Piano Strutturale Comunale

COMUNE DI MIRANDOLA
Provincia di Modena

Sindaco: Maino Benatti

Assessore Economia e Sviluppo Sostenibile: Roberto Ganzerli

B - SISTEMA NATURALE E AMBIENTALE
MICROZONAZIONE SISMICA

Rapporti di prova delle indagini geognostiche e geofisiche

Comune di Mirandola
Servizio urbanistica

Arch. Adele Rampolla
Arch. Carlo Caleffi
Geom. Angela Zibordi

gruppo di lavoro:

Studio di Geologia Tarabusi

Dott. Geol. Gabriele Tarabusi
Dott. Geol. Ruggero Mazzoni
Dott. Geol. Margherita Aguzzi

Adozione: delibera C.C. n. 60 del 09/04/2014

Approvazione: delibera C.C. n. 111 del 27/07/2015

Elaborato

QC_B_REL3 ALL

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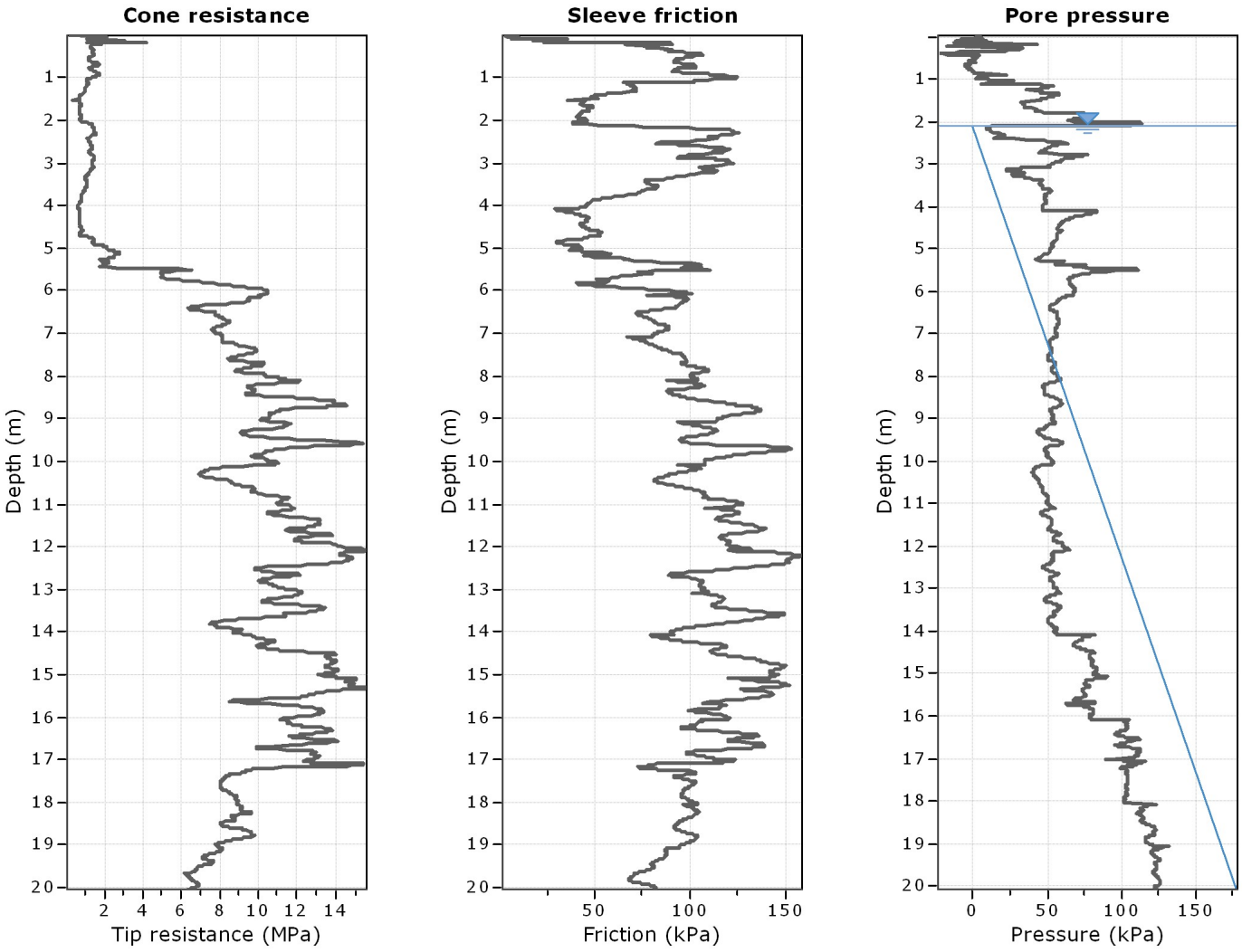
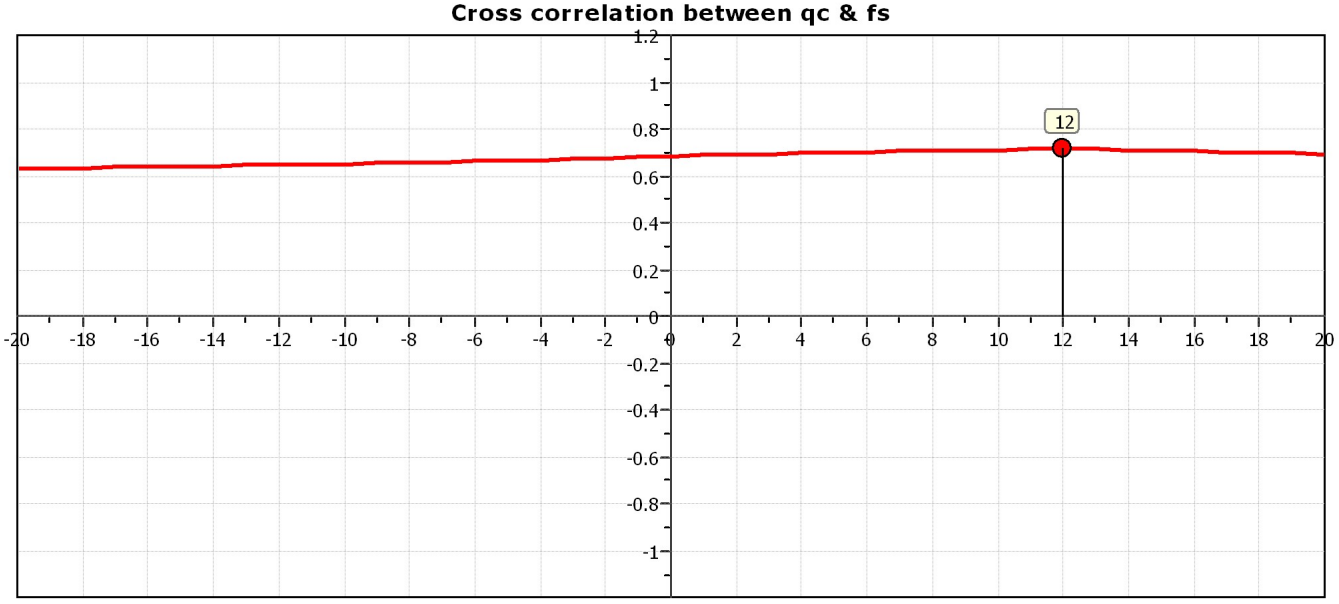
Viale A.Oriani 42
40137 Bologna
http://www.studiotarabusi.it

CPT: CPTU1
Total depth: 20.04 m, Date: 19/01/2015
Coords: lat 44.536556° lon 11.035418°
Cone Type: Pagani
Cone Operator: Calzolari

Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**



The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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Location: **Mirandola (MO)**

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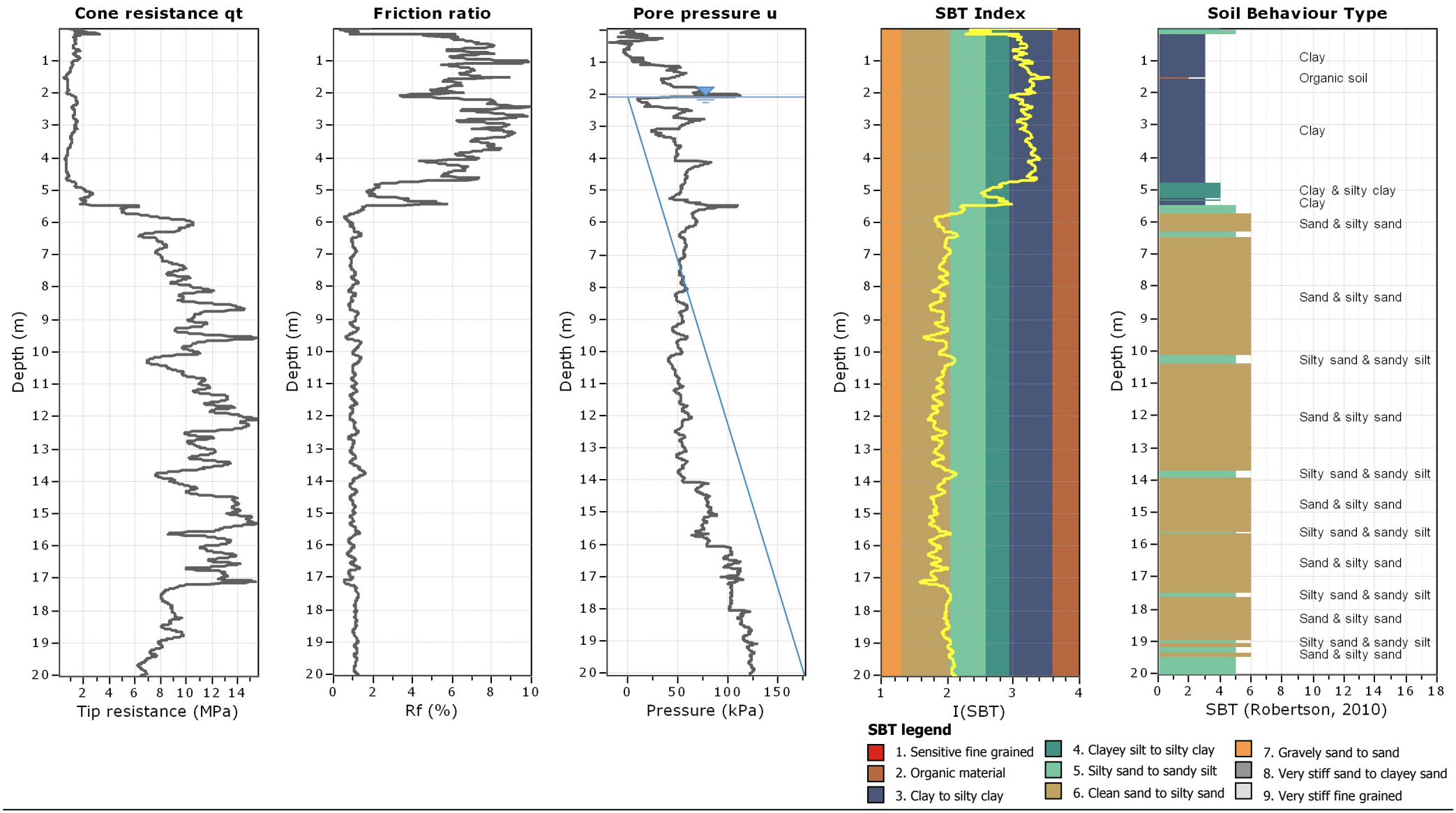

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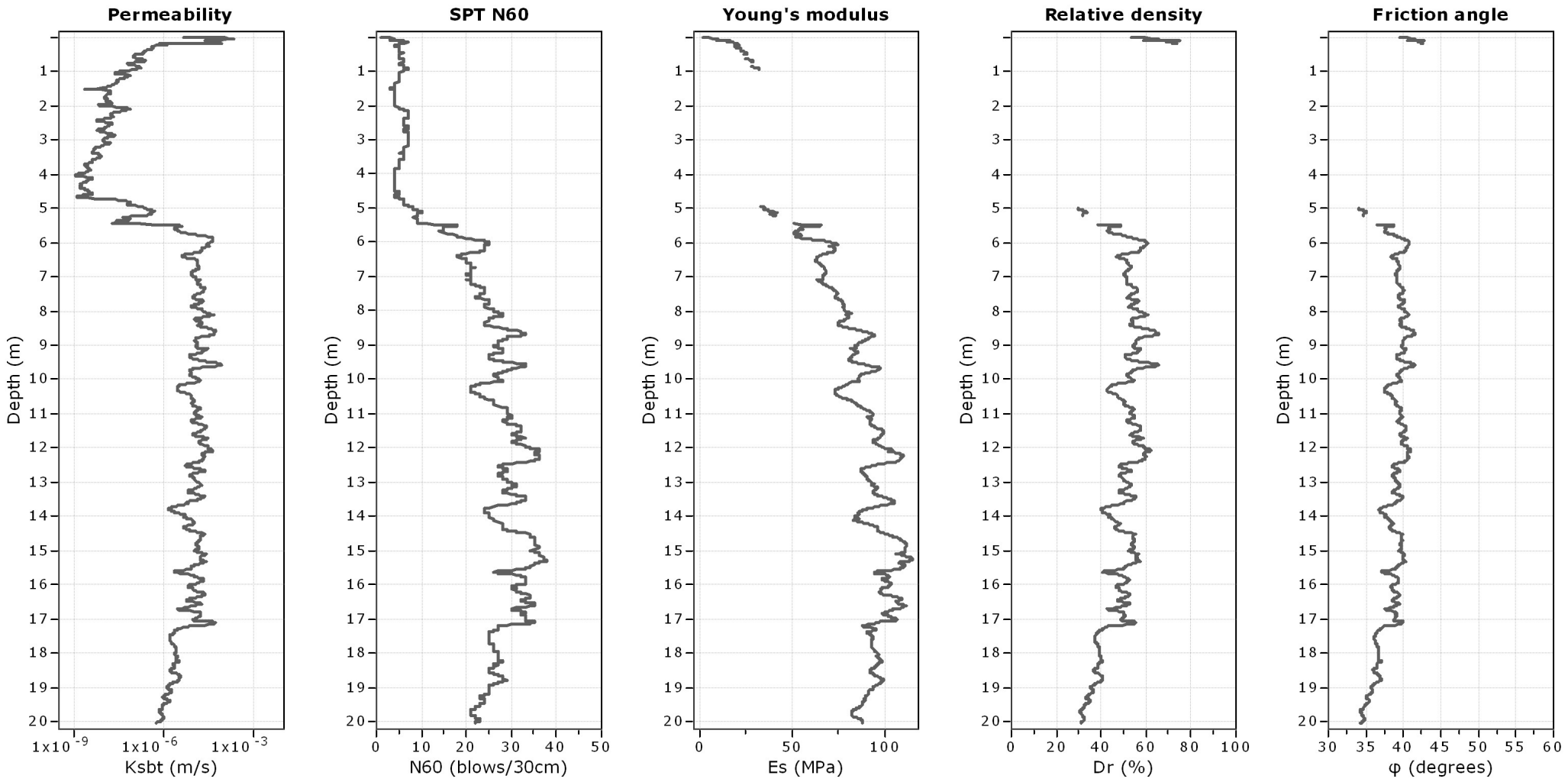

Calculation parameters

Permeability: Based on SBT_n
SPT N_{60}: Based on I_c and q_t
Young's modulus: Based on variable alpha using I_c (Robertson, 2009)
Relative desnisty constant, C_{Dr}: 350.0
Phi: Based on Kulhawy & Mayne (1990)
User defined estimation data

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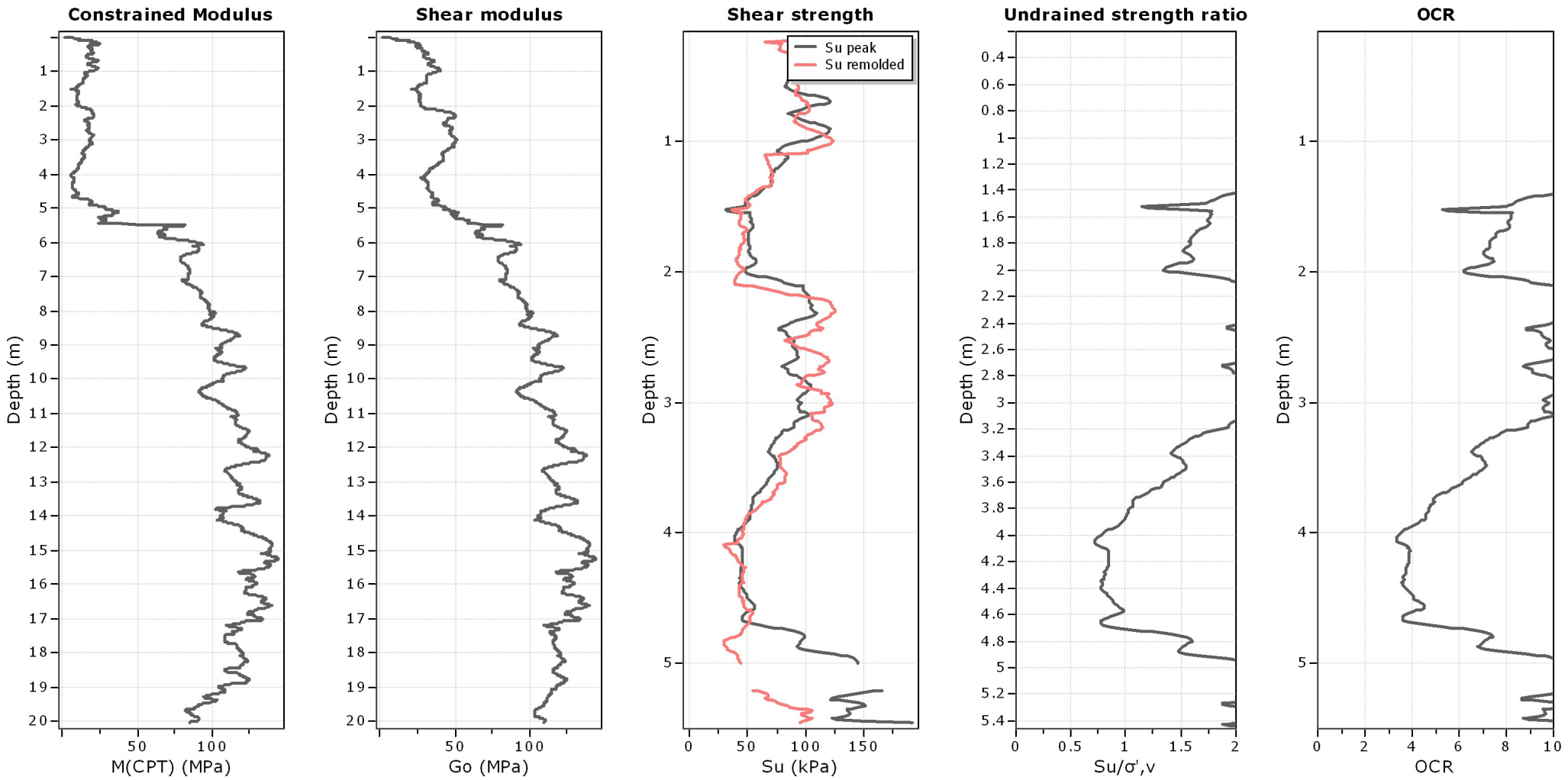

Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable *alpha* using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: 14
OCR factor for clays, N_{kt}: 0.33
User defined estimation data

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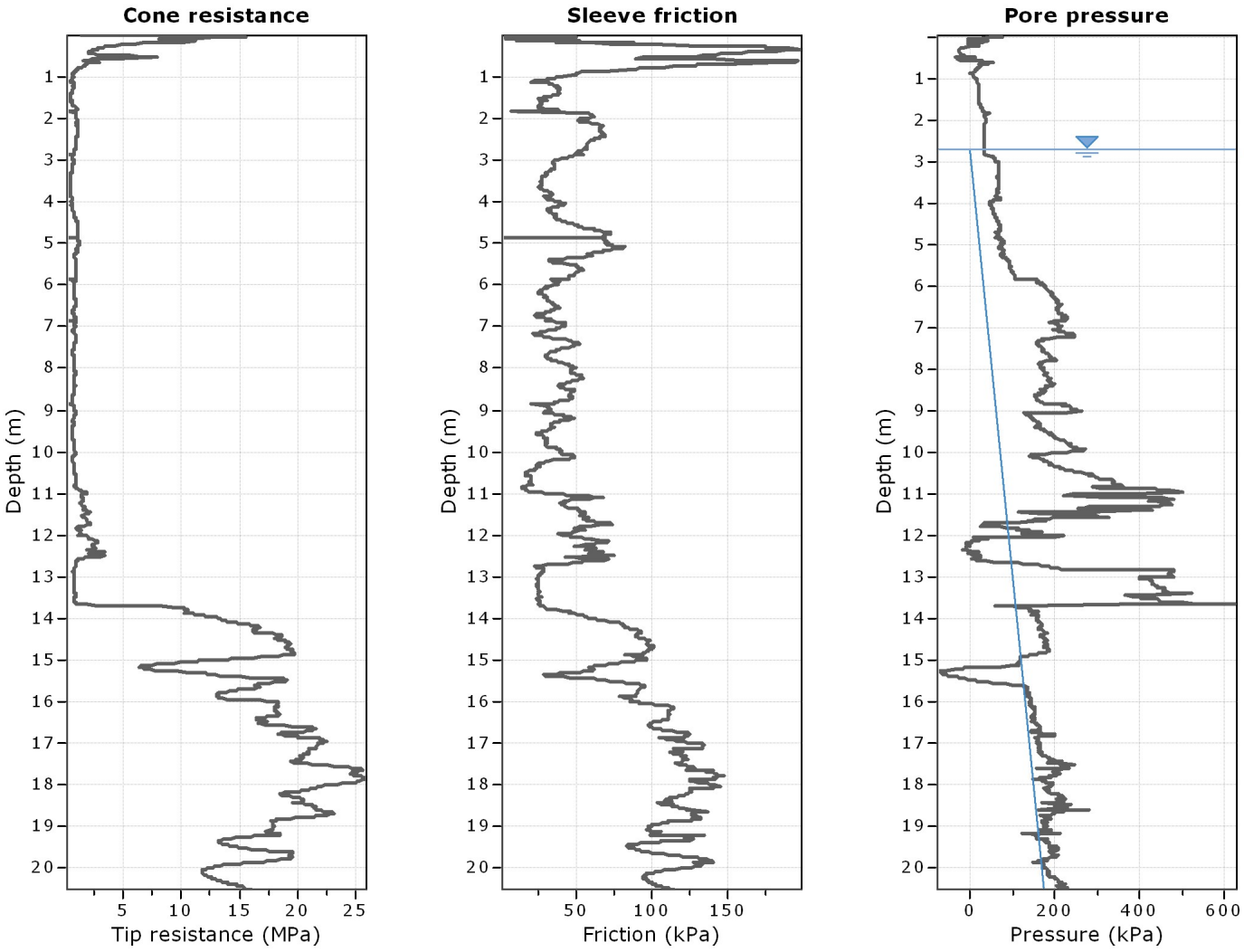
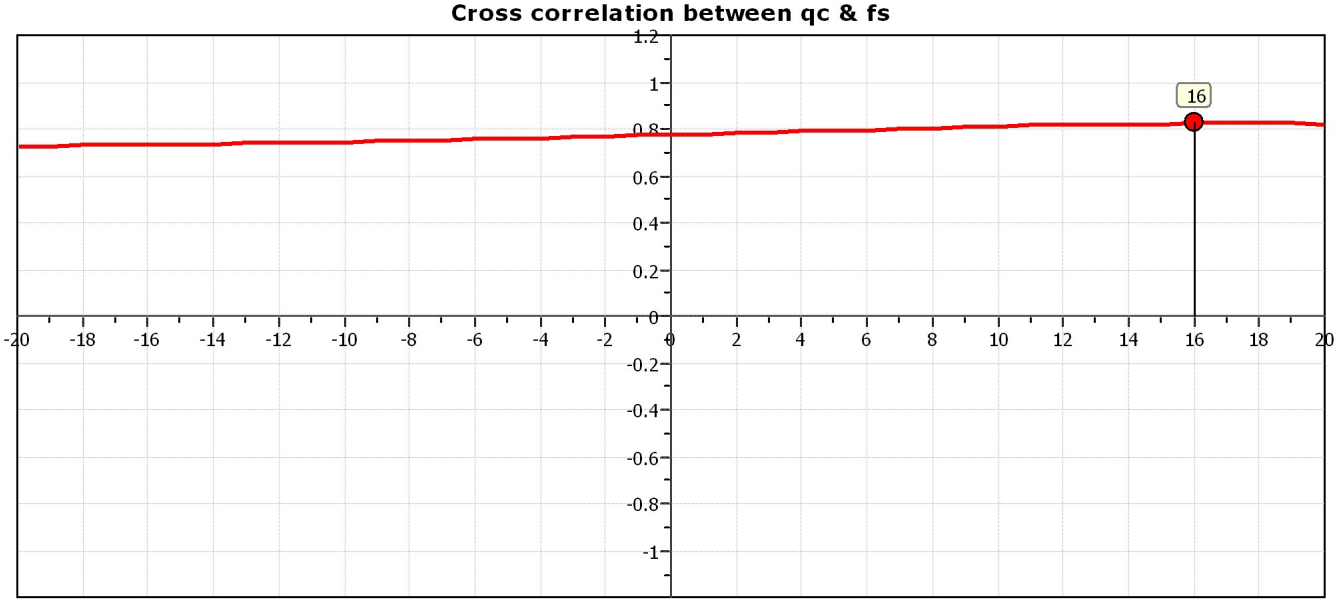
CPT: CPTU2
Total depth: 20.50 m, Date: 25/02/2014
Coords: lat 44.541577° lon 11.035248°
Cone Type: Pagani
Cone Operator: Calzolari

Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**



The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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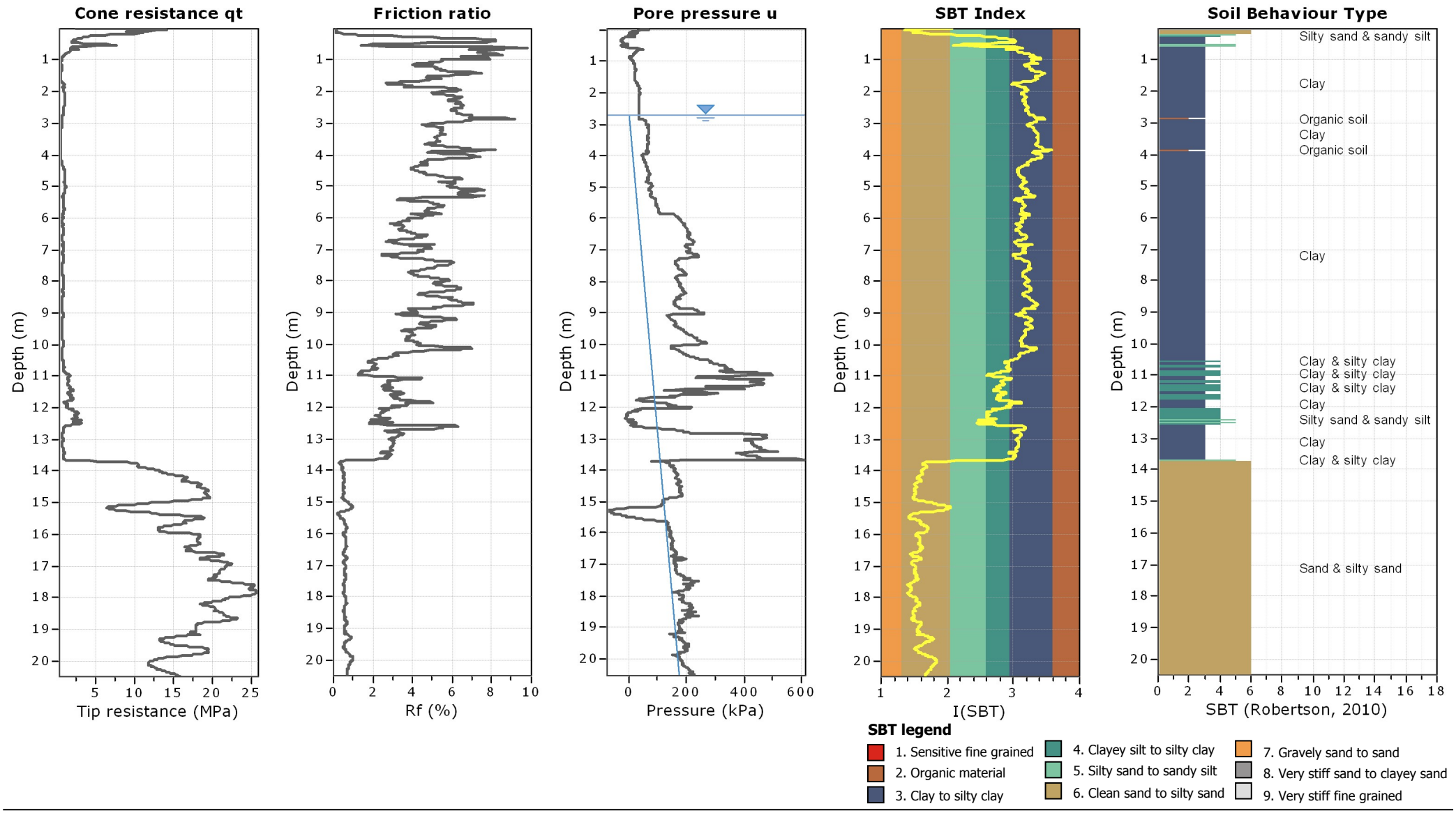
Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**

CPT: CPTU2
Total depth: 20.50 m, Date: 25/02/2014
Coords: lat 44.541577° lon 11.035248°
Cone Type: Pagani
Cone Operator: Calzolari



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Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**

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Coords: lat 44.541577° lon 11.035248°
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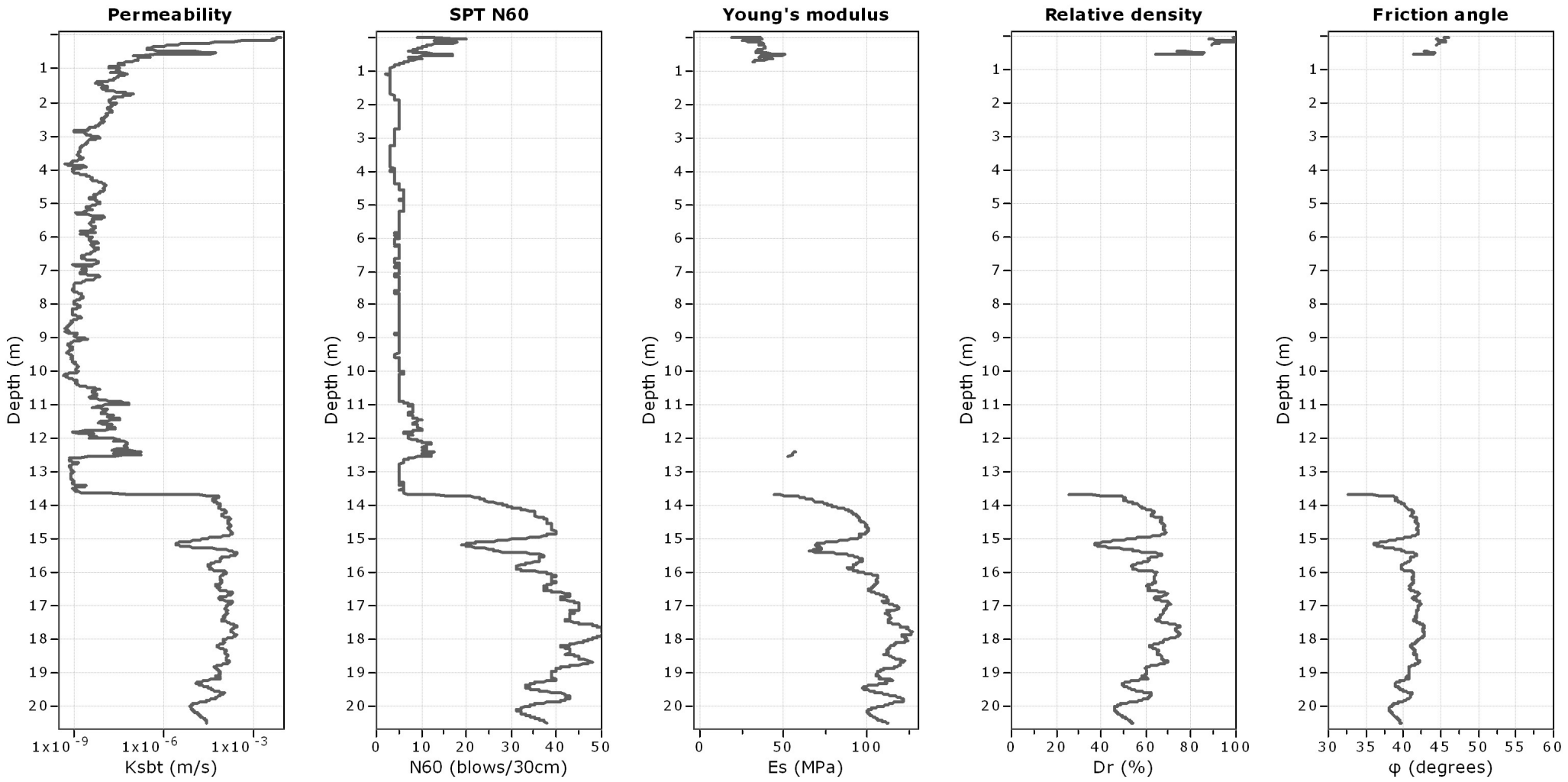
Cone Operator: Calzolari



Calculation parameters

Permeability: Based on SBT_n
SPT N_{60}: Based on I_c and q_t
Young's modulus: Based on variable alpha using I_c (Robertson, 2009)
Relative desnisty constant, C_{Dr}: 350.0
Phi: Based on Kulhawy & Mayne (1990)
User defined estimation data

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Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**

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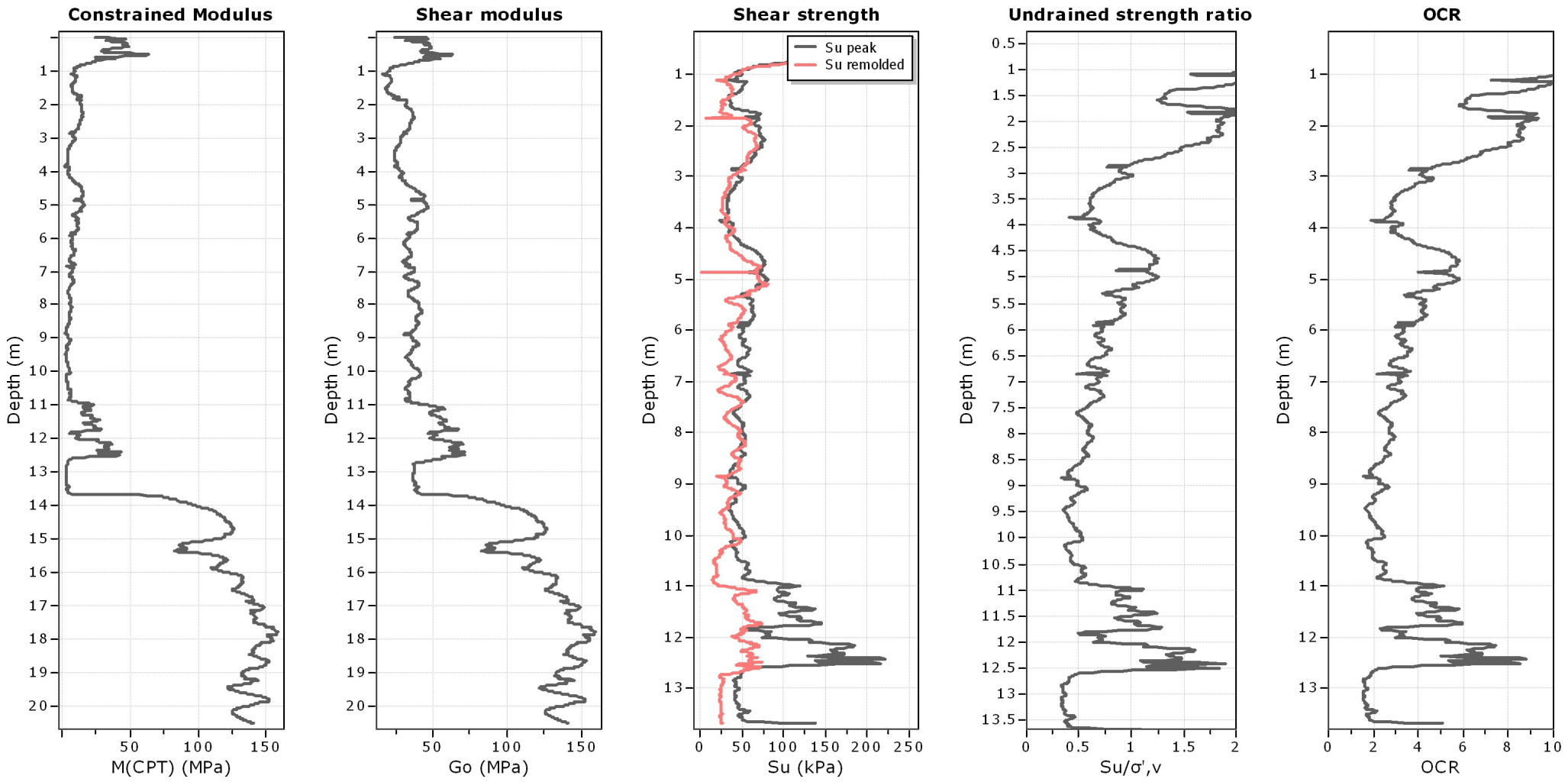
Coords: lat 44.541577° lon 11.035248°
Cone Type: Pagani
Cone Operator: Calzolari



Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable *alpha* using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: 14
OCR factor for clays, N_{kt}: 0.33
User defined estimation data

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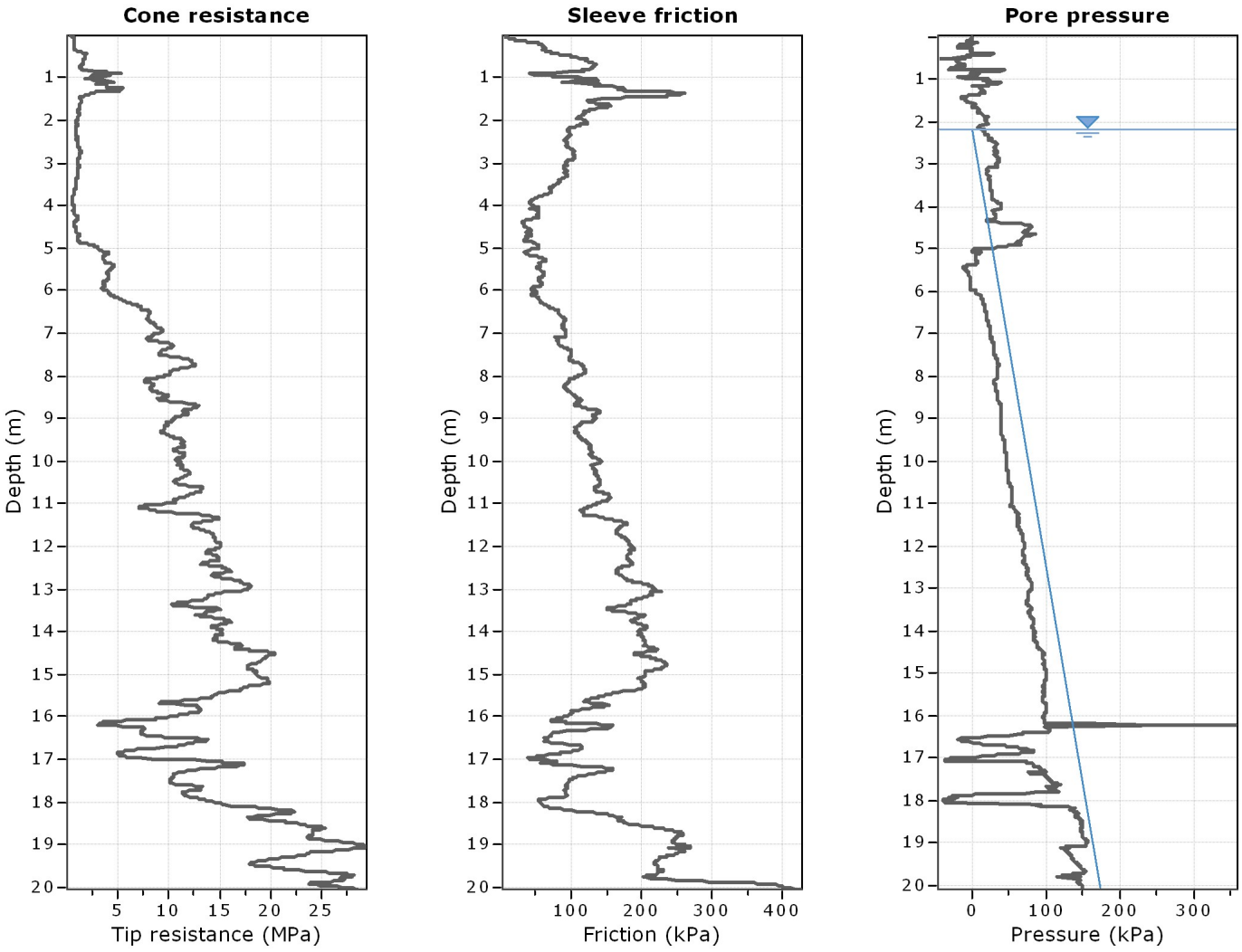
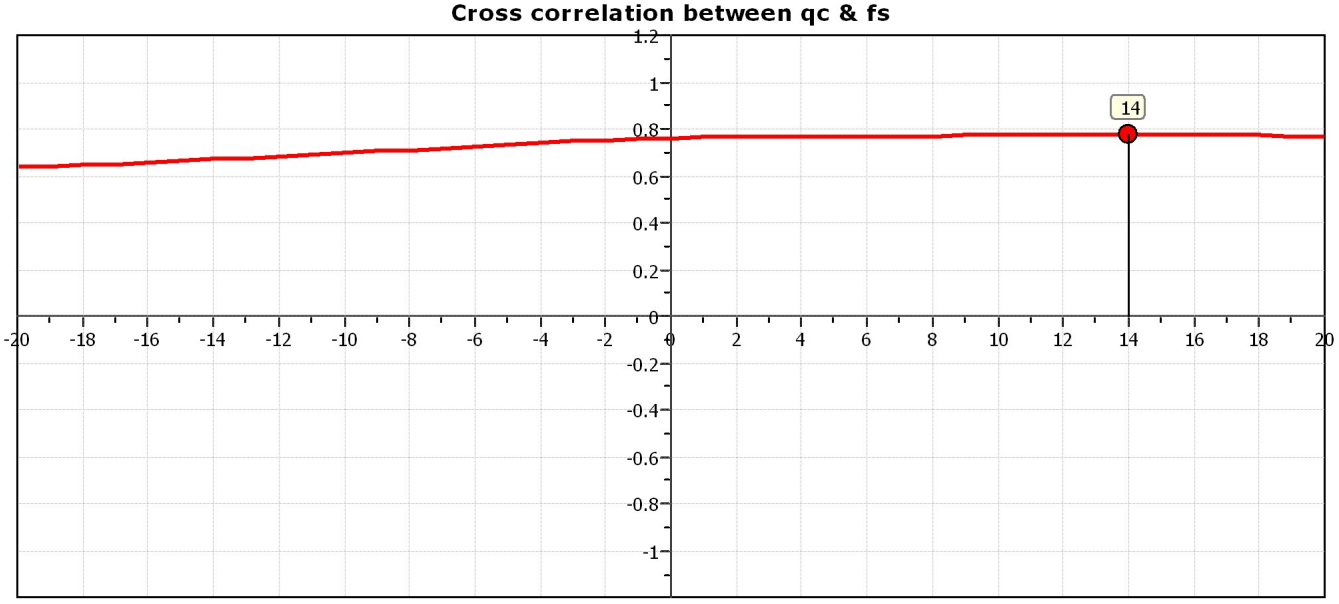
CPT: CPTU3
Total depth: 20.05 m, Date: 19/01/2015
Coords: lat 44.539123° lon 11.048923°
Cone Type: Pagani
Cone Operator: Calzolari

Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**



The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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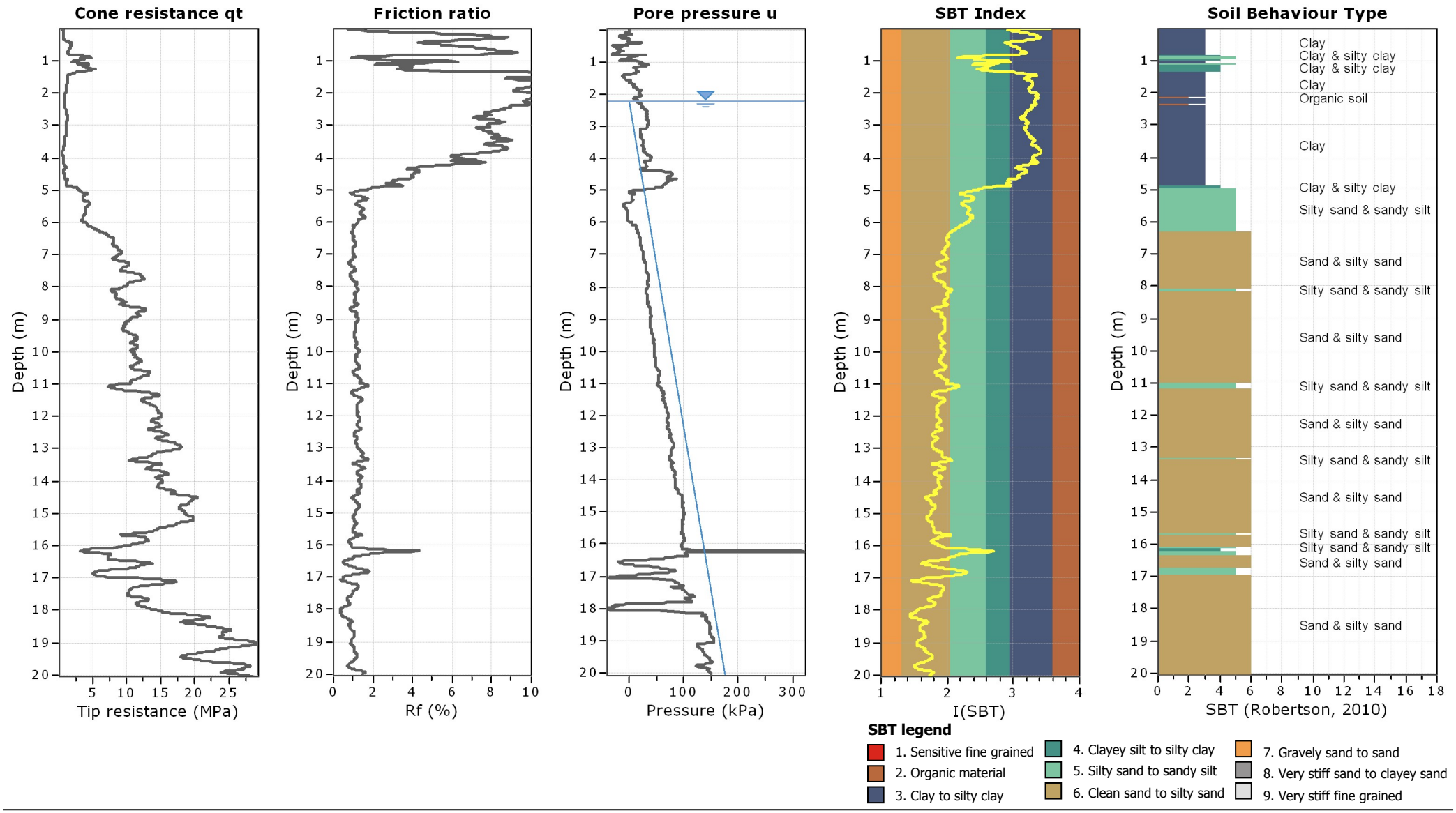
Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**

CPT: CPTU3
Total depth: 20.05 m, Date: 19/01/2015
Coords: lat 44.539123° lon 11.048923°
Cone Type: Pagani
Cone Operator: Calzolari



