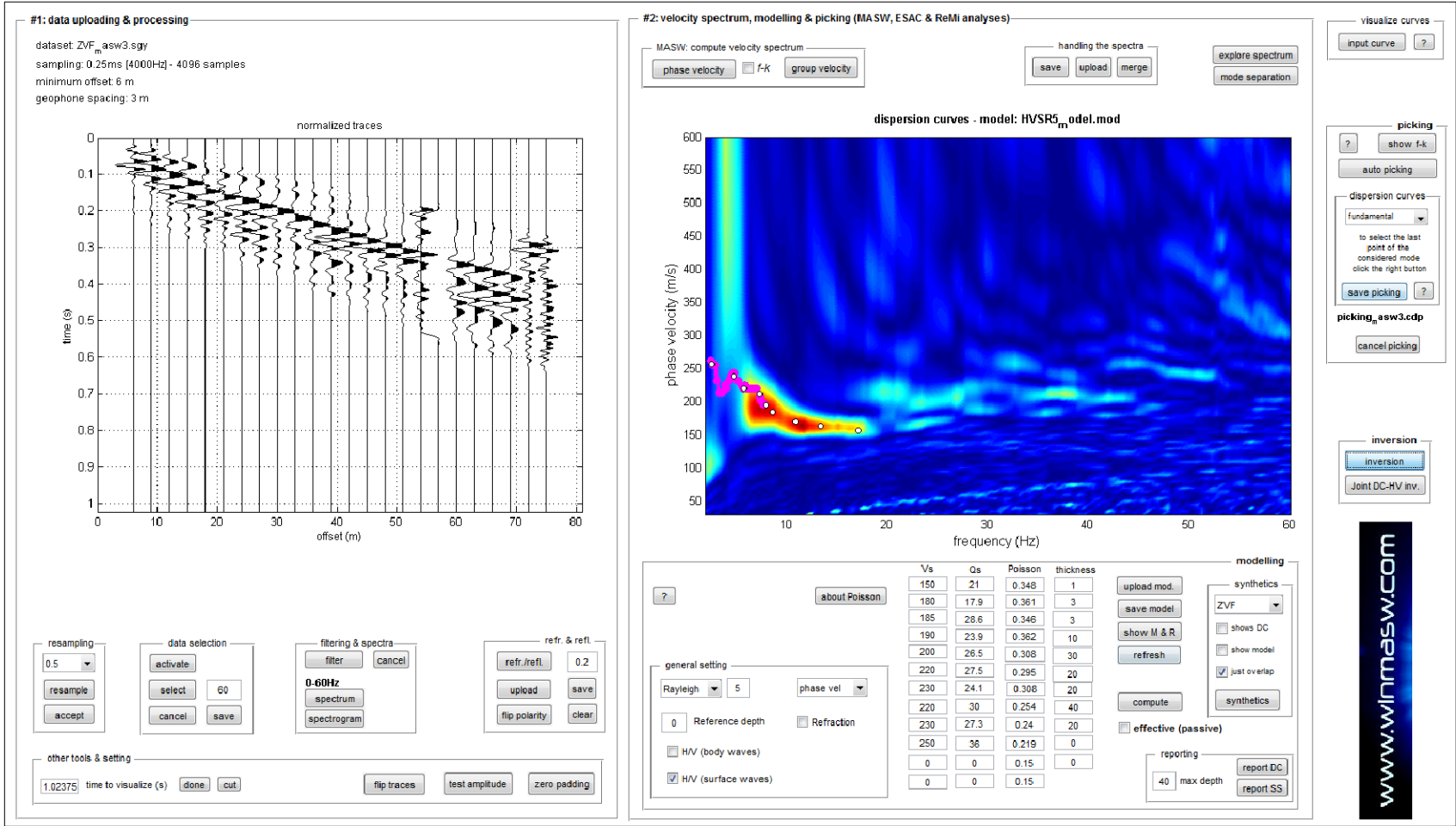
Stendimento ESAC



SPETTRO DI VELOCITA' ESAC E CURVA DI DISPERSIONE EFFETTIVA



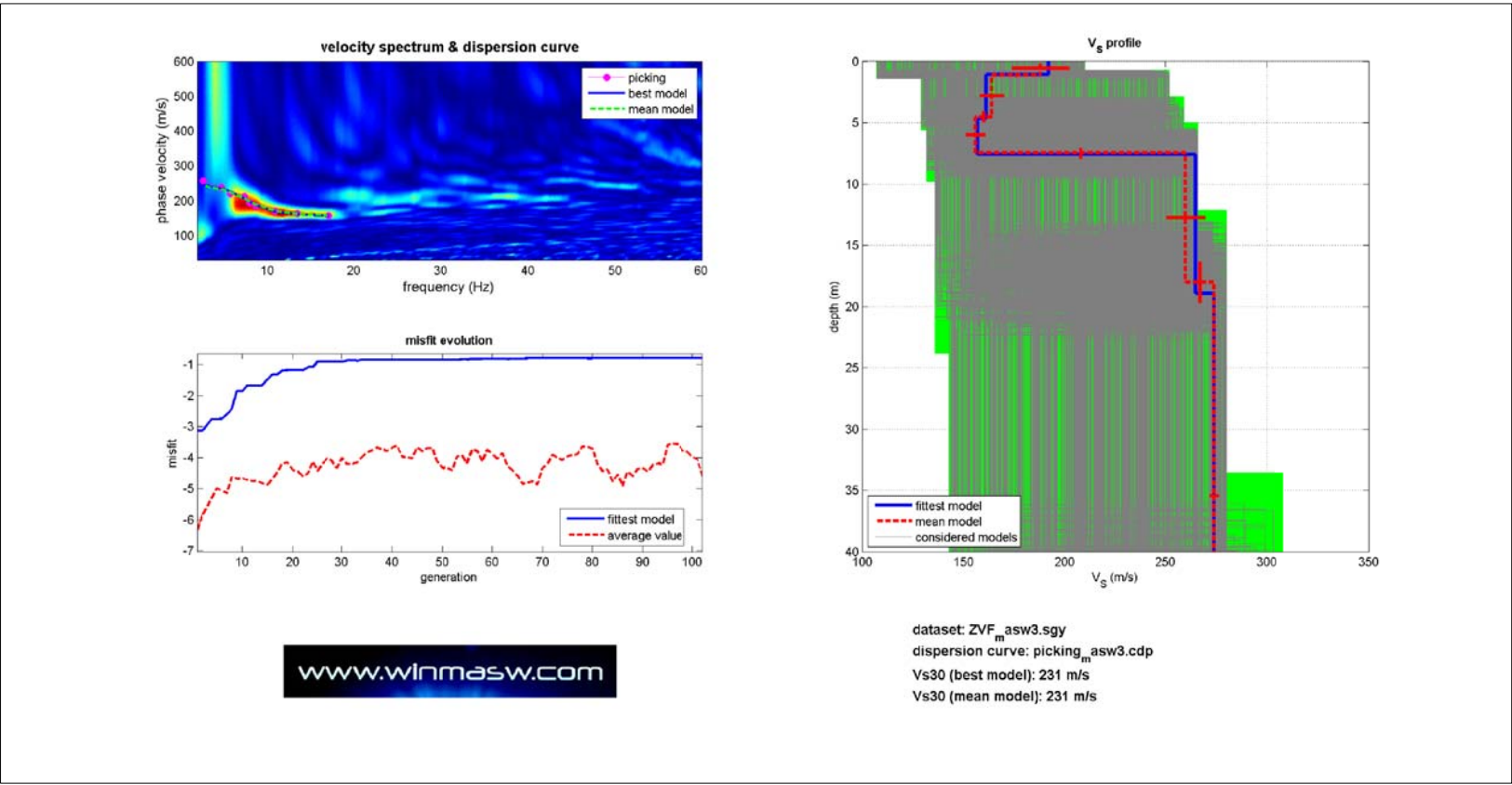
SISMOGRAMMI, SPETTRO DI VELOCITA' E CURVA DI DISPERIONE EFFETTIVA DA ESAC



Stendimento MASW

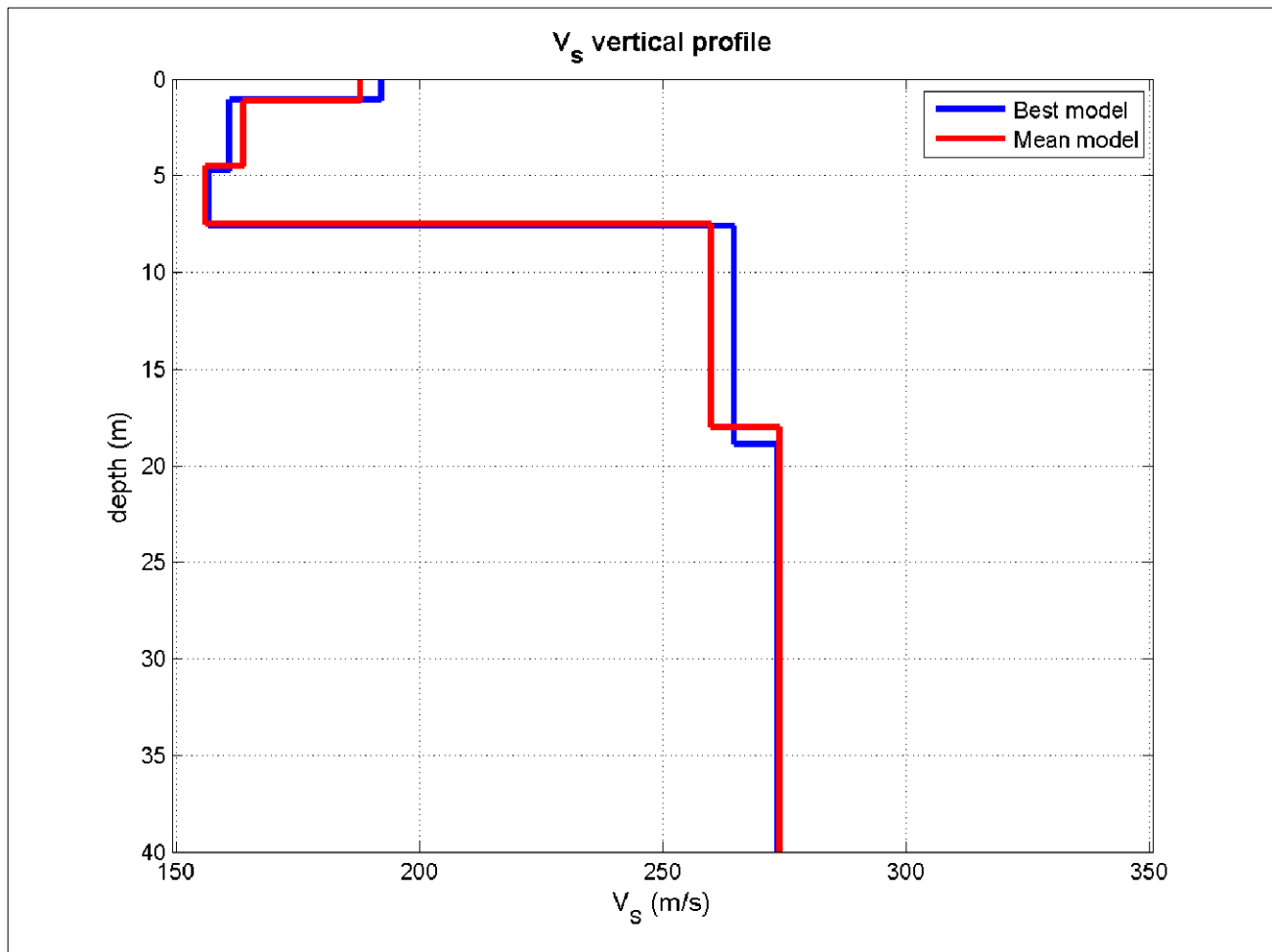


INVERSIONE CONGIUNTA MASW - ESAC E PROFILO DI VELOCITA'



