

COMUNE DI BARBERINO VAL D'ELSA
PROVINCIA DI FIRENZE



PIANO STRUTTURALE Variante generale

Variante n.3 al Piano Strutturale approvato con D.C.C. n° 54 del 01/06/2005

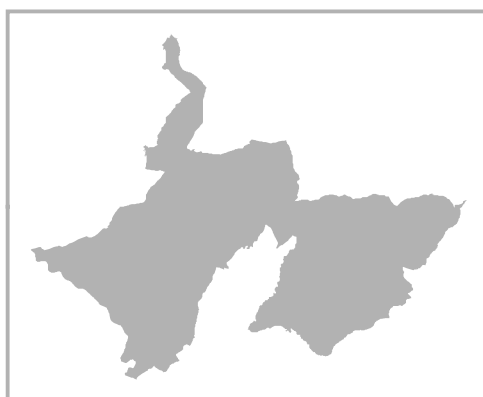
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Approvazione: D.C.C. n. del / /
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RELAZIONE TECNICA
SULLE MISURE HVSR

GR03

RELAZIONE TECNICA RELATIVA ALLE MISURE DI SISMICA PASSIVA A STAZIONE SINGOLA HVSR NEL COMUNE DI BARBERINO VAL D'ELSA (FI)

L'acquisizione è stata effettuata con lo strumento denominato "ECHO TROMO HVSR 3" prodotto dalla ditta AMBROGEO di Rivergaro (PC), costituito da un geofono 3D con frequenza di risonanza di 2,0 Hz e da uno specifico acquisitore di dati a 24 bit che registra su un file in formato SAF (Sesame Ascii Format).

Il geofono 3D è costituito da un geofono verticale e da due geofoni orizzontali orientati secondo una terna di assi cartesiani X, Y e Z. Gli assi X e Y corrispondono ai geofoni orizzontali che oscillano rispettivamente secondo la direzione est-ovest e nord-sud, mentre l'asse Z corrisponde alla direzione alto-basso in cui oscilla il geofono verticale.

Ogni misurazione è stata effettuata per una durata di 30 minuti, alla frequenza di 128 Hz.

Per l'elaborazione dei dati è stato utilizzato il software "WinMASW 5.0 Professional" della EliaSoft. Tramite tale software è stato possibile ripulire il dataset dai disturbi provocati dal passaggio di autoveicoli nelle strade vicine, in modo da non considerare tali parti di registrazione per la successiva elaborazione.

Complessivamente sono state eseguite n. 15 misure nell'arco di tempo compreso fra i giorni 01.07.2013 e 10.07.2013, suddivise in n. 3 per il capoluogo di Barberino Val d'Elsa (di seguito denominate BARBERINO1, BARBERINO2 e BARBERINO3), n. 3 per la frazione di Marcialla (di seguito MARCIALLA1, MARCIALLA2 e MARCIALLA3), n. 3 per la frazione di Vico d'Elsa (denominate VICO1, VICO2 e VICO3) e n. 6 nella Zona Industriale compresa fra le Località Valcanoro e Zambra (di seguito denominate, in ordine alfabetico, ZI-BOSCOMARZI, ZI-CHIANO, ZI-DROVE, , ZI-GRILLAIE, ZI-VALCANORO e ZI-ZAMBRA).

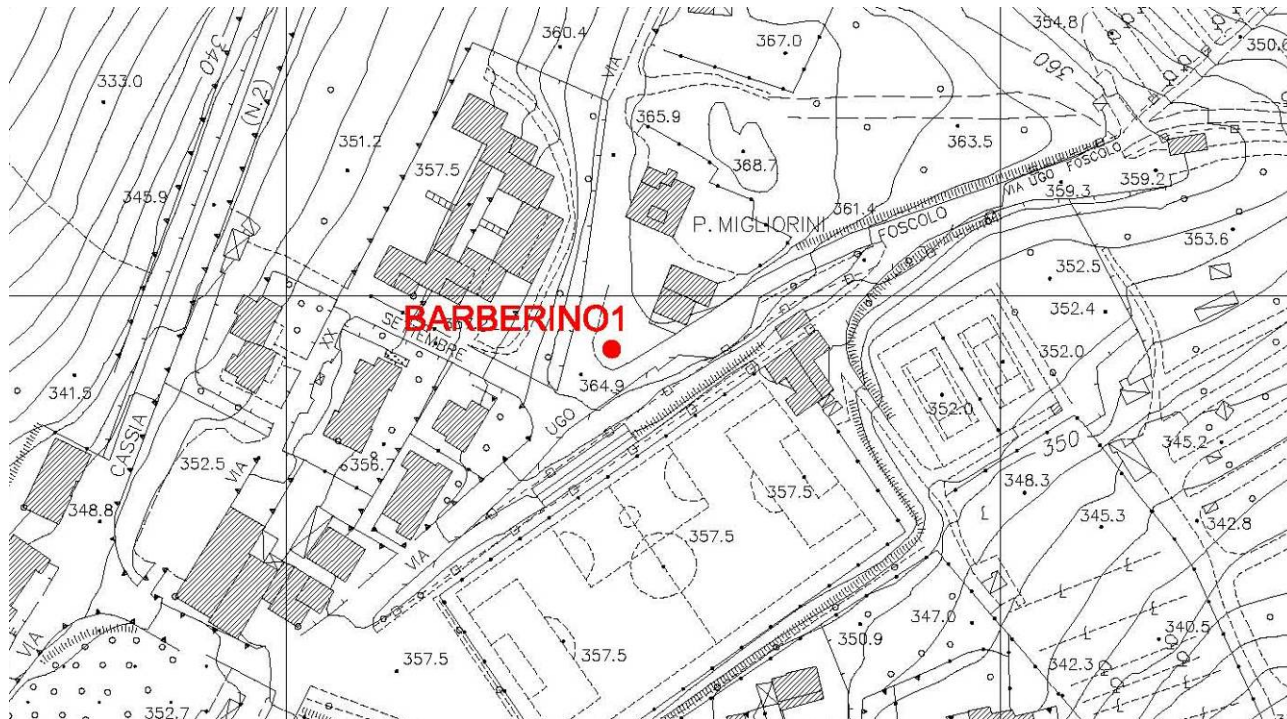
Di seguito si riporta, per ogni misurazione, la scheda riassuntiva, con l'ubicazione della prova e la relativa documentazione fotografica, ed i risultati dell'elaborazione con i diagrammi e gli output di calcolo.

1. Prova HVSR “BARBERINO1”

Loc. Barberino Val d'Elsa – Via Ugo Foscolo

Coordinate WGS84: 43.546222, 11.177022

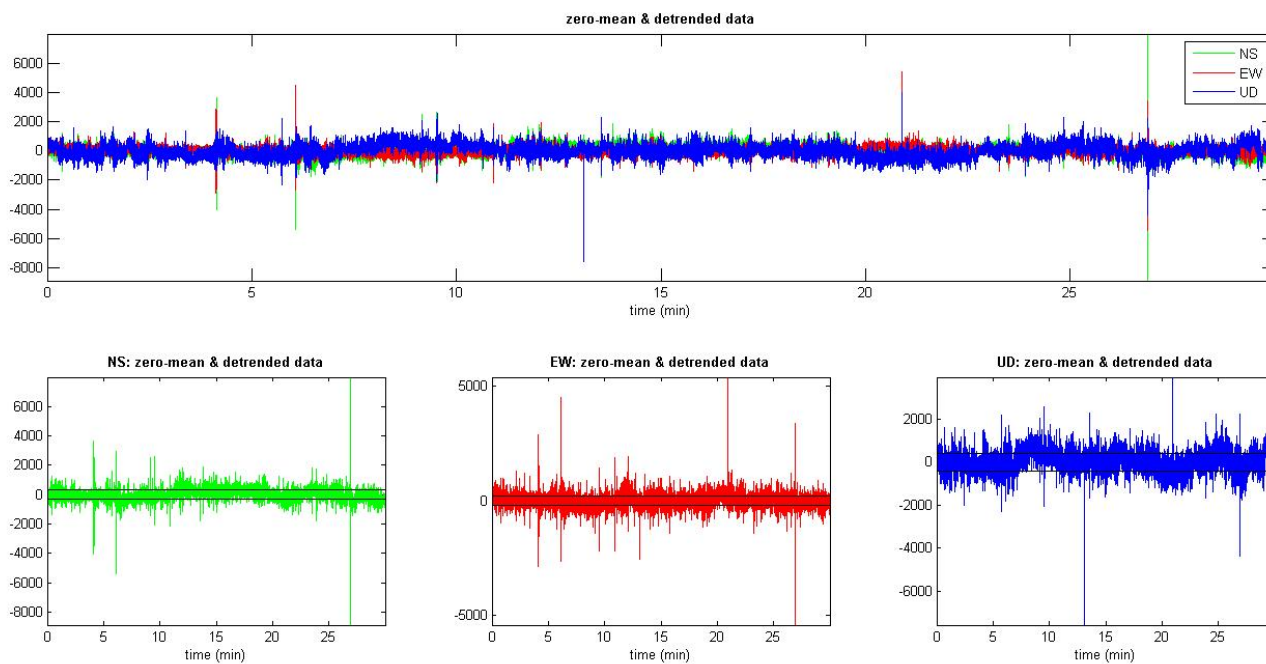
Data esecuzione prova : 09/07/2013 - 21.04/21.34 (durata 30 min)



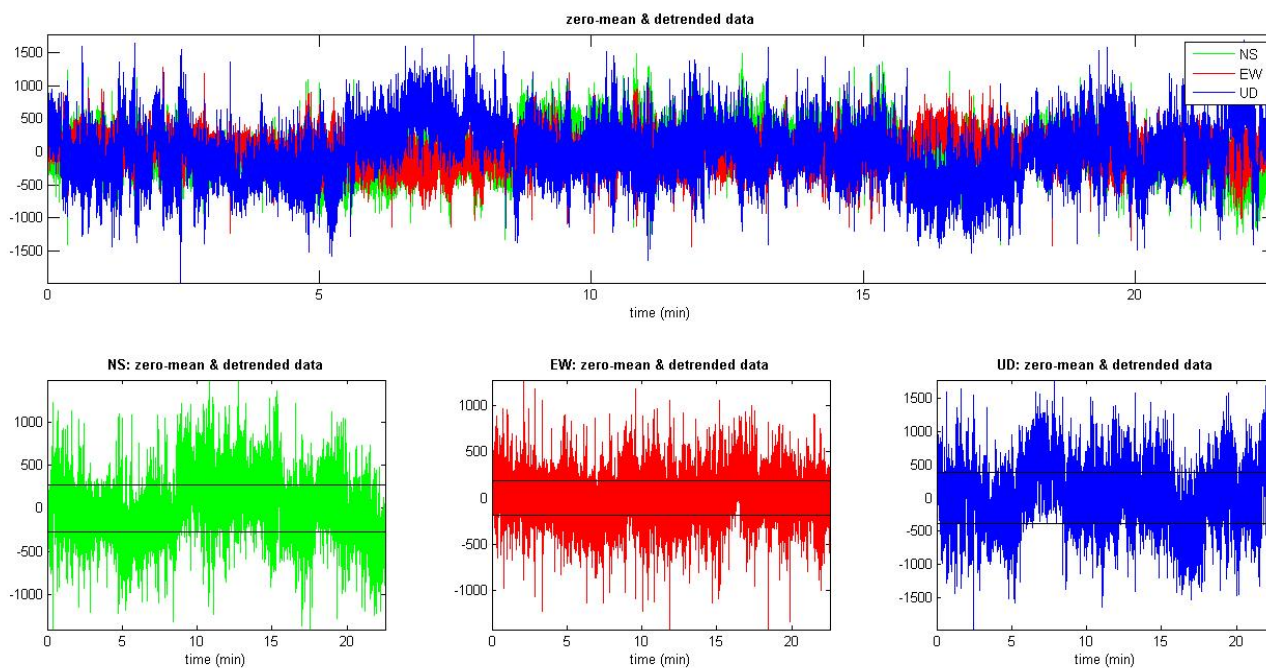
Ubicazione prova BARBERINO1- scala 1:2000



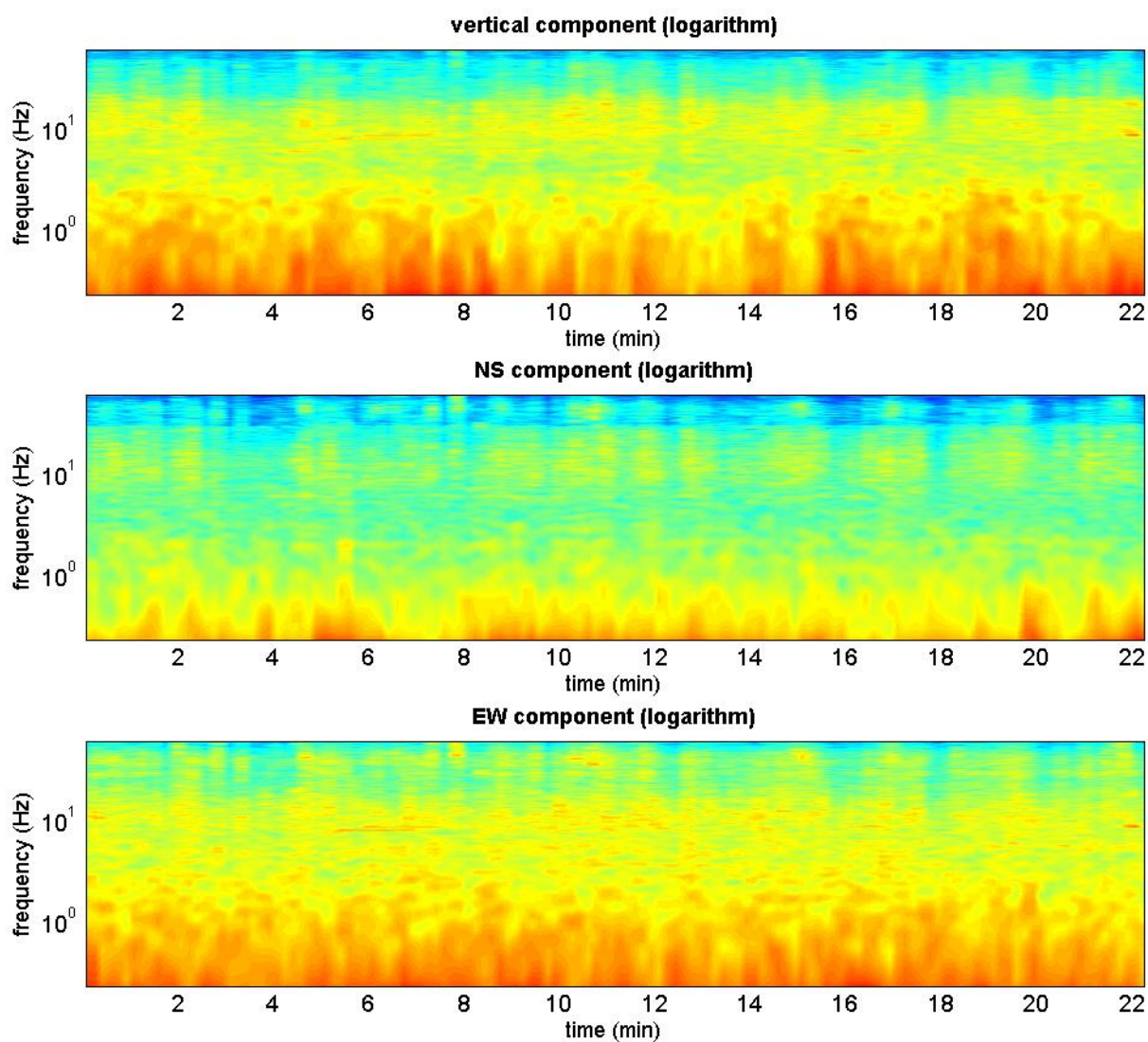
Prova BARBERINO1



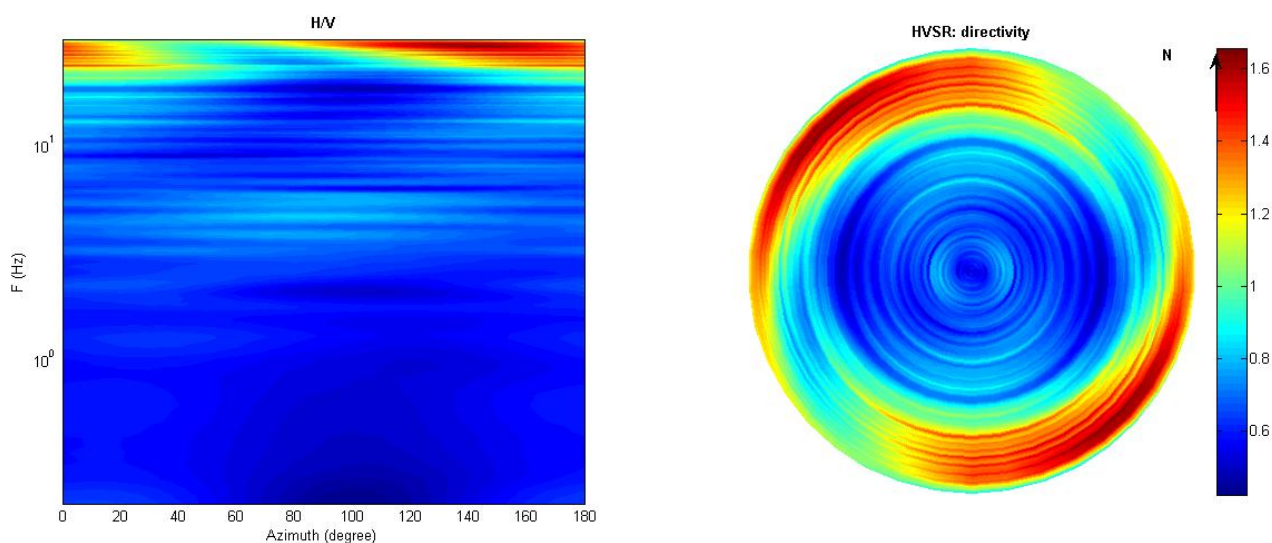
Prova “BARBERINO1”: Dati originali



Prova “BARBERINO1”: Dati ripuliti



Prova “BARBERINO1”: Diagramma relativo alla stazionarietà del segnale



Prova “BARBERINO1”: Diagramma relativo alla direzionalità del segnale

Horizontal-to-Vertical Spectral Ratio

www.winmasw.com

Date: 10 7 2013

Time: 11 16

Dataset: BARBERINO1.SAF

Sampling frequency (Hz): 128

Window length (sec): 20

Length of analysed temporal sequence (min): 22.6

Tapering (%): 10

In the following the results considering the data in the 0.5-20.0Hz frequency range

Peak frequency (Hz): 20.0 (±6.0)

Peak HVSR value: 0.8 (±0.1)

Criteria for a reliable H/V curve

#1. [f0 > 10/Lw]: 20.0 > 0.5 (OK)

#2. [nc > 200]: 53710 > 200 (OK)

#3. [f0>0.5Hz; sigmaA(f) < 2 for 0.5f0 < f < 2f0] (OK)

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

#1. [exists f- in the range [f0/4, f0] | AH/V(f-) < A0/2]: (NO)

#2. [exists f+ in the range [f0, 4f0] | AH/V(f+) < A0/2]: (NO)

#3. [A0 > 2]: 0.8 < 2 (NO)

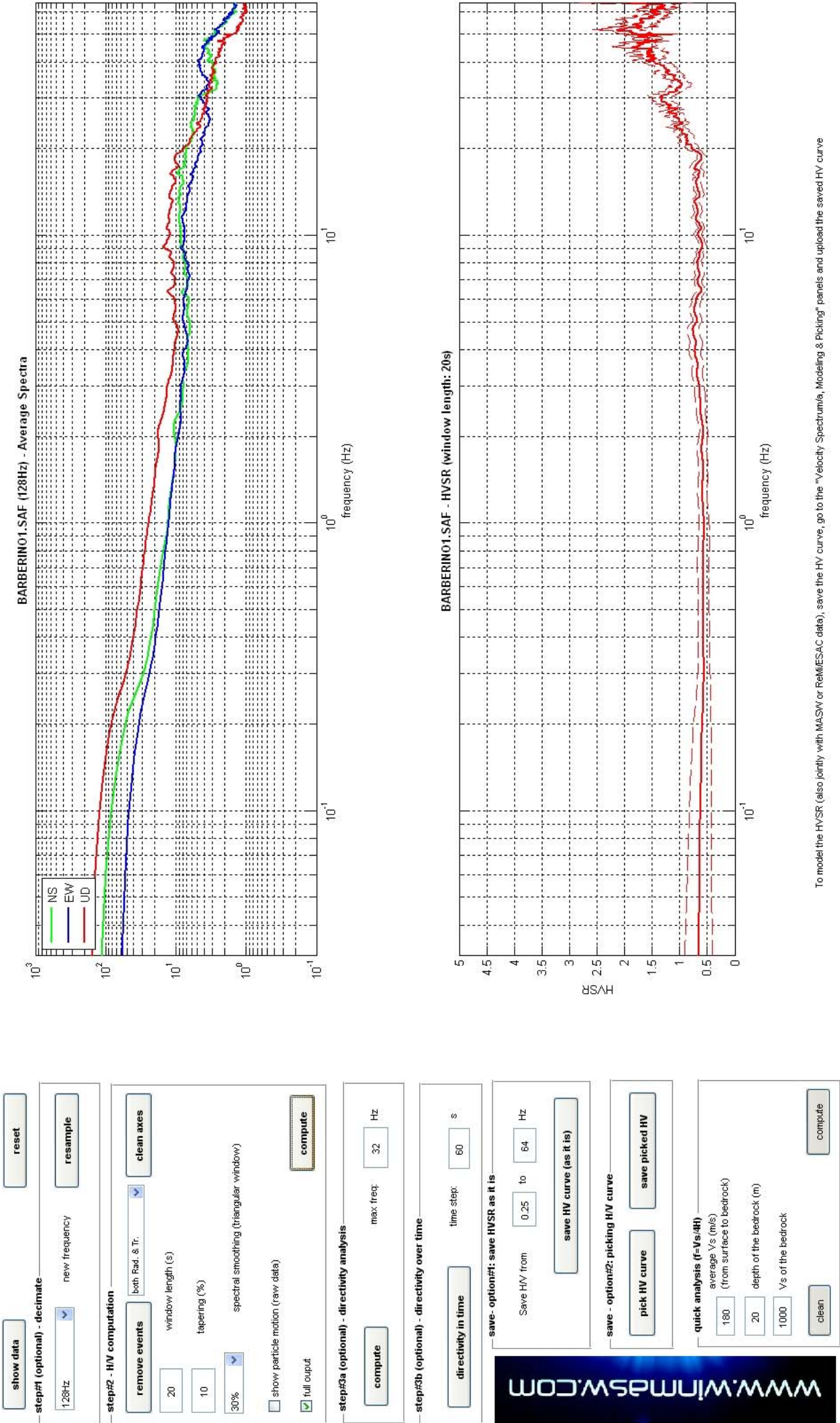
#4. [fpeak[Ah/v(f) ± sigmaA(f)] = f0 ± 5%]: (NO)

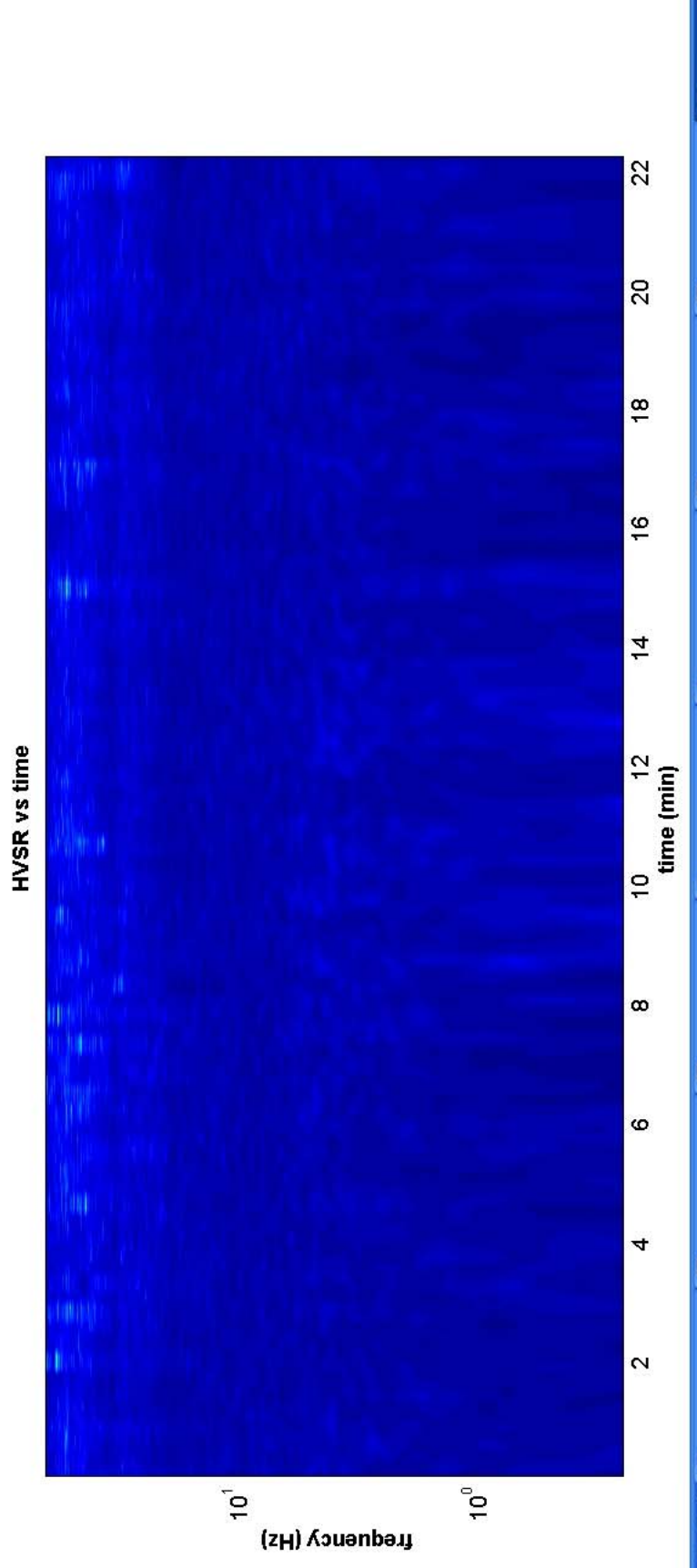
#5. [sigmaf < epsilon(f0)]: 6.009 > 1.002 (NO)

#6. [sigmaA(f0) < theta(f0)]: 0.104 < 1.58 (OK)

Please, be aware of possible industrial/man-induced peaks or spurious peaks due to meaningless numerical instabilities.

Remember that SESAME criteria should be considered in a flexible perspective and that if you modify the processing parameters they can change.



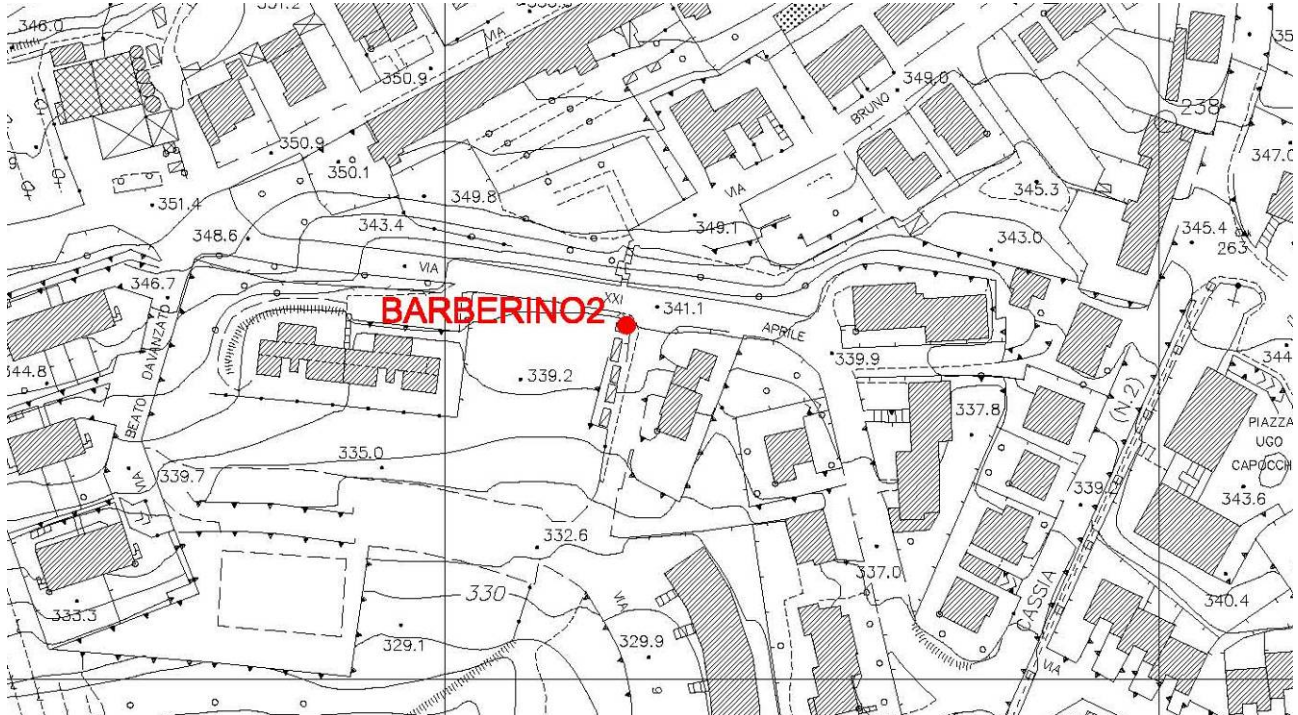


2. Prova HVSR “BARBERINO2”

Loc. Barberino Val d'Elsa – Via XXV Aprile

Coordinate WGS84: 43.540147, 11.168777

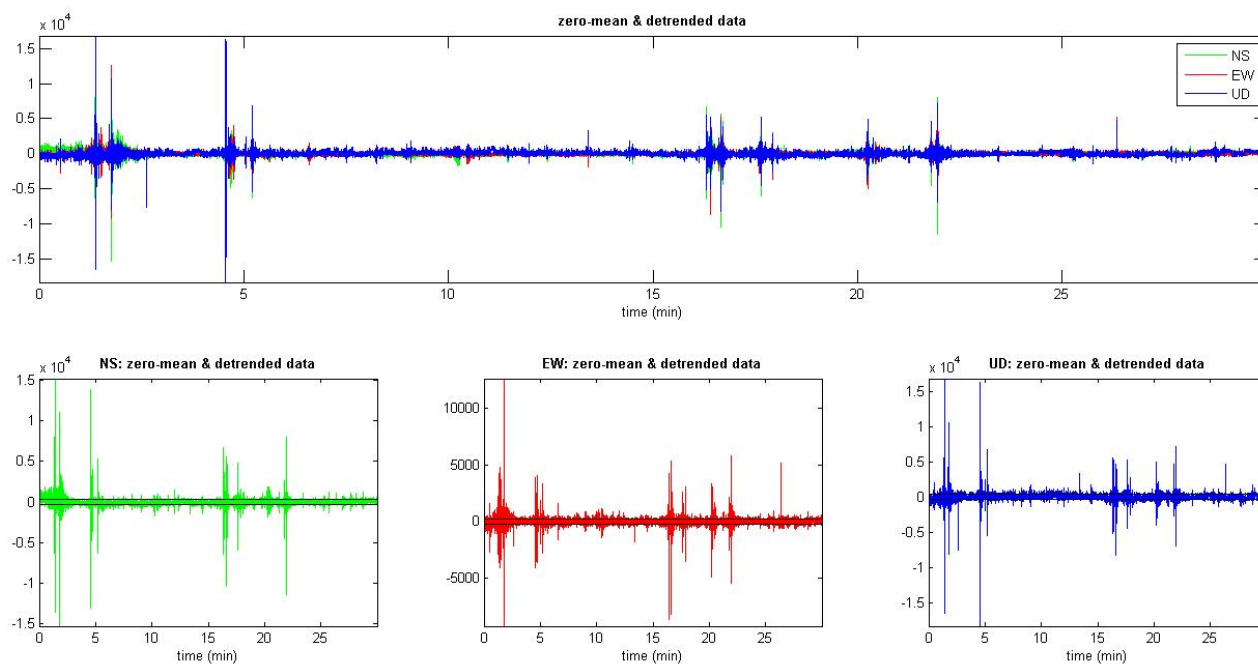
Data esecuzione prova : 01/07/2013 - 19.22/19.52 (durata 30 min)



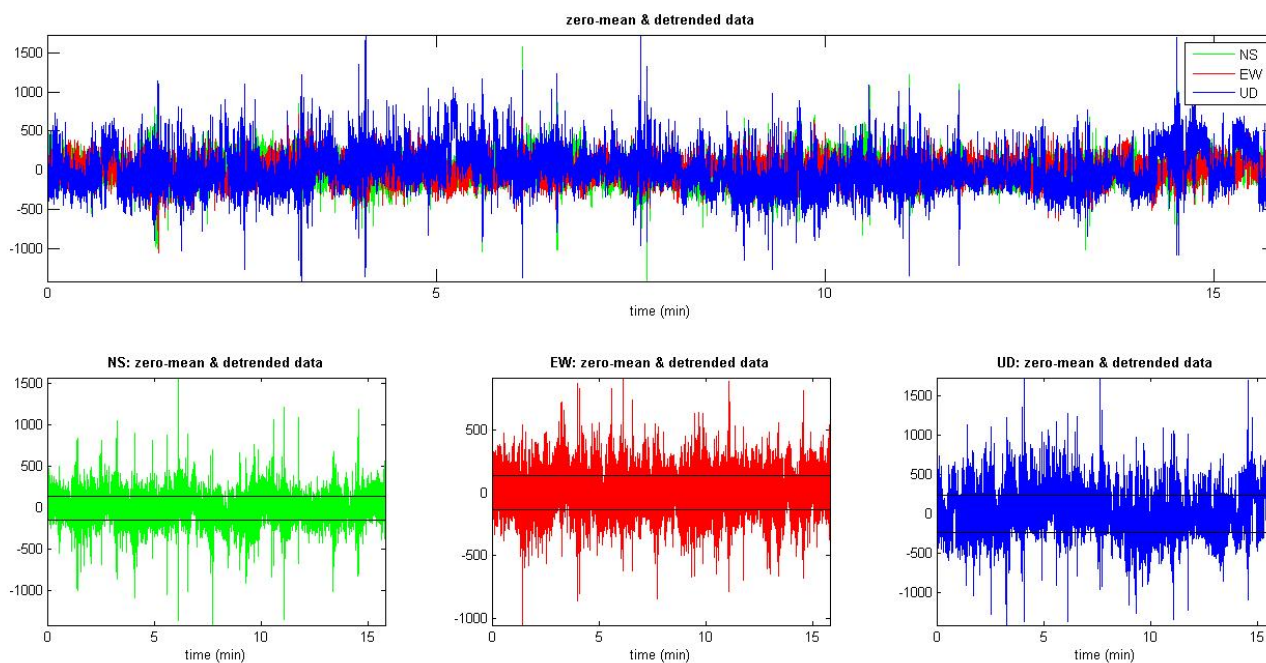
Ubicazione prova BARBERINO2- scala 1:2000



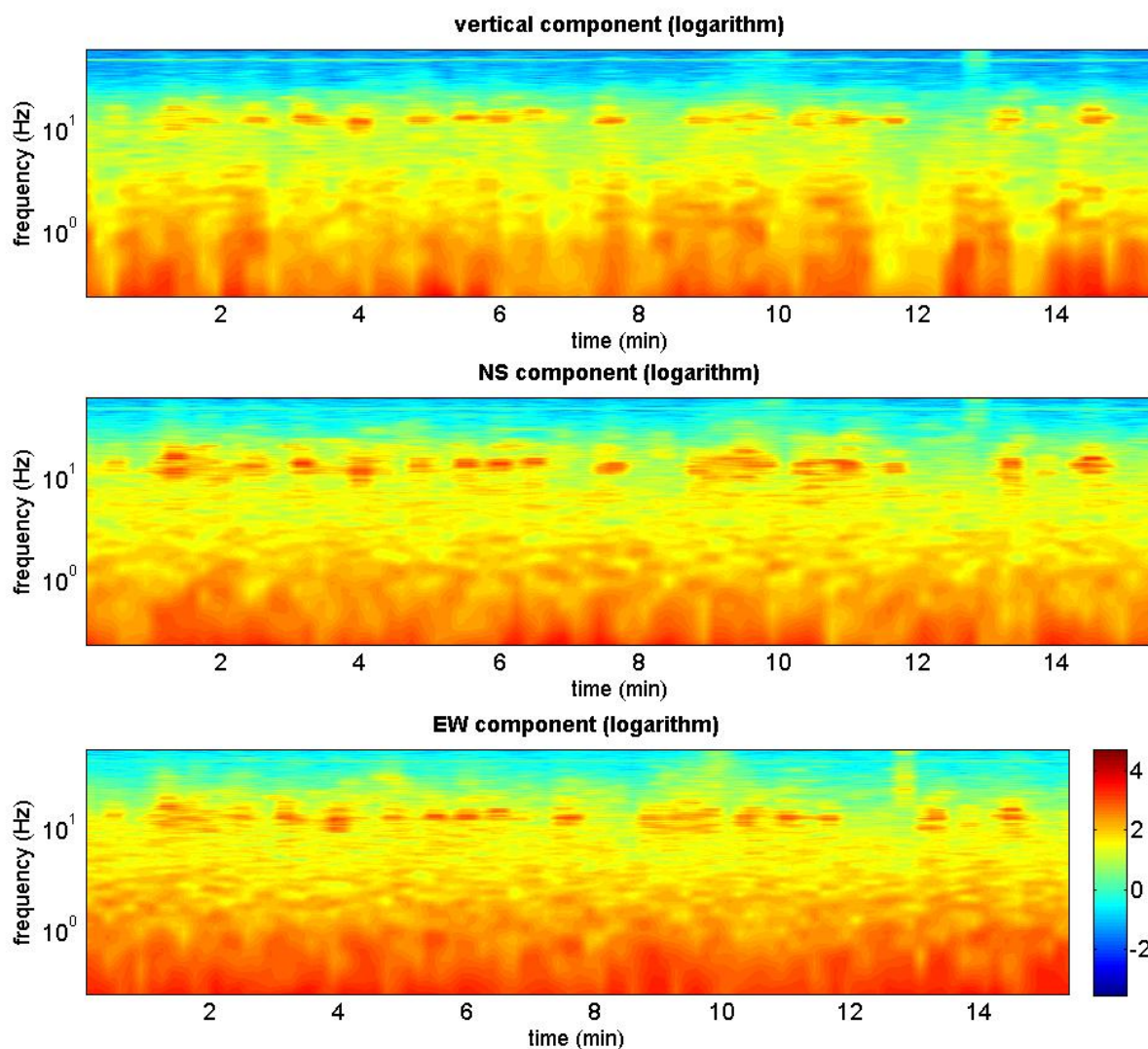
Prova BARBERINO2



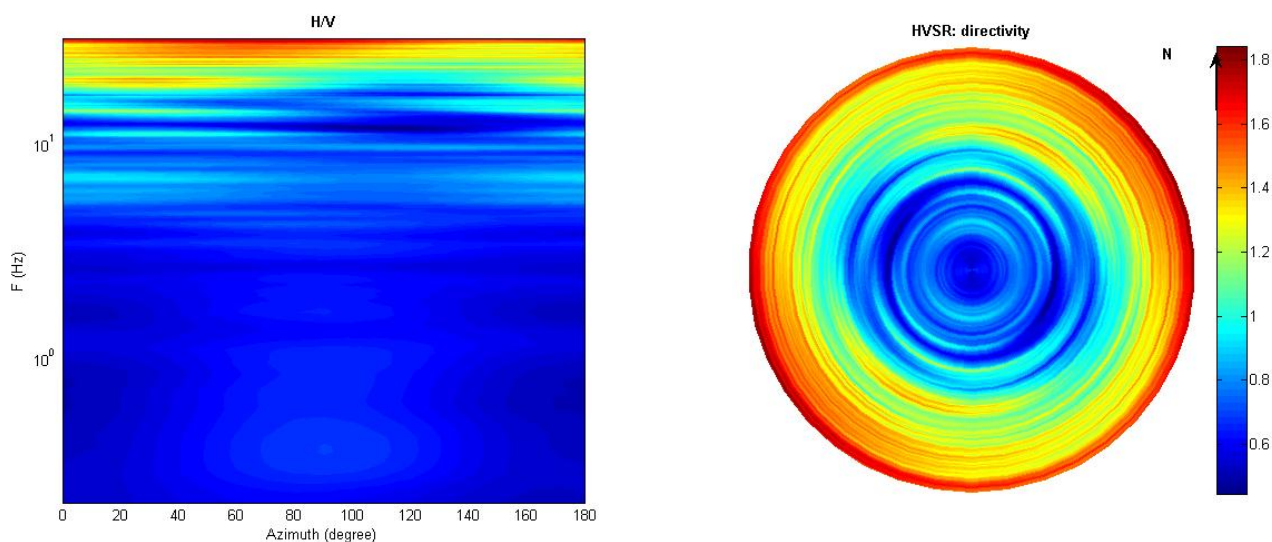
Prova “BARBERINO2”: Dati originali



Prova “BARBERINO2”: Dati ripuliti



Prova “BARBERINO2”: Diagramma relativo alla stazionarietà del segnale



Prova “BARBERINO2”: Diagramma relativo alla direzionalità del segnale

Horizontal-to-Vertical Spectral Ratio

www.winmasw.com

Date: 10 7 2013

Time: 10 53

Dataset: BARBERINO2.SAF

Sampling frequency (Hz): 128

Window length (sec): 20

Length of analysed temporal sequence (min): 15.8

Tapering (%): 10

In the following the results considering the data in the 0.5-20.0Hz frequency range