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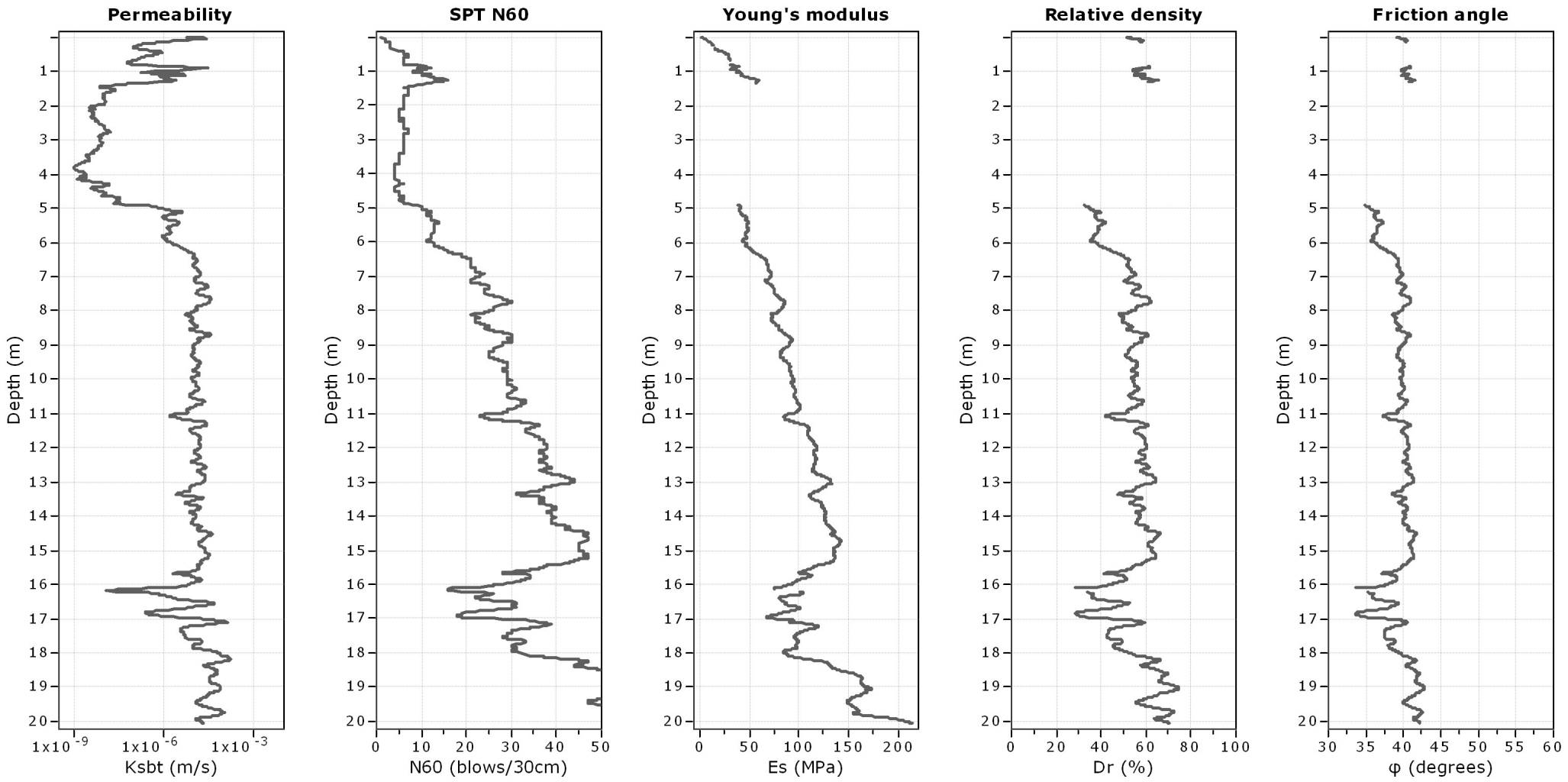
Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**

CPT: CPTU3
Total depth: 20.05 m, Date: 19/01/2015
Coords: lat 44.539123° lon 11.048923°
Cone Type: Pagani
Cone Operator: Calzolari



Calculation parameters

Permeability: Based on SBT_n
SPT N_{60}: Based on I_c and q_t
Young's modulus: Based on variable alpha using I_c (Robertson, 2009)
Relative desnisty constant, C_{Dr}: 350.0
Phi: Based on Kulhawy & Mayne (1990)
User defined estimation data

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Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**

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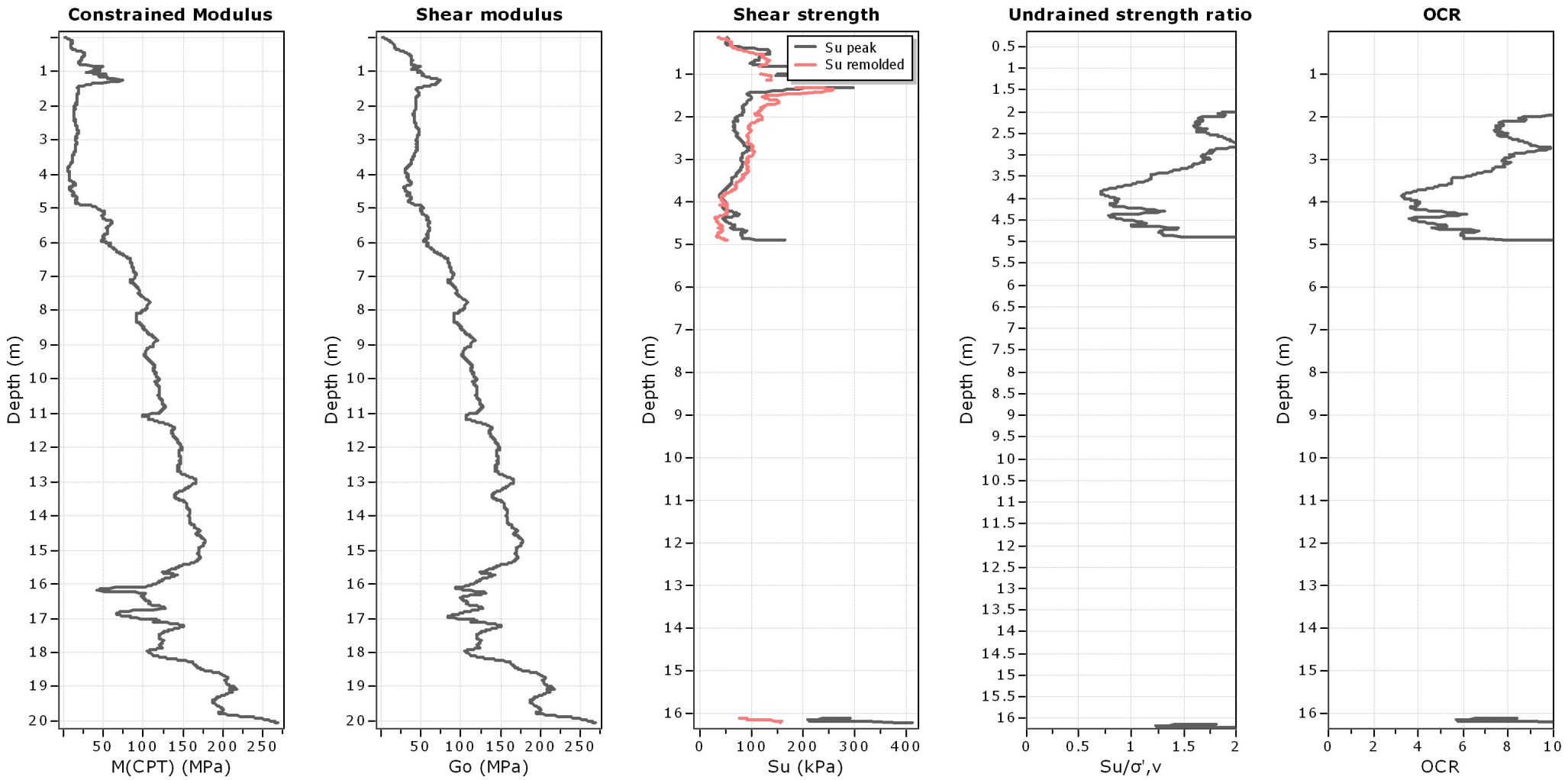
Coords: lat 44.539123° lon 11.048923°
Cone Type: Pagani
Cone Operator: Calzolari



Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable *alpha* using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: 14
OCR factor for clays, N_{kt}: 0.33
User defined estimation data

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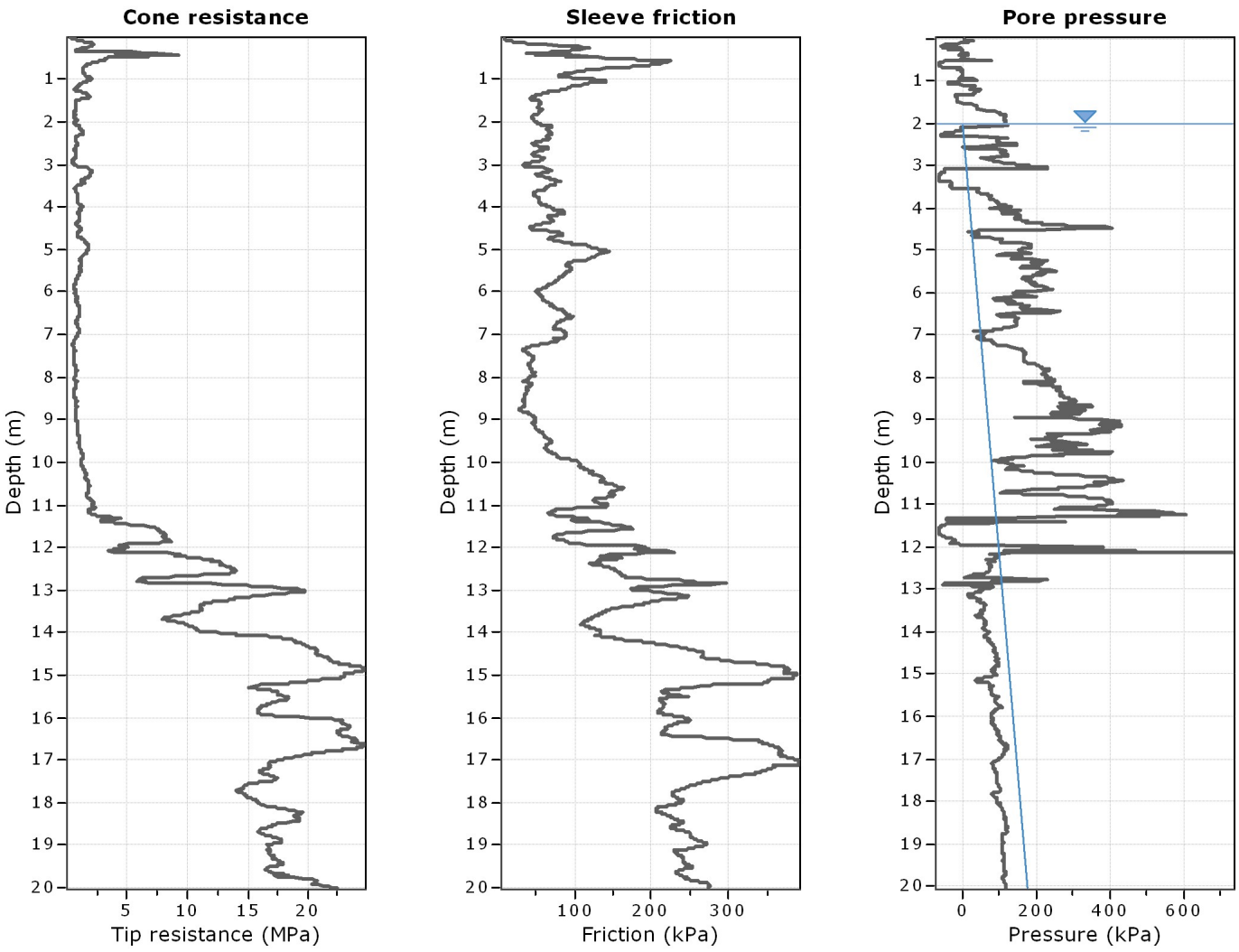
CPT: CPTU4
Total depth: 20.04 m, Date: 19/01/2015
Coords: lat 44.529712° lon 11.047505°
Cone Type: Pagani
Cone Operator: Calzolari

Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**



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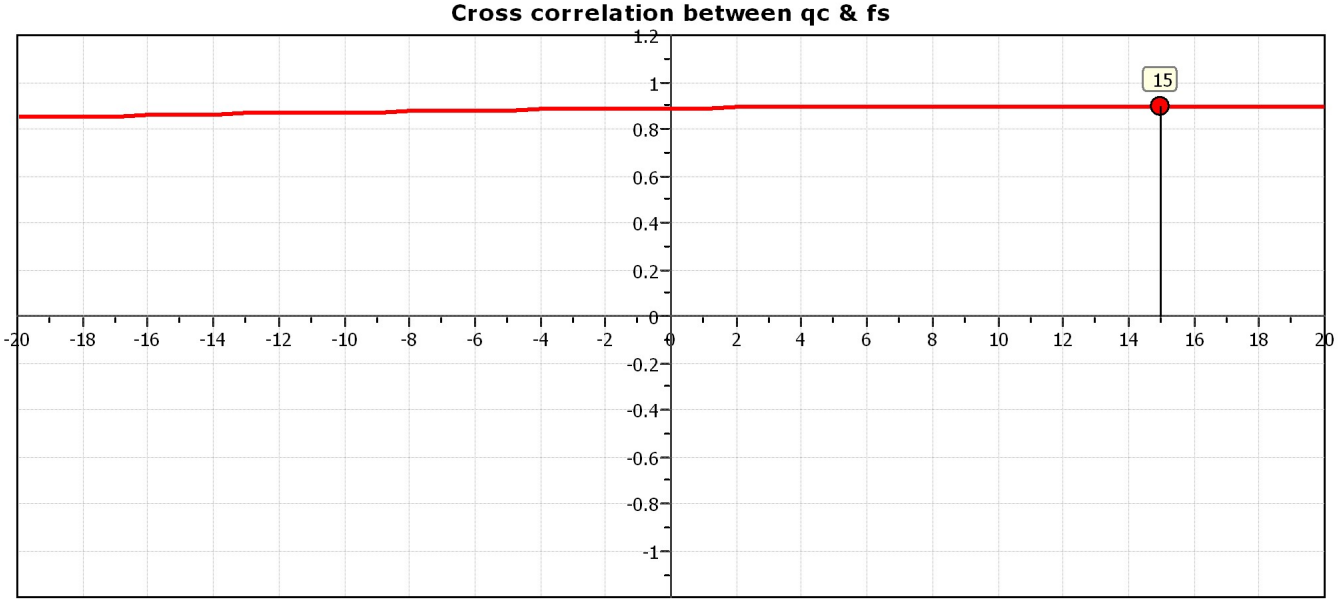

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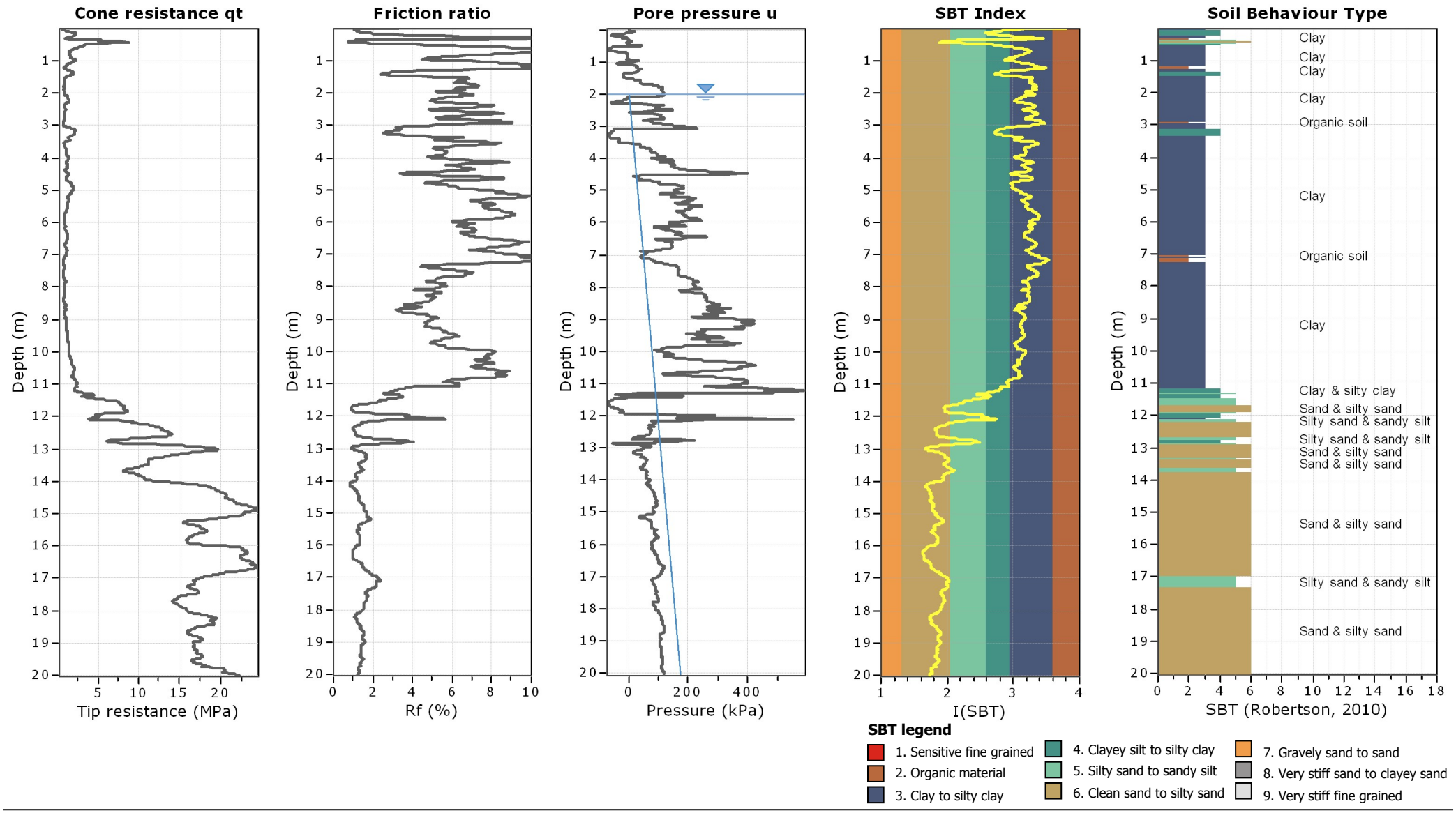
http://www.studiotarabusi.it

Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**

CPT: CPTU4
Total depth: 20.04 m, Date: 19/01/2015
Coords: lat 44.529712° lon 11.047505°
Cone Type: Pagani
Cone Operator: Calzolari



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Project: **PSC MIRANDOLA 2015**
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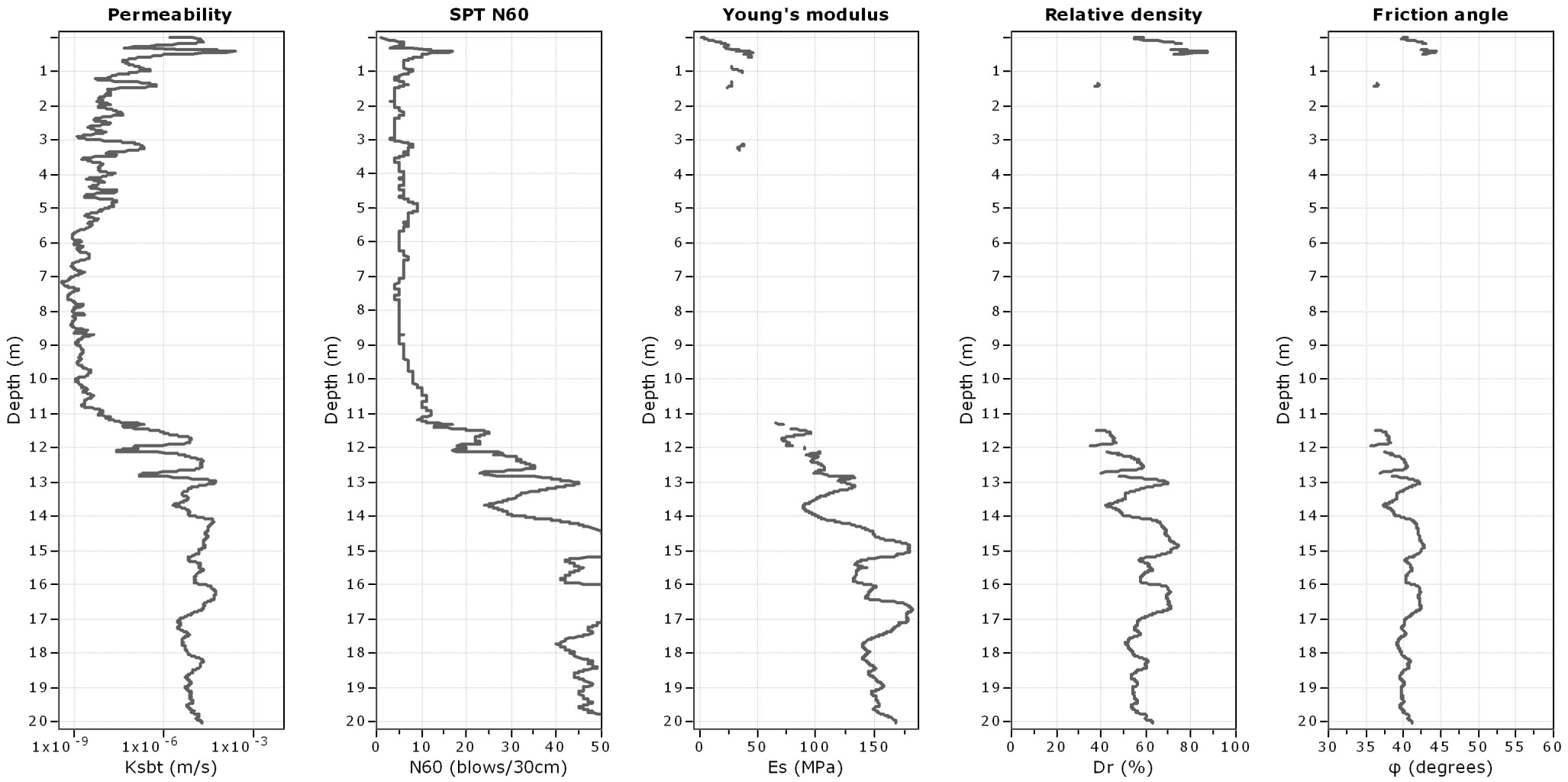
Cone Operator: Calzolari



Calculation parameters

Permeability: Based on SBT_n
SPT N_{60}: Based on I_c and q_t
Young's modulus: Based on variable alpha using I_c (Robertson, 2009)
Relative desnisty constant, C_{Dr}: 350.0
Phi: Based on Kulhawy & Mayne (1990)
User defined estimation data

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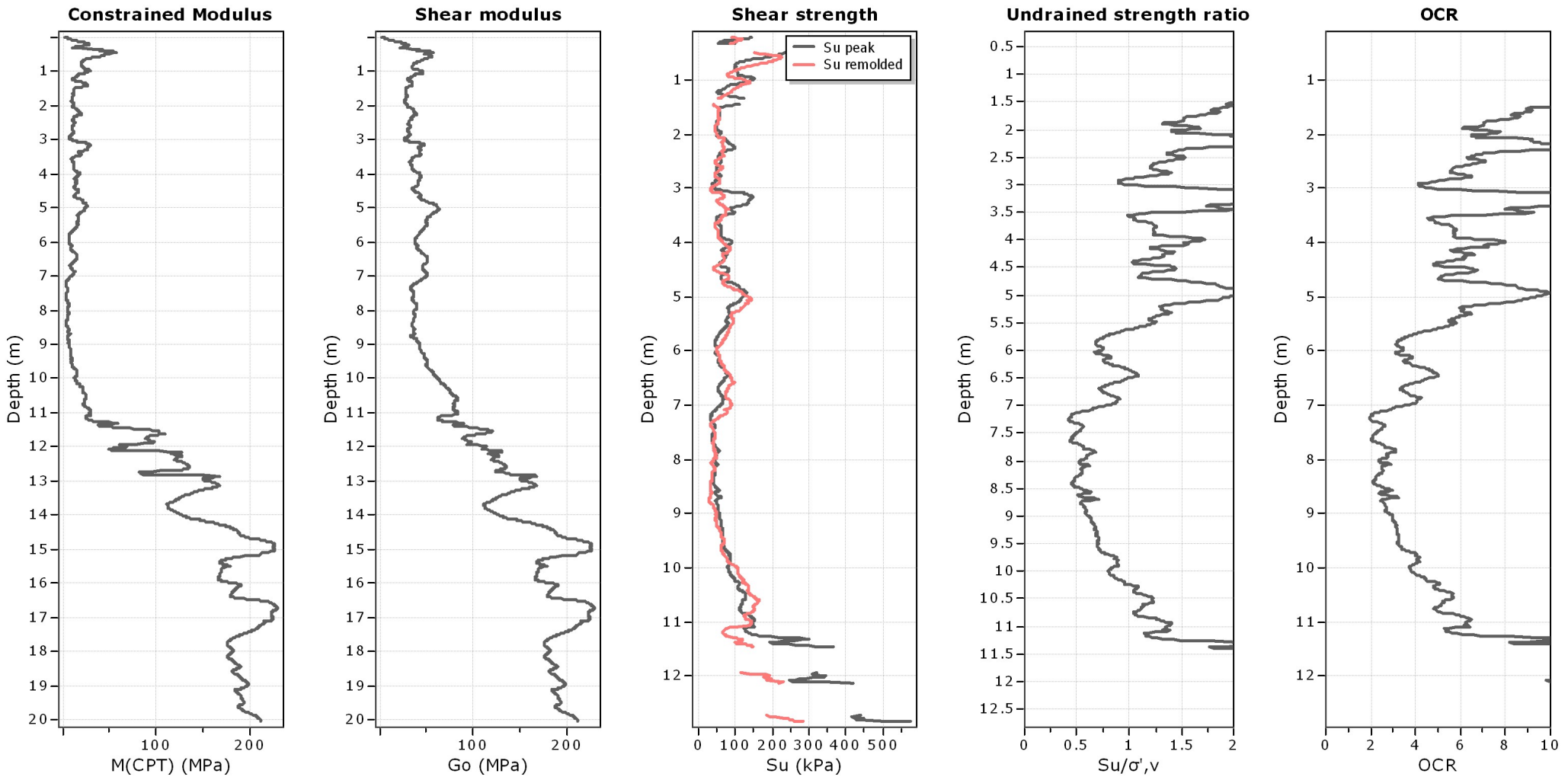

Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable *alpha* using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: 14
OCR factor for clays, N_{kt}: 0.33
User defined estimation data

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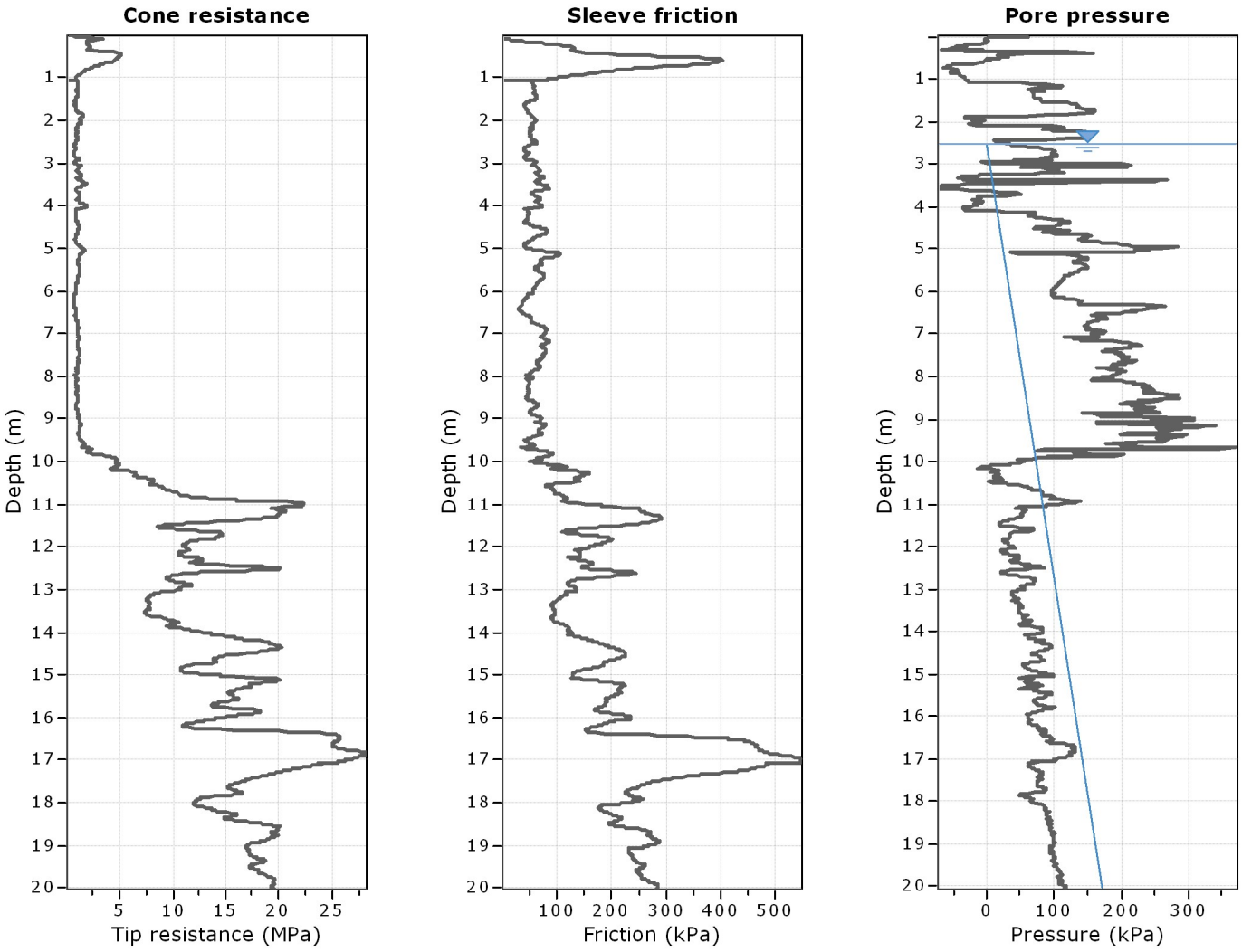
CPT: CPTU5
Total depth: 20.03 m, Date: 19/01/2015
Coords: lat 44.528221° lon 11.046985°
Cone Type: Pagani
Cone Operator: Calzolari

Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**



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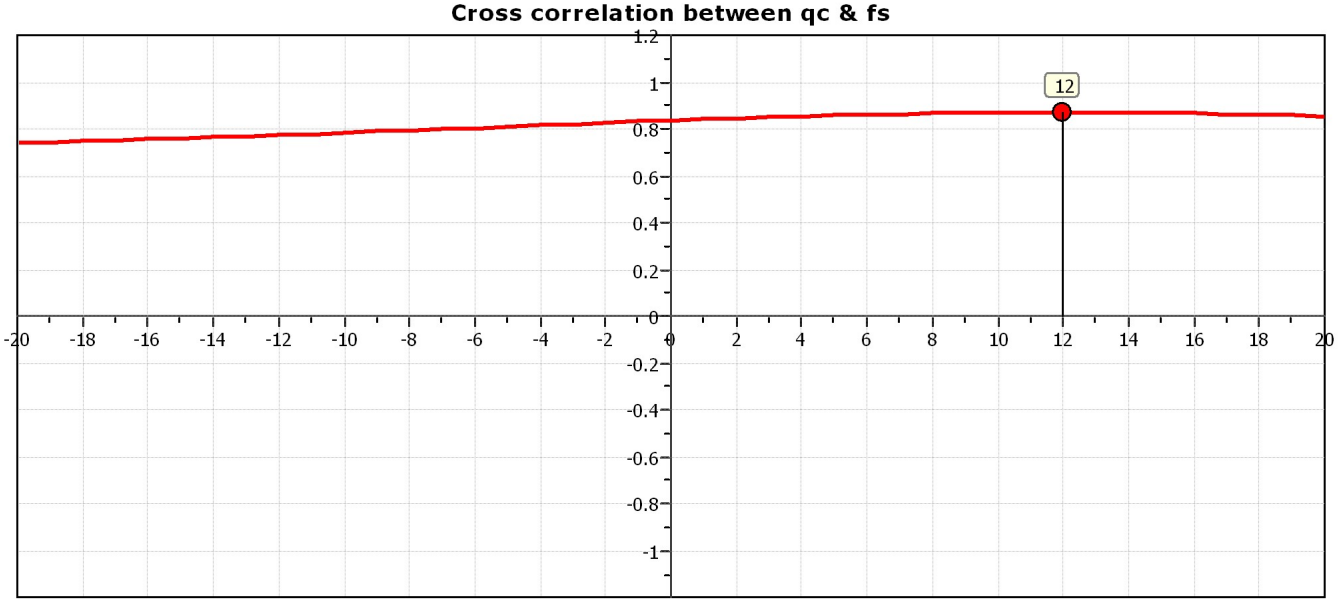

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Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**

CPT: CPTU5
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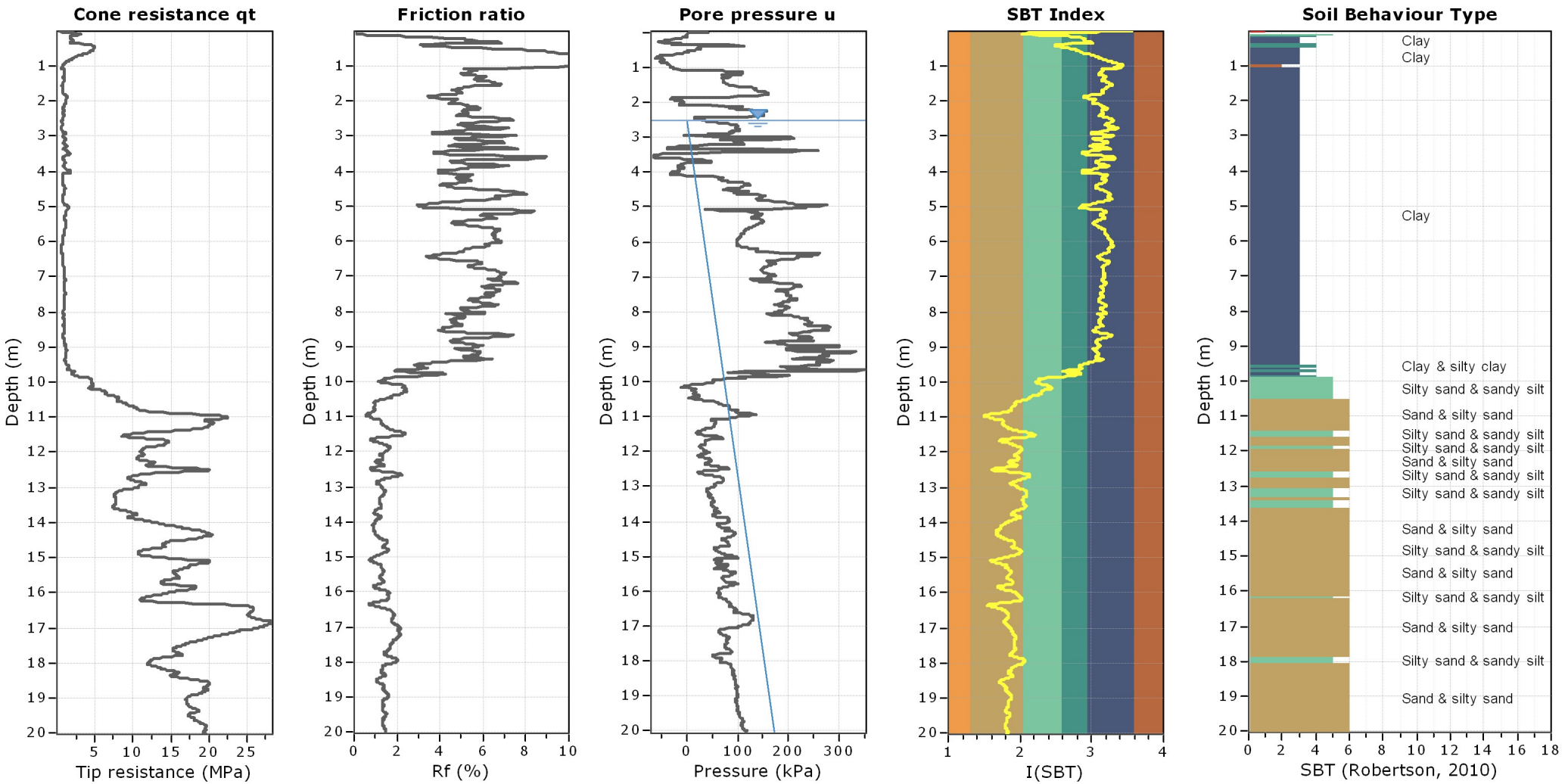
Coords: lat 44.528221° lon 11.046985°
Cone Type: Pagani
Cone Operator: Calzolari



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Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**

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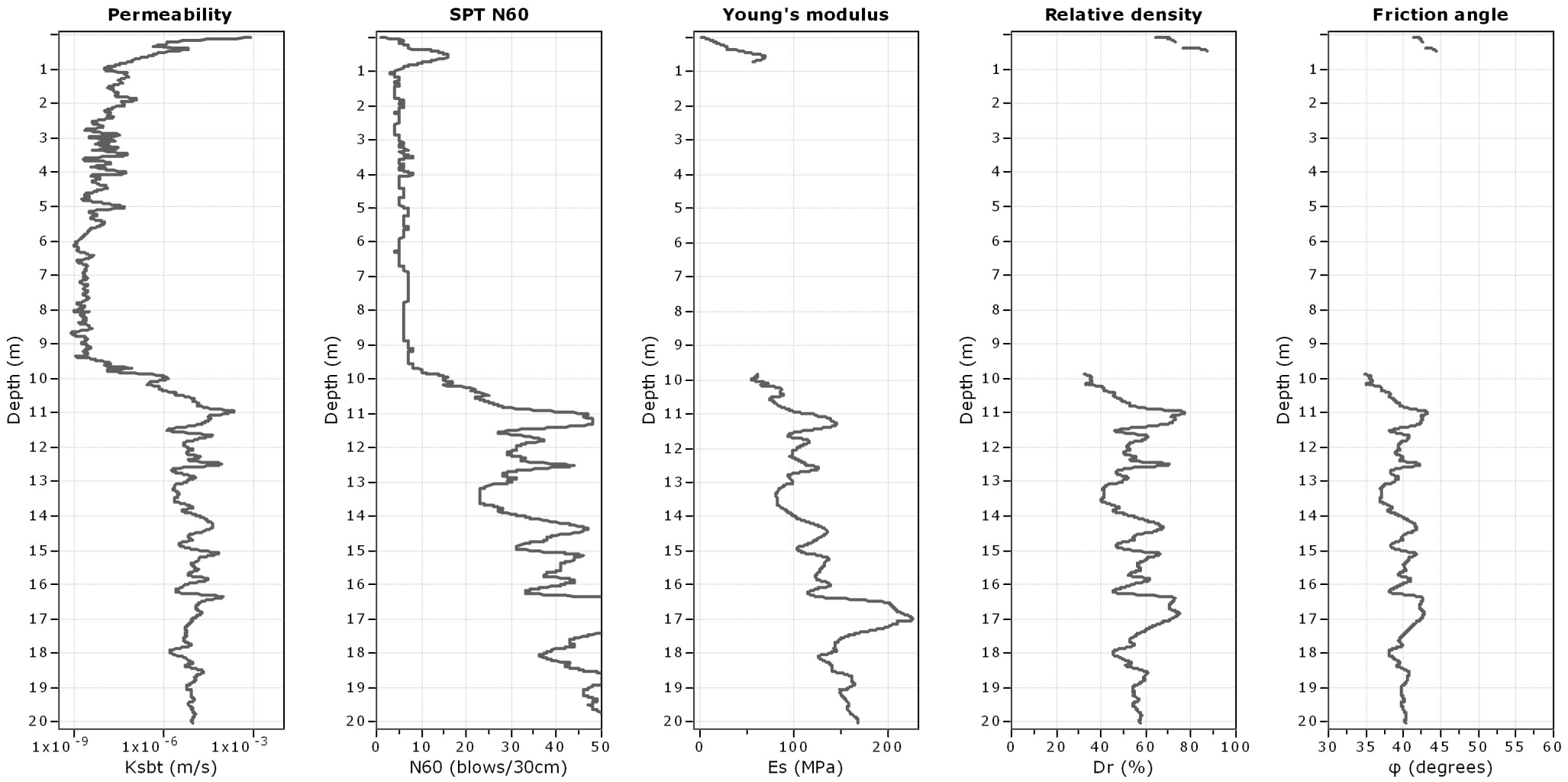

Calculation parameters

Permeability: Based on SBT_n
SPT N_{60}: Based on I_c and q_t
Young's modulus: Based on variable alpha using I_c (Robertson, 2009)
Relative desnisty constant, C_{Dr}: 350.0
Phi: Based on Kulhawy & Mayne (1990)
User defined estimation data

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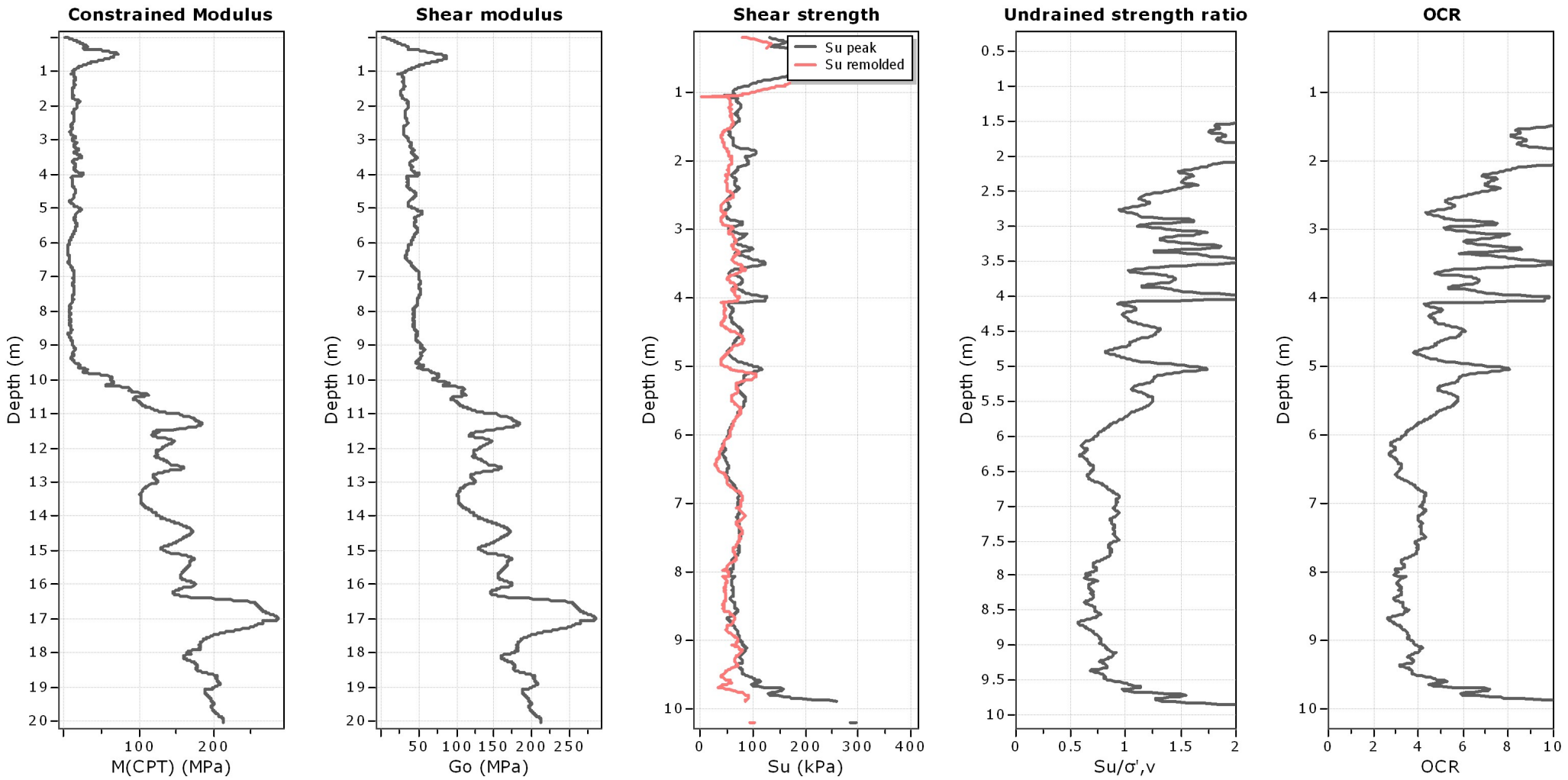

Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable *alpha* using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: 14
OCR factor for clays, N_{kt}: 0.33
User defined estimation data

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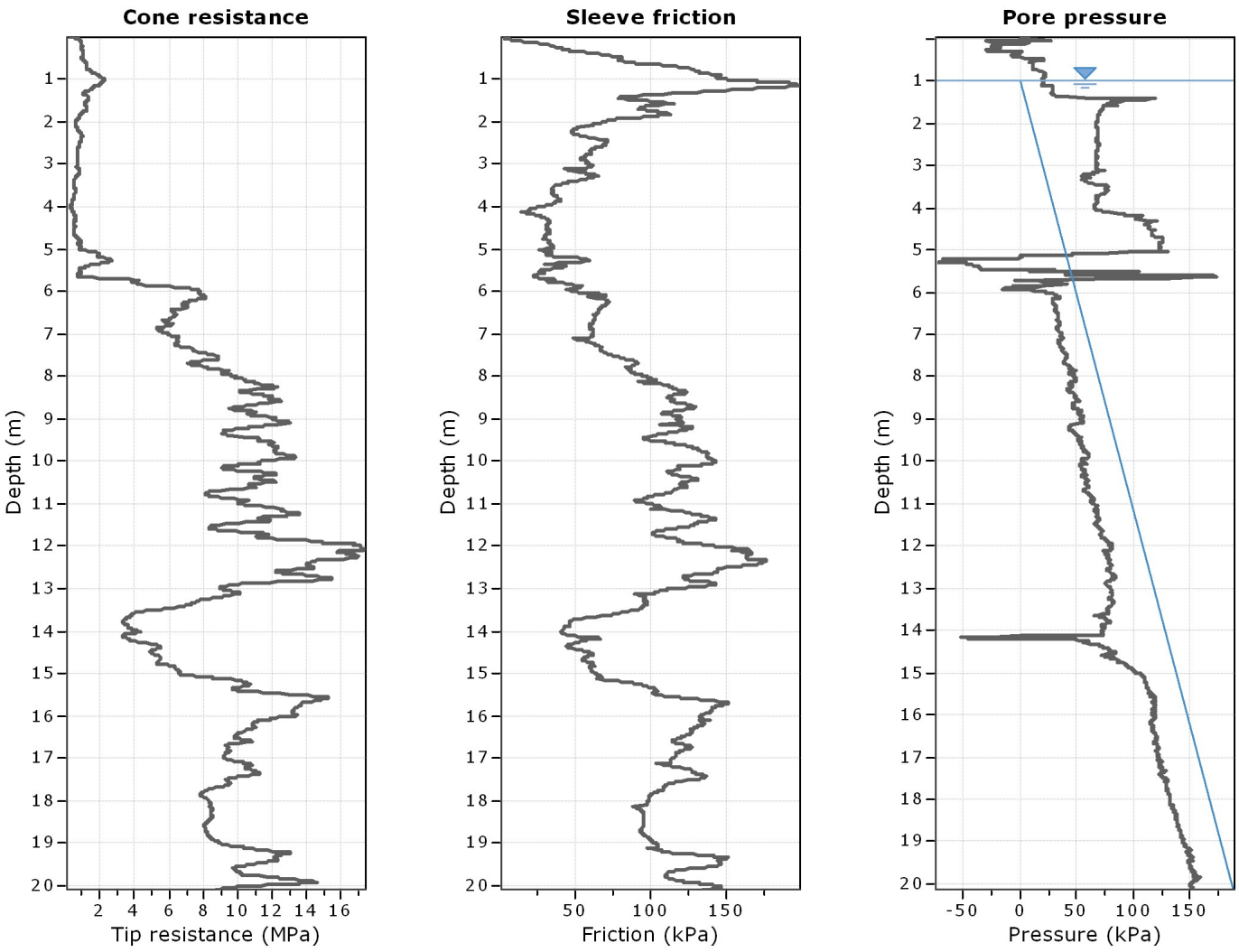
CPT: CPTU6
Total depth: 20.09 m, Date: 19/01/2015
Coords: lat 44.560824° lon 11.139591°
Cone Type: Pagani
Cone Operator: Calzolari

Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**



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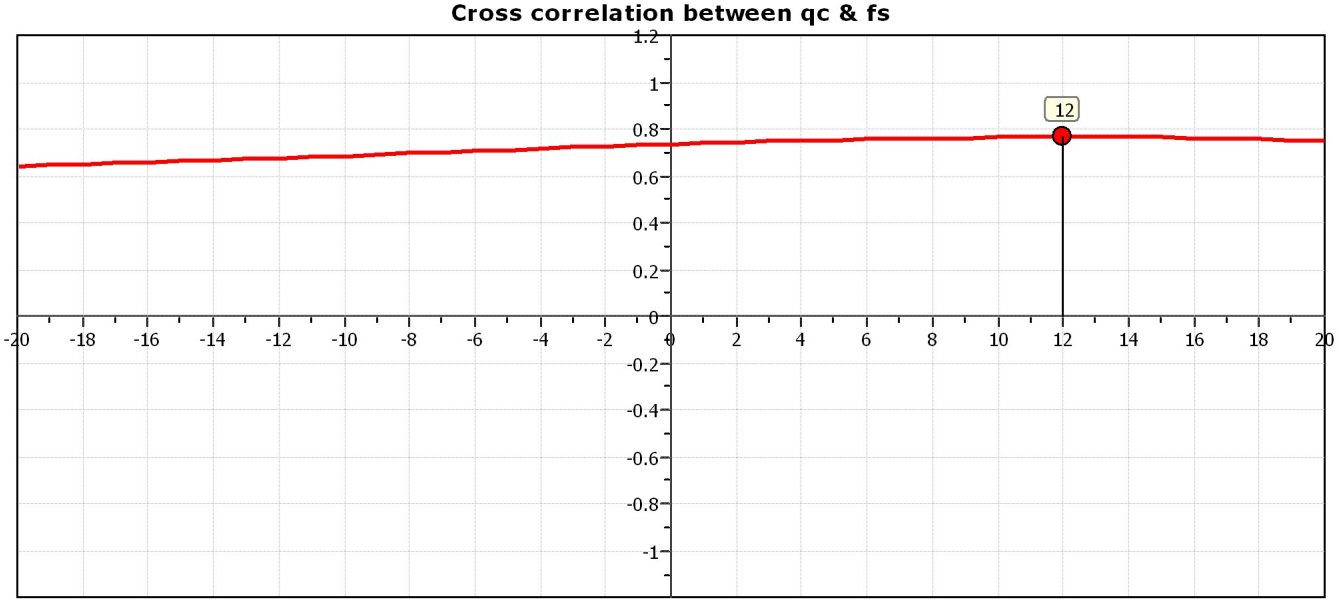