RISULTANZE DELL'ANALISI SISMICA CONGIUNTA MASW - ESAC 03
SAN PIETRO IN TRENTO

PROFILO DI VELOCITA' MASW – ESAC 03



Mean model

V_s (m/s): 188, 164, 156, 260, 274

Thickness (m): 1.1, 3.4, 3.0, 10.5, 22.0

Density (gr/cm³) (approximate values): 1.87 1.83 1.74 1.92 1.93

Seismic/Dynamic Shear modulus (MPa) (approximate values): 66 49 42 130 145

Analysis: Rayleigh Waves

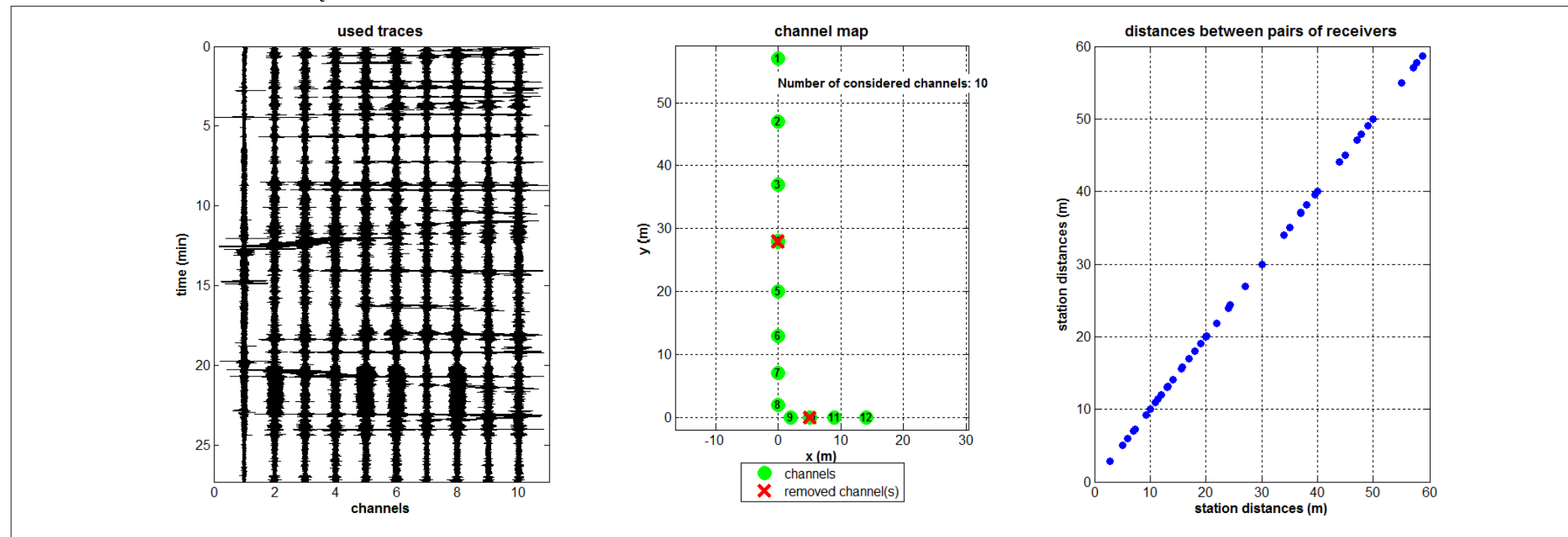
Approximate values for V_p and Poisson

V_p (m/s): 472 389 277 572 589

Poisson: 0.41 0.39 0.27 0.37 0.36

V_{s30} (m/s): 231

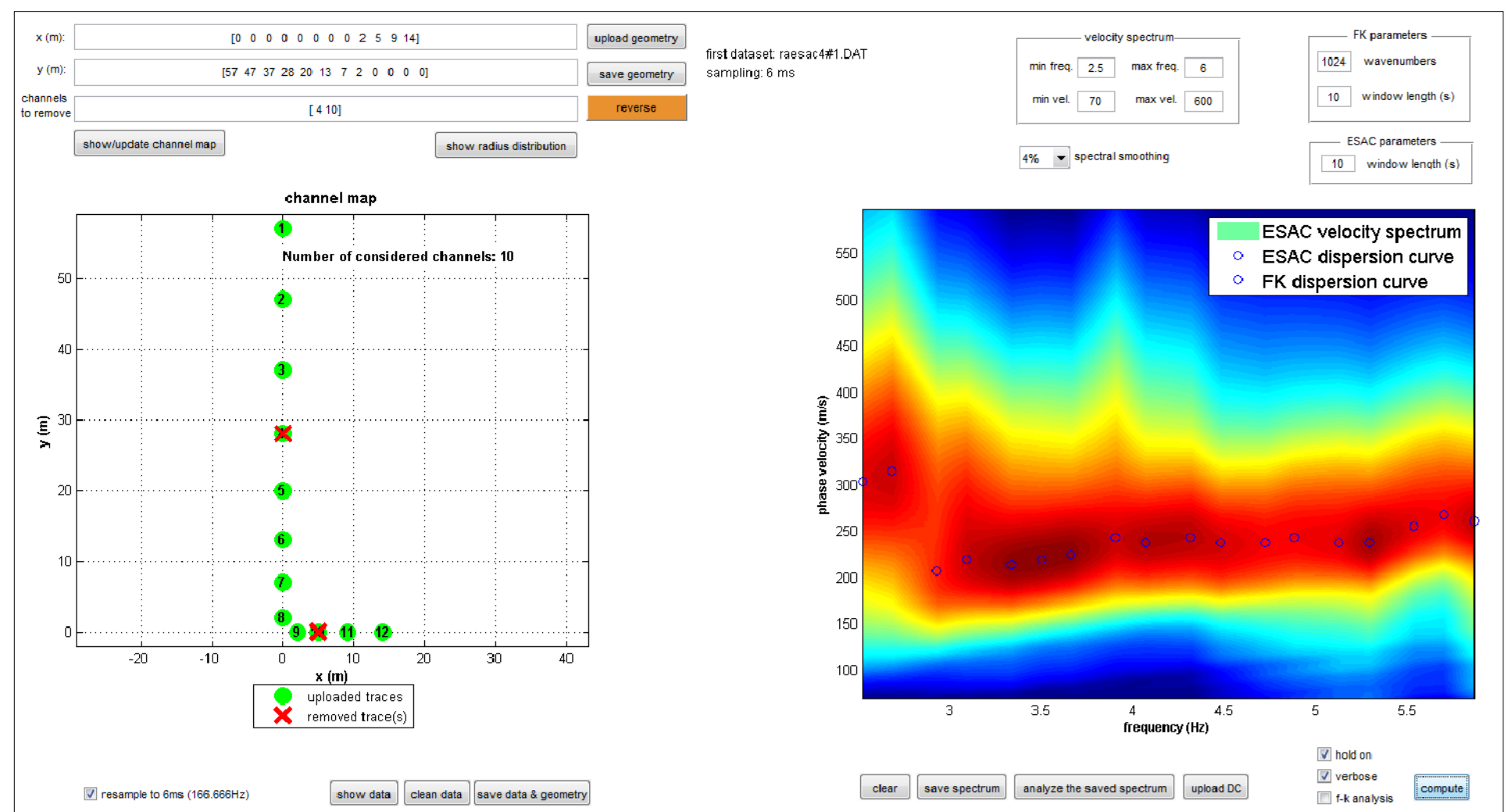
ACQUISIZIONE ESAC



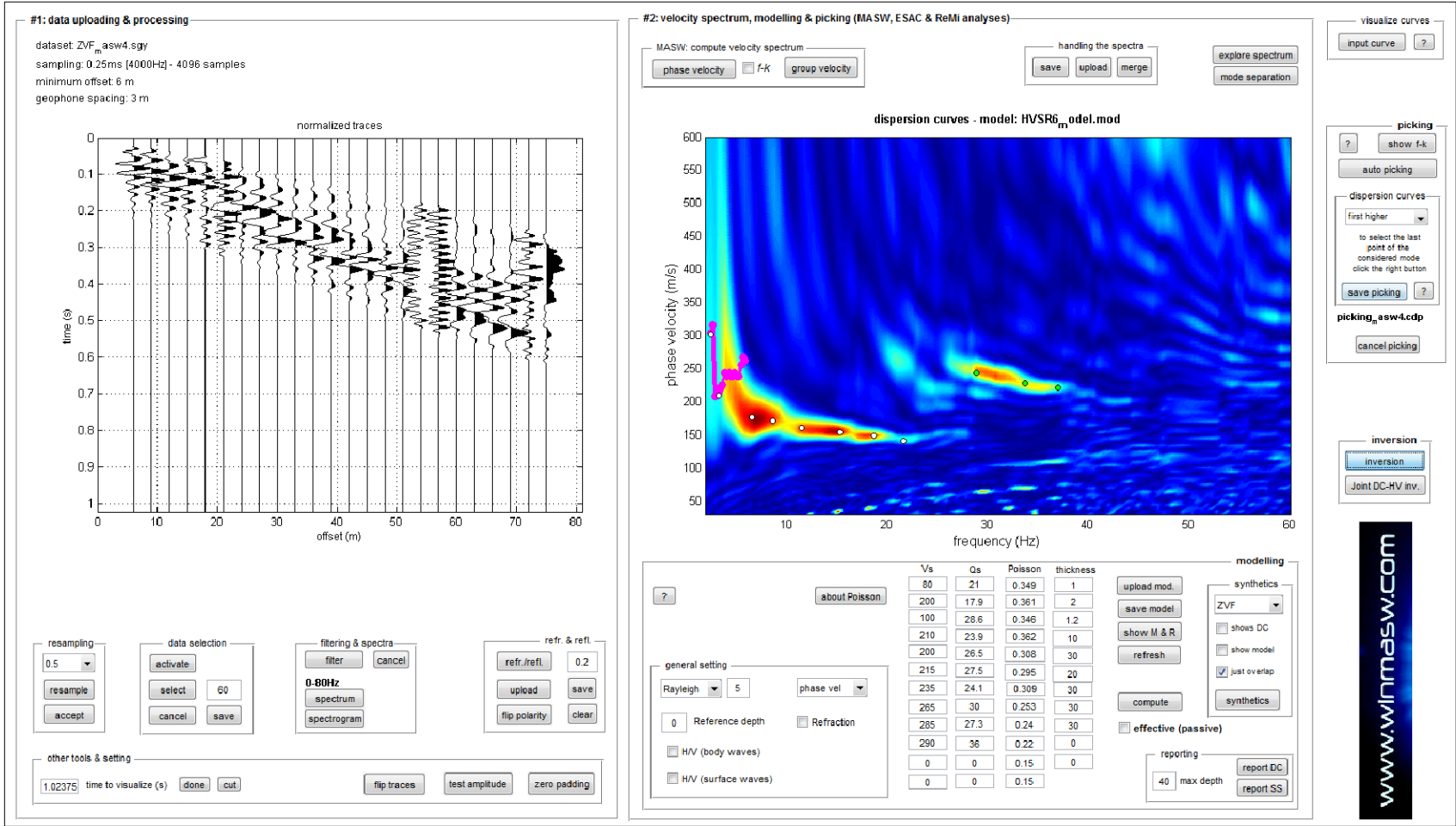
Stendimento ESAC



SPETTRO DI VELOCITA' ESAC E CURVA DI DISPERSIONE EFFETTIVA



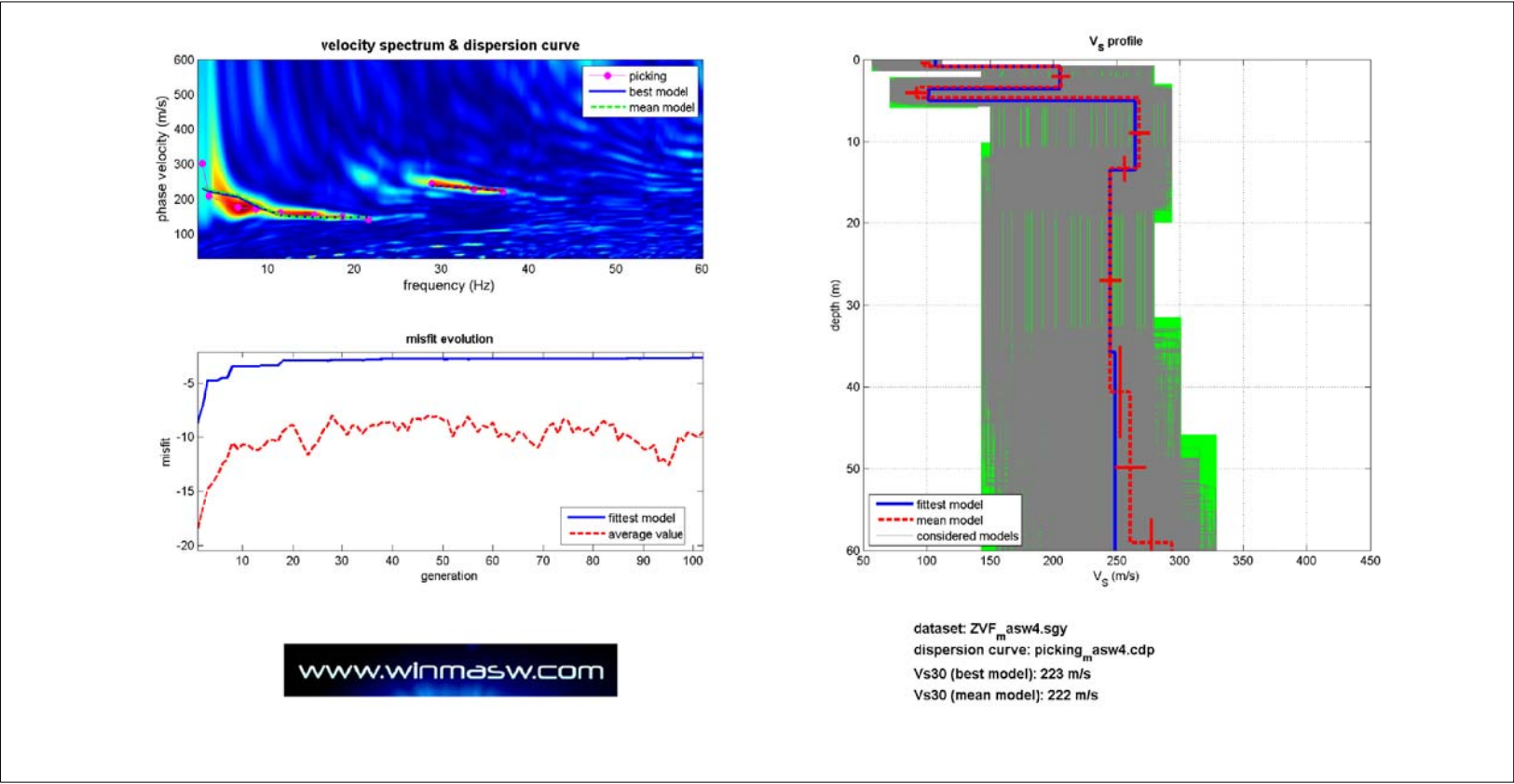
SISMOGRAMMI, SPETTRO DI VELOCITA' E CURVA DI DISPERIONE EFFETTIVA DA ESAC



Stendimento MASW

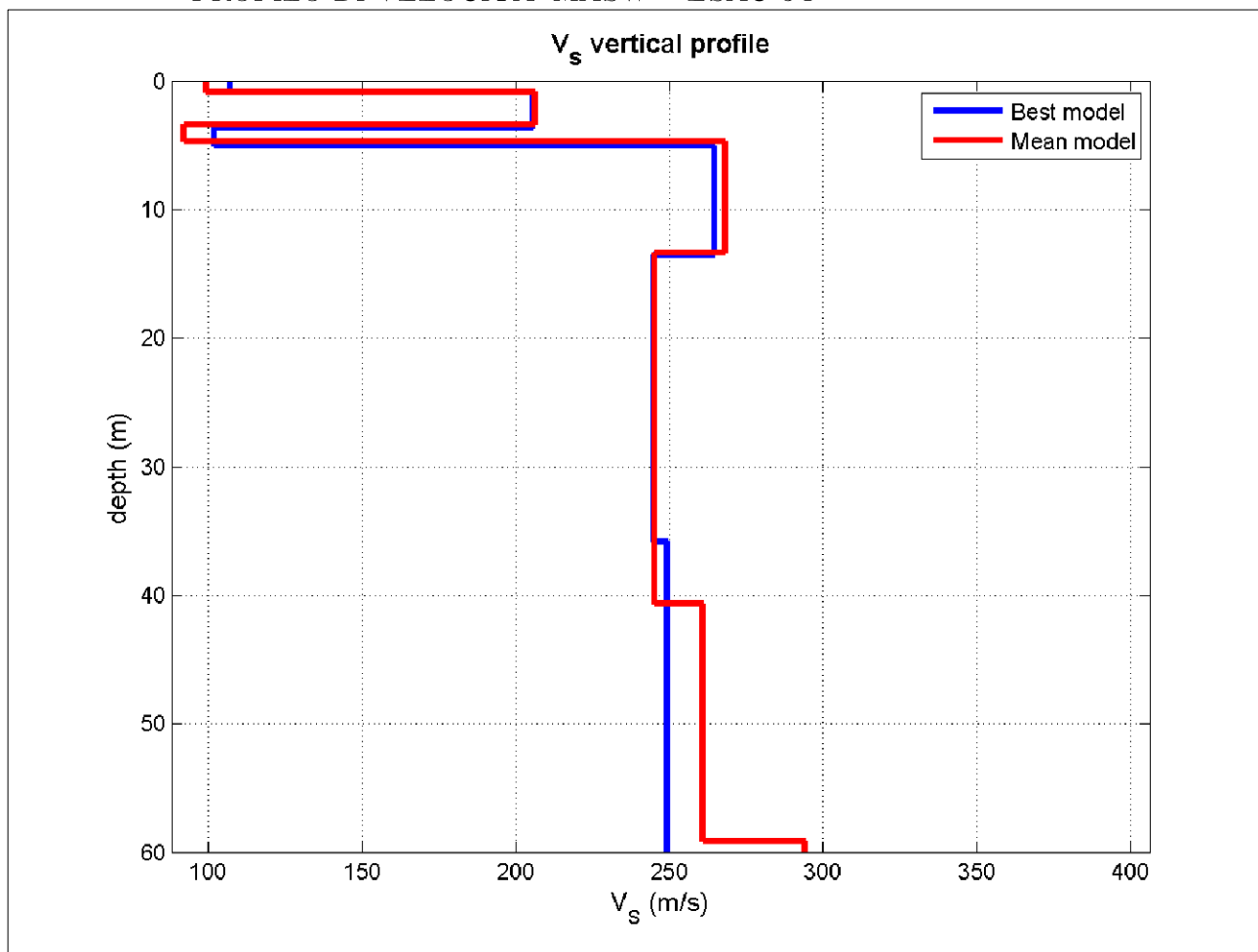


INVERSIONE CONGIUNTA MASW - ESAC E PROFILO DI VELOCITA'



RISULTANZE DELL'ANALISI SISMICA CONGIUNTA MASW - ESAC 04
SAN PIETRO IN VINCOLI

PROFILO DI VELOCITA' MASW – ESAC 04



Mean model

Vs (m/s): 99, 206, 92, 268, 245, 261, 294

Thickness (m): 0.9, 2.5, 1.3, 8.7, 27.3, 18.5, 0.8

Density (gr/cm³) (approximate values): 1.68 1.85 1.62 1.94 1.85 1.88 1.91

Seismic/Dynamic Shear modulus (MPa) (approximate values): 17 79 14 139 111 128 165