Peak frequency (Hz): 19.9 (±5.3)

Peak HVSR value: 1.1 (±0.2)

Criteria for a reliable H/V curve

#1. $[f0 > 10/Lw]$: 19.9 > 0.5 (OK)

#2. $[nc > 200]$: 36927 > 200 (OK)

#3. $[f0 > 0.5\text{Hz}; \sigma_A(f) < 2 \text{ for } 0.5f0 < f < 2f0]$ (OK)

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

#1. $[\text{exists } f^- \text{ in the range } [f0/4, f0] \mid AH/V(f^-) < A0/2]$: (NO)

#2. $[\text{exists } f^+ \text{ in the range } [f0, 4f0] \mid AH/V(f^+) < A0/2]$: (NO)

#3. $[A0 > 2]$: 1.1 < 2 (NO)

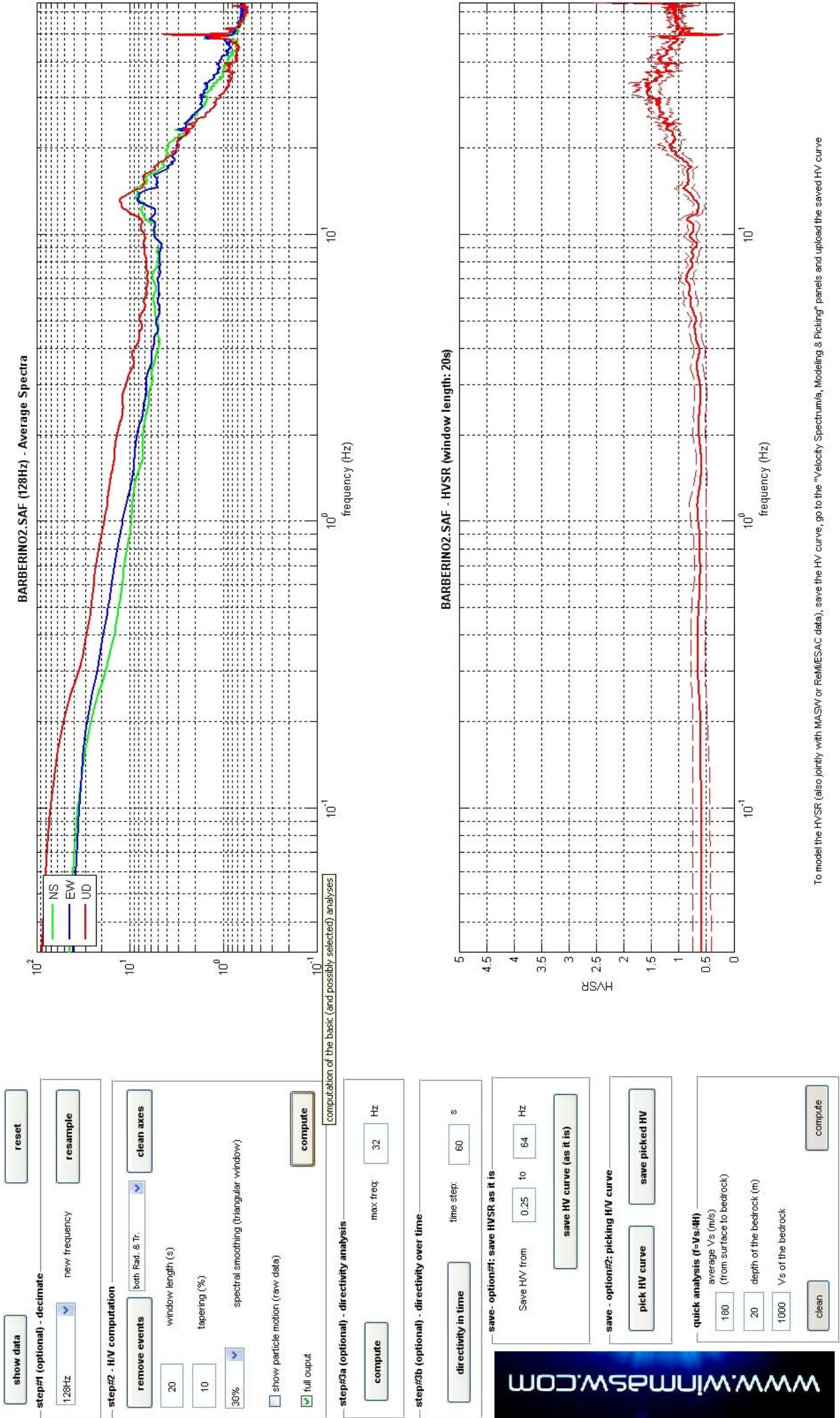
#4. $[f_{peak}[Ah/v(f) \pm \sigma_A A(f)] = f0 \pm 5\%]$: (OK)

#5. $[\sigma_{maf} < \epsilon(f0)]$: 5.335 > 0.993 (NO)

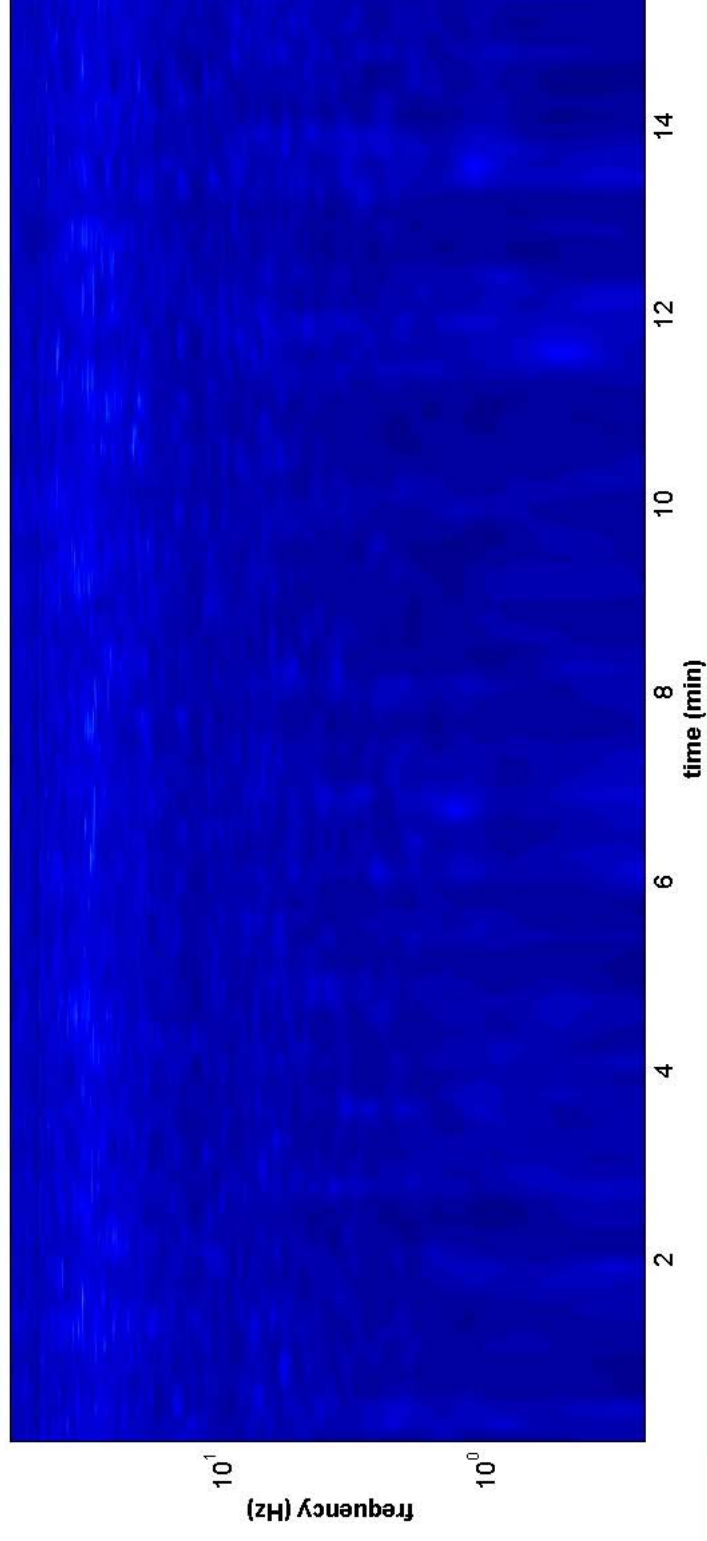
#6. $[\sigma_A A(f0) < \theta(f0)]$: 0.158 < 1.58 (OK)

Please, be aware of possible industrial/man-induced peaks or spurious peaks due to meaningless numerical instabilities.

Remember that SESAME criteria should be considered in a flexible perspective and that if you modify the processing parameters they can change.



HVSR vs time

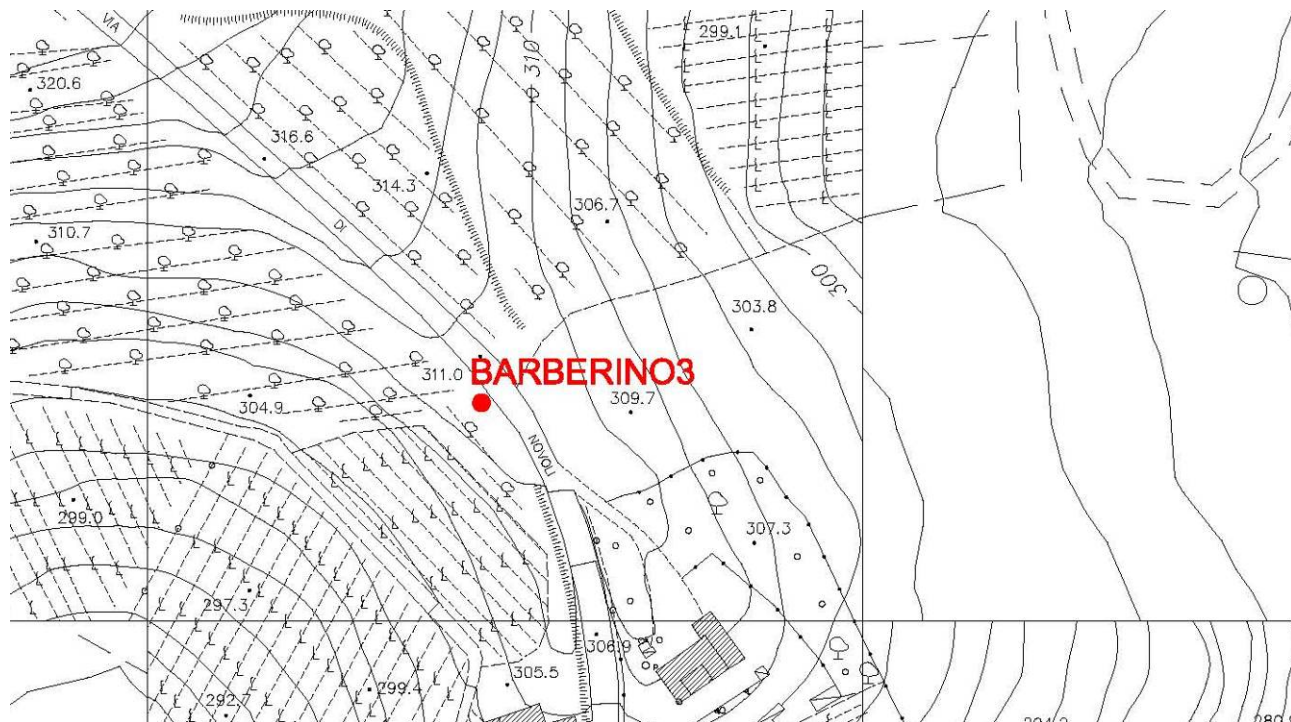


3. Prova HVSR “BARBERINO3”

Loc. Barberino Val d'Elsa – Via di Novoli

Coordinate WGS84: 43.536071, 11.176614

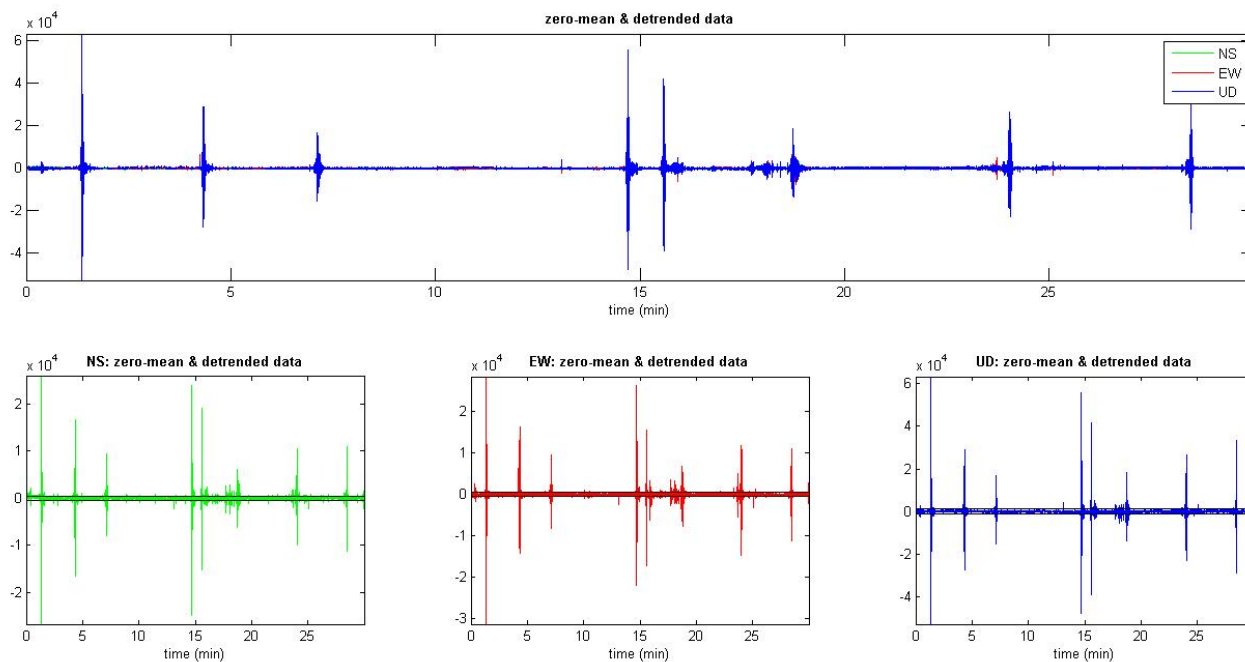
Data esecuzione prova : 01/07/2013 – 20.15/20.45 (durata 30 min)



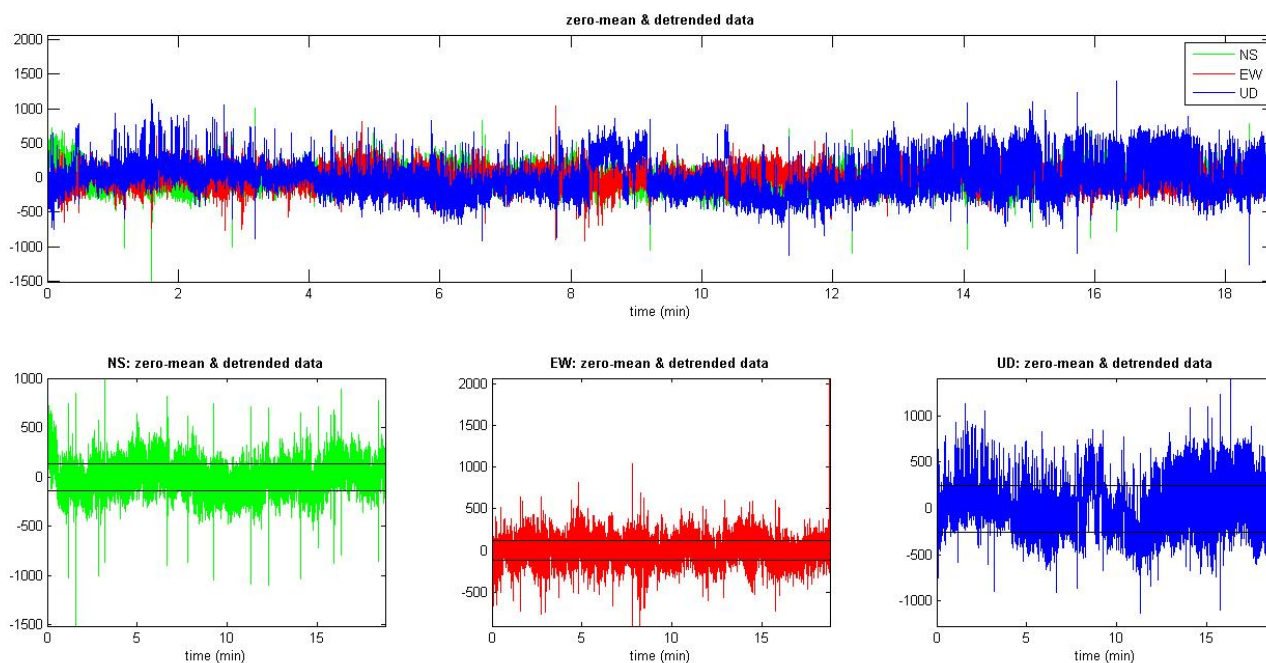
Ubicazione prova “BARBERINO3”- scala 1:2000



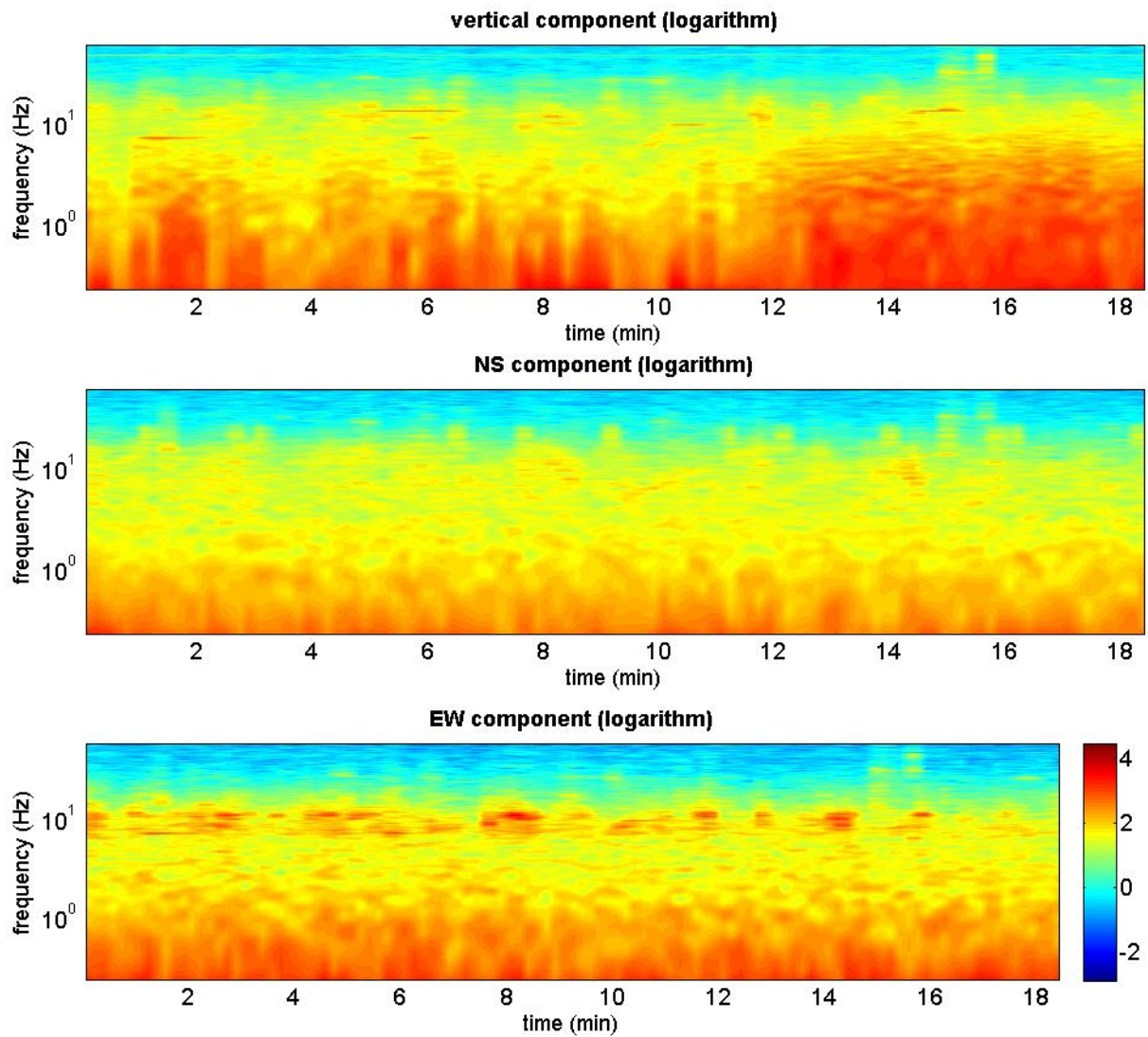
Prova “BARBERINO3”



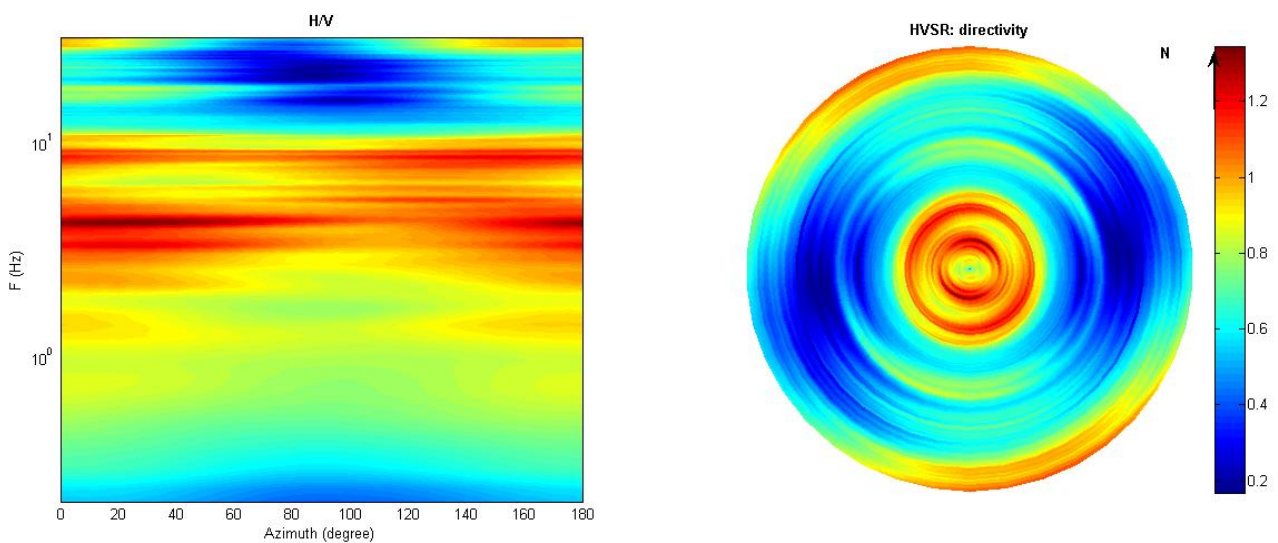
Prova “BARBERINO3”: Dati originali



Prova “BARBERINO3”: Dati ripuliti



Prova “BARBERINO3”: Diagramma relativo alla stazionarietà del segnale



Prova “BARBERINO3”: Diagramma relativo alla direzionalità del segnale

Horizontal-to-Vertical Spectral Ratio

www.winmasw.com

Date: 9 7 2013

Time: 15 59

Dataset: BARBERINO3.SAF

Sampling frequency (Hz): 128

Window length (sec): 20

Length of analysed temporal sequence (min): 18.8

Tapering (%): 10

In the following the results considering the data in the 0.5-20.0Hz frequency range

Peak frequency (Hz): 11.5 (±3.0)

Peak HVSR value: 1.3 (±0.4)

Criteria for a reliable H/V curve

#1. [f0 > 10/Lw]: 11.5 > 0.5 (OK)

#2. [nc > 200]: 25612 > 200 (OK)

#3. [f0>0.5Hz; sigmaA(f) < 2 for 0.5f0 < f < 2f0] (OK)

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

#1. [exists f- in the range [f0/4, f0] | AH/V(f-) < A0/2]: yes, at frequency 5.2Hz (OK)

#2. [exists f+ in the range [f0, 4f0] | AH/V(f+) < A0/2]: (NO)

#3. [A0 > 2]: 1.3 < 2 (NO)

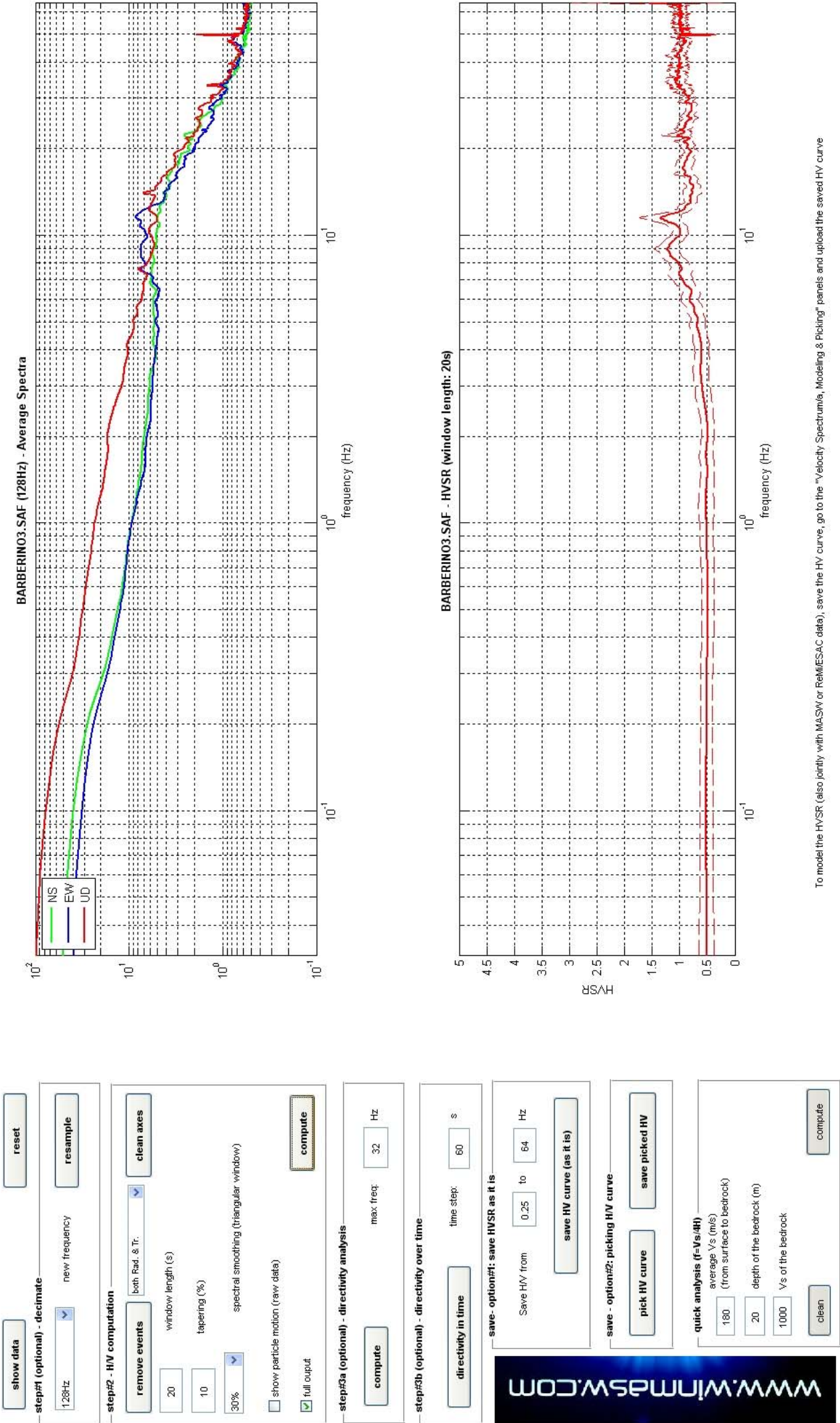
#4. [fpeak[Ah/v(f) ± sigmaA(f)] = f0 ± 5%]: (NO)

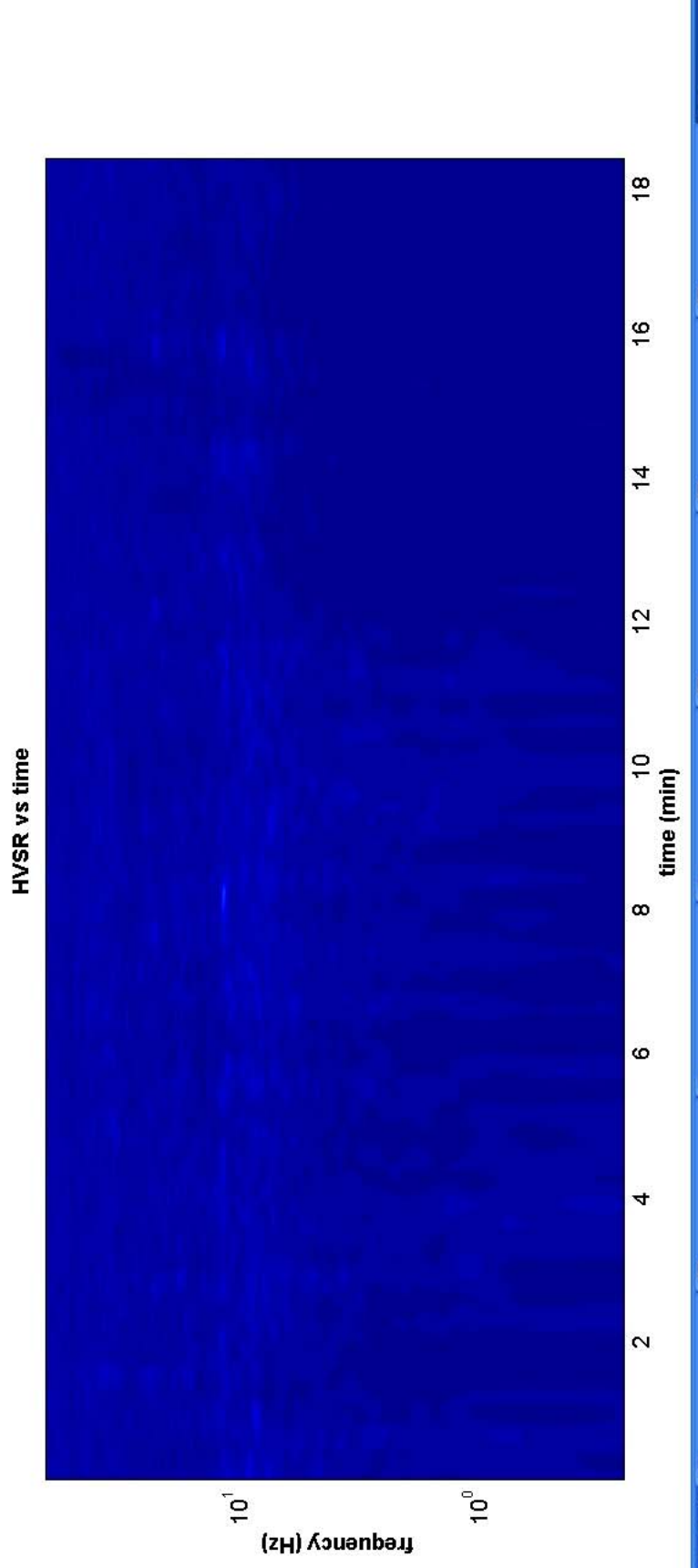
#5. [sigmaf < epsilon(f0)]: 2.962 > 0.577 (NO)

#6. [sigmaA(f0) < theta(f0)]: 0.377 < 1.58 (OK)

Please, be aware of possible industrial/man-induced peaks or spurious peaks due to meaningless numerical instabilities.

Remember that SESAME criteria should be considered in a flexible perspective and that if you modify the processing parameters they can change.



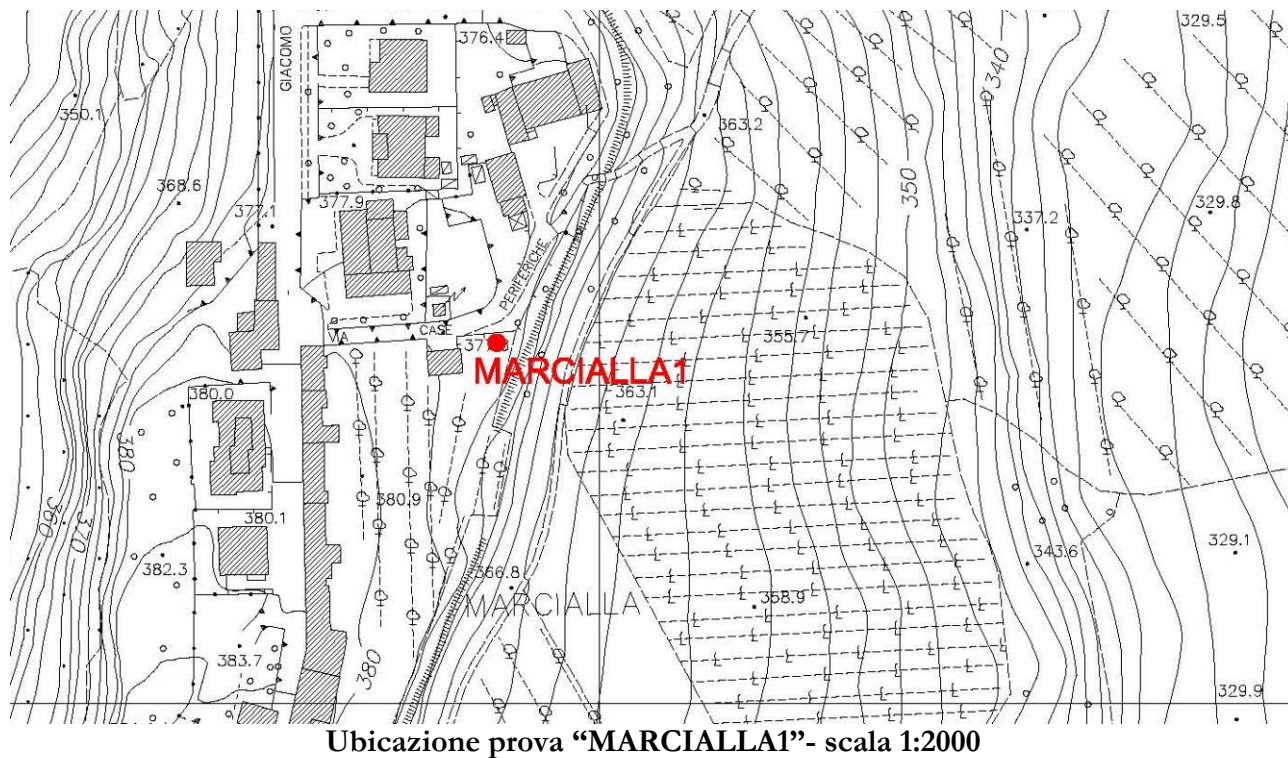


4. Prova HVSR “MARCIALLA1”

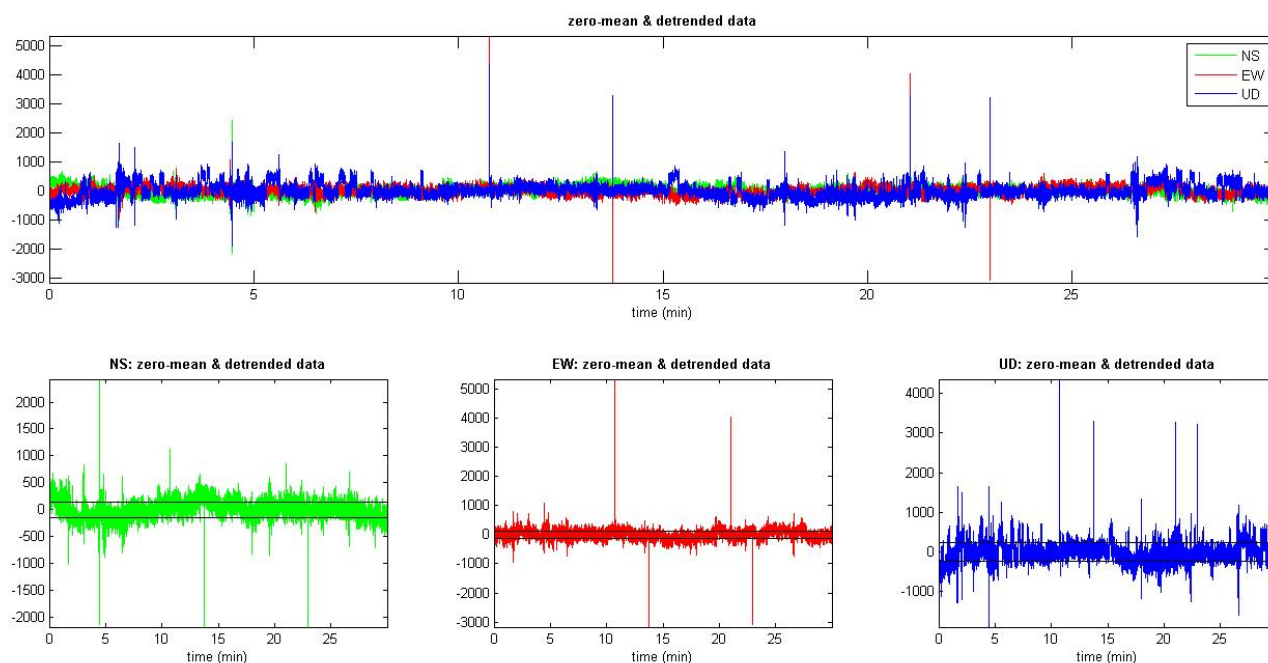
Loc. Marcialla – Via Case Periferiche

Coordinate WGS84: 43.576662, 11.141874

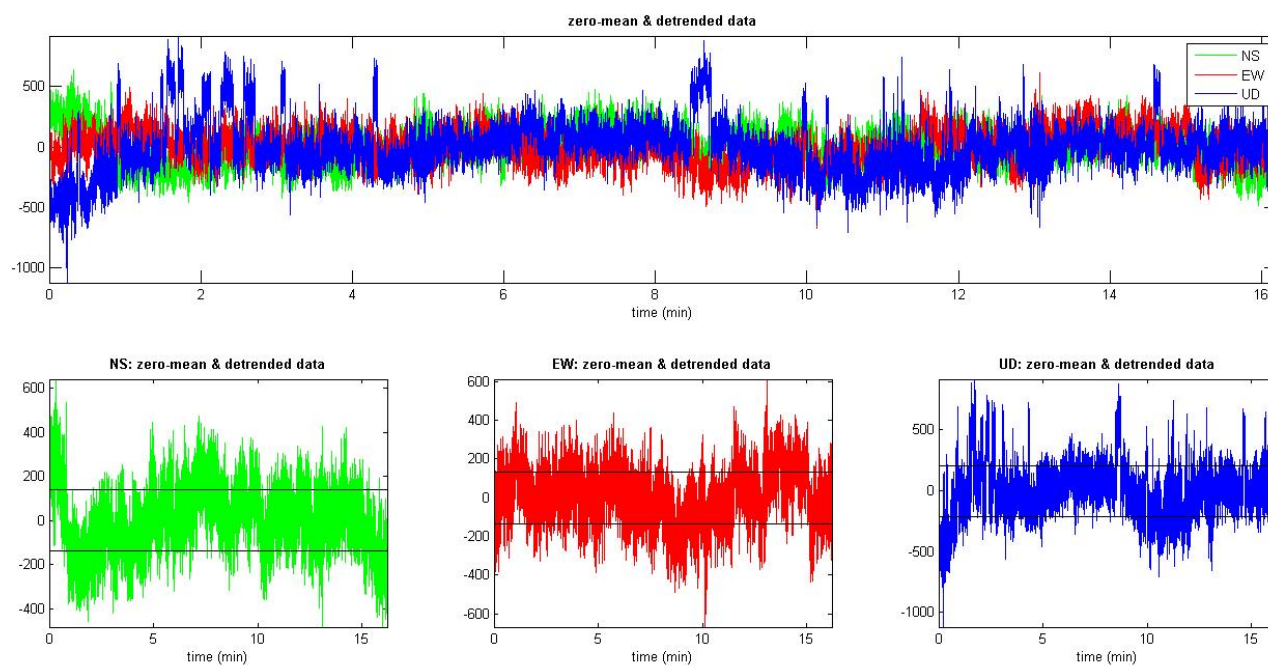
Data esecuzione prova : 02/07/2013 - 14.04/14.34 (durata 30 min)