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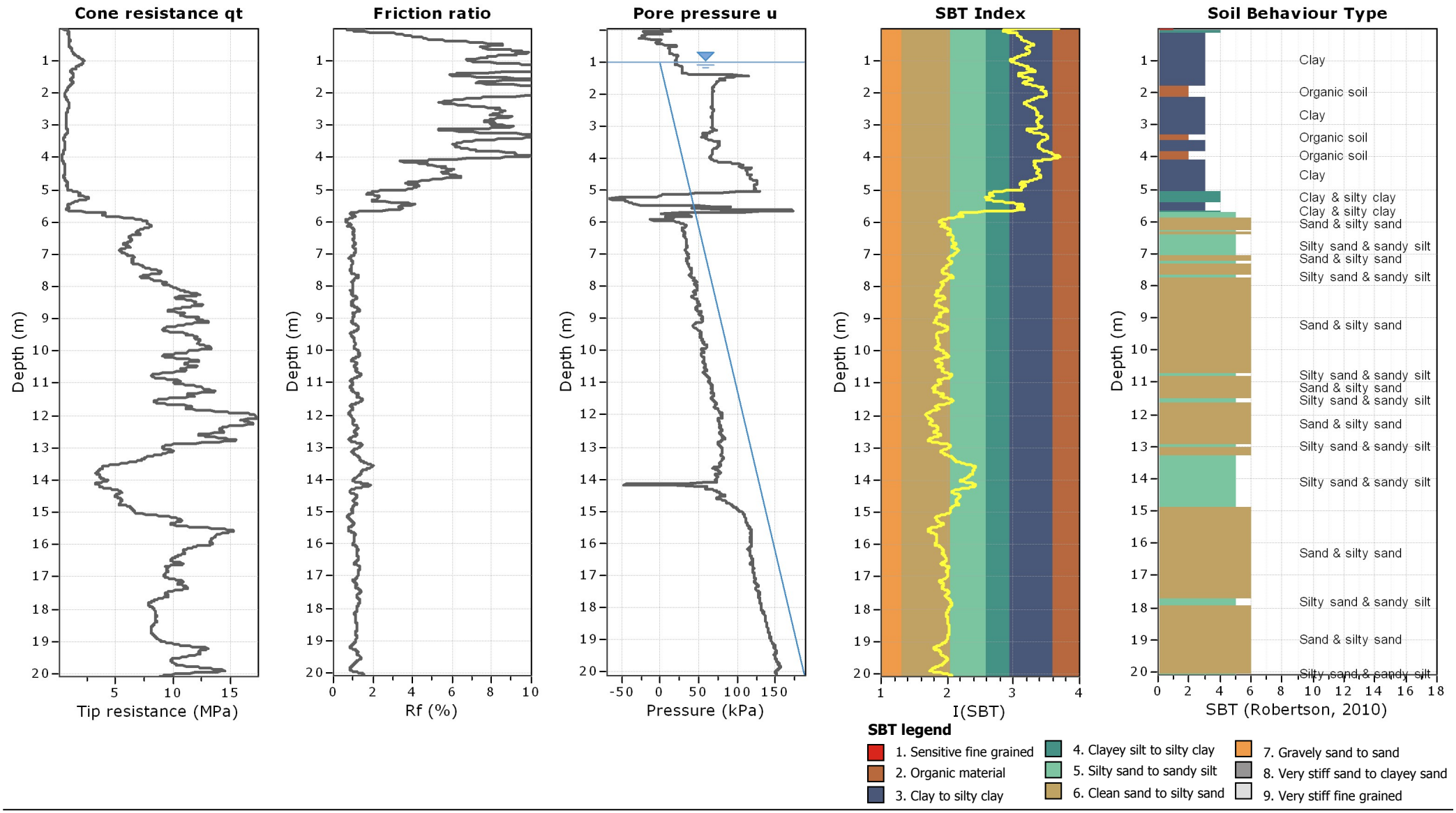
Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**

CPT: CPTU6
Total depth: 20.09 m, Date: 19/01/2015
Coords: lat 44.560824° lon 11.139591°
Cone Type: Pagani
Cone Operator: Calzolari



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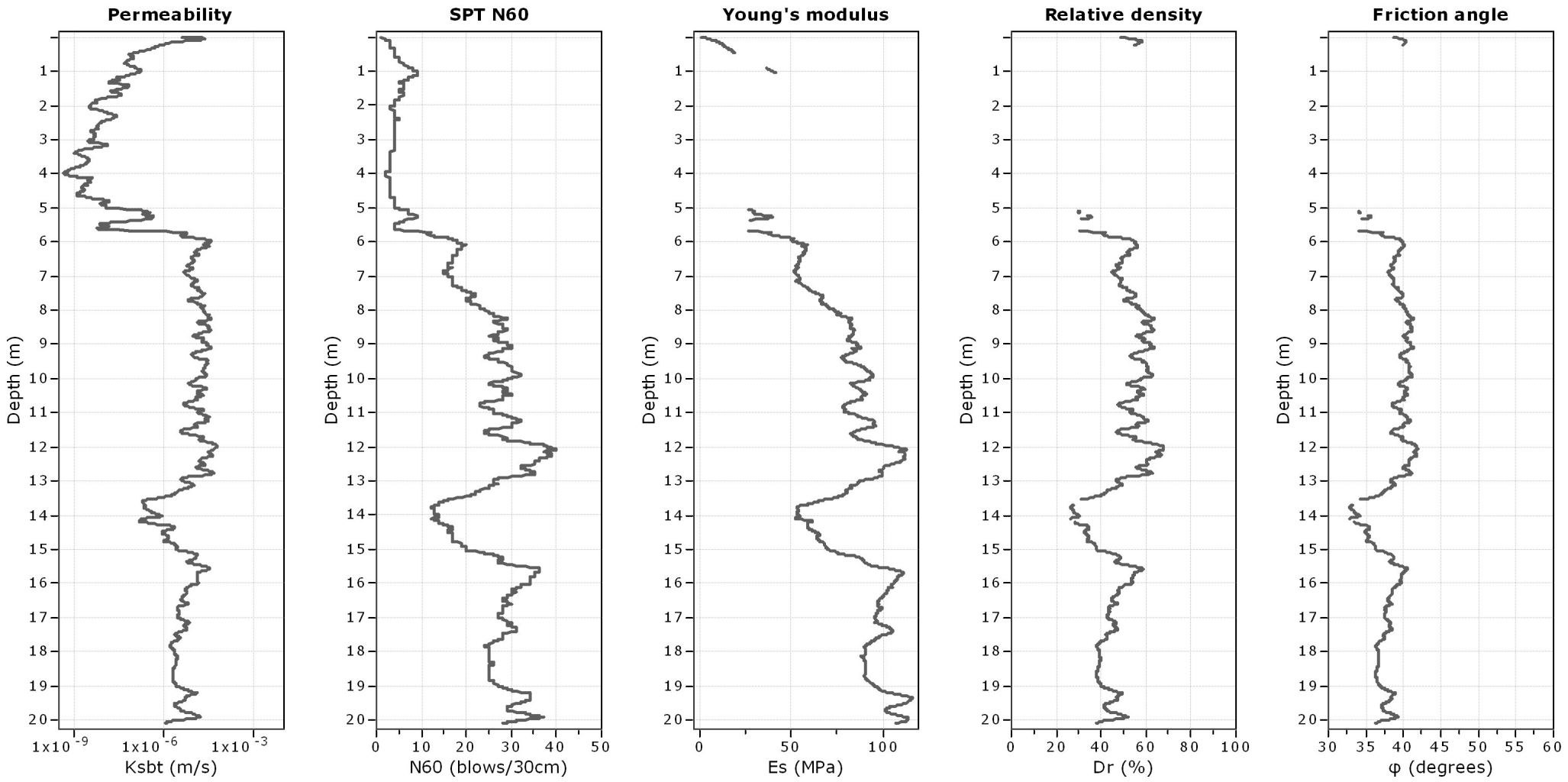
Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**

CPT: CPTU6
Total depth: 20.09 m, Date: 19/01/2015
Coords: lat 44.560824° lon 11.139591°
Cone Type: Pagani
Cone Operator: Calzolari



Calculation parameters

Permeability: Based on SBT_n
SPT N_{60}: Based on I_c and q_t
Young's modulus: Based on variable alpha using I_c (Robertson, 2009)
Relative desnisty constant, C_{Dr}: 350.0
Phi: Based on Kulhawy & Mayne (1990)
User defined estimation data

Studio di geologia Tarabusi
Viale A.Oriani 42
40137 Bologna
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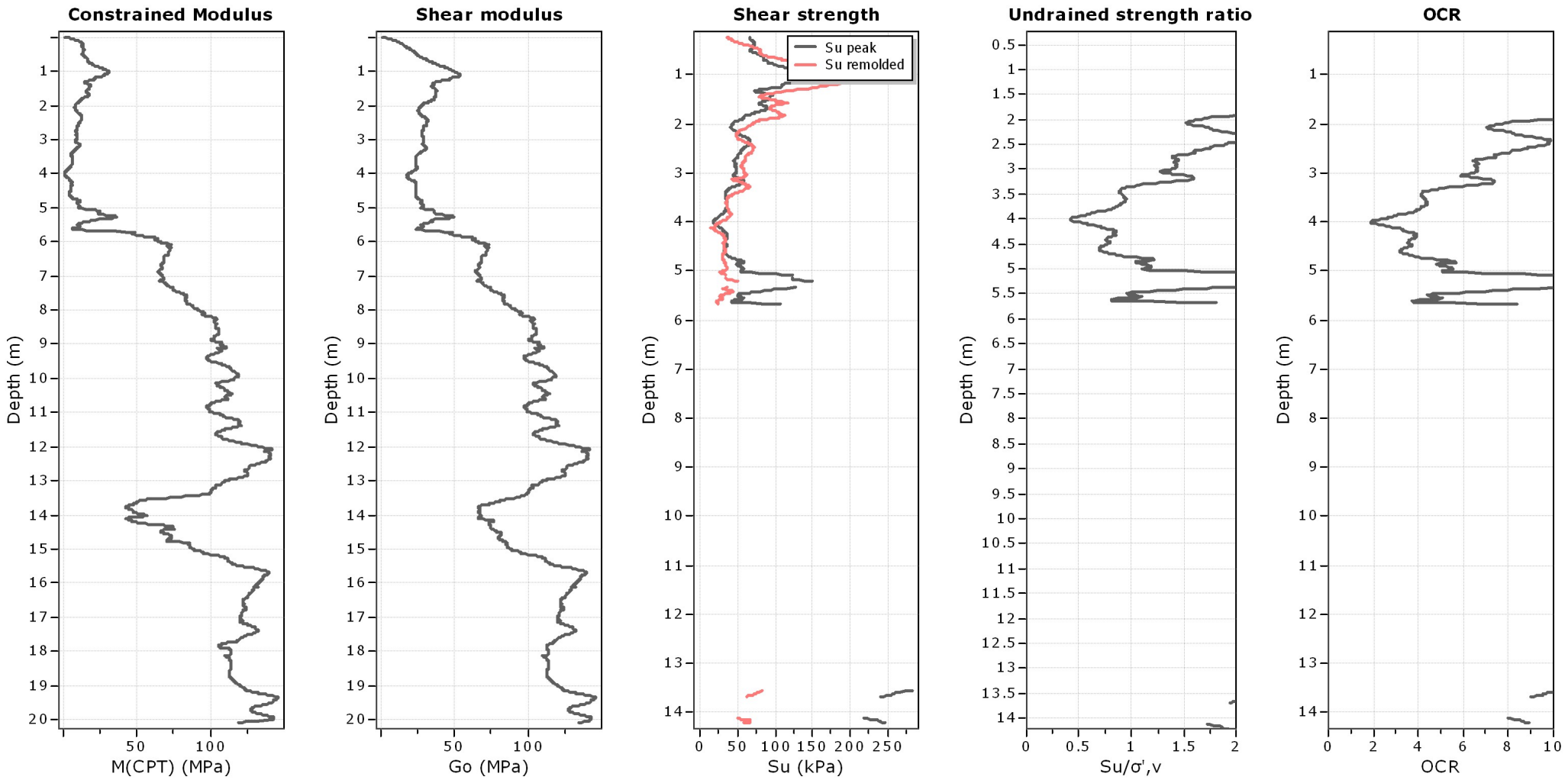
Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**

CPT: CPTU6
Total depth: 20.09 m, Date: 19/01/2015
Coords: lat 44.560824° lon 11.139591°
Cone Type: Pagani
Cone Operator: Calzolari



Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable *alpha* using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: 14
OCR factor for clays, N_{kt}: 0.33
User defined estimation data

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Viale A.Oriani 42
40137 Bologna
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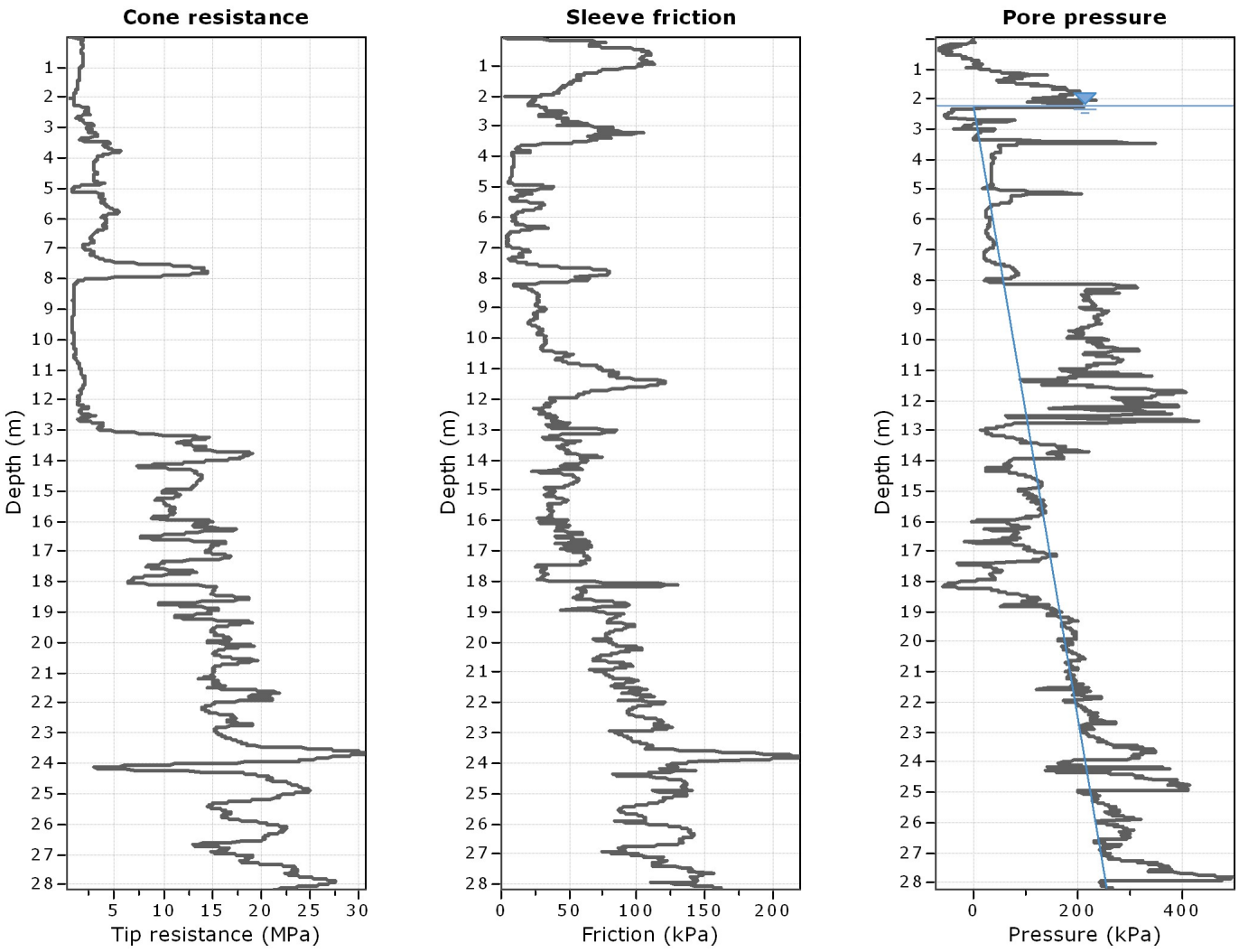
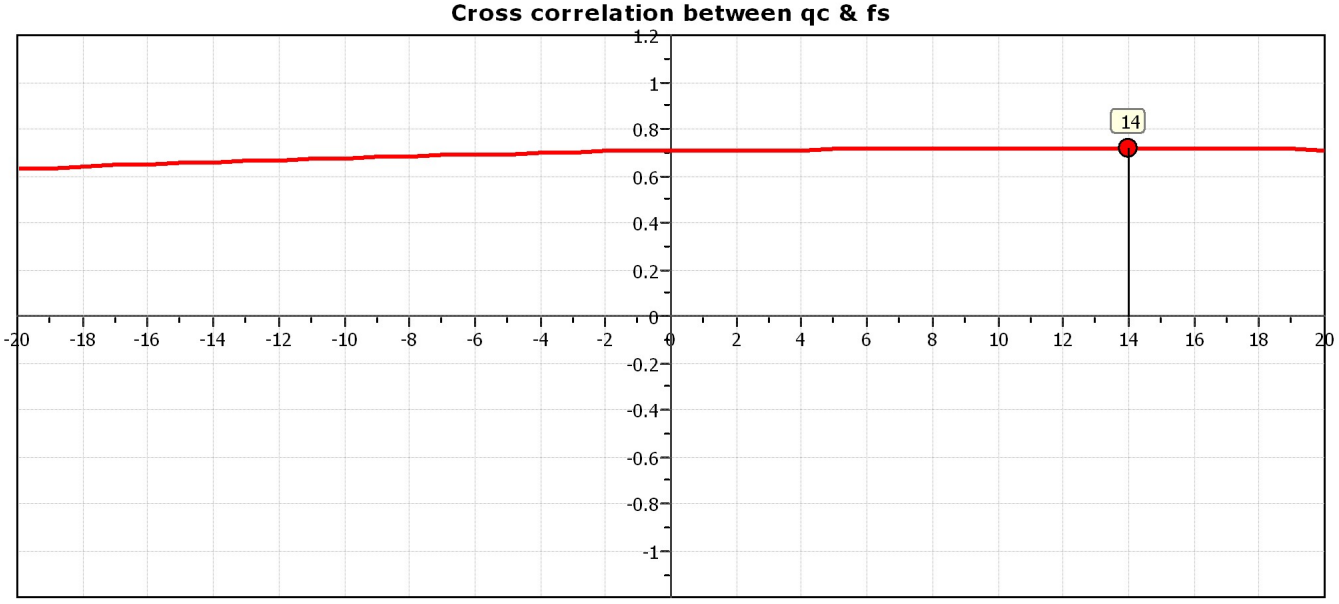
CPT: CPTUS1
Total depth: 28.16 m, Date: 03/02/2015
Coords: lat 44.540078° lon 11.045981°
Cone Type: Pagani
Cone Operator: Calzolari

Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**



The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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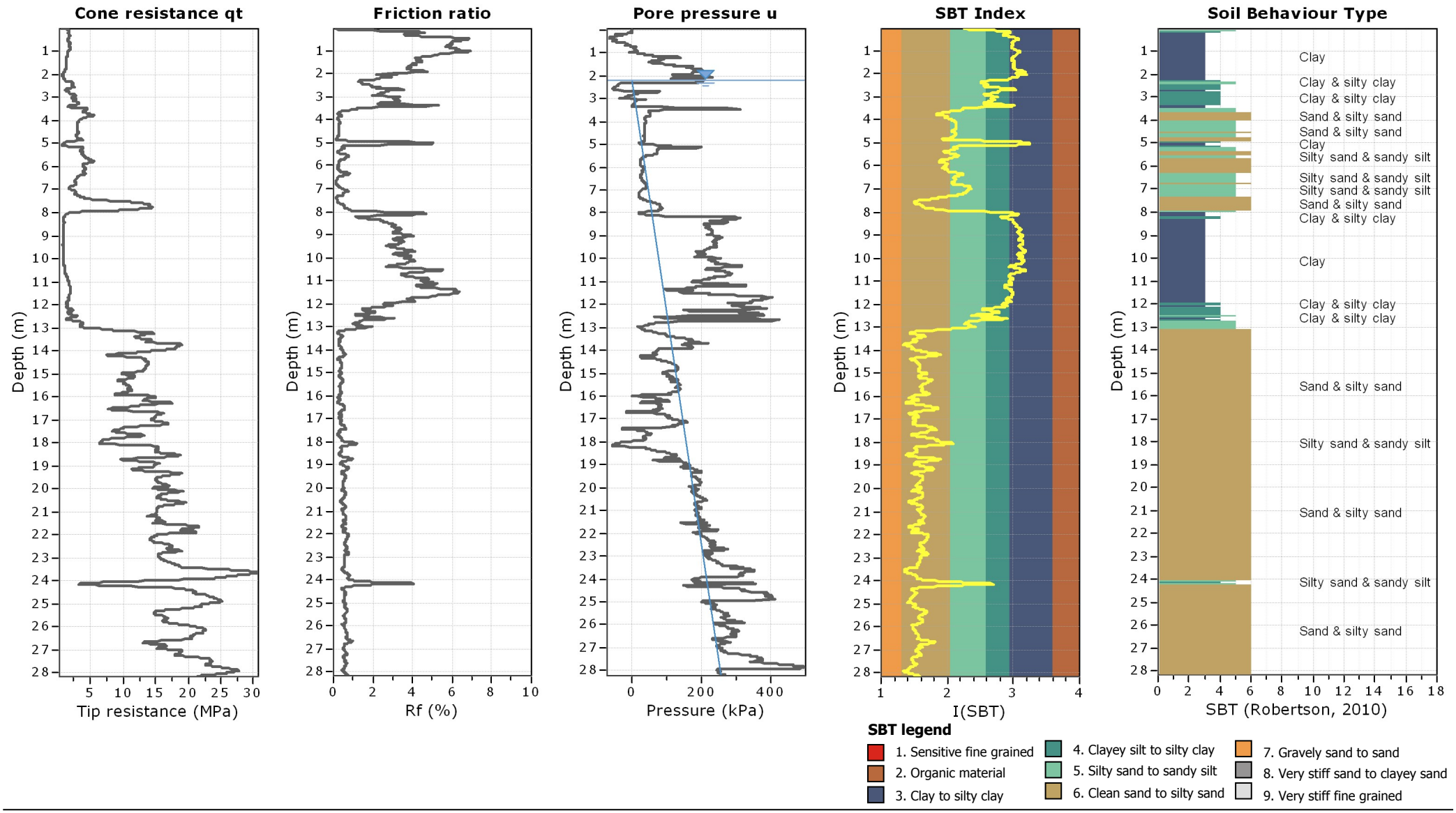
Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**

CPT: CPTUS1
Total depth: 28.16 m, Date: 03/02/2015
Coords: lat 44.540078° lon 11.045981°
Cone Type: Pagani
Cone Operator: Calzolari



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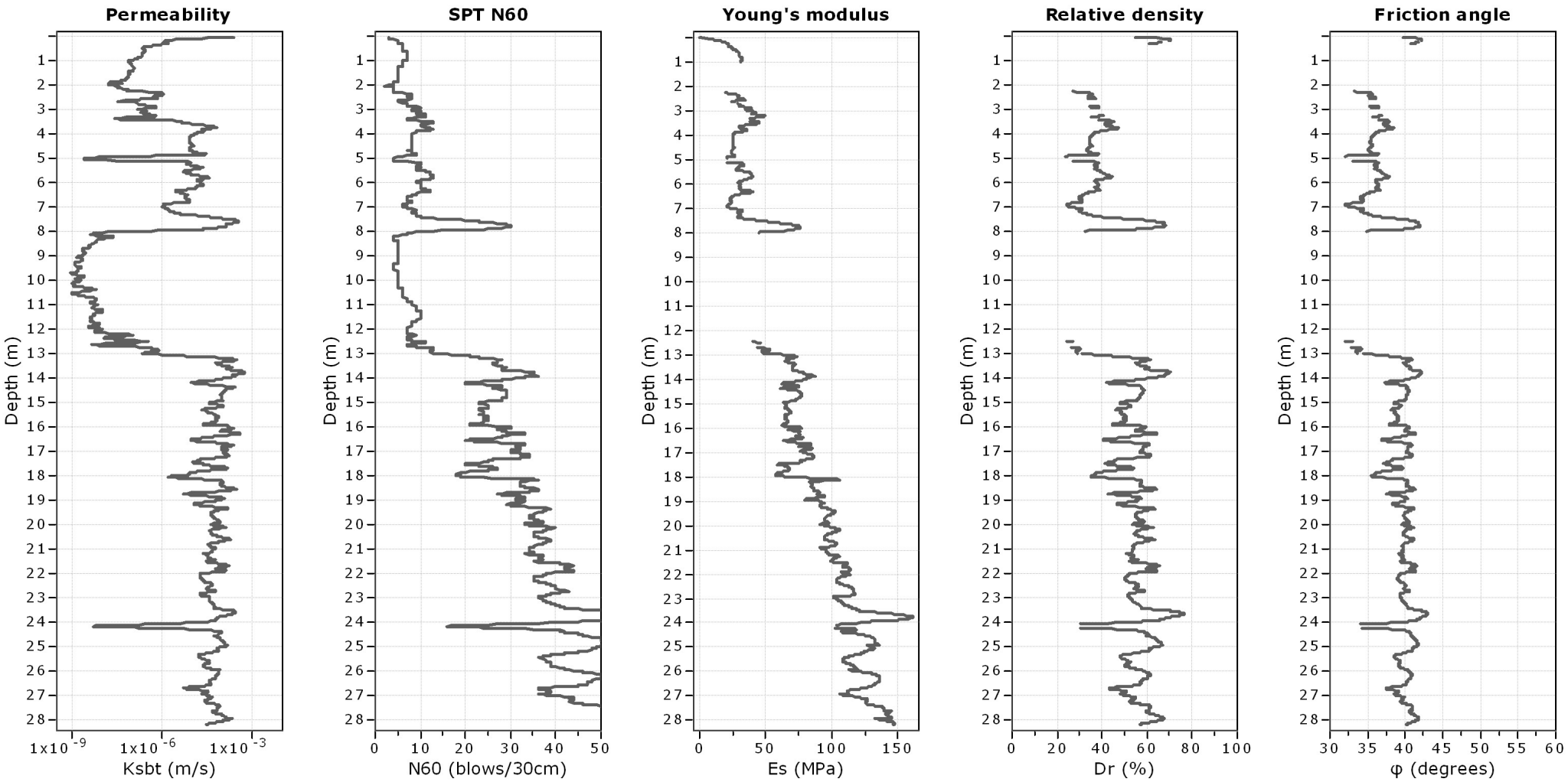
Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**

CPT: CPTUS1
Total depth: 28.16 m, Date: 03/02/2015
Coords: lat 44.540078° lon 11.045981°
Cone Type: Pagani
Cone Operator: Calzolari



Calculation parameters

Permeability: Based on SBT_n
SPT N_{60}: Based on I_c and q_t
Young's modulus: Based on variable alpha using I_c (Robertson, 2009)
Relative desnisty constant, C_{Dr}: 350.0
Phi: Based on Kulhawy & Mayne (1990)
User defined estimation data

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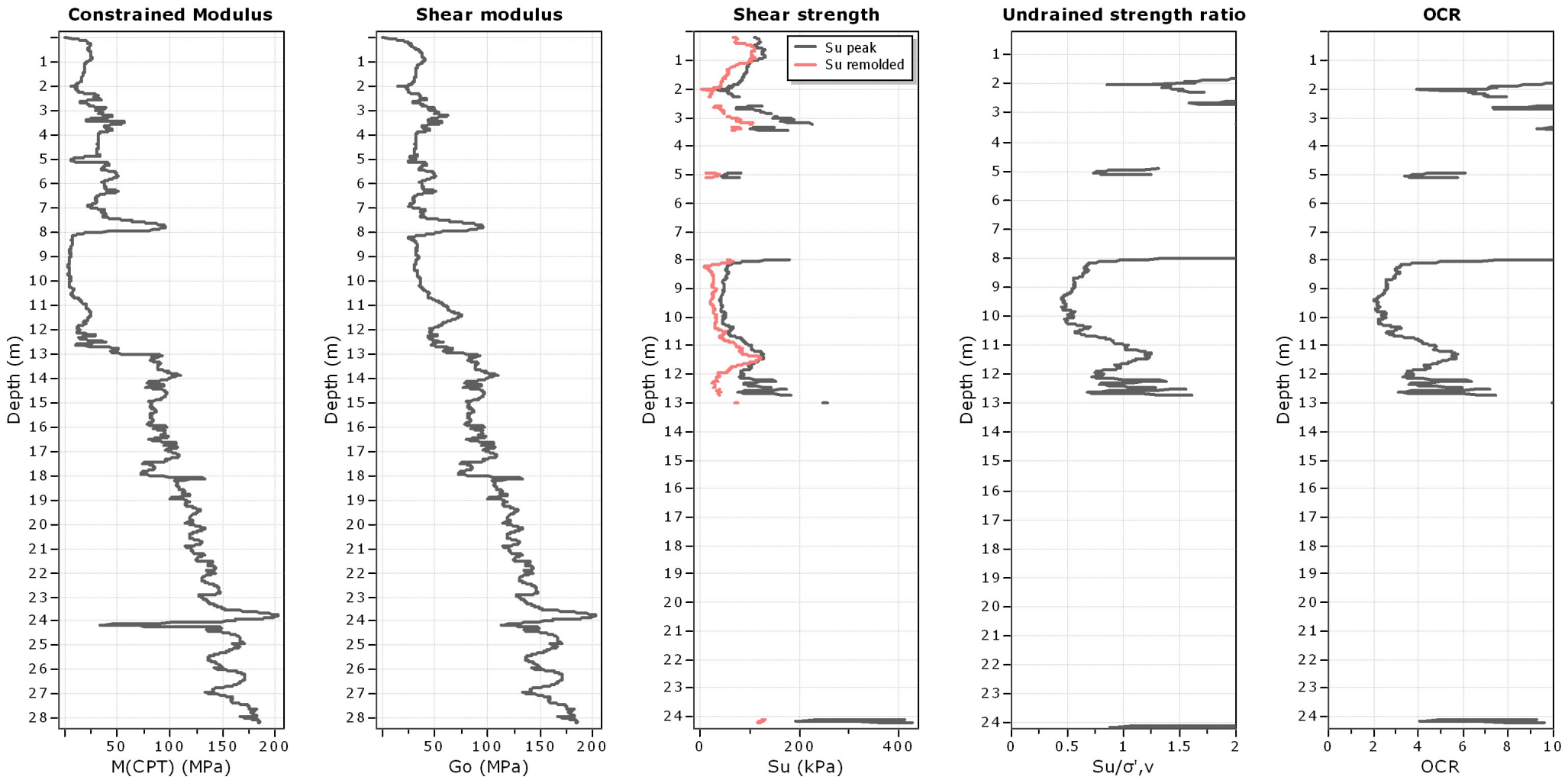
Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**

CPT: CPTUS1
Total depth: 28.16 m, Date: 03/02/2015
Coords: lat 44.540078° lon 11.045981°
Cone Type: Pagani
Cone Operator: Calzolari



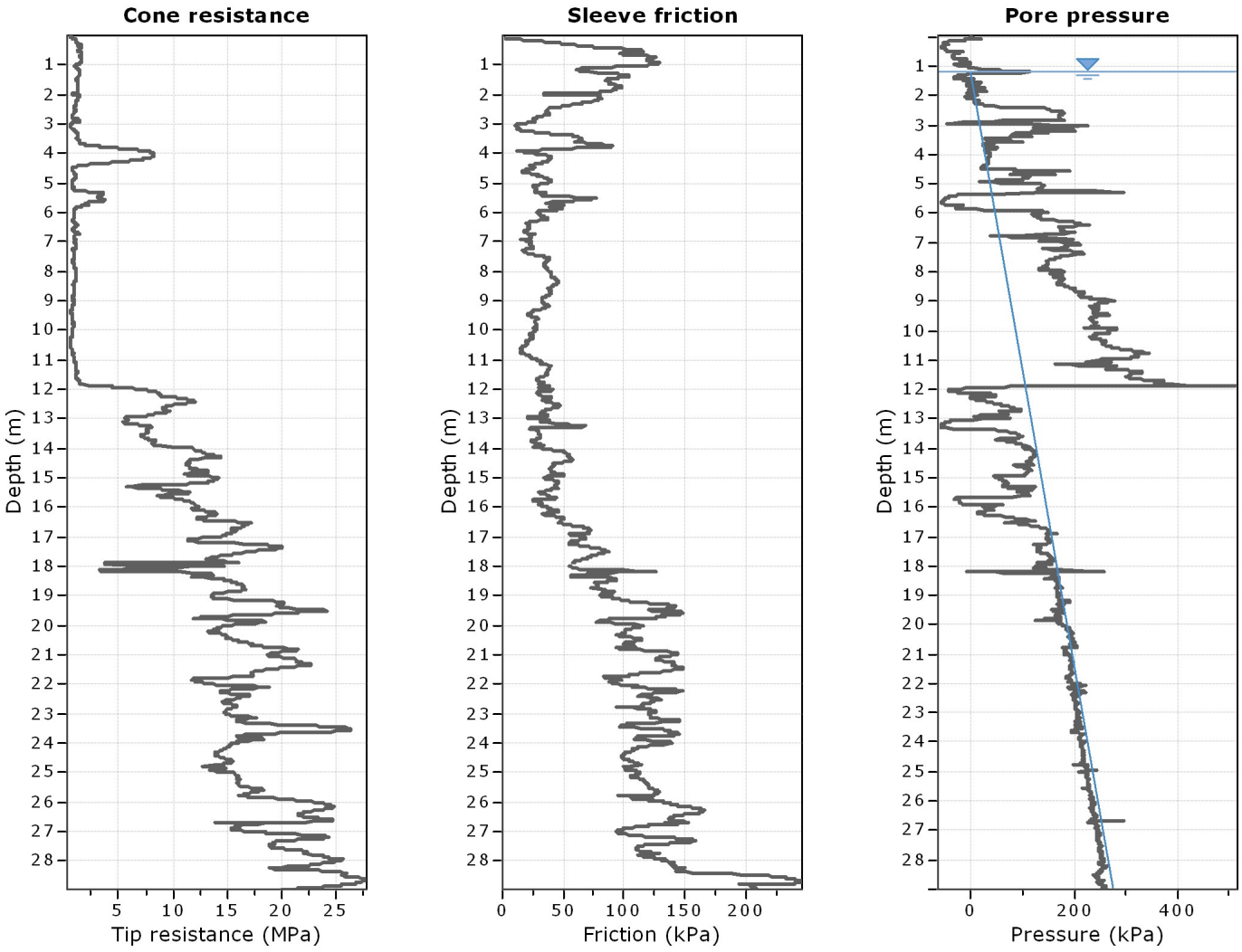
Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable *alpha* using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: 14
OCR factor for clays, N_{kt}: 0.33
User defined estimation data

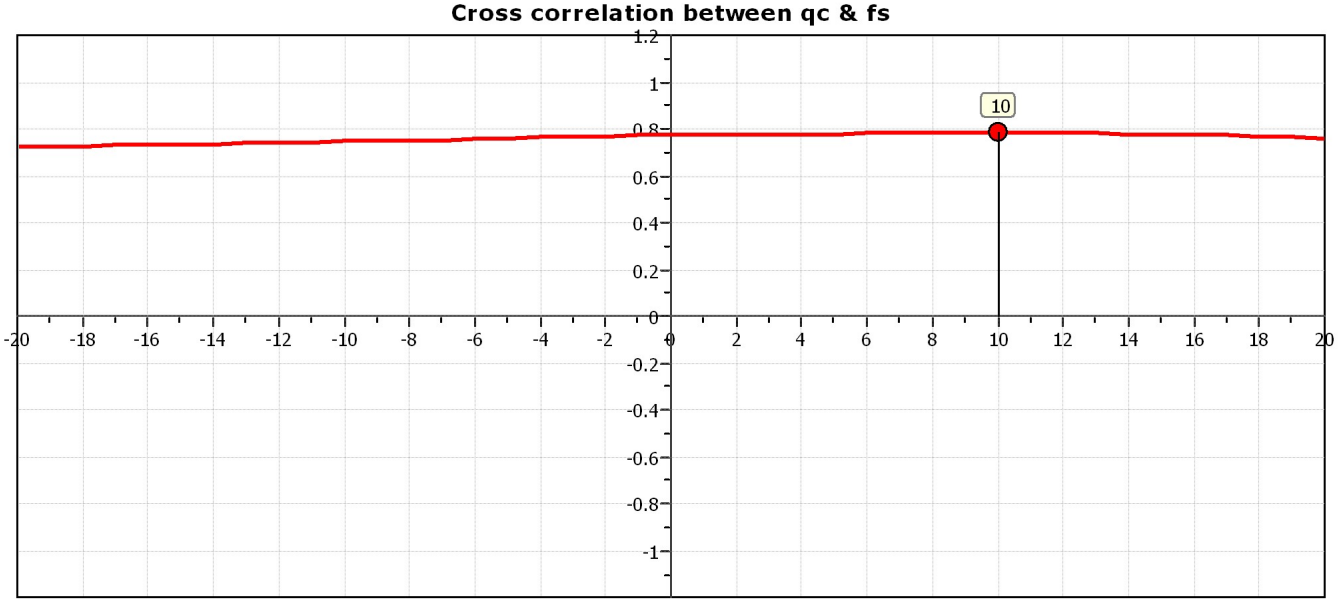
Studio di geologia Tarabusi
Viale A.Oriani 42
40137 Bologna
http://www.studiotarabusi.it

CPT: CPTUS2
Total depth: 28.95 m, Date: 02/02/2015
Coords: lat 44.538172° lon 11.052629°
Cone Type: Pagani
Cone Operator: Calzolari

Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**



The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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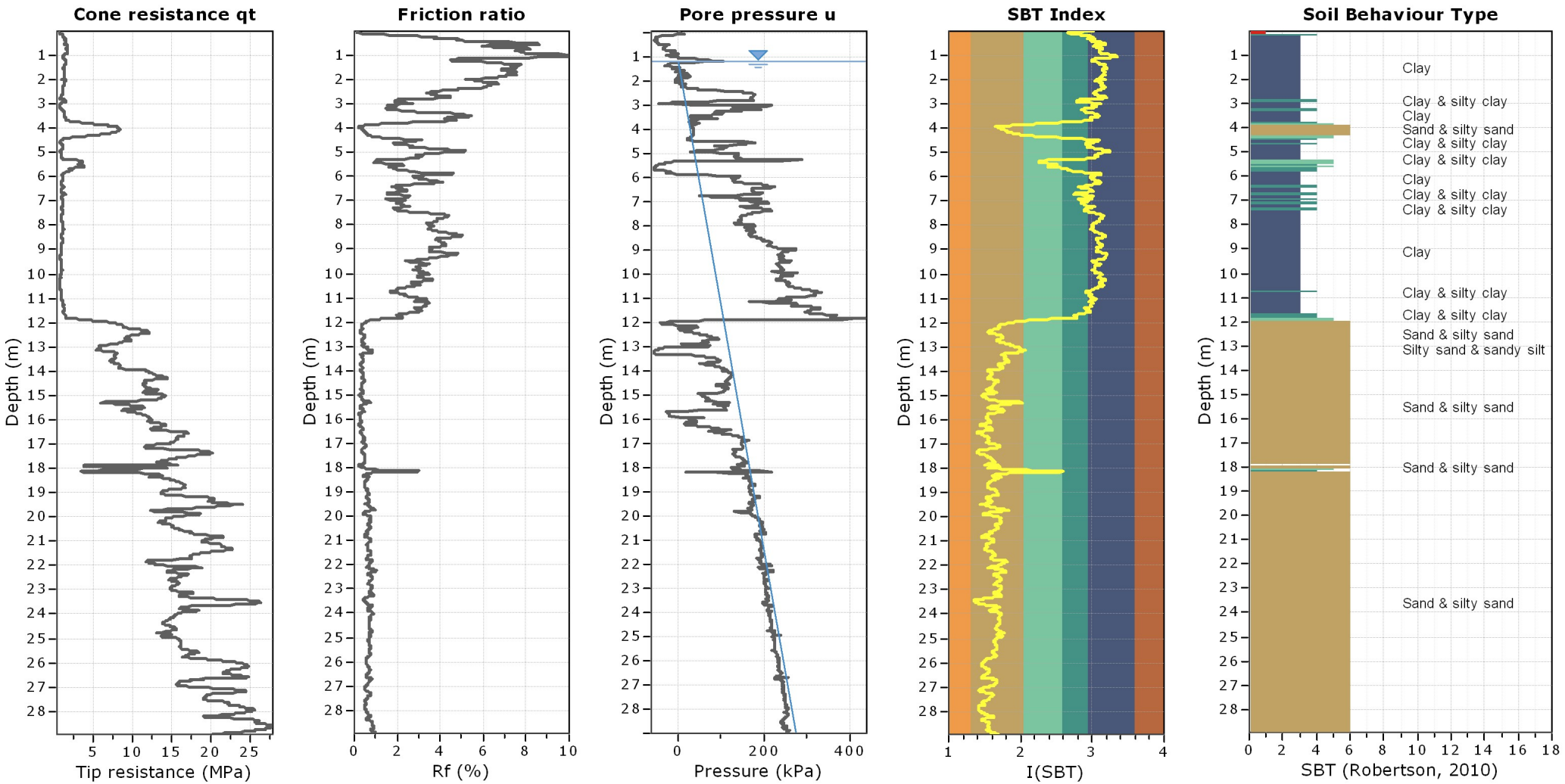
http://www.studiotarabusi.it

Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**

CPT: CPTUS2
Total depth: 28.95 m, Date: 02/02/2015
Coords: lat 44.538172° lon 11.052629°
Cone Type: Pagani
Cone Operator: Calzolari



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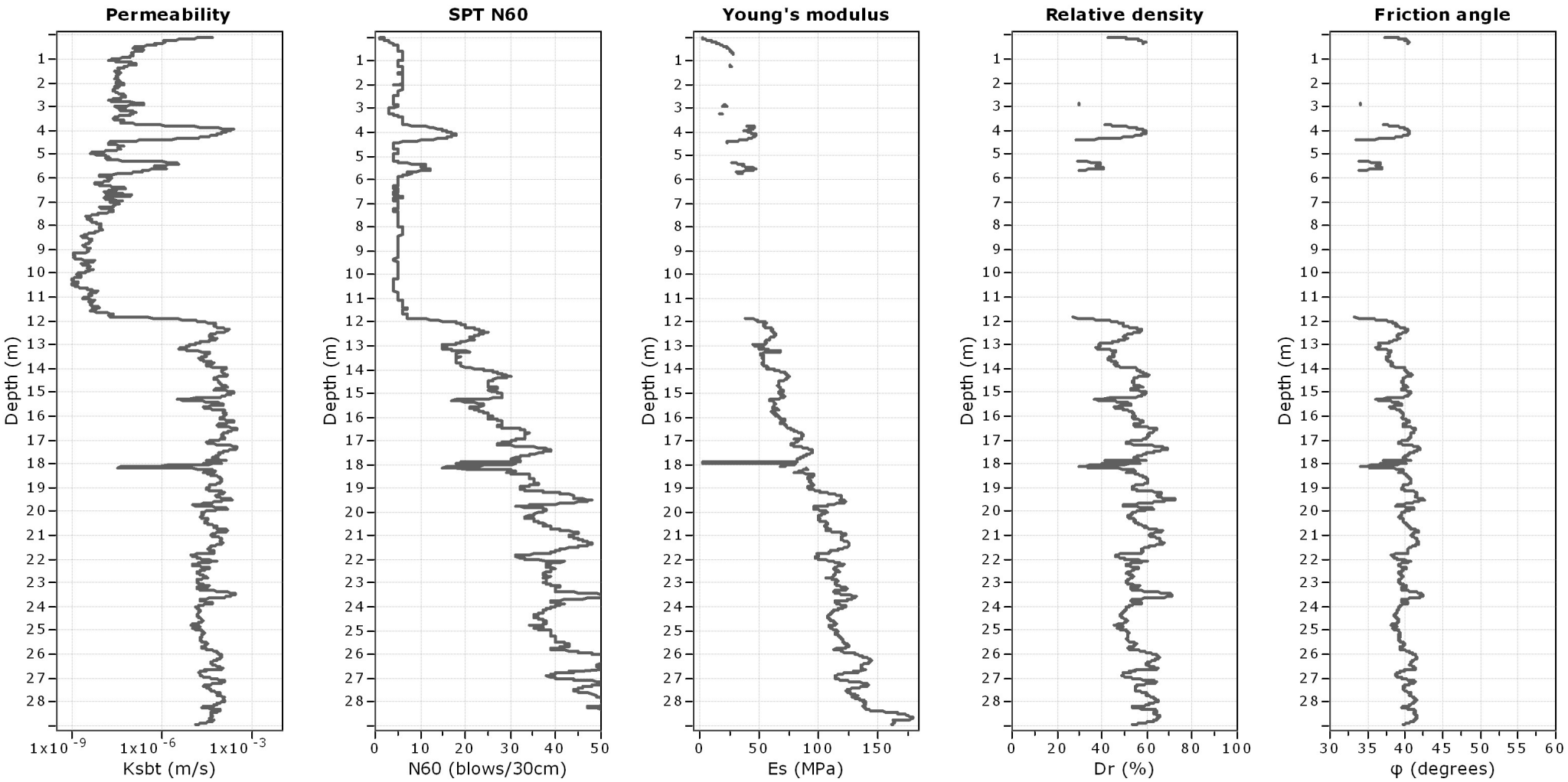
Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**

CPT: CPTUS2
Total depth: 28.95 m, Date: 02/02/2015
Coords: lat 44.538172° lon 11.052629°
Cone Type: Pagani
Cone Operator: Calzolari



Calculation parameters

Permeability: Based on SBT_n
SPT N_{60}: Based on I_c and q_t
Young's modulus: Based on variable alpha using I_c (Robertson, 2009)
Relative desnisty constant, C_{Dr}: 350.0
Phi: Based on Kulhawy & Mayne (1990)
User defined estimation data

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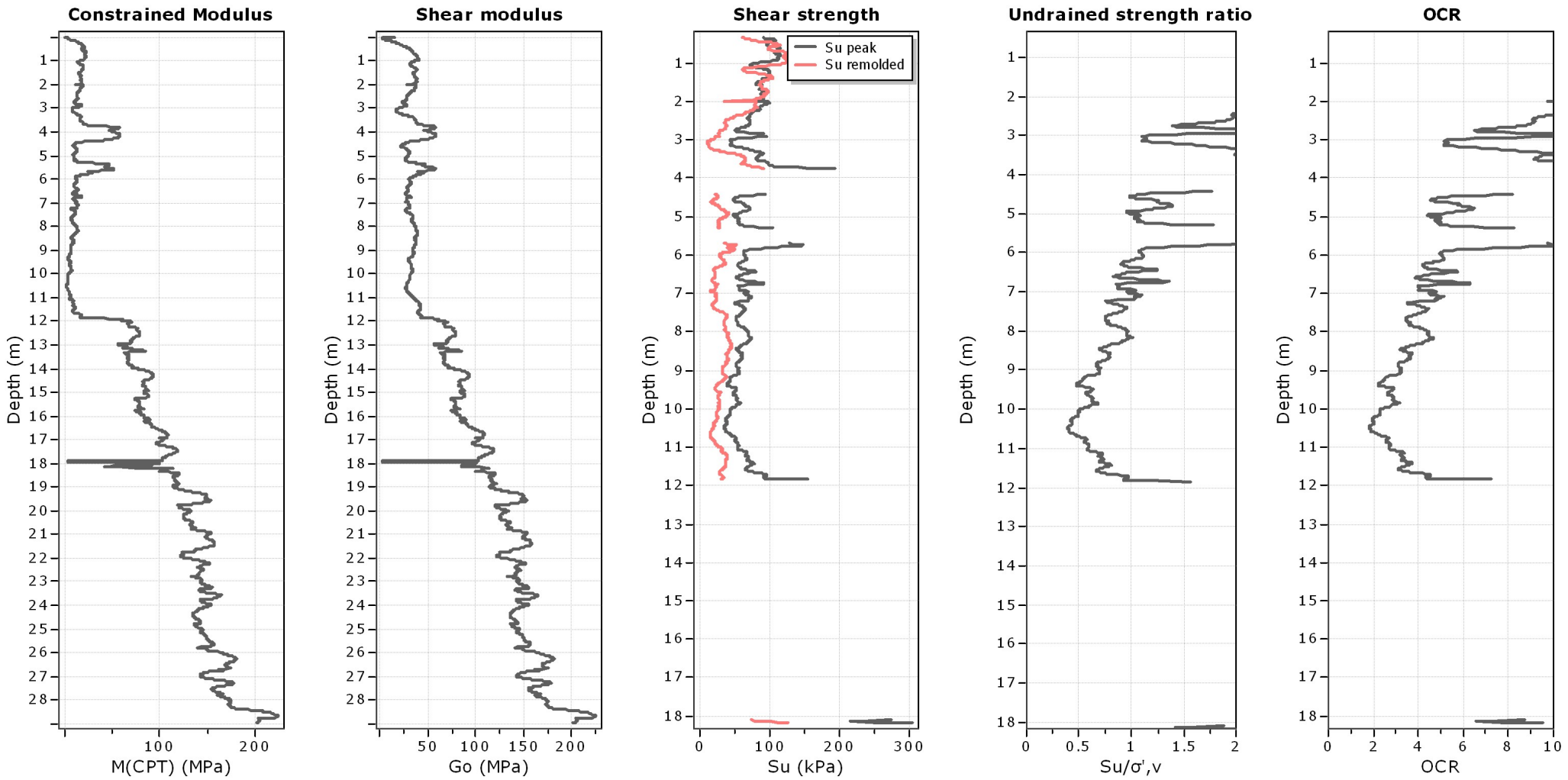
Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**