Analysis: Rayleigh Waves

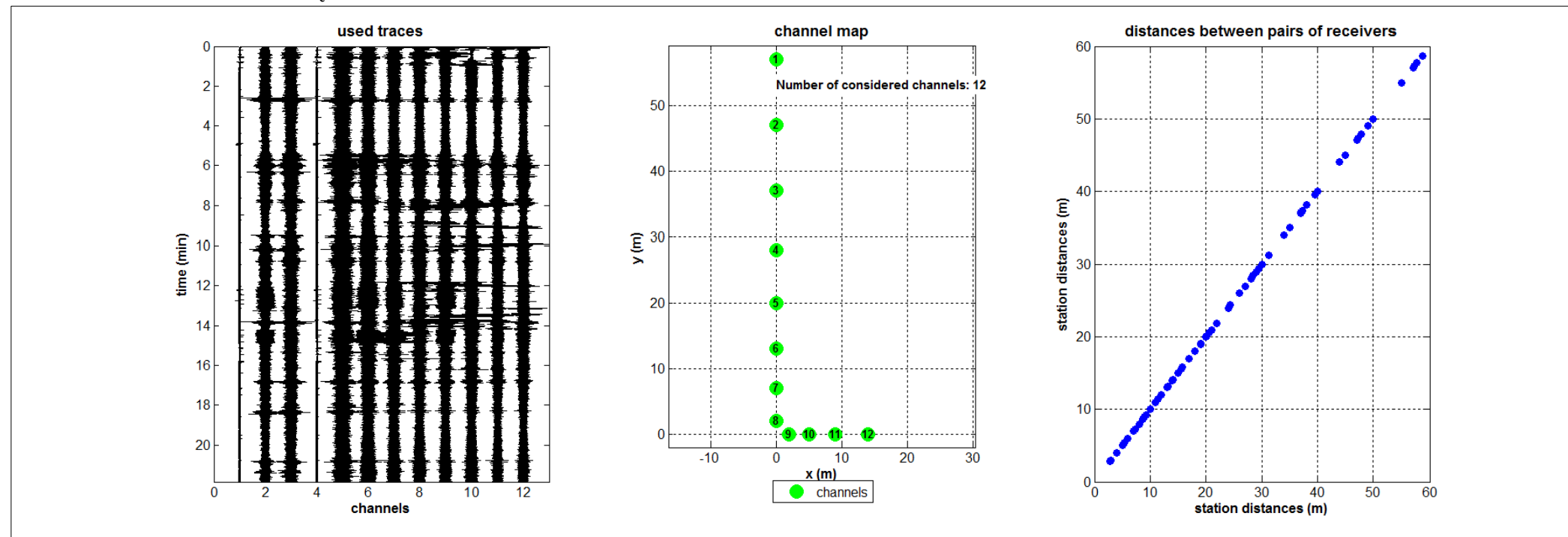
Approximate values for Vp and Poisson

Vp (m/s): 216 431 164 621 436 486 558

Poisson: 0.37 0.35 0.27 0.39 0.27 0.30 0.31

Vs30 (m/s): 222

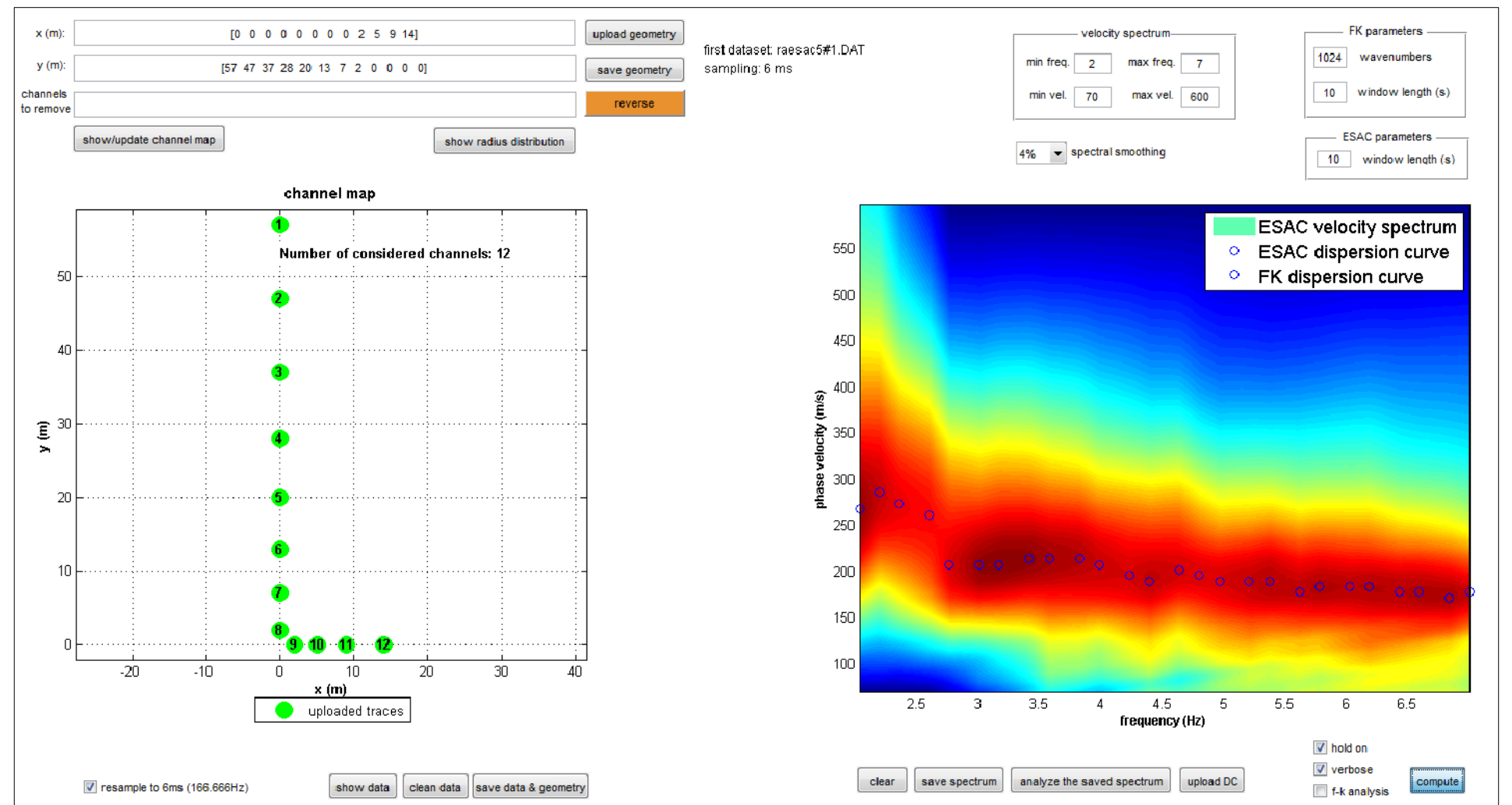
ACQUISIZIONE ESAC



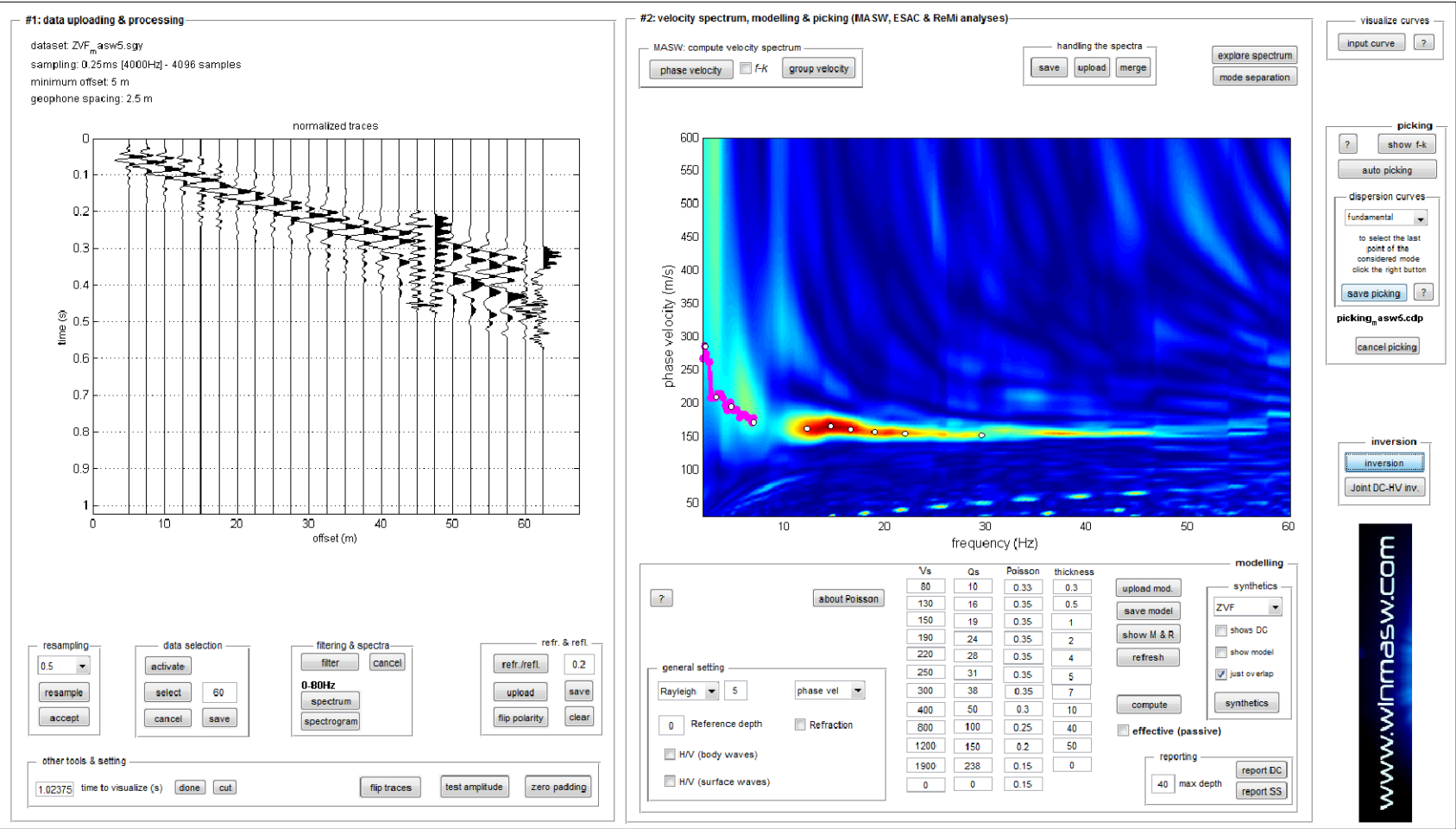
Stendimento ESAC



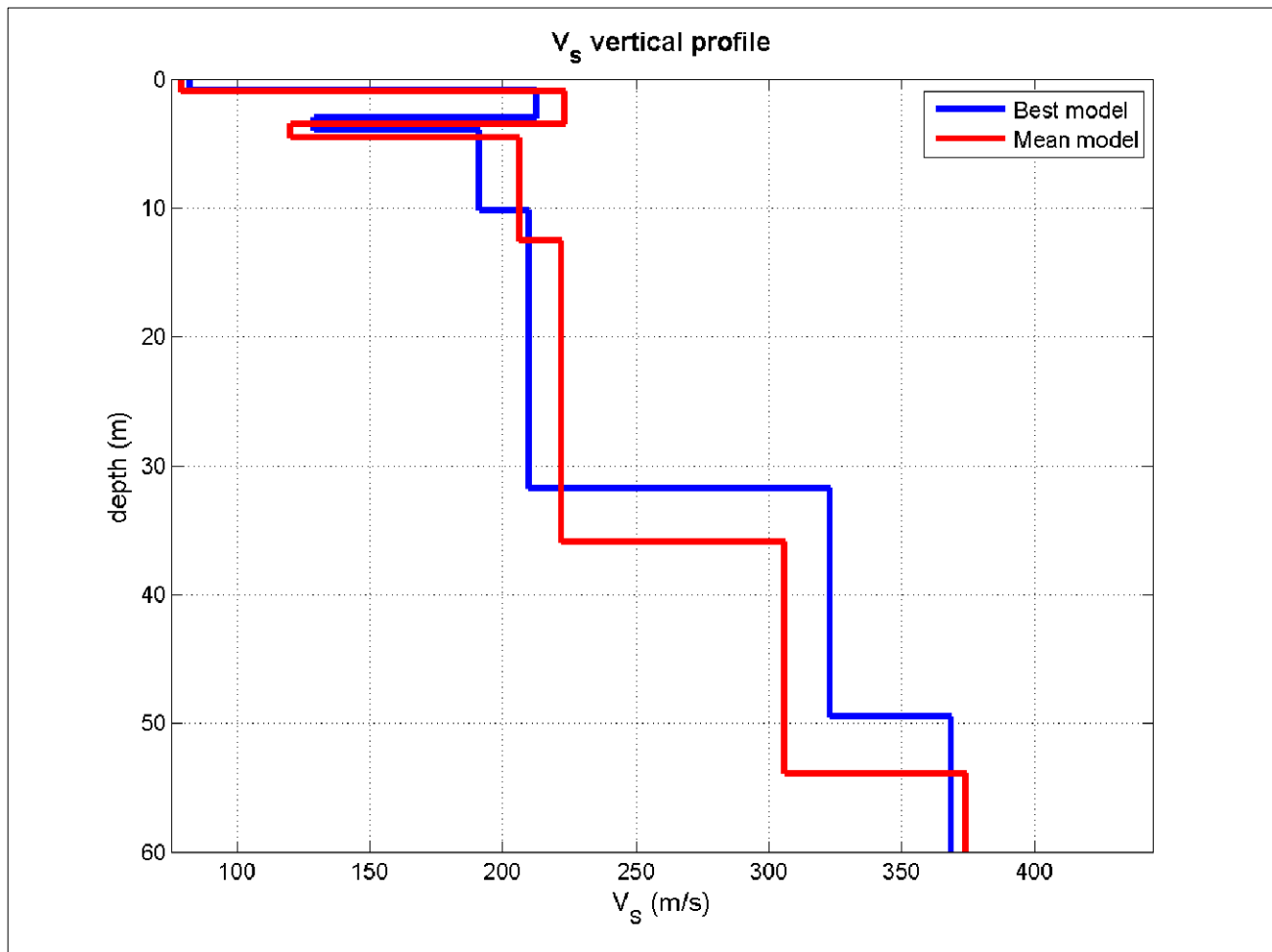
SPETTRO DI VELOCITA' ESAC E CURVA DI DISPERSIONE EFFETTIVA



SISMOGRAMMI, SPETTRO DI VELOCITA' E CURVA DI DISPERIONE EFFETTIVA DA ESAC



PROFILO DI VELOCITA' MASW – ESAC 05



Mean model

Vs (m/s): 79, 223, 120, 206, 222, 306, 374

Thickness (m): 1.0, 2.5, 1.1, 8.1, 23.4, 17.9, 6.0

Density (gr/cm3) (approximate values): 1.61 1.92 1.69 1.86 1.83 1.91 1.97