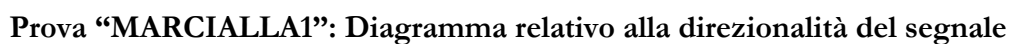
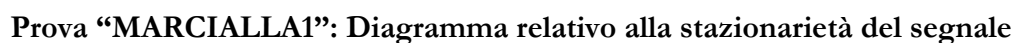
Prova “MARCIALLA1”



Prova “MARCIALLA1”: Dati originali



Prova “MARCIALLA1”: Dati ripuliti



Horizontal-to-Vertical Spectral Ratio

www.winmasw.com

Date: 9 7 2013

Time: 17 7

Dataset: MARCIALLA1.SAF

Sampling frequency (Hz): 128

Window length (sec): 20

Length of analysed temporal sequence (min): 16.2

Tapering (%): 10

In the following the results considering the data in the 0.5-20.0Hz frequency range

Peak frequency (Hz): 1.8 (±6.2)

Peak HVSR value: 1.0 (±0.2)

Criteria for a reliable H/V curve

#1. [f0 > 10/Lw]: 1.8 > 0.5 (OK)

#2. [nc > 200]: 3482 > 200 (OK)

#3. [f0>0.5Hz; sigmaA(f) < 2 for 0.5f0 < f < 2f0] (OK)

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

#1. [exists f- in the range [f0/4, f0] | AH/V(f-) < A0/2]: (NO)

#2. [exists f+ in the range [f0, 4f0] | AH/V(f+) < A0/2]: (NO)

#3. [A0 > 2]: 1.0 < 2 (NO)

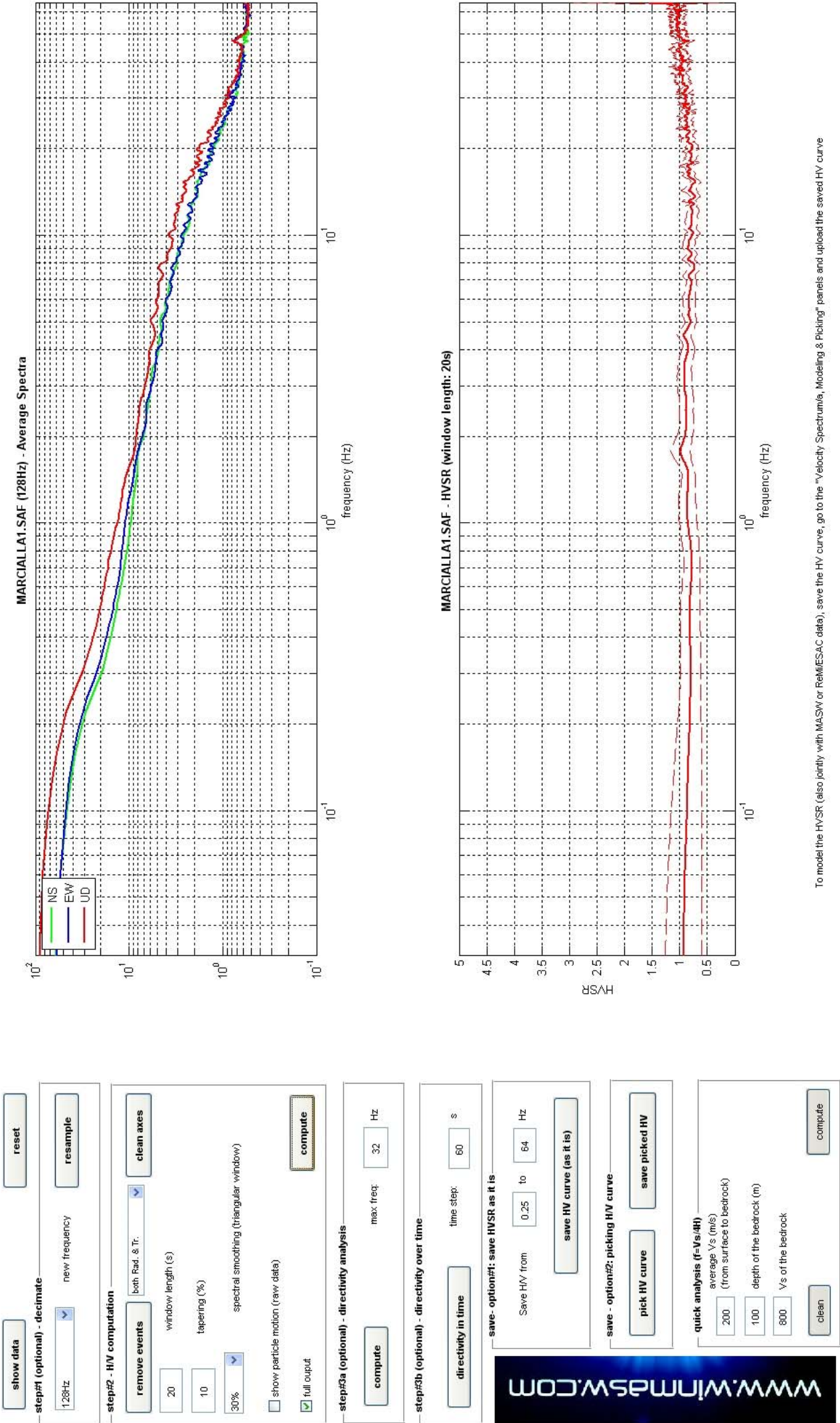
#4. [fpeak[Ah/v(f) ± sigmaA(f)] = f0 ± 5%]: (OK)

#5. [sigmaf < epsilon(f0)]: 6.159 > 0.181 (NO)

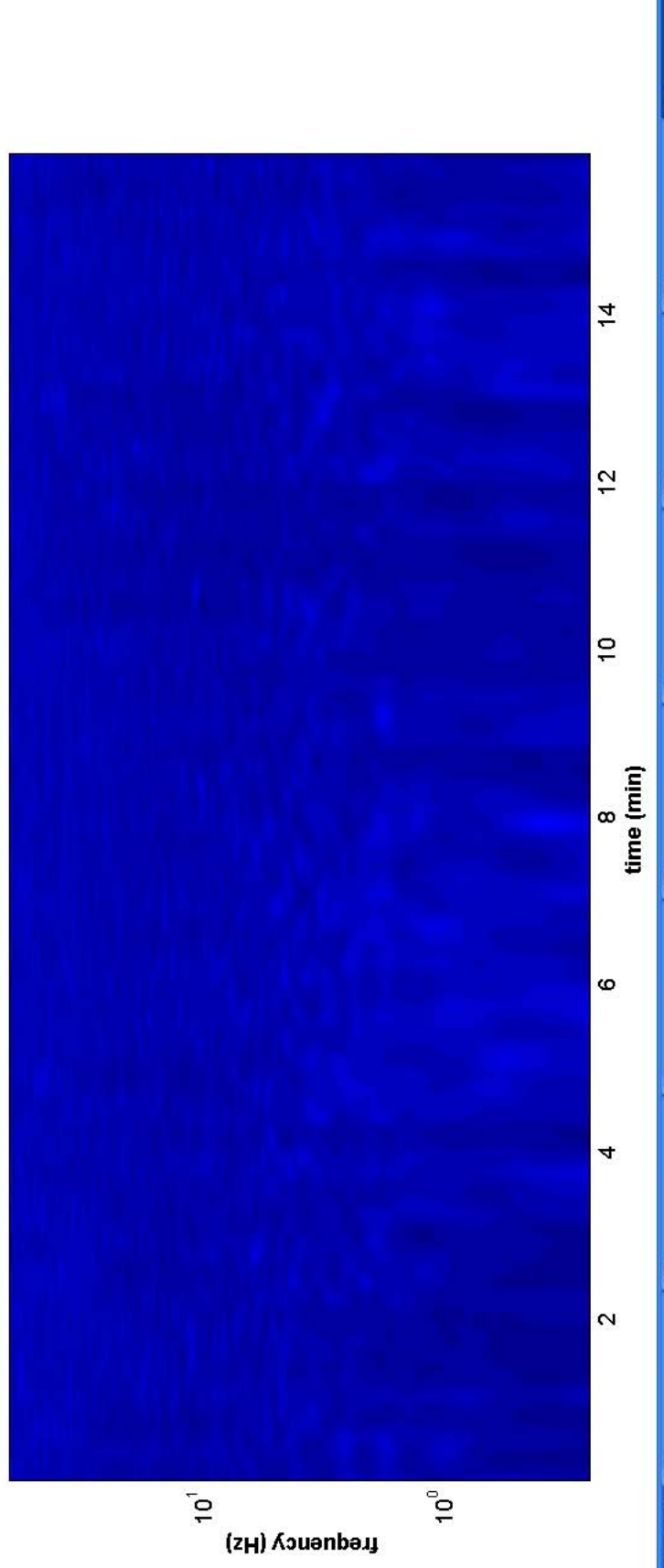
#6. [sigmaA(f0) < theta(f0)]: 0.178 < 1.78 (OK)

Please, be aware of possible industrial/man-induced peaks or spurious peaks due to meaningless numerical instabilities.

Remember that SESAME criteria should be considered in a flexible perspective and that if you modify the processing parameters they can change.



HVSR vs time

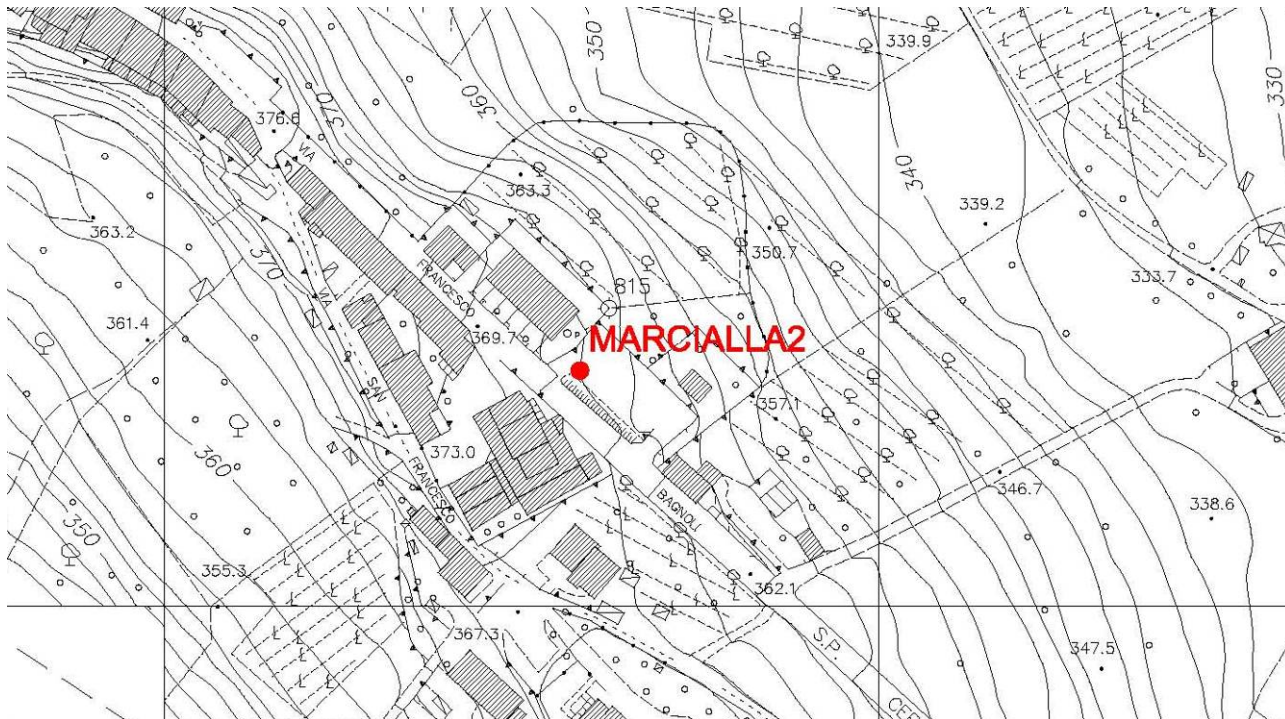


5. Prova HVSR “MARCIALLA2”

Loc. Marcialla – Via Francesco Bagnoli

Coordinate WGS84: 43.572699, 11.143548

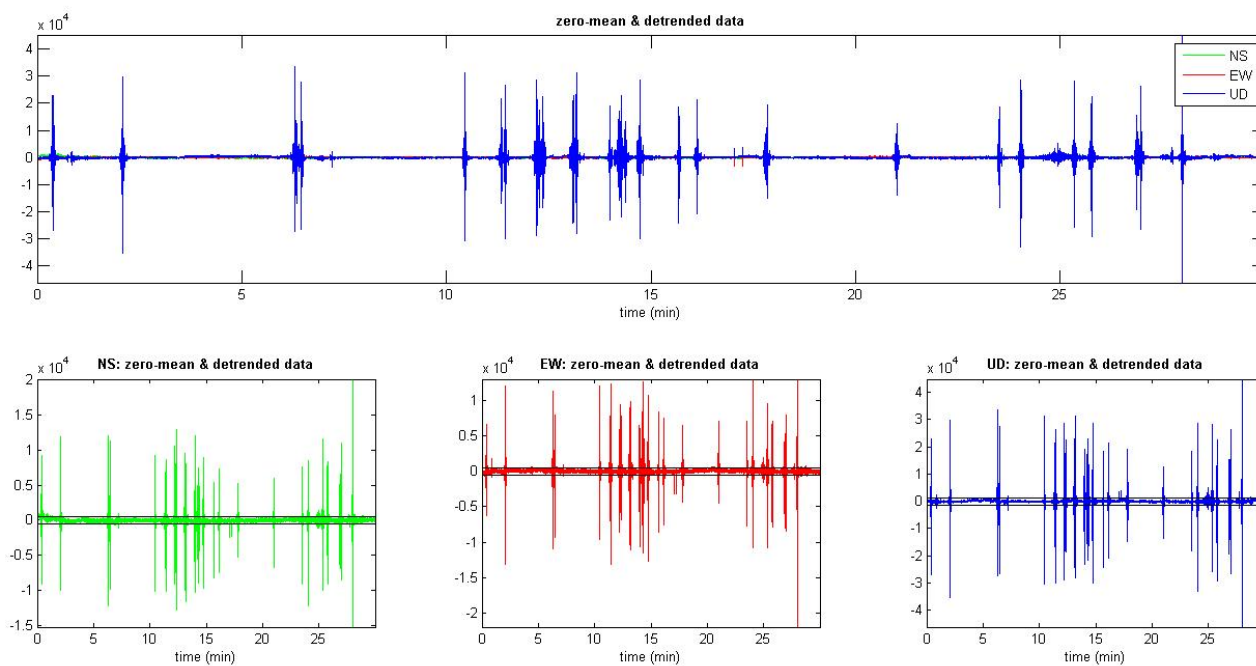
Data esecuzione prova : 08/07/2013 – 22.36/23.06 (durata 30 min)



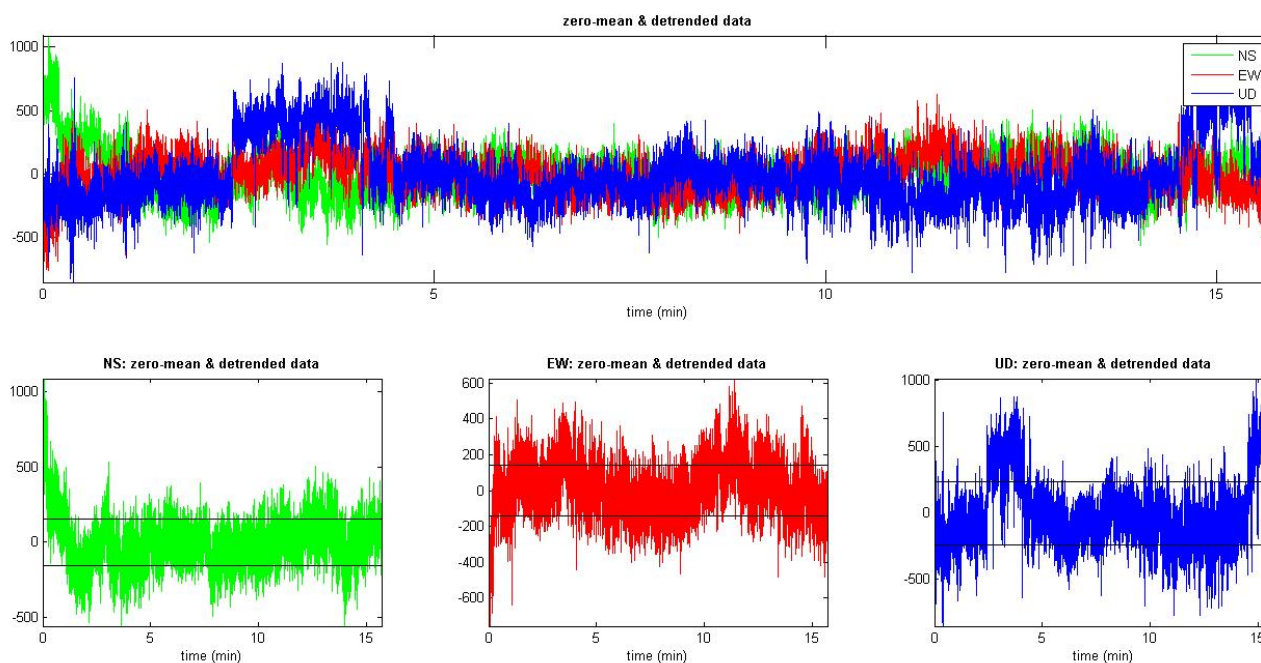
Ubicazione prova “MARCIALLA2”- scala 1:2000



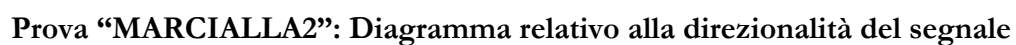
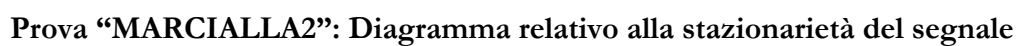
Prova “MARCIALLA2”



Prova "MARCIALLA2": Dati originali



Prova "MARCIALLA2": Dati ripuliti



Horizontal-to-Vertical Spectral Ratio

www.winmasw.com

Date: 9 7 2013

Time: 17 19

Dataset: MARCIALLA2.SAF

Sampling frequency (Hz): 128

Window length (sec): 20

Length of analysed temporal sequence (min): 15.7

Tapering (%): 10

In the following the results considering the data in the 0.5-20.0Hz frequency range

Peak frequency (Hz): 6.7 (±2.5)

Peak HVSR value: 1.6 (±0.3)

Criteria for a reliable H/V curve

#1. [f0 > 10/Lw]: 6.7 > 0.5 (OK)

#2. [nc > 200]: 12445 > 200 (OK)

#3. [f0>0.5Hz; sigmaA(f) < 2 for 0.5f0 < f < 2f0] (OK)

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

#1. [exists f- in the range [f0/4, f0] | AH/V(f-) < A0/2]: (NO)

#2. [exists f+ in the range [f0, 4f0] | AH/V(f+) < A0/2]: yes, at frequency 10.2Hz (OK)

#3. [A0 > 2]: 1.6 < 2 (NO)

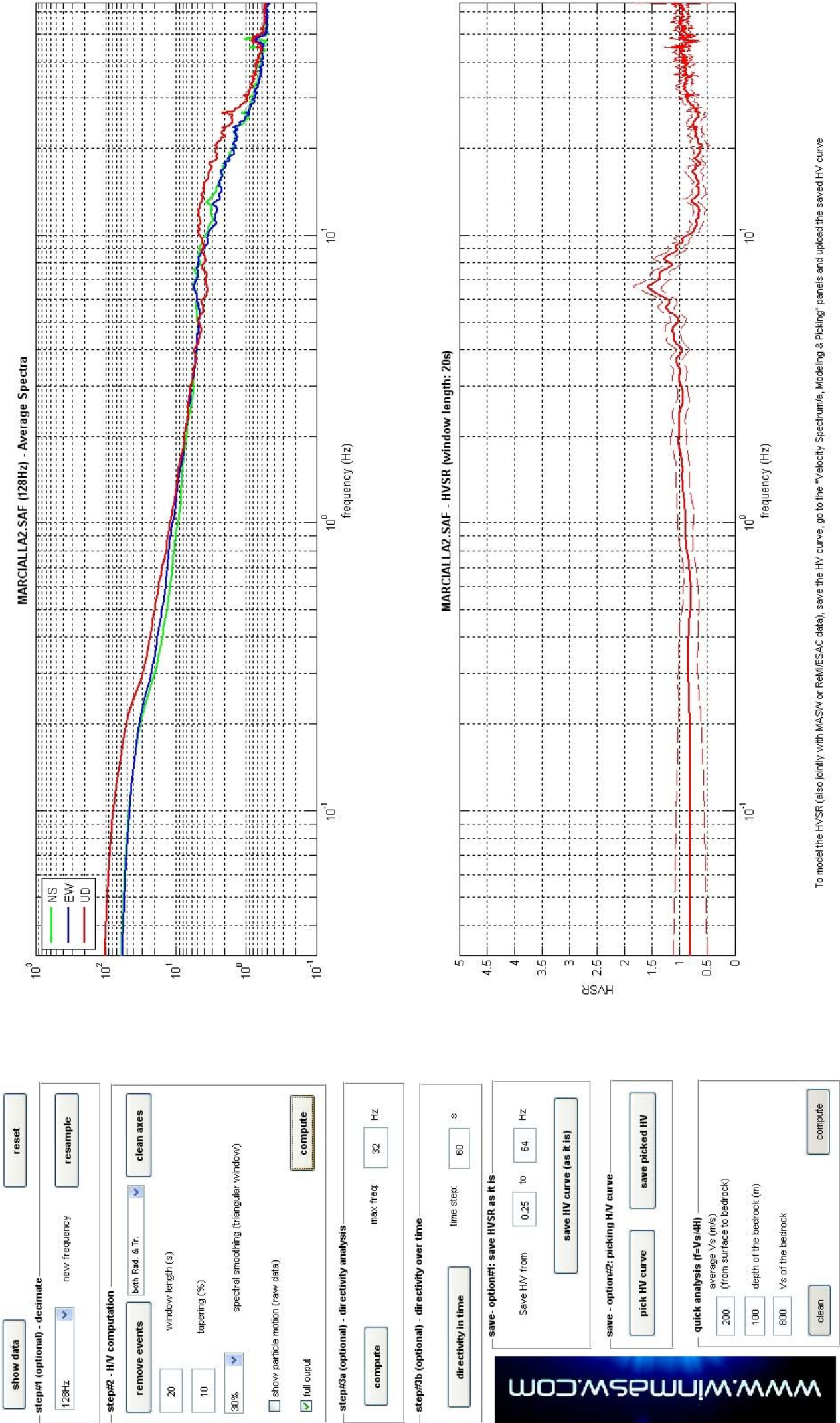
#4. [fpeak[Ah/v(f) ± sigmaA(f)] = f0 ± 5%]: (OK)

#5. [sigmaf < epsilon(f0)]: 2.523 > 0.335 (NO)

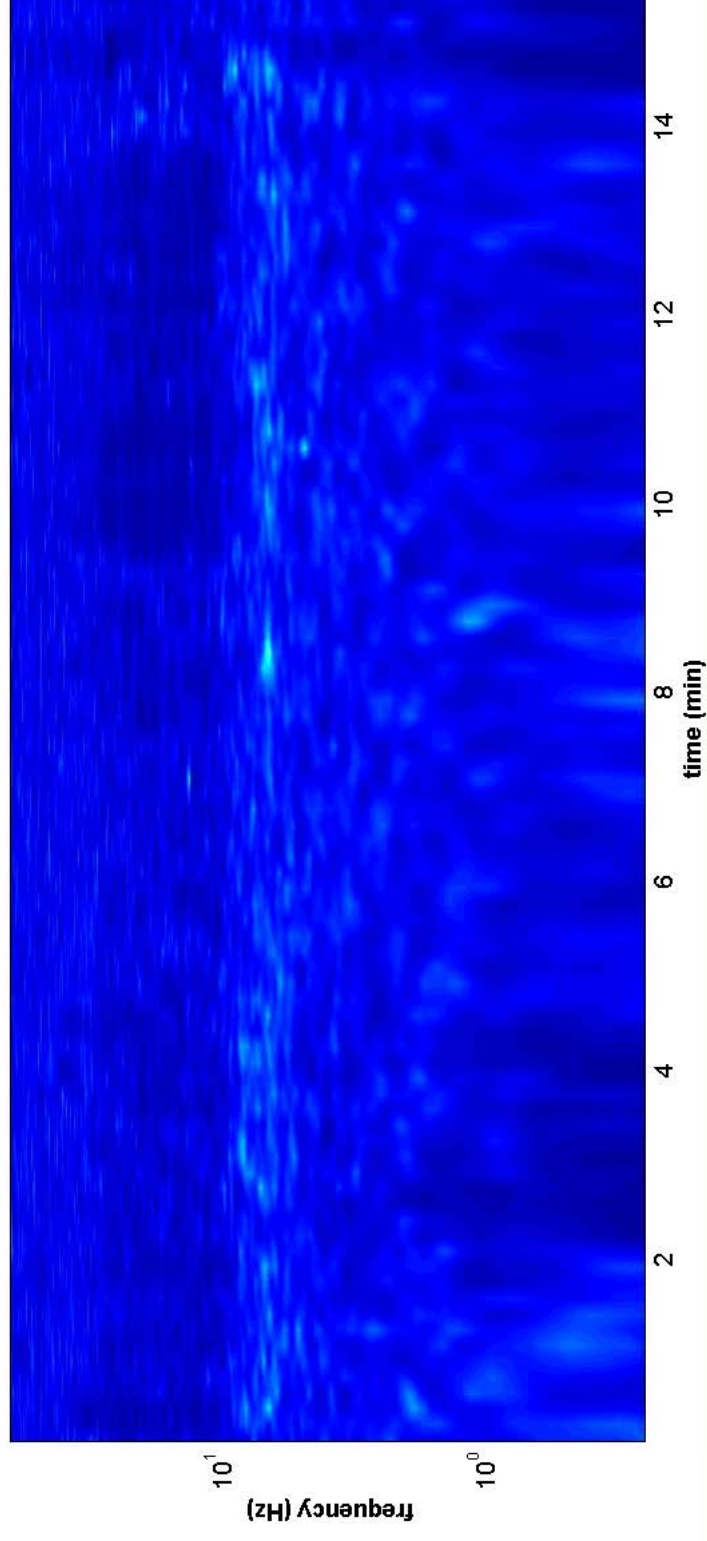
#6. [sigmaA(f0) < theta(f0)]: 0.266 < 1.58 (OK)

Please, be aware of possible industrial/man-induced peaks or spurious peaks due to meaningless numerical instabilities.

Remember that SESAME criteria should be considered in a flexible perspective and that if you modify the processing parameters they can change.



HVSR vs time

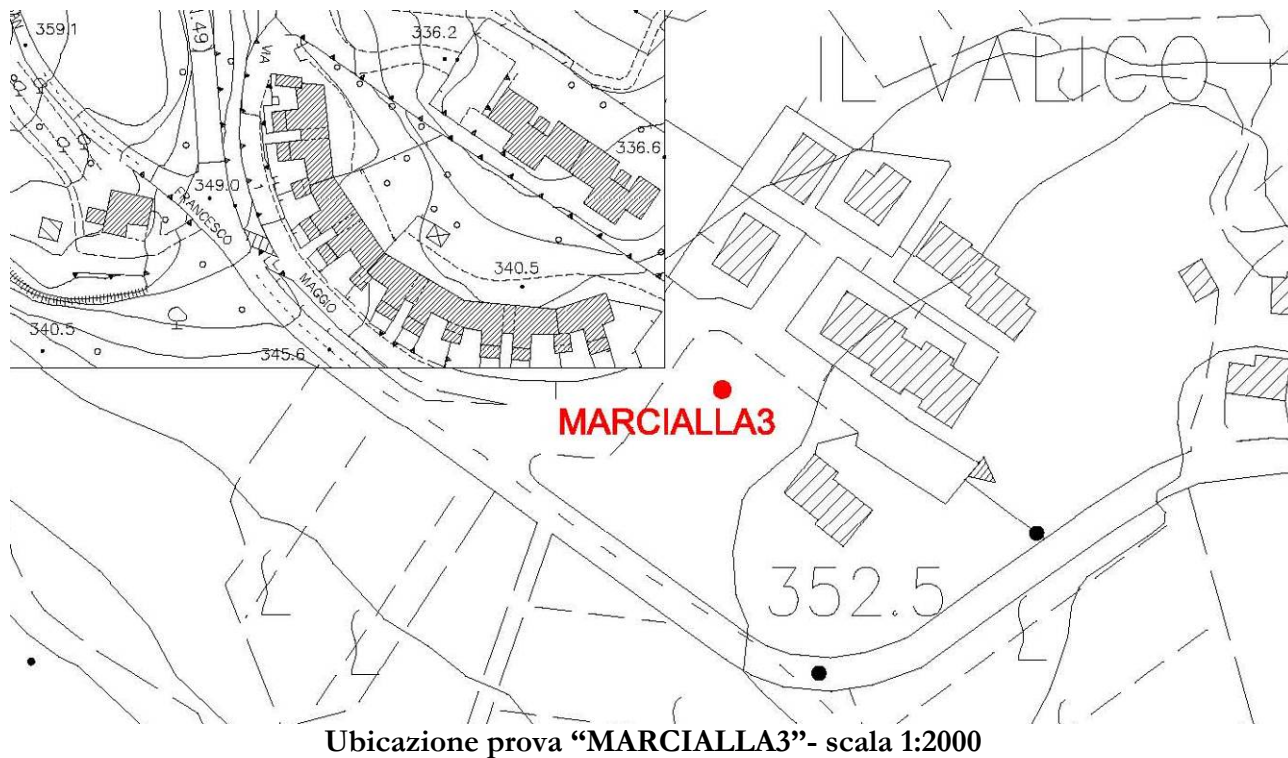


6. Prova HVSR “MARCIALLA3”

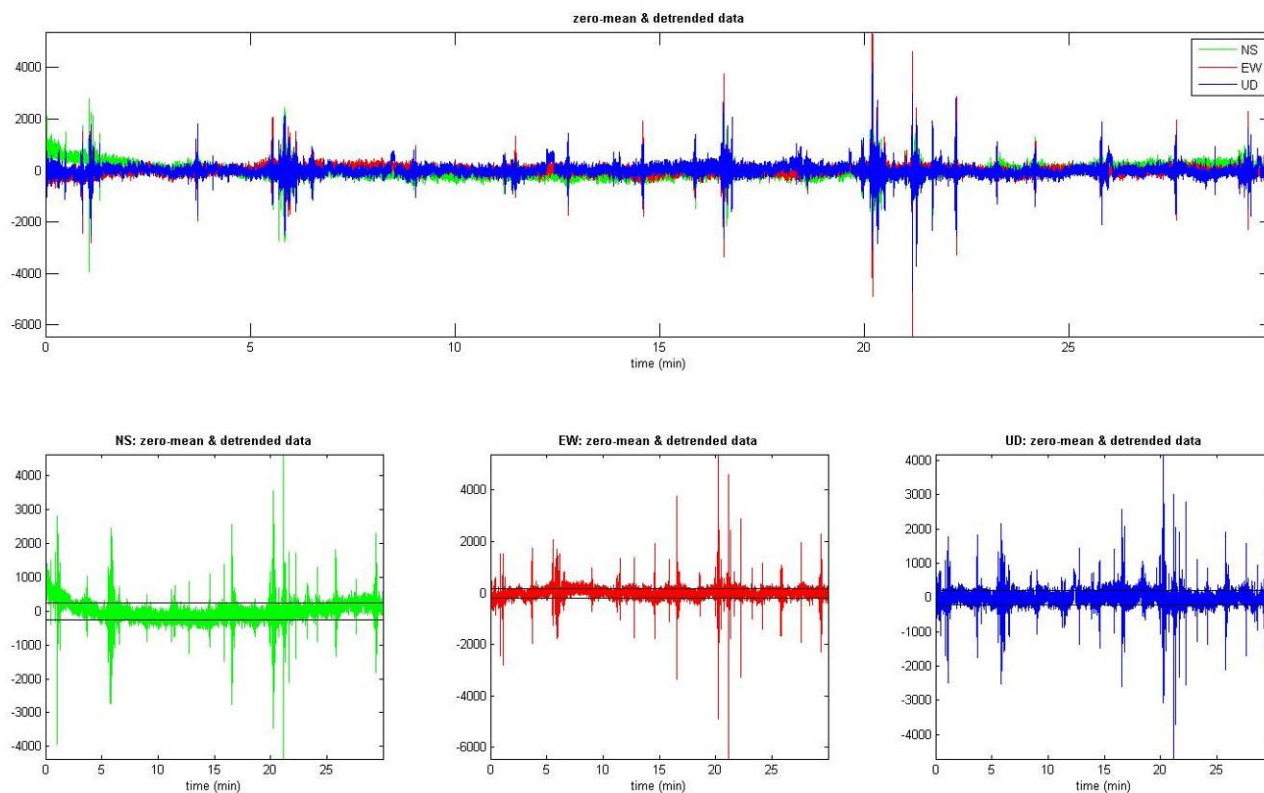
Loc. Marcialla – Via I Maggio

Coordinate WGS84: 43.570243, 11.147193

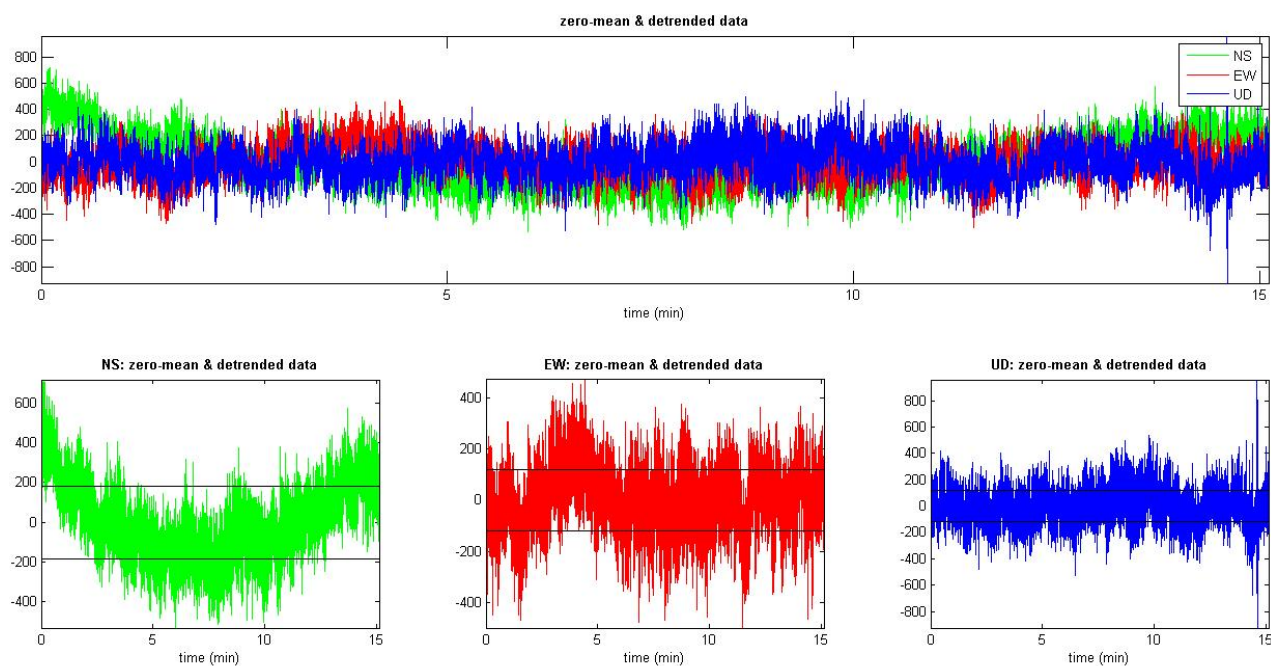
Data esecuzione prova : 02/07/2013 – 19.26/19.56 (durata 30 min)



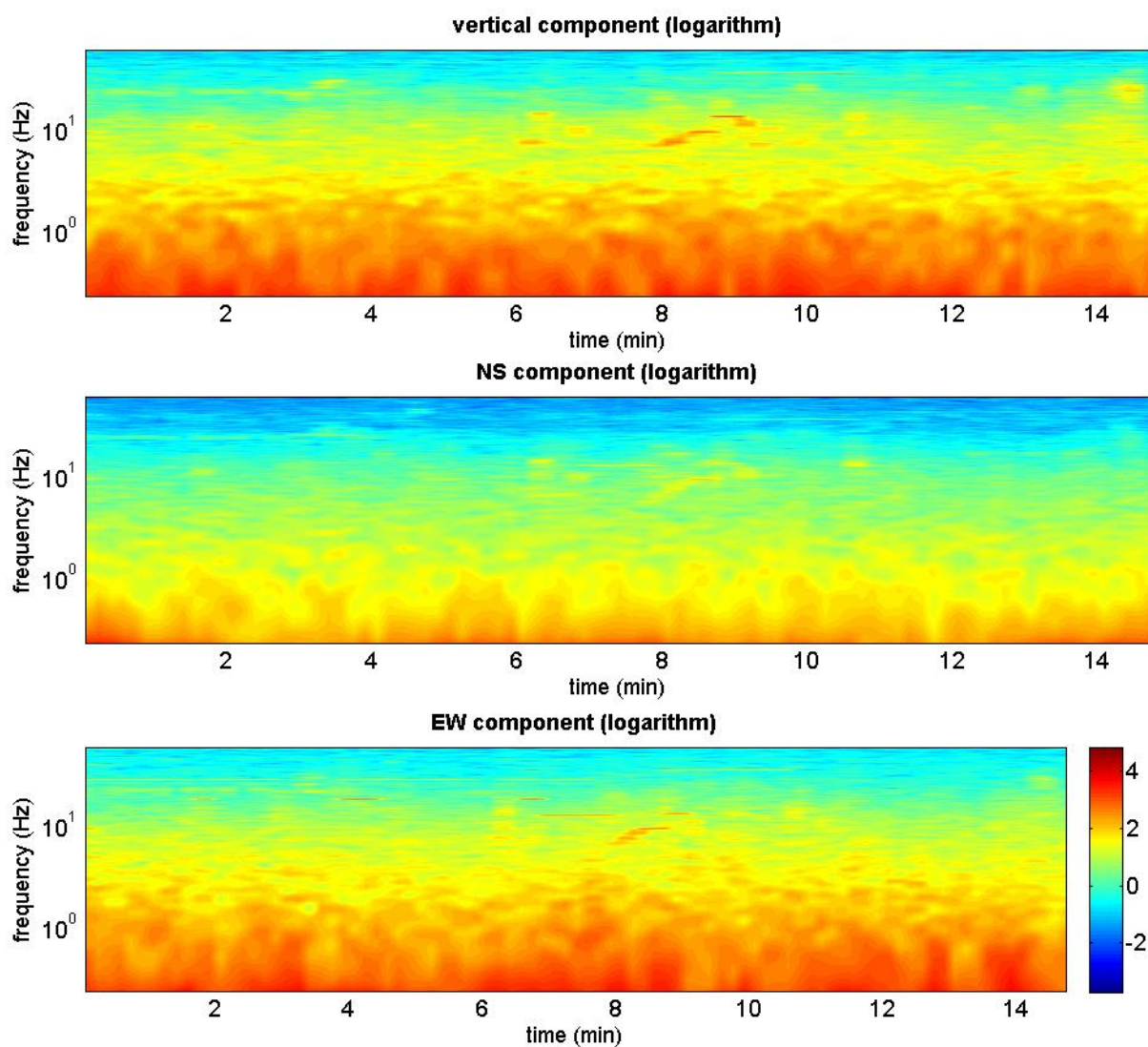
Prova “MARCIALLA3”