CPT: CPTUS2
Total depth: 28.95 m, Date: 02/02/2015
Coords: lat 44.538172° lon 11.052629°
Cone Type: Pagani
Cone Operator: Calzolari



Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable *alpha* using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: 14
OCR factor for clays, N_{kt}: 0.33
User defined estimation data

Studio di geologia Tarabusi
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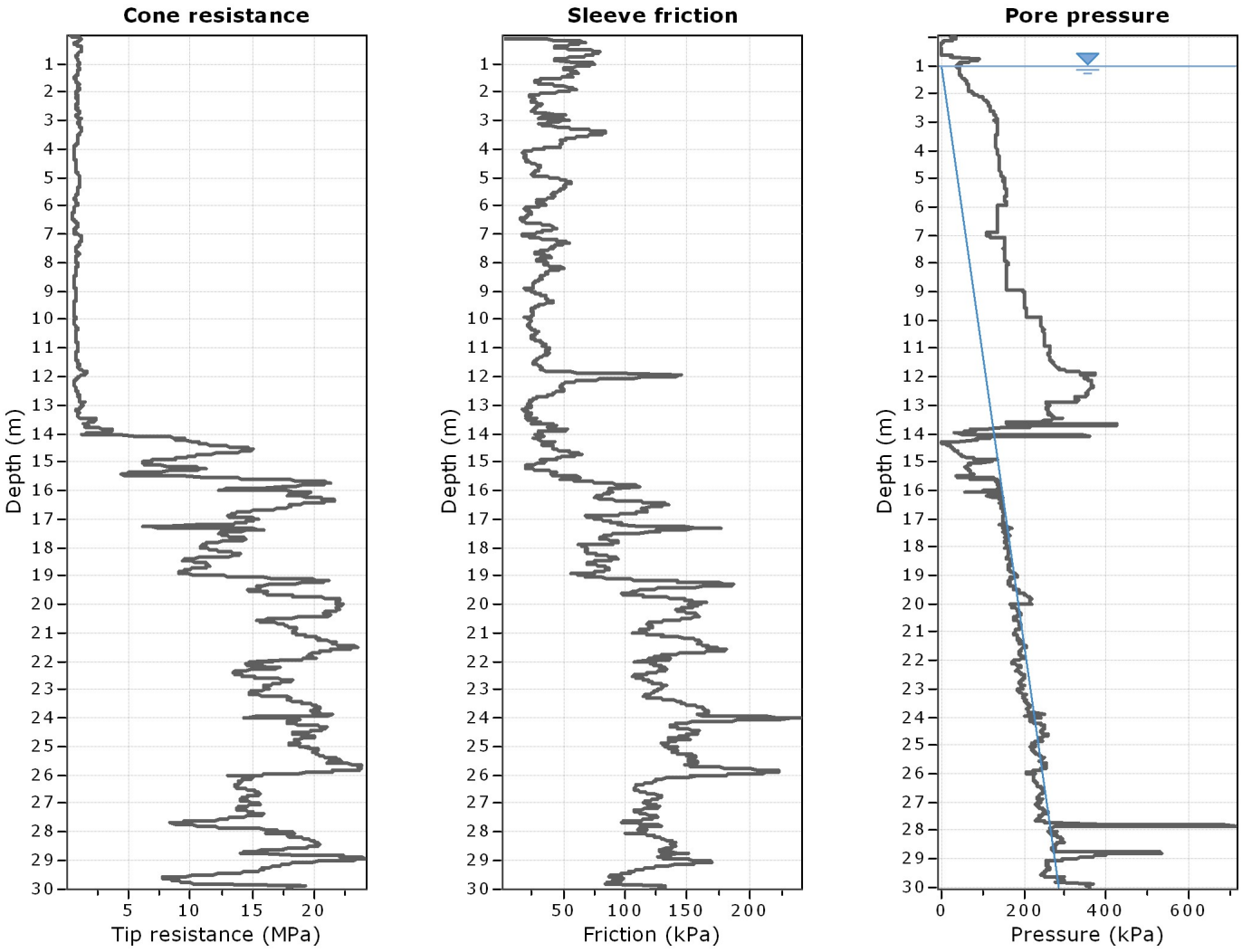
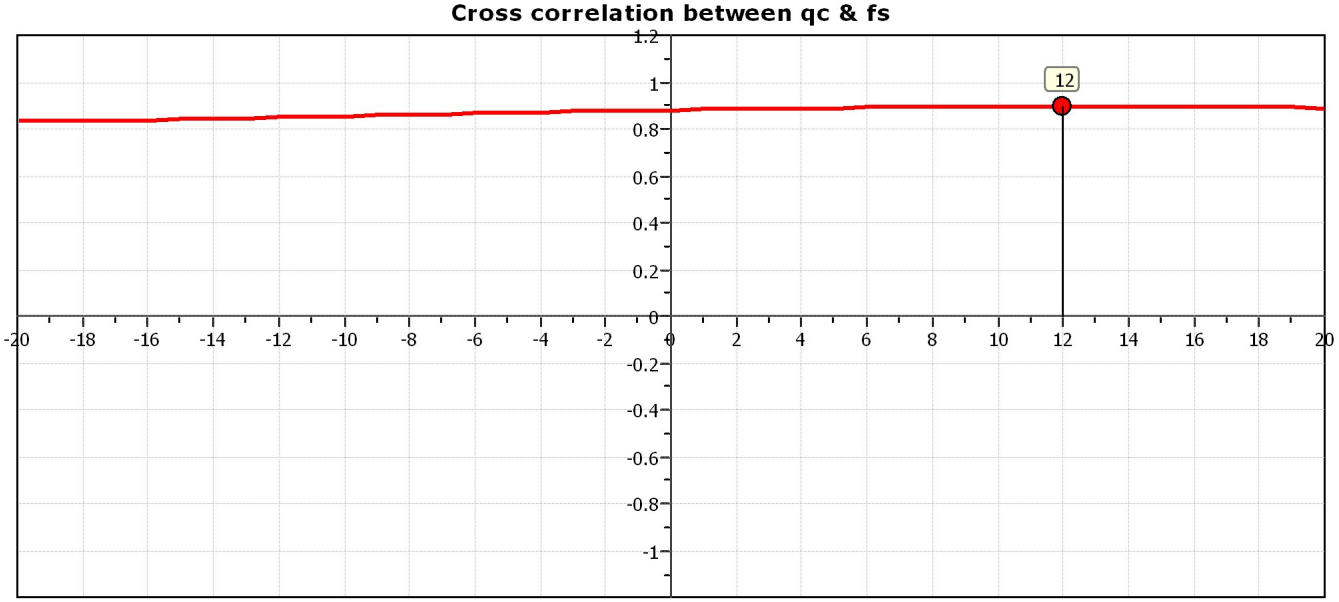
http://www.studiotarabusi.it

CPT: CPTUS3
Total depth: 30.02 m, Date: 05/02/2015
Coords: lat 44.533206° lon 11.057706°
Cone Type: Pagani
Cone Operator: Calzolari

Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**



The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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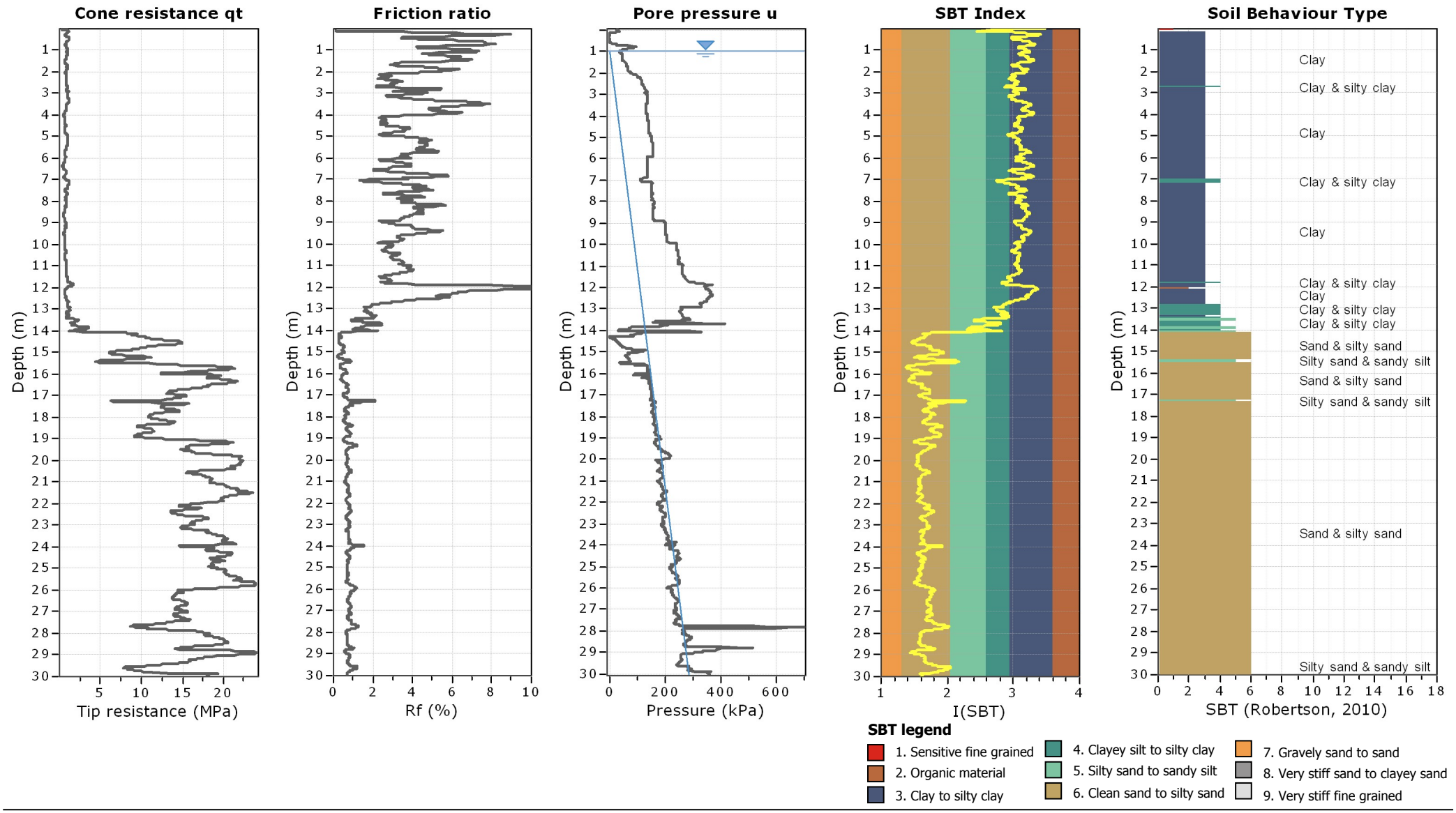
Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**

CPT: CPTUS3
Total depth: 30.02 m, Date: 05/02/2015
Coords: lat 44.533206° lon 11.057706°
Cone Type: Pagani
Cone Operator: Calzolari



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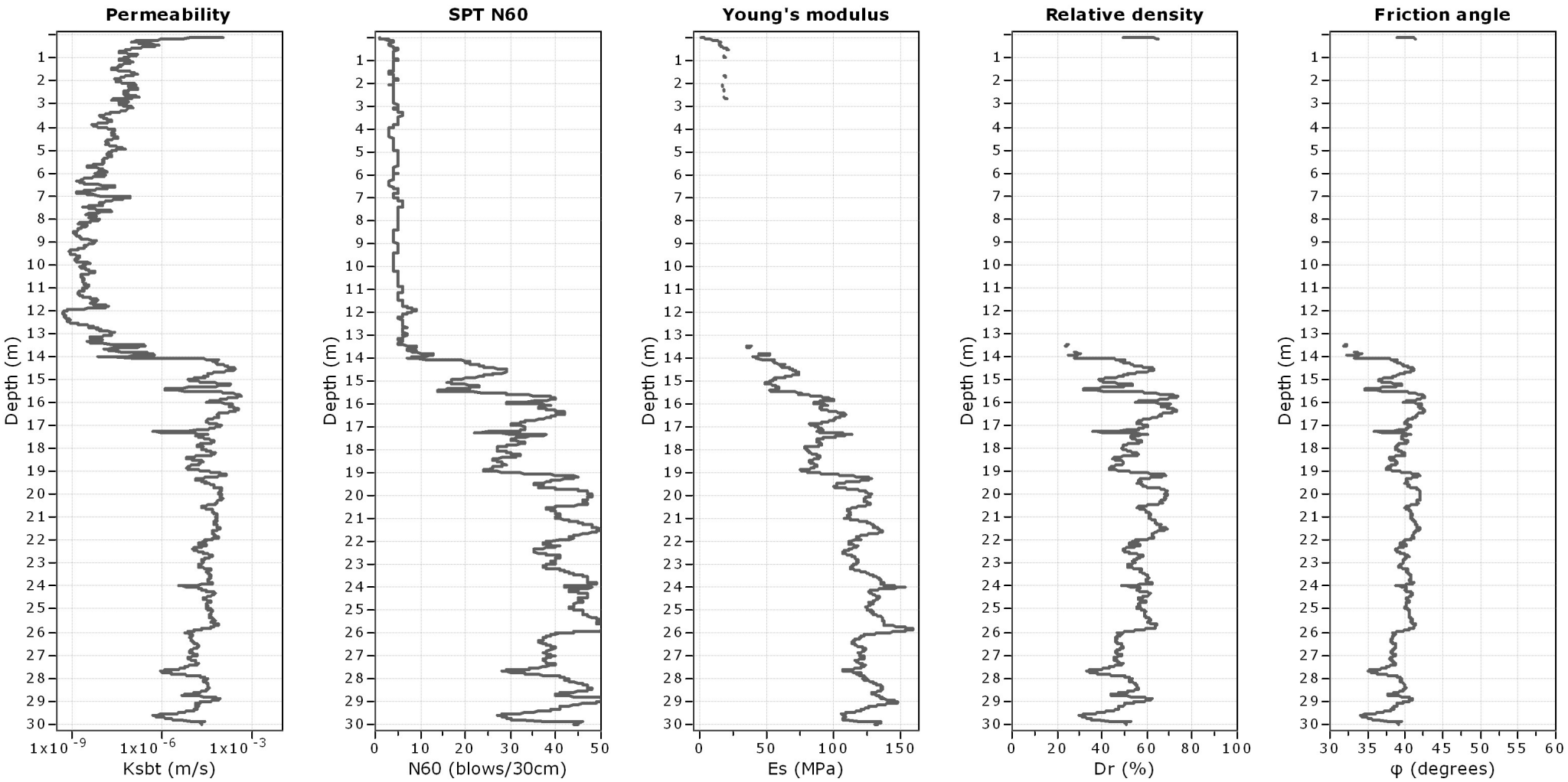
Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**

CPT: CPTUS3
Total depth: 30.02 m, Date: 05/02/2015
Coords: lat 44.533206° lon 11.057706°
Cone Type: Pagani
Cone Operator: Calzolari



Calculation parameters

Permeability: Based on SBT_n
SPT N_{60}: Based on I_c and q_t
Young's modulus: Based on variable alpha using I_c (Robertson, 2009)
Relative desnisty constant, C_{Dr}: 350.0
Phi: Based on Kulhawy & Mayne (1990)
User defined estimation data

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40137 Bologna
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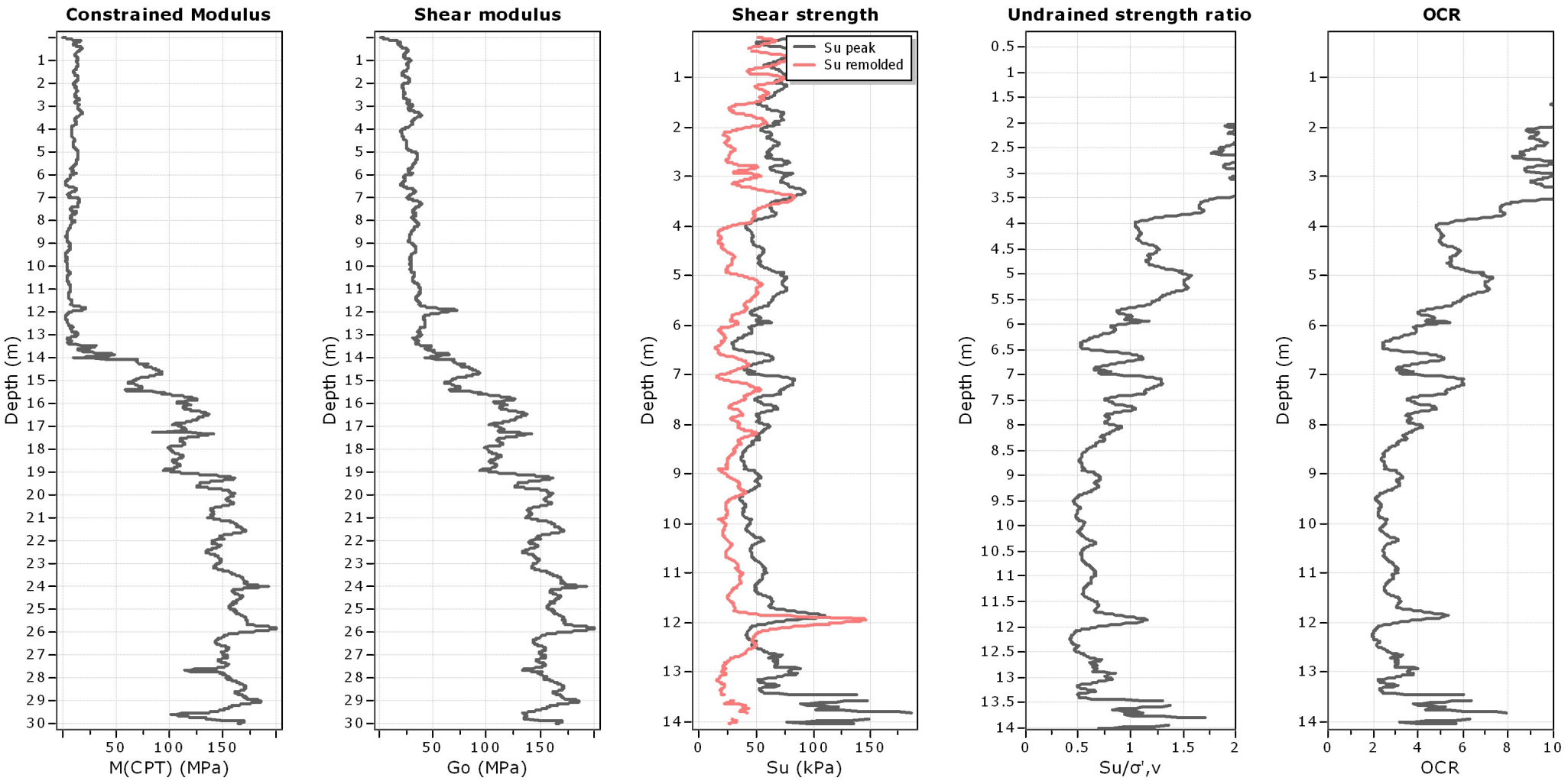
Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**

CPT: CPTUS3
Total depth: 30.02 m, Date: 05/02/2015
Coords: lat 44.533206° lon 11.057706°
Cone Type: Pagani
Cone Operator: Calzolari



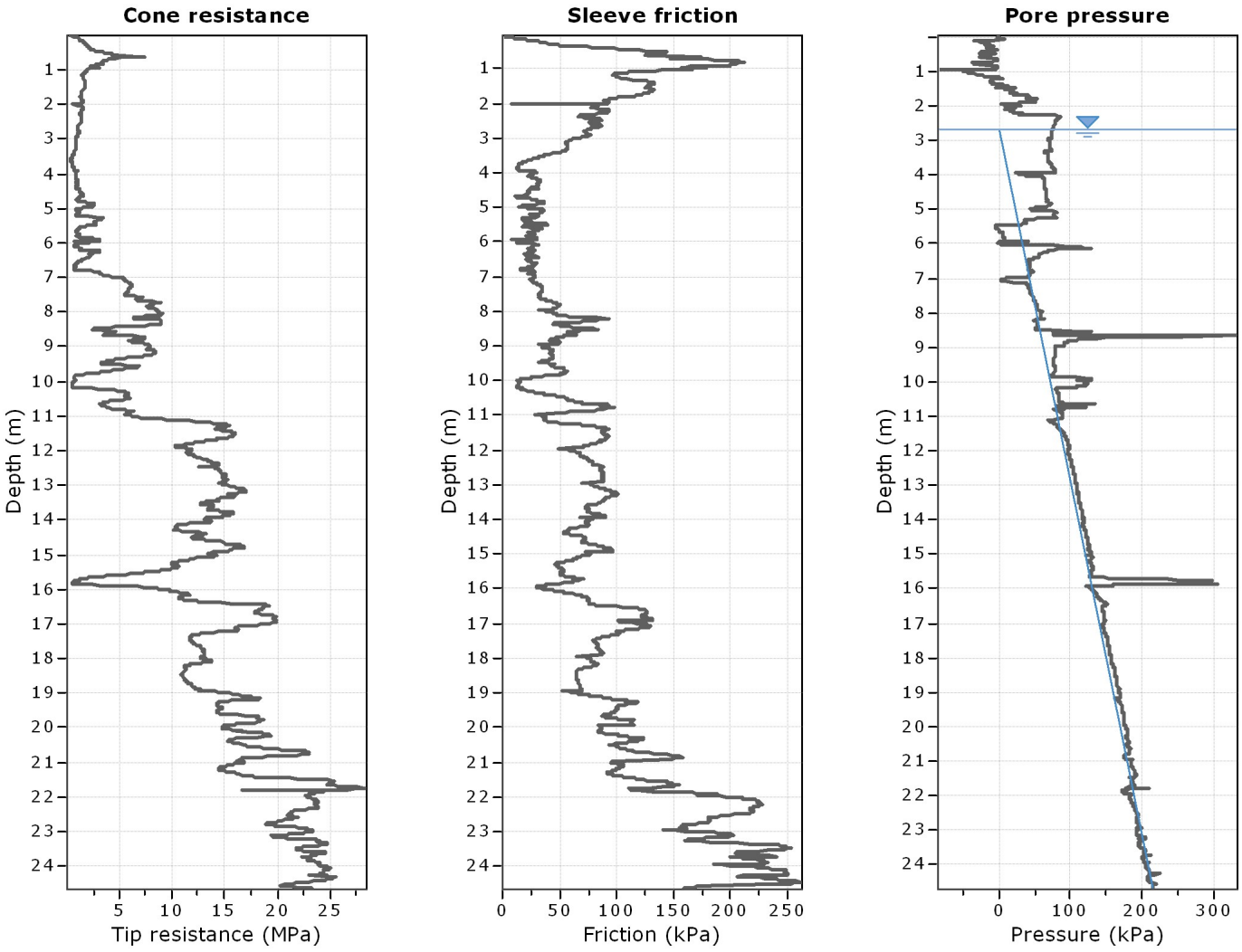
Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable *alpha* using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: 14
OCR factor for clays, N_{kt}: 0.33
User defined estimation data

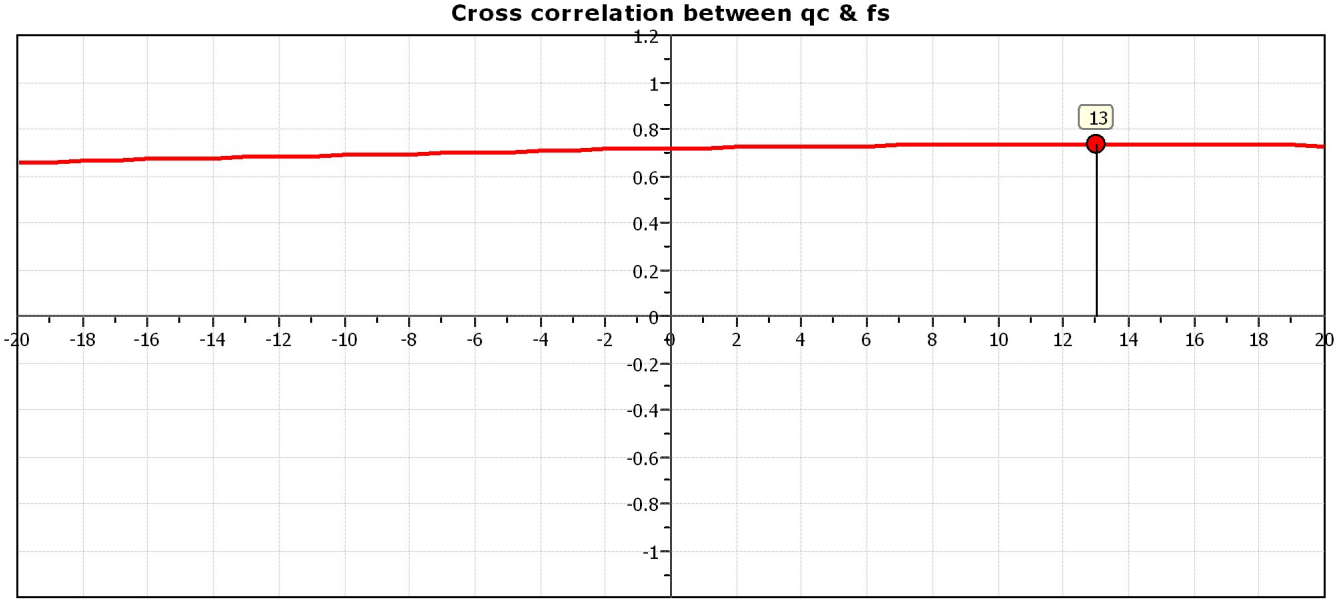
Studio di geologia Tarabusi
Viale A.Oriani 42
40137 Bologna
http://www.studiotarabusi.it

CPT: CPTUS4
Total depth: 24.67 m, Date: 05/02/2015
Coords: lat 44.534946° lon 11.066512°
Cone Type: Pagani
Cone Operator: Calzolari

Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**



The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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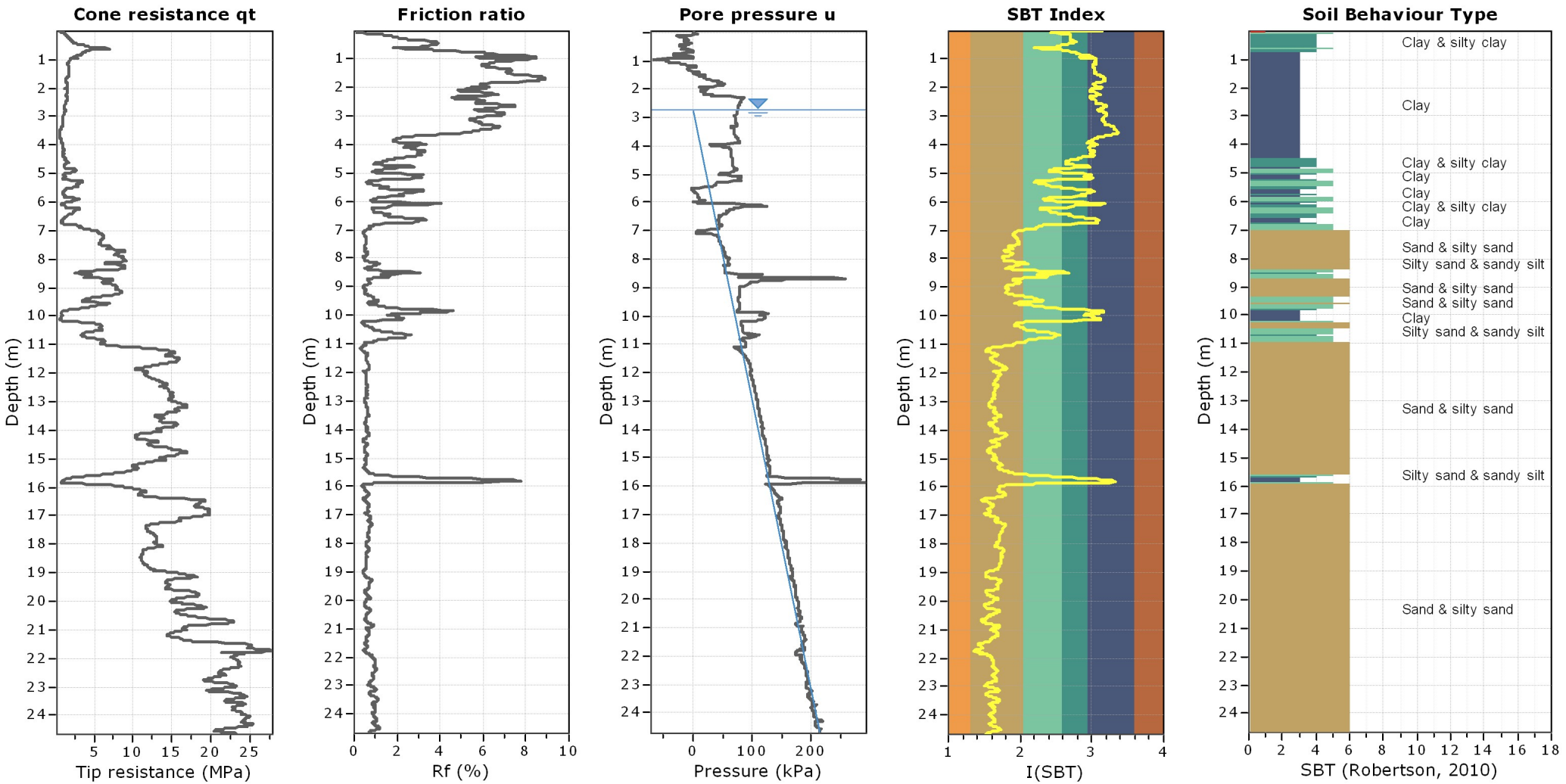
http://www.studiotarabusi.it

Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**

CPT: CPTUS4
Total depth: 24.67 m, Date: 05/02/2015
Coords: lat 44.534946° lon 11.066512°
Cone Type: Pagani
Cone Operator: Calzolari



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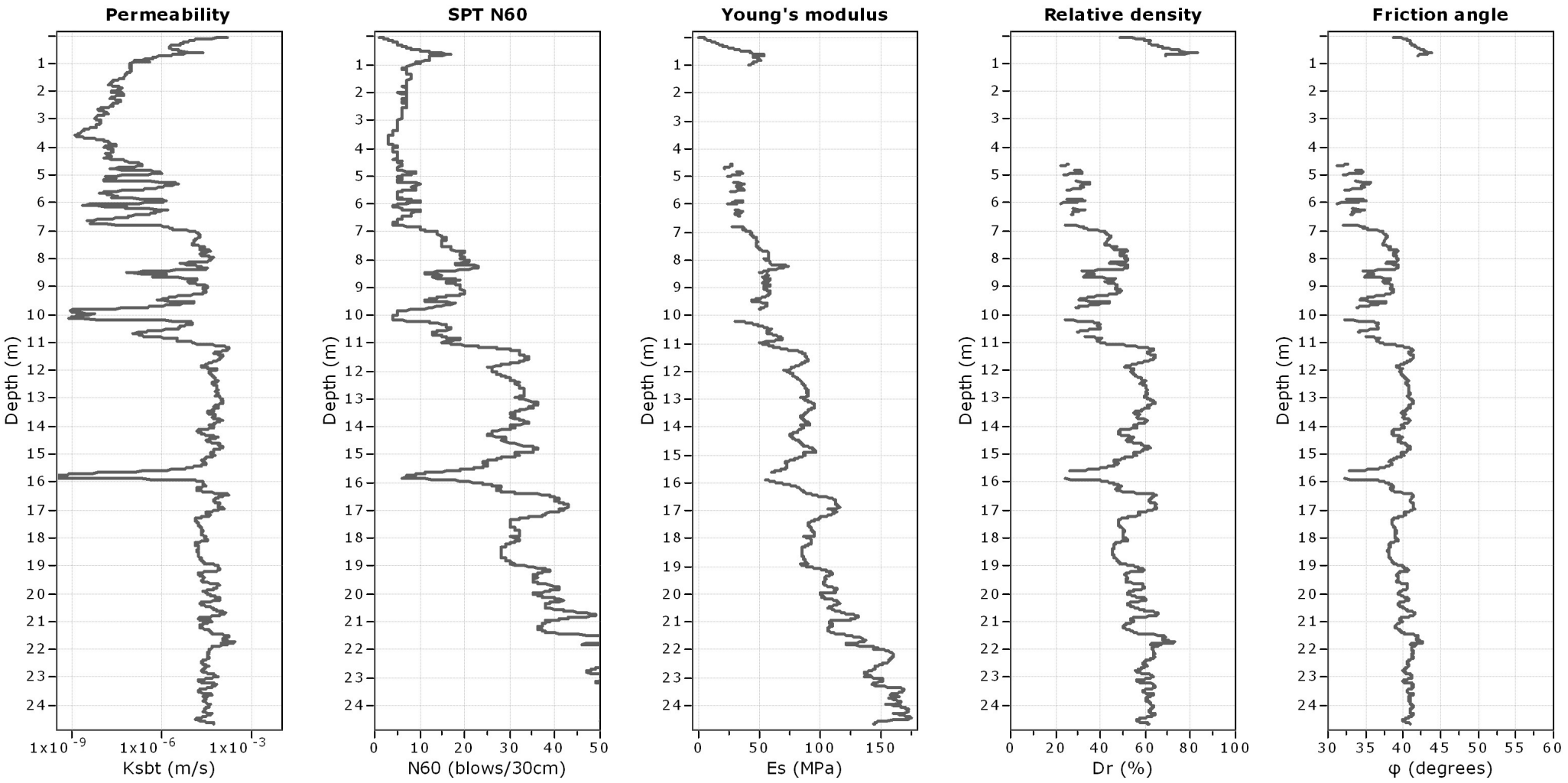
Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**

CPT: CPTUS4
Total depth: 24.67 m, Date: 05/02/2015
Coords: lat 44.534946° lon 11.066512°
Cone Type: Pagani
Cone Operator: Calzolari



Calculation parameters

Permeability: Based on SBT_n
SPT N_{60}: Based on I_c and q_t
Young's modulus: Based on variable alpha using I_c (Robertson, 2009)
Relative desnisty constant, C_{Dr}: 350.0
Phi: Based on Kulhawy & Mayne (1990)
User defined estimation data

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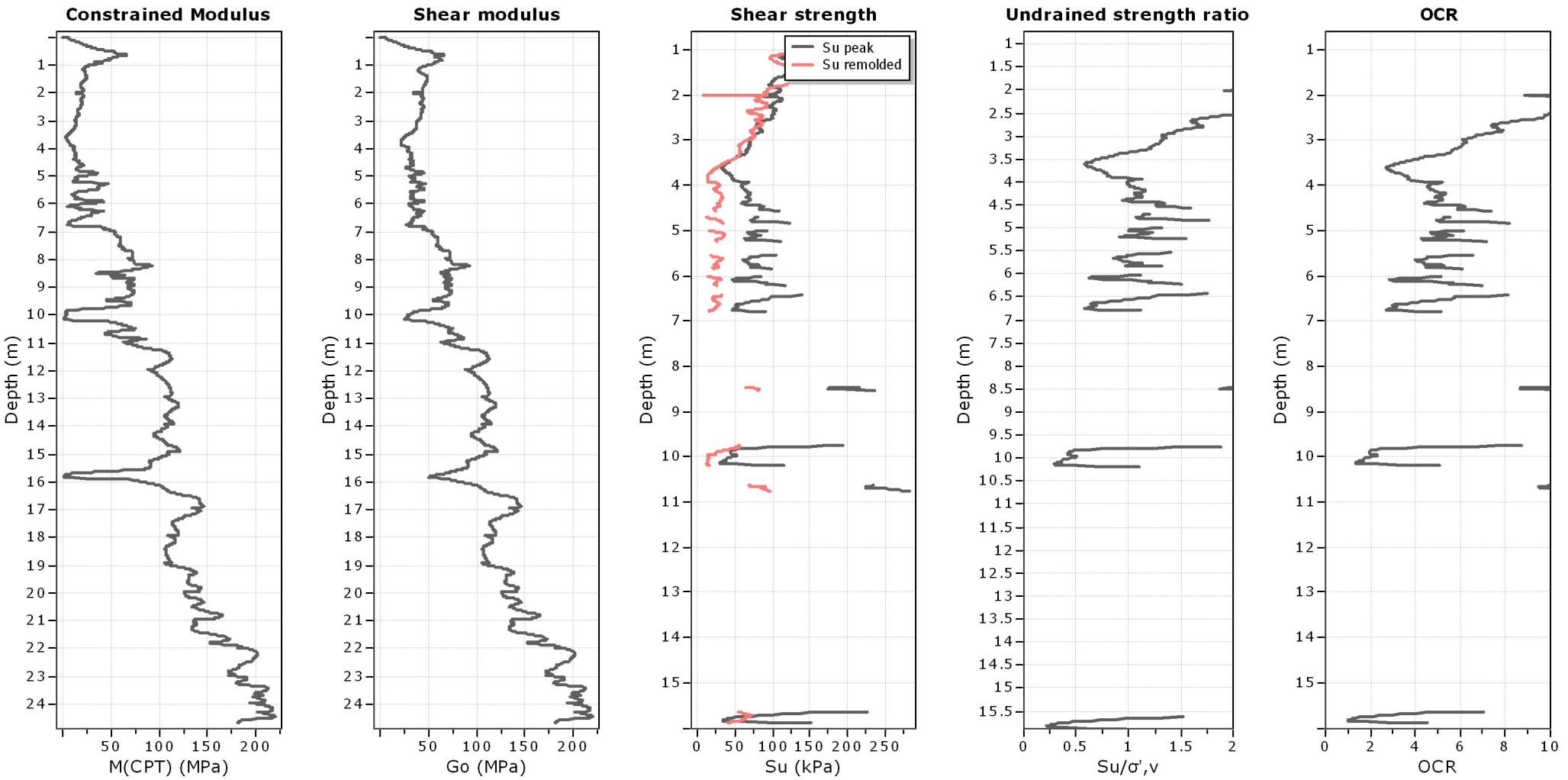
Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**

CPT: CPTUS4
Total depth: 24.67 m, Date: 05/02/2015
Coords: lat 44.534946° lon 11.066512°
Cone Type: Pagani
Cone Operator: Calzolari



Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable *alpha* using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: 14
OCR factor for clays, N_{kt}: 0.33
User defined estimation data

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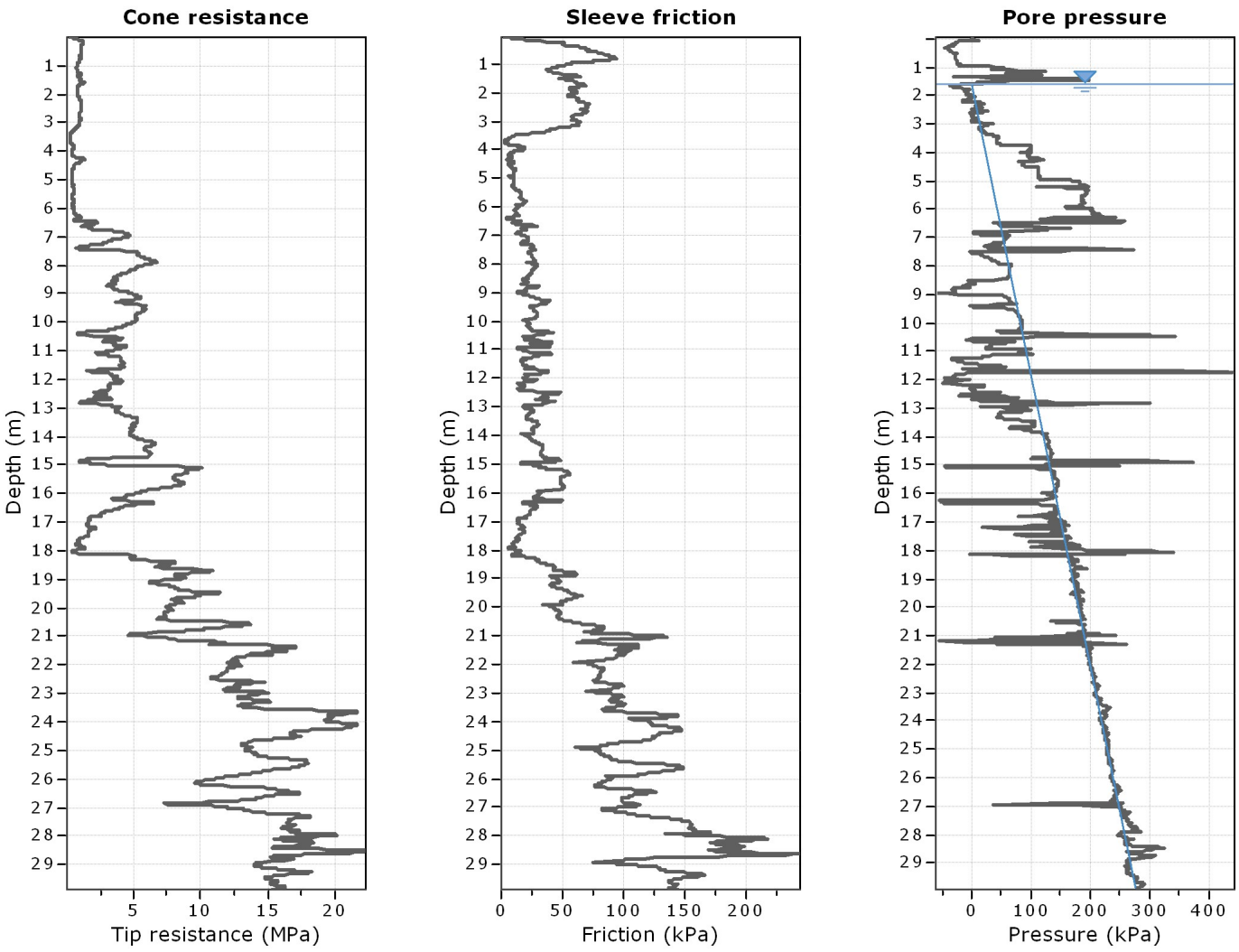
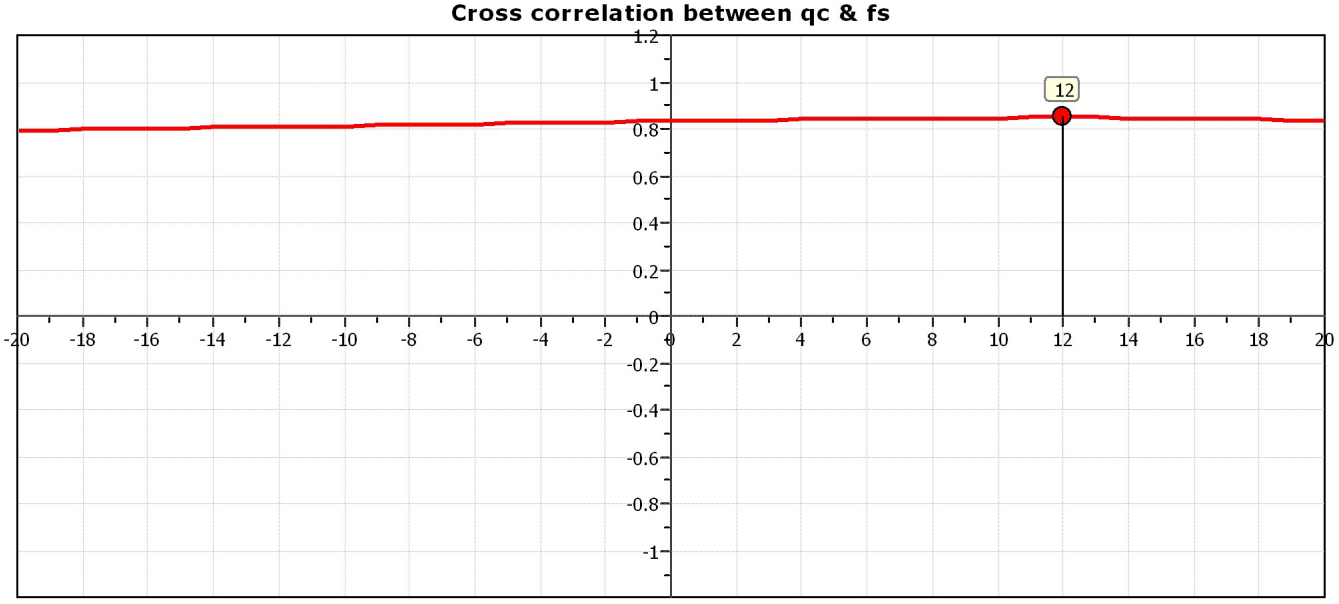
http://www.studiotarabusi.it

CPT: CPTUS5
Total depth: 29.87 m, Date: 03/02/2015
Coords: lat 44.559593° lon 11.140014°
Cone Type: Pagani
Cone Operator: Calzolari

Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**



The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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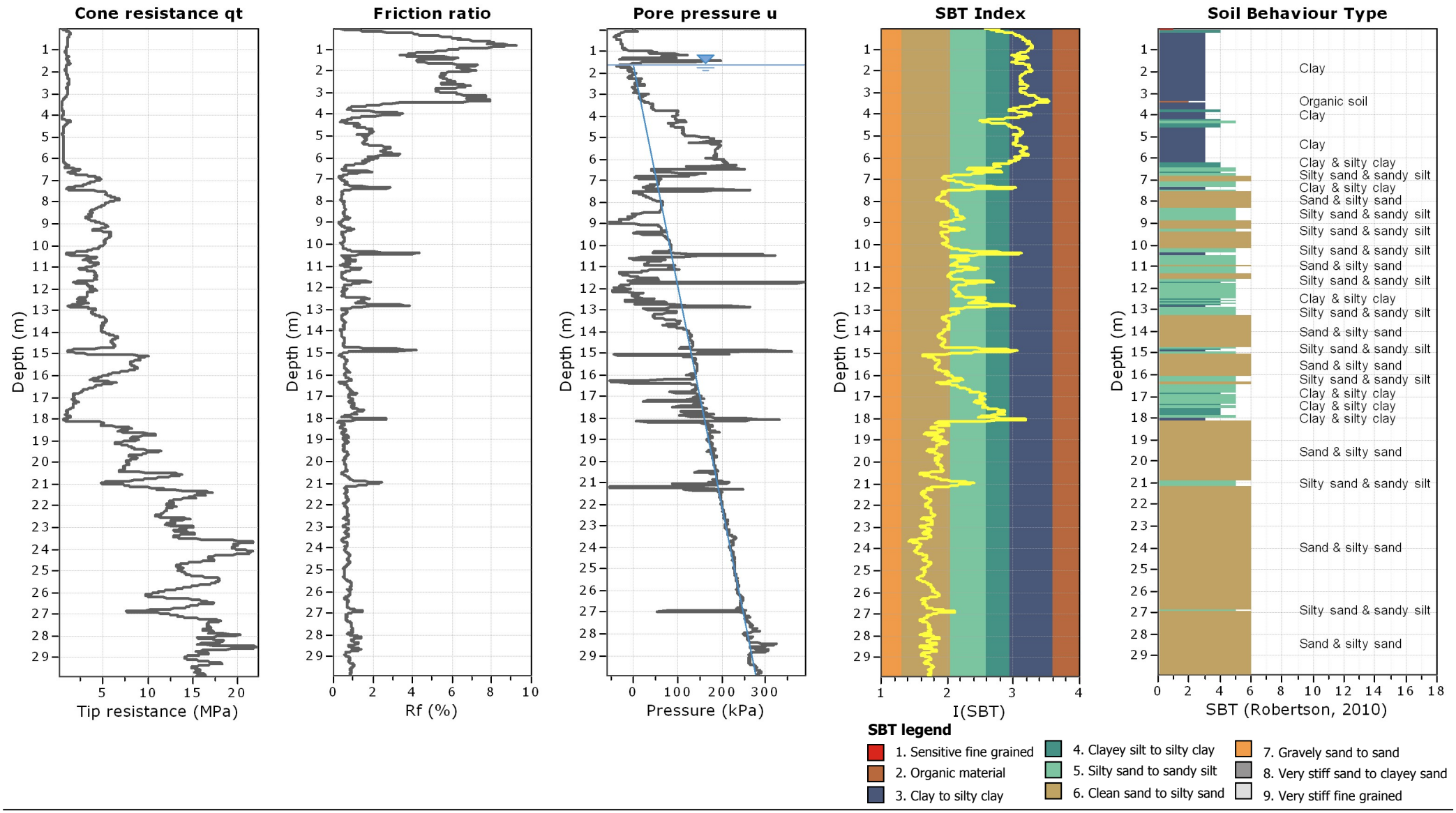
http://www.studiotarabusi.it

Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**

CPT: CPTUS5
Total depth: 29.87 m, Date: 03/02/2015
Coords: lat 44.559593° lon 11.140014°
Cone Type: Pagani
Cone Operator: Calzolari



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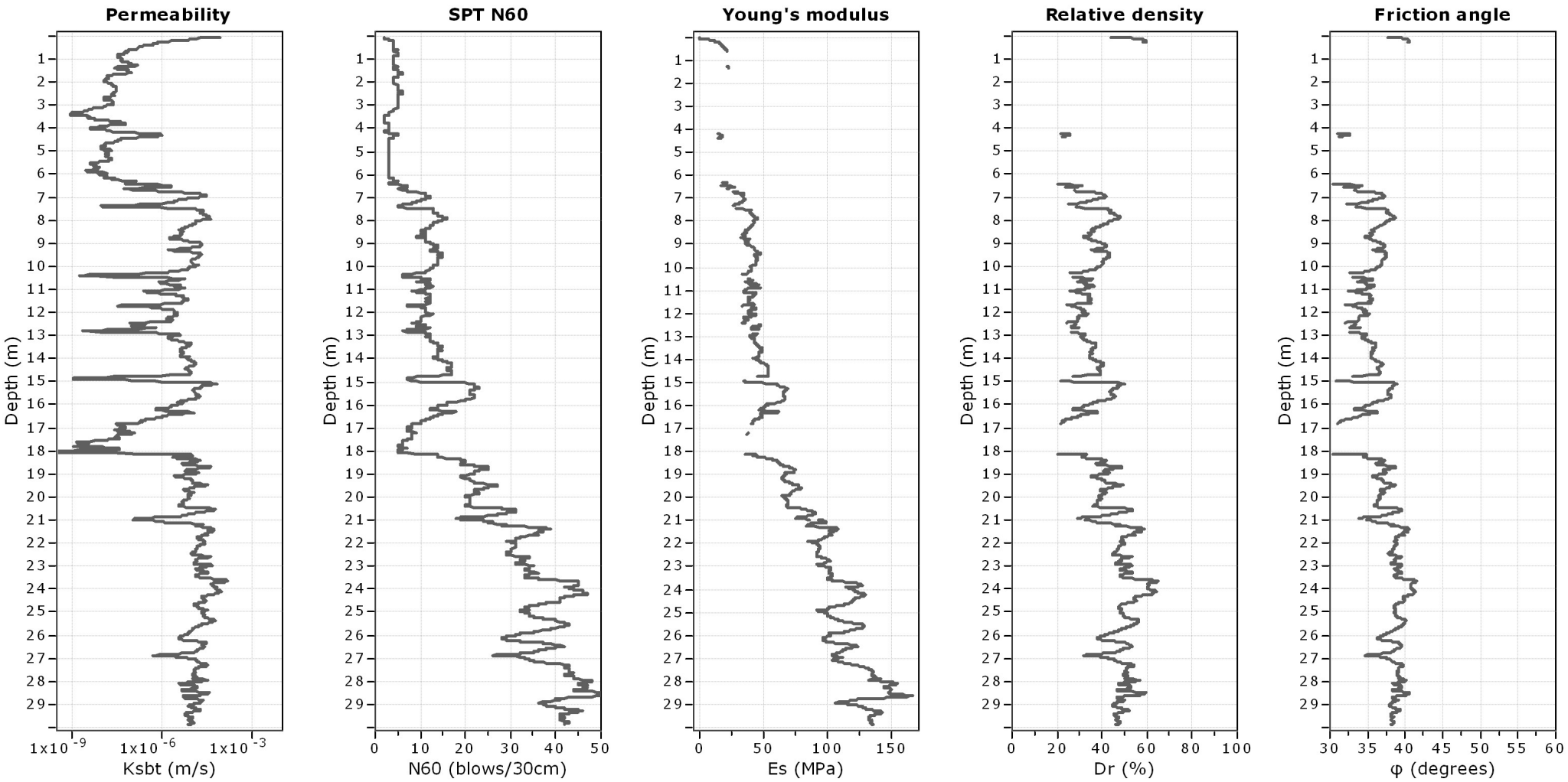
Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**

CPT: CPTUS5
Total depth: 29.87 m, Date: 03/02/2015
Coords: lat 44.559593° lon 11.140014°
Cone Type: Pagani
Cone Operator: Calzolari



Calculation parameters

Permeability: Based on SBT_n
SPT N_{60}: Based on I_c and q_t
Young's modulus: Based on variable alpha using I_c (Robertson, 2009)
Relative desnisty constant, C_{Dr}: 350.0
Phi: Based on Kulhawy & Mayne (1990)
User defined estimation data

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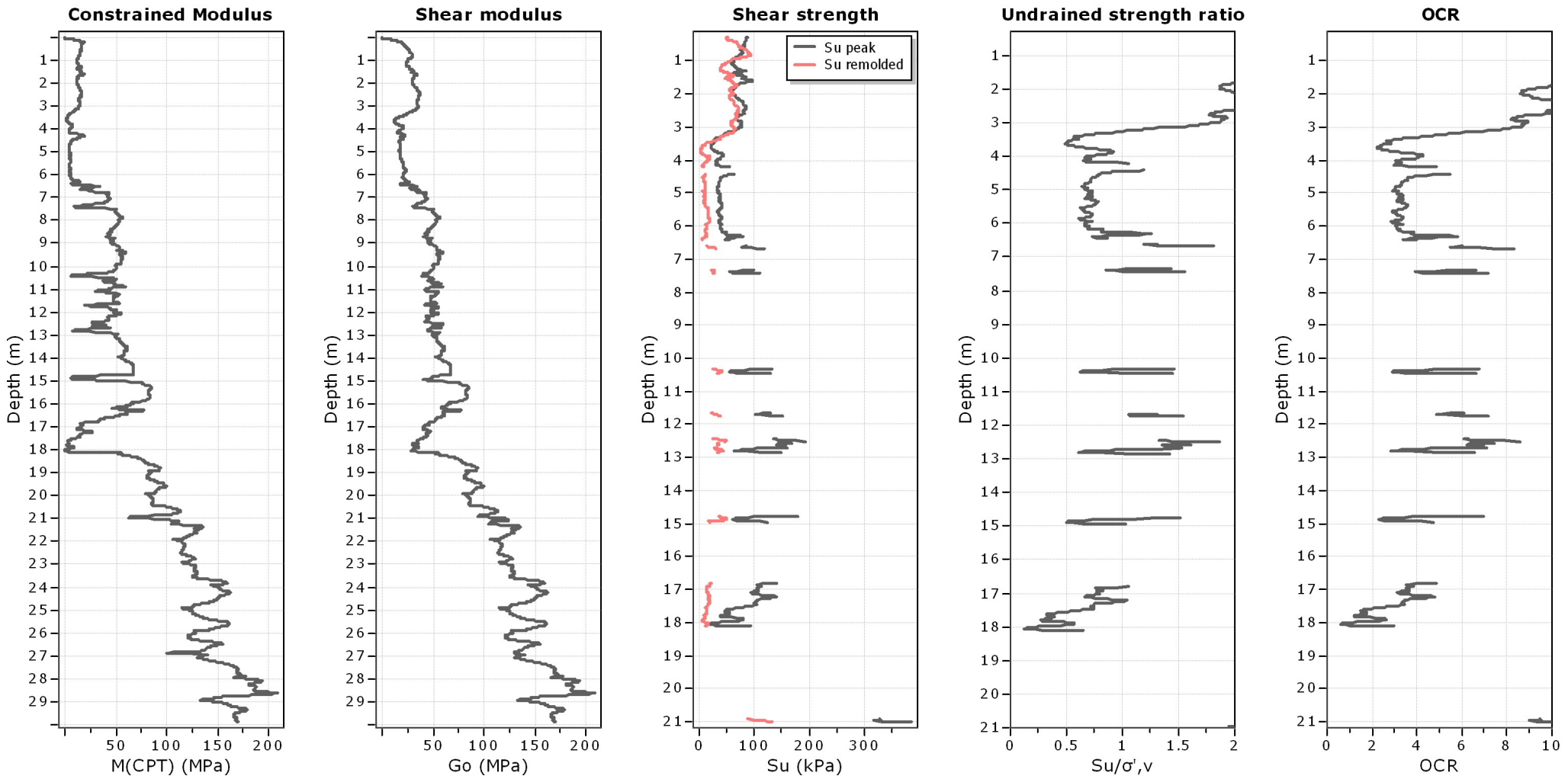
Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**

CPT: CPTUS5
Total depth: 29.87 m, Date: 03/02/2015
Coords: lat 44.559593° lon 11.140014°
Cone Type: Pagani
Cone Operator: Calzolari



Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable *alpha* using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: 14
OCR factor for clays, N_{kt}: 0.33
User defined estimation data

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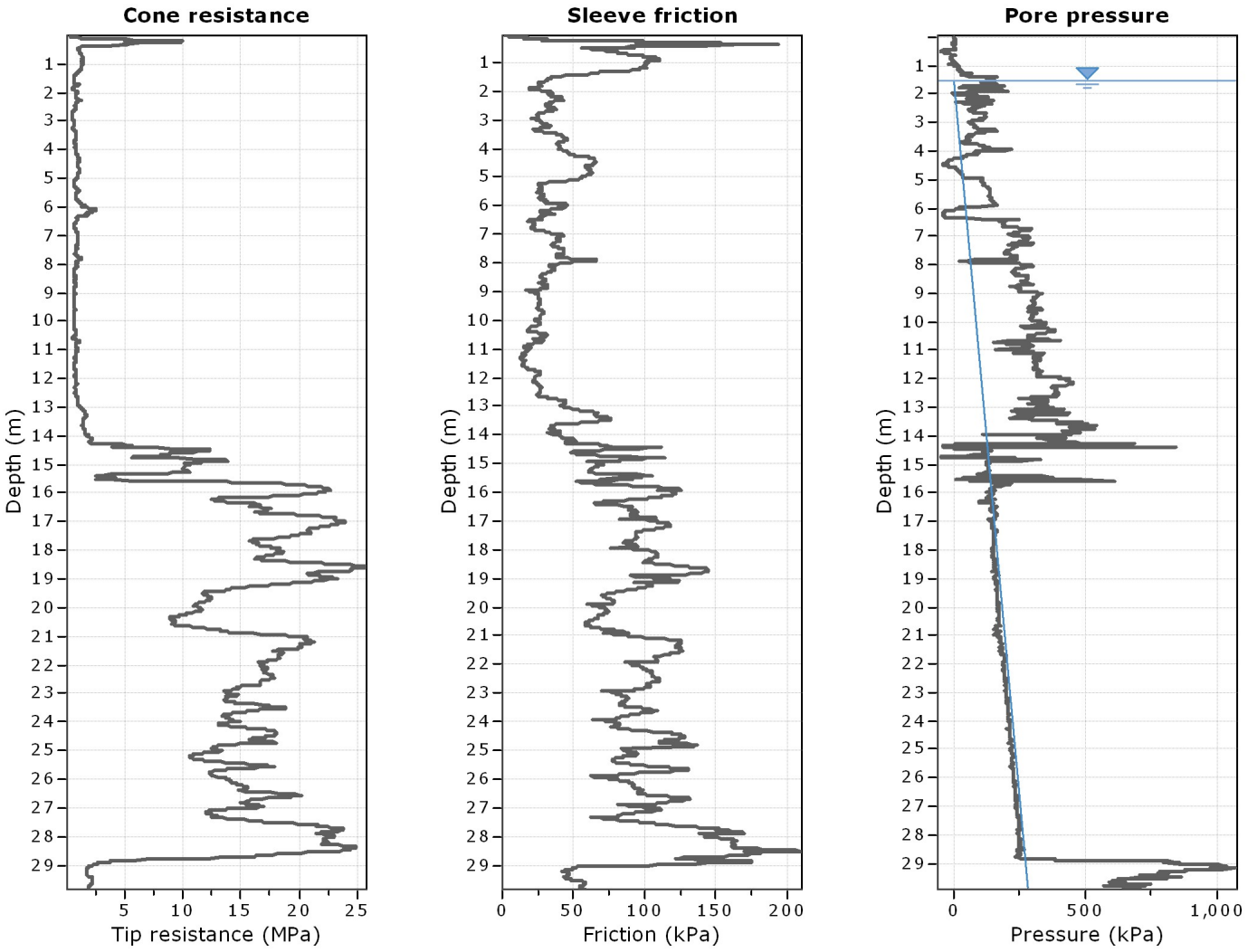
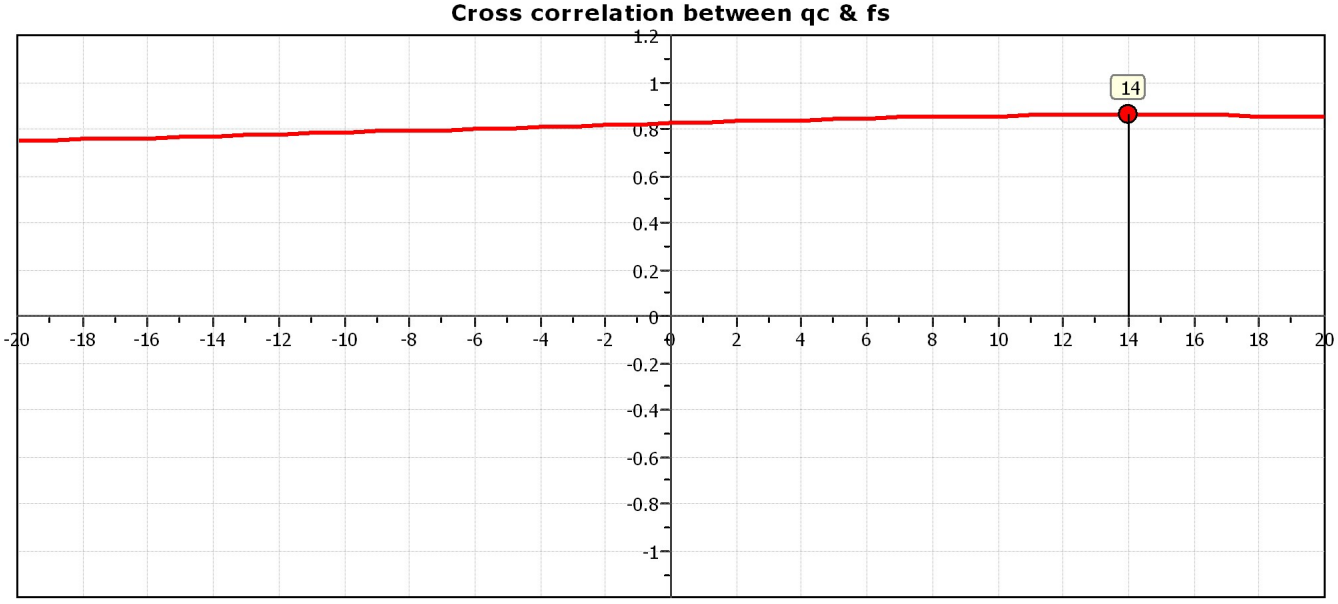
40137 Bologna
http://www.studiotarabusi.it

CPT: CPTUS6
Total depth: 29.85 m, Date: 04/02/2015
Coords: lat 44.561064° lon 11.142219°
Cone Type: Pagani
Cone Operator: Calzolari

Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**



The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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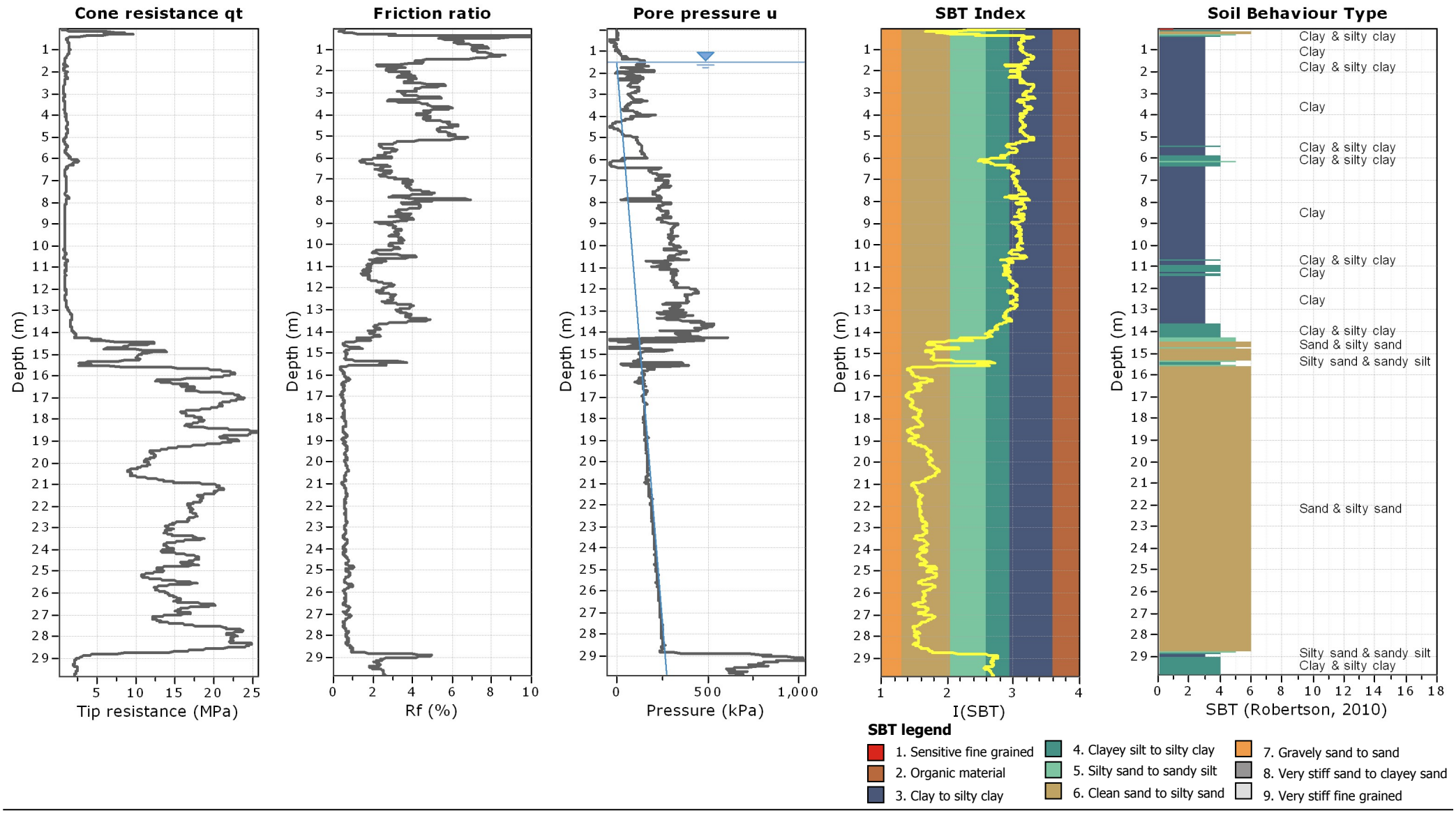
http://www.studiotarabusi.it

Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**

CPT: CPTUS6
Total depth: 29.85 m, Date: 04/02/2015
Coords: lat 44.561064° lon 11.142219°
Cone Type: Pagani
Cone Operator: Calzolari



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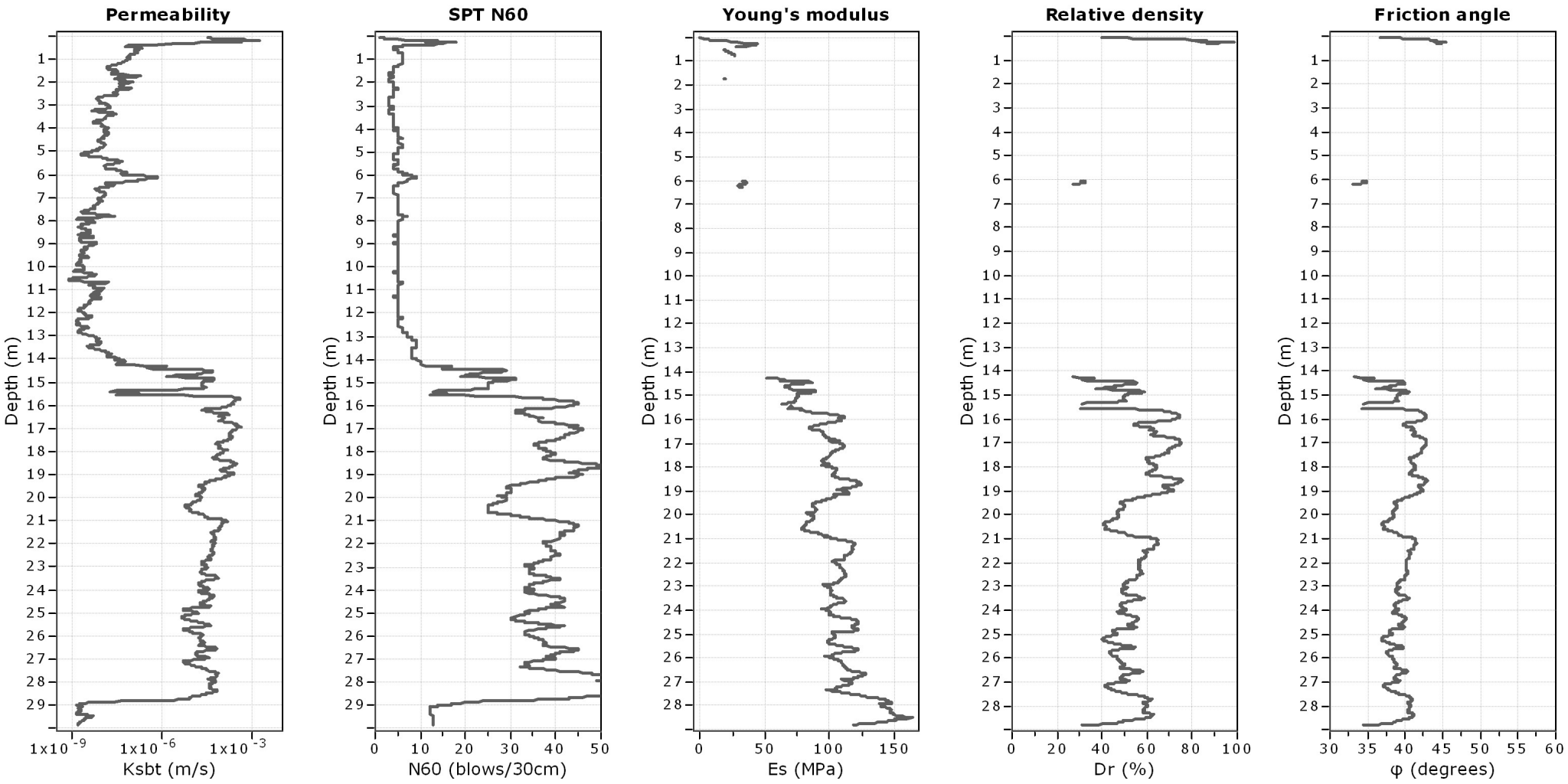
Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**

CPT: CPTUS6
Total depth: 29.85 m, Date: 04/02/2015
Coords: lat 44.561064° lon 11.142219°
Cone Type: Pagani
Cone Operator: Calzolari



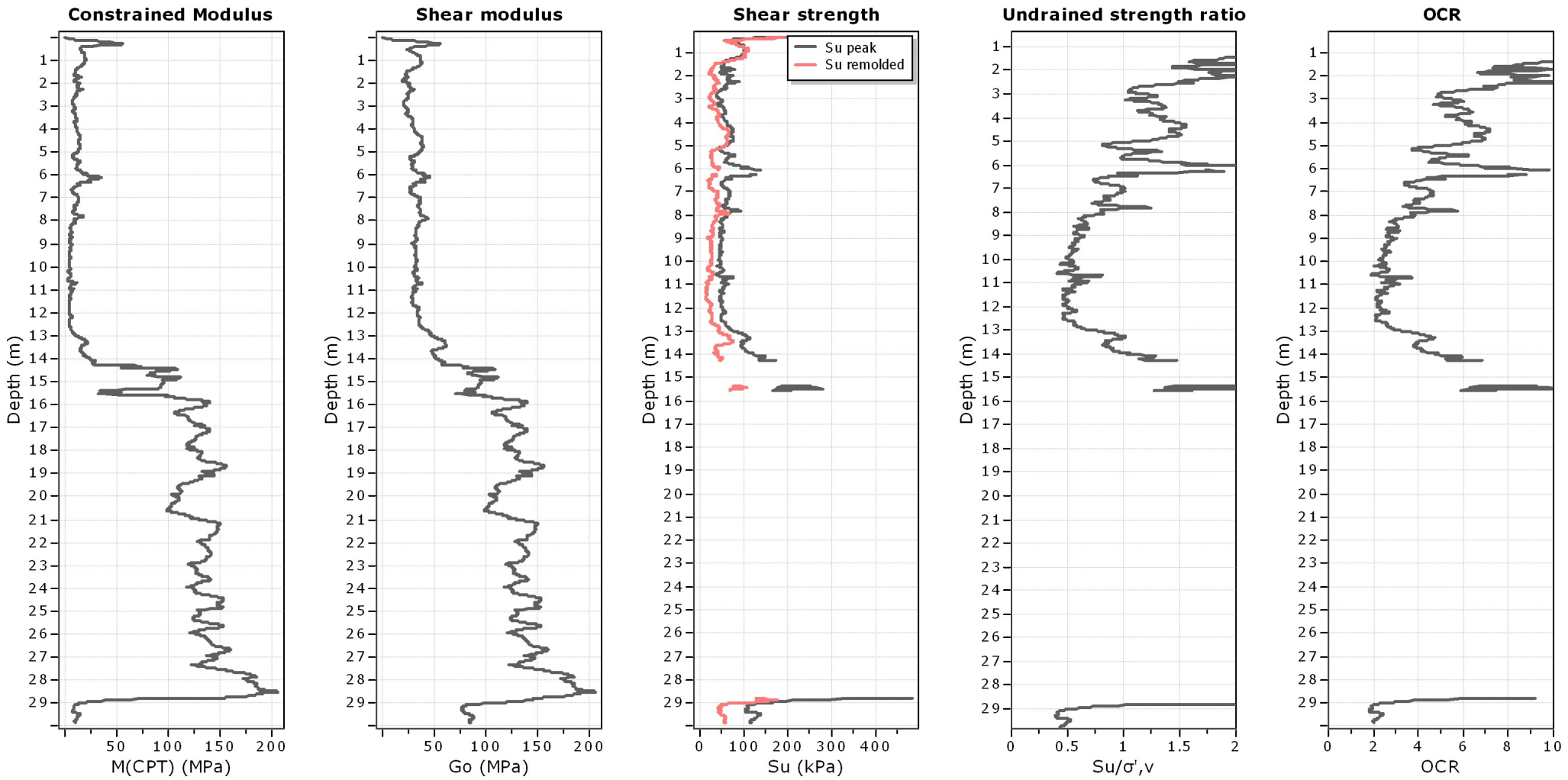
Calculation parameters

Permeability: Based on SBT_n
SPT N_{60}: Based on I_c and q_t
Young's modulus: Based on variable alpha using I_c (Robertson, 2009)
Relative desnisty constant, C_{Dr}: 350.0
Phi: Based on Kulhawy & Mayne (1990)
User defined estimation data

Studio di geologia Tarabusi
Viale A.Oriani 42
40137 Bologna
http://www.studiotarabusi.it

Project: **PSC MIRANDOLA 2015**
Location: **Mirandola (MO)**

CPT: CPTUS6
Total depth: 29.85 m, Date: 04/02/2015
Coords: lat 44.561064° lon 11.142219°
Cone Type: Pagani
Cone Operator: Calzolari



Calculation parameters

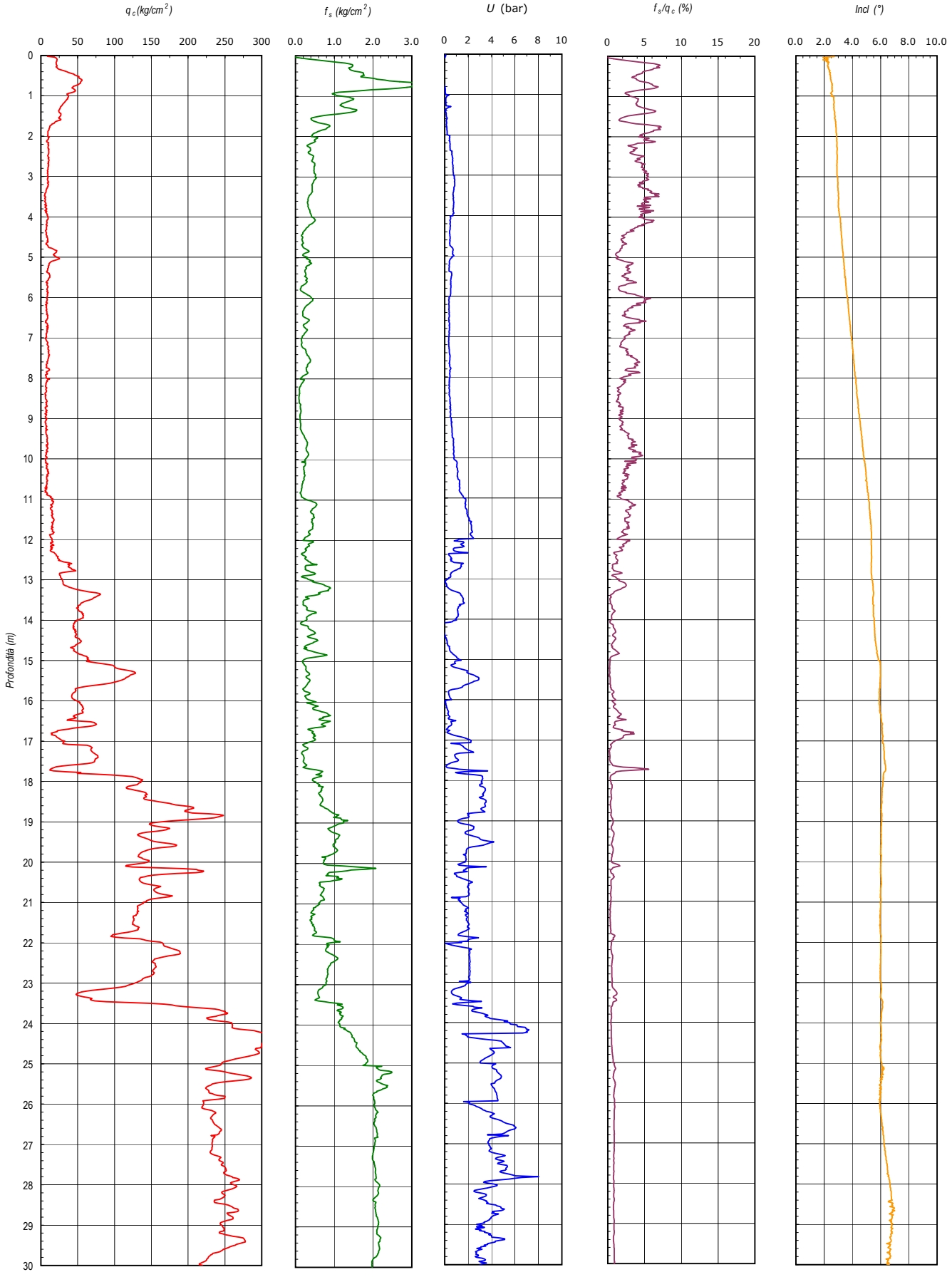
Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable *alpha* using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: 14
OCR factor for clays, N_{kt}: 0.33
User defined estimation data

184050B001

COMMITTENTE: Comune di Mirandola (Modena)
CANTIERE: PSC Mirandola
LOCALITA' : Mirandola

PREFORO (m da p.c.)	assente
PROF. FALDA (m da p.c.)	chiuso a 1,66
TIPO PUNTA	piezocono sismico

PROVA : SCPTU1 **PROFONDITA' (m da p.c.): 30,00 m.** **DATA PROVA: 17/11/2011** **Certificato di prova:**

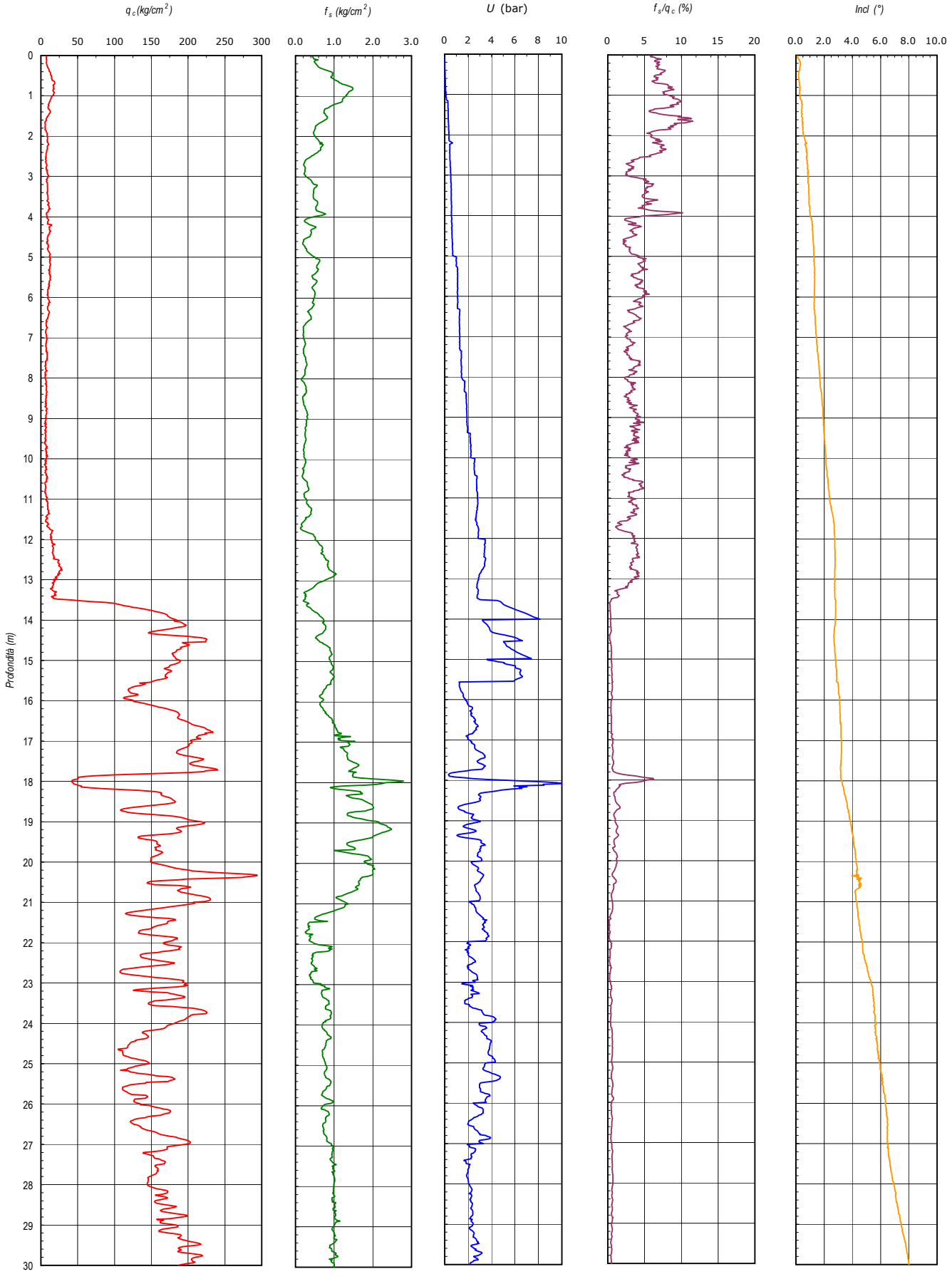


184070B002

COMMITTENTE: Comune di Mirandola (Modena)
CANTIERE: PSC Mirandola
LOCALITA' : Mirandola

PREFORO (m da p.c.): assente
PROF. FALDA (m da p.c.): chiuso 1,35 m
TIPO PUNTA: piezocono sismico

PROVA : SCPTU6 **PROFONDITA' (m da p.c.): 30,00 m.** **DATA PROVA: 21/11/2011** **Certificato di prova:**



PROVA PENETROMETRICA STATICA CPT 2
TABELLA PARAMETRI GEOTECNICI

3.010496-117

- committente: Comune di Miradola
- lavoro: Microzonazione sismica
- località: San Martino Spino (MO)
- resp. cantiere: Nome Responsabile
- assist. cantiere: Nome Assistente

- data prova : 31/05/2007
- quota inizio : Piano Campagna
- prof. falda : 2,74 m da quota inizio

- data emiss. : 28/11/2011
- pagina n°:

	NATURA COESIVA										NATURA GRANULARE									
Prof. m	Rp kg/cm²	Rp/Rl (-)	Natura Litol.	Y' t/m³	p'vo kg/cm²	Cu kg/cm²	OCR (-)	Eu50 kg/cm²	Eu25 kg/cm²	Mo kg/cm²	Dr %	ø1s (°)	ø2s (°)	ø3s (°)	ø4s (°)	ødm (°)	ømy (°)	Amax/g (-)	E'50 kg/cm²	E'25 kg/cm²	Mo kg/cm²
0,20	20	17	4/:/:	1,85	0,04	0,80	99,9	136	204	60	97	42	43	44	46	44	27	0,248	33	50	60
0,40	20	9	4/:/:	1,85	0,07	0,80	99,9	136	204	60	80	39	41	43	44	41	27	0,191	33	50	60
0,60	16	7	2////	1,85	0,11	0,70	62,3	118	177	52	--	--	--	--	--	--	--	--	--	--	--
0,80	14	9	2////	1,85	0,15	0,64	38,9	108	162	48	--	--	--	--	--	--	--	--	--	--	--
1,00	14	14	2////	1,85	0,19	0,64	29,4	108	162	48	--	--	--	--	--	--	--	--	--	--	--
1,20	20	14	4/:/:	1,85	0,22	0,80	31,2	136	204	60	53	35	38	40	42	36	27	0,113	33	50	60
1,40	27	24	4/:/:	1,85	0,26	0,95	31,8	161	242	81	60	36	38	41	43	37	28	0,130	45	68	81
1,60	17	13	2////	1,85	0,30	0,72	19,2	123	184	54	--	--	--	--	--	--	--	--	--	--	--
1,80	10	8	2////	1,85	0,33	0,50	10,4	85	128	40	--	--	--	--	--	--	--	--	--	--	--
2,00	11	9	2////	1,85	0,37	0,54	10,0	91	137	42	--	--	--	--	--	--	--	--	--	--	--
2,20	13	14	2////	1,85	0,41	0,60	10,3	103	154	47	--	--	--	--	--	--	--	--	--	--	--
2,40	12	13	2////	1,85	0,44	0,57	8,6	105	158	45	--	--	--	--	--	--	--	--	--	--	--
2,60	17	20	2////	1,85	0,48	0,72	10,5	123	184	54	--	--	--	--	--	--	--	--	--	--	--
2,80	15	25	2////	0,95	0,50	0,67	9,0	119	178	50	--	--	--	--	--	--	--	--	--	--	--
3,00	15	25	2////	0,95	0,52	0,67	8,6	123	185	50	--	--	--	--	--	--	--	--	--	--	--
3,20	15	28	2////	0,95	0,54	0,67	8,2	128	193	50	--	--	--	--	--	--	--	--	--	--	--
3,40	10	19	2////	0,90	0,56	0,50	5,5	151	226	40	--	--	--	--	--	--	--	--	--	--	--
3,60	7	15	1***	0,46	0,57	0,35	3,4	31	46	11	--	--	--	--	--	--	--	--	--	--	--
3,80	6	18	2////	0,82	0,58	0,30	2,7	154	231	29	--	--	--	--	--	--	--	--	--	--	--
4,00	7	17	2////	0,84	0,60	0,35	3,2	167	250	32	--	--	--	--	--	--	--	--	--	--	--
4,20	6	15	1***	0,46	0,61	0,30	2,6	33	49	9	--	--	--	--	--	--	--	--	--	--	--
4,40	6	15	1***	0,46	0,62	0,30	2,6	33	50	9	--	--	--	--	--	--	--	--	--	--	--
4,60	8	17	2////	0,86	0,63	0,40	3,5	179	268	35	--	--	--	--	--	--	--	--	--	--	--
4,80	7	17	2////	0,84	0,65	0,35	2,9	176	263	32	--	--	--	--	--	--	--	--	--	--	--
5,00	6	15	1***	0,46	0,66	0,30	2,3	34	51	9	--	--	--	--	--	--	--	--	--	--	--
5,20	6	18	2////	0,82	0,68	0,30	2,3	163	245	29	--	--	--	--	--	--	--	--	--	--	--
5,40	6	18	2////	0,82	0,69	0,30	2,2	165	247	29	--	--	--	--	--	--	--	--	--	--	--
5,60	6	15	1***	0,46	0,70	0,30	2,2	35	53	9	--	--	--	--	--	--	--	--	--	--	--
5,80	8	40	4/:/:	0,84	0,72	0,40	3,0	197	295	35	--	28	31	35	38	25	26	--	13	20	24
6,00	31	39	3::::	0,88	0,74	--	--	--	--	--	39	33	36	38	41	32	29	0,078	52	78	93
6,20	42	39	3::::	0,90	0,75	--	--	--	--	--	49	35	37	39	42	34	30	0,102	70	105	126
6,40	55	52	3::::	0,93	0,77	--	--	--	--	--	58	36	38	40	43	35	31	0,124	92	138	165
6,60	38	57	3::::	0,90	0,79	--	--	--	--	--	44	34	37	39	42	33	30	0,090	63	95	114
6,80	35	20	4/:/:	0,98	0,81	1,17	9,9	199	298	105	41	34	36	39	41	32	29	0,082	58	88	105
7,00	48	31	3::::	0,91	0,83	--	--	--	--	--	51	35	37	40	42	34	31	0,107	80	120	144
7,20	46	38	3::::	0,91	0,85	--	--	--	--	--	49	35	37	39	42	34	31	0,102	77	115	138
7,40	37	33	3::::	0,89	0,86	--	--	--	--	--	41	34	36	39	41	32	30	0,083	62	93	111
7,60	41	44	3::::	0,90	0,88	--	--	--	--	--	44	34	37	39	42	33	30	0,090	68	103	123
7,80	52	37	3::::	0,92	0,90	--	--	--	--	--	52	35	37	40	42	34	31	0,109	87	130	156
8,00	46	26	4/:/:	1,01	0,92	1,53	11,9	261	391	138	47	35	37	39	42	33	31	0,097	77	115	138
8,20	41	34	3::::	0,90	0,94	--	--	--	--	--	43	34	36	39	41	32	30	0,087	68	103	123
8,40	54	48	3::::	0,92	0,96	--	--	--	--	--	52	35	37	40	42	34	31	0,109	90	135	162
8,60	55	43	3::::	0,93	0,98	--	--	--	--	--	52	35	37	40	42	34	31	0,109	92	138	165
8,80	57	50	3::::	0,93	0,99	--	--	--	--	--	53	35	38	40	42	34	31	0,111	95	143	171
9,00	55	49	3::::	0,93	1,01	--	--	--	--	--	51	35	37	40	42	34	31	0,107	92	138	165
9,20	57	50	3::::	0,93	1,03	--	--	--	--	--	52	35	37	40	42	34	31	0,109	95	143	171
9,40	57	39	3::::	0,93	1,05	--	--	--	--	--	51	35	37	40	42	34	31	0,108	95	143	171
9,60	45	37	3::::	0,91	1,07	--	--	--	--	--	43	34	36	39	41	32	31	0,087	75	113	135
9,80	45	36	3::::	0,91	1,09	--	--	--	--	--	43	34	36	39	41	32	31	0,086	75	113	135
10,00	40	55	3::::	0,90	1,10	--	--	--	--	--	38	33	36	38	41	31	30	0,075	67	100	120
10,20	46	41	3::::	0,91	1,12	--	--	--	--	--	42	34	36	39	41	32	31	0,086	77	115	138
10,40	48	40	3::::	0,91	1,14	--	--	--	--	--	44	34	36	39	41	32	31	0,088	80	120	144
10,60	53	35	3::::	0,92	1,16	--	--	--	--	--	47	35	37	39	42	33	31	0,095	88	133	159
10,80	48	28	4/:/:	1,01	1,18	1,60	9,2	281	421	144	43	34	36	39	41	32	31	0,086	80	120	144
11,00	57	43	3::::	0,93	1,20	--	--	--	--	--	48	35	37	39	42	33	31	0,100	95	143	171
11,20	52	41	3::::	0,92	1,22	--	--	--	--	--	45	34	37	39	42	32	31	0,091	87	130	156
11,40	52	28	4/:/:	1,01	1,24	1,73	9,6	298	447	156	44	34	37	39	42	32	31	0,090	87	130	156
11,60	71	43	3::::	0,95	1,26	--	--	--	--	--	55	36	38	40	42	34	32	0,116	118	178	213
11,80	63	45	3::::	0,94	1,27	--	--	--	--	--	50	35	37	40	42	33	32	0,104	105	158	189
12,00	51	55	3::::	0,92	1,29	--	--	--	--	--	43	34	36	39	41	32	31	0,086	85	128	153
12,20	48	55	3::::	0,91	1,31	--	--	--	--	--	40	34	36	39	41	31	31	0,080	80	120	144
12,40	47	28	4/:/:	1,01	1,33	1,57	7,7	323	485	141	39	33	36	38	41	31	31	0,078	78	118	141
12,60	41	51	3::::	0,90	1,35	--	--	--	--	--	34	33	35	38	41	30	30	0,066	68	103	123
12,80	43	43	3::::	0,91	1,37	--	--	--	--	--	35	33	35	38	41	31	30	0,069	72	108	129
13,00	26	26	4/:/:	0,95	1,39	0,93	3,8	390	586	78	18	30	33	36	39	28	28	0,034	43	65	78
13,20	8	20	2////	0,86	1,40	0,40	1,3	236	354	35	--	--	--	--	--	--	--	--	--	--	--
13,40	22	16	4/:/:	0,93	1,42	0,85	3,3	398	596	66	11	30	33	36	39	27	28	0,023	37	55	66
13,60	57	37	3::::	0,93	1,44	--	--	--	--	--	44	34	37	39	42	32	31	0,089	95	143	171
13,80	55	52	3::::	0,93	1,46	--	--	--	--	--	42	34	36	39	41	32	31	0,085	92	138	165
14,00	62	42	3::::	0,94	1,48	--	--	--	--	--	46	34	37	39	42	32	32	0,094	103	155	186
14,20	63	45	3::::	0,94	1,50	--	--	--	--	--	46	34	37	39	42	32	32	0,095	105	158	189
14,40	55	55	3::::	0,93	1,52	--	--	--	--	--	41	34	36	39	41	31	31	0,083	92	138	165
14,60	56	56	3::::	0,93	1,53	--	--	--	--	--	42	34	36	39	41	31	31	0,084	93	140	168
14,80	59	40	3::::	0,93	1,55	--	--	--	--	--	43	34	36	39	41	32	32	0,087	98	148	177
15,00	57	39	3::::	0,93	1,57	--	--	--	--	--	42	34	36	39	41	31	31	0,084	95	143	171
15,20	50	50	3::::	0,92	1,59	--	--	--	--	--	37	33	36	38	41	31	31	0,073	83	125	150
15,40	59	37	3::::	0,93	1,61	--	--	--	--	--	42	34	36	39	41	31	32	0,085	98	148	177
15,60	24	21	4/:/:	0,94	1,63	0,89	2,9	442	663	72	11	30	33	36	39	26	28	0,022	40	60	72
15,80	10	8	2////	0,90	1,65	0,50	1,4	293	440	40	--	--	--	--	--	--	--	--	--	--	--
16,00	46	57	3::::	0,91	1,66	--	--	--	--	--	33	33	35	38	41	30	31	0,064	77	115	138
16,20	44	30	4/:/:	1,00	1,68	1,47	5,3	460	690	132	31	32	35	38	40	29	31	0,060	73	110	132
16,40	12	14	2////	0,92	1,70	0,57	1,6	331	496	45	--	--	--	--	--	--	--	--	--	--	--
16,60	111	56	3::::	1,02	1,72	--	--	--	--	--	62	37	39	41	43	35	34	0,137	185	278	333
16,80	94	49	3::::	0,99	1,74	--	--	--	--	--	56	36	38	40	43	34	34	0,120	157	235	282
17,00	88	46	3::::	0,98	1,76	--	--	--	--	--	54	36	38	40	42	33	33	0,114	147	220	264
17,20	79	62	3::::	0,97	1,78	--	--	--	--	--	50	35	37	40	42	32	33	0,104	132	198	237
17,40	83	59	3::::	0,97	1,80	--	--	--	--	--	51	35	37	40	42	33	33	0,107	138	208	249
17,60	60	41	3::::	0,93	1,82	--	--	--	--	--	40	34	36	39	41	31	32	0,079	100	150	180
17,80	74	53	3::::	0,96	1,84	--	--	--	--	--	47	35	37	39	42	32	32	0,096	123	185	222
18,00	81	30	4/:/:	1,03	1,86	2,70	10,0	459	689	243	50	35	37	40	42	32	33	0,103	135	203	243
18,20	62	66	3::::	0,94	1,88	--	--	--	--	--	40	34	36	39	41	31	32	0,080	103	155	186
18,40	109	74	3::::	1,01	1,90	--	--	--	--	--	59	36	38	40	43	34	34	0,129	182	273	327
18,60	54	32	3::::	0,92	1,92	--	--	--	--	--	35	33	35	38	41	30	31	0,068	90	135	162
18,80	94	52	3::::	0,99	1,94	--	--	--	--	--	54	36	38	40	42	33	34	0,114	157	235	282
19,00	150	56	3::::	1,08	1,96	--	--	--	--	--	70	38	40	42	44	35	36	0,158	250	375	450
19,20	168	55	3::::	1,10	1,98	--	--	--	--	--	73	38	40	42	44	36	37	0,169	280	420	504
19,40	158	50	3::::	1,09	2,00	--	--	--	--	--	71	38	40	42	44	36	36	0,161	263	395	474
19,60	153	47	3::::	1,08	2,02	--	--	--	--	--	69	38	40	42	44	35	36	0,157	255	383	459
19,80	136	73	3::::	1,05	2,04	--	--	--	--	--	65	37	39	41	43	35	35	0,145	227	340	408
20,00	164	57	3::::	1,10	2,07	--	--	--	--	--	71	38	40	42	44	36	37	0,163	273	410	492