Seismic/Dynamic Shear modulus (MPa) (approximate values): 10 95 24 79 90 179 276

Analysis: Rayleigh Waves

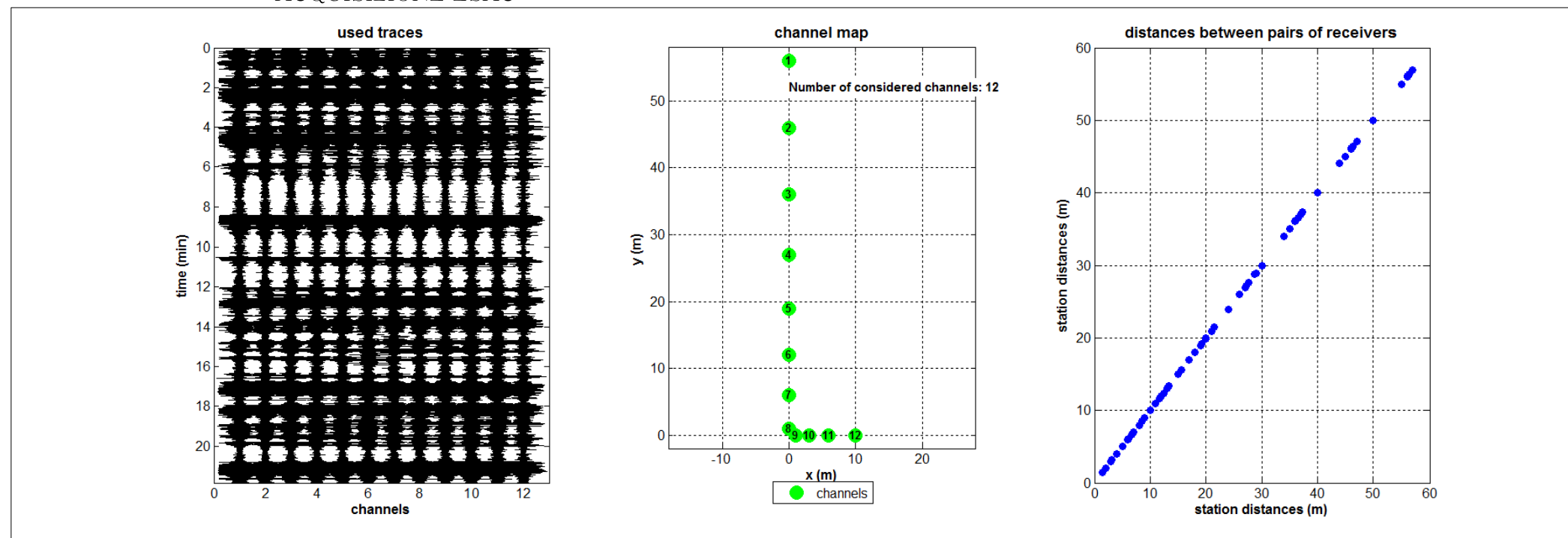
Approximate values for Vp and Poisson

Vp (m/s): 157 565 223 449 391 556 707

Poisson: 0.33 0.41 0.30 0.37 0.26 0.28 0.31

Vs30 (m/s): 200

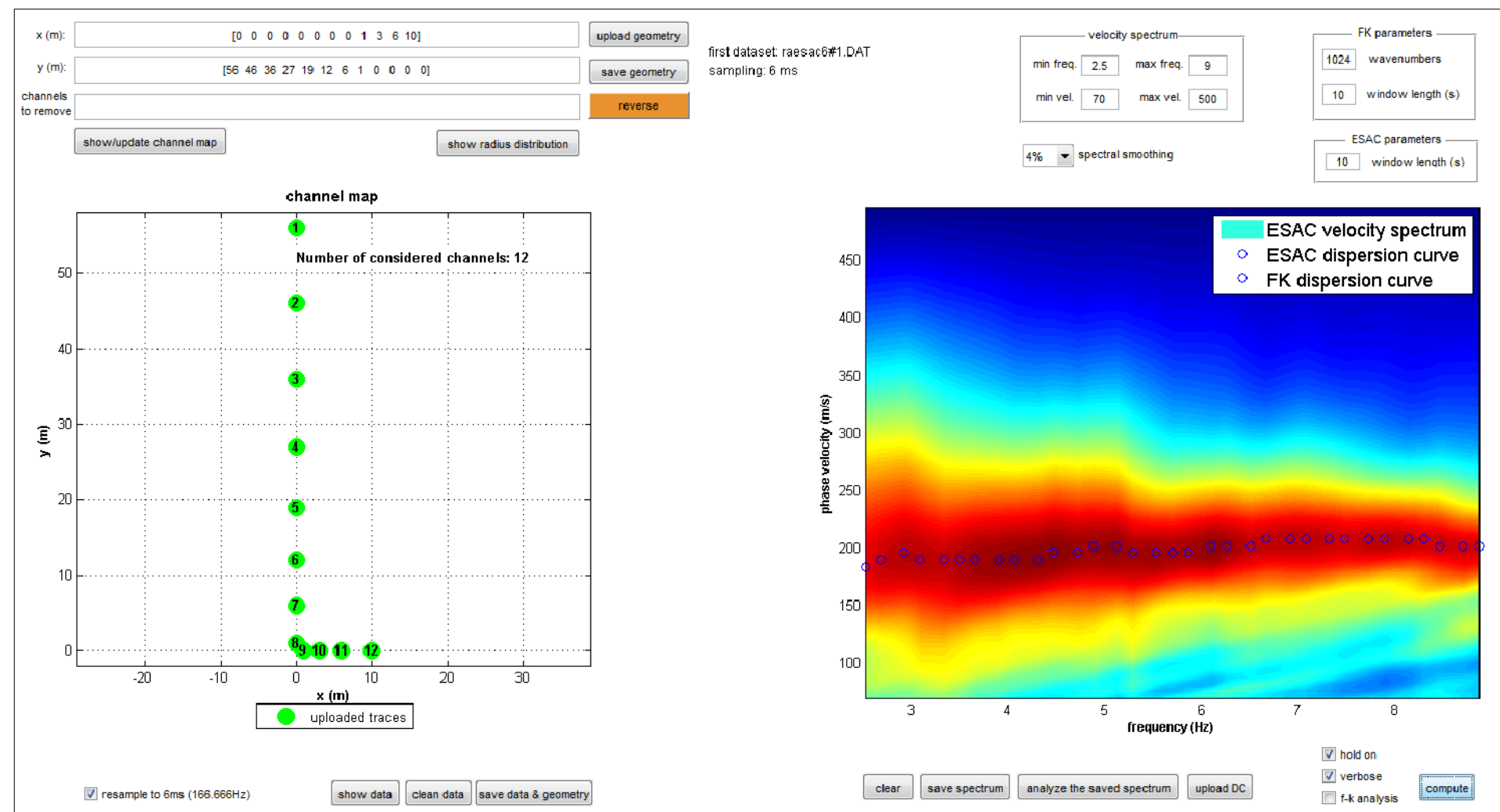
ACQUISIZIONE ESAC



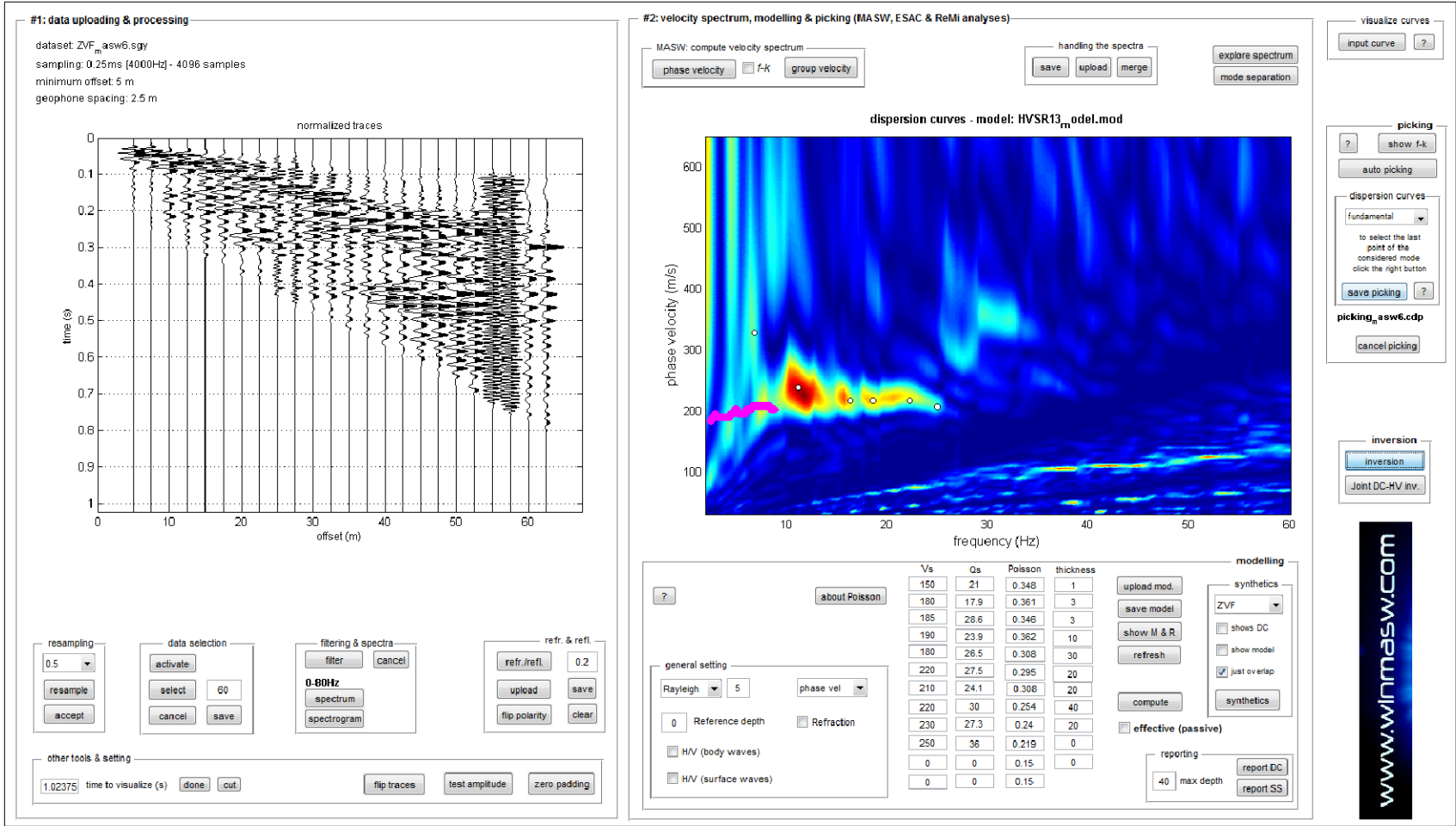
Stendimento ESAC



SPETTRO DI VELOCITA' ESAC E CURVA DI DISPERSIONE EFFETTIVA



SISMOGRAMMI, SPETTRO DI VELOCITA' E CURVA DI DISPERIONE EFFETTIVA DA ESAC

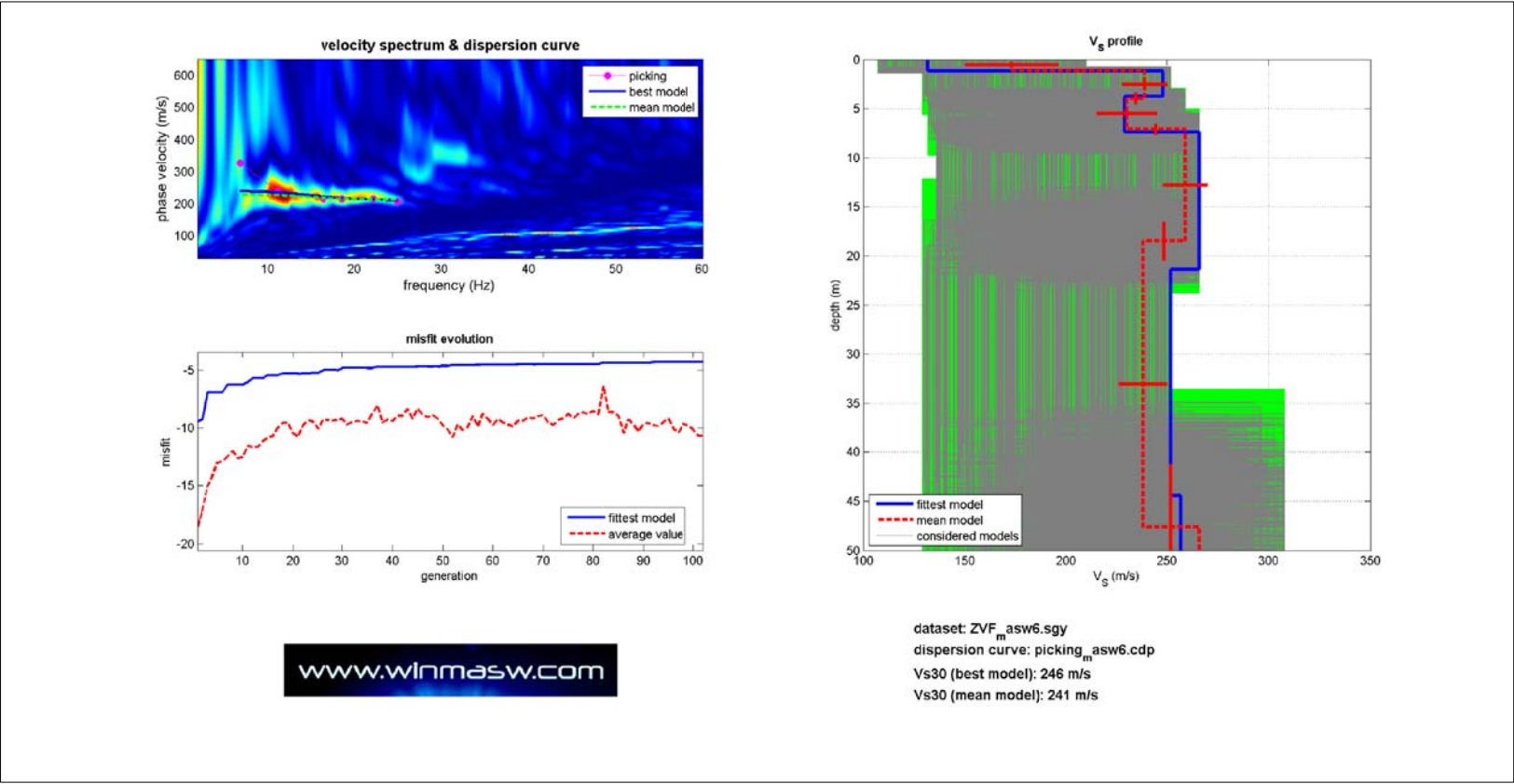


Stendimento MASW

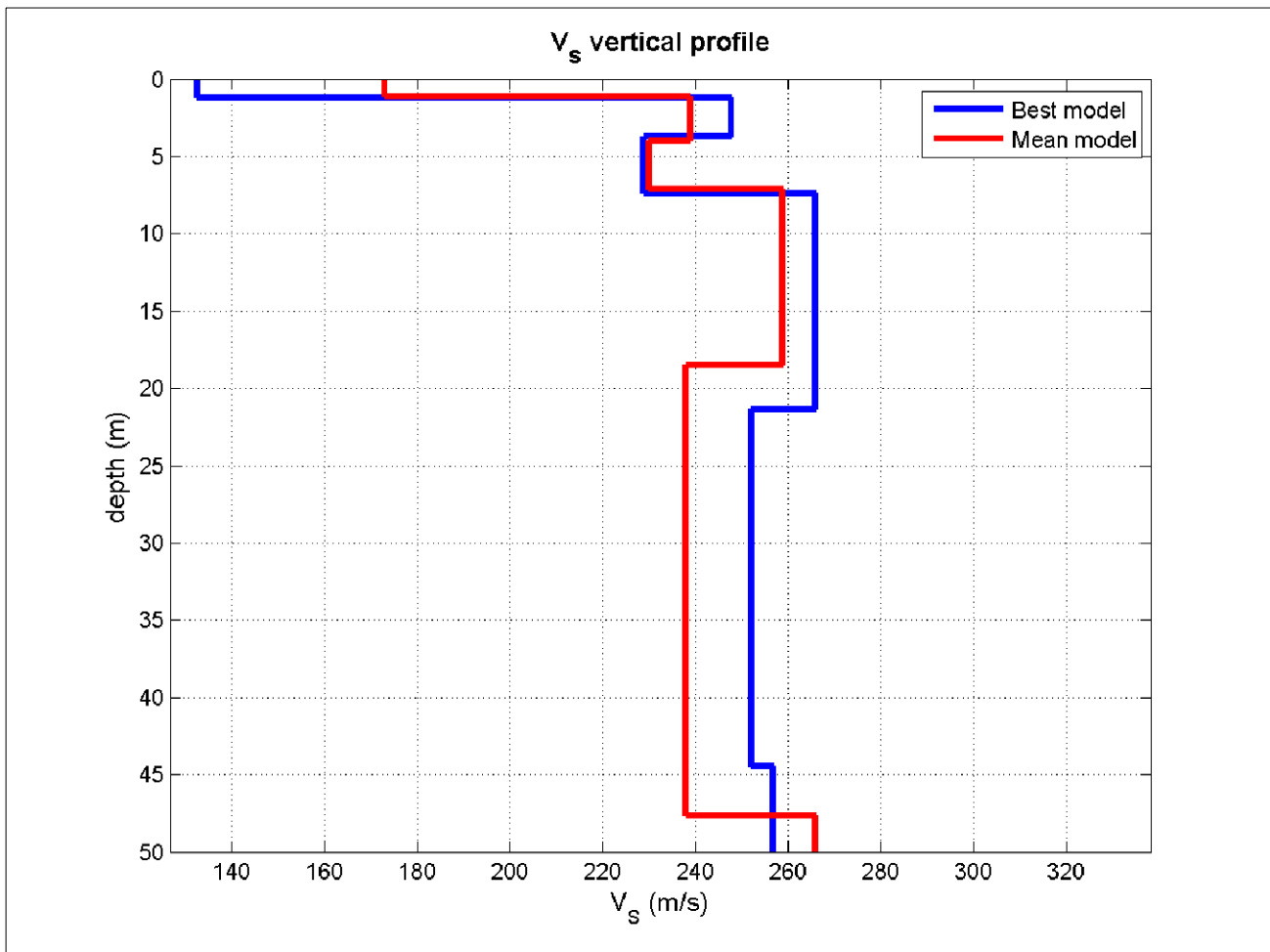


RISULTANZE DELL'ANALISI SISMICA CONGIUNTA MASW - ESAC 06
FOSSO GHIAIA

INVERSIONE CONGIUNTA MASW - ESAC E PROFILO DI VELOCITA'