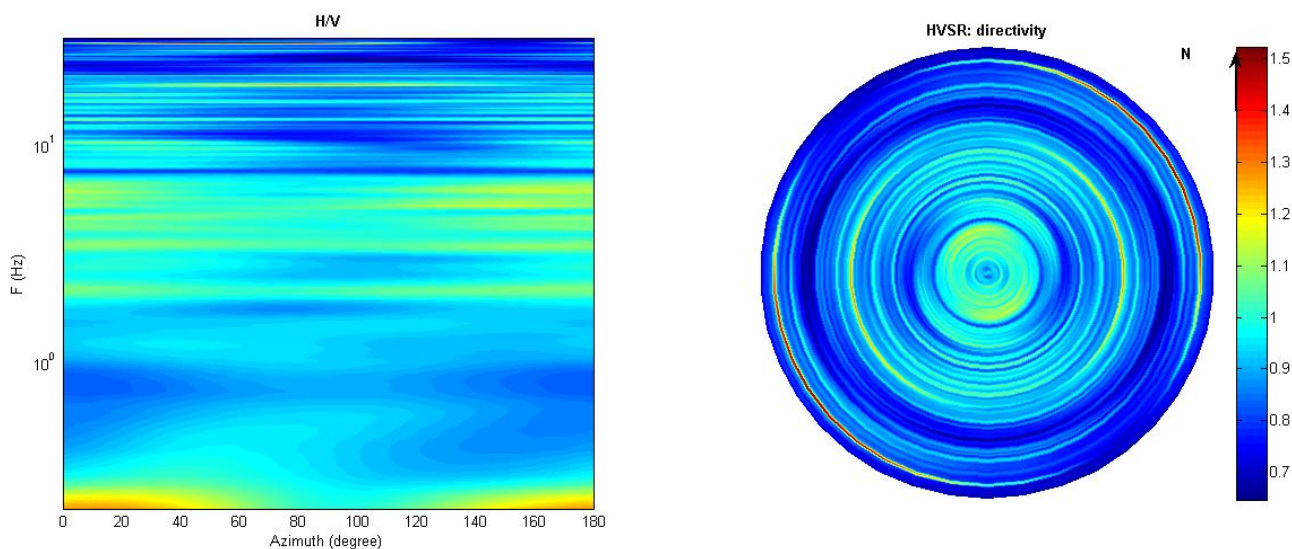
Prova “MARCIALLA3”: Dati originali



Prova “MARCIALLA3”: Dati ripuliti



Prova “MARCIALLA3”: Diagramma relativo alla stazionarietà del segnale



Prova “MARCIALLA3”: Diagramma relativo alla direzionalità del segnale

Horizontal-to-Vertical Spectral Ratio

www.winmasw.com

Date: 9 7 2013

Time: 17 31

Dataset: MARCIALLA3.SAF

Sampling frequency (Hz): 128

Window length (sec): 20

Length of analysed temporal sequence (min): 15.1

Tapering (%): 10

In the following the results considering the data in the 0.5-20.0Hz frequency range

Peak frequency (Hz): 3.6 (± 5.7)

Peak HVSR value: 1.1 (± 0.1)

Criteria for a reliable H/V curve

#1. $[f0 > 10/Lw]$: 3.6 $>$ 0.5 (OK)

#2. $[nc > 200]$: 6400 $>$ 200 (OK)

#3. $[f0 > 0.5\text{Hz}; \sigma_{A(f)} < 2 \text{ for } 0.5f0 < f < 2f0]$ (OK)

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

#1. $[\text{exists } f^- \text{ in the range } [f0/4, f0] \mid AH/V(f^-) < A0/2]$: (NO)

#2. $[\text{exists } f^+ \text{ in the range } [f0, 4f0] \mid AH/V(f^+) < A0/2]$: (NO)

#3. $[A0 > 2]$: 1.1 $<$ 2 (NO)

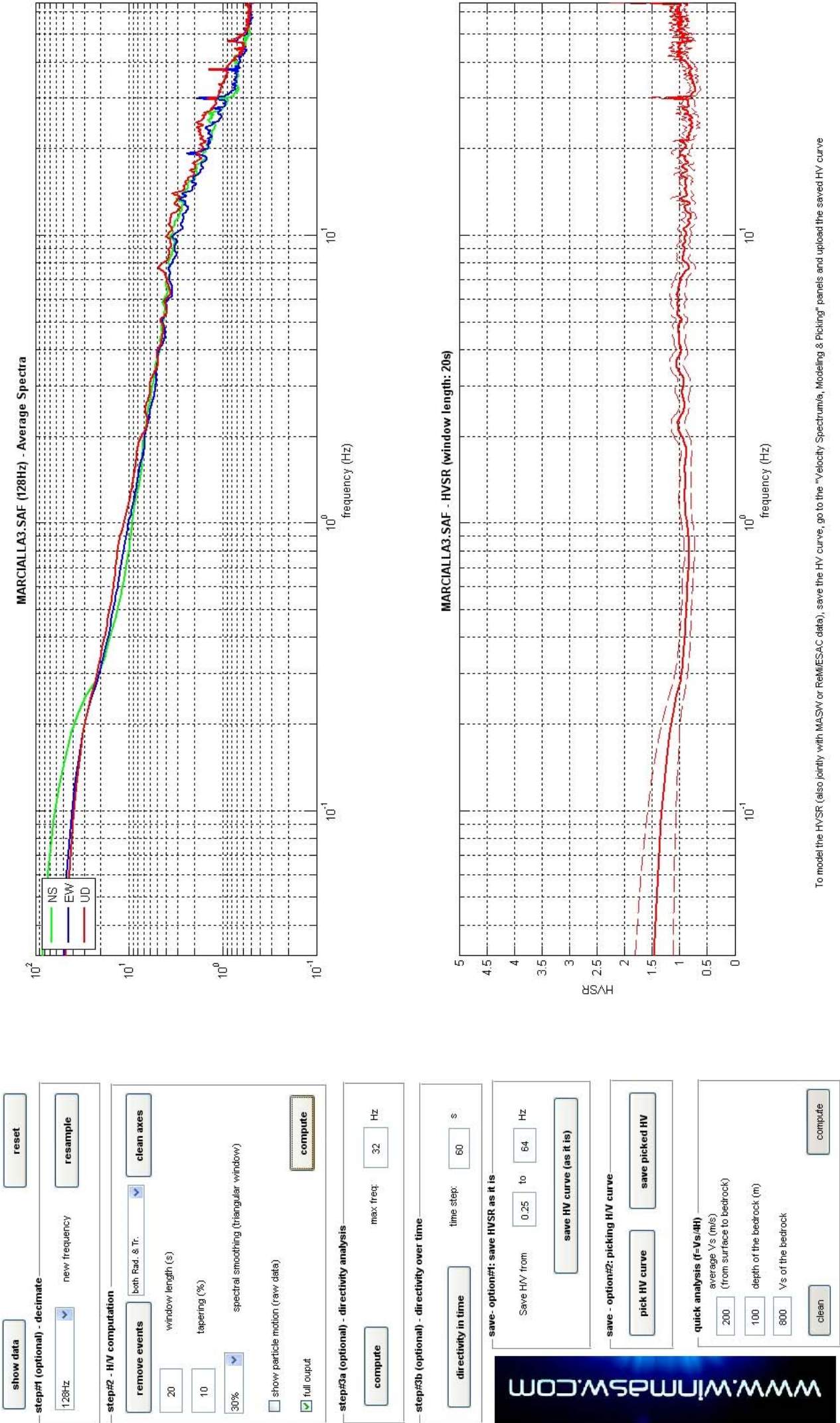
#4. $[f_{peak}[Ah/v(f) \pm \sigma_{A(f)}] = f0 \pm 5\%]$: (NO)

#5. $[\sigma_{A(f)} < \epsilon(f0)]$: 5.665 $>$ 0.180 (NO)

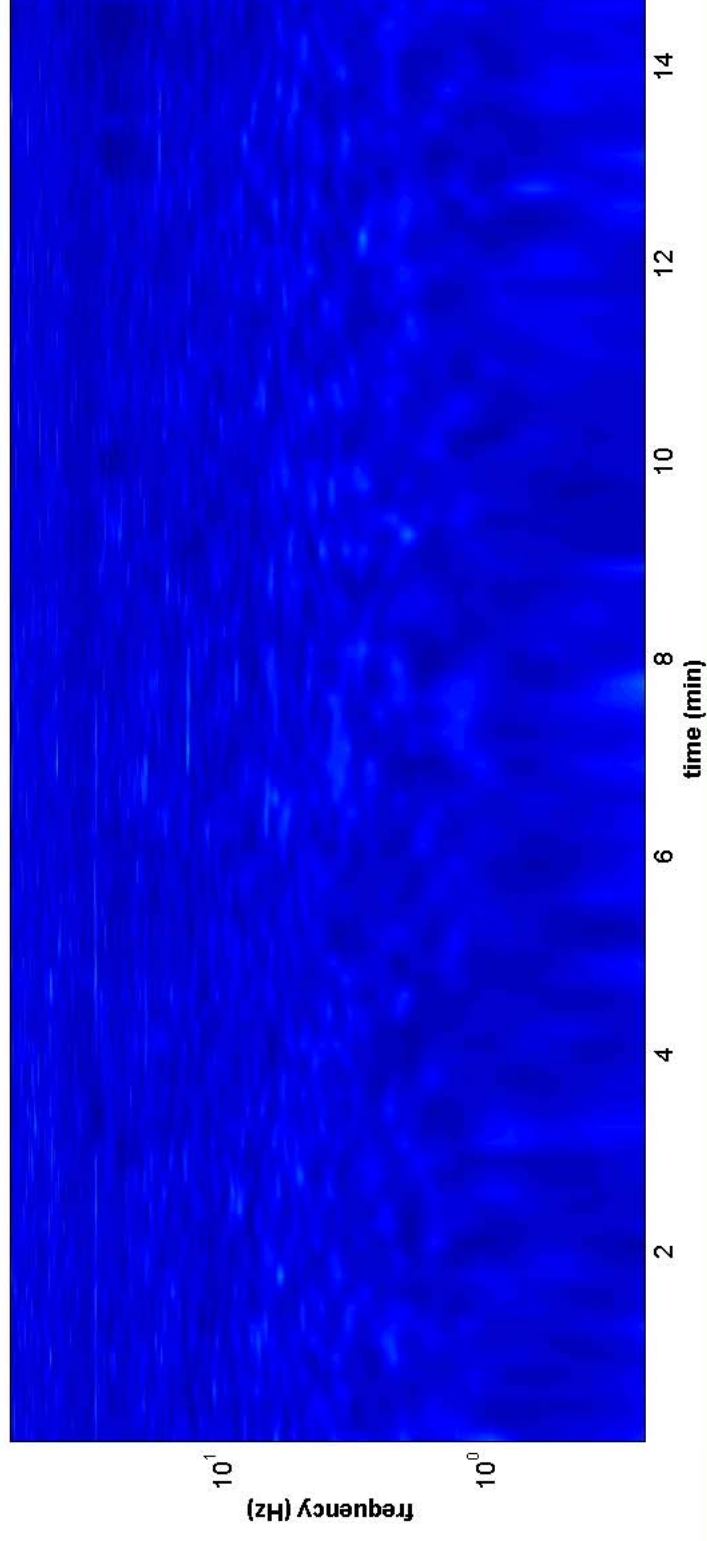
#6. $[\sigma_{A(f0)} < \theta(f0)]$: 0.123 $<$ 1.58 (OK)

Please, be aware of possible industrial/man-induced peaks or spurious peaks due to meaningless numerical instabilities.

Remember that SESAME criteria should be considered in a flexible perspective and that if you modify the processing parameters they can change.



HVSR vs time

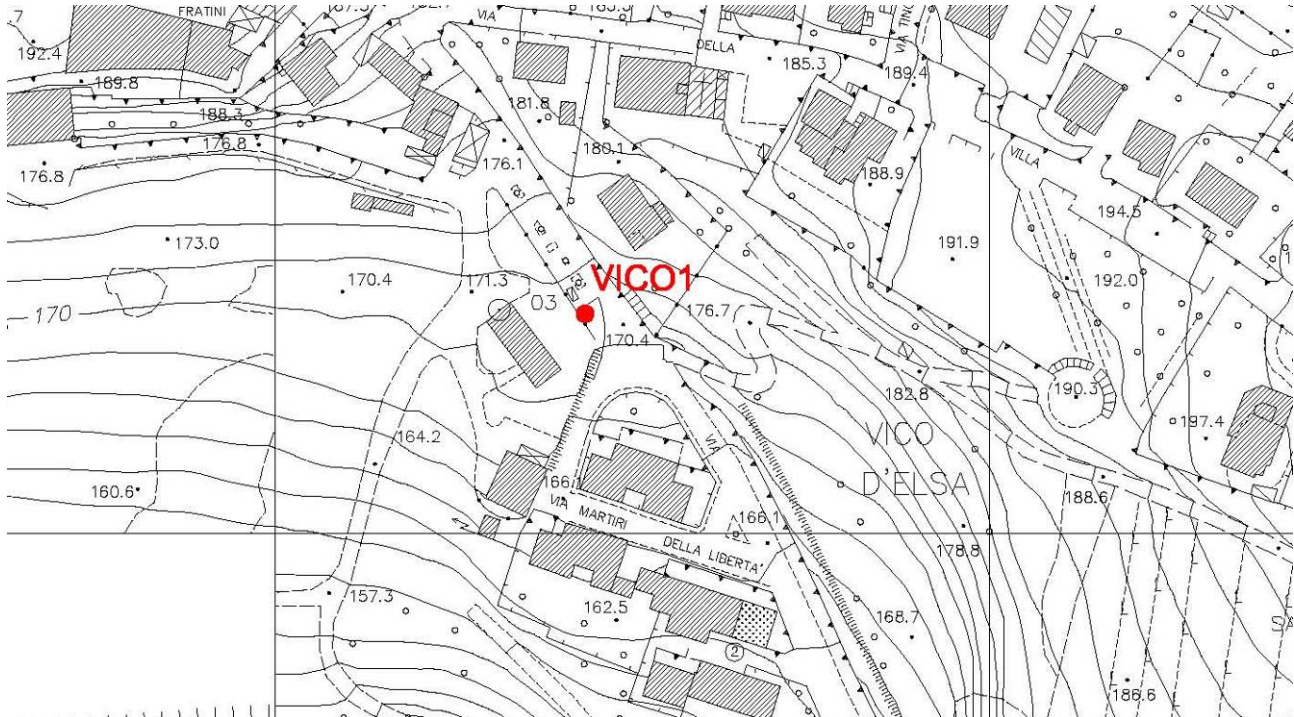


7. Prova HVSR “VICO1”

Loc. Vico d'Elsa – Via Zambra

Coordinate WGS84: 43.512296, 11.098962

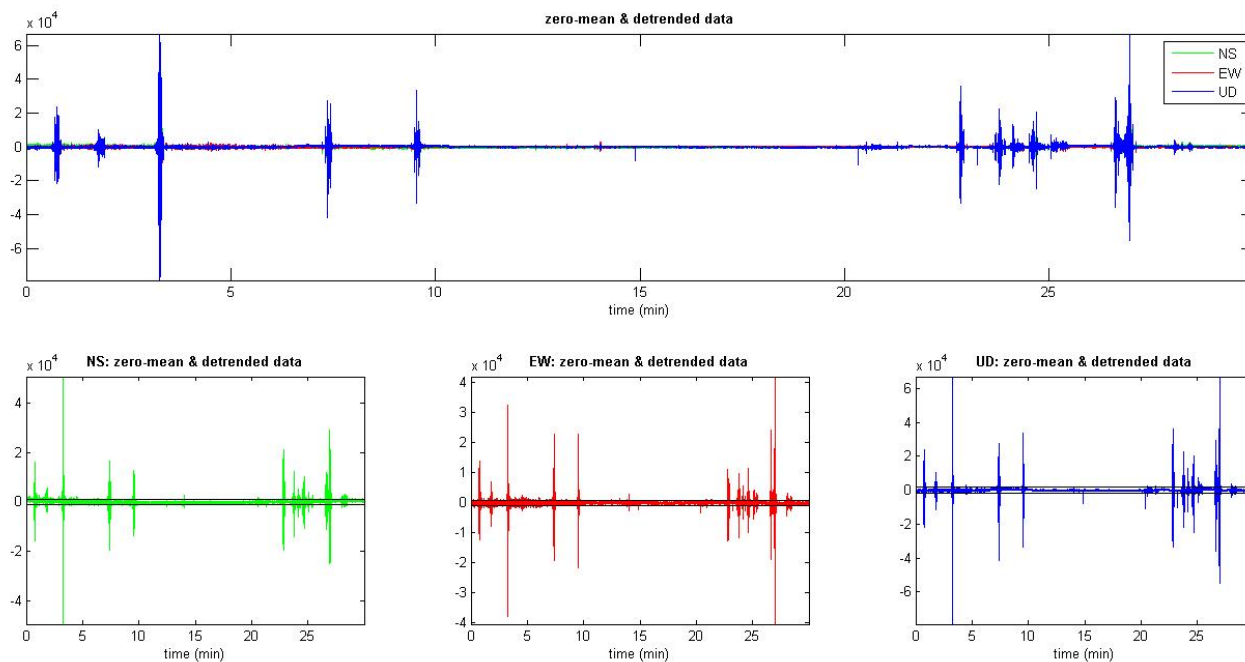
Data esecuzione prova : 05/07/2013 – 14.42/15.12 (durata 30 min)



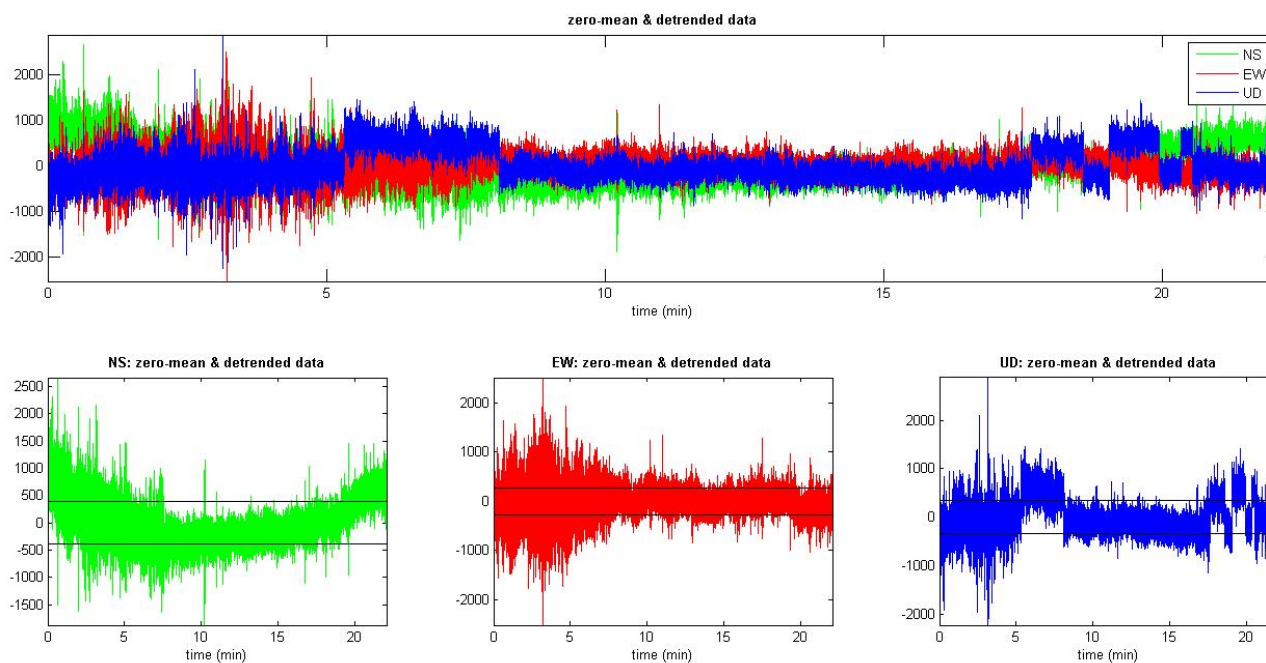
Ubicazione prova “VICO1”- scala 1:2000



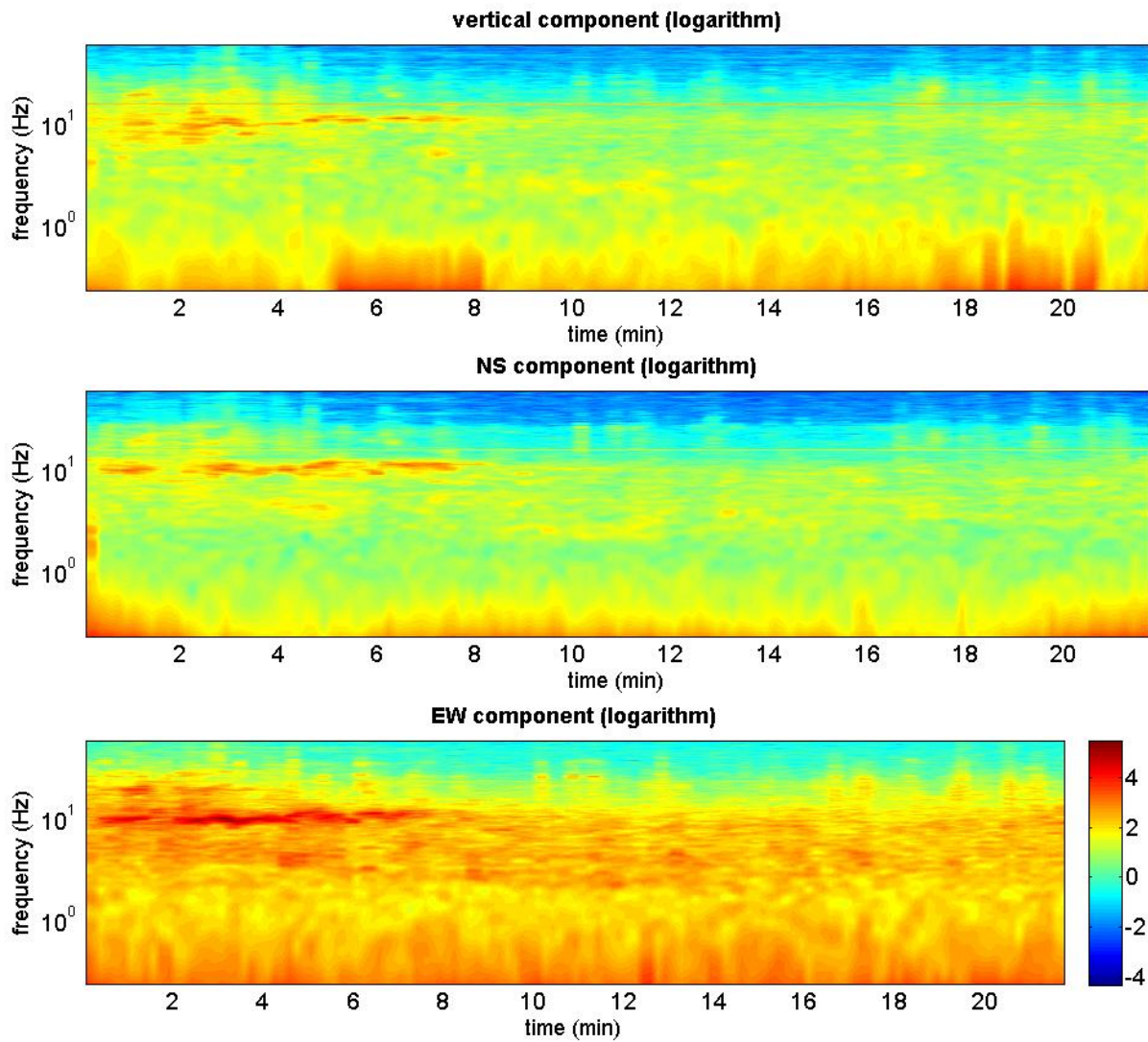
Prova “VICO1”



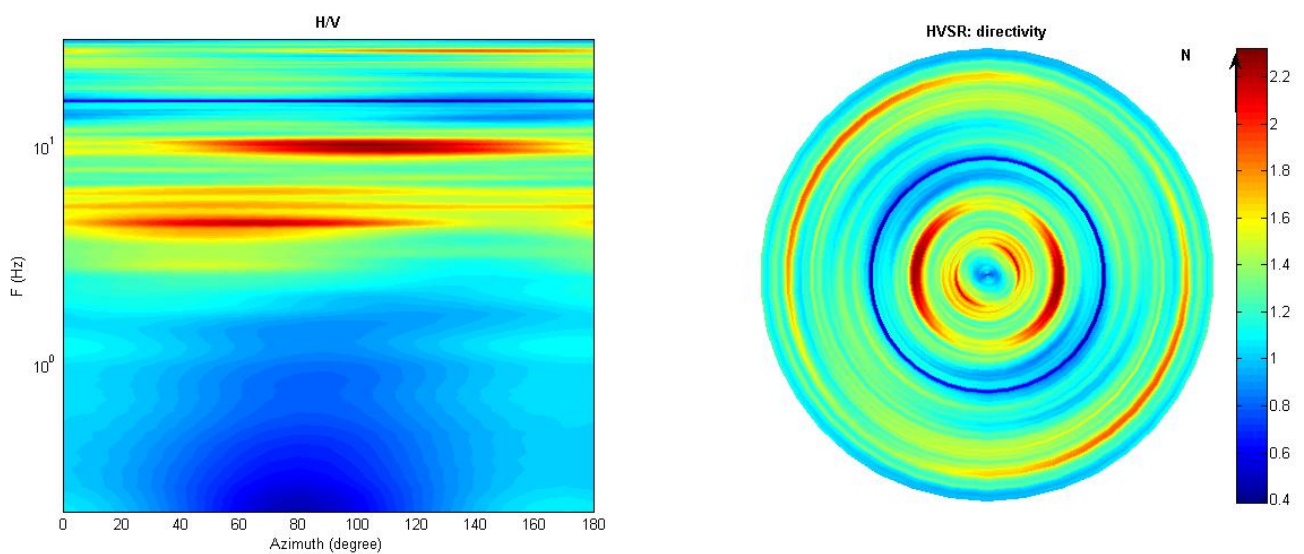
Prova “VICO1”: Dati originali



Prova “VICO1”: Dati ripuliti



Prova “VICO1”: Diagramma relativo alla stazionarietà del segnale



Prova “VICO1”: Diagramma relativo alla direzionalità del segnale

Horizontal-to-Vertical Spectral Ratio

www.winmasw.com

Date: 9 7 2013

Time: 16 12

Dataset: VICO1.SAF

Sampling frequency (Hz): 128

Window length (sec): 20

Length of analysed temporal sequence (min): 22.1

Tapering (%): 10

In the following the results considering the data in the 0.5-20.0Hz frequency range

Peak frequency (Hz): 4.6 (± 3.7)

Peak HVSR value: 1.8 (± 0.3)

Criteria for a reliable H/V curve

#1. $[f0 > 10/Lw]$: 4.6 > 0.5 (OK)

#2. $[nc > 200]$: 12042 > 200 (OK)

#3. $[f0 > 0.5\text{Hz}; \sigma_{A(f)} < 2 \text{ for } 0.5f0 < f < 2f0]$ (OK)

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

#1. $[\text{exists } f^- \text{ in the range } [f0/4, f0] \mid AH/V(f^-) < A0/2]$: yes, at frequency 1.6Hz (OK)

#2. $[\text{exists } f^+ \text{ in the range } [f0, 4f0] \mid AH/V(f^+) < A0/2]$: yes, at frequency 16.3Hz (OK)

#3. $[A0 > 2]$: 1.8 < 2 (NO)

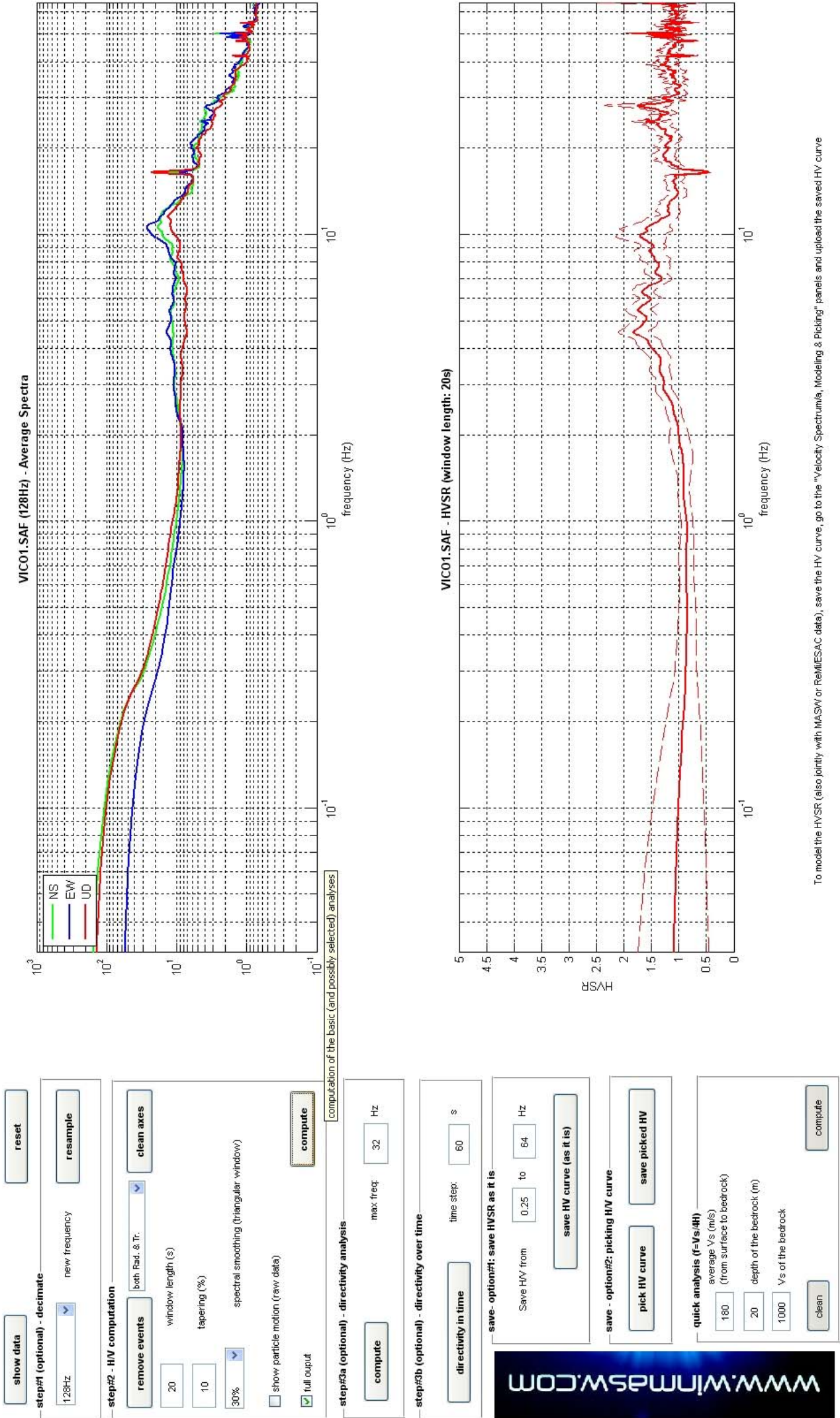
#4. $[f_{peak}[Ah/v(f) \pm \sigma_{A(f)}] = f0 \pm 5\%]$: (NO)

#5. $[\sigma_{A(f)} < \epsilon(f0)]$: 3.713 > 0.230 (NO)

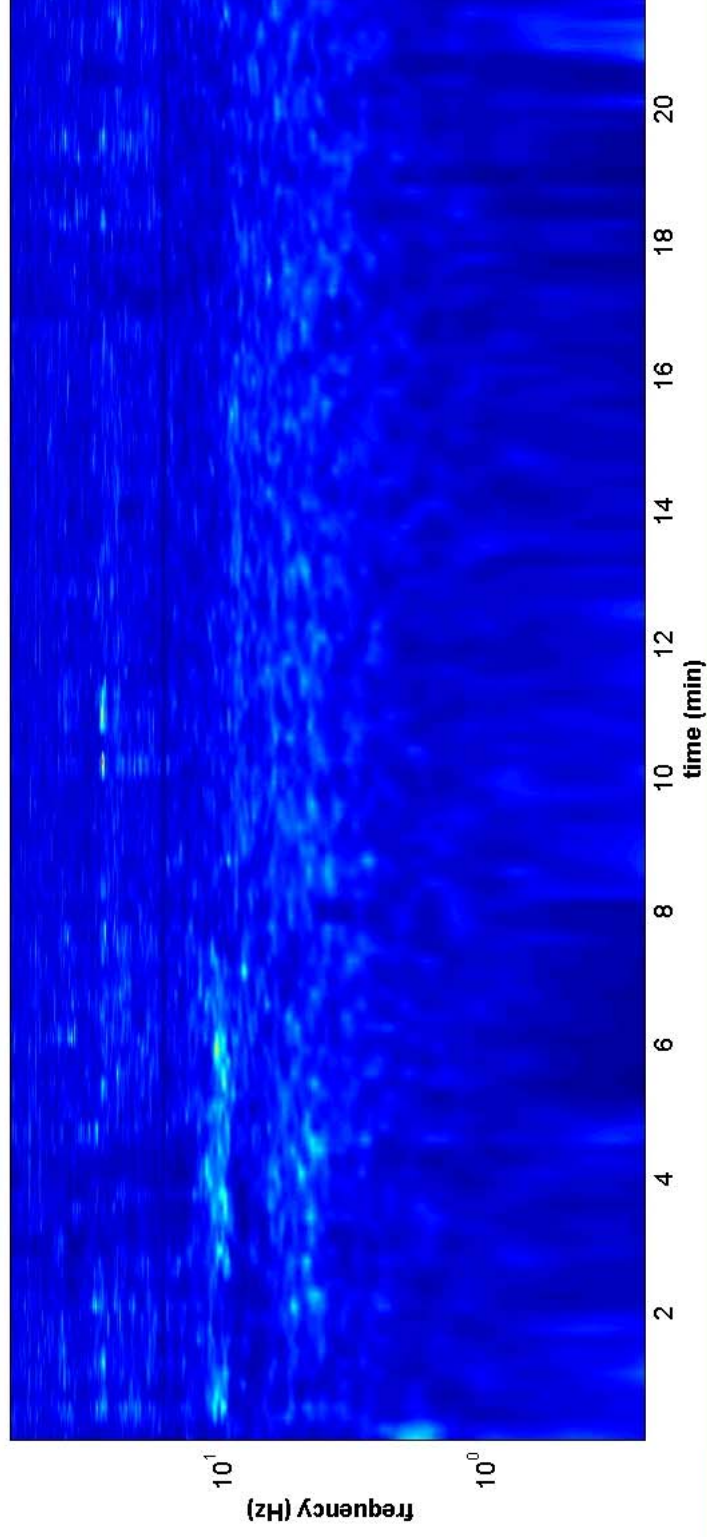
#6. $[\sigma_{A(f0)} < \theta(f0)]$: 0.271 < 1.58 (OK)

Please, be aware of possible industrial/man-induced peaks or spurious peaks due to meaningless numerical instabilities.

Remember that SESAME criteria should be considered in a flexible perspective and that if you modify the processing parameters they can change.