PROVA PENETROMETRICA STATICA CPT 2
TABELLA PARAMETRI GEOTECNICI

3.010496-117

- committente: Comune di Miradola
- lavoro: Microzonazione sismica
- località: San Martino Spino (MO)
- resp. cantiere: Nome Responsabile
- assist. cantiere: Nome Assistente

- data prova : 31/05/2007
- quota inizio : Piano Campagna
- prof. falda : 2,74 m da quota inizio
- data emiss. : 28/11/2011
- pagina n°:

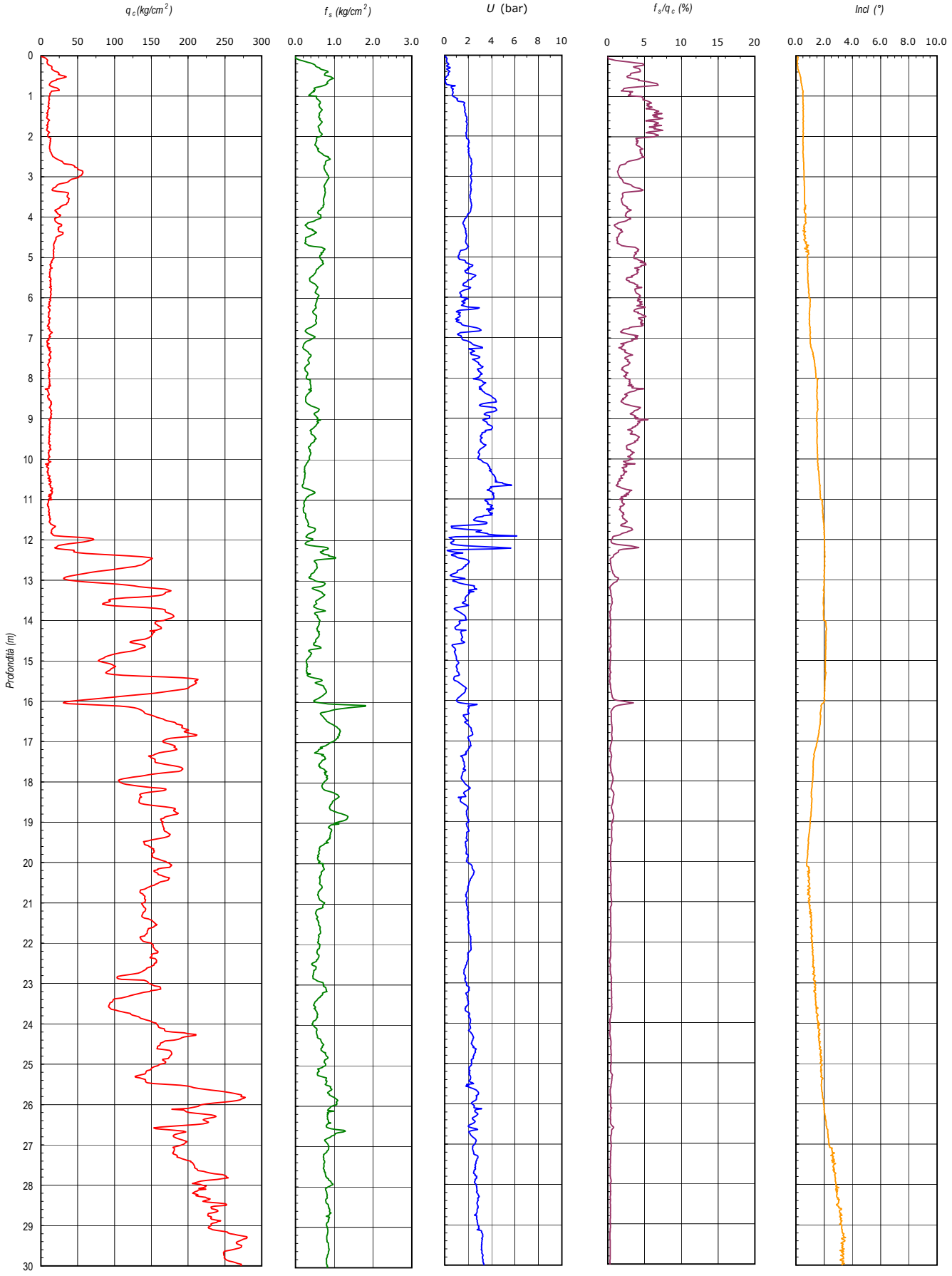
					NATURA COESIVA						NATURA GRANULARE									
Prof. m	Rp kg/cm²	Rp/Rl (-)	Natura Litol.	Y' t/m³	p'vo kg/cm²	Cu kg/cm²	OCR (-)	Eu50 kg/cm²	Eu25	Mo kg/cm²	Dr %	ø1s (°)	ø2s (°)	ø3s (°)	ø4s (°)	ødm (°)	ømy (°)	Amax/g (-)	E'50 kg/cm²	E'25	Mo kg/cm²
20,20	110	36	3::::	1,02	2,09	--	--	--	--	--	57	36	38	40	43	33	34	0,123	183	275	330
20,40	148	69	3::::	1,07	2,11	--	--	--	--	--	67	37	39	41	43	35	36	0,151	247	370	444
20,60	164	43	3::::	1,10	2,13	--	--	--	--	--	71	38	40	42	44	36	37	0,161	273	410	492
20,80	119	40	3::::	1,03	2,15	--	--	--	--	--	59	36	38	40	43	34	35	0,128	198	298	357
21,00	156	43	3::::	1,08	2,17	--	--	--	--	--	68	38	39	41	43	35	36	0,154	260	390	468
21,20	178	44	3::::	1,12	2,19	--	--	--	--	--	73	38	40	42	44	36	37	0,167	297	445	534
21,40	136	55	3::::	1,05	2,22	--	--	--	--	--	63	37	39	41	43	34	35	0,139	227	340	408
21,60	125	36	3::::	1,04	2,24	--	--	--	--	--	60	36	38	41	43	34	35	0,131	208	313	375
21,80	157	46	3::::	1,09	2,26	--	--	--	--	--	68	37	39	41	43	35	36	0,152	262	393	471
22,00	131	50	3::::	1,05	2,28	--	--	--	--	--	61	37	39	41	43	34	35	0,134	218	328	393
22,20	32	12	4/:/:	0,97	2,30	1,07	2,4	572	858	96	13	30	33	36	39	26	29	0,025	53	80	96
22,40	98	37	3::::	1,00	2,32	--	--	--	--	--	51	35	37	40	42	32	34	0,106	163	245	294
22,60	172	49	3::::	1,11	2,34	--	--	--	--	--	70	38	40	42	44	35	37	0,159	287	430	516
22,80	175	54	3::::	1,11	2,36	--	--	--	--	--	70	38	40	42	44	35	37	0,160	292	438	525
23,00	183	46	3::::	1,12	2,38	--	--	--	--	--	72	38	40	42	44	36	37	0,164	305	458	549
23,20	242	51	3::::	1,15	2,41	--	--	--	--	--	81	39	41	43	44	37	39	0,193	403	605	726
23,40	204	70	3::::	1,15	2,43	--	--	--	--	--	75	38	40	42	44	36	38	0,174	340	510	612
23,60	128	26	4/:/:	1,07	2,45	4,27	12,5	725	1088	384	59	36	38	40	43	33	35	0,127	213	320	384
23,80	116	16	4/:/:	1,06	2,47	3,87	11,0	657	986	348	55	36	38	40	42	33	35	0,117	193	290	348
24,00	292	58	3::::	1,15	2,50	--	--	--	--	--	86	40	42	43	45	38	40	0,211	487	730	876
24,20	291	61	3::::	1,15	2,52	--	--	--	--	--	86	40	42	43	45	38	40	0,210	485	728	873
24,40	277	54	3::::	1,15	2,54	--	--	--	--	--	84	40	41	43	45	37	40	0,204	462	693	831
24,60	280	53	3::::	1,15	2,57	--	--	--	--	--	84	40	41	43	45	37	40	0,204	467	700	840
24,80	269	66	3::::	1,15	2,59	--	--	--	--	--	83	40	41	43	45	37	40	0,199	448	673	807
25,00	245	49	3::::	1,15	2,61	--	--	--	--	--	79	39	41	43	44	37	39	0,188	408	613	735
25,20	227	44	3::::	1,15	2,63	--	--	--	--	--	77	39	40	42	44	36	39	0,179	378	568	681
25,40	227	44	3::::	1,15	2,66	--	--	--	--	--	76	39	40	42	44	36	39	0,178	378	568	681
25,60	235	57	3::::	1,15	2,68	--	--	--	--	--	77	39	41	42	44	36	39	0,181	392	588	705
25,80	162	47	3::::	1,09	2,70	--	--	--	--	--	64	37	39	41	43	34	36	0,143	270	405	486
26,00	126	39	3::::	1,04	2,72	--	--	--	--	--	55	36	38	40	42	33	35	0,118	210	315	378
26,20	124	42	3::::	1,04	2,74	--	--	--	--	--	55	36	38	40	42	33	35	0,116	207	310	372
26,40	129	46	3::::	1,04	2,76	--	--	--	--	--	56	36	38	40	42	33	35	0,119	215	323	387
26,60	142	38	3::::	1,06	2,79	--	--	--	--	--	59	36	38	40	43	33	36	0,128	237	355	426
26,80	173	54	3::::	1,11	2,81	--	--	--	--	--	66	37	39	41	43	34	37	0,146	288	433	519
27,00	155	42	3::::	1,08	2,83	--	--	--	--	--	62	37	39	41	43	34	36	0,135	258	388	465
27,20	156	40	3::::	1,08	2,85	--	--	--	--	--	62	37	39	41	43	34	36	0,135	260	390	468
27,40	164	40	3::::	1,10	2,87	--	--	--	--	--	63	37	39	41	43	34	37	0,139	273	410	492
27,60	204	47	3::::	1,15	2,90	--	--	--	--	--	71	38	40	42	44	35	38	0,161	340	510	612
27,80	220	51	3::::	1,15	2,92	--	--	--	--	--	73	38	40	42	44	35	38	0,168	367	550	660
28,00	200	86	3::::	1,15	2,94	--	--	--	--	--	69	38	40	42	44	35	38	0,158	333	500	600
28,20	178	44	3::::	1,12	2,96	--	--	--	--	--	65	37	39	41	43	34	37	0,145	297	445	534
28,40	124	43	3::::	1,04	2,99	--	--	--	--	--	53	35	38	40	42	32	35	0,111	207	310	372
28,60	94	29	4/:/:	1,05	3,01	3,13	6,6	770	1155	282	43	34	36	39	41	30	34	0,087	157	235	282
28,80	176	54	3::::	1,11	3,03	--	--	--	--	--	64	37	39	41	43	34	37	0,143	293	440	528
29,00	127	32	3::::	1,04	3,05	--	--	--	--	--	53	35	38	40	42	32	35	0,112	212	318	381
29,20	162	45	3::::	1,09	3,07	--	--	--	--	--	61	37	39	41	43	33	36	0,134	270	405	486
29,40	278	85	3::::	1,15	3,09	--	--	--	--	--	80	39	41	43	44	36	40	0,189	463	695	834
29,60	181	43	3::::	1,12	3,12	--	--	--	--	--	65	37	39	41	43	34	37	0,143	302	453	543
29,80	162	62	3::::	1,09	3,14	--	--	--	--	--	61	36	39	41	43	33	36	0,132	270	405	486
30,00	178	--	3::::	1,12	3,16	--	--	--	--	--	64	37	39	41	43	34	37	0,141	297	445	534

184100B001

COMMITTENTE: Comune di Mirandola (Modena)
CANTIERE: PSC Mirandola
LOCALITA' : Mirandola

PREFORO (m da p.c.)	assente
PROF. FALDA (m da p.c.)	2,36 m.
TIPO PUNTA	piezocono sismico

PROVA : SCPTU2 **PROFONDITA' (m da p.c.): 30,00 m.** **DATA PROVA: 18/11/2011** **Certificato di prova:**



ANTENNA SISMICA (ESAC)

CLIENTE: Comune di Mirandola

CODICE LAVORO: **1538**

CODICE PROVA: **Esac1**

LOCALITA':	Via Concordia - Mirandola		
DATA PROVA:	13/01/2015	**TERRENO DI MISURA:**	Naturale soffice
Coordinata est:	4973250.12 m	**SPACING:**	5 m.
Coordinata nord:	662623.22 m	**RECORD TIME (min):**	18
QUOTA (m.s.l.m.):	15	**CONDIZIONI METEO:**	Sole

FOTO AEREA (Google Earth)

FOTO AREA DI INDAGINE

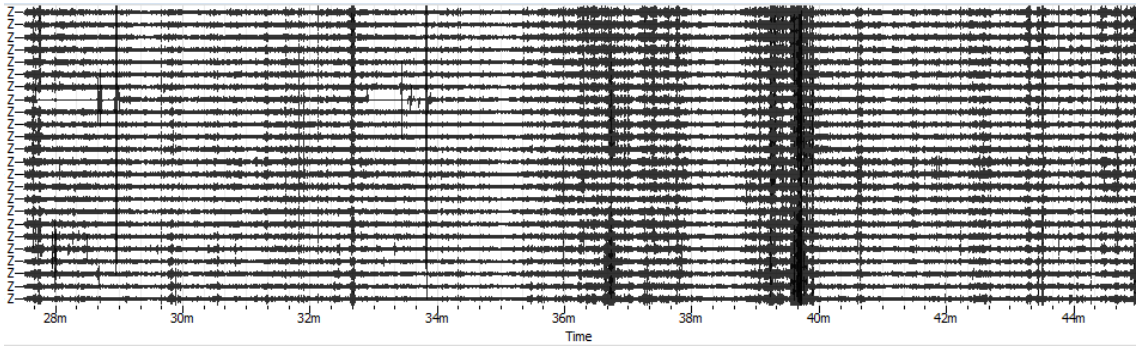
ANTENNA SISMICA (ESAC)

CLIENTE Comune di Mirandola

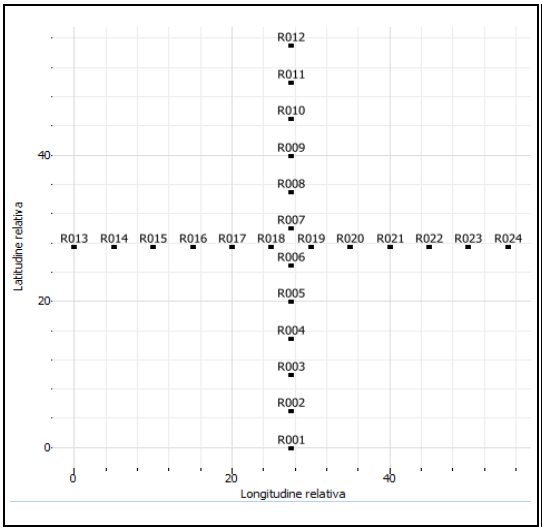
CODICE LAVORO 1538
CODICE PROVA Esac1

LOCALITA':	Via Concordia - Mirandola	**STRUMENTAZIONE**	Geometrics GEODE
DATA PROVA:	13/01/2015	**N°CANALI**	24
LONGITUDINE:	4973250.12 m	**SPACING**	5 m.
LATITUDINE:	662623.22 m	**RECORD TIME (min)**	18
QUOTA (m.s.l.m.):	15	**SAMPLING (Sec)**	0.0

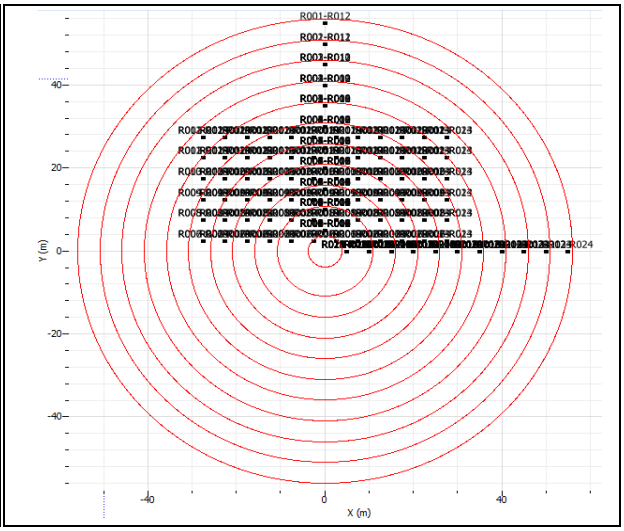
REGISTRAZIONE



PLANIMETRIA ARRAY



CO-ARRAY E RINGS

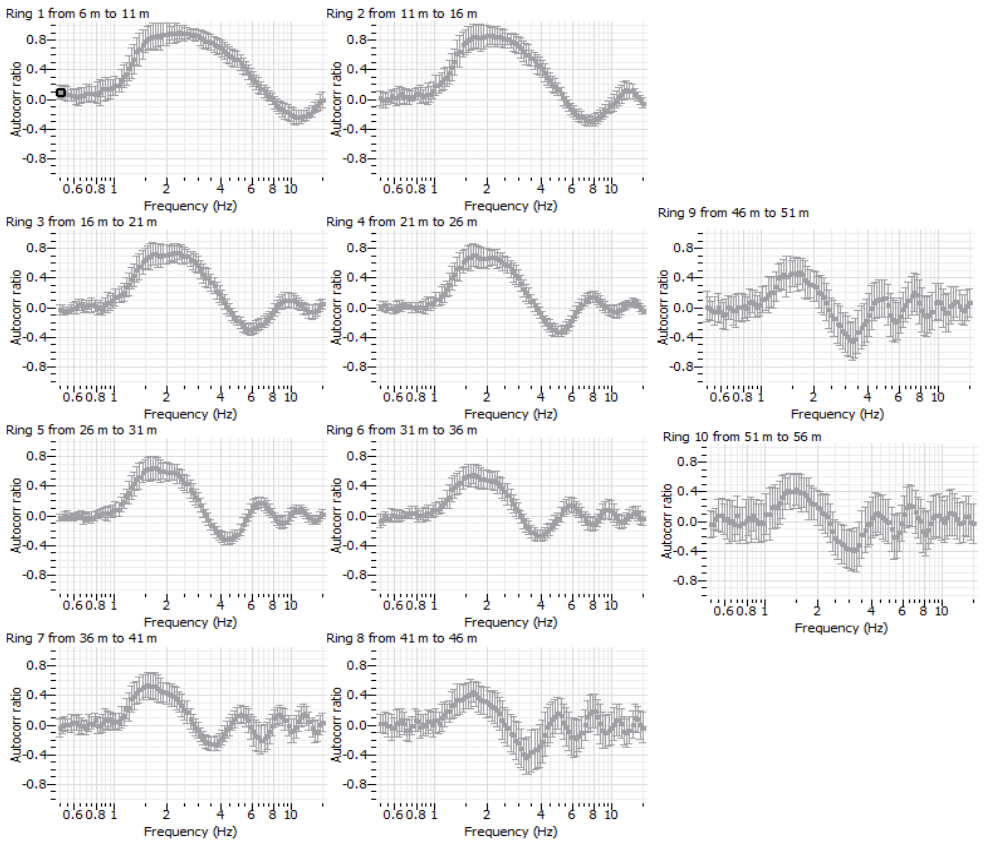


ANTENNA SISMICA ESAC

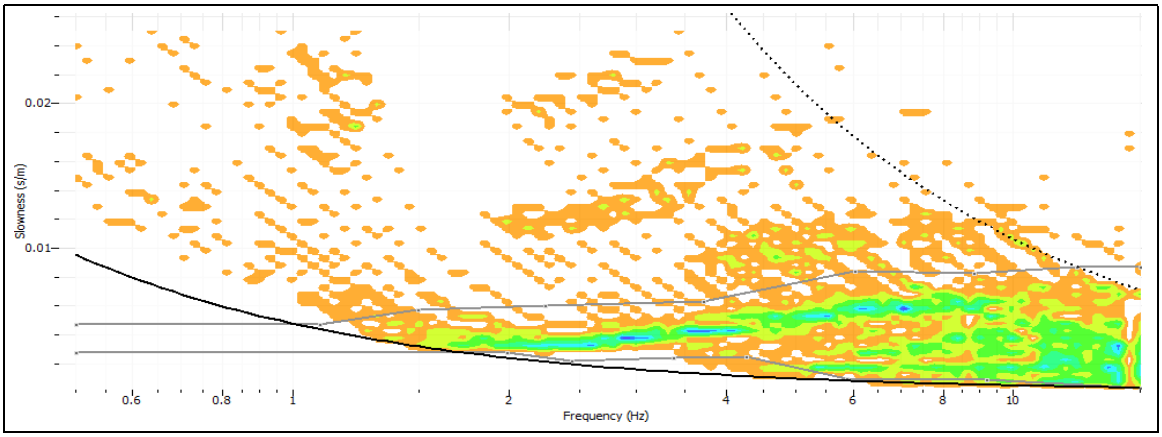
CLIENTE **Comune di Mirandola**

CODICE LAVORO **1538**
CODICE PROVA **Esac1**

CURVE DI DISPERSIONE CORRIPONDENTI AD OGNI RINGS



CUMULATA DELLE CURVE DI DISPERSIONE DEI RINGS E RELATIVO PICKING PER INDIVIRNUARNE LE FASI PIÙ SIGNIFICATIVE



RAPPORTO SPETTRALE A STAZIONE SINGOLA (HVSR)

CLIENTE: Comune di Mirandola

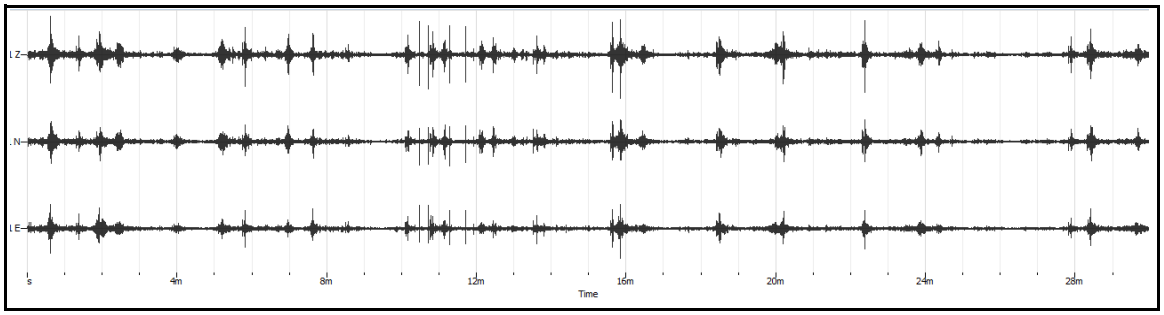
CODICE LAVORO: 1538

CODICE PROVA: Esac1

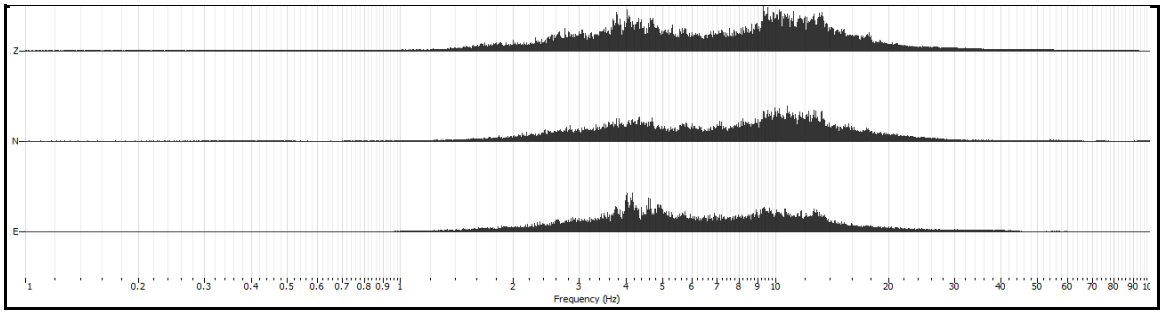
PARAMETRI DI ACQUISIZIONE	
Apparecchiatura di misura	Sara SL 07
Lunghezza registrazione	20 min
Fine registrazione	00:00:00
Frequenza di campionamento	200 Hz

PARAMETRI DI ELABORAZIONE	
Windows lenght (sec)	20
Overlap	5%
Smoothing windows	Konno & Ohmachi
Costant	40
Taper	0.5%
Low Pass	15 Hz
N° of windows	49

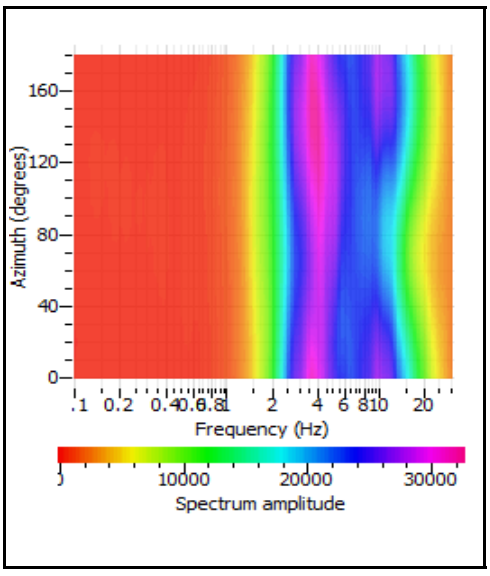
RECORD (Time)



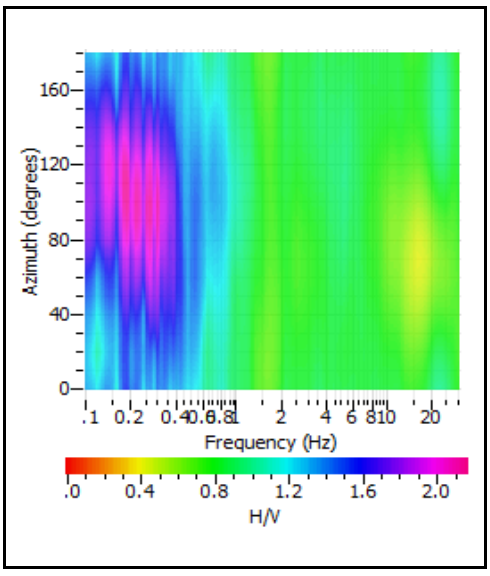
RECORD (Frequenzy)



HORIZONTAL SPECTRUM ROTATE



HV ROTATE RESULTS



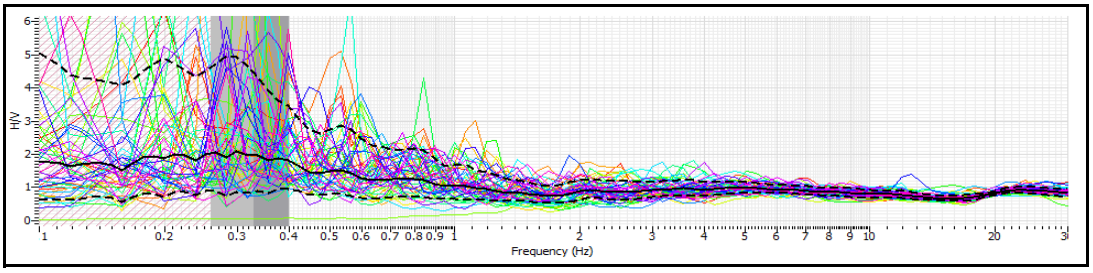
RAPPORTO SPETTRALE A STAZIONE SINGOLA (HVSR)

CLIENTE **Comune di Mirandola**

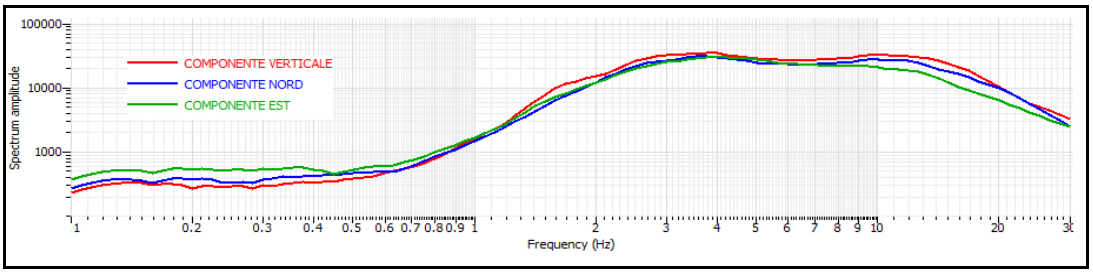
CODICE LAVORO **1538**
CODICE PROVA **Esac1**

RAPPORTO SPETTRALE H/V

Max HVSR 0.32 ± 0.06 Hz. A0 = 1.24



SPETTRO SINGOLE COMPONENTI



Criteri per una curva H/V affidabile
[tutti 3 dovrebbero risultare soddisfatti]

f0	**0.32**		
Lw	**20**		
nw	**71**		
f0 > 10 / Lw	**0.32 > 10/20**		☒
nc (f0) > 200	**454.4 > 200**	☑	
σA(f) < 2 for 0.5 f0 < f < 2 f0 if f0 > 0.5 Hz	**Exceeded 0 out of 100 times**	☑	
σA(f) < 3 for 0.5 f0 < f < 2 f0 if f0 < 0.5 Hz			

Criteri per un picco H/V chiaro
[almeno 5 su 6 dovrebbero essere soddisfatti]

Exists f^- in [f0/4, f0] | AH/V(f^-) < A0/2	**0 Hz**		☒
Exists f^+ in [4f0, f0] | AH/V(f^+) < A0/2	**0 Hz**		☒
A0 > 2	**1.24 > 2**		☒
fpeak [AH/V(f) ± σA(f)] = f0 ± 5%	**0.47574 < 0.05**		☒
σf < ε(f0)	**0.069531 < 0.064**		☒
σA(f0) < θ(f0)	**0.7361365 < 2.5**	☑	

Lw	Window lenght
nW	Number of windows used in the analysis
nc = Lw nW f0	Number of significant cycles
f	Current frequency
f0	H/V peak frequency
σf	Standard deviation of H/V peak frequency
ε(f0)	Threshold value for the stability condition σf < ε(f0)
A0	H/V peak amplitude at frequency f0
AH/V(f)	H/V curve amplitude at frequency f
f -	Frequency between f0/4 and f0 for which AH/V(f-) < A0/2
f+	Frequency between f0 and 4f0 for which AH/V(f+) < A0/2
σA(f)	Standard deviation of AH/V(f), σA(f) is the factor by which the mean AH/V(f) curve should be multiplier or divided
σlogH/V(f)	Standard deviation of log AH/V(f) curve
θ(f0)	Threshold value for the stability condition σA(f) < θ(f0)

Thresold value for σ_f and $\sigma_A(f_0)$					
Freq. Range [Hz]	< 0.2	0.2 - 0.5	0.5 - 1.0	1.0 - 2.0	> 2.0
$\varepsilon(f_0)$ (Hz)	0.25 f_0	0.20 f_0	0.15 f_0	0.10 f_0	0.05 f_0
$\theta(f_0)$ for $\sigma_A(f_0)$	3.00	2.50	2.00	1.78	1.58
Log $\theta(f_0)$ for $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

In accordo con SESAME Guidelines 2005

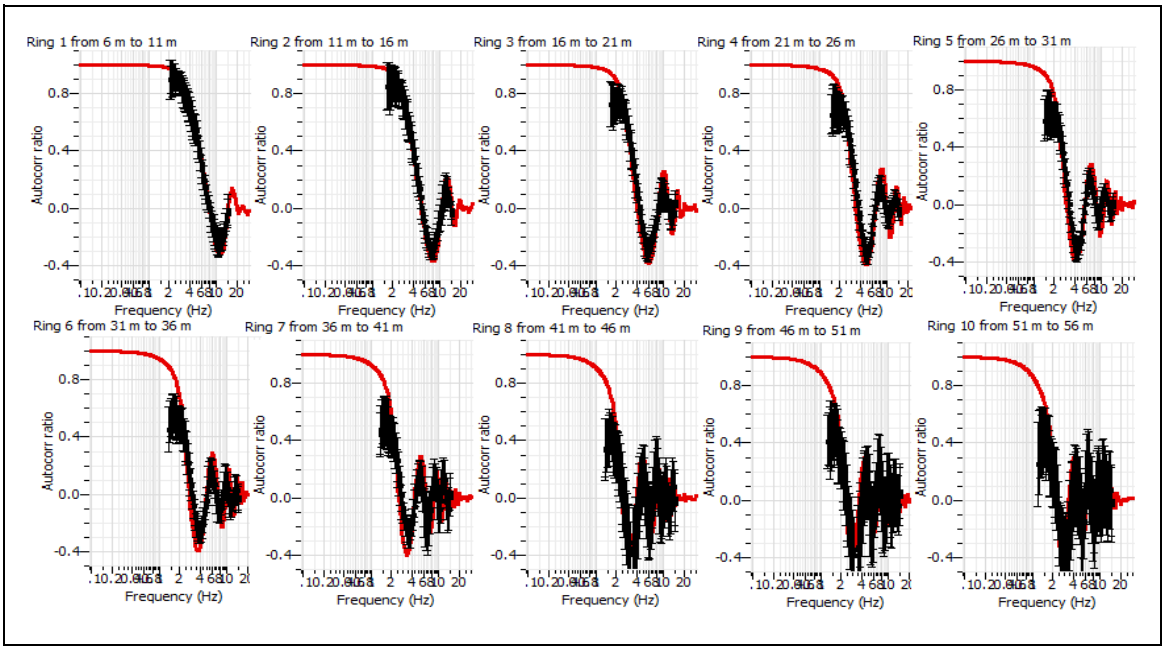
ANALISI CONGIUNTA PROVA ESAC - HVSR

CLIENTE **Comune di Mirandola**

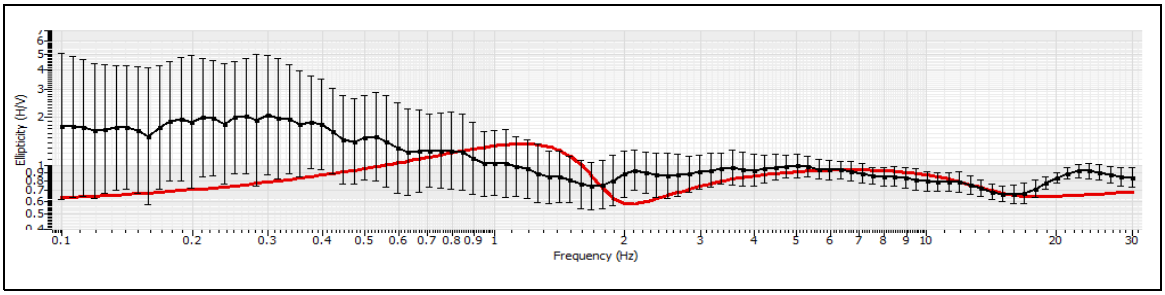
CODICE LAVORO **1538**
CODICE PROVA **Esac1**

LOCALITA':	Via Concordia - Mirandola	**APPARECCHIATURA ESAC:**	Geometrics GEODE
DATA PROVA:	13/01/2015	**APPARECCHIATURA HVSR:**	SARA SL 07
LONGITUDINE:	4973250.12 m	**N°CANALI**	24
LATITUDINE:	662623.22 m	**SPACING**	5 m.
QUOTA (m.s.l.m.):	15	**RECORD TIME (min)**	18
AZIMUT	45°		

VERTICAL RINGS AUTOCORRELATION



ELIPTICITY AUTOCORRELATION CURVES



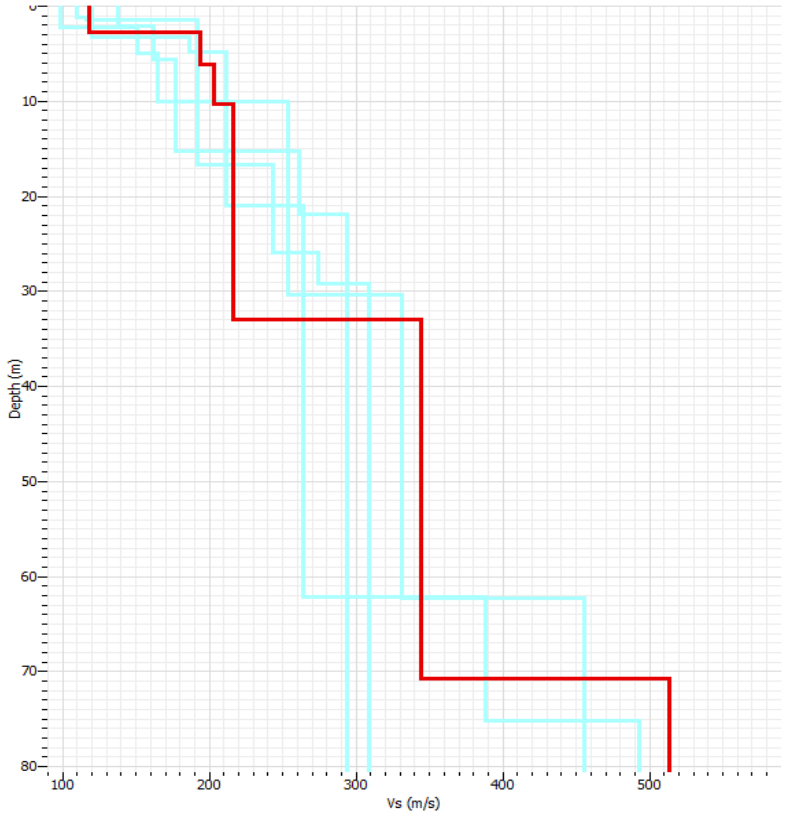
ANALISI CONGIUNTA PROVA ESAC - HVSR

CLIENTE **Comune di Mirandola**

CODICE LAVORO **1538**
CODICE PROVA **Esac1**

LOCALITA':	Via Concordia - Mirandola	**APPARECCHIATURA ESAC:**	Geometrics GEODE
DATA PROVA:	13/01/2015	**APPARECCHIATURA HVSR:**	SARA SL 07
LONGITUDINE:	4973250.12 m	**N°CANALI**	24
LATITUDINE:	662623.22 m	**SPACING**	5 m.
QUOTA (m.s.l.m.):	15	**RECORD TIME (min)**	18
AZIMUT	45°		

PROFILO VELOCITÀ ONDE DI TAGLIO



CALCOLO VS 30

SPESSORE	PROFONDITA'	Vs	SPESSORE/Vs
2.64	0	117	0.022564103
3.68	2.64	193	0.019067358
3.8	6.32	203	0.018719212
19.88	10.12	215	0.092465116
	30		
			0.152815788

$$Vs_{30} = 196$$

Seismic classification of soils
(It. D.M. 14/01/2008)

C

ANTENNA SISMICA (ESAC)

CLIENTE: Comune di Mirandola

CODICE LAVORO: **1538**

CODICE PROVA: **Esac2**

LOCALITA':	Via dell'Industria - Mirandola		
DATA PROVA:	13/01/2015	**TERRENO DI MISURA:**	Naturale soffice
Coordinata est:	4973996.85 m	**SPACING:**	5 m.
Coordinata nord:	663807.63 m	**RECORD TIME (min):**	18
QUOTA (m.s.l.m.):	14	**CONDIZIONI METEO:**	Sole

FOTO AEREA (Google Earth)

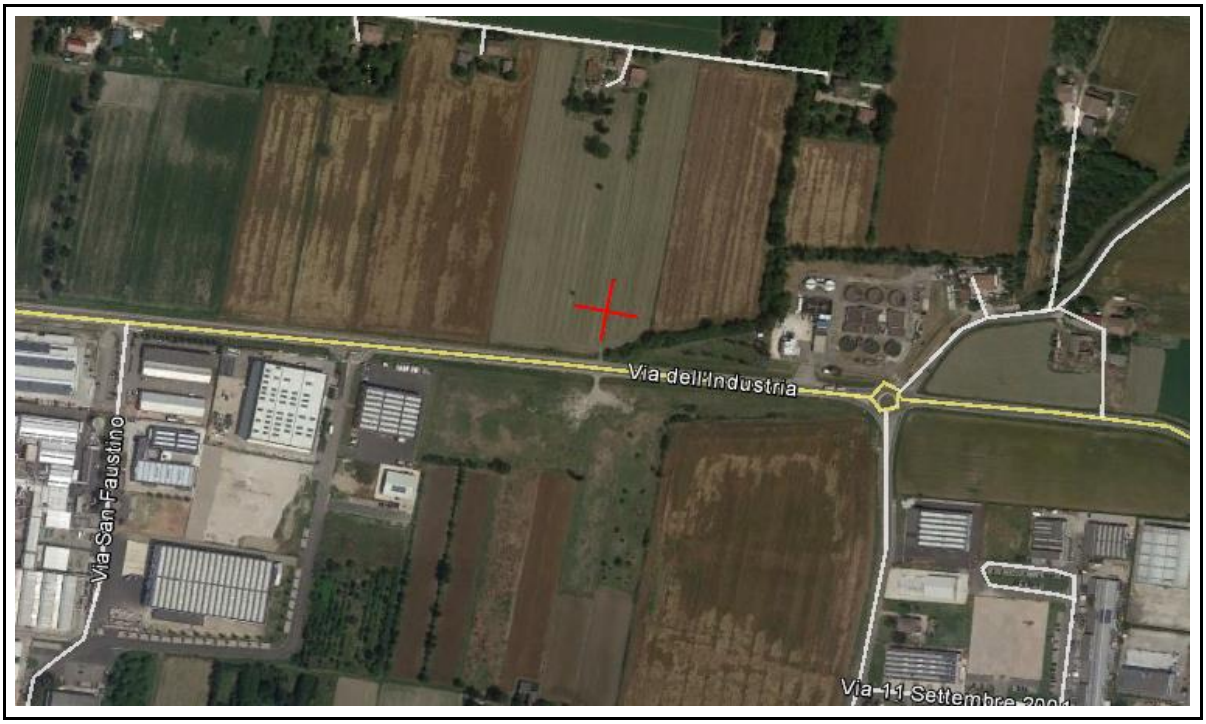


FOTO AREA DI INDAGINE

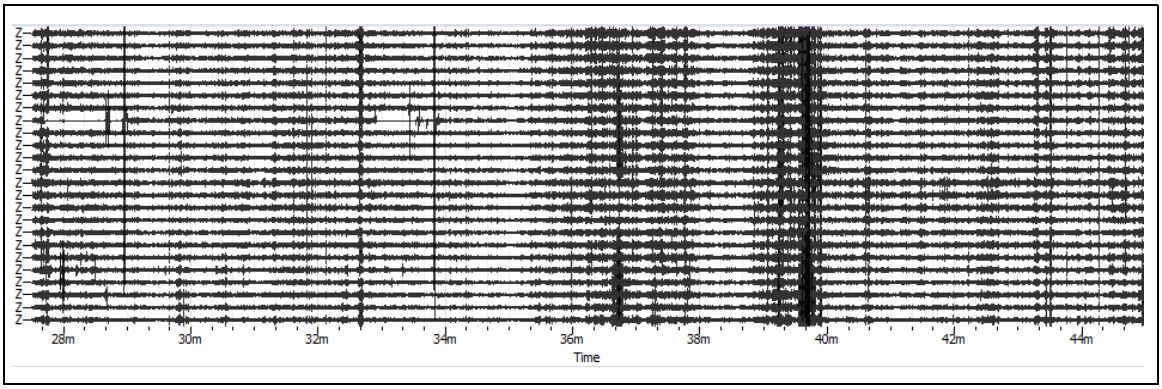
ANTENNA SISMICA (ESAC)

CLIENTE **Comune di Mirandola**

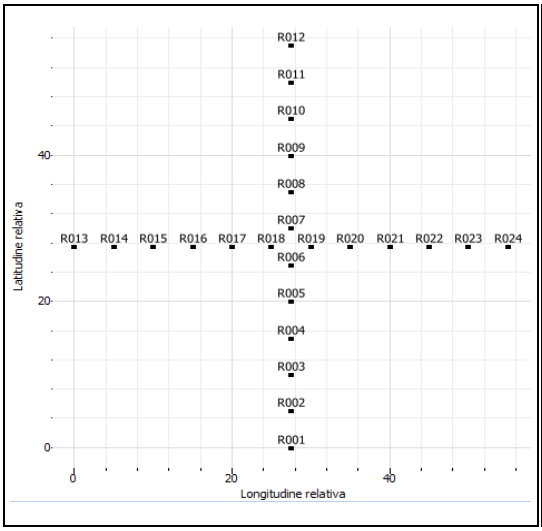
CODICE LAVORO **1538**
CODICE PROVA **Esac2**

LOCALITA':	Via dell'Industria - Mirandola	**STRUMENTAZIONE**	Geometrics GEODE
DATA PROVA:	13/01/2015	**N°CANALI**	24
LONGITUDINE:	4973996.85 m	**SPACING**	5 m.
LATITUDINE:	663807.63 m	**RECORD TIME (min)**	18
QUOTA (m.s.l.m.):	14	**SAMPLING (Sec)**	0.0

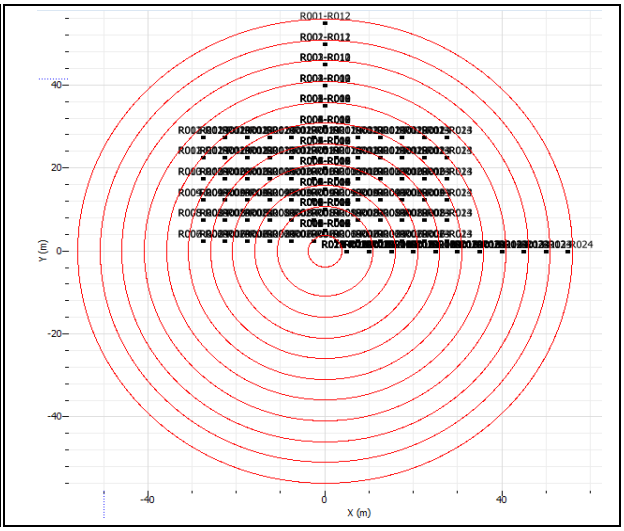
REGISTRAZIONE



PLANIMETRIA ARRAY



CO-ARRAY E RINGS

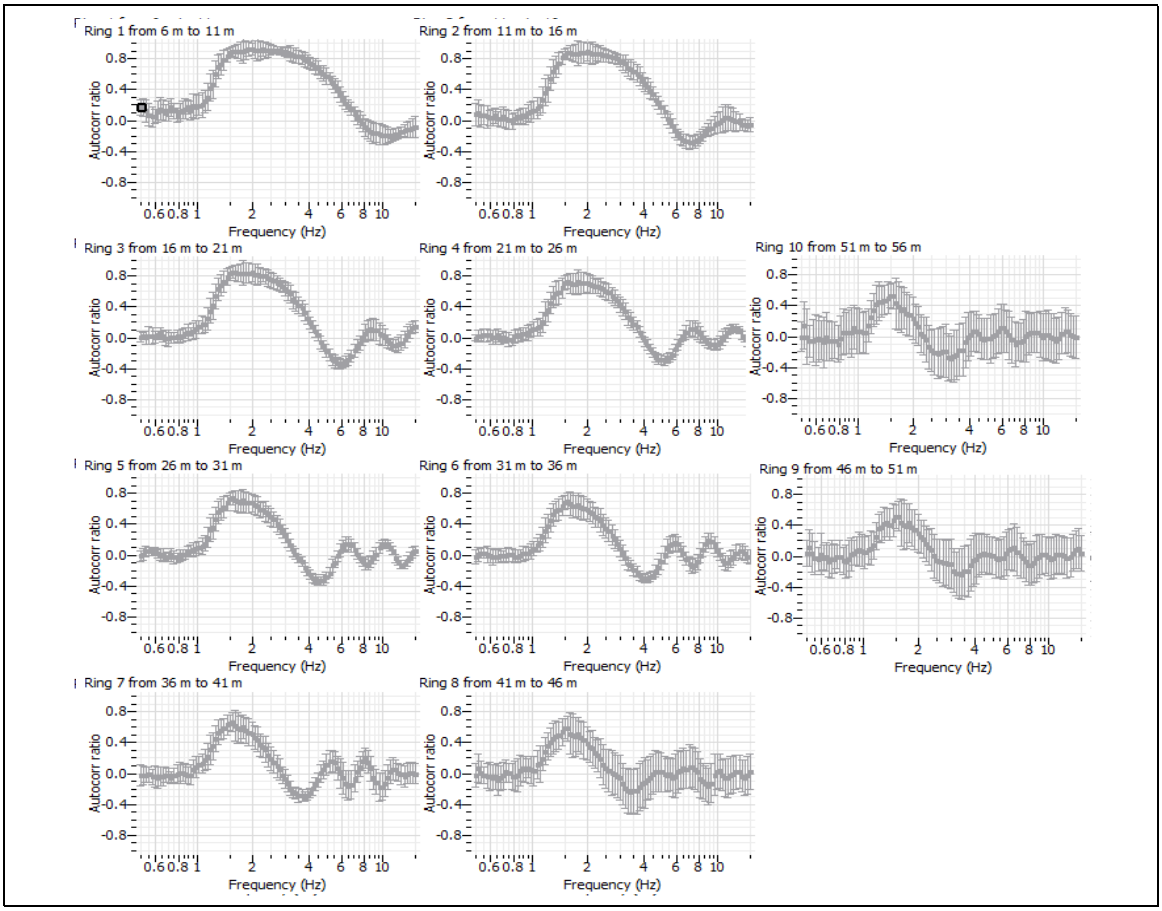


ANTENNA SISMICA ESAC

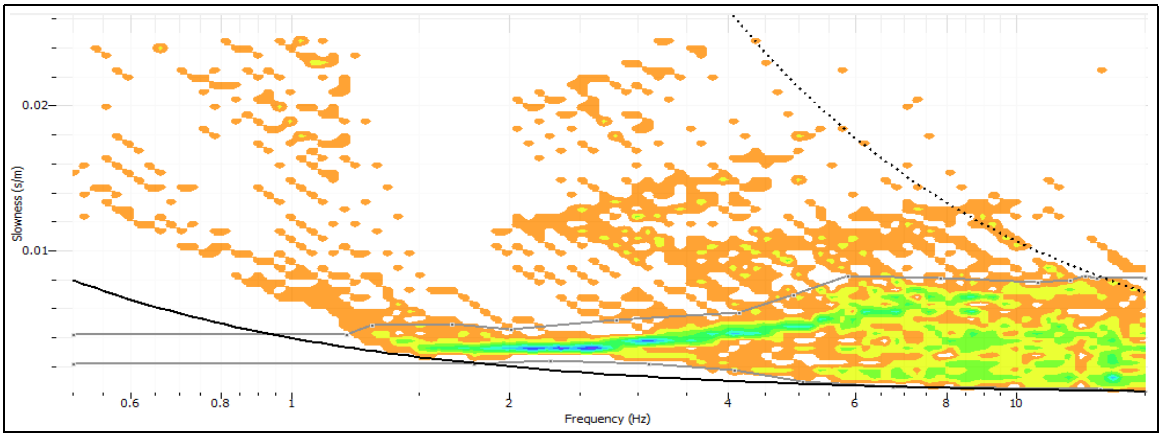
CLIENTE **Comune di Mirandola**

CODICE LAVORO **1538**
CODICE PROVA **Esac2**

CURVE DI DISPERSIONE CORRIPONDENTI AD OGNI RINGS



CUMULATA DELLE CURVE DI DISPERSIONE DEI RINGS E RELATIVO PICKING PER INDIVIRNUARNE LE FASI PIÙ SIGNIFICATIVE



RAPPORTO SPETTRALE A STAZIONE SINGOLA (HVSR)