PROFILO DI VELOCITA' MASW – ESAC 06



Mean model

Vs (m/s): 173, 239, 230, 259, 238, 266

Thickness (m): 1.1, 2.9, 3.1, 11.4, 29.1, 2.4

Density (gr/cm³) (approximate values): 1.80 1.90 1.89 1.96 1.86 1.89

Seismic/Dynamic Shear modulus (MPa) (approximate values): 54 109 100 132 105 134

Analysis: Rayleigh Waves

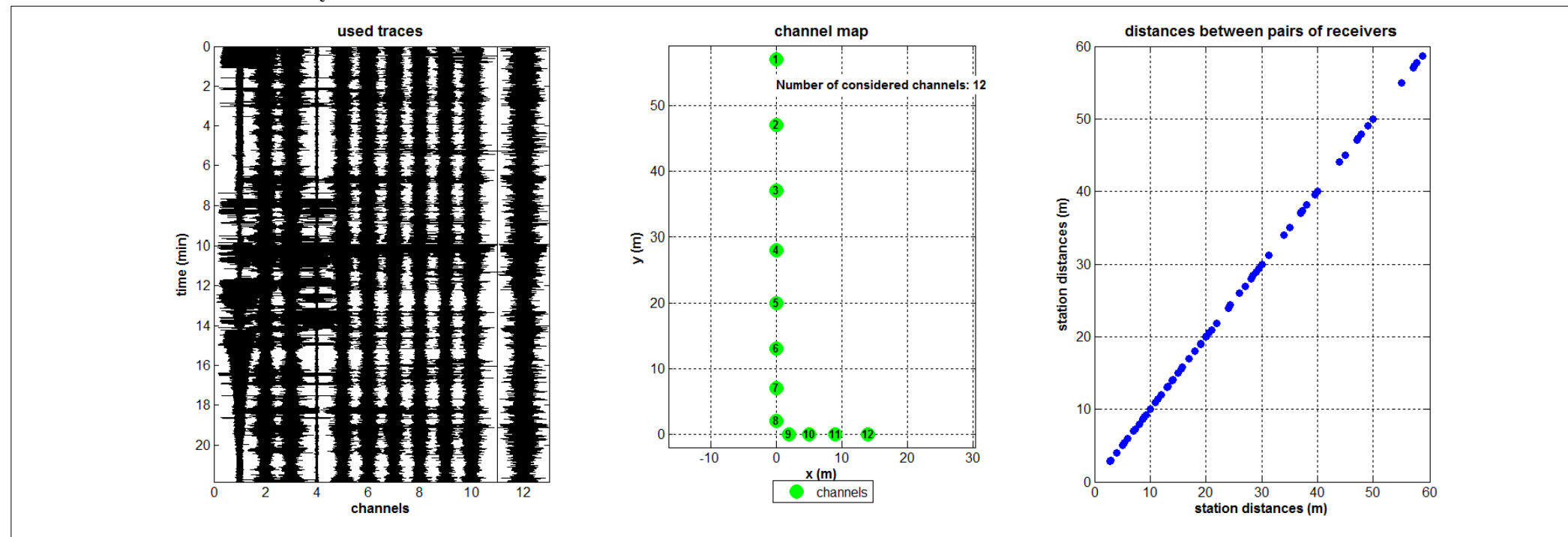
Approximate values for Vp and Poisson

Vp (m/s): 353 538 511 682 442 518

Poisson: 0.34 0.38 0.37 0.42 0.30 0.32

Vs30 (m/s): 241

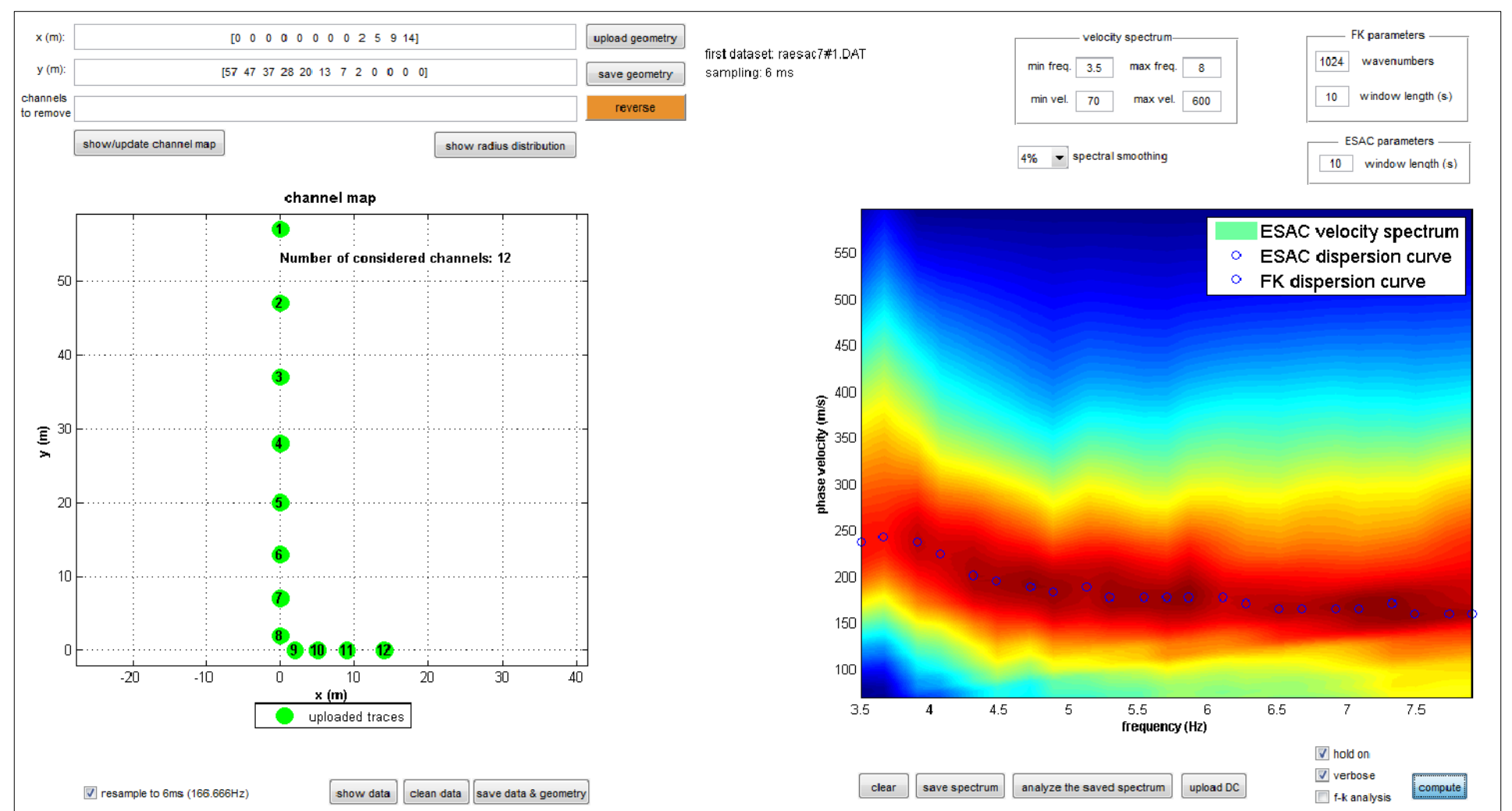
ACQUISIZIONE ESAC



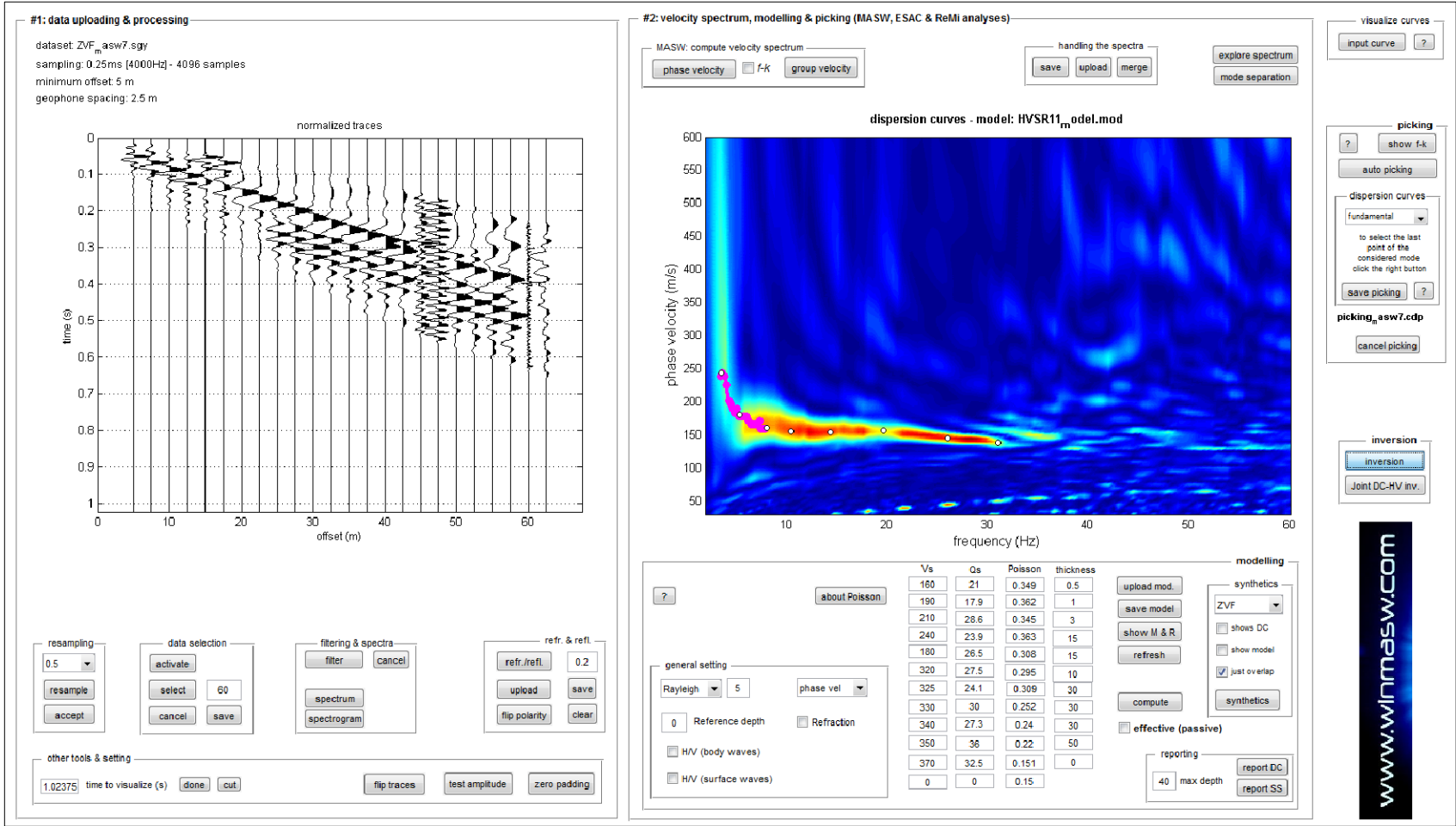
Stendimento ESAC



SPETTRO DI VELOCITA' ESAC E CURVA DI DISPERSIONE EFFETTIVA



SISMOGRAMMI, SPETTRO DI VELOCITA' E CURVA DI DISPERIONE EFFETTIVA DA ESAC

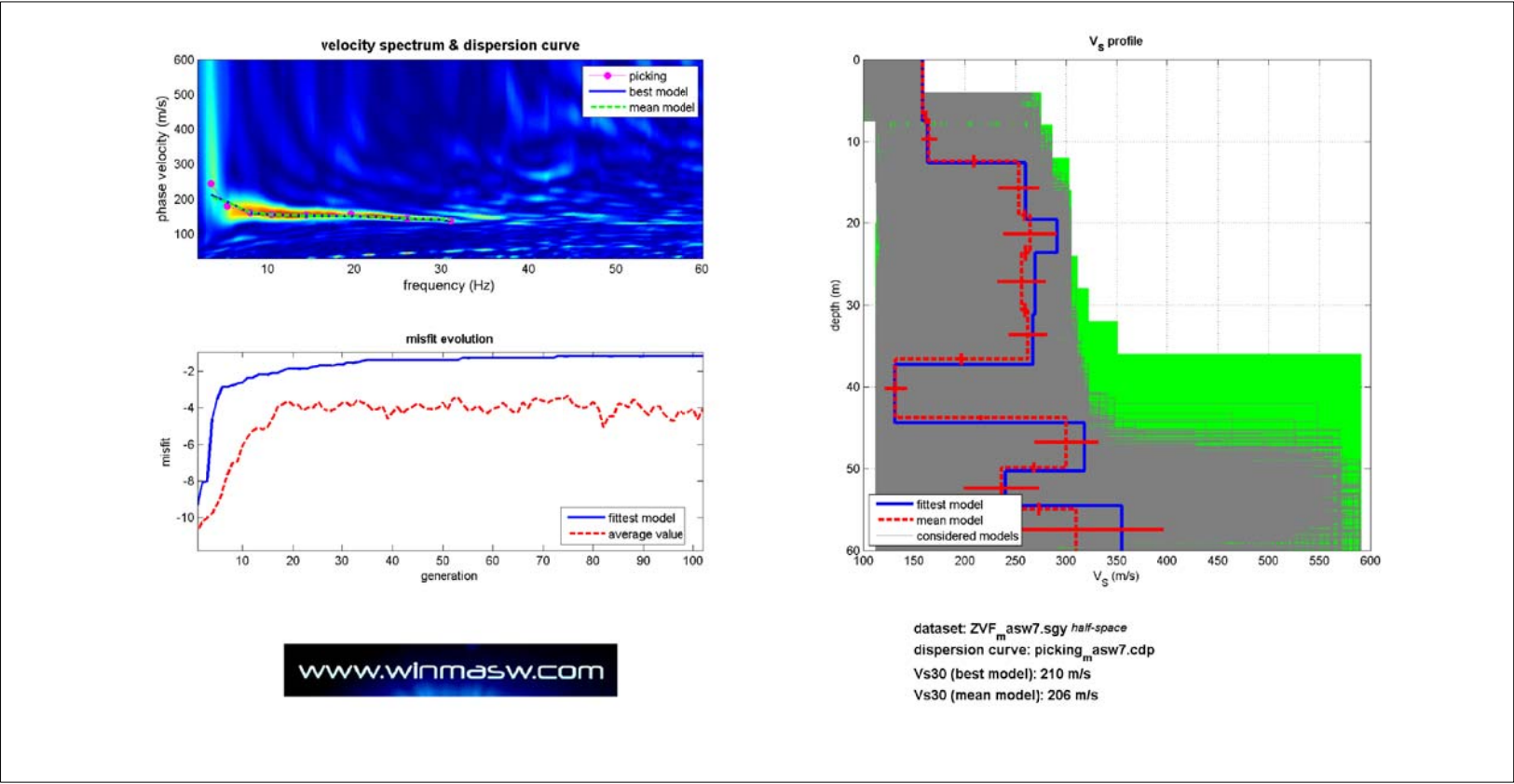


Stendimento MASW

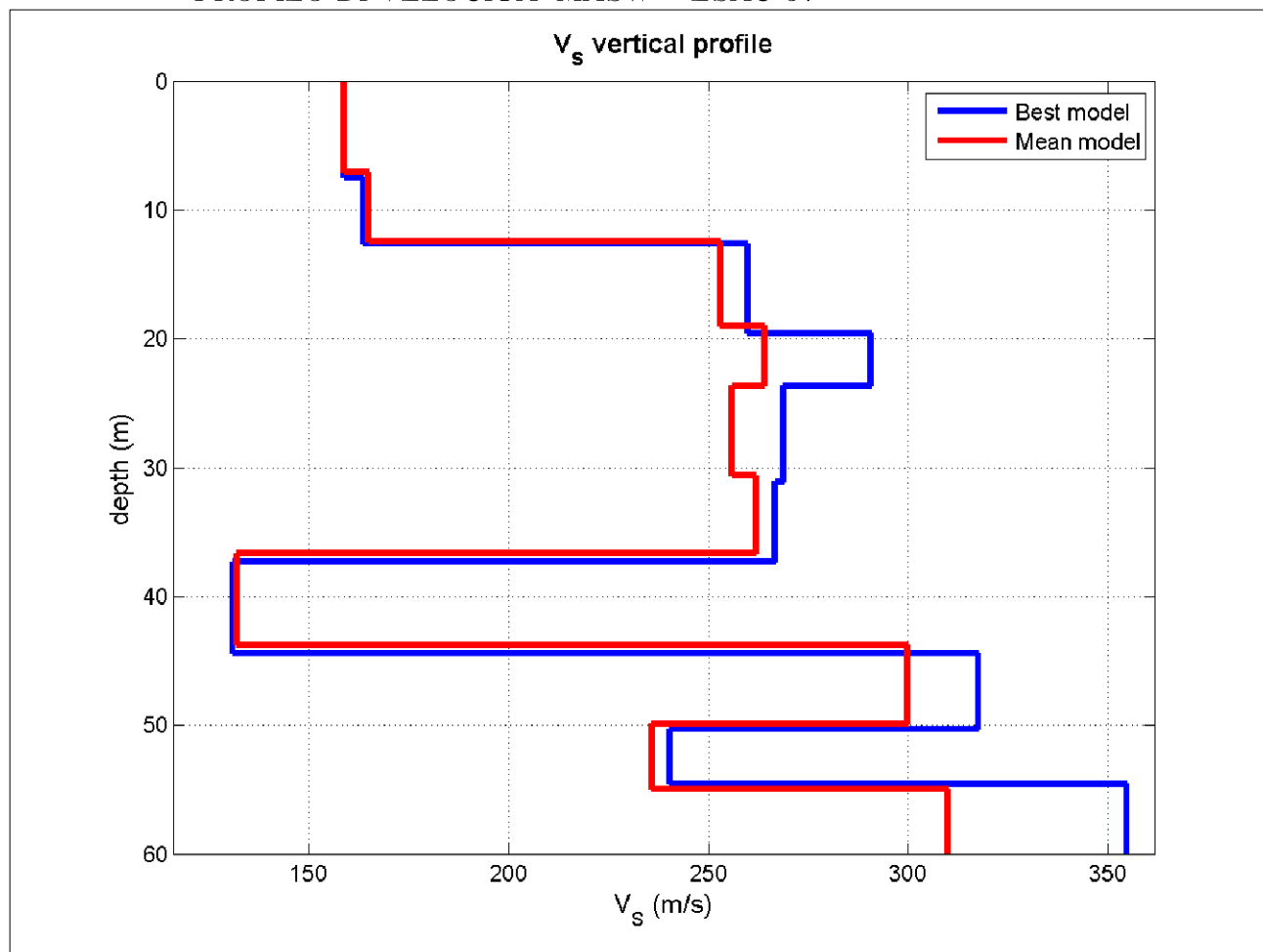


RISULTANZE DELL'ANALISI SISMICA CONGIUNTA MASW - ESAC 07 PORTO FUORI

INVERSIONE CONGIUNTA MASW - ESAC E PROFILO DI VELOCITA'



PROFILO DI VELOCITA' MASW – ESAC 07



Mean model

Vs (m/s): 159, 165, 253, 264, 256, 262, 132, 300, 236, 310

Thickness (m): 7.1, 5.4, 6.5, 4.6, 7.0, 6.0, 7.2, 6.1, 5.1, 5

Density (gr/cm³) (approximate values): 1.91 1.82 1.89 1.92 1.91 1.87 1.73 1.88 1.83 1.90

Seismic/Dynamic Shear modulus (MPa) (approximate values): 48 50 121 134 125 129 30 169 102 182