HVSR vs time



8. Prova HVSR “VICO2”

Loc. Vico d'Elsa – Via della Villa

Coordinate WGS84: 43.511537, 11.103041

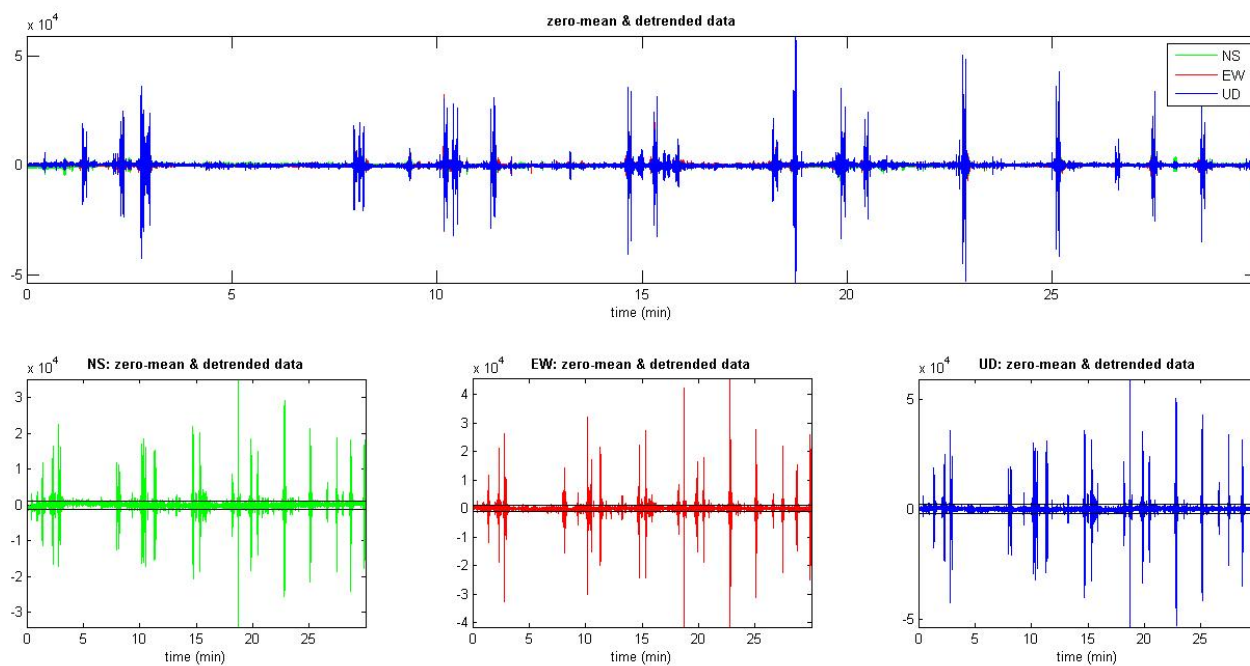
Data esecuzione prova : 03/07/2013 – 13.19/13.49 (durata 30 min)



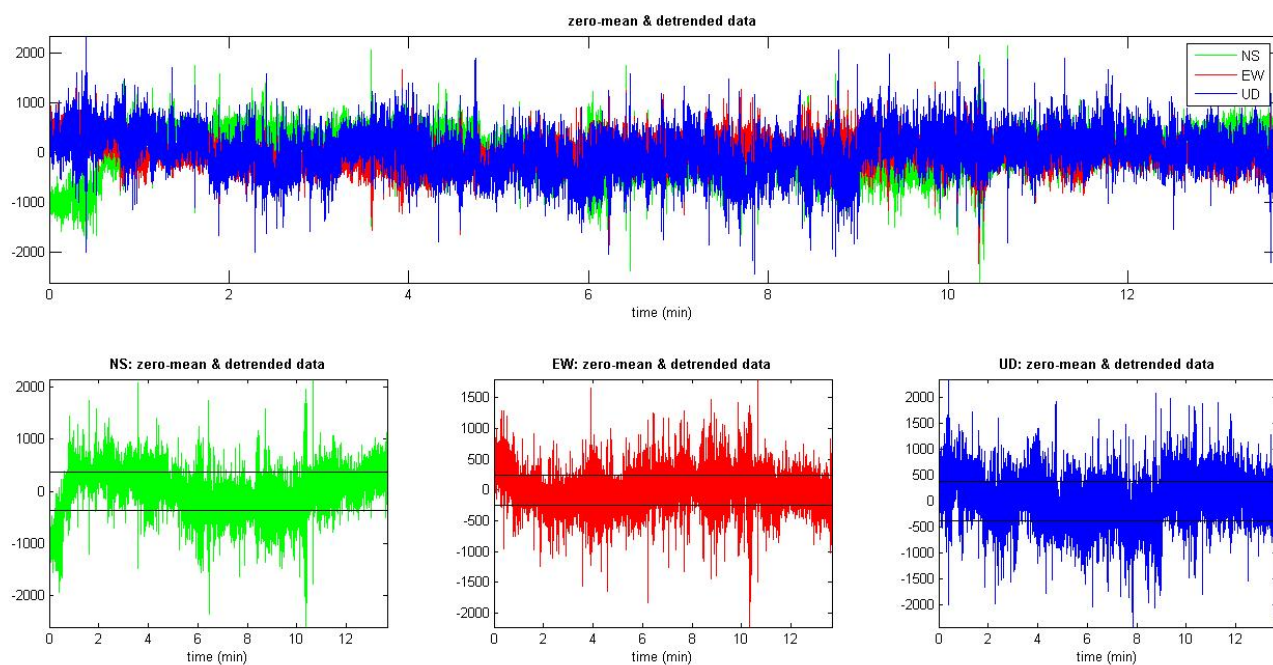
Ubicazione prova “VICO2”- scala 1:2000



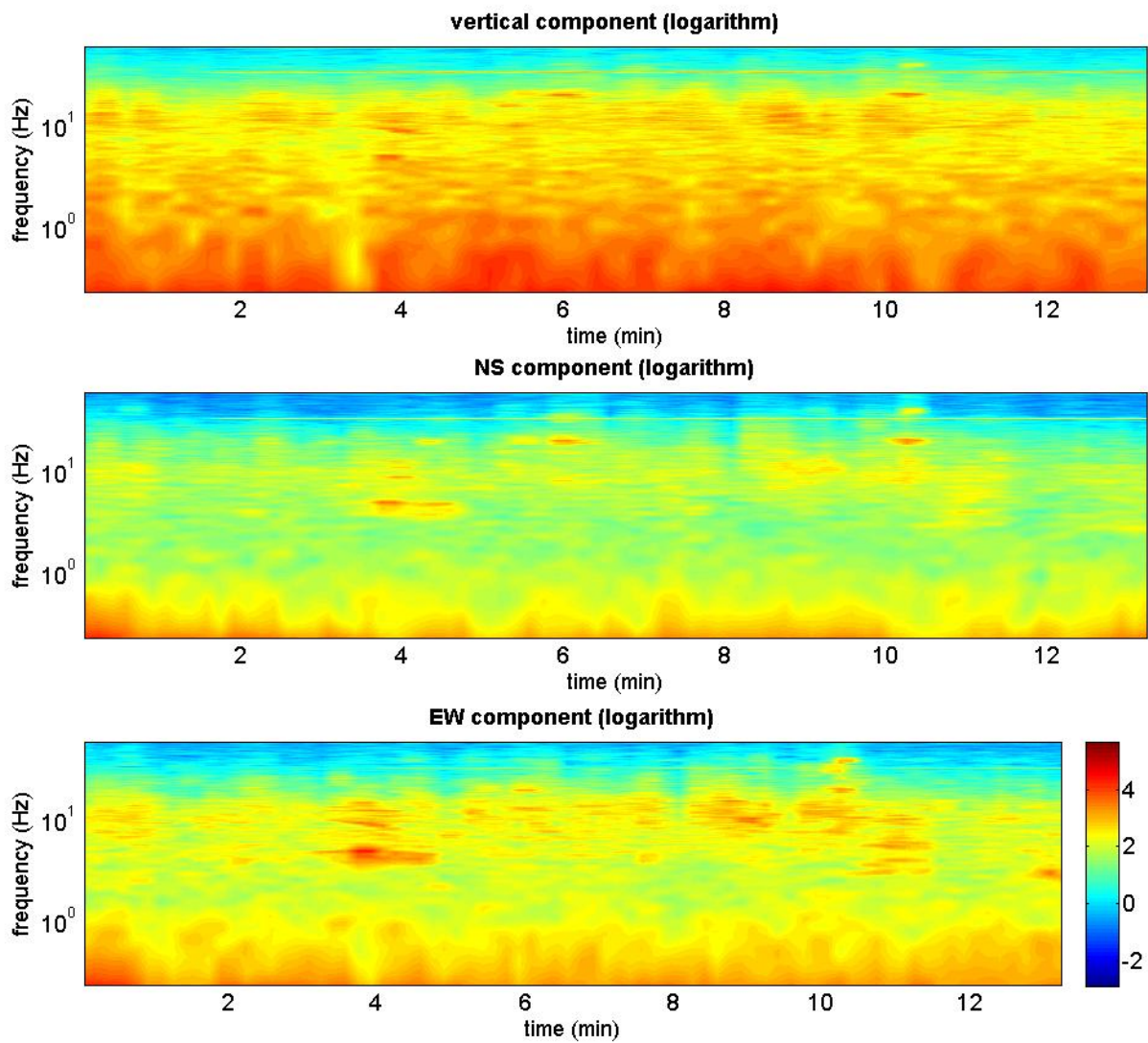
Prova “VICO2”



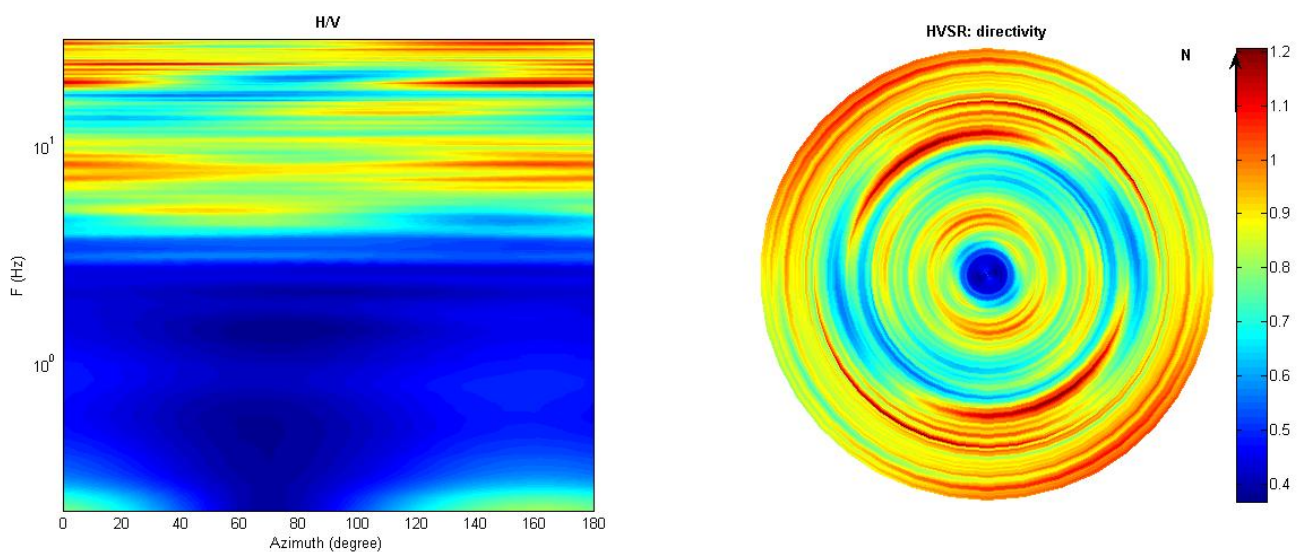
Prova “VICO2”: Dati originali



Prova “VICO2”: Dati ripuliti



Prova “VICO2”: Diagramma relativo alla stazionarietà del segnale



Prova “VICO2”: Diagramma relativo alla direzionalità del segnale

Horizontal-to-Vertical Spectral Ratio

www.winmasw.com

Date: 9 7 2013

Time: 16 30

Dataset: VICO2.SAF

Sampling frequency (Hz): 128

Window length (sec): 20

Length of analysed temporal sequence (min): 13.6

Tapering (%): 10

In the following the results considering the data in the 0.5-20.0Hz frequency range

Peak frequency (Hz): 8.3 (± 4.8)

Peak HVSR value: 0.9 (± 0.1)

Criteria for a reliable H/V curve

#1. $[f0 > 10/Lw]: 8.3 > 0.5$ (OK)

#2. $[nc > 200]: 13357 > 200$ (OK)

#3. $[f0 > 0.5\text{Hz}; \sigma_{A(f)} < 2 \text{ for } 0.5f0 < f < 2f0]$ (OK)

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

#1. $[\text{exists } f^- \text{ in the range } [f0/4, f0] \mid |AH/V(f^-)| < A0/2]: \text{yes, at frequency } 3.0\text{Hz}$ (OK)

#2. $[\text{exists } f^+ \text{ in the range } [f0, 4f0] \mid |AH/V(f^+)| < A0/2]:$ (NO)

#3. $[A0 > 2]: 0.9 < 2$ (NO)

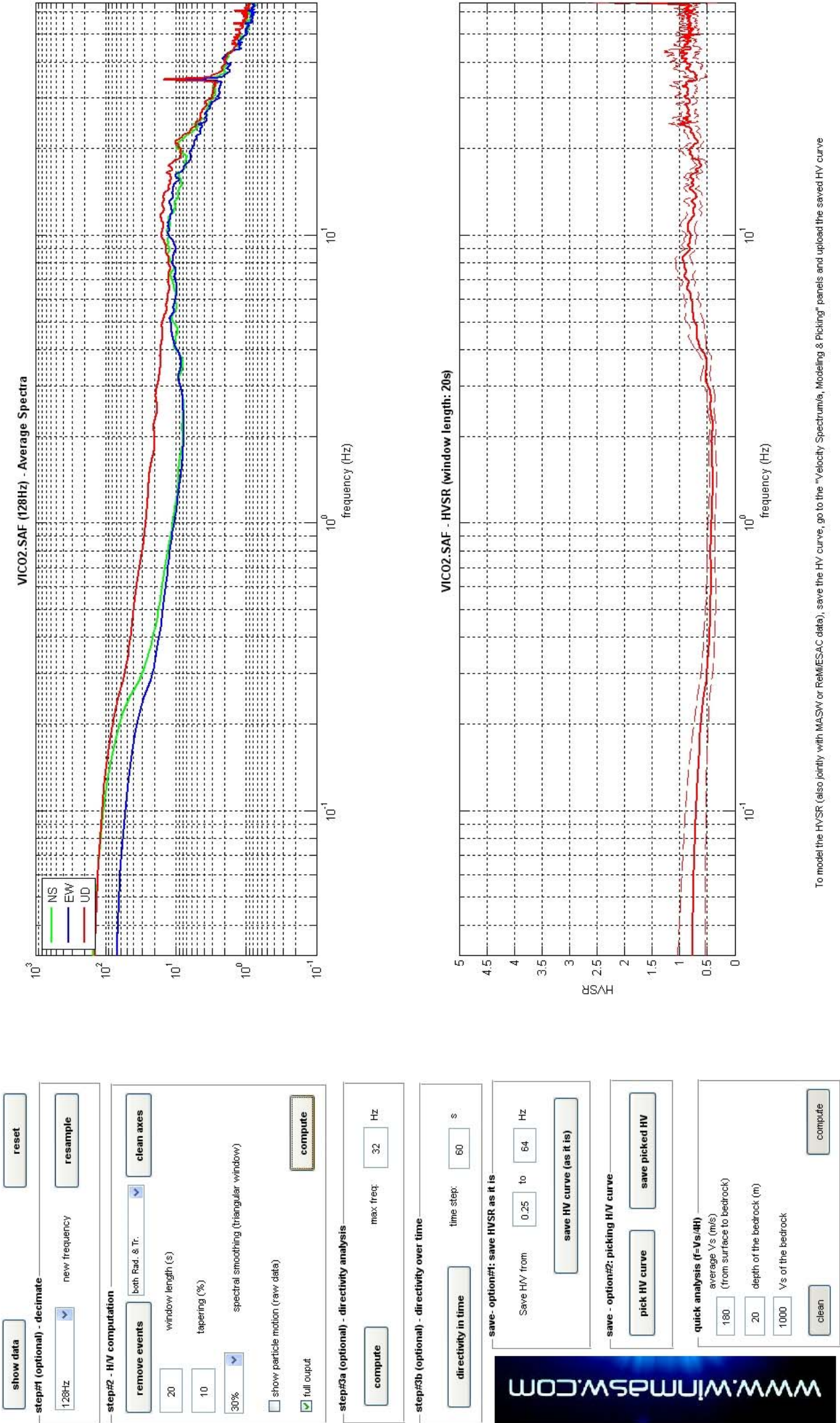
#4. $[f_{\text{peak}}[Ah/v(f) \pm \sigma_{A(f)}] = f0 \pm 5\%]:$ (OK)

#5. $[\sigma_{\text{maf}} < \epsilon(f0)]: 4.781 > 0.417$ (NO)

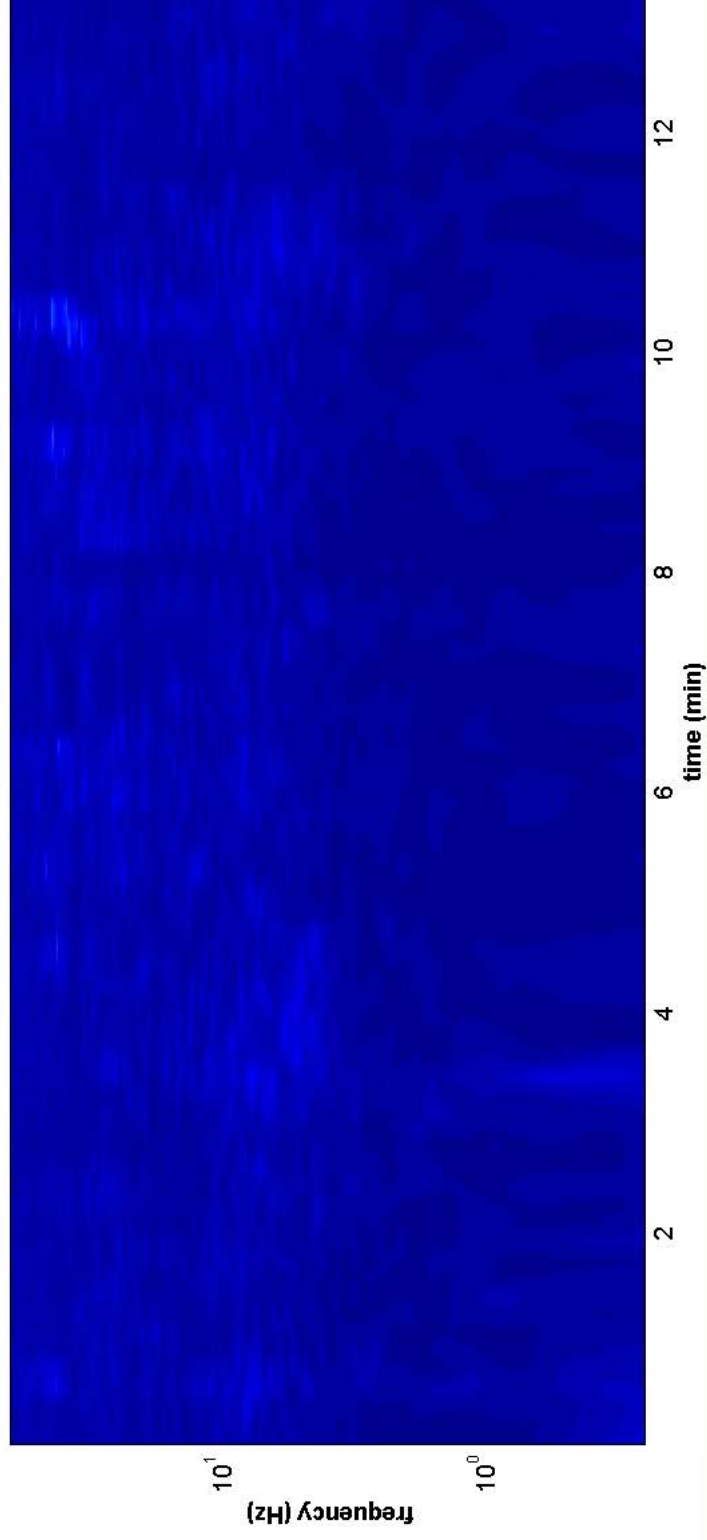
#6. $[\sigma_{A(f0)} < \theta(f0)]: 0.141 < 1.58$ (OK)

Please, be aware of possible industrial/man-induced peaks or spurious peaks due to meaningless numerical instabilities.

Remember that SESAME criteria should be considered in a flexible perspective and that if you modify the processing parameters they can change.



HVSR vs time

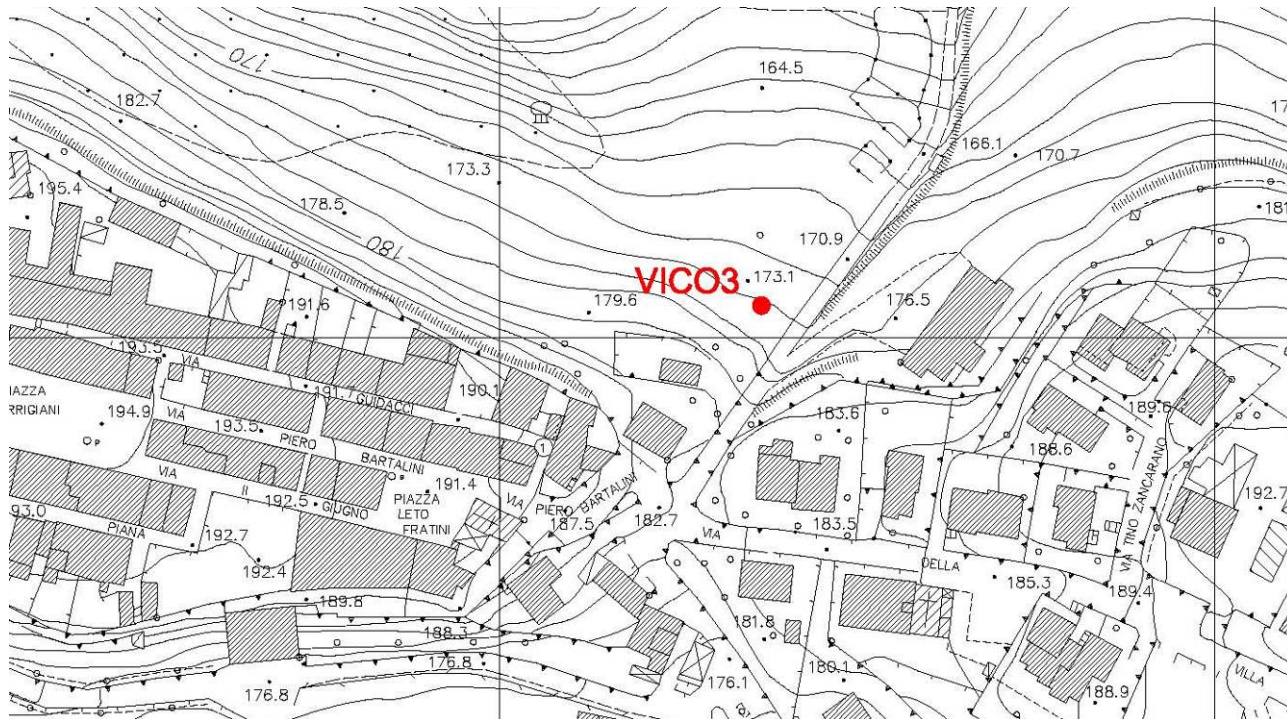


9. Prova HVSR “VICO3”

Loc. Vico d'Elsa – Via della Villa

Coordinate WGS84: 43.513613, 11.098881

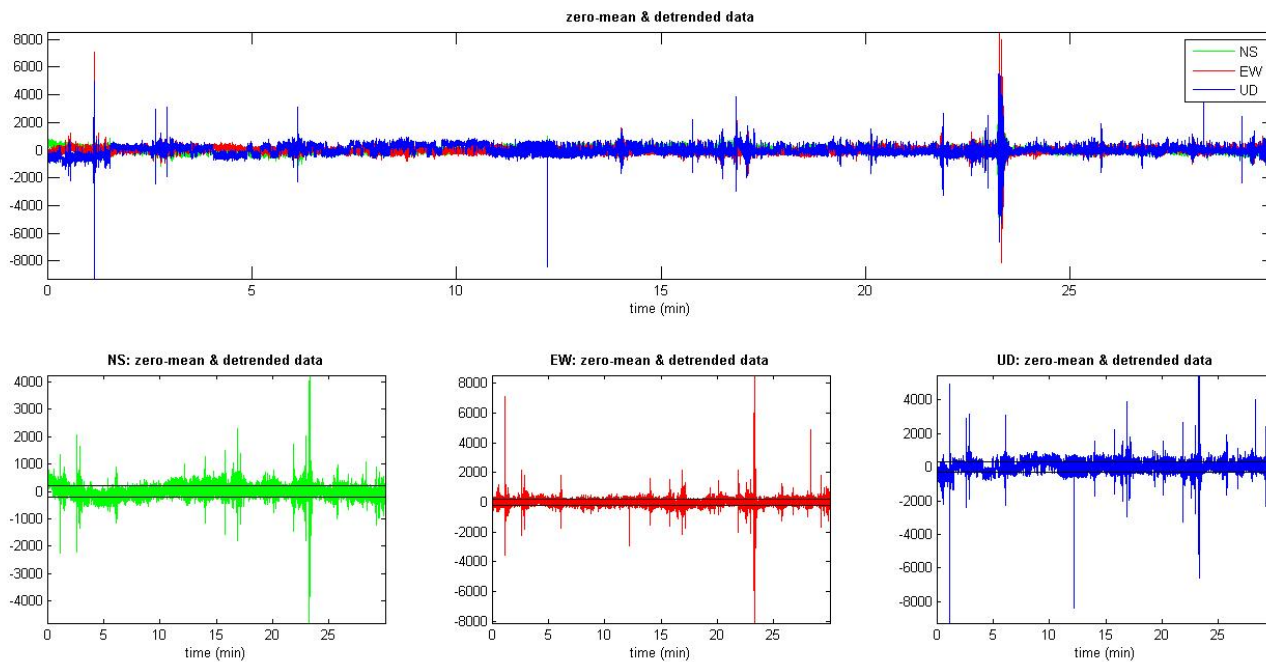
Data esecuzione prova : 05/07/2013 – 21.12/21.42 (durata 30 min)



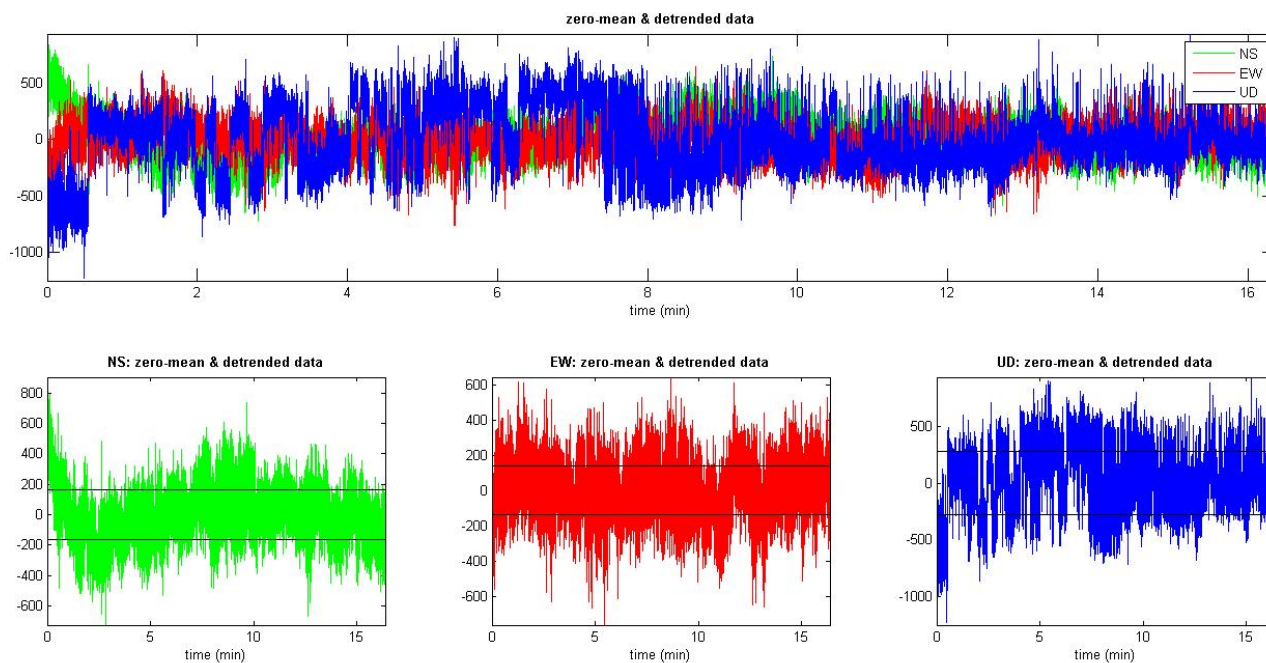
Ubicazione prova “VICO3”- scala 1:2000



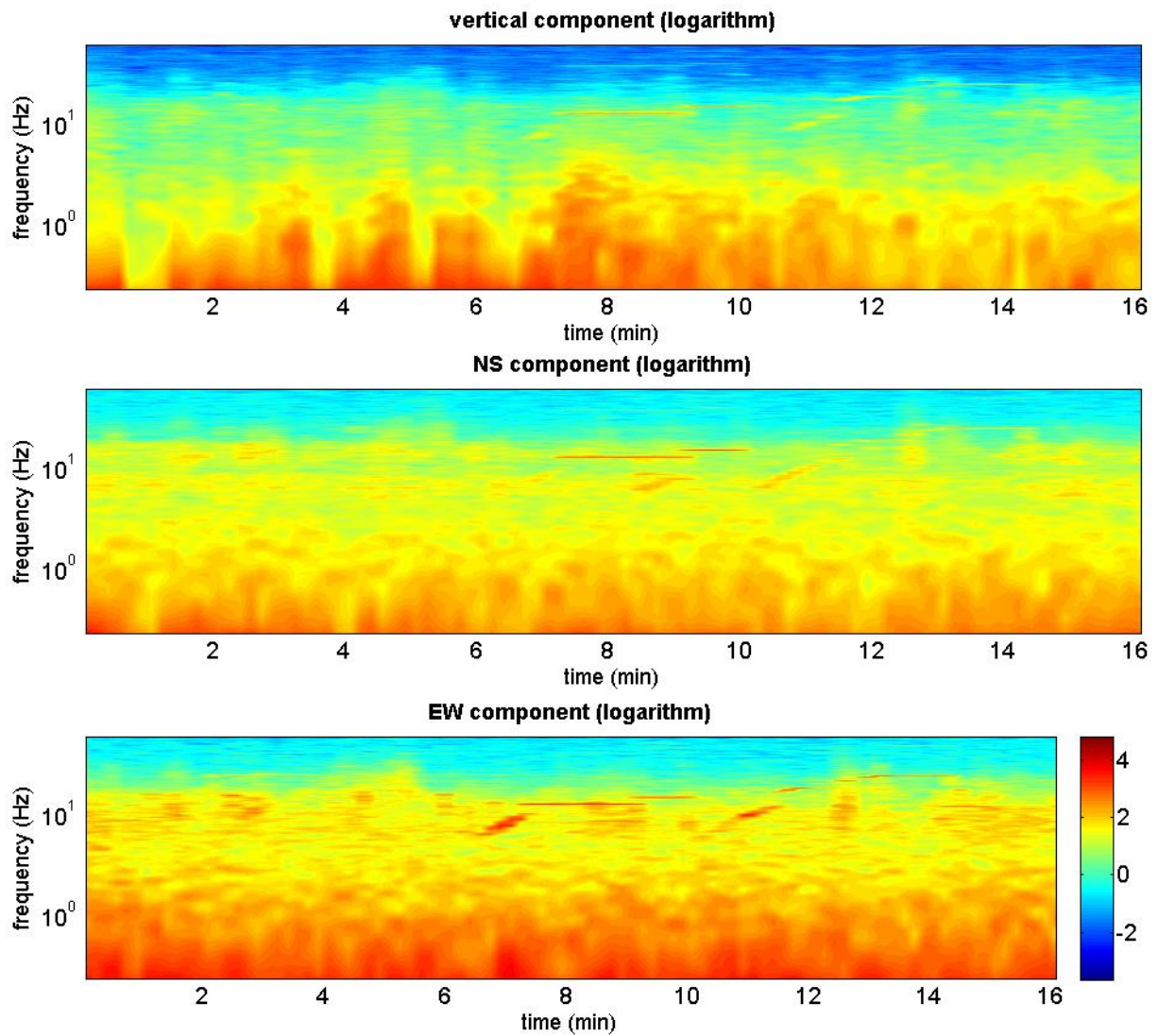
Prova “VICO3”



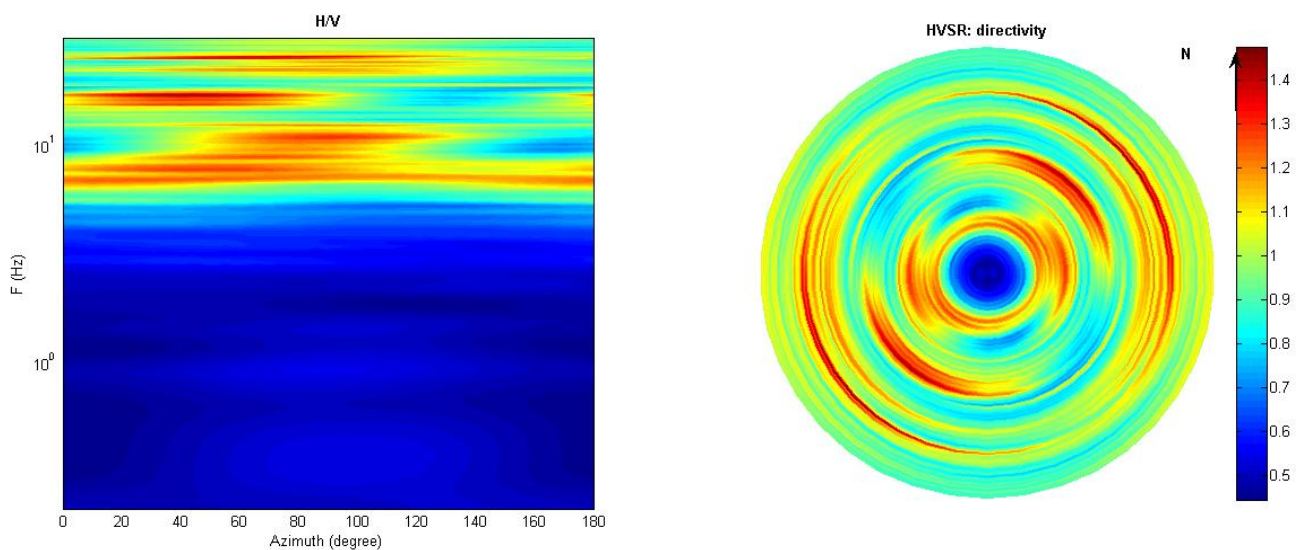
Prova “VICO3”: Dati originali



Prova “VICO3”: Dati ripuliti



Prova “VICO3”: Diagramma relativo alla stazionarietà del segnale



Prova “VICO3”: Diagramma relativo alla direzionalità del segnale

Horizontal-to-Vertical Spectral Ratio

www.winmasw.com

Date: 9 7 2013

Time: 16 44

Dataset: VICO3.SAF

Sampling frequency (Hz): 128

Window length (sec): 20

Length of analysed temporal sequence (min): 16.4

Tapering (%): 10

In the following the results considering the data in the 0.5-20.0Hz frequency range

Peak frequency (Hz): 7.2 (± 4.2)

Peak HVSR value: 1.2 (± 0.2)

Criteria for a reliable H/V curve

#1. $[f0 > 10/Lw]$: 7.2 > 0.5 (OK)

#2. $[nc > 200]$: 13951 > 200 (OK)

#3. $[f0 > 0.5\text{Hz}; \sigma_{A(f)} < 2 \text{ for } 0.5f0 < f < 2f0]$ (OK)

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

#1. $[\text{exists } f^- \text{ in the range } [f0/4, f0] \mid \Delta H/V(f^-) < A0/2]$: yes, at frequency 3.5Hz (OK)

#2. $[\text{exists } f^+ \text{ in the range } [f0, 4f0] \mid \Delta H/V(f^+) < A0/2]$: (NO)

#3. $[A0 > 2]$: 1.2 < 2 (NO)

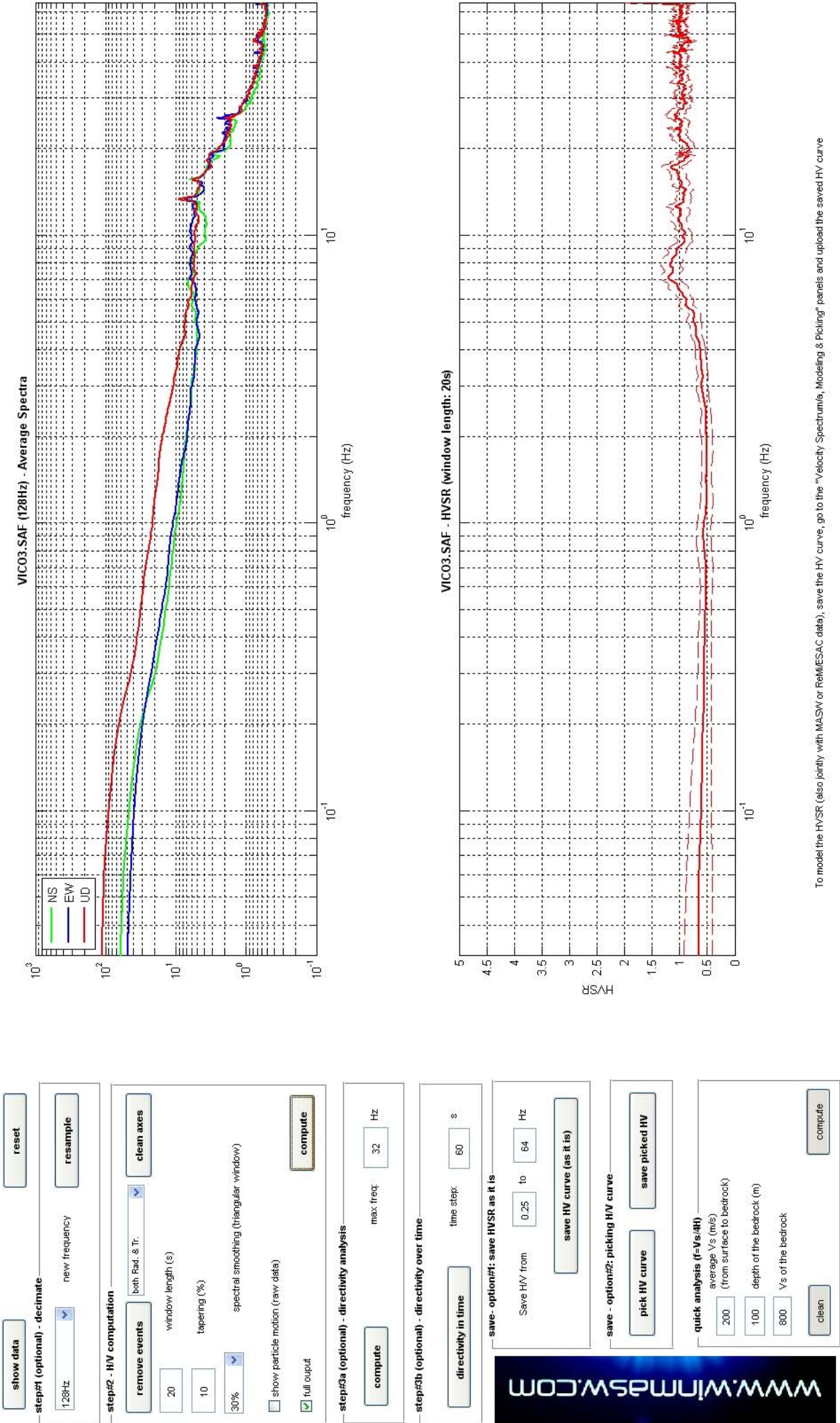
#4. $[f_{peak}[\Delta h/v(f) \pm \sigma_{A(f)}] = f0 \pm 5\%]$: (OK)

#5. $[\sigma_{A(f)} < \epsilon(f0)]$: 4.205 > 0.360 (NO)

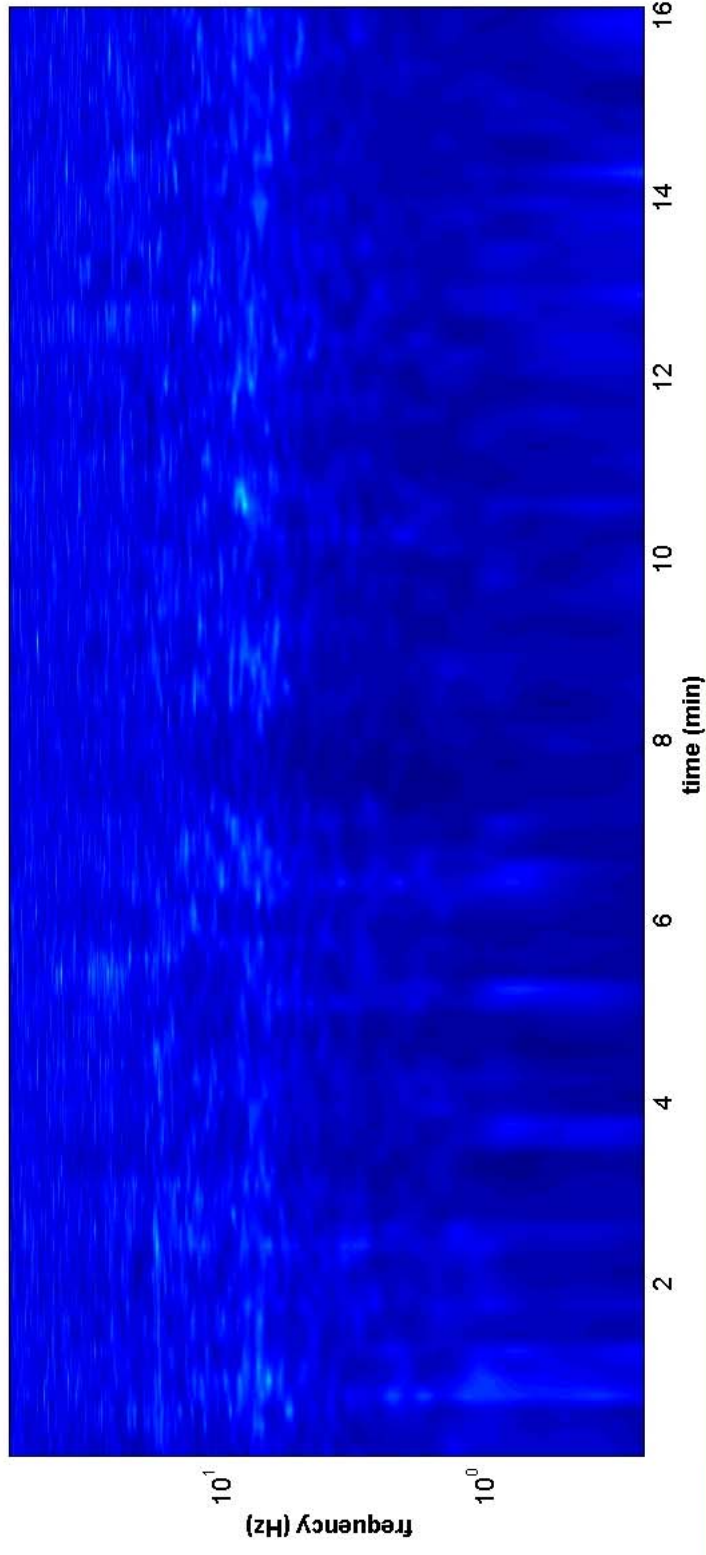
#6. $[\sigma_{A(f0)} < \theta(f0)]$: 0.179 < 1.58 (OK)

Please, be aware of possible industrial/man-induced peaks or spurious peaks due to meaningless numerical instabilities.

Remember that SESAME criteria should be considered in a flexible perspective and that if you modify the processing parameters they can change.