CLIENTE: Comune di Mirandola

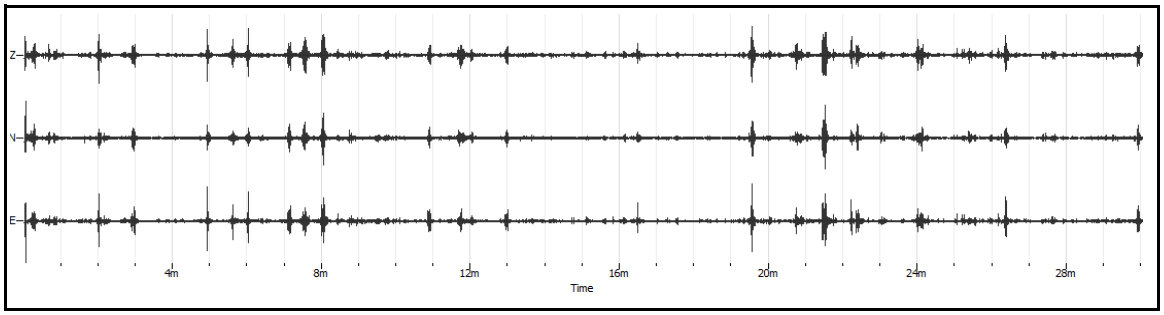
CODICE LAVORO: 1538

CODICE PROVA: Esac2

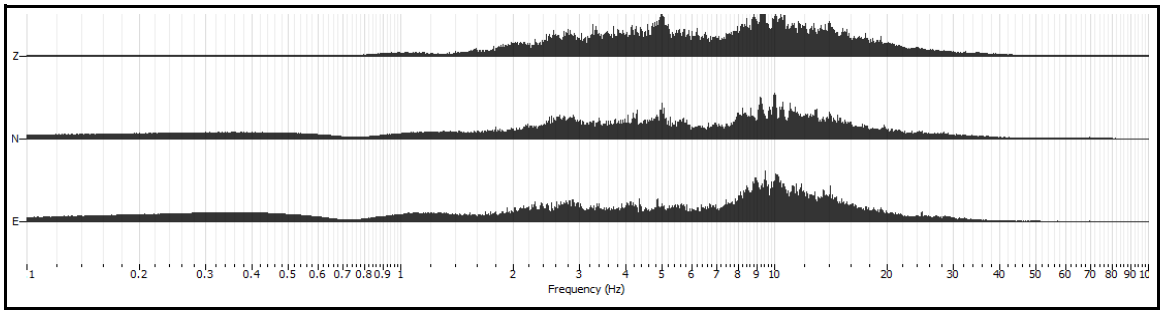
PARAMETRI DI ACQUISIZIONE	
Apparecchiatura di misura	Sara SL 07
Lunghezza registrazione	20 min
Fine registrazione	00:00:00
Frequenza di campionamento	200 Hz

PARAMETRI DI ELABORAZIONE	
Windows lenght (sec)	20
Overlap	5%
Smoothing windows	Konno & Ohmachi
Costant	40
Taper	0.5%
Low Pass	15 Hz
N° of windows	70

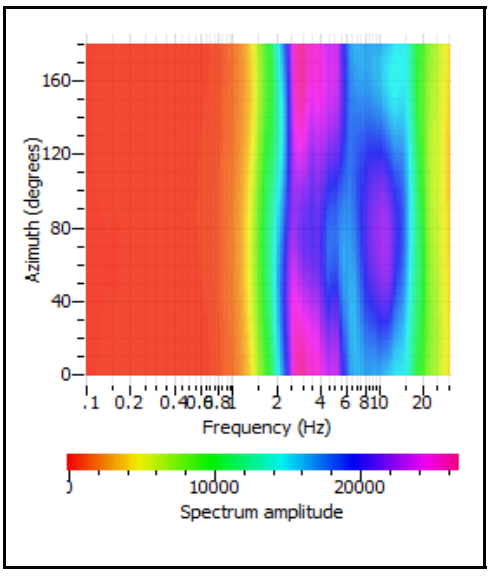
RECORD (Time)



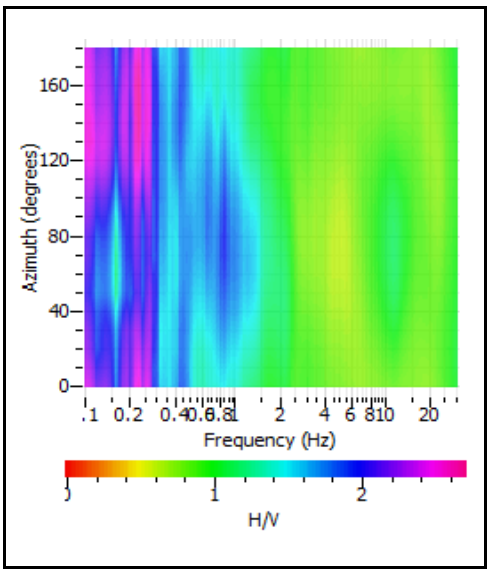
RECORD (Frequenzy)



HORIZONTAL SPECTRUM ROTATE



HV ROTATE RESULTS



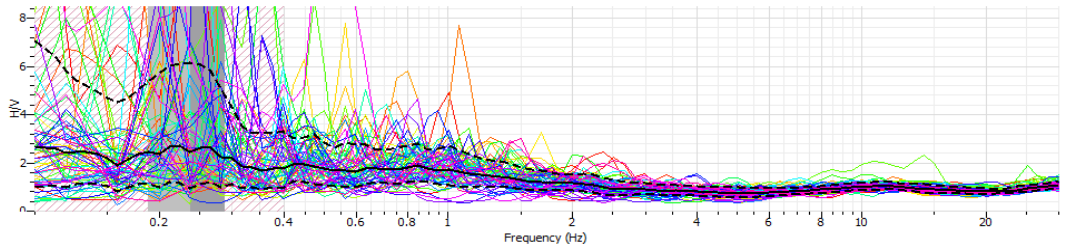
RAPPORTO SPETTRALE A STAZIONE SINGOLA (HVSR)

CLIENTE **Comune di Mirandola**

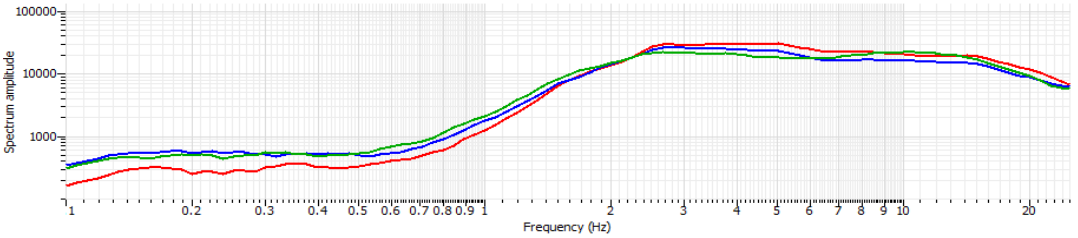
CODICE LAVORO **1538**
CODICE PROVA **Esac2**

RAPPORTO SPETTRALE H/V

Max HVSR 0.23 ± 0.04 Hz. A0 = 2.68



SPETTRO SINGOLE COMPONENTI



Criteri per una curva H/V affidabile

[tutti 3 dovrebbero risultare soddisfatti]

f0	**0.23**		
Lw	**20**		
nw	**71**		
f0 > 10 / Lw	**0.23 > 10/20**		☒
nc (f0) > 200	**326.6 > 200**	☑	
σA(f) < 2 for 0.5 f0 < f < 2 f0 if f0 > 0.5 Hz	**Exceeded 0 out of 100 times**	☑	
σA(f) < 3 for 0.5 f0 < f < 2 f0 if f0 < 0.5 Hz			

Criteri per un picco H/V chiaro

[almeno 5 su 6 dovrebbero essere soddisfatti]

Exists f^- in [f0/4, f0] | AH/V(f^-) < A0/2	**0 Hz**		☒
Exists f^+ in [4f0, f0] | AH/V(f^+) < A0/2	**0 Hz**		☒
A0 > 2	**2.68 > 2**	☑	
fpeak [AH/V(f) ± σA(f)] = f0 ± 5%	**< 0.05**	☑	
σf < ε(f0)	**0.049904 < 0.046**		☒
σA(f0) < θ(f0)	**0.77987 < 2.5**	☑	

Lw	Window lenght
nW	Number of windows used in the analysis
nc = Lw nW f0	Number of significant cycles
f	Current frequency
f0	H/V peak frequency
σf	Standard deviation of H/V peak frequency
ε(f0)	Threshold value for the stability condition σf < ε(f0)
A0	H/V peak amplitude at frequency f0
AH/V(f)	H/V curve amplitude at frequency f
f -	Frequency between f0/4 and f0 for which AH/V(f-) < A0/2
f+	Frequency between f0 and 4f0 for which AH/V(f+) < A0/2
σA(f)	Standard deviation of AH/V(f), σA(f) is the factor by which the mean AH/V(f) curve should be multiplier or divided
σlogH/V(f)	Standard deviation of log AH/V(f) curve
θ(f0)	Threshold value for the stability condition σA(f) < θ(f0)

Thresold value for σ_f and $\sigma_A(f_0)$					
Freq. Range [Hz]	< 0.2	0.2 - 0.5	0.5 - 1.0	1.0 - 2.0	> 2.0
$\varepsilon(f_0)$ (Hz)	0.25 f_0	0.20 f_0	0.15 f_0	0.10 f_0	0.05 f_0
$\theta(f_0)$ for $\sigma_A(f_0)$	3.00	2.50	2.00	1.78	1.58
Log $\theta(f_0)$ for $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

In accordo con SESAME Guidelines 2005

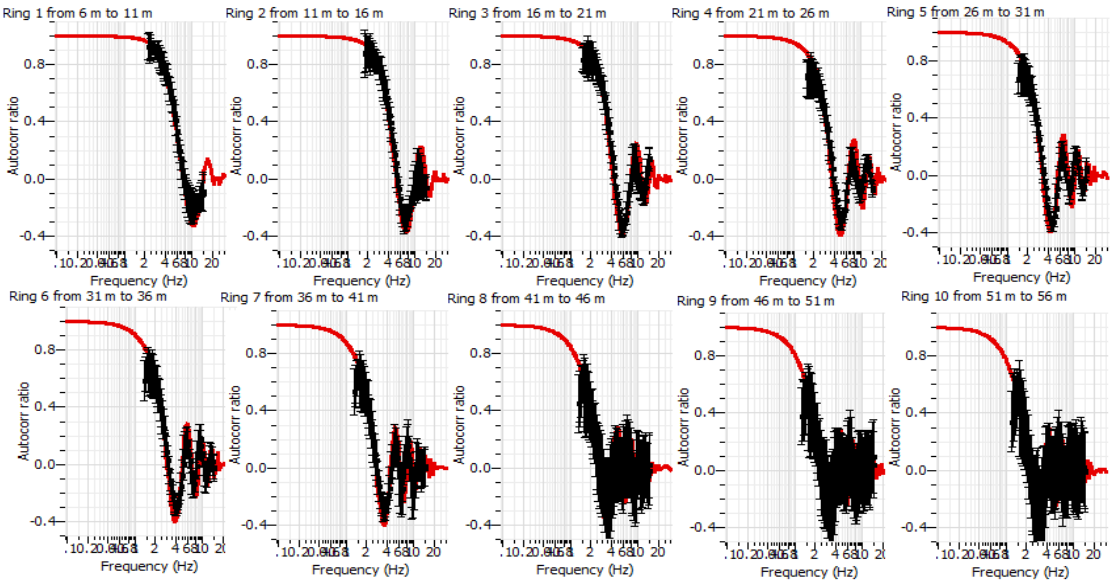
ANALISI CONGIUNTA PROVA ESAC - HVSR

CLIENTE **Comune di Mirandola**

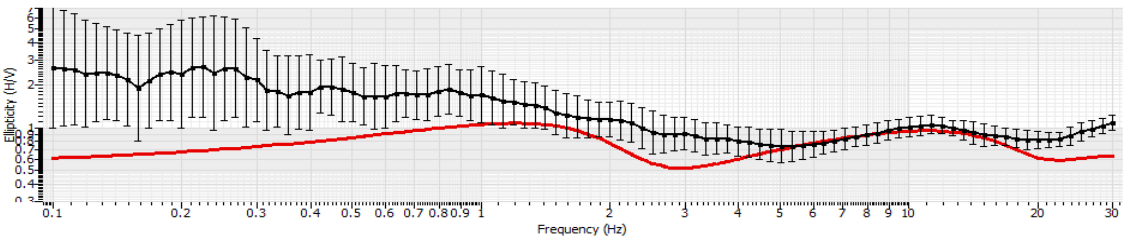
CODICE LAVORO **1538**
CODICE PROVA **Esac2**

LOCALITA':	Via dell'Industria - Mirandola	**APPARECCHIATURA ESAC:**	Geometrics GEODE
DATA PROVA:	13/01/2015	**APPARECCHIATURA HVSR:**	SARA SL 07
LONGITUDINE:	4973996.85 m	**N°CANALI**	24
LATITUDINE:	663807.63 m	**SPACING**	5 m.
QUOTA (m.s.l.m.):	14	**RECORD TIME (min)**	18
AZIMUT	45°		

VERTICAL RINGS AUTOCORRELATION



ELIPTICITY AUTOCORRELATION CURVES



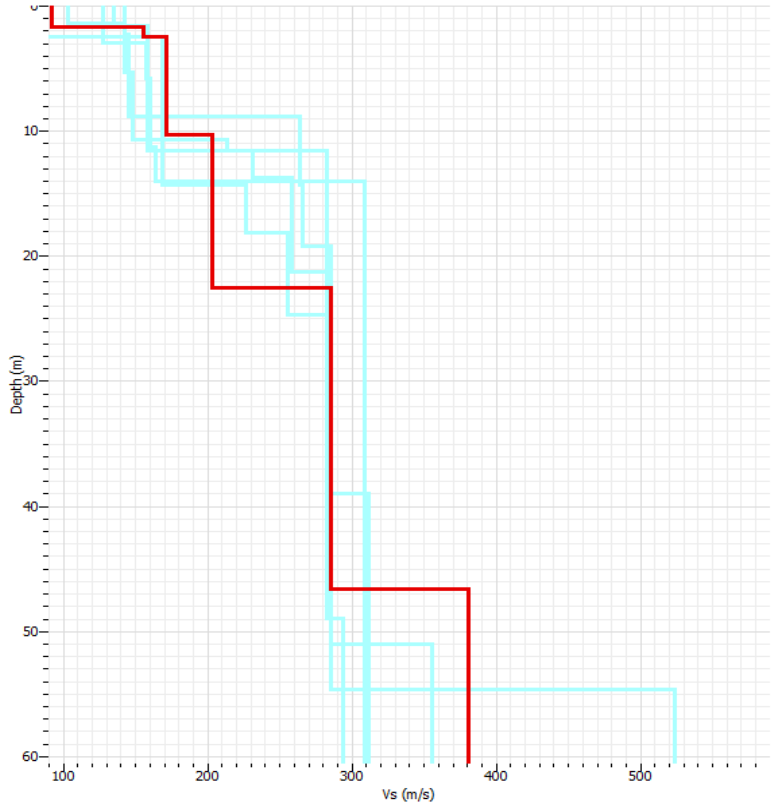
ANALISI CONGIUNTA PROVA ESAC - HVSR

CLIENTE **Comune di Mirandola**

CODICE LAVORO **1538**
CODICE PROVA **Esac2**

LOCALITA':	Via dell'Industria - Mirandola	**APPARECCHIATURA ESAC:**	Geometrics GEODE
DATA PROVA:	13/01/2015	**APPARECCHIATURA HVSR:**	SARA SL 07
LONGITUDINE:	4973996.85 m	**N°CANALI**	24
LATITUDINE:	663807.63 m	**SPACING**	5 m.
QUOTA (m.s.l.m.):	14	**RECORD TIME (min)**	18
AZIMUT	45°		

PROFILO VELOCITÀ ONDE DI TAGLIO



CALCOLO VS 30

SPESSORE	PROFONDITA'	Vs	SPESSORE/Vs
1.85	0	91	0.02032967
8.27	1.85	171	0.048362573
12.03	10.12	203	0.059261084
7.85	22.15	285	0.02754386
	30		
			0.155497187

$$Vs_{30} = 193$$

Seismic classification of soils
(It. D.M. 14/01/2008)

C

ANTENNA SISMICA (ESAC)

CLIENTE: Comune di Mirandola

CODICE LAVORO: **1538**

CODICE PROVA: **Esac3**

LOCALITA':	Via Nicolò De Conti - Mirandola		
DATA PROVA:	13/01/2015	**TERRENO DI MISURA:**	Naturale soffice
Coordinata est:	4972741.47 m	**SPACING:**	5 m.
Coordinata nord:	665552.74 m	**RECORD TIME (min):**	18
QUOTA (m.s.l.m.):	14	**CONDIZIONI METEO:**	Sole

FOTO AEREA (Google Earth)

FOTO AREA DI INDAGINE

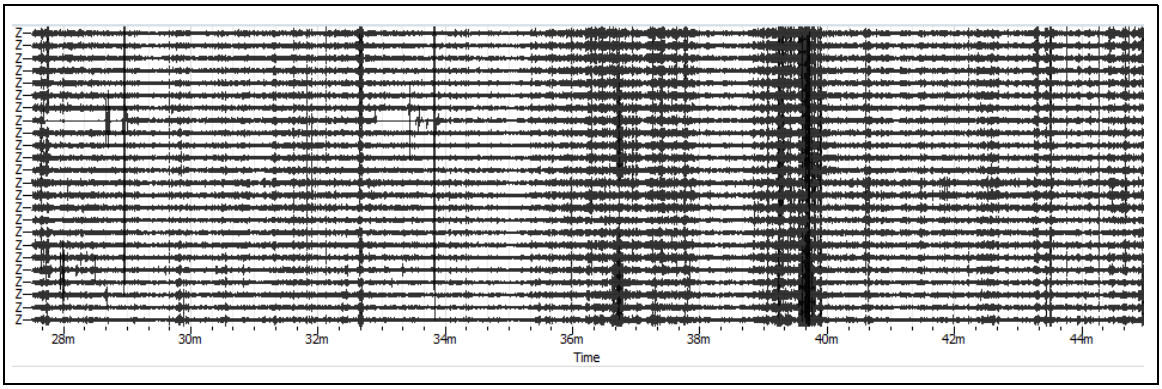
ANTENNA SISMICA (ESAC)

CLIENTE **Comune di Mirandola**

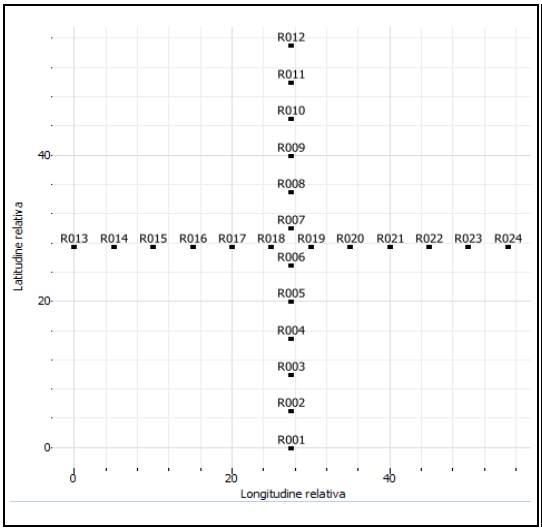
CODICE LAVORO **1538**
CODICE PROVA **Esac3**

LOCALITA':	Via Nicolò De Conti - Mirandola	**STRUMENTAZIONE**	Geometrics GEODE
DATA PROVA:	13/01/2015	**N°CANALI**	24
LONGITUDINE:	4972741.47 m	**SPACING**	5 m.
LATITUDINE:	665552.74 m	**RECORD TIME (min)**	18
QUOTA (m.s.l.m.):	14	**SAMPLING (Sec)**	0.0

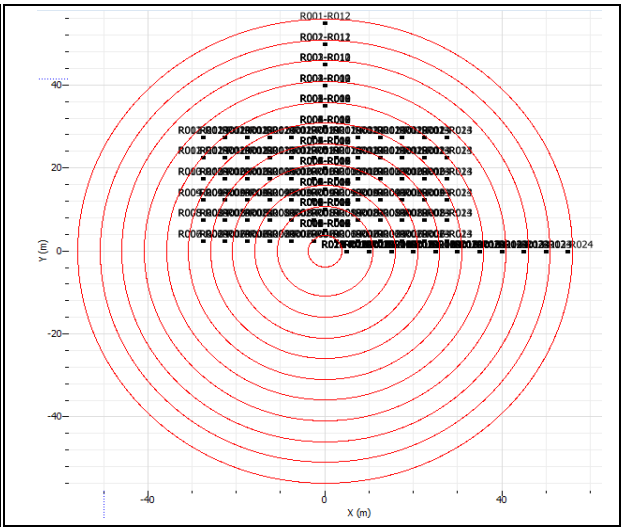
REGISTRAZIONE



PLANIMETRIA ARRAY



CO-ARRAY E RINGS

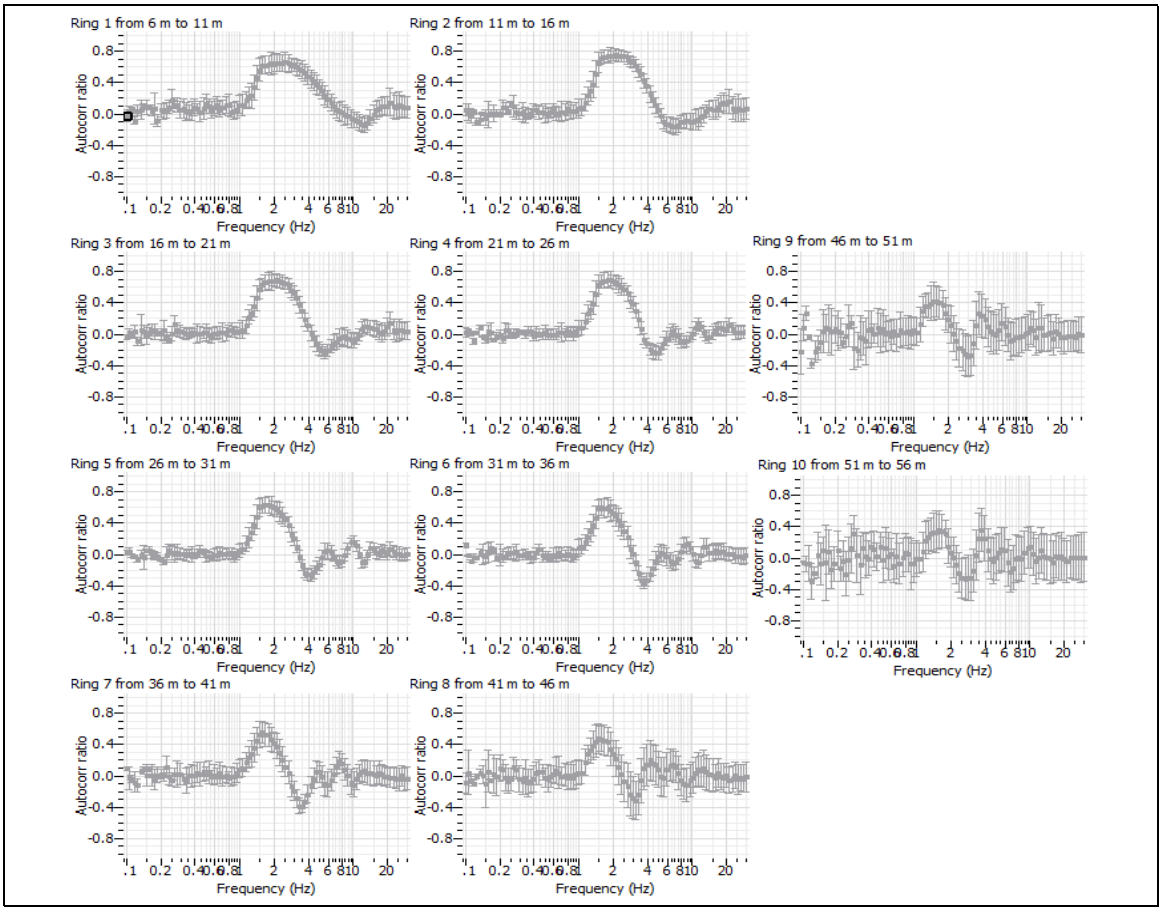


ANTENNA SISMICA ESAC

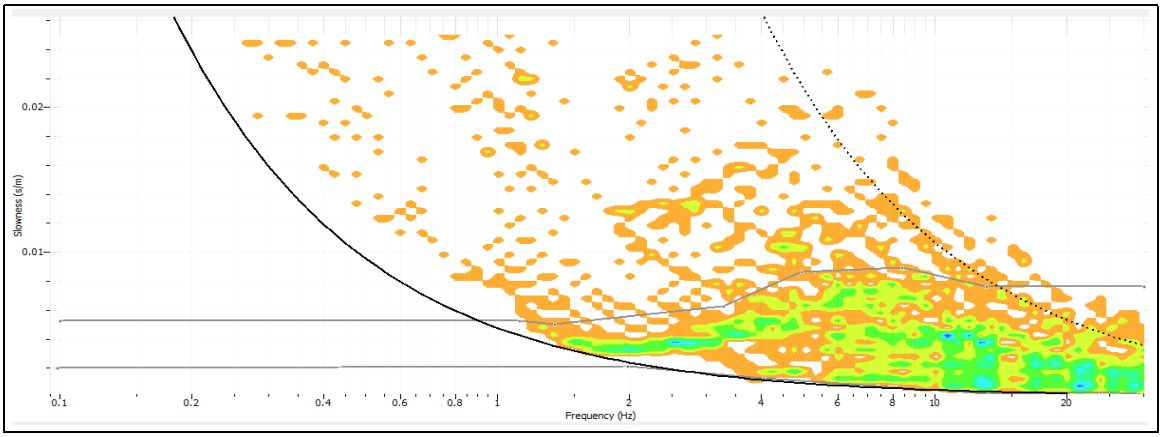
CLIENTE **Comune di Mirandola**

CODICE LAVORO **1538**
CODICE PROVA **Esac3**

CURVE DI DISPERSIONE CORRIPONDENTI AD OGNI RINGS



CUMULATA DELLE CURVE DI DISPERSIONE DEI RINGS E RELATIVO PICKING PER INDIVIRNUARNE LE FASI PIÙ SIGNIFICATIVE



RAPPORTO SPETTRALE A STAZIONE SINGOLA (HVSR)

CLIENTE: Comune di Mirandola

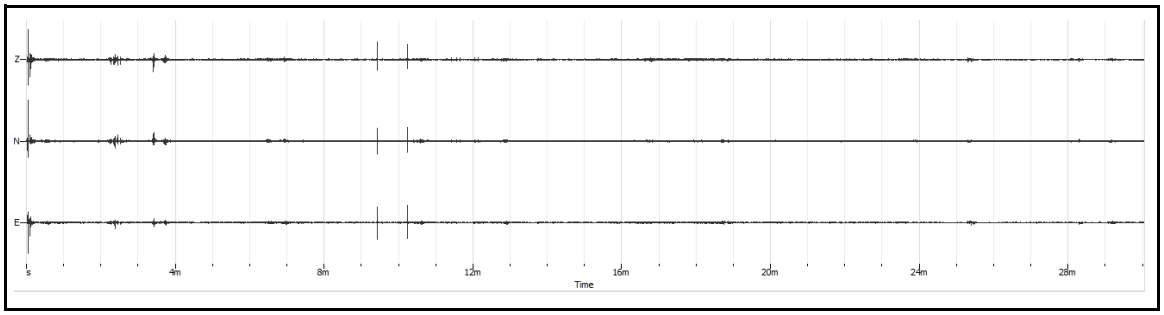
CODICE LAVORO: 1538

CODICE PROVA: Esac3

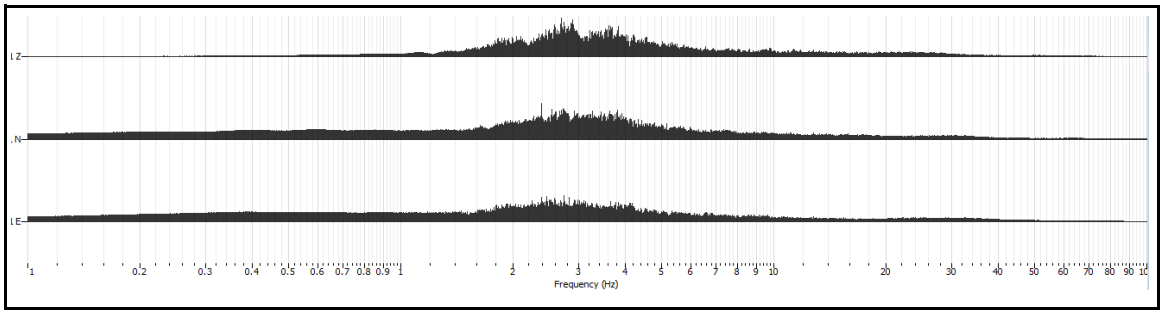
PARAMETRI DI ACQUISIZIONE	
Apparecchiatura di misura	Sara SL 07
Lunghezza registrazione	20 min
Fine registrazione	00:00:00
Frequenza di campionamento	200 Hz

PARAMETRI DI ELABORAZIONE	
Windows lenght (sec)	20
Overlap	5%
Smoothing windows	Konno & Ohmachi
Costant	40
Taper	0.5%
Low Pass	15 Hz
N° of windows	72

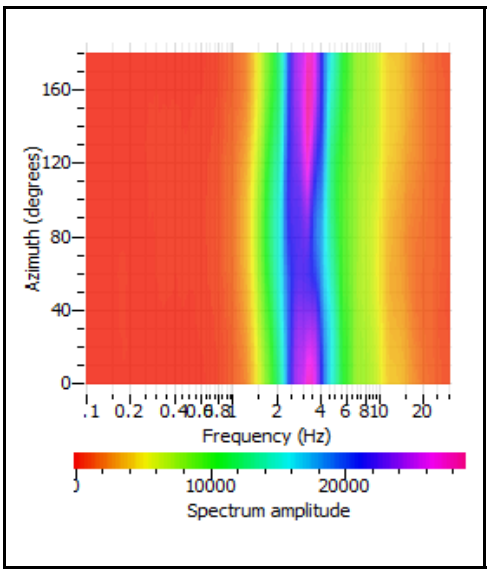
RECORD (Time)



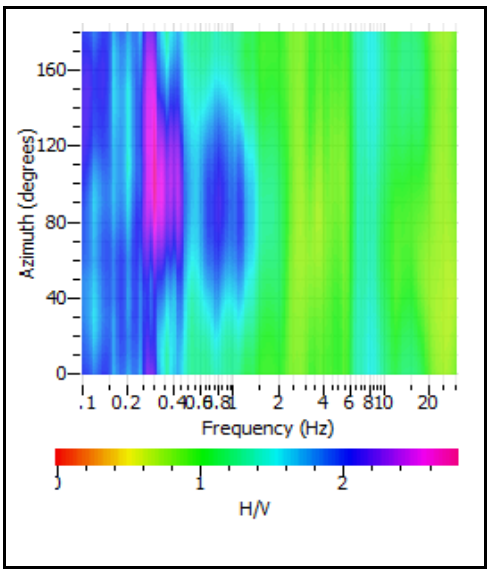
RECORD (Frequenzy)



HORIZONTAL SPECTRUM ROTATE



HV ROTATE RESULTS



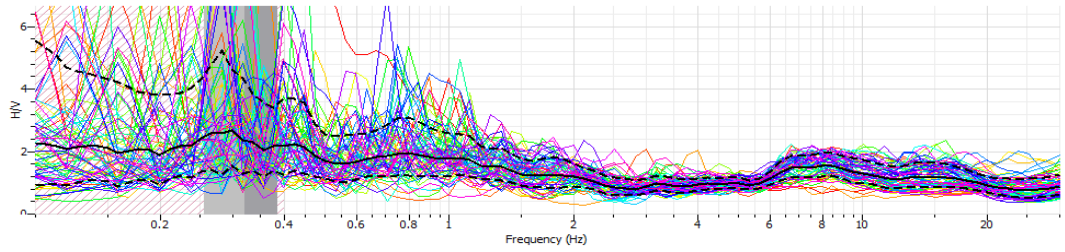
RAPPORTO SPETTRALE A STAZIONE SINGOLA (HVSR)

CLIENTE **Comune di Mirandola**

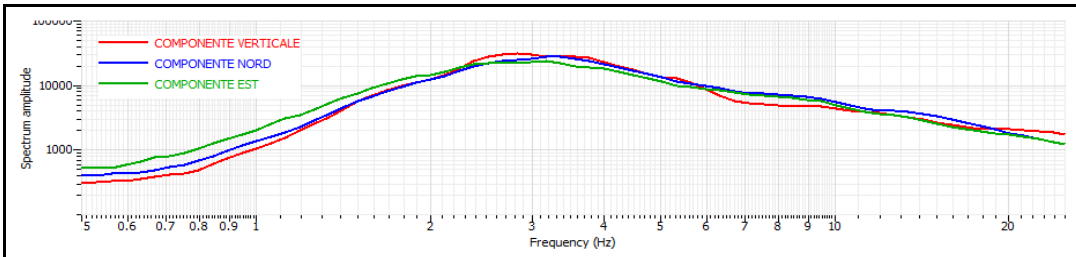
CODICE LAVORO **1538**
CODICE PROVA **Esac3**

RAPPORTO SPETTRALE H/V

Max HVSR 0.32 ± 0.06 Hz. A0 = 2.67



SPETTRO SINGOLE COMPONENTI



Criteri per una curva H/V affidabile
[tutti 3 dovrebbero risultare soddisfatti]

f0	**0.32**		
Lw	**20**		
nw	**71**		
f0 > 10 / Lw	**0.32 > 10/20**		☒
nc (f0) > 200	**454.4 > 200**	☑	
σA(f) < 2 for 0.5 f0 < f < 2 f0 if f0 > 0.5 Hz	**Exceeded 0 out of 100 times**	☑	
σA(f) < 3 for 0.5 f0 < f < 2 f0 if f0 < 0.5 Hz			

Criteri per un picco H/V chiaro
[almeno 5 su 6 dovrebbero essere soddisfatti]

Exists f^- in [f0/4, f0] | AH/V(f^-) < A0/2	**0 Hz**		☒
Exists f^+ in [4f0, f0] | AH/V(f^+) < A0/2	**0 Hz**		☒
A0 > 2	**2.67 > 2**	☑	
fpeak [AH/V(f) ± σA(f)] = f0 ± 5%	**< 0.05**	☑	
σf < ε(f0)	**0.064605 < 0.064**		☒
σA(f0) < θ(f0)	**0.93423 < 2.5**	☑	

Lw	Window lenght
nW	Number of windows used in the analysis
nc = Lw nW f0	Number of significant cycles
f	Current frequency
f0	H/V peak frequency
σf	Standard deviation of H/V peak frequency
ε(f0)	Threshold value for the stability condition σf < ε(f0)
A0	H/V peak amplitude at frequency f0
AH/V(f)	H/V curve amplitude at frequency f
f -	Frequency between f0/4 and f0 for which AH/V(f-) < A0/2
f+	Frequency between f0 and 4f0 for which AH/V(f+) < A0/2
σA(f)	Standard deviation of AH/V(f), σA(f) is the factor by which the mean AH/V(f) curve should be multiplier or divided
σlogH/V(f)	Standard deviation of log AH/V(f) curve
θ(f0)	Threshold value for the stability condition σA(f) < θ(f0)

Thresold value for σ_f and $\sigma_A(f_0)$					
Freq. Range [Hz]	< 0.2	0.2 - 0.5	0.5 - 1.0	1.0 - 2.0	> 2.0
$\varepsilon(f_0)$ (Hz)	0.25 f_0	0.20 f_0	0.15 f_0	0.10 f_0	0.05 f_0
$\theta(f_0)$ for $\sigma_A(f_0)$	3.00	2.50	2.00	1.78	1.58
Log $\theta(f_0)$ for $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

In accordo con SESAME Guidelines 2005

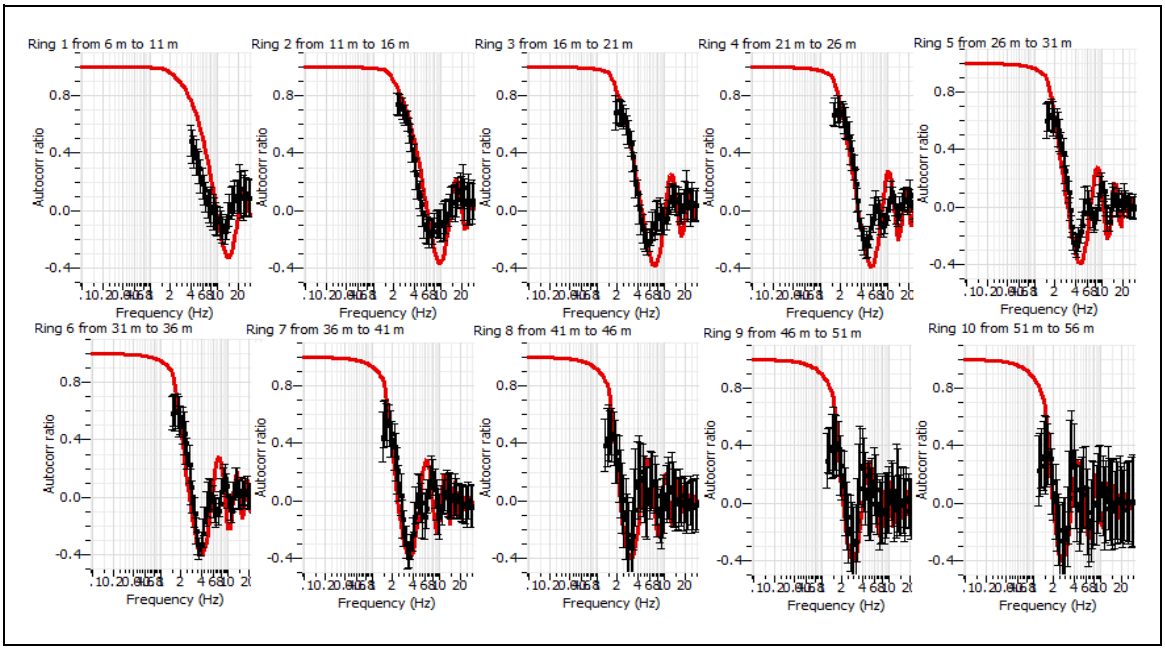
ANALISI CONGIUNTA PROVA ESAC - HVSR

CLIENTE **Comune di Mirandola**

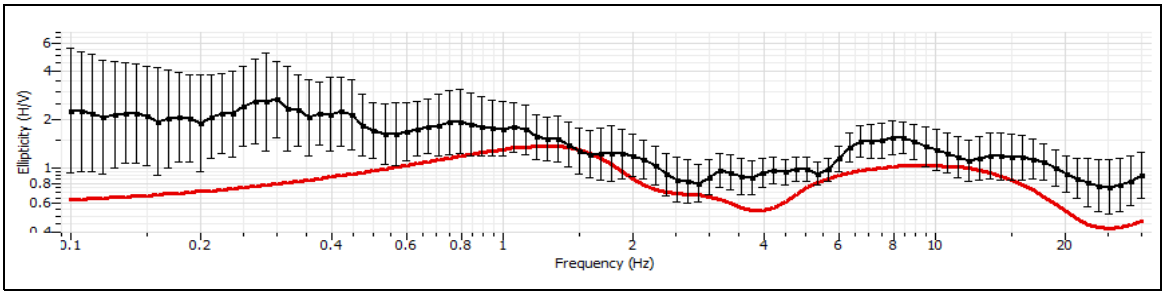
CODICE LAVORO **1538**
CODICE PROVA **Esac3**

LOCALITA':	Via Nicolò De Conti - Mirandola	**APPARECCHIATURA ESAC:**	Geometrics GEODE
DATA PROVA:	13/01/2015	**APPARECCHIATURA HVSR:**	SARA SL 07
LONGITUDINE:	4972741.47 m	**N°CANALI**	24
LATITUDINE:	665552.74 m	**SPACING**	5 m.
QUOTA (m.s.l.m.):	14	**RECORD TIME (min)**	18
AZIMUT	45°		

VERTICAL RINGS AUTOCORRELATION



ELIPTICITY AUTOCORRELATION CURVES



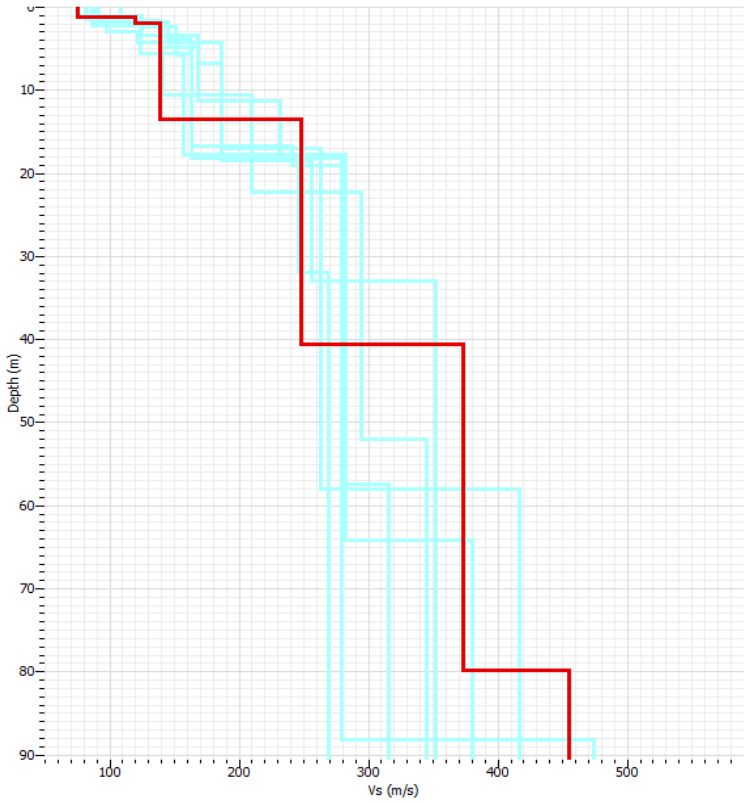
ANALISI CONGIUNTA PROVA ESAC - HVSR

CLIENTE **Comune di Mirandola**

CODICE LAVORO **1538**
CODICE PROVA **Esac3**

LOCALITA':	Via Nicolò De Conti - Mirandola	**APPARECCHIATURA ESAC:**	Geometrics GEODE
DATA PROVA:	13/01/2015	**APPARECCHIATURA HVSR:**	SARA SL 07
LONGITUDINE:	4972741.47 m	**N°CANALI**	24
LATITUDINE:	665552.74 m	**SPACING**	5 m.
QUOTA (m.s.l.m.):	14	**RECORD TIME (min)**	18
AZIMUT	45°		

PROFILO VELOCITÀ ONDE DI TAGLIO



CALCOLO VS 30

SPESSORE	PROFONDITA'	Vs	SPESSORE/Vs
1.2	0	75	0.016
0.71	1.2	120	0.005916667
11.5	1.91	139	0.082733813
16.59	13.41	248	0.066895161
	30		
			0.171545641

$Vs_{30} = 175$

Seismic classification of soils
(It. D.M. 14/01/2008)

D

ANTENNA SISMICA (ESAC)

CLIENTE: Comune di Mirandola

CODICE LAVORO: **1538**

CODICE PROVA: **Esac4**

LOCALITA':	Via Nazioni Unite - Mirandola		
DATA PROVA:	13/01/2015	**TERRENO DI MISURA:**	Naturale soffice
Coordinata est:	664261.78 m	**SPACING:**	5 m.
Coordinata nord:	4971900.00 m	**RECORD TIME (min):**	18
QUOTA (m.s.l.m.):	15	**CONDIZIONI METEO:**	Sole

FOTO AEREA (Google Earth)

FOTO AREA DI INDAGINE

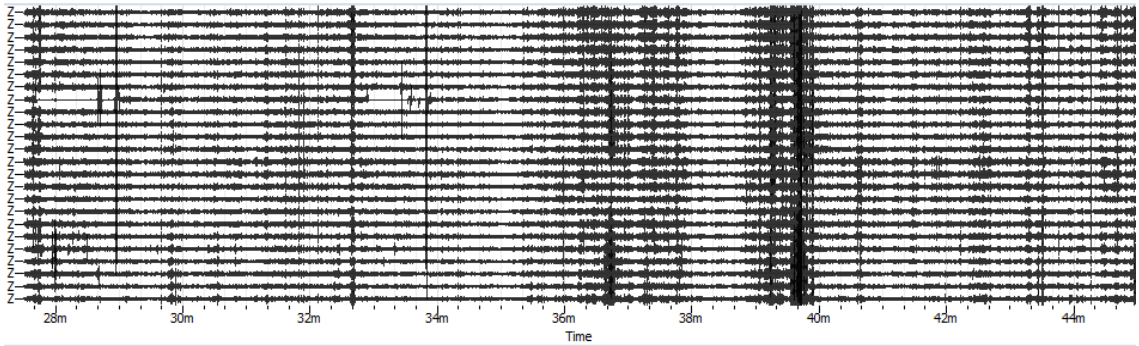
ANTENNA SISMICA (ESAC)

CLIENTE **Comune di Mirandola**

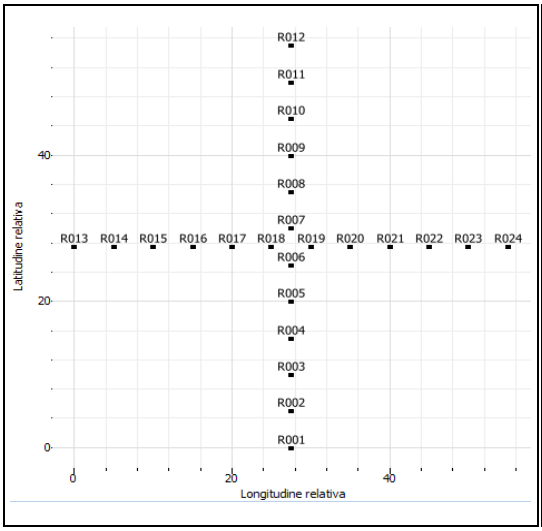
CODICE LAVORO **1538**
CODICE PROVA **Esac4**