Analysis: Rayleigh Waves

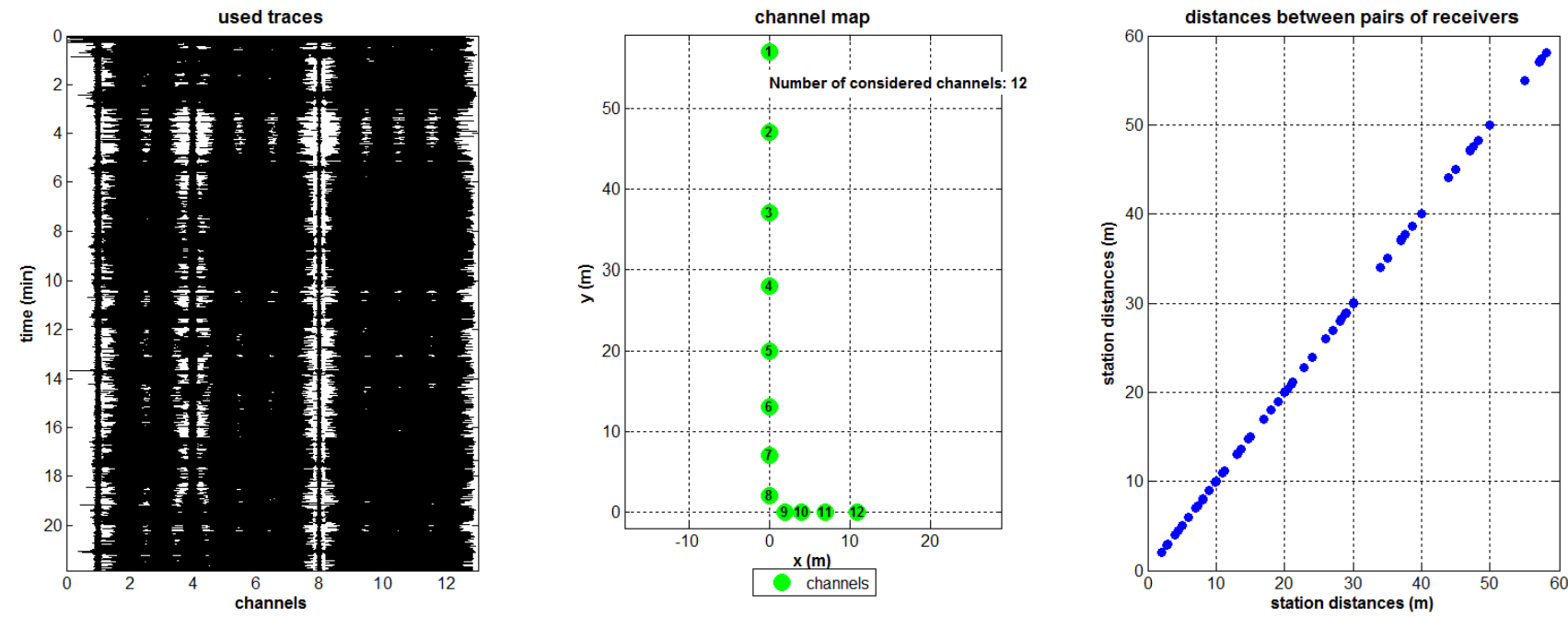
Approximate values for Vp and Poisson

Vp (m/s): 545 386 508 567 561 477 258 494 389 523

Poisson: 0.45 0.39 0.34 0.36 0.37 0.28 0.32 0.21 0.21 0.23

Vs30 (m/s): 206

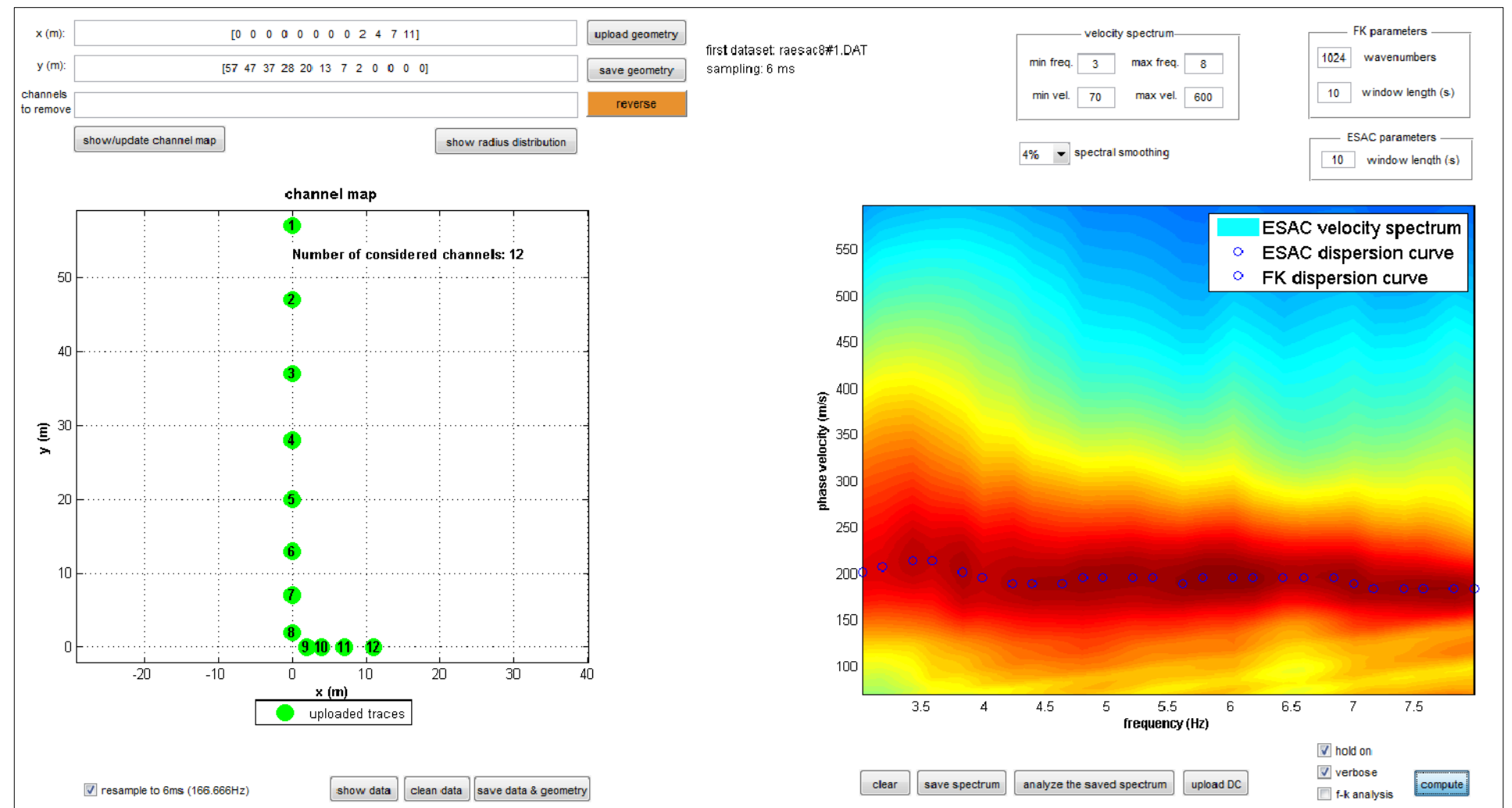
ACQUISIZIONE ESAC



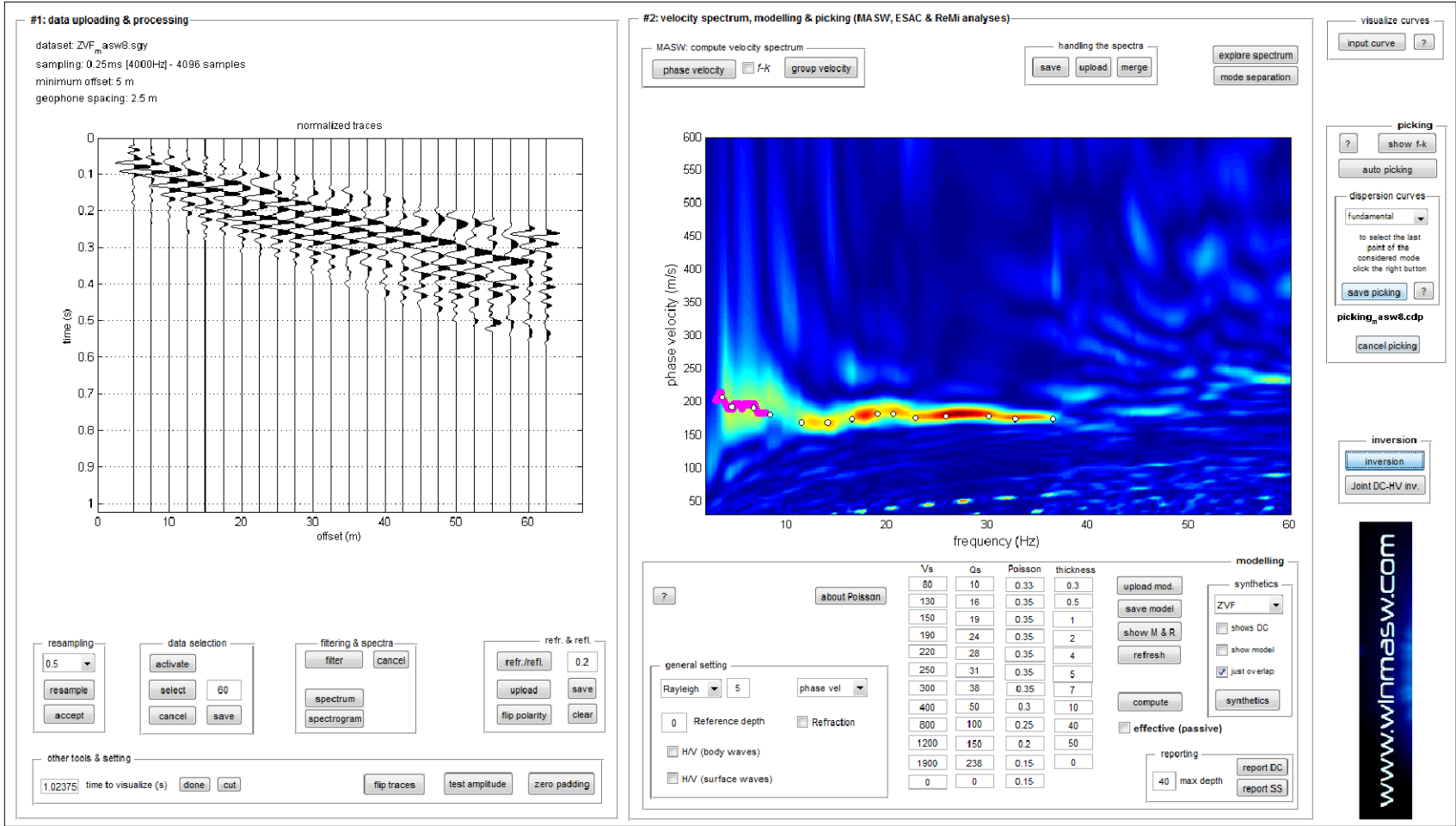
Stendimento ESAC



SPETTRO DI VELOCITA' ESAC E CURVA DI DISPERSIONE EFFETTIVA



SISMOGRAMMI, SPETTRO DI VELOCITA' E CURVA DI DISPERIONE EFFETTIVA DA ESAC

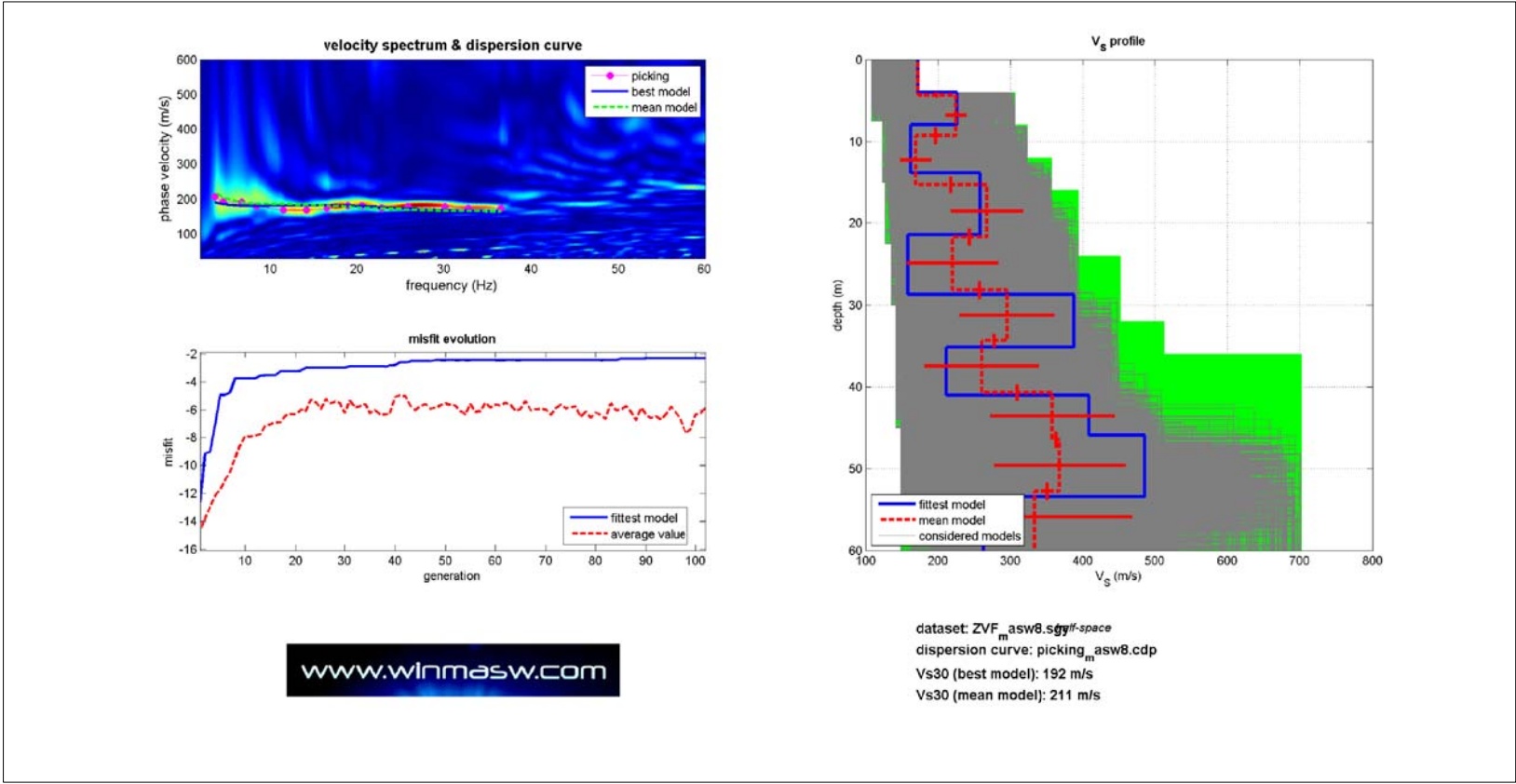


Stendimento MASW

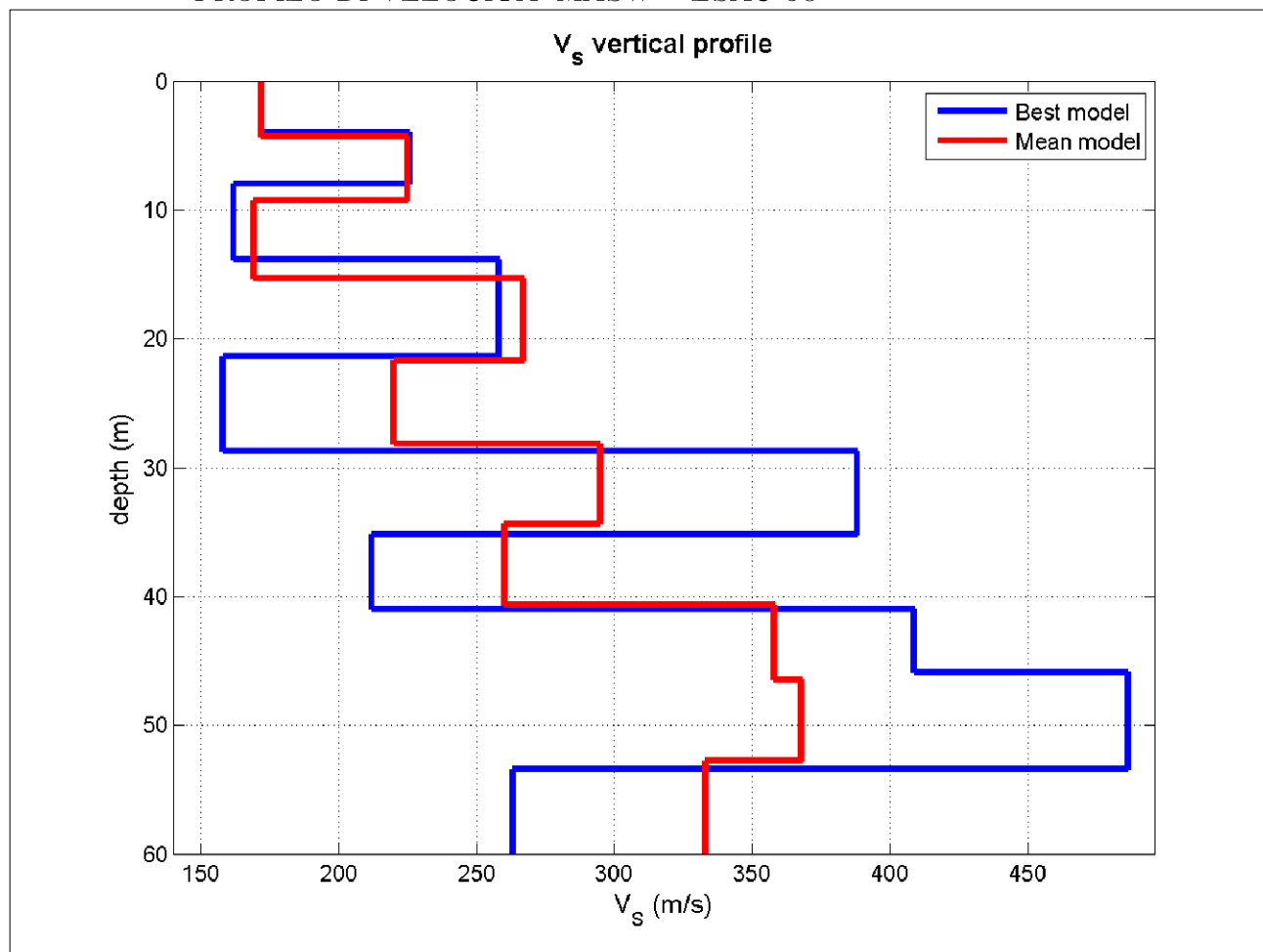


INVERSIONE CONGIUNTA MASW - ESAC E PROFILO DI VELOCITA'

RISULTANZE DELL'ANALISI SISMICA CONGIUNTA MASW - ESAC 08 RAVENNA



PROFILO DI VELOCITA' MASW – ESAC 08



Mean model

Vs (m/s): 172, 225, 169, 267, 220, 295, 260, 358, 368, 333

Thickness (m): 4.3, 5.0, 6.0, 6.4, 6.5, 6.2, 6.4, 5.8, 6.3, 7.1

Density (gr/cm³) (approximate values): 1.97 1.93 1.82 1.94 1.85 1.91 1.89 1.93 1.94 1.90

Seismic/Dynamic Shear modulus (MPa) (approximate values): 58 97 52 138 90 167 128 248 263 211