HVSR vs time

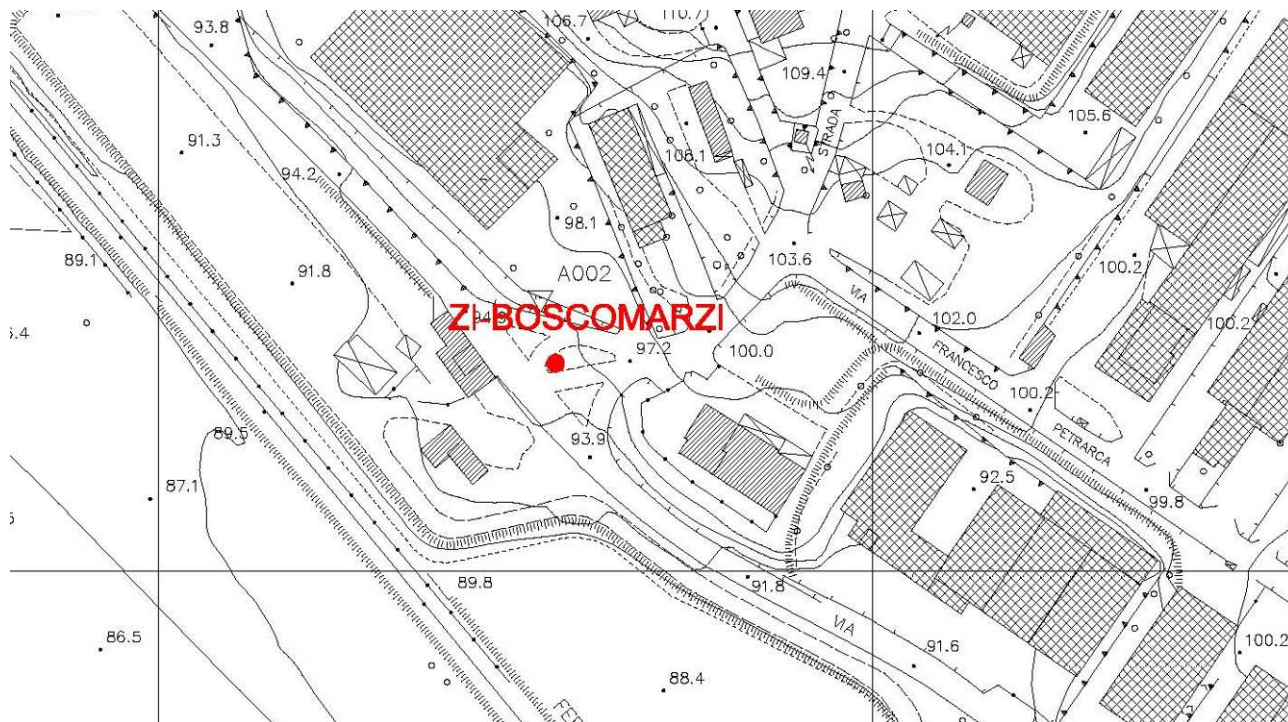


10. Prova HVSR “ZI-BOSCOMARZI”

Loc. Bosco ai Marzi – Strada di Linari

Coordinate WGS84: 43.484706, 11.127975

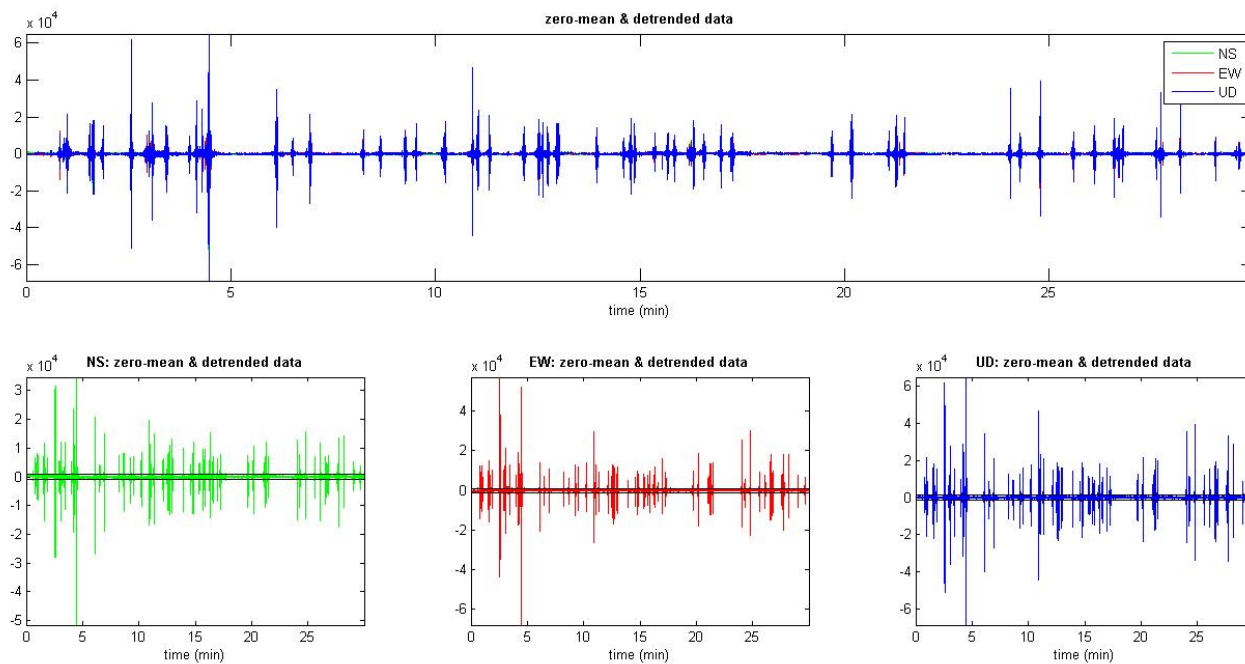
Data esecuzione prova : 10/07/2013 – 21.17/21.47 (durata 30 min)



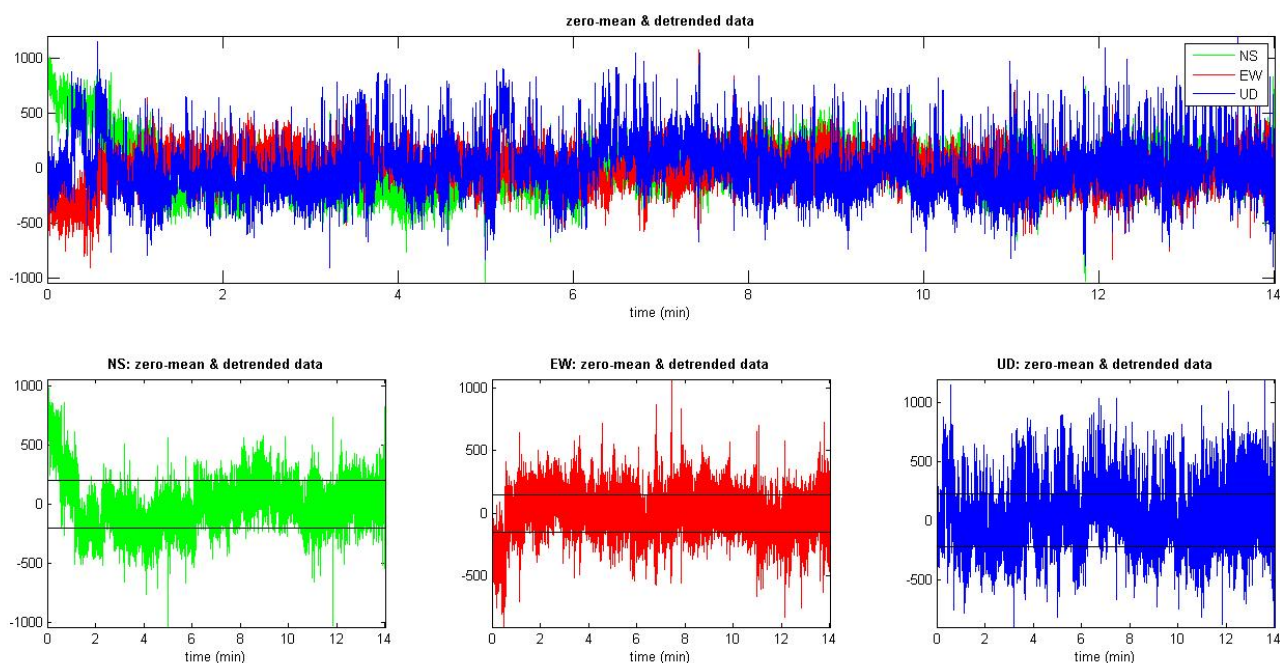
Ubicazione prova “ZI-BOSCOMARZI”- scala 1:2000



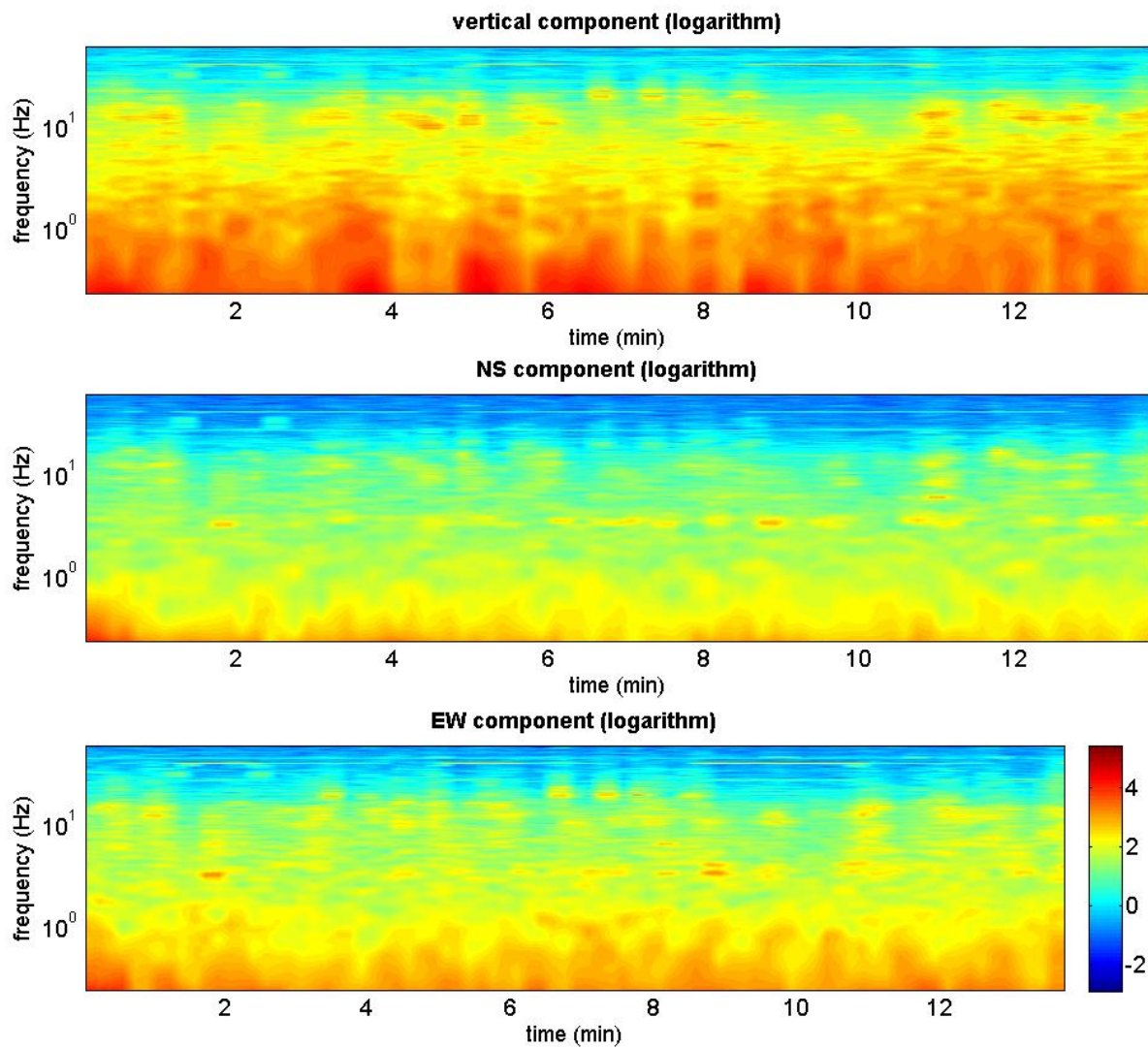
Prova “ZI-BOSCOMARZI”



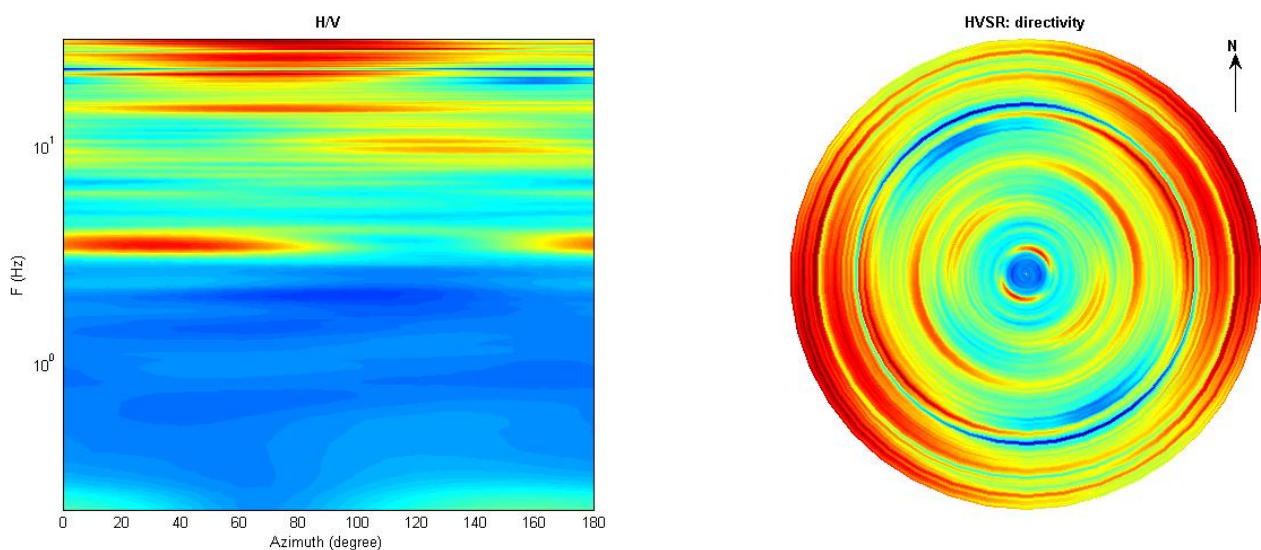
Prova “ZI-BOSCOMARZI”: Dati originali



Prova “ZI-BOSCOMARZI”: Dati ripuliti



Prova “ZI-BOSCOMARZI”: Diagramma relativo alla stazionarietà del segnale



Prova “ZI-BOSCOMARZI”: Diagramma relativo alla direzionalità del segnale

Horizontal-to-Vertical Spectral Ratio

www.winmasv.com

Date: 12 7 2013

Time: 10 47

Dataset: ZI-BOSCOMARZI.SAF

Sampling frequency (Hz): 128

Window length (sec): 20

Length of analysed temporal sequence (min): 14.0

Tapering (%): 10

In the following the results considering the data in the 0.5-20.0Hz frequency range

Peak frequency (Hz): 15.0 (± 4.9)

Peak HVSR value: 0.9 (± 0.1)

Criteria for a reliable H/V curve

#1. $[f0 > 10/Lw]$: 15.0 > 0.5 (OK)

#2. $[nc > 200]$: 24964 > 200 (OK)

#3. $[f0 > 0.5\text{Hz}; \sigma_A(f) < 2 \text{ for } 0.5f0 < f < 2f0]$ (OK)

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

#1. $[\text{exists } f^- \text{ in the range } [f0/4, f0] \mid AH/V(f^-) < A0/2]$: (NO)

#2. $[\text{exists } f^+ \text{ in the range } [f0, 4f0] \mid AH/V(f^+) < A0/2]$: (NO)

#3. $[A0 > 2]$: 0.9 < 2 (NO)

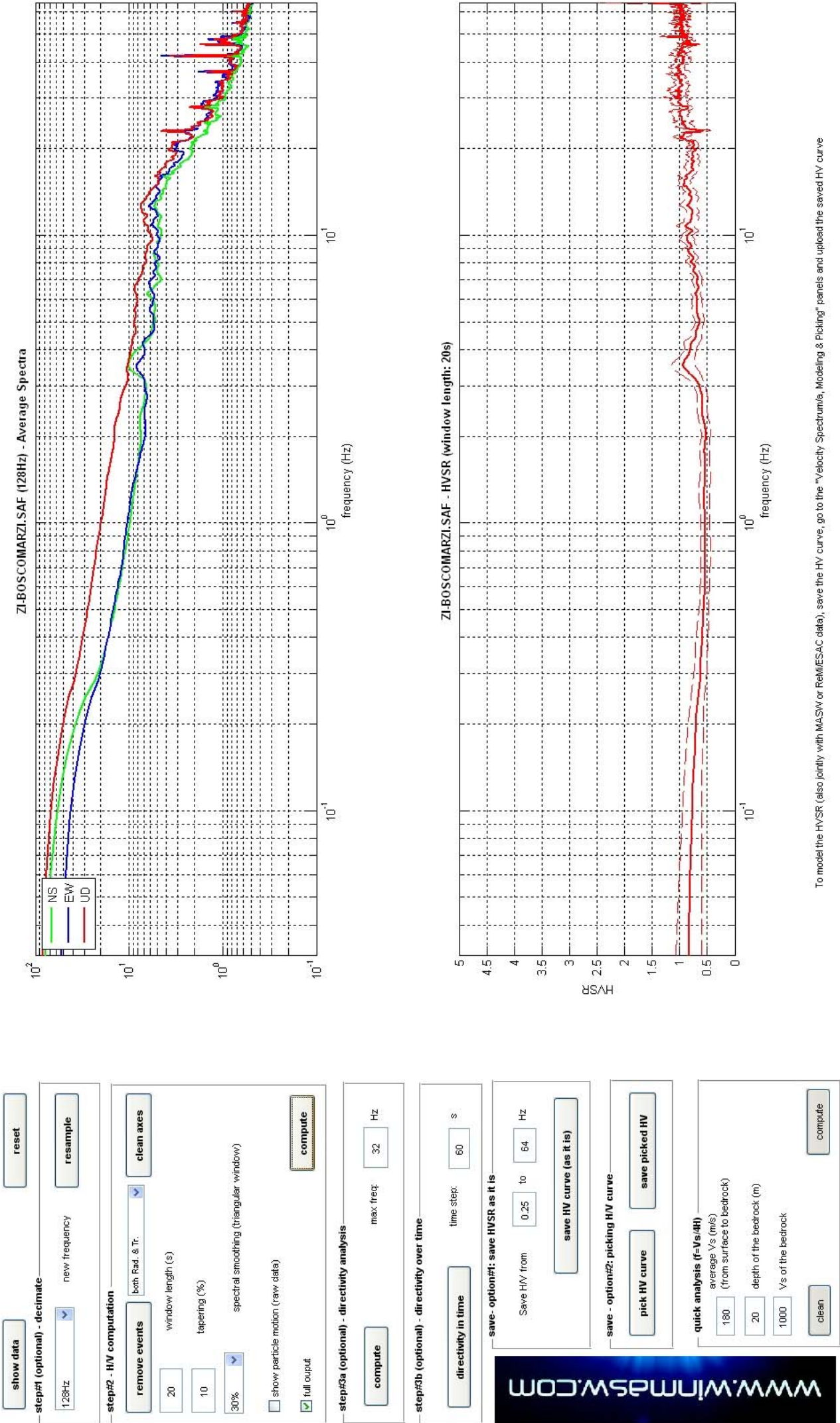
#4. $[f_{peak}[Ah/v(f) \pm \sigma_A(f)] = f0 \pm 5\%]$: (NO)

#5. $[\sigma_A(f) < \epsilon(f0)]$: 4.924 > 0.752 (NO)

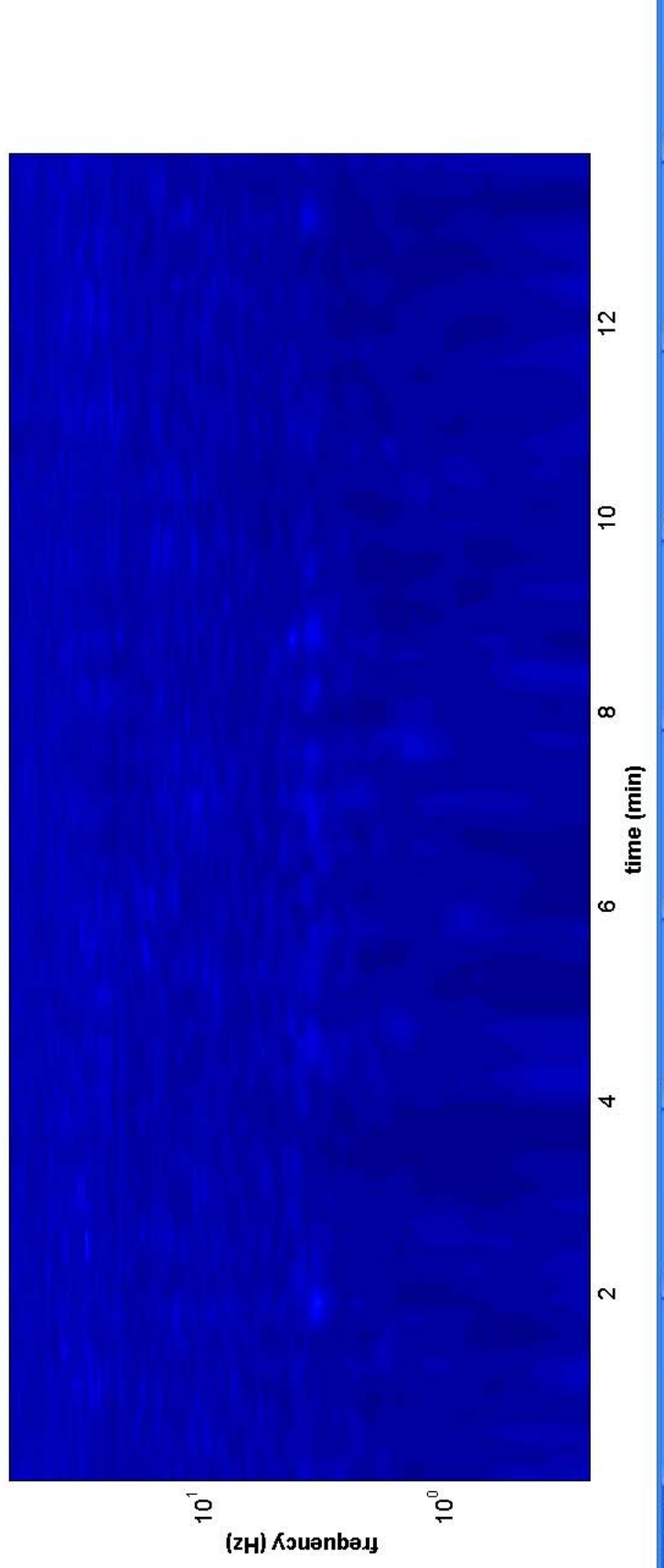
#6. $[\sigma_A(f0) < \theta(f0)]$: 0.123 < 1.58 (OK)

Please, be aware of possible industrial/man-induced peaks or spurious peaks due to meaningless numerical instabilities.

Remember that SESAME criteria should be considered in a flexible perspective and that if you modify the processing parameters they can change.



HVSR vs time



11. Prova HVSR “ZI-CHIANO”

Loc. Chiano – Via Giovanni Boccaccio

Coordinate WGS84: 43.484529, 11.136378

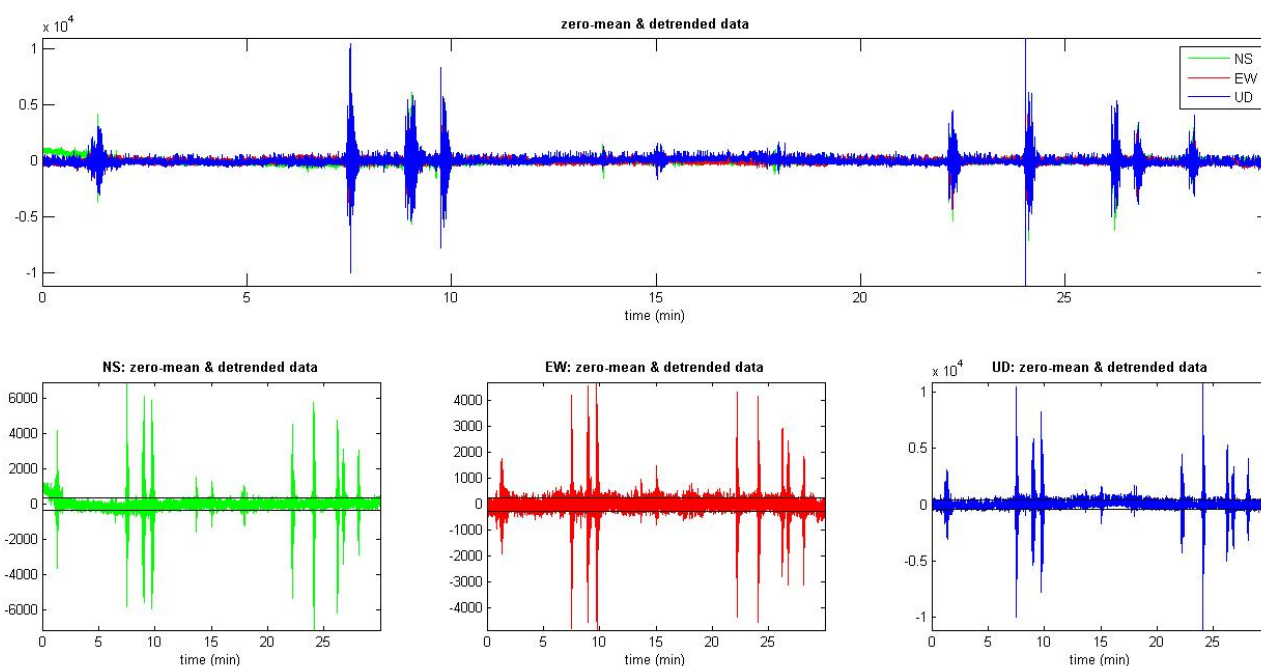
Data esecuzione prova : 05/07/2013 – 22.27/22.57 (durata 30 min)



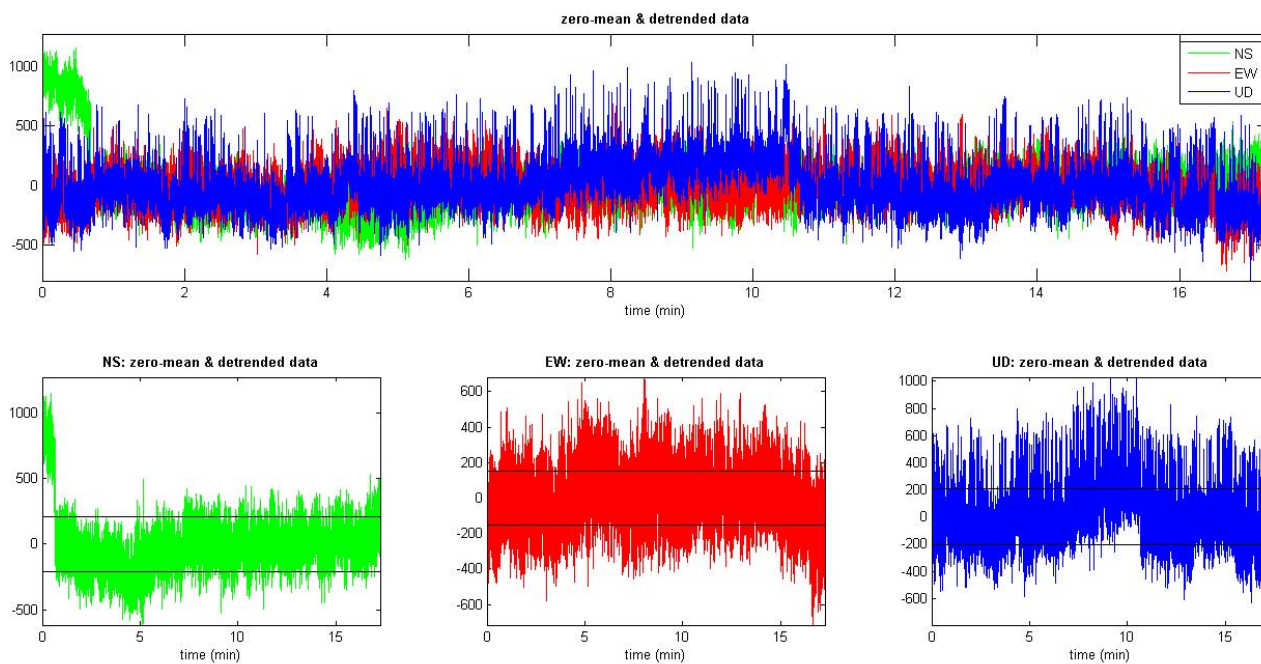
Ubicazione prova “ZI-CHIANO”- scala 1:2000



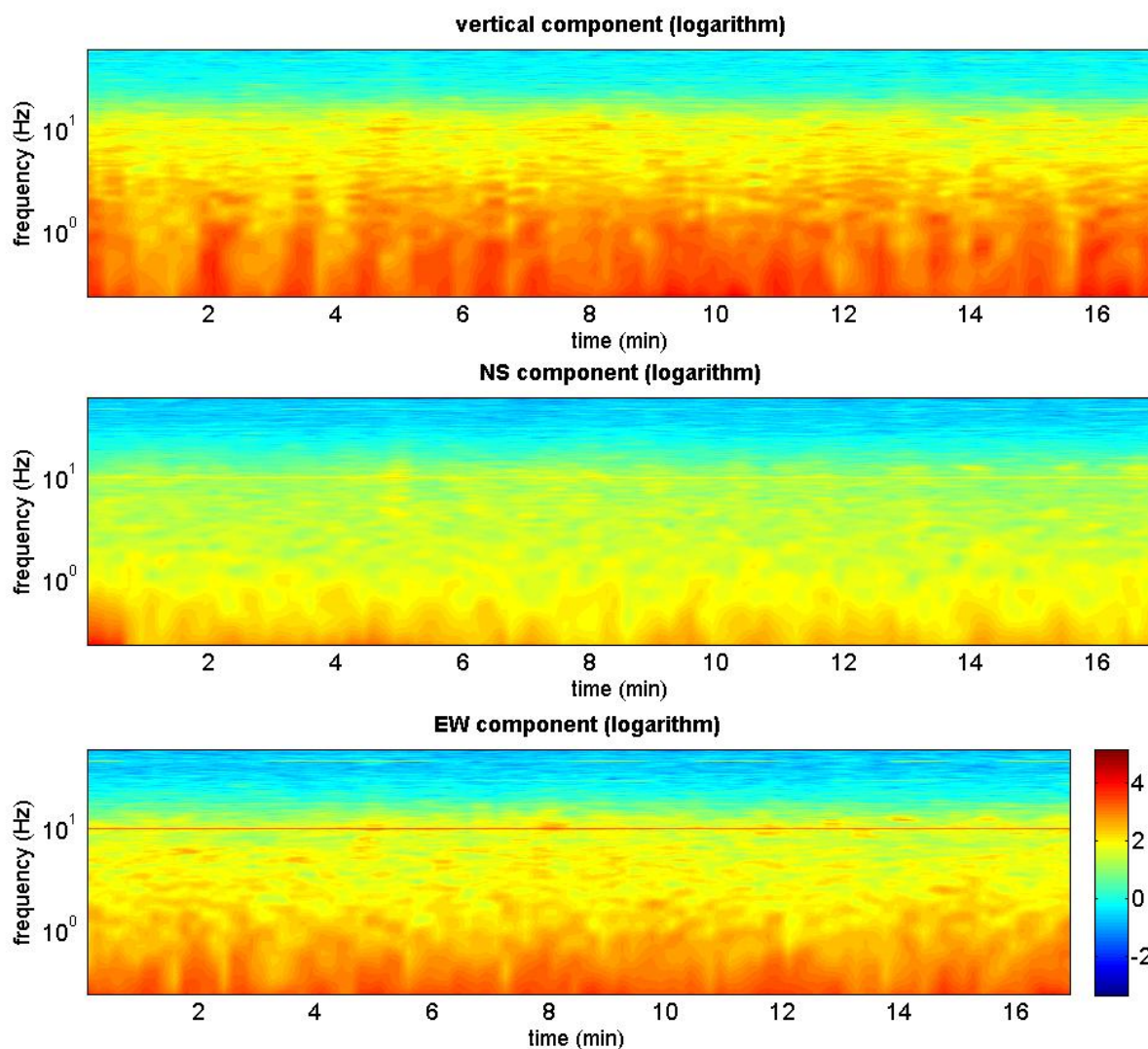
Prova “ZI-CHIANO”



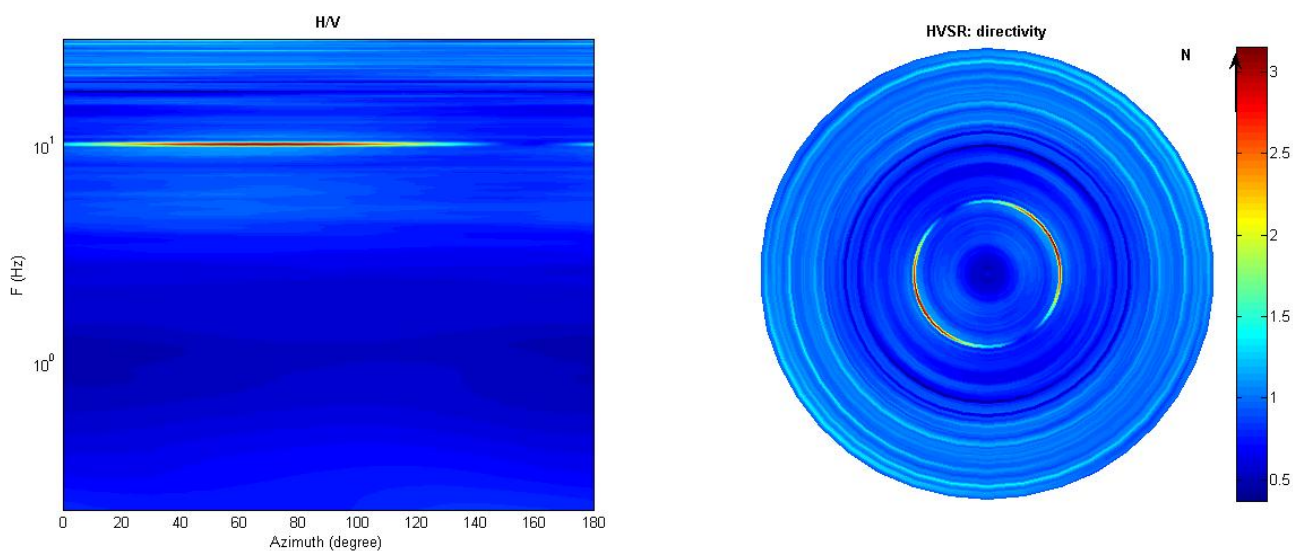
Prova “ZI-CHIANO”: Dati originali



Prova “ZI-CHIANO”: Dati ripuliti



Prova “ZI-CHIANO”: Diagramma relativo alla stazionarietà del segnale



Prova “ZI-CHIANO”: Diagramma relativo alla direzionalità del segnale

Horizontal-to-Vertical Spectral Ratio

www.winmasw.com

Date: 10 7 2013

Time: 11 46

Dataset: ZI-CHIANO.SAF

Sampling frequency (Hz): 128

Window length (sec): 20

Length of analysed temporal sequence (min): 17.3

Tapering (%): 10

In the following the results considering the data in the 0.5-20.0Hz frequency range

Peak frequency (Hz): 10.5 (± 1.0)

Peak HVSR value: 2.0 (± 0.2)

Criteria for a reliable H/V curve

#1. $[f0 > 10/Lw]$: 10.5 > 0.5 (OK)

#2. $[nc > 200]$: 21367 > 200 (OK)

#3. $[f0 > 0.5\text{Hz}; \sigma A(f) < 2 \text{ for } 0.5f0 < f < 2f0]$ (OK)

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

#1. $[\text{exists } f^- \text{ in the range } [f0/4, f0] \mid AH/V(f^-) < A0/2]$: yes, at frequency 10.1Hz (OK)

#2. $[\text{exists } f^+ \text{ in the range } [f0, 4f0] \mid AH/V(f^+) < A0/2]$: yes, at frequency 10.8Hz (OK)

#3. $[A0 > 2]$: 2.0 > 2 (OK)

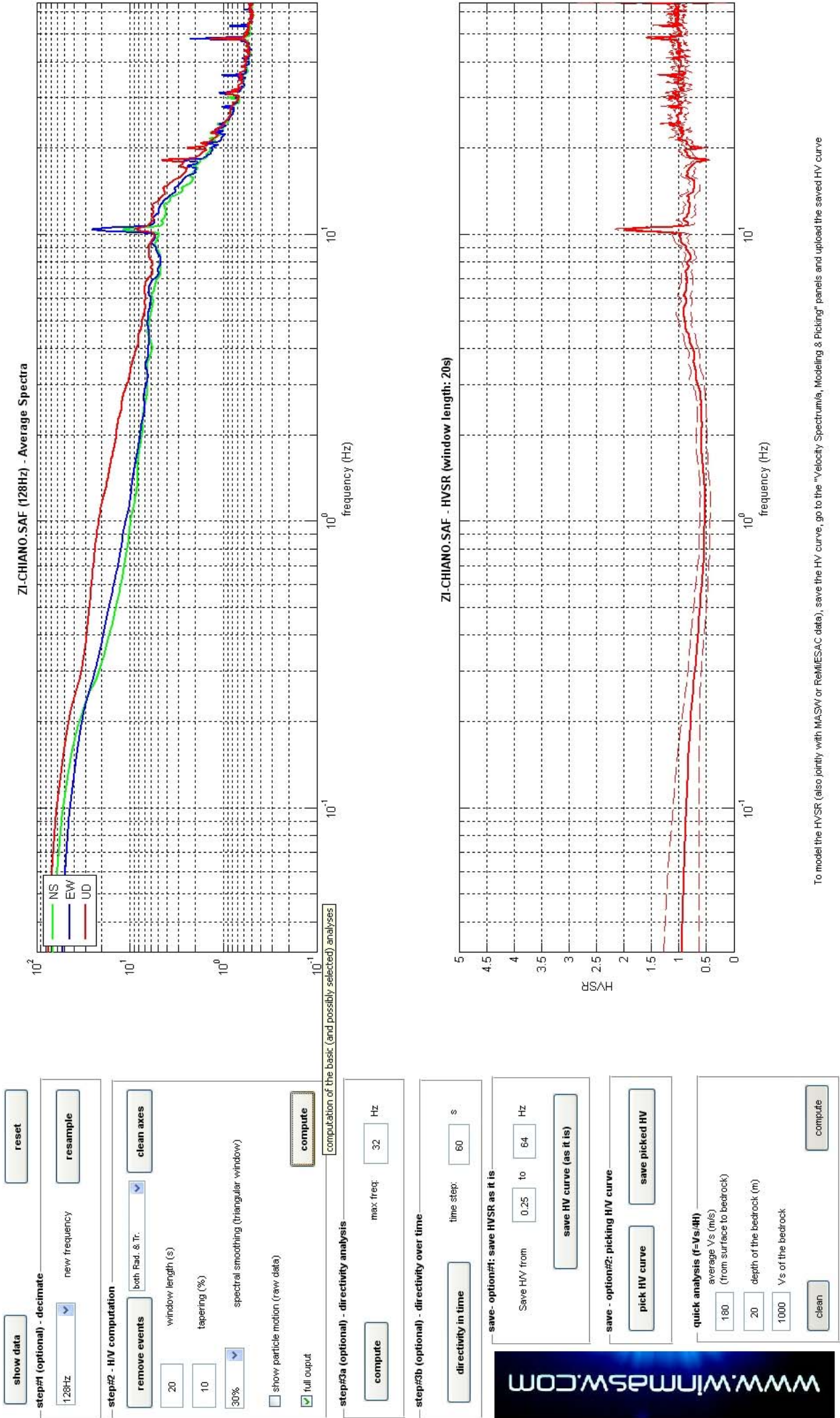
#4. $[f_{peak}[Ah/v(f) \pm \sigma A(f)] = f0 \pm 5\%]$: (OK)

#5. $[\sigma maf < \epsilon(f0)]: 0.962 > 0.524$ (NO)

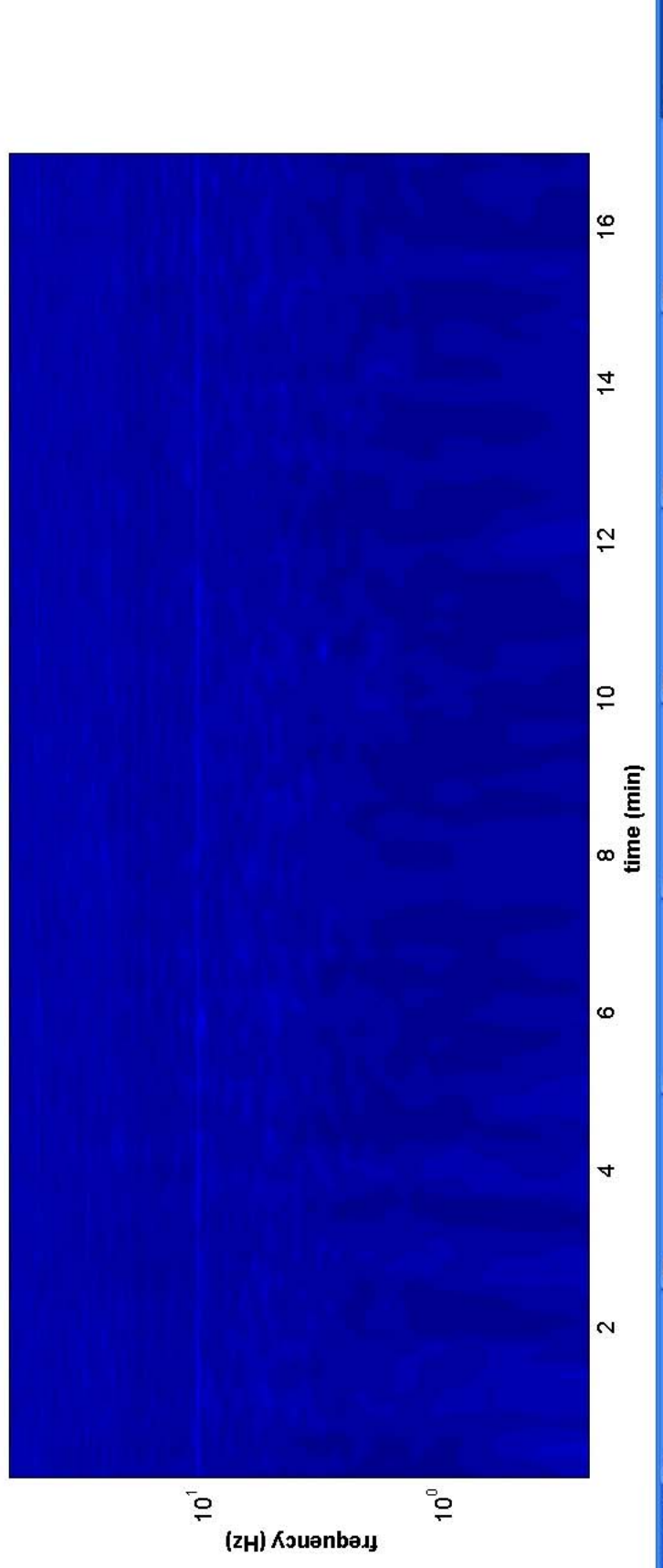
#6. $[\sigma A(f0) < \theta(f0)]: 0.166 < 1.58$ (OK)

Please, be aware of possible industrial/man-induced peaks or spurious peaks due to meaningless numerical instabilities.