LOCALITA':	Via Nazioni Unite - Mirandola	**STRUMENTAZIONE**	Geometrics GEODE
DATA PROVA:	13/01/2015	**N°CANALI**	24
LONGITUDINE:	664261.78 m	**SPACING**	5 m.
LATITUDINE:	4971900.00 m	**RECORD TIME (min)**	18
QUOTA (m.s.l.m.):	15	**SAMPLING (Sec)**	0.0

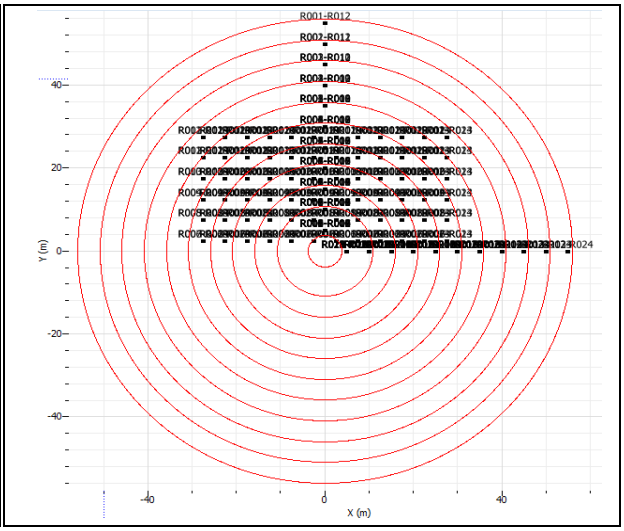
REGISTRAZIONE



PLANIMETRIA ARRAY



CO-ARRAY E RINGS

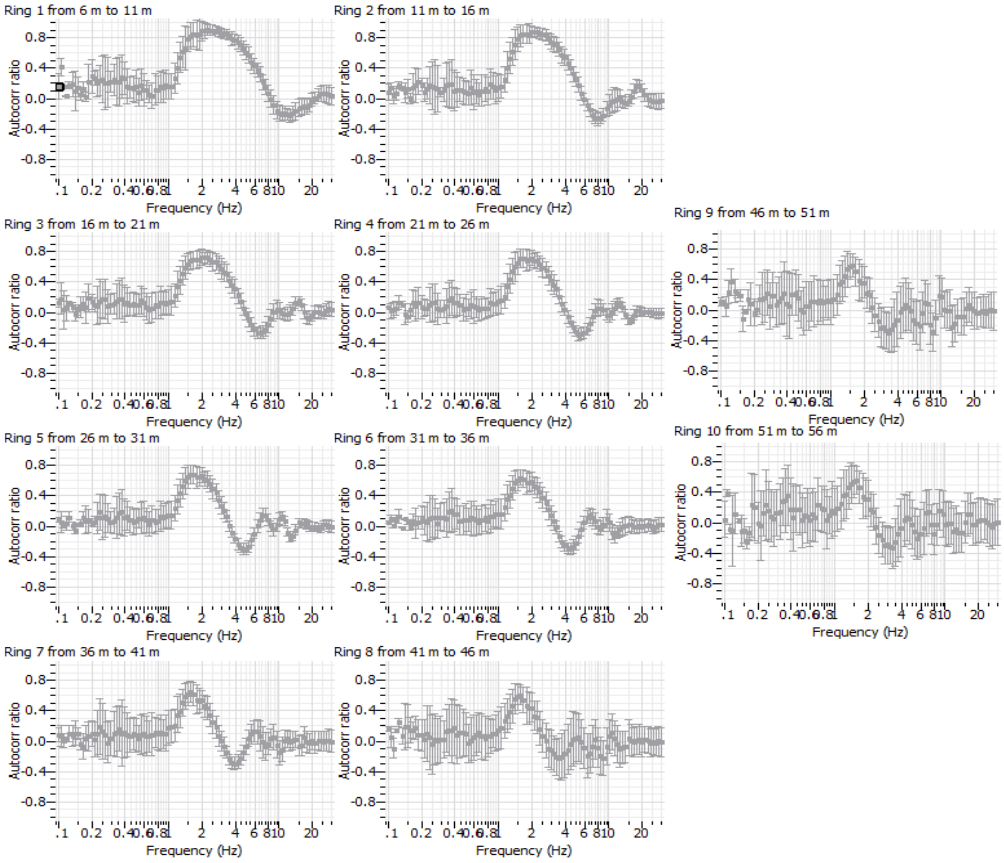


ANTENNA SISMICA ESAC

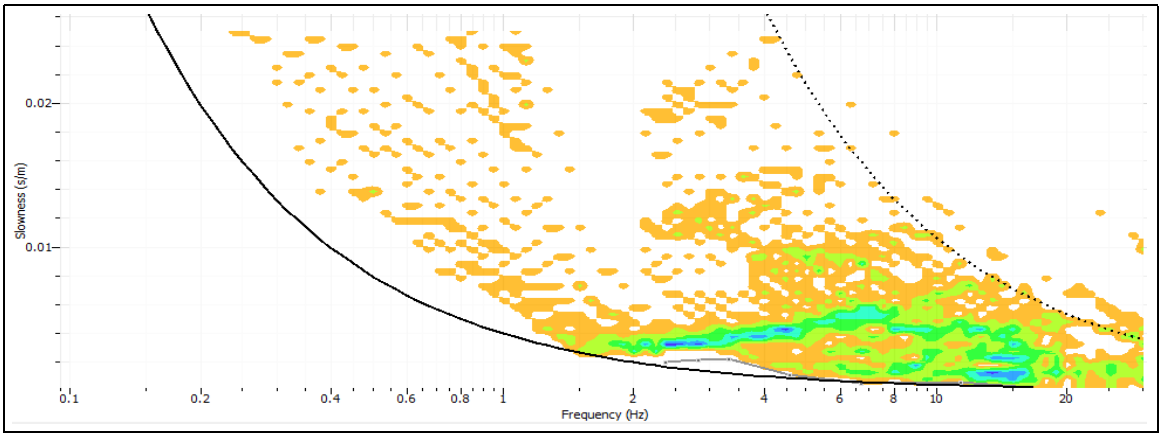
CLIENTE **Comune di Mirandola**

CODICE LAVORO **1538**
CODICE PROVA **Esac4**

CURVE DI DISPERSIONE CORRIPONDENTI AD OGNI RINGS



CUMULATA DELLE CURVE DI DISPERSIONE DEI RINGS E RELATIVO PICKING PER INDIVIRNUARNE LE FASI PIÙ SIGNIFICATIVE



RAPPORTO SPETTRALE A STAZIONE SINGOLA (HVSR)

CLIENTE: Comune di Mirandola

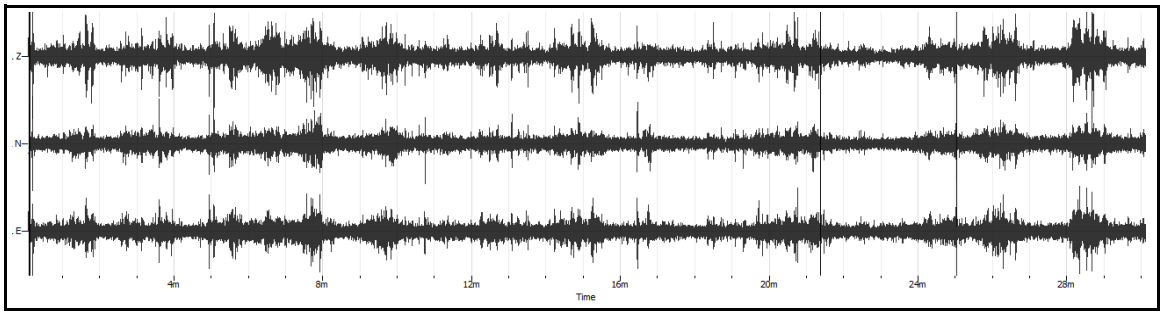
CODICE LAVORO: 1538

CODICE PROVA: Esac4

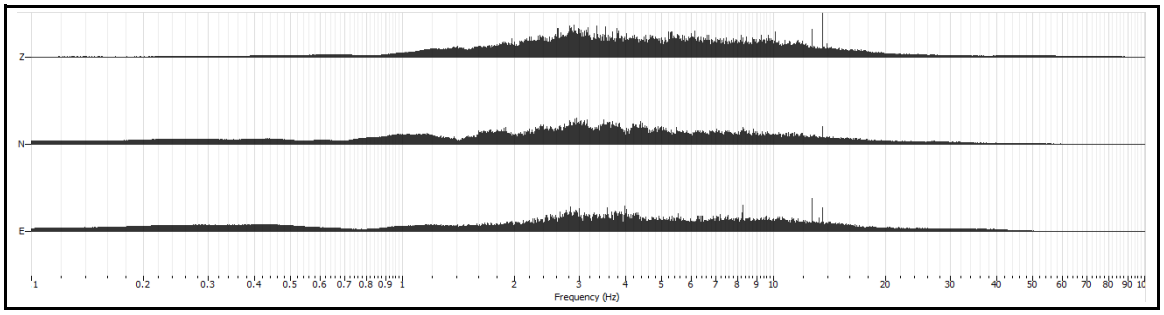
PARAMETRI DI ACQUISIZIONE	
Apparecchiatura di misura	Sara SL 07
Lunghezza registrazione	20 min
Fine registrazione	00:00:00
Frequenza di campionamento	200 Hz

PARAMETRI DI ELABORAZIONE	
Windows lenght (sec)	20
Overlap	5%
Smoothing windows	Konno & Ohmachi
Costant	40
Taper	0.5%
Low Pass	15 Hz
N° of windows	65

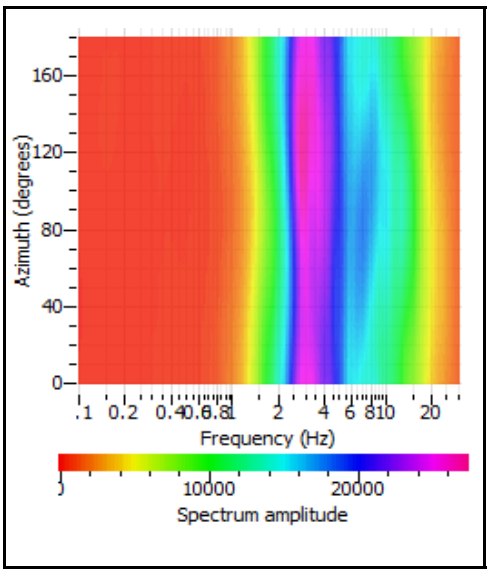
RECORD (Time)



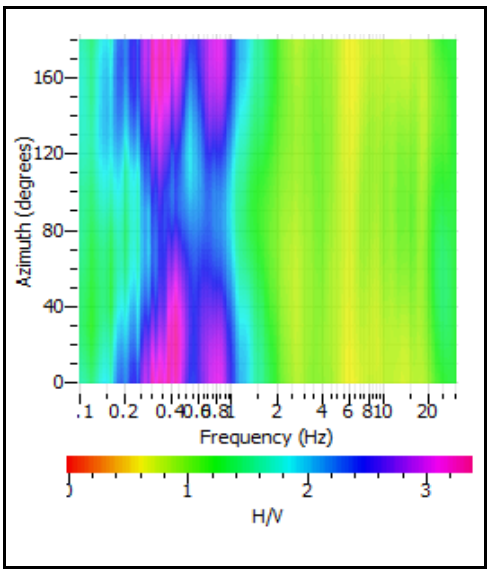
RECORD (Frequenzy)



HORIZONTAL SPECTRUM ROTATE



HV ROTATE RESULTS



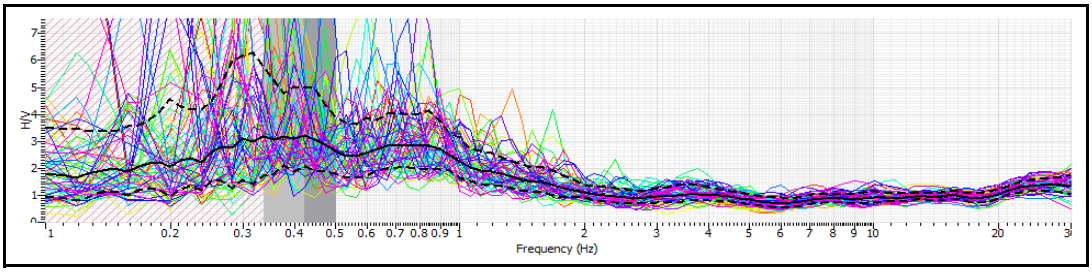
RAPPORTO SPETTRALE A STAZIONE SINGOLA (HVSR)

CLIENTE **Comune di Mirandola**

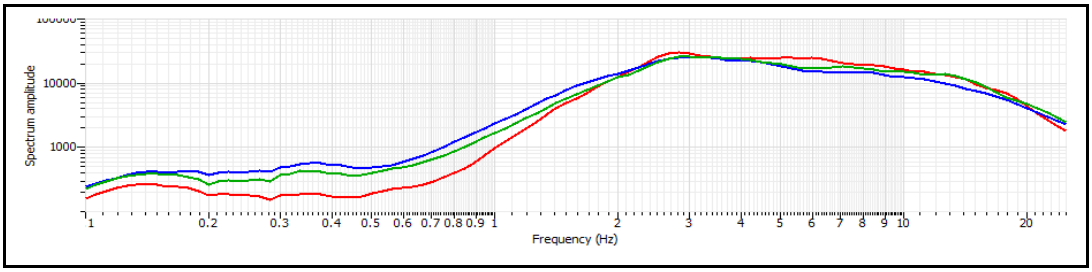
CODICE LAVORO **1538**
CODICE PROVA **Esac4**

RAPPORTO SPETTRALE H/V

Max HVSR 0.42 ± 0.08 Hz. A0 = 3.2



SPETTRO SINGOLE COMPONENTI



Criteri per una curva H/V affidabile

[tutti 3 dovrebbero risultare soddisfatti]

f0	**0.42**		
Lw	**20**		
nw	**71**		
f0 > 10 / Lw	**0.42 > 10/20**		☒
nc (f0) > 200	**596.4 > 200**	☑	
σA(f) < 2 for 0.5 f0 < f < 2 f0 if f0 > 0.5 Hz	**Exceeded 0 out of 100 times**	☑	
σA(f) < 3 for 0.5 f0 < f < 2 f0 if f0 < 0.5 Hz			

Criteri per un picco H/V chiaro

[almeno 5 su 6 dovrebbero essere soddisfatti]

Exists f^- in [f0/4, f0] | AH/V(f^-) < A0/2	**0 Hz**		☒
Exists f^+ in [4f0, f0] | AH/V(f^+) < A0/2	**1.68 Hz**	☑	
A0 > 2	**3.2 > 2**	☑	
fpeak [AH/V(f) ± σA(f)] = f0 ± 5%	**< 0.05**	☑	
σf < ε(f0)	**0.083362 < 0.084**	☑	
σA(f0) < θ(f0)	**1.00143 < 2.5**	☑	

Lw	Window lenght
nW	Number of windows used in the analysis
nc = Lw nW f0	Number of significant cycles
f	Current frequency
f0	H/V peak frequency
σf	Standard deviation of H/V peak frequency
ε(f0)	Threshold value for the stability condition σf < ε(f0)
A0	H/V peak amplitude at frequency f0
AH/V(f)	H/V curve amplitude at frequency f
f -	Frequency between f0/4 and f0 for which AH/V(f-) < A0/2
f+	Frequency between f0 and 4f0 for which AH/V(f+) < A0/2
σA(f)	Standard deviation of AH/V(f), σA(f) is the factor by which the mean AH/V(f) curve should be multiplier or divided
σlogH/V(f)	Standard deviation of log AH/V(f) curve
θ(f0)	Threshold value for the stability condition σA(f) < θ(f0)

Thresold value for σ_f and $\sigma_A(f_0)$					
Freq. Range [Hz]	< 0.2	0.2 - 0.5	0.5 - 1.0	1.0 - 2.0	> 2.0
$\varepsilon(f_0)$ (Hz)	0.25 f_0	0.20 f_0	0.15 f_0	0.10 f_0	0.05 f_0
$\theta(f_0)$ for $\sigma_A(f_0)$	3.00	2.50	2.00	1.78	1.58
Log $\theta(f_0)$ for $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

In accordo con SESAME Guidelines 2005

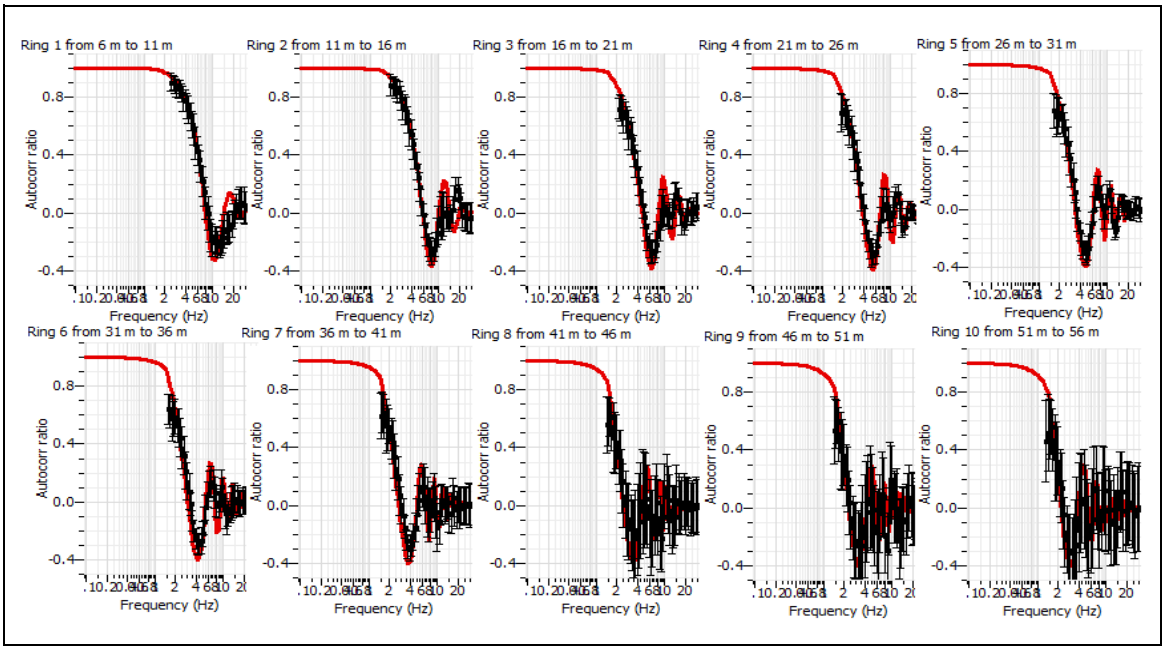
ANALISI CONGIUNTA PROVA ESAC - HVSR

CLIENTE **Comune di Mirandola**

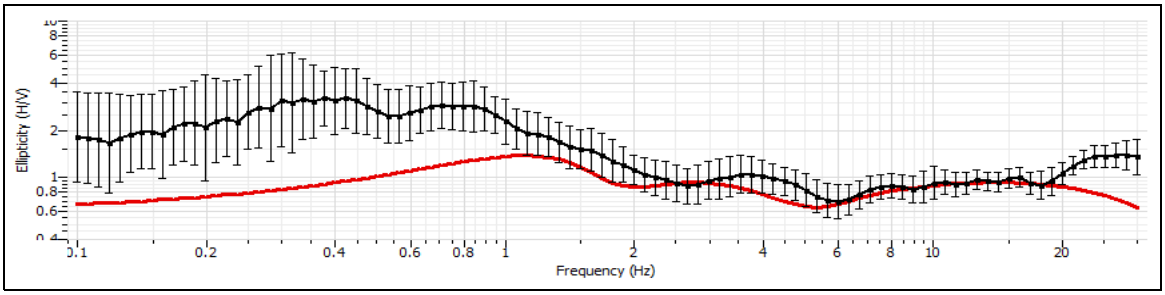
CODICE LAVORO **1538**
CODICE PROVA **Esac4**

LOCALITA':	Via Nazioni Unite - Mirandola	**APPARECCHIATURA ESAC:**	Geometrics GEODE
DATA PROVA:	13/01/2015	**APPARECCHIATURA HVSR:**	SARA SL 07
LONGITUDINE:	664261.78 m	**N°CANALI**	24
LATITUDINE:	4971900.00 m	**SPACING**	5 m.
QUOTA (m.s.l.m.):	15	**RECORD TIME (min)**	18
AZIMUT	45°		

VERTICAL RINGS AUTOCORRELATION



ELIPTICITY AUTOCORRELATION CURVES



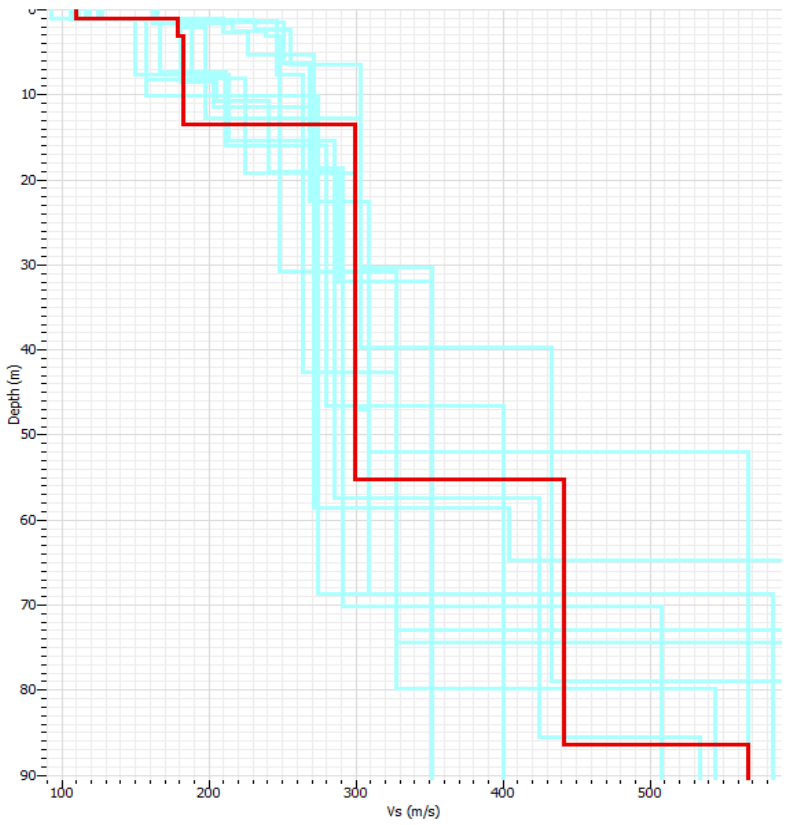
ANALISI CONGIUNTA PROVA ESAC - HVSR

CLIENTE **Comune di Mirandola**

CODICE LAVORO **1538**
CODICE PROVA **Esac4**

LOCALITA':	Via Nazioni Unite - Mirandola	**APPARECCHIATURA ESAC:**	Geometrics GEODE
DATA PROVA:	13/01/2015	**APPARECCHIATURA HVSR:**	SARA SL 07
LONGITUDINE:	664261.78 m	**N°CANALI**	24
LATITUDINE:	4971900.00 m	**SPACING**	5 m.
QUOTA (m.s.l.m.):	15	**RECORD TIME (min)**	18
AZIMUT	45°		

PROFILO VELOCITÀ ONDE DI TAGLIO



CALCOLO VS 30

SPESSORE	PROFONDITA'	Vs	SPESSORE/Vs
1.05	0	109	0.009633028
2.03	1.05	179	0.011340782
10.35	3.08	182	0.056868132
16.57	13.43	300	0.055233333
	30		
			0.133075275

$$Vs_{30} = 225$$

Seismic classification of soils
(It. D.M. 14/01/2008)

C

ANTENNA SISMICA (ESAC)

CLIENTE: Comune di Mirandola

CODICE LAVORO: **1538**

CODICE PROVA: **Esac5**

LOCALITA':	Via Valnemorosa - San Martino Spino		
DATA PROVA:	13/01/2015	**TERRENO DI MISURA:**	Naturale soffice
Coordinata est:	676176.30 m	**SPACING:**	5 m.
Coordinata nord:	4978096.72 m	**RECORD TIME (min):**	18
QUOTA (m.s.l.m.):	9	**CONDIZIONI METEO:**	Sole

FOTO AEREA (Google Earth)

FOTO AREA DI INDAGINE

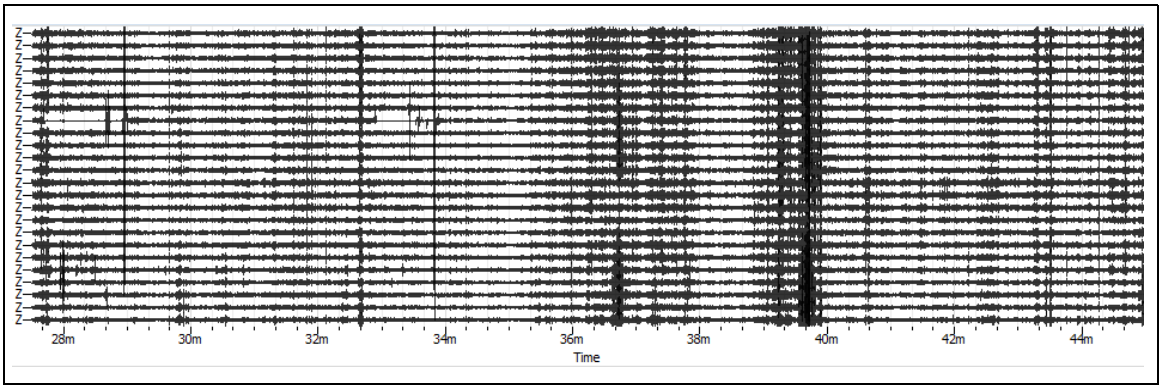
ANTENNA SISMICA (ESAC)

CLIENTE Comune di Mirandola

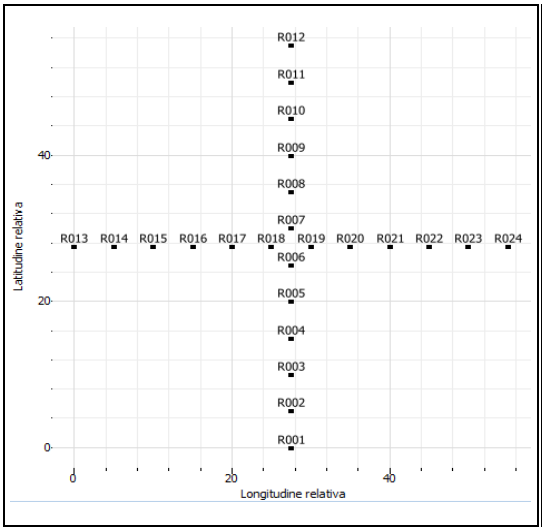
CODICE LAVORO 1538
CODICE PROVA Esac5

LOCALITA':	Via Valnemorosa - San Martino Spino	**STRUMENTAZIONE**	Geometrics GEODE
DATA PROVA:	13/01/2015	**N°CANALI**	24
LONGITUDINE:	676176.30 m	**SPACING**	5 m.
LATITUDINE:	4978096.72 m	**RECORD TIME (min)**	18
QUOTA (m.s.l.m.):	9	**SAMPLING (Sec)**	0.0

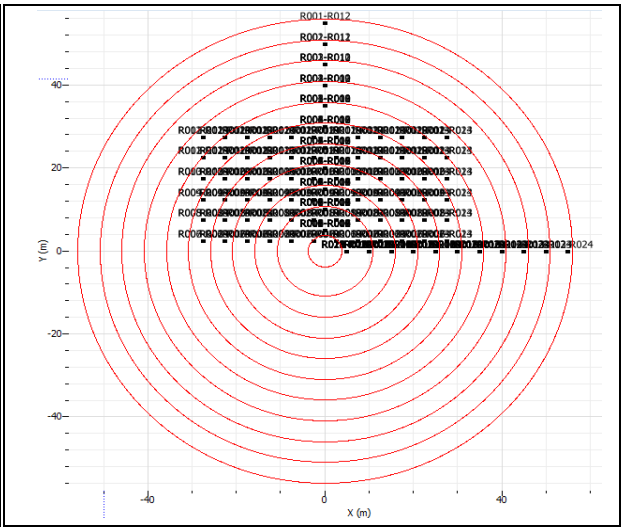
REGISTRAZIONE



PLANIMETRIA ARRAY



CO-ARRAY E RINGS

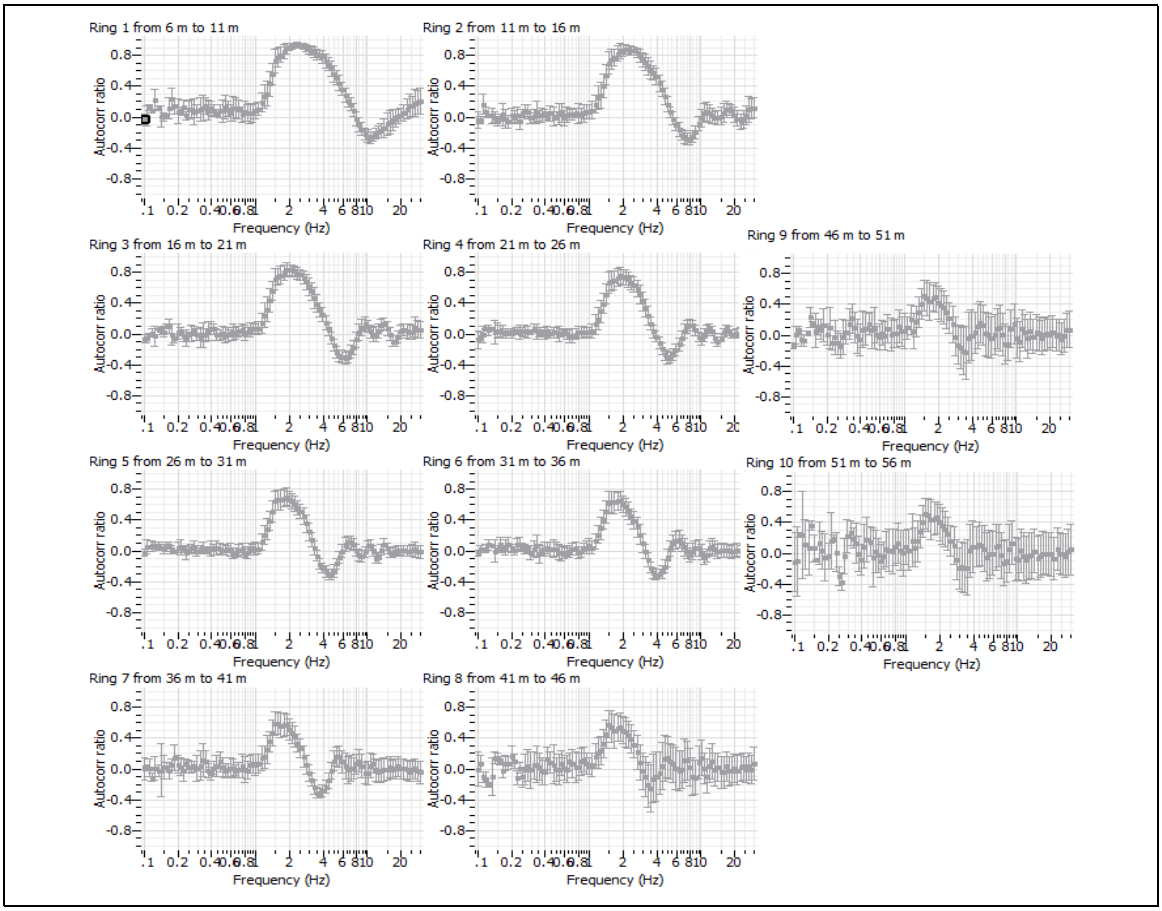


ANTENNA SISMICA ESAC

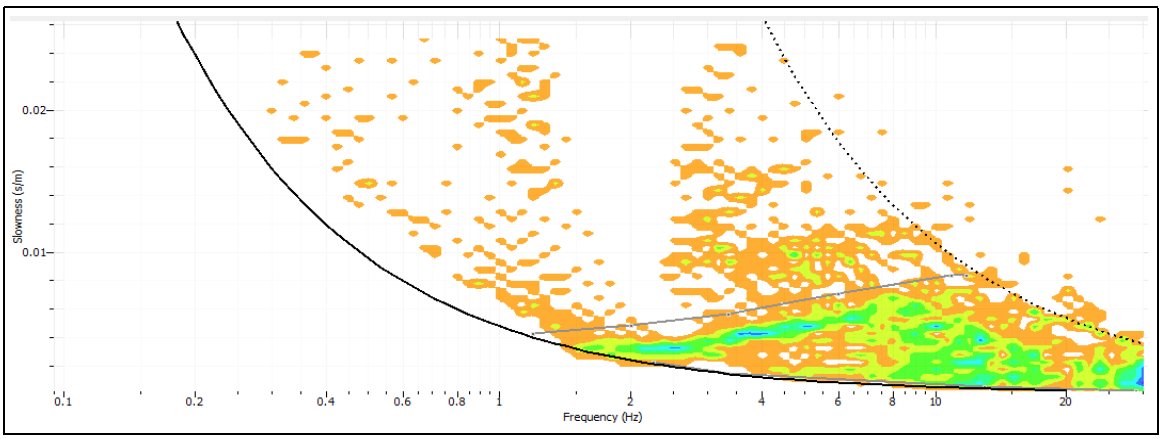
CLIENTE **Comune di Mirandola**

CODICE LAVORO **1538**
CODICE PROVA **Esac5**

CURVE DI DISPERSIONE CORRIPONDENTI AD OGNI RINGS



CUMULATA DELLE CURVE DI DISPERSIONE DEI RINGS E RELATIVO PICKING PER INDIVIRNUARNE LE FASI PIÙ SIGNIFICATIVE



RAPPORTO SPETTRALE A STAZIONE SINGOLA (HVSR)

CLIENTE: Comune di Mirandola

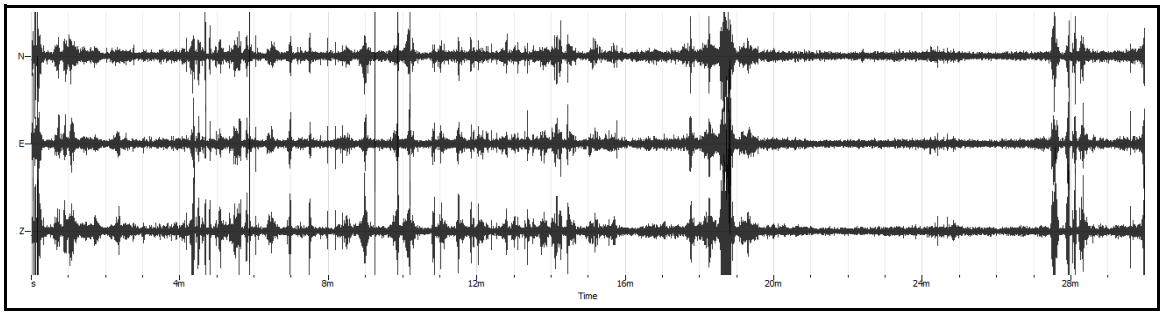
CODICE LAVORO: 1538

CODICE PROVA: Esac5

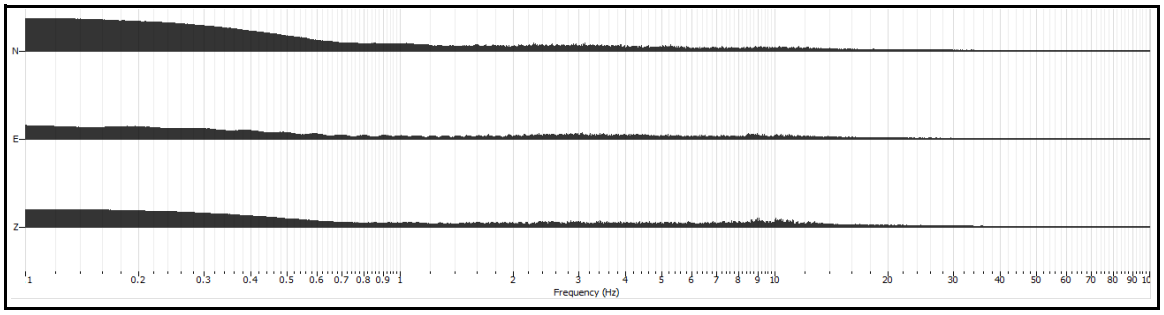
PARAMETRI DI ACQUISIZIONE	
Apparecchiatura di misura	Sara SL 07
Lunghezza registrazione	20 min
Fine registrazione	00:00:00
Frequenza di campionamento	200 Hz

PARAMETRI DI ELABORAZIONE	
Windows lenght (sec)	20
Overlap	5%
Smoothing windows	Konno & Ohmachi
Costant	40
Taper	0.5%
Low Pass	15 Hz
N° of windows	50

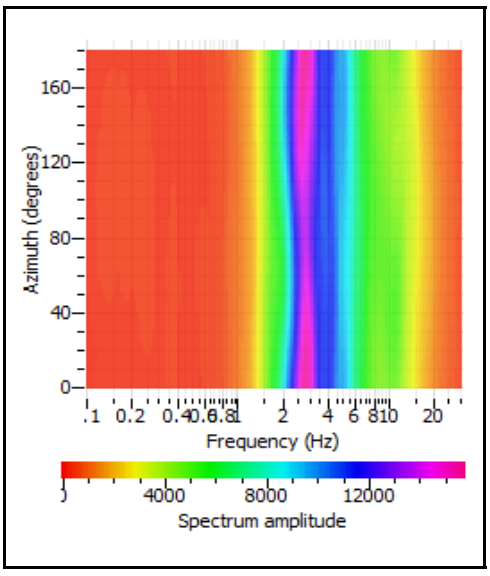
RECORD (Time)



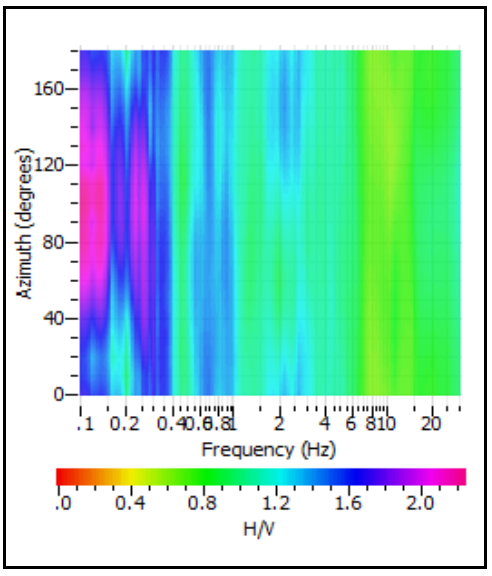
RECORD (Frequenzy)



HORIZONTAL SPECTRUM ROTATE



HV ROTATE RESULTS



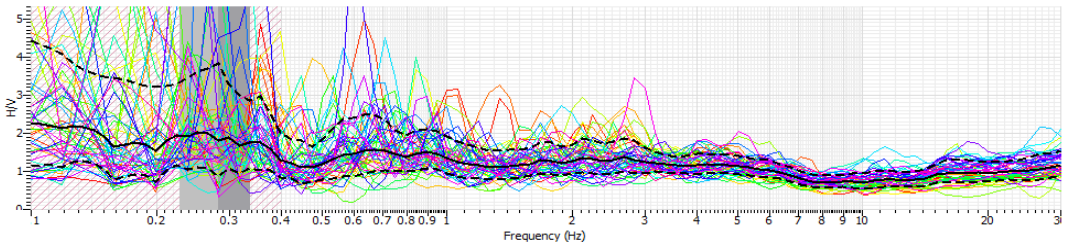
RAPPORTO SPETTRALE A STAZIONE SINGOLA (HVSR)

CLIENTE **Comune di Mirandola**

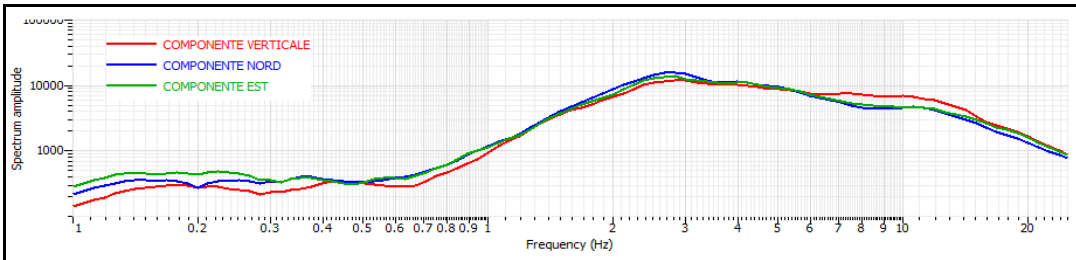
CODICE LAVORO **1538**
CODICE PROVA **Esac5**

RAPPORTO SPETTRALE H/V

Max HVSR 0.28 ± 0.05 Hz. A0 = 2.22



SPETTRO SINGOLE COMPONENTI



Criteri per una curva H/V affidabile
[tutti 3 dovrebbero risultare soddisfatti]

f0	**0.28**		
Lw	**20**		
nw	**71**		
f0 > 10 / Lw	**0.28 > 10/20**		☒
nc (f0) > 200	**397.6 > 200**	☑	
σA(f) < 2 for 0.5 f0 < f < 2 f0 if f0 > 0.5 Hz	**Exceeded 0 out of 100 times**	☑	
σA(f) < 3 for 0.5 f0 < f < 2 f0 if f0 < 0.5 Hz			

Criteri per un picco H/V chiaro
[almeno 5 su 6 dovrebbero essere soddisfatti]

Exists f^- in [f0/4, f0] | AH/V(f^-) < A0/2	**0 Hz**		☒
Exists f^+ in [4f0, f0] | AH/V(f^+) < A0/2	**0 Hz**		☒
A0 > 2	**2.22 > 2**	☑	
fpeak [AH/V(f) ± σA(f)] = f0 ± 5%	**< 0.05**	☑	
σf < ε(f0)	**0.054068 < 0.056**	☑	
σA(f0) < θ(f0)	**0.742255 < 2.5**	☑	

Lw	Window lenght
nW	Number of windows used in the analysis
nc = Lw nW f0	Number of significant cycles
f	Current frequency
f0	H/V peak frequency
σf	Standard deviation of H/V peak frequency
ε(f0)	Threshold value for the stability condition σf < ε(f0)
A0	H/V peak amplitude at frequency f0
AH/V(f)	H/V curve amplitude at frequency f
f -	Frequency between f0/4 and f0 for which AH/V(f-) < A0/2
f+	Frequency between f0 and 4f0 for which AH/V(f+) < A0/2
σA(f)	Standard deviation of AH/V(f), σA(f) is the factor by which the mean AH/V(f) curve should be multiplier or divided
σlogH/V(f)	Standard deviation of log AH/V(f) curve
θ(f0)	Threshold value for the stability condition σA(f) < θ(f0)

Thresold value for σ_f and $\sigma_A(f_0)$					
Freq. Range [Hz]	< 0.2	0.2 - 0.5	0.5 - 1.0	1.0 - 2.0	> 2.0
$\varepsilon(f_0)$ (Hz)	0.25 f_0	0.20 f_0	0.15 f_0	0.10 f_0	0.05 f_0
$\theta(f_0)$ for $\sigma_A(f_0)$	3.00	2.50	2.00	1.78	1.58
Log $\theta(f_0)$ for $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

In accordo con SESAME Guidelines 2005

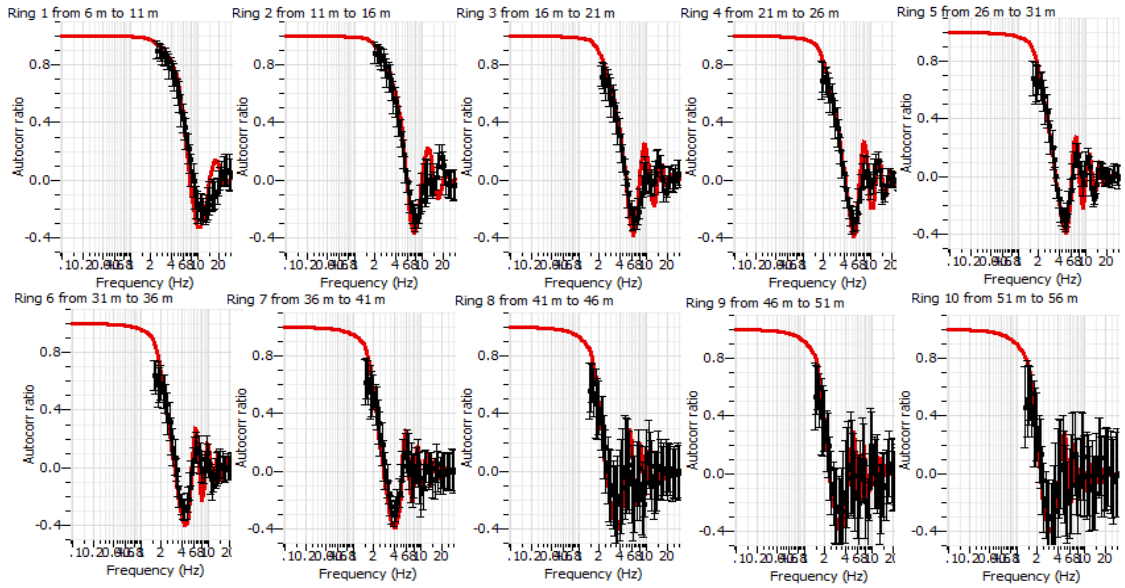
ANALISI CONGIUNTA PROVA ESAC - HVSR

CLIENTE **Comune di Mirandola**

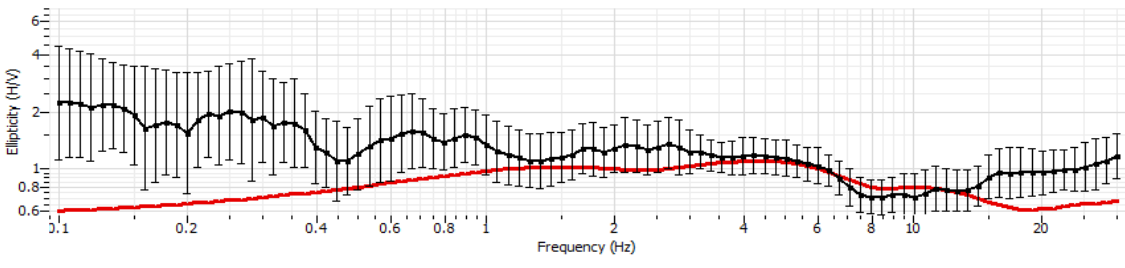
CODICE LAVORO **1538**
CODICE PROVA **Esac5**

LOCALITA':	Via Valnemorosa - San Martino Spino	**APPARECCHIATURA ESAC:**	Geometrics GEODE
DATA PROVA:	13/01/2015	**APPARECCHIATURA HVSR:**	SARA SL 07
LONGITUDINE:	676176.30 m	**N°CANALI**	24
LATITUDINE:	4978096.72 m	**SPACING**	5 m.
QUOTA (m.s.l.m.):	9	**RECORD TIME (min)**	18
AZIMUT	45°		

VERTICAL RINGS AUTOCORRELATION



ELIPTICITY AUTOCORRELATION CURVES



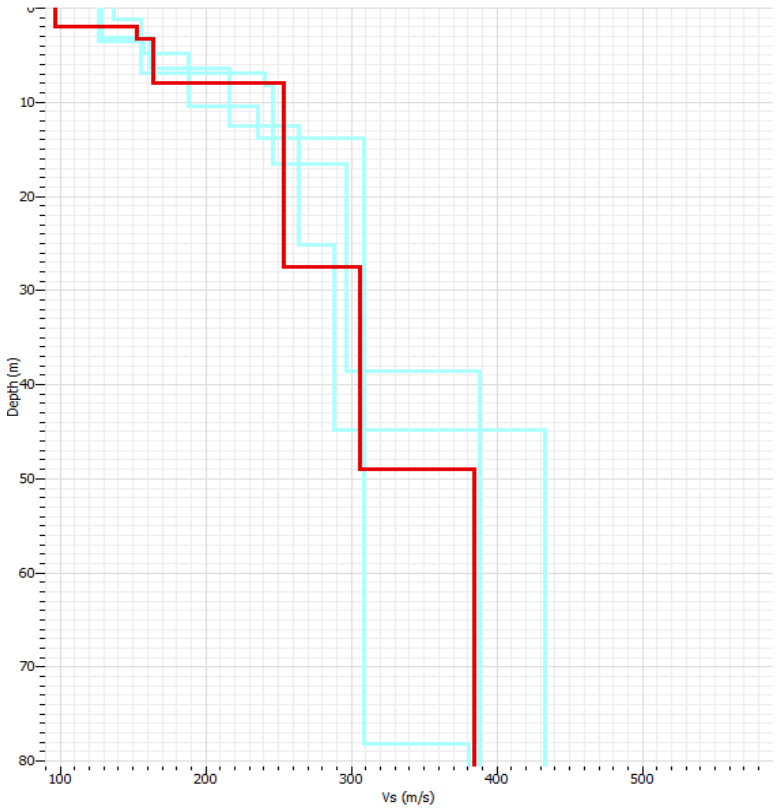
ANALISI CONGIUNTA PROVA ESAC - HVSR

CLIENTE **Comune di Mirandola**

CODICE LAVORO **1538**
CODICE PROVA **Esac5**

LOCALITA':	Via Valnemorosa - San Martino Spino	**APPARECCHIATURA ESAC:**	Geometrics GEODE