Analysis: Rayleigh Waves

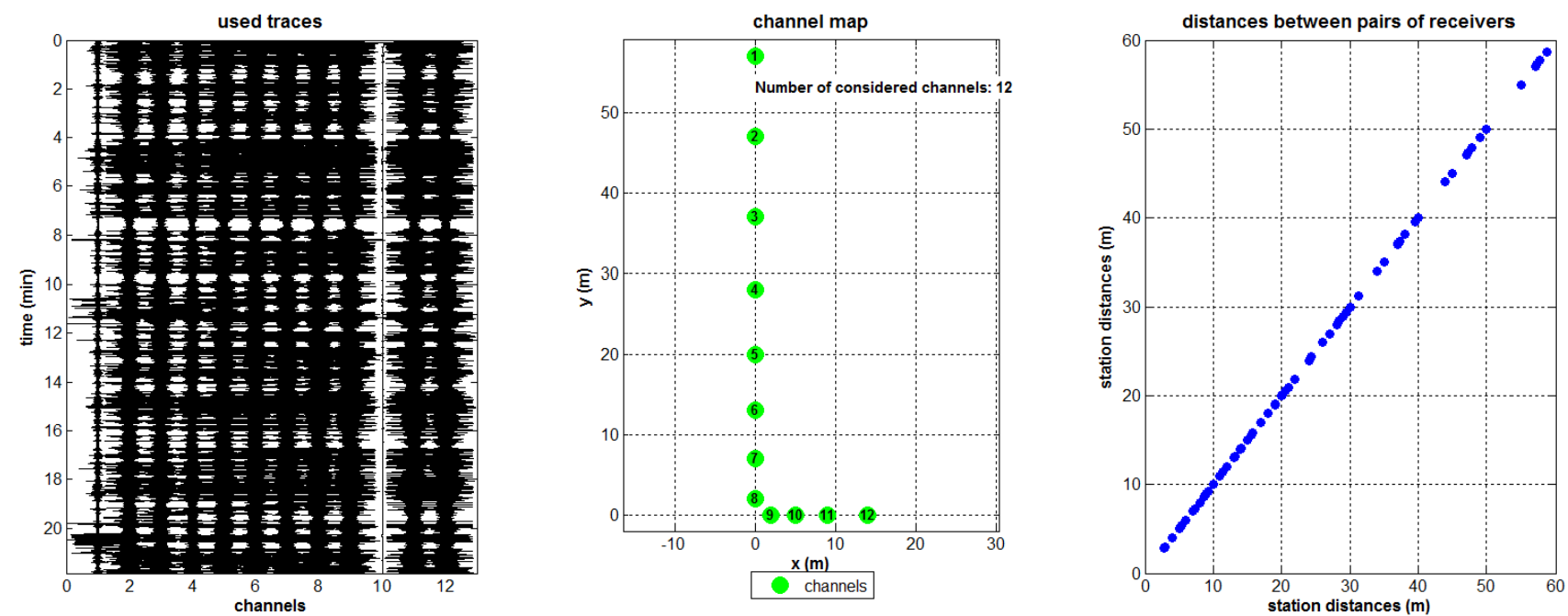
Approximate values for Vp and Poisson

Vp (m/s): 694 587 379 618 433 562 509 603 629 532

Poisson: 0.47 0.41 0.38 0.39 0.33 0.31 0.32 0.23 0.24 0.18

Vs30 (m/s): 211

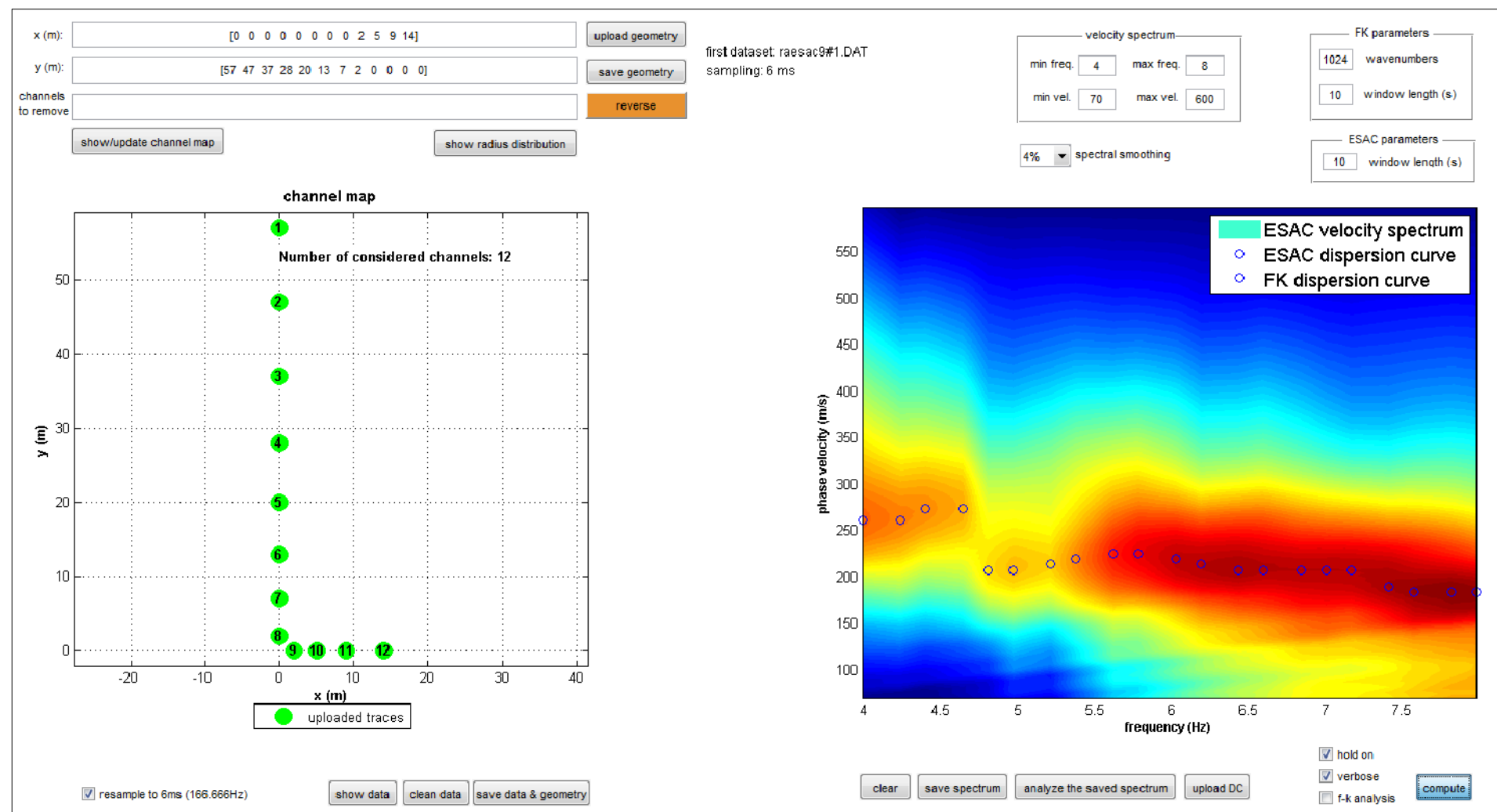
ACQUISIZIONE ESAC



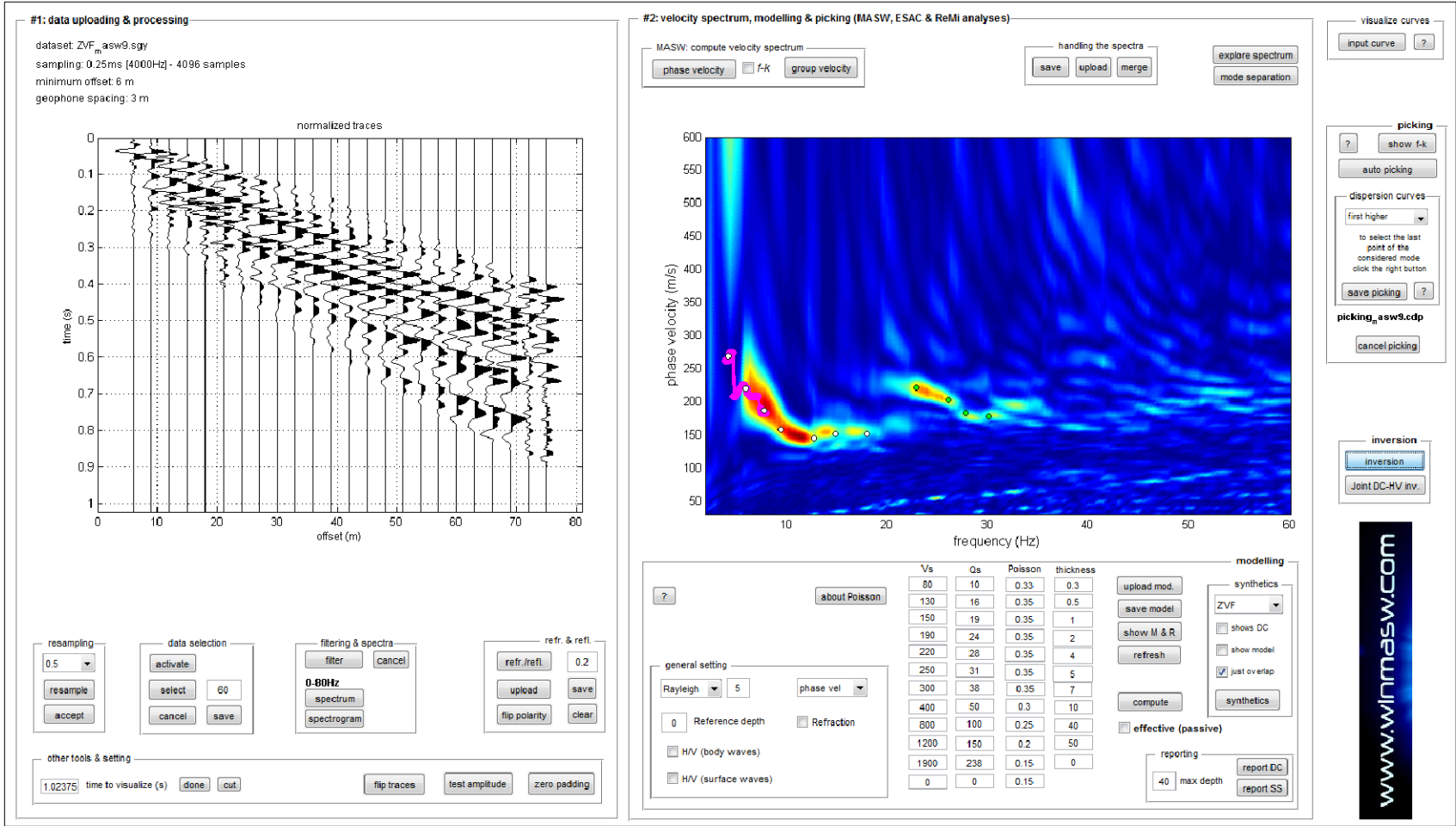
Stendimento ESAC



SPETTRO DI VELOCITA' ESAC E CURVA DI DISPERSIONE EFFETTIVA



SISMOGRAMMI, SPETTRO DI VELOCITA' E CURVA DI DISPERIONE EFFETTIVA DA ESAC

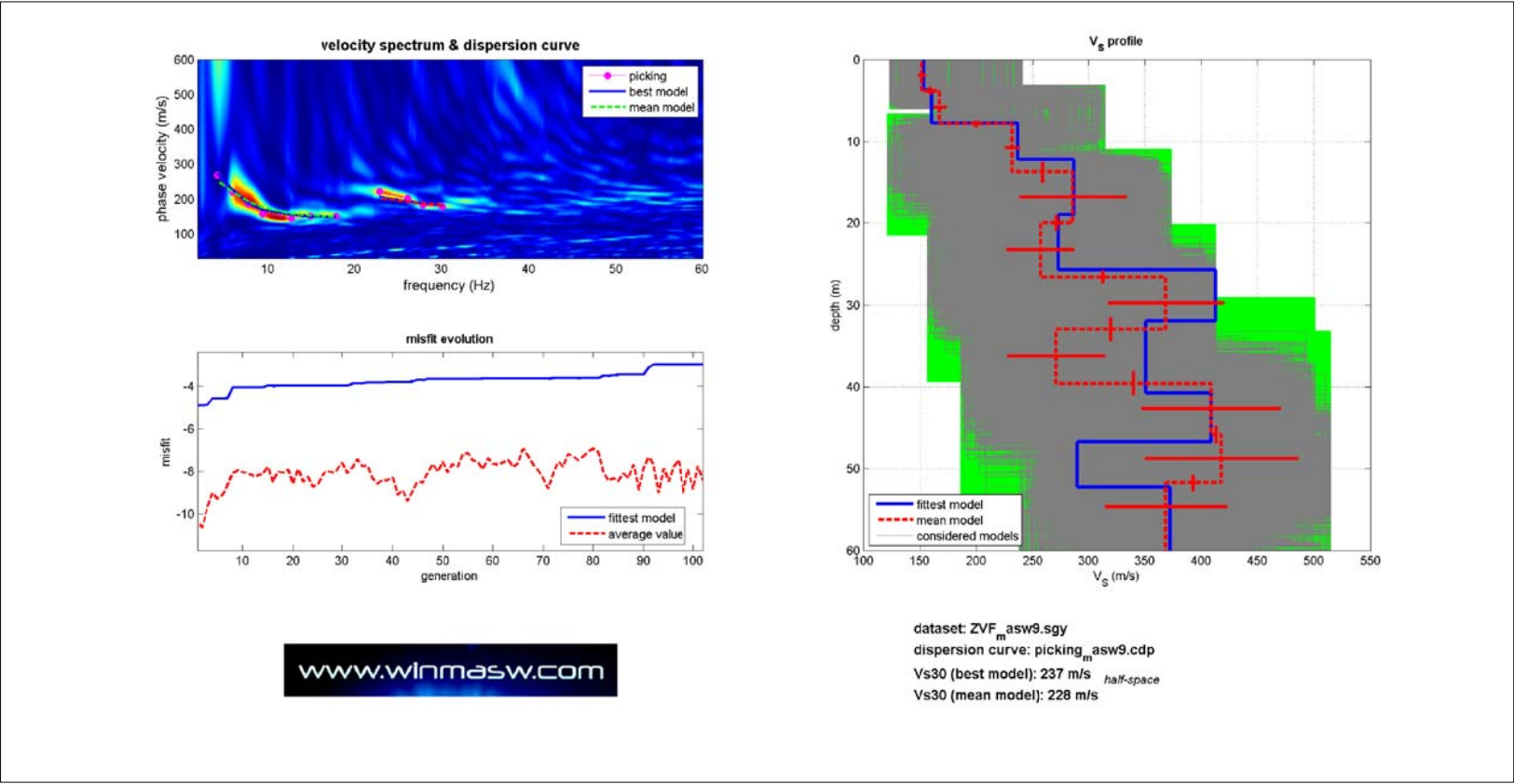


Stendimento MASW

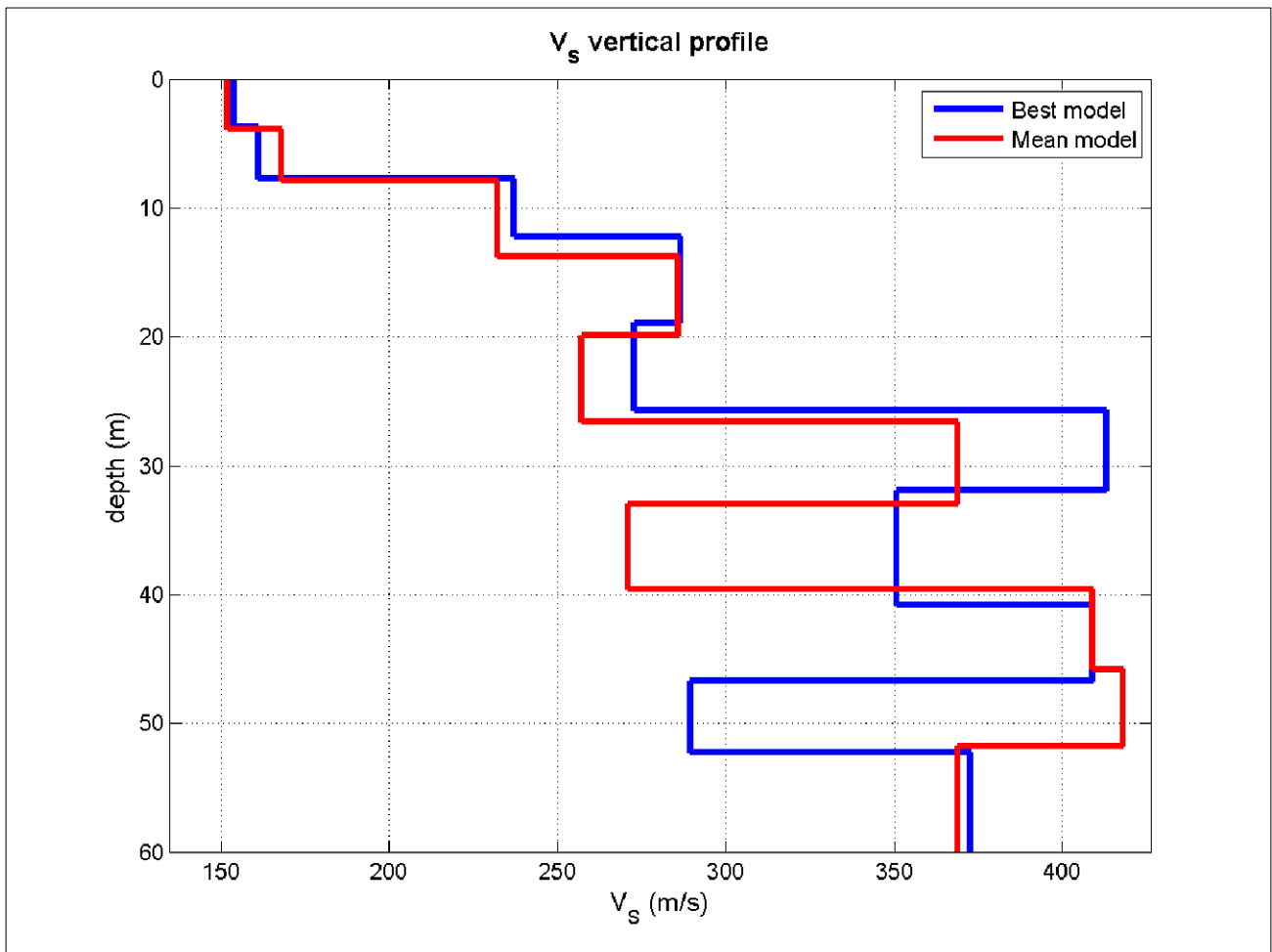


RISULTANZE DELL'ANALISI SISMICA CONGIUNTA MASW - ESAC 09 LIDO DI SAVIO

INVERSIONE CONGIUNTA MASW - ESAC E PROFILO DI VELOCITA'



PROFILO DI VELOCITA' MASW – ESAC 09



Mean model

Vs (m/s): 152, 168, 232, 286, 257, 369, 271, 409, 418, 369

Thickness (m): 3.9, 4.0, 5.9, 6.2, 6.6, 6.4, 6.6, 6.3, 5.9, 8.2

Density (gr/cm³) (approximate values): 1.85 1.78 1.88 1.96 1.92 1.97 1.92 1.95 1.96 1.93

Seismic/Dynamic Shear modulus (MPa) (approximate values): 43 50 101 160 127 269 141 327 343 262