Remember that SESAME criteria should be considered in a flexible perspective and that if you modify the processing parameters they can change.



HVSR vs time



12. Prova HVSR “ZI-DROVE”

Loc. Drove – Via Giosuè Carducci

Coordinate WGS84: 43.479912, 11.136893

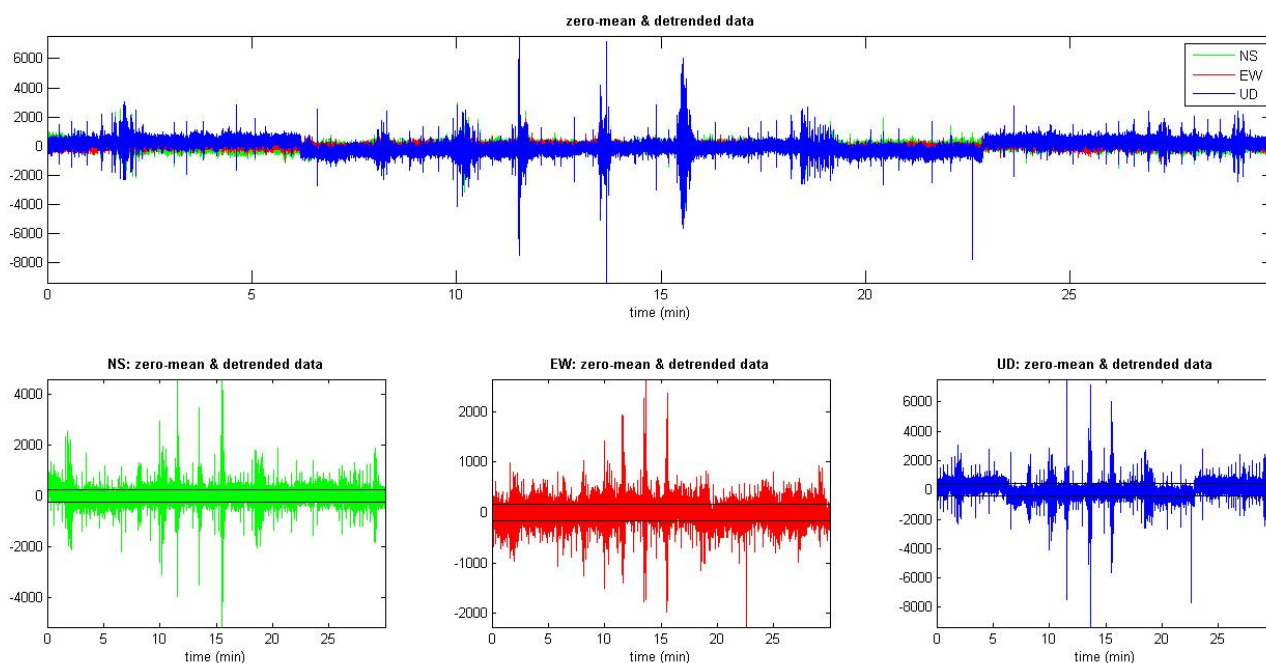
Data esecuzione prova : 04/07/2013 – 22.39/23.09 (durata 30 min)



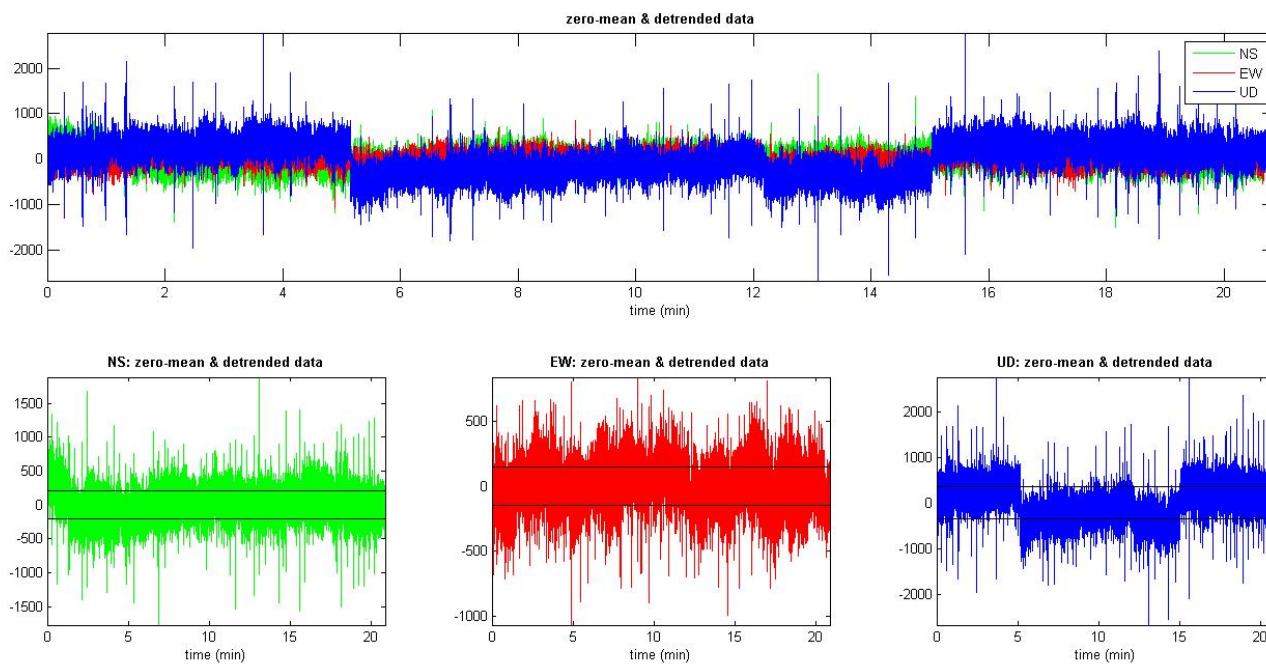
Ubicazione prova “ZI-DROVE”- scala 1:2000



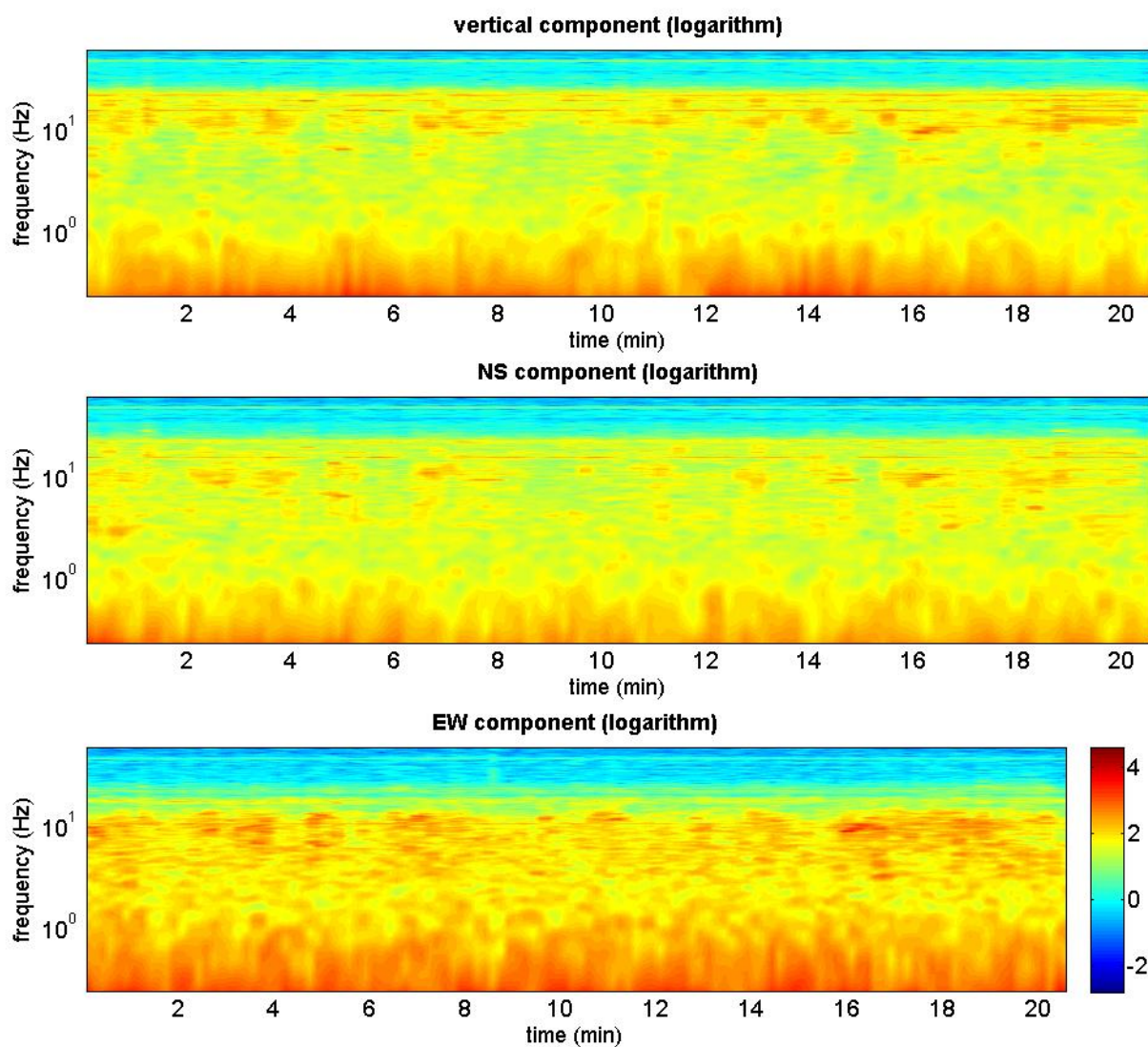
Prova “ZI-DROVE”



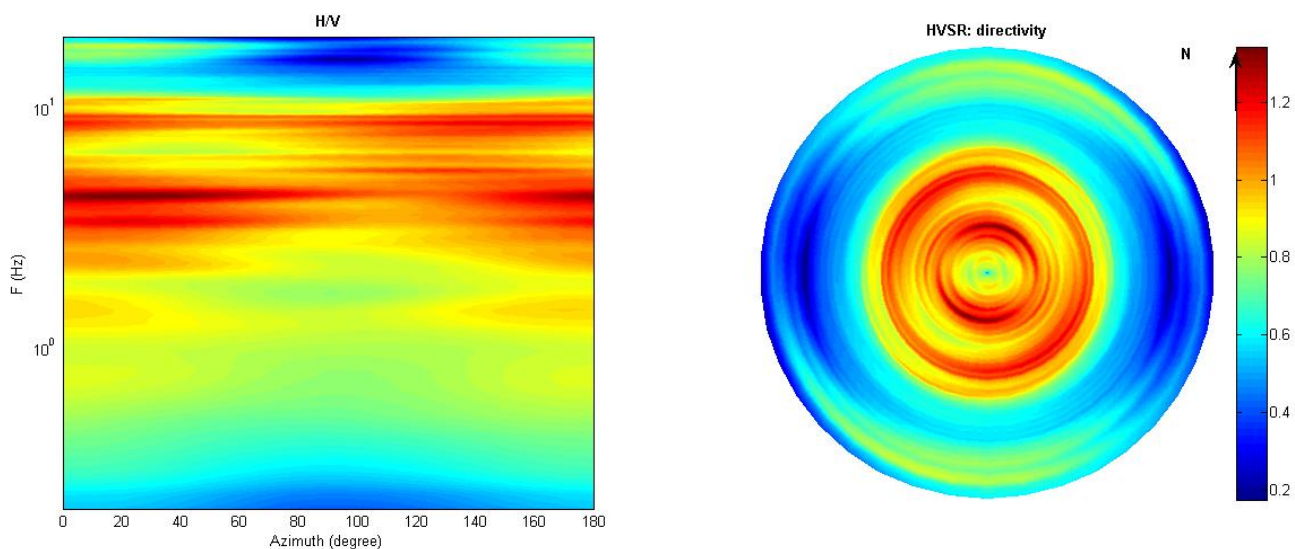
Prova “ZI-DROVE”: Dati originali



Prova “ZI-DROVE”: Dati ripuliti



Prova “ZI-DROVE”: Diagramma relativo alla stazionarietà del segnale



Prova “ZI-DROVE”: Diagramma relativo alla direzionalità del segnale

Horizontal-to-Vertical Spectral Ratio

www.winmasw.com

Date: 9 7 2013

Time: 15 48

Dataset: ZI-DROVE.SAF

Sampling frequency (Hz): 128

Window length (sec): 20

Length of analysed temporal sequence (min): 20.9

Tapering (%): 10

In the following the results considering the data in the 0.5-20.0Hz frequency range

Peak frequency (Hz): 4.4 (± 2.3)

Peak HVSR value: 1.2 (± 0.1)

Criteria for a reliable H/V curve

#1. $[f0 > 10/Lw]: 4.4 > 0.5$ (OK)

#2. $[nc > 200]: 11010 > 200$ (OK)

#3. $[f0 > 0.5\text{Hz}; \sigma_A(f) < 2 \text{ for } 0.5f0 < f < 2f0]$ (OK)

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

#1. $[\text{exists } f^- \text{ in the range } [f0/4, f0] \mid AH/V(f^-) < A0/2]:$ (NO)

#2. $[\text{exists } f^+ \text{ in the range } [f0, 4f0] \mid AH/V(f^+) < A0/2]:$ yes, at frequency 12.6Hz (OK)

#3. $[A0 > 2]: 1.2 < 2$ (NO)

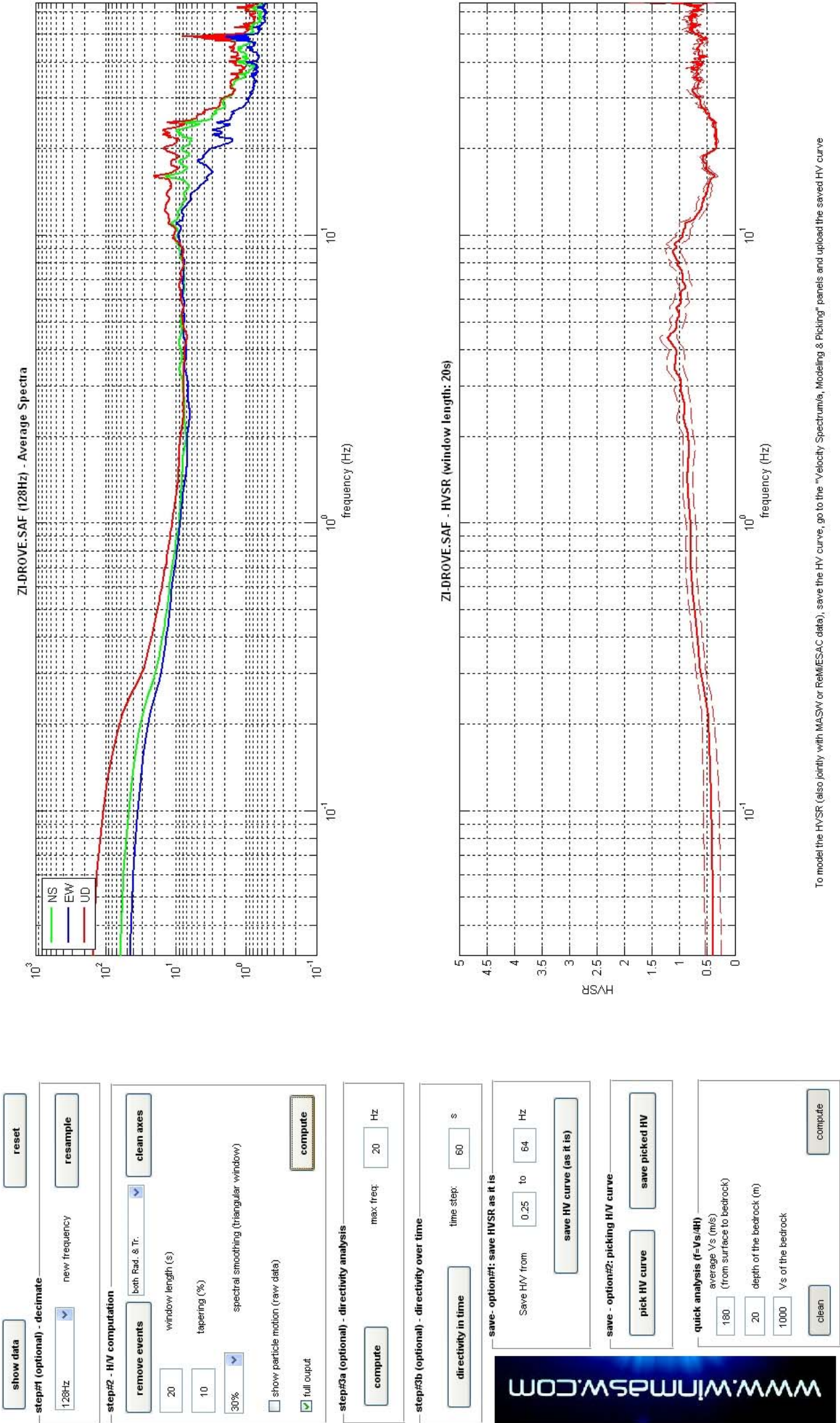
#4. $[f_{\text{peak}}[Ah/v(f) \pm \sigma_A(f)] = f0 \pm 5\%]:$ (OK)

#5. $[\sigma_A(f) < \epsilon(f0)]: 2.326 > 0.222$ (NO)

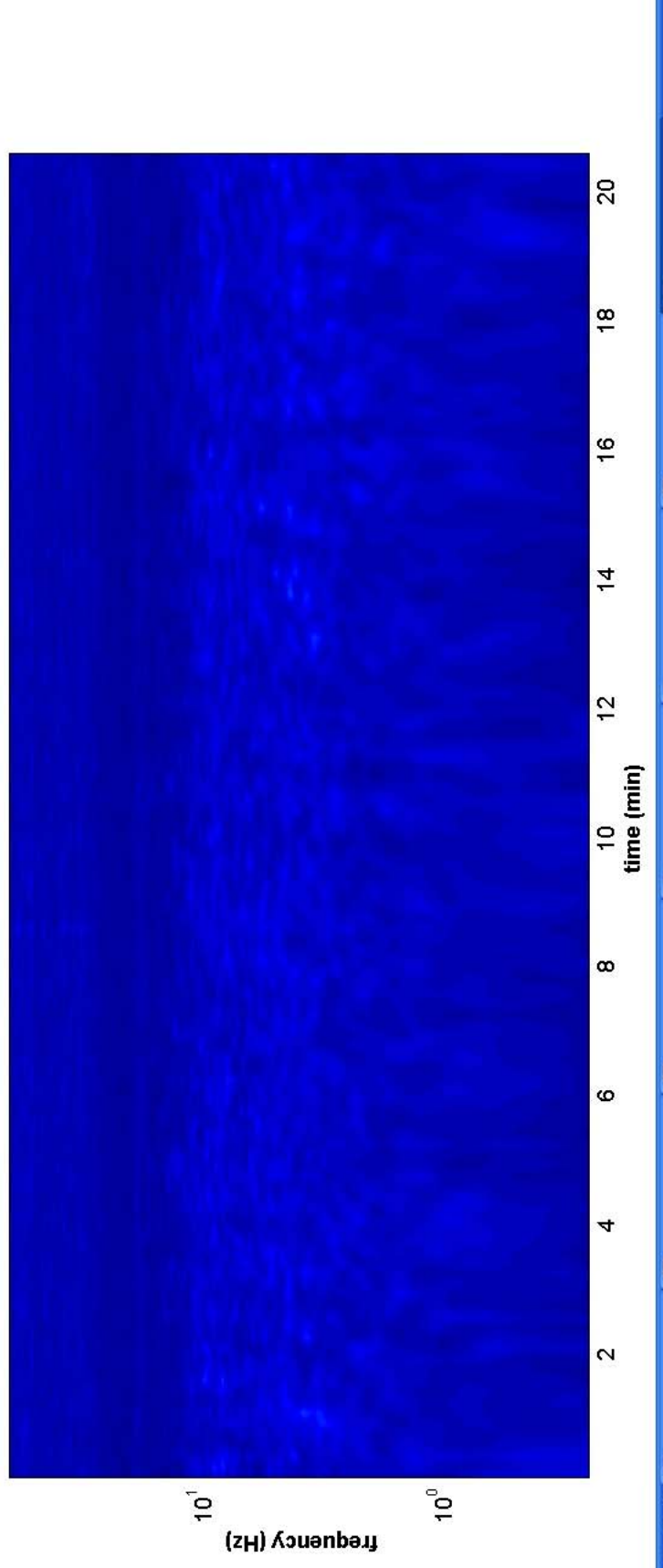
#6. $[\sigma_A(f0) < \theta(f0)]: 0.150 < 1.58$ (OK)

Please, be aware of possible industrial/man-induced peaks or spurious peaks due to meaningless numerical instabilities.

Remember that SESAME criteria should be considered in a flexible perspective and that if you modify the processing parameters they can change.



HVSR vs time



13. Prova HVSR “ZI-GRILLAIE”

Loc. Le Grillaie – Via Caduti di Nassiriya

Coordinate WGS84: 43.495592, 11.115999

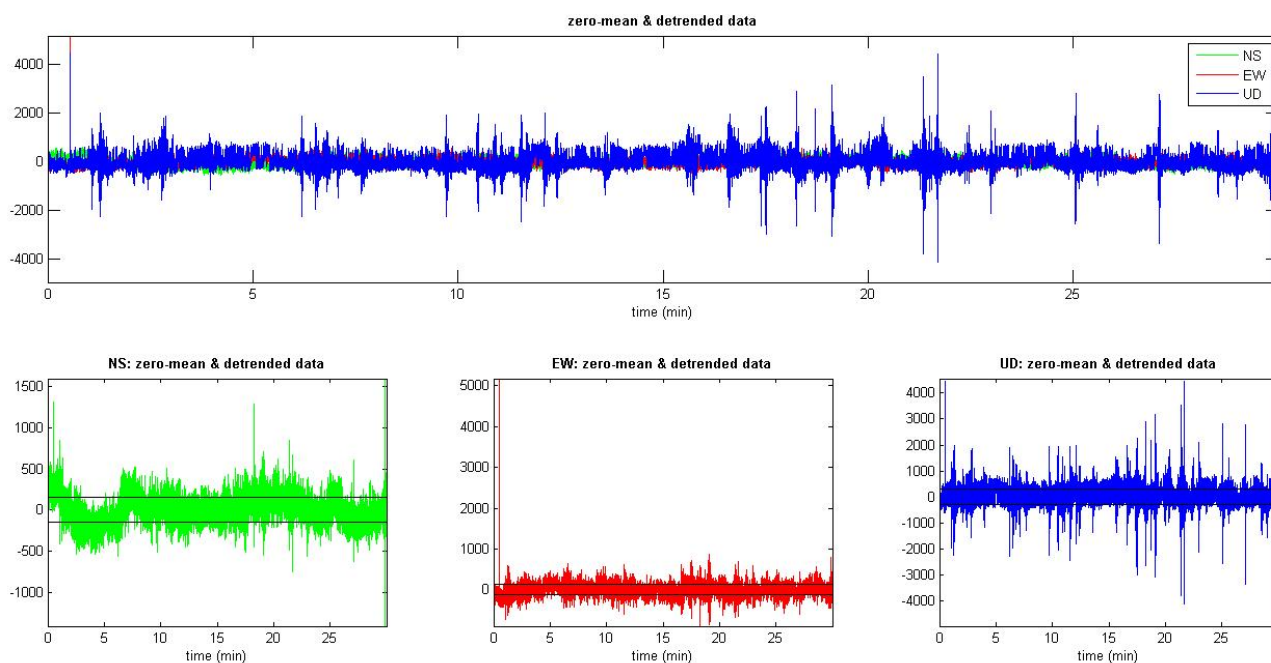
Data esecuzione prova : 07/07/2013 – 20.01/20.31 (durata 30 min)



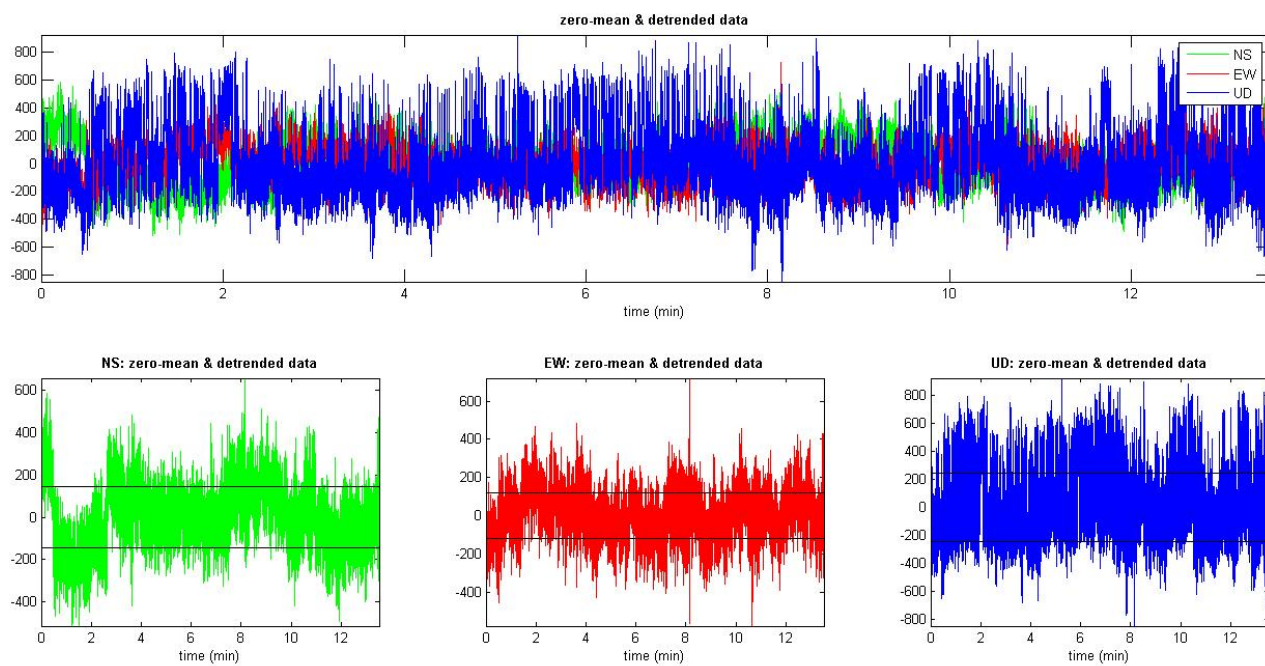
Ubicazione prova “ZI-GRILLAIE”- scala 1:2000



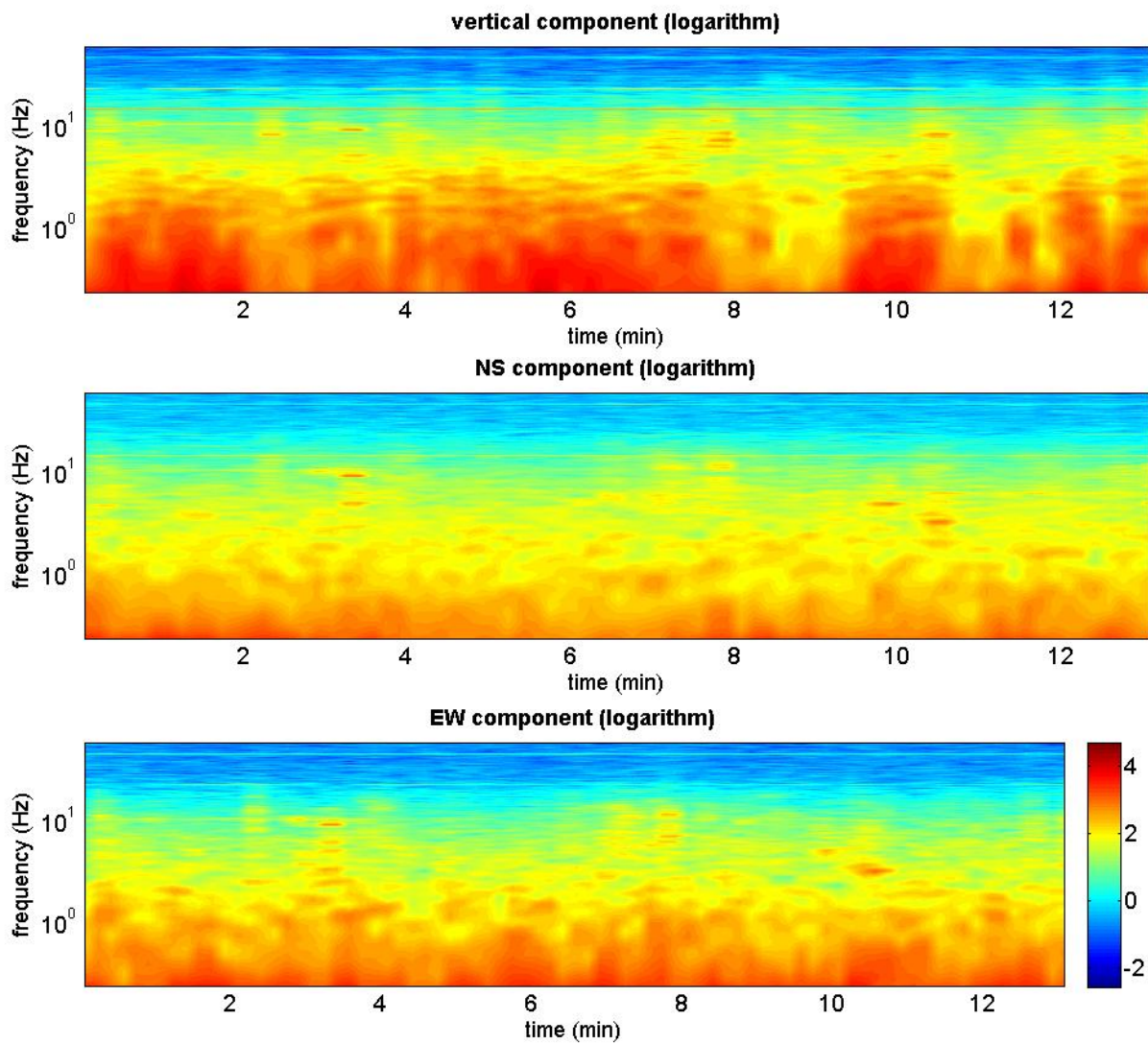
Prova “ZI-GRILLAIE”



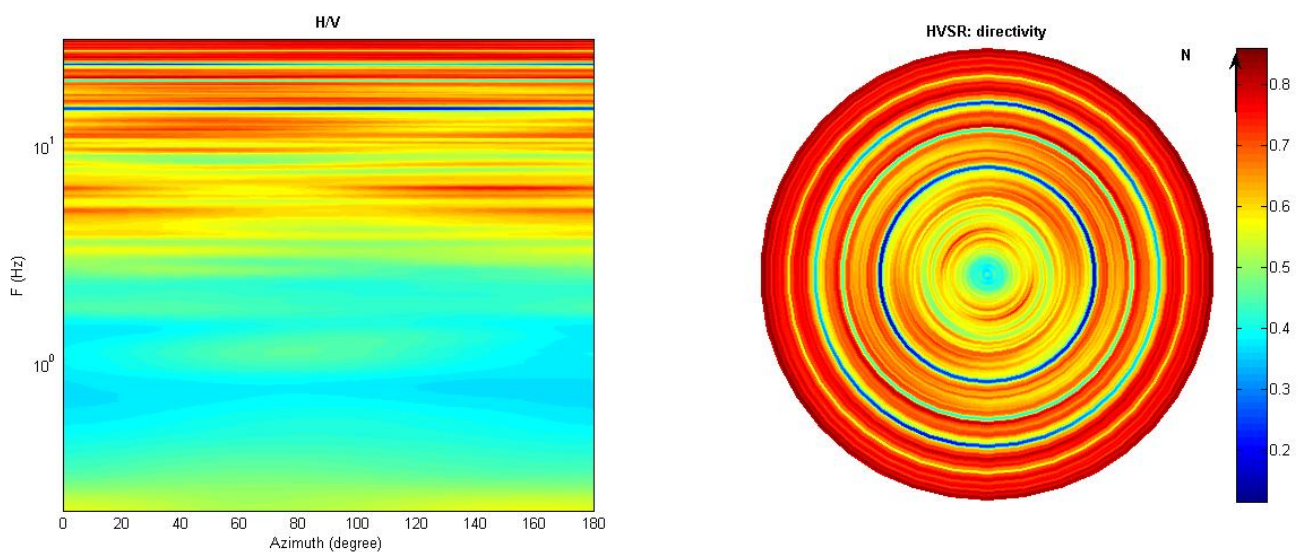
Prova “ZI-GRILLAIE”: Dati originali



Prova “ZI-GRILLAIE”: Dati ripuliti



Prova “ZI-GRILLAIE”: Diagramma relativo alla stazionarietà del segnale



Prova “ZI-GRILLAIE”: Diagramma relativo alla direzionalità del segnale

Horizontal-to-Vertical Spectral Ratio

www.winmasw.com

Date: 12 7 2013

Time: 10 36

Dataset: ZI-GRILLAIE.SAF

Sampling frequency (Hz): 128

Window length (sec): 20

Length of analysed temporal sequence (min): 13.5

Tapering (%): 10

In the following the results considering the data in the 0.5-20.0Hz frequency range

Peak frequency (Hz): 16.6 (±5.8)

Peak HVSR value: 0.7 (±0.1)

Criteria for a reliable H/V curve

#1. [f0 > 10/Lw]: 16.6 > 0.5 (OK)

#2. [nc > 200]: 26182 > 200 (OK)

#3. [f0>0.5Hz; sigmaA(f) < 2 for 0.5f0 < f < 2f0] (OK)

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

#1. [exists f- in the range [f0/4, f0] | AH/V(f-) < A0/2]: yes, at frequency 15.5Hz (OK)

#2. [exists f+ in the range [f0, 4f0] | AH/V(f+) < A0/2]: (NO)

#3. [A0 > 2]: 0.7 < 2 (NO)

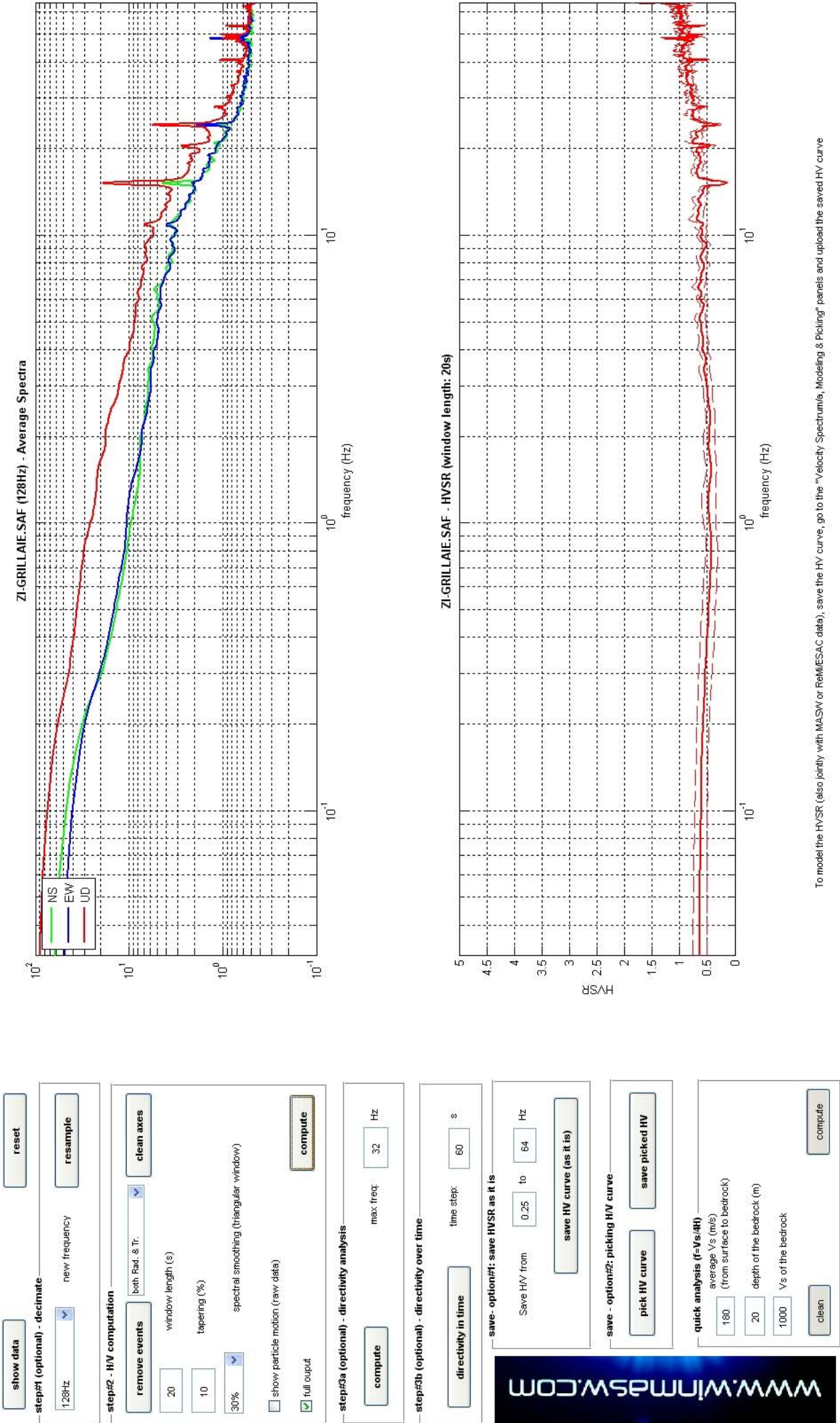
#4. [fpeak[Ah/v(f) ± sigmaA(f)] = f0 ± 5%]: (NO)

#5. [sigmaf < epsilon(f0)]: 5.825 > 0.829 (NO)

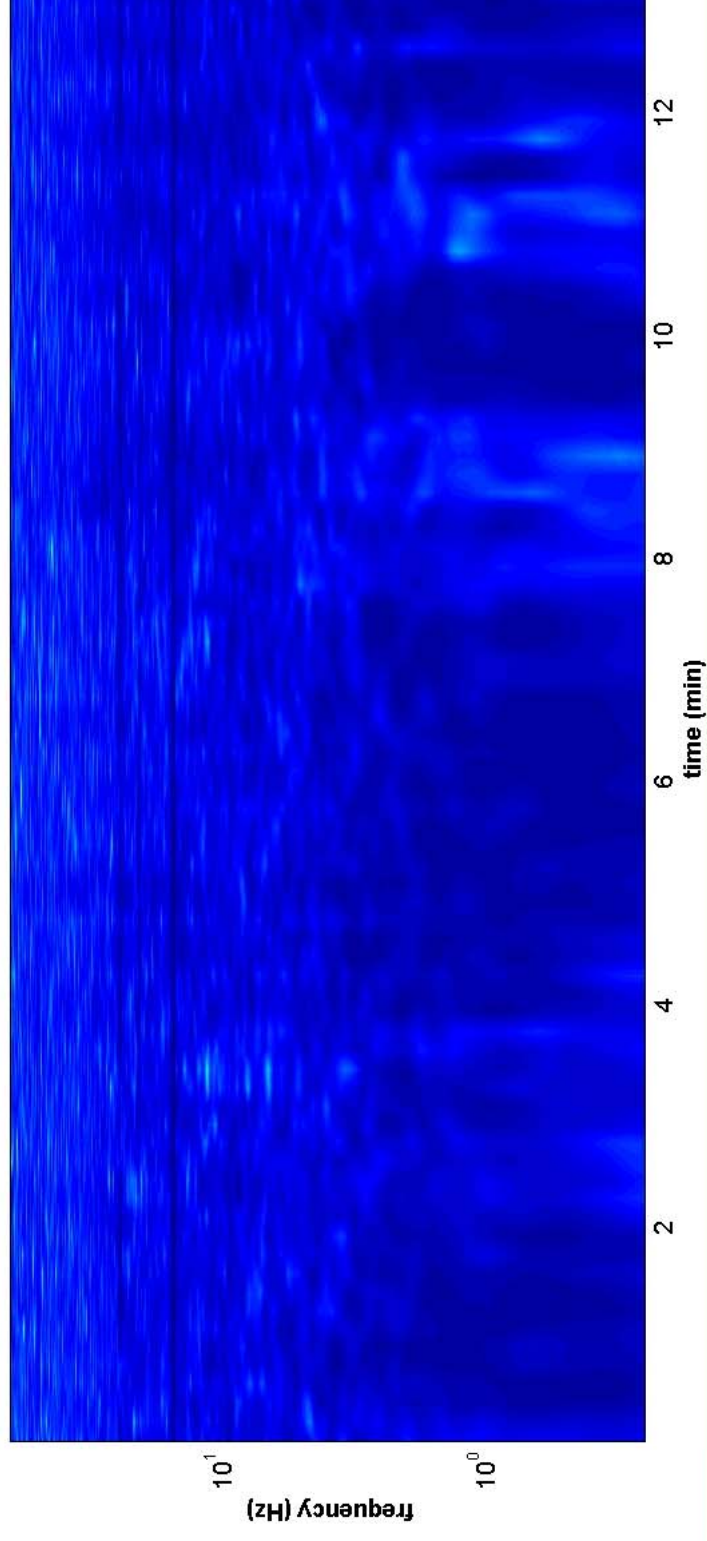
#6. [sigmaA(f0) < theta(f0)]: 0.092 < 1.58 (OK)

Please, be aware of possible industrial/man-induced peaks or spurious peaks due to meaningless numerical instabilities.