Analysis: Rayleigh Waves

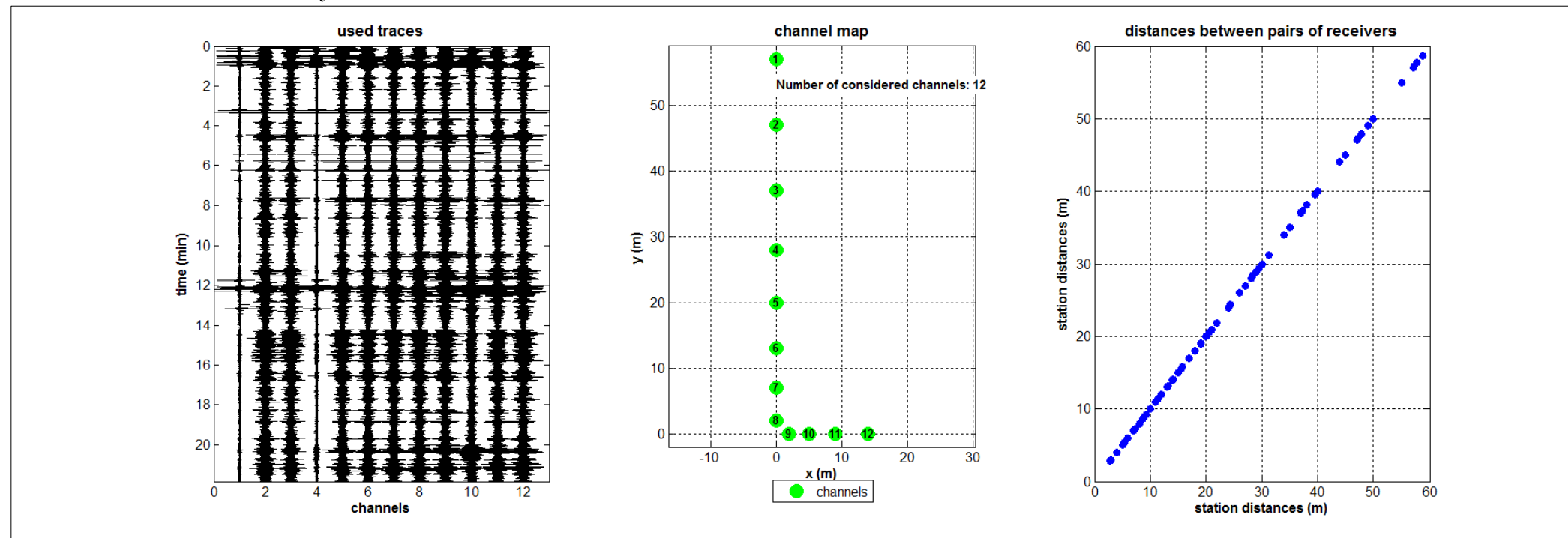
Approximate values for Vp and Poisson

Vp (m/s): 431 317 493 677 579 719 577 658 693 589

Poisson: 0.43 0.30 0.36 0.39 0.38 0.32 0.36 0.19 0.21 0.18

Vs30 (m/s): 228

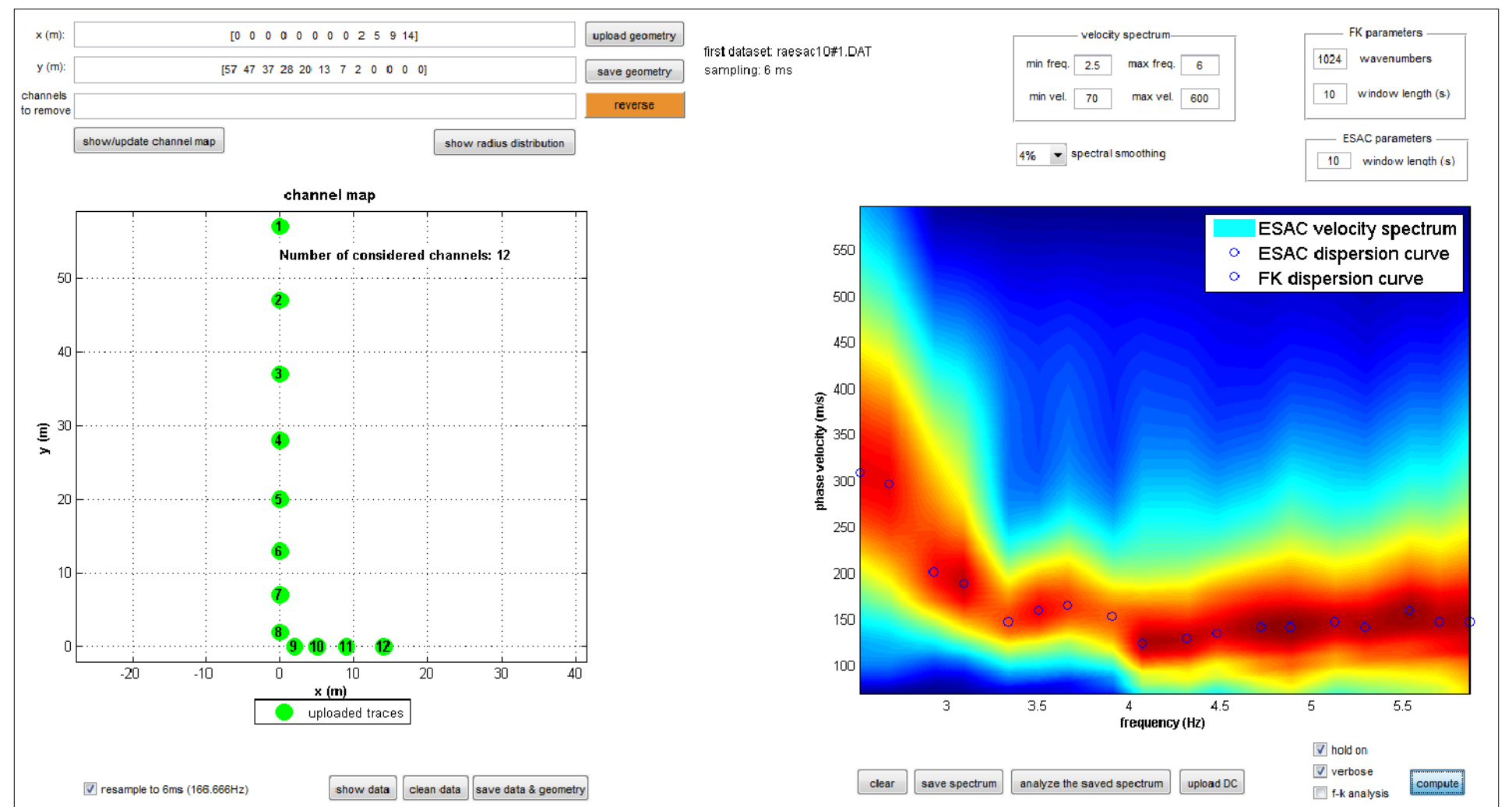
ACQUISIZIONE ESAC



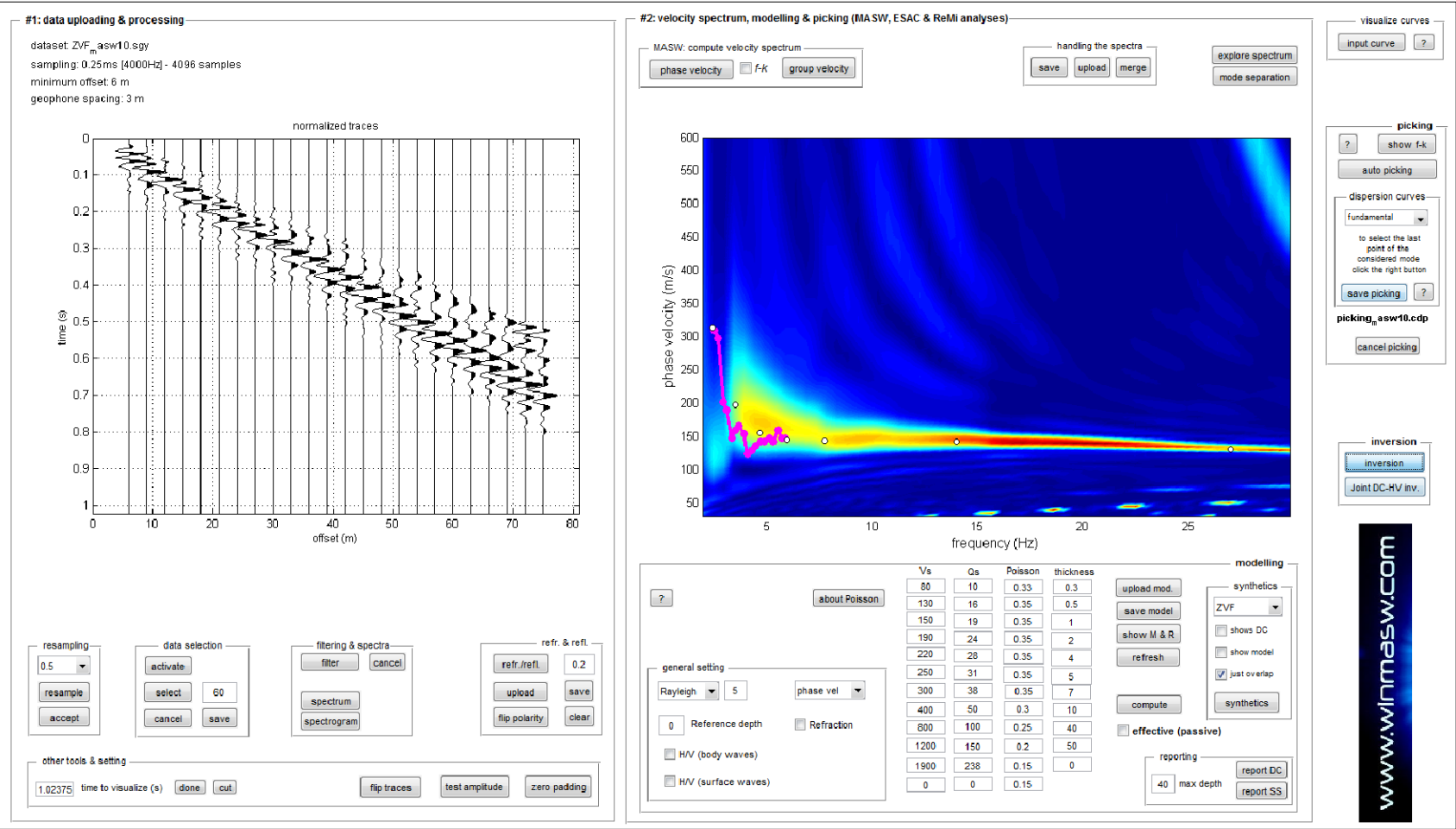
Stendimento ESAC



SPETTRO DI VELOCITA' ESAC E CURVA DI DISPERSIONE EFFETTIVA



SISMOGRAMMI, SPETTRO DI VELOCITA' E CURVA DI DISPERIONE EFFETTIVA DA ESAC

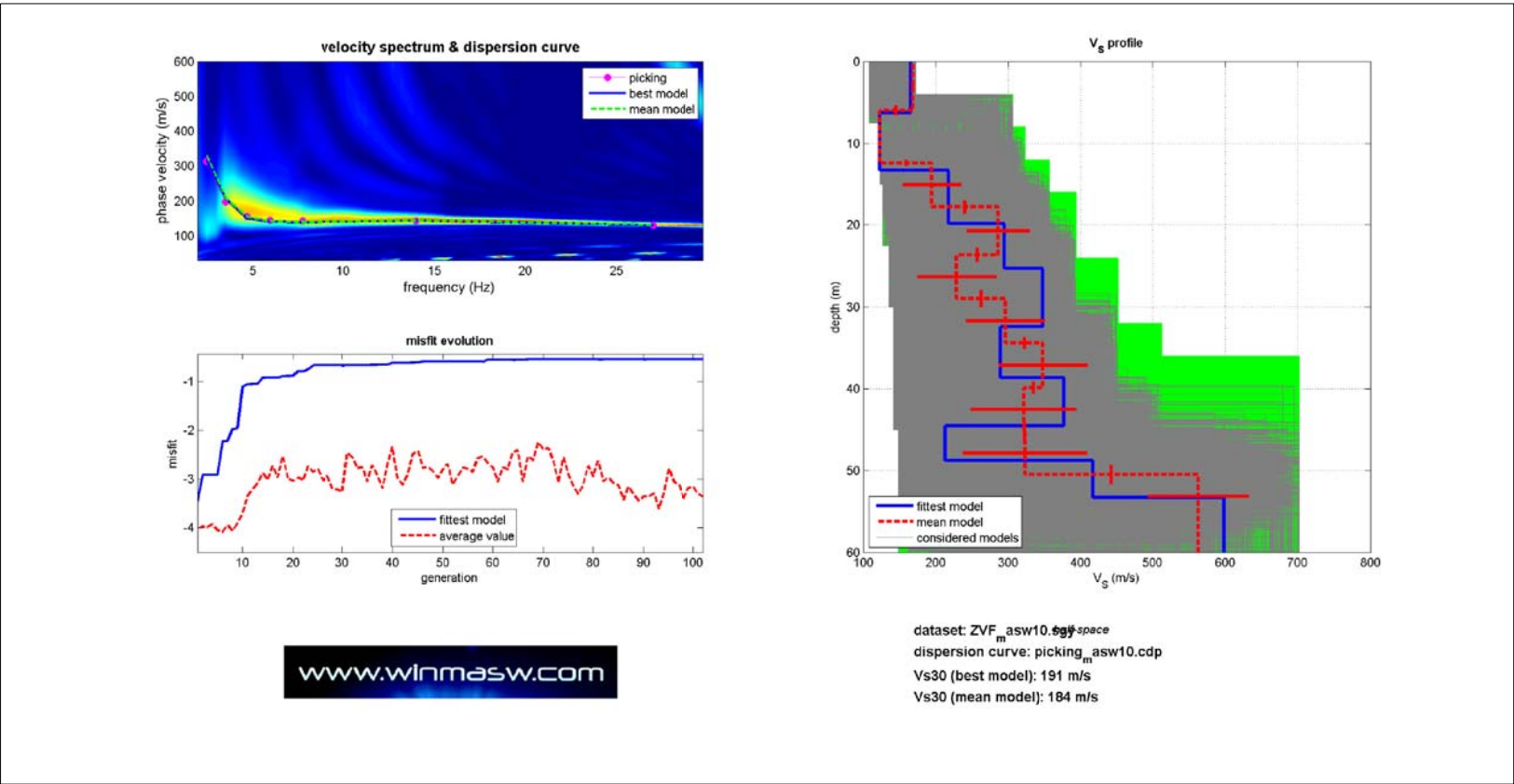


Stendimento MASW

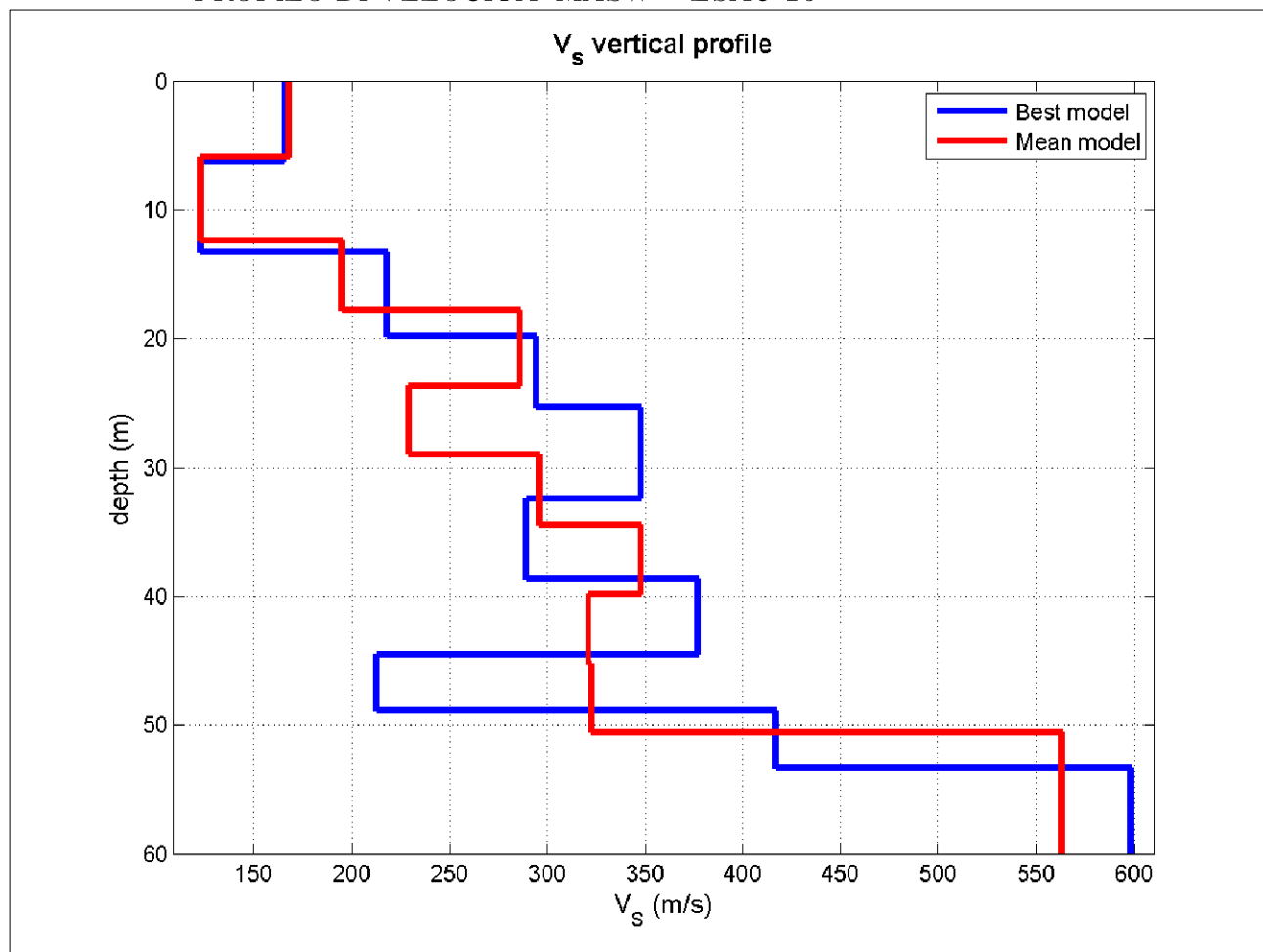


RISULTANZE DELL'ANALISI SISMICA CONGIUNTA MASW - ESAC 10 MARINA DI RAVENNA

INVERSIONE CONGIUNTA MASW - ESAC E PROFILO DI VELOCITA'



PROFILO DI VELOCITA' MASW – ESAC 10



Mean model

Vs (m/s): 168, 123, 195, 286, 229, 296, 348, 321, 323, 563

Thickness (m): 6.0, 6.4, 5.4, 5.8, 5.4, 5.4, 5.4, 5.4, 5.3, 9.5

Density (gr/cm³) (approximate values): 1.79 1.77 1.83 1.93 1.90 1.92 1.94 1.92 1.92 2.03

Seismic/Dynamic Shear modulus (MPa) (approximate values): 50 27 70 158 100 168 235 198 201 645

Analysis: Rayleigh Waves

Approximate values for Vp and Poisson

Vp (m/s): 330 311 393 604 535 579 637 579 581 921

Poisson: 0.33 0.41 0.34 0.36 0.39 0.32 0.29 0.28 0.28 0.20

Vs30 (m/s): 184