Remember that SESAME criteria should be considered in a flexible perspective and that if you modify the processing parameters they can change.



HVSR vs time

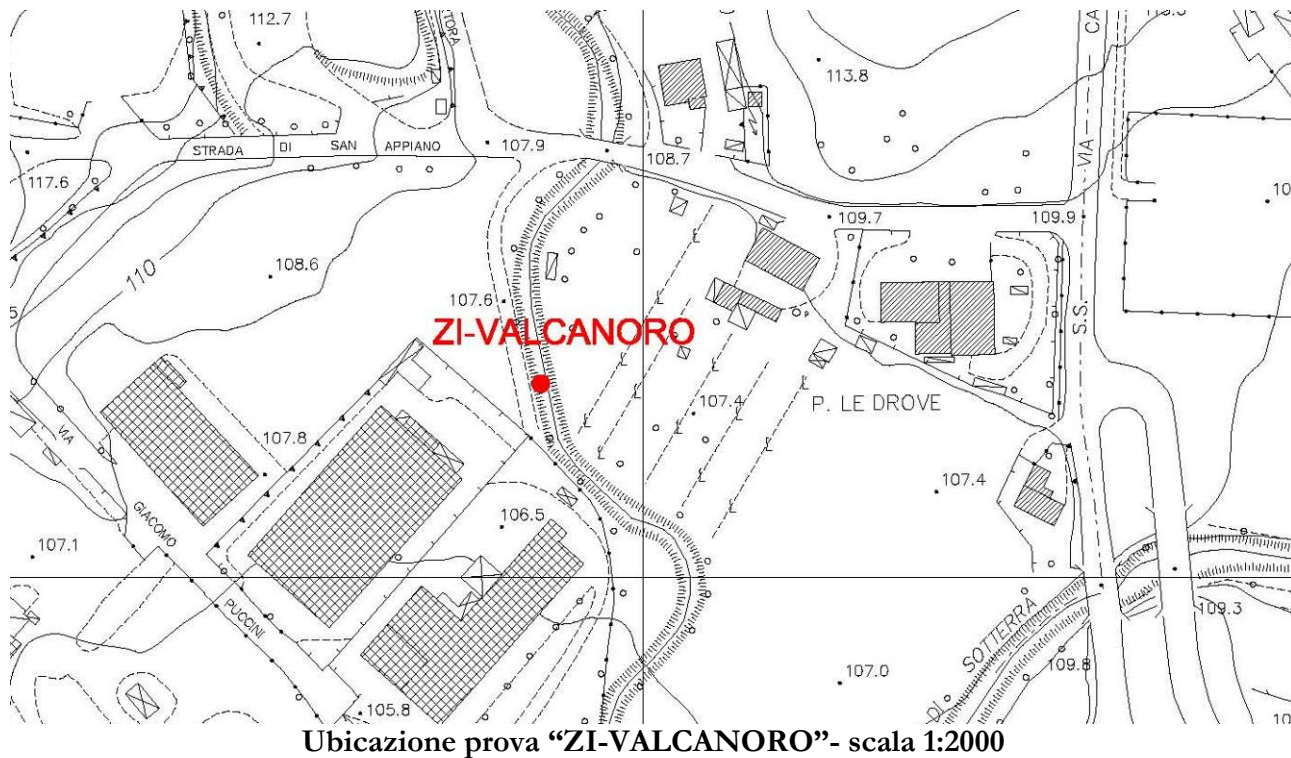


14. Prova HVSR “ZI-VALCANORO”

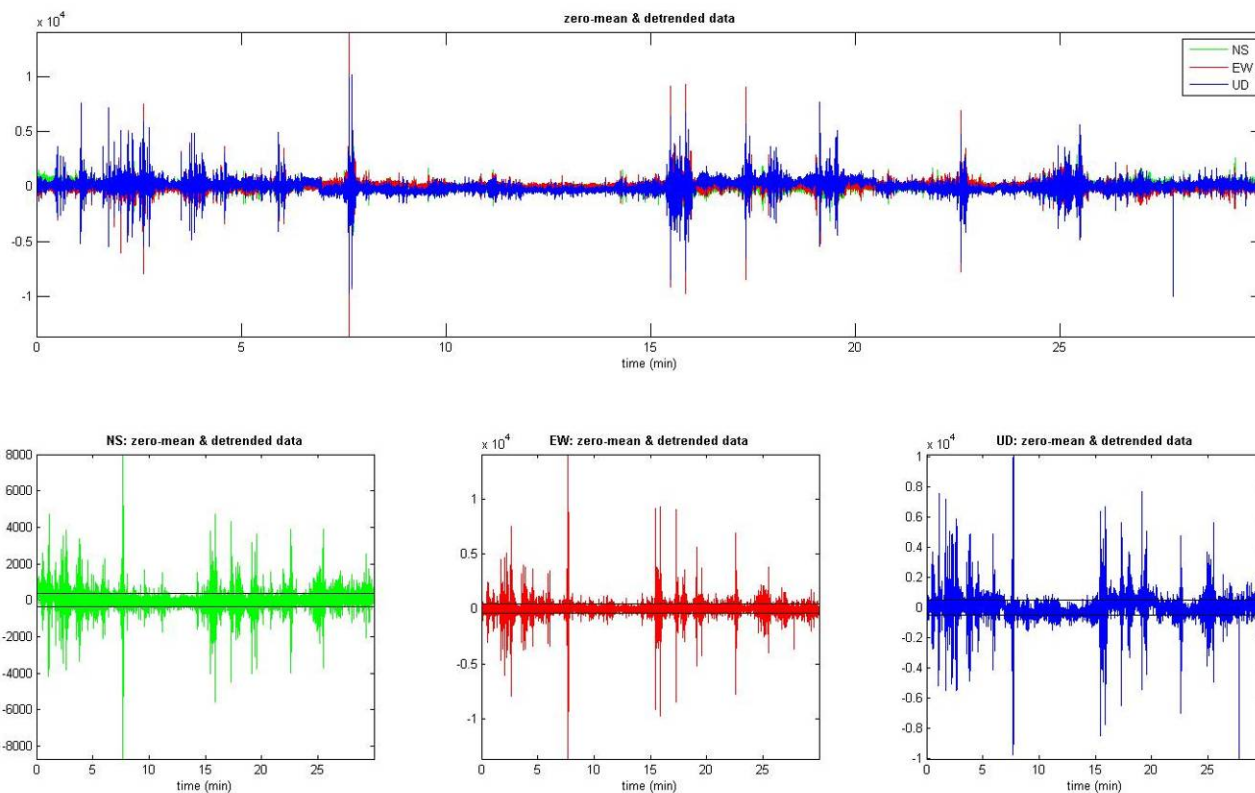
Loc. Valcanoro – Strada di Sant’Appiano

Coordinate WGS84: 43.487855, 11.148711

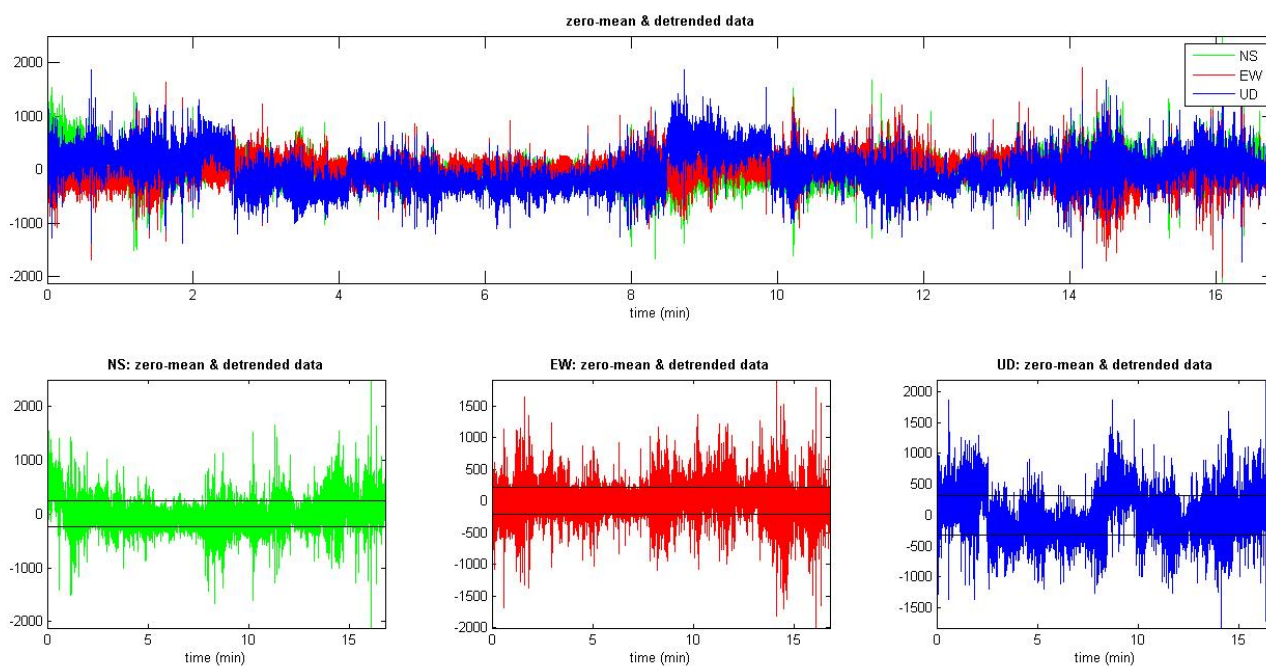
Data esecuzione prova : 04/07/2013 – 21.37/22.07 (durata 30 min)



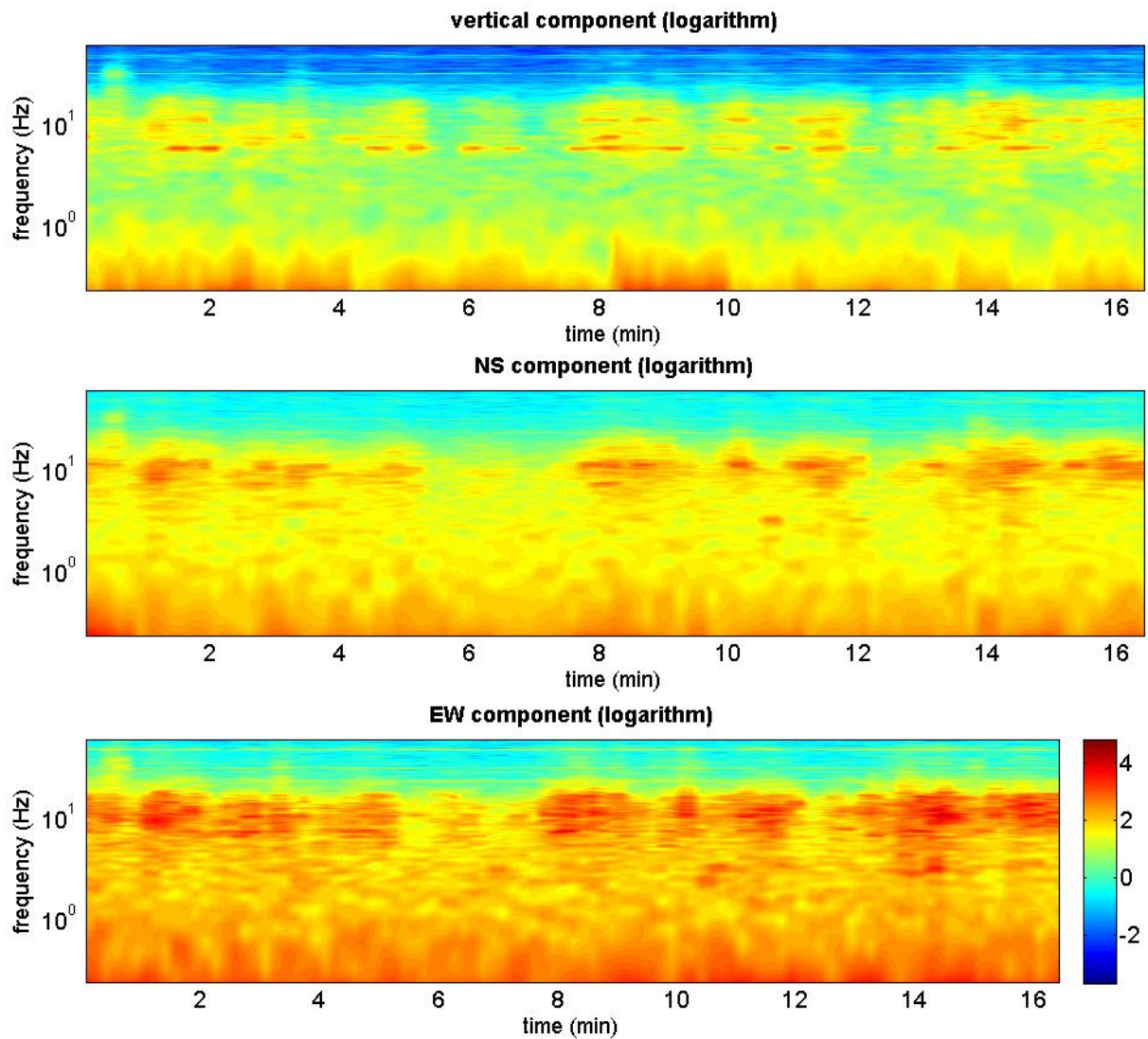
Prova “ZI-VALCANORO”



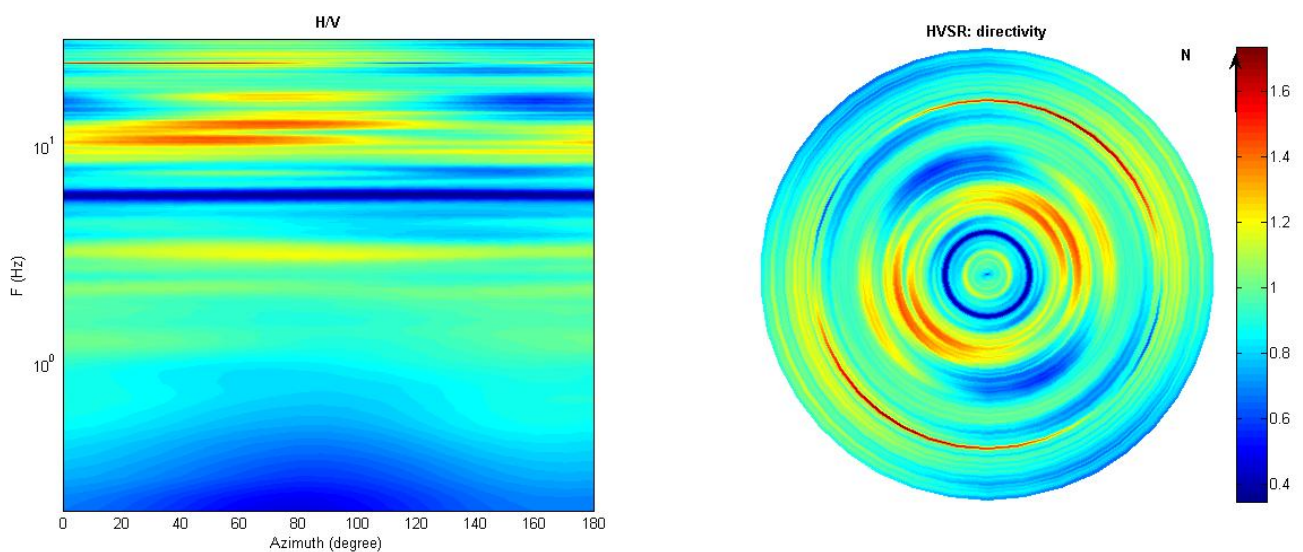
Prova “ZI-VALCANORO”: Dati originali



Prova “ZI-VALCANORO”: Dati ripuliti



Prova “ZI-VALCANORO”: Diagramma relativo alla stazionarietà del segnale



Prova “ZI-VALCANORO”: Diagramma relativo alla direzionalità del segnale

Horizontal-to-Vertical Spectral Ratio

www.winmasw.com

Date: 9 7 2013

Time: 17 45

Dataset: ZI-VALCANORO.SAF

Sampling frequency (Hz): 128

Window length (sec): 20

Length of analysed temporal sequence (min): 16.8

Tapering (%): 10

In the following the results considering the data in the 0.5-20.0Hz frequency range

Peak frequency (Hz): 10.7 (±4.5)

Peak HVSR value: 1.2 (±0.2)

Criteria for a reliable H/V curve

#1. [f0 > 10/Lw]: 10.7 > 0.5 (OK)

#2. [nc > 200]: 21233 > 200 (OK)

#3. [f0>0.5Hz; sigmaA(f) < 2 for 0.5f0 < f < 2f0] (OK)

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

#1. [exists f- in the range [f0/4, f0] | AH/V(f-) < A0/2]: yes, at frequency 6.4Hz (OK)

#2. [exists f+ in the range [f0, 4f0] | AH/V(f+) < A0/2]: (NO)

#3. [A0 > 2]: 1.2 < 2 (NO)

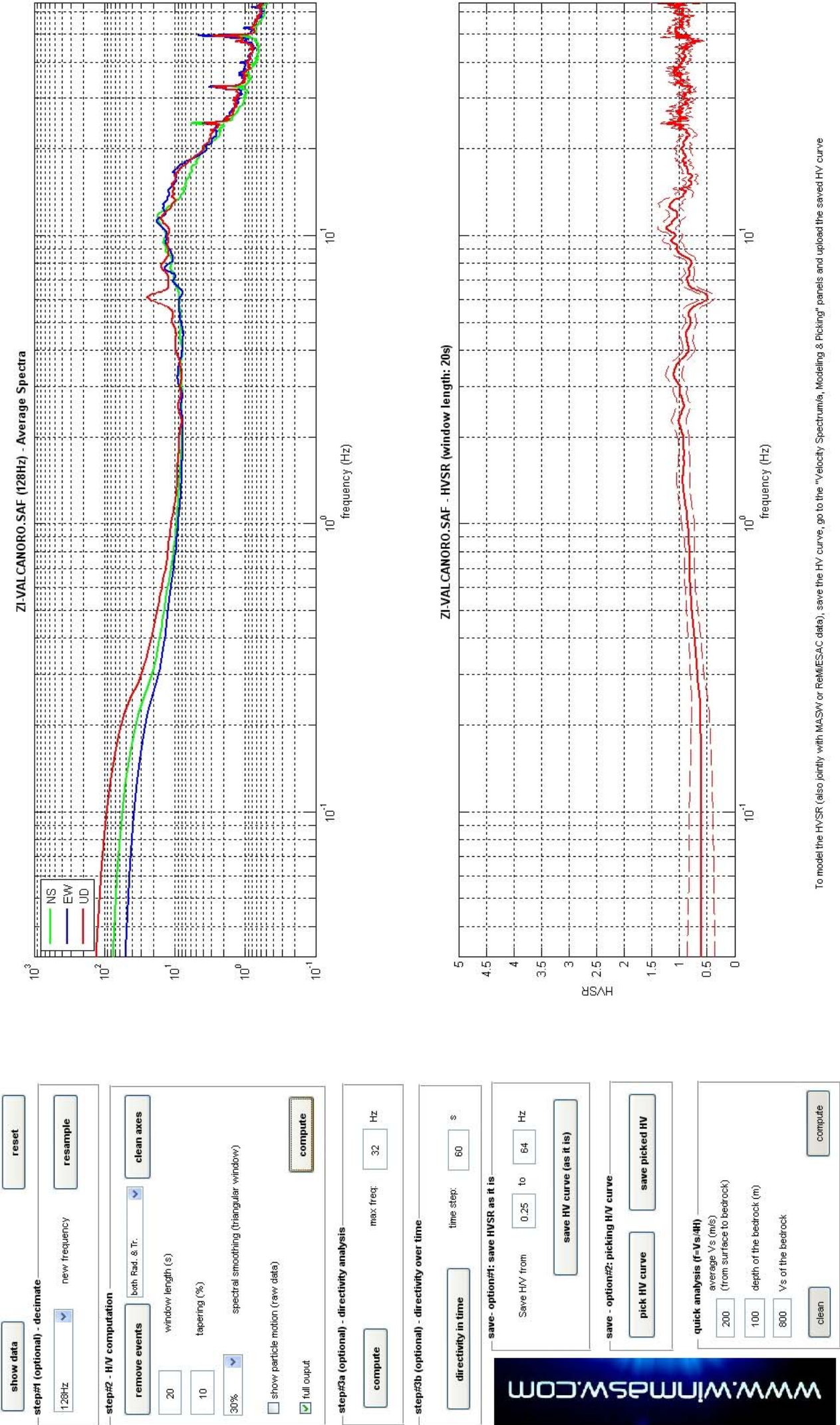
#4. [fpeak[Ah/v(f) ± sigmaA(f)] = f0 ± 5%]: (OK)

#5. [sigmaf < epsilon(f0)]: 4.516 > 0.536 (NO)

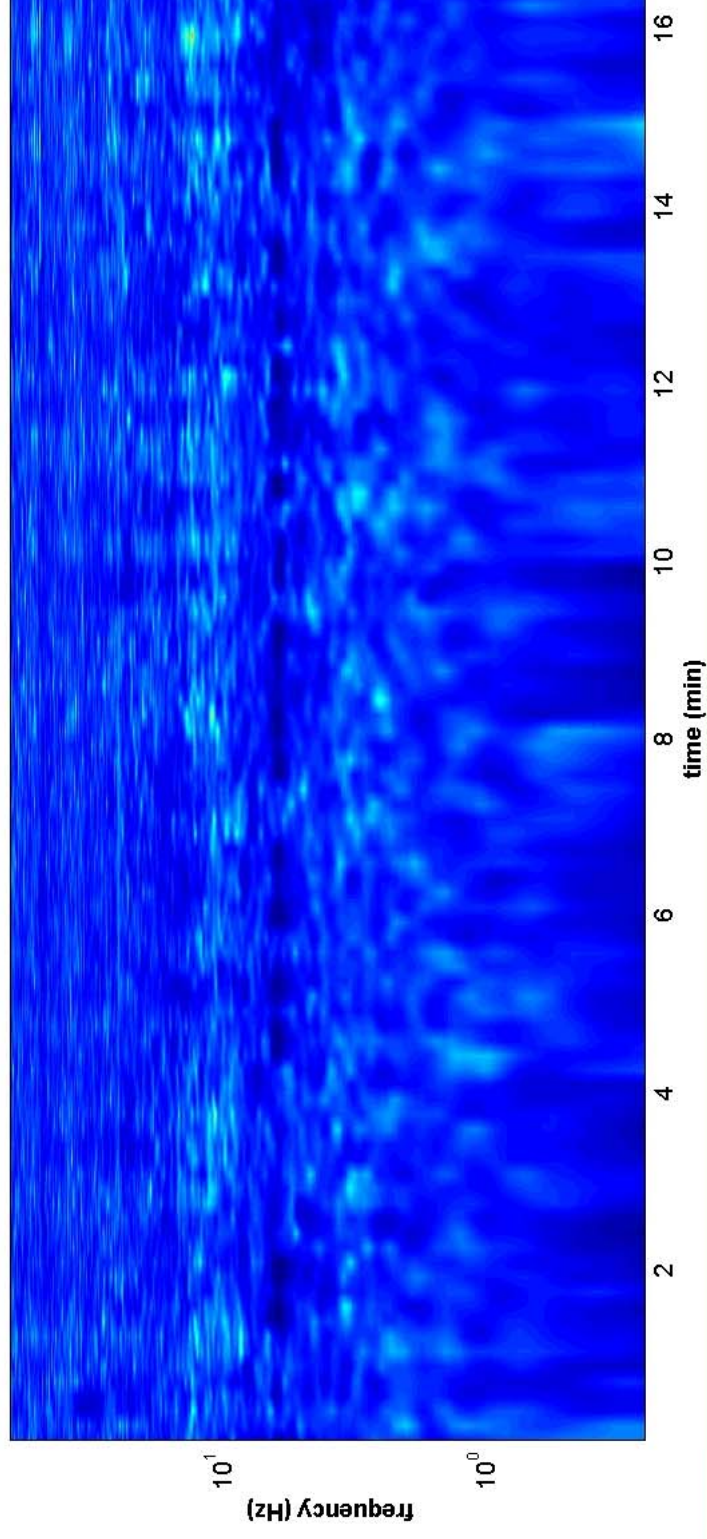
#6. [sigmaA(f0) < theta(f0)]: 0.160 < 1.58 (OK)

Please, be aware of possible industrial/man-induced peaks or spurious peaks due to meaningless numerical instabilities.

Remember that SESAME criteria should be considered in a flexible perspective and that if you modify the processing parameters they can change.



HVSR vs time

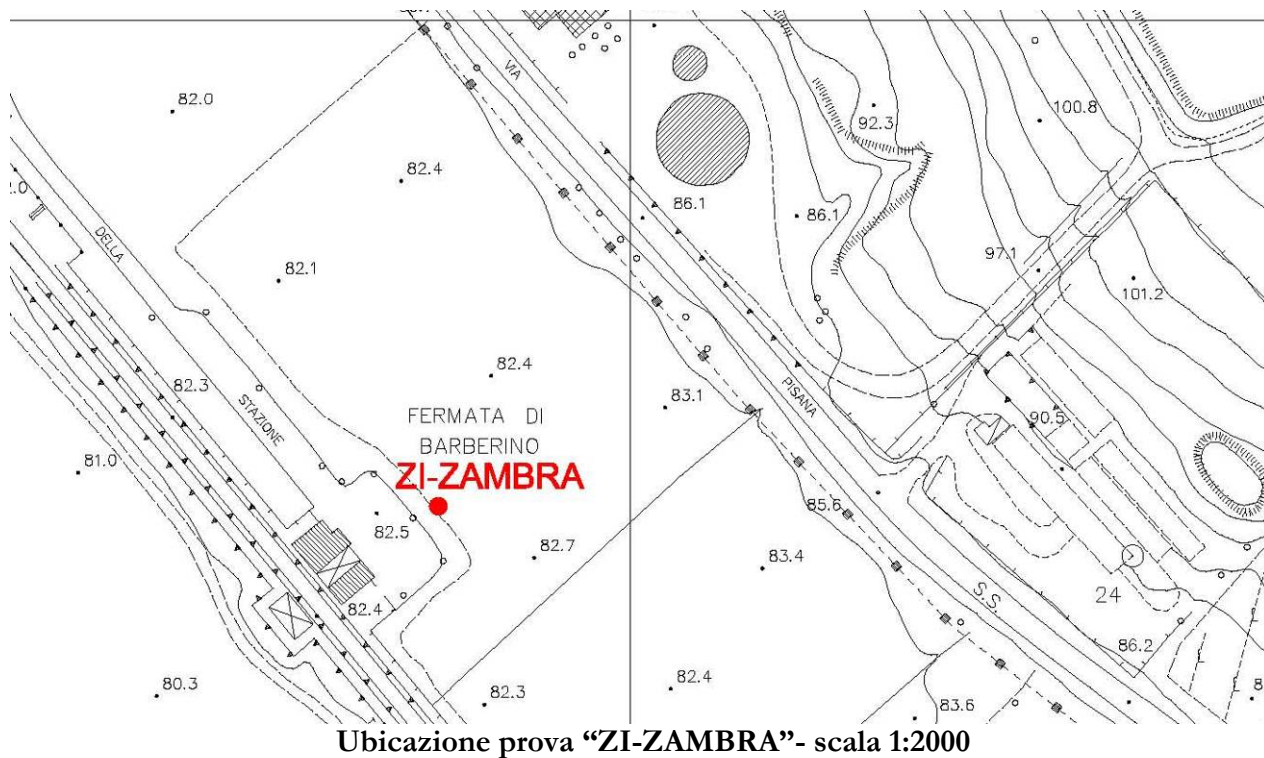


15. Prova HVSR “ZI-ZAMBRA”

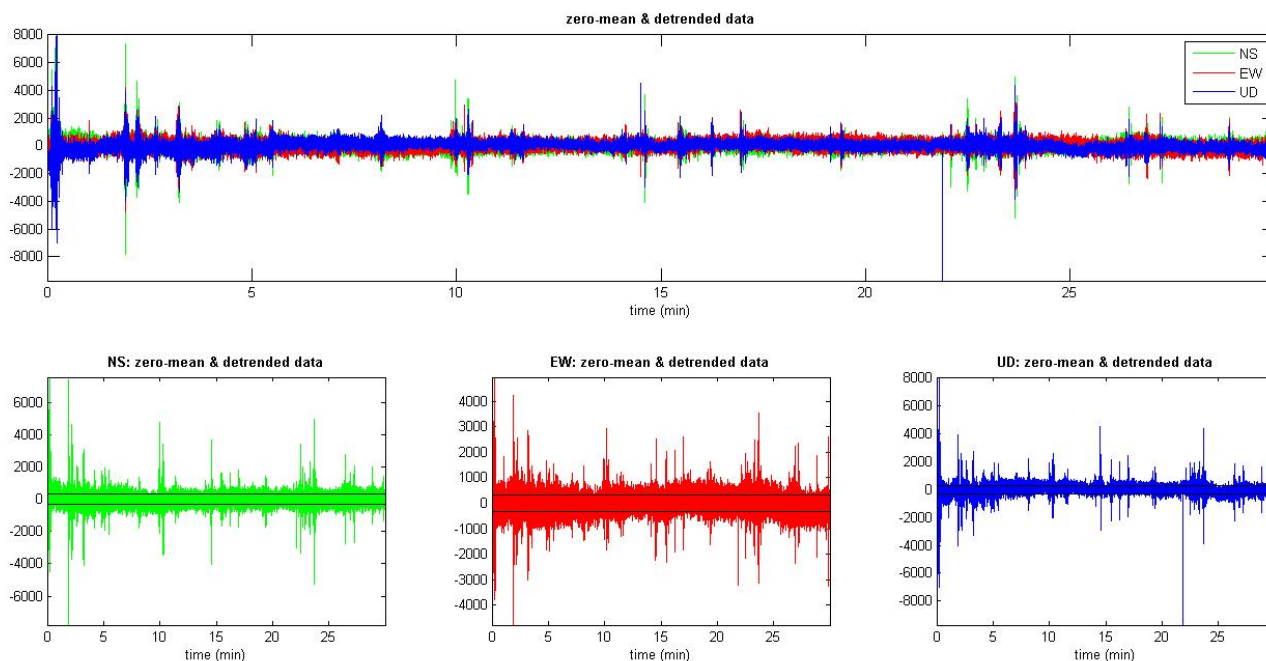
Loc. Zambra – Via della Stazione

Coordinate WGS84: 43.49945, 11.111694

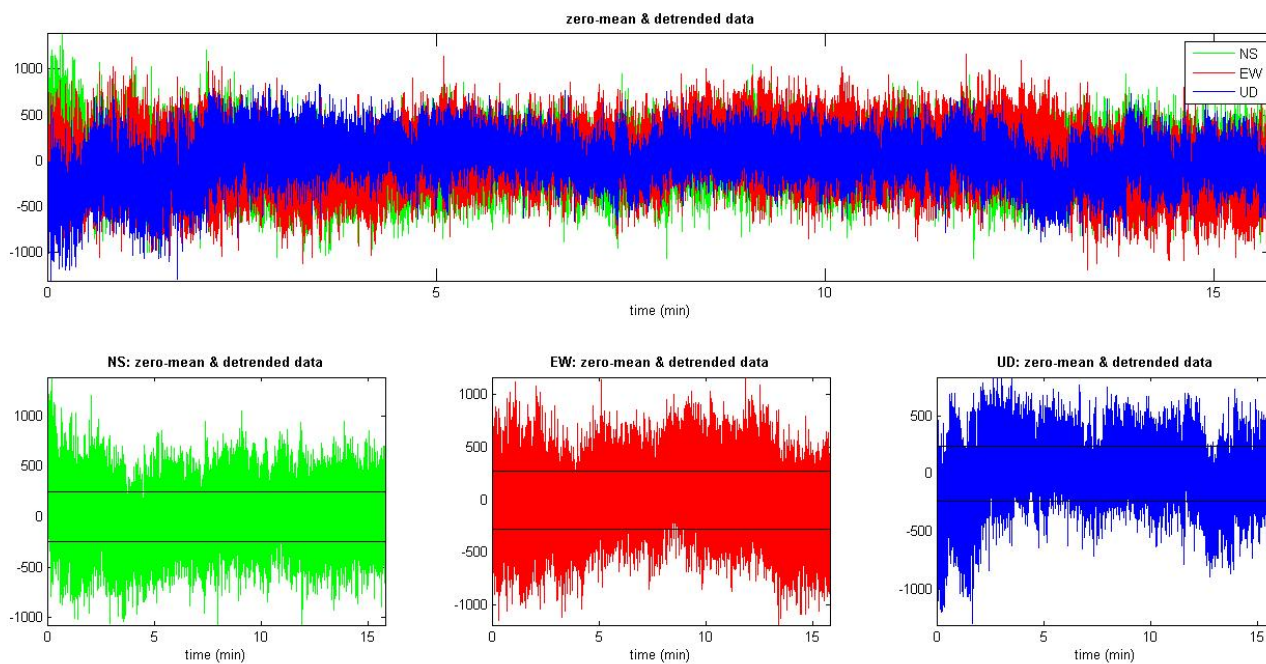
Data esecuzione prova : 03/07/2013 – 21.39/22.09 (durata 30 min)



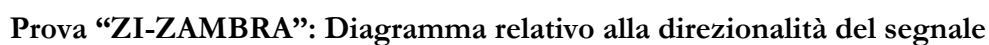
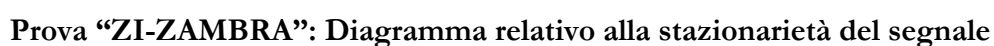
Prova “ZI-ZAMBRA”



Prova “ZI-ZAMBRA”: Dati originali



Prova “ZI-ZAMBRA”: Dati ripuliti



Horizontal-to-Vertical Spectral Ratio

www.winmasw.com

Date: 10 7 2013

Time: 11 33

Dataset: ZI-ZAMBRA.SAF

Sampling frequency (Hz): 128

Window length (sec): 20

Length of analysed temporal sequence (min): 15.8

Tapering (%): 10

In the following the results considering the data in the 0.5-20.0Hz frequency range

Peak frequency (Hz): 17.0 (± 2.9)

Peak HVSR value: 2.3 (± 0.4)

Criteria for a reliable H/V curve

#1. $[f0 > 10/Lw]$: 17.0 > 0.5 (OK)

#2. $[nc > 200]$: 31694 > 200 (OK)

#3. $[f0 > 0.5\text{Hz}; \sigma_A(f) < 2 \text{ for } 0.5f0 < f < 2f0]$ (OK)

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

#1. $[\text{exists } f^- \text{ in the range } [f0/4, f0] \mid AH/V(f^-) < A0/2]$: yes, at frequency 14.3Hz (OK)

#2. $[\text{exists } f^+ \text{ in the range } [f0, 4f0] \mid AH/V(f^+) < A0/2]$: (NO)

#3. $[A0 > 2]$: 2.3 > 2 (OK)

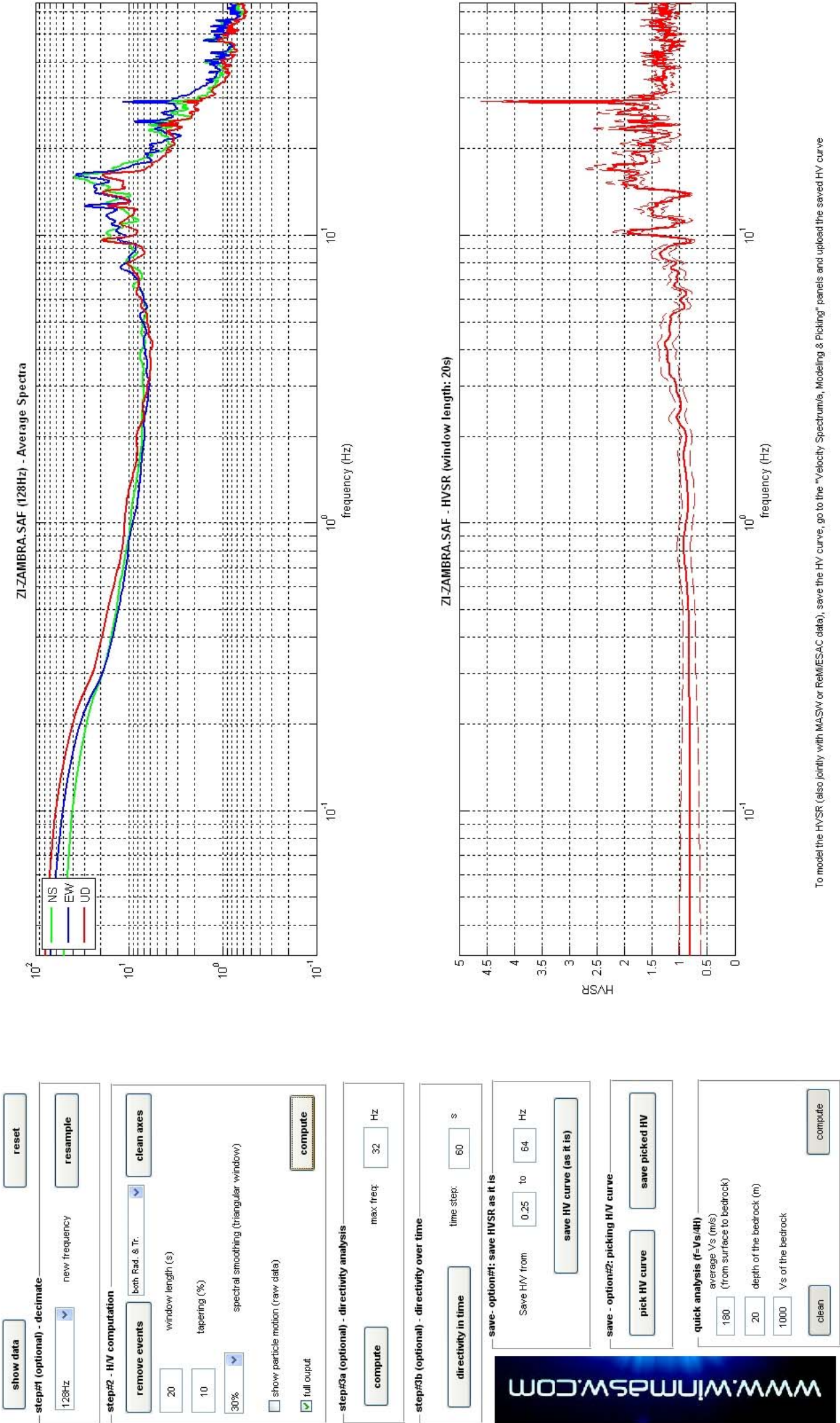
#4. $[f_{peak}[Ah/v(f) \pm \sigma_A(f)] = f0 \pm 5\%]$: (OK)

#5. $[\sigma_A(f) < \epsilon(f0)]$: 2.886 > 0.852 (NO)

#6. $[\sigma_A(f0) < \theta(f0)]$: 0.378 < 1.58 (OK)

Please, be aware of possible industrial/man-induced peaks or spurious peaks due to meaningless numerical instabilities.

Remember that SESAME criteria should be considered in a flexible perspective and that if you modify the processing parameters they can change.



HVSR vs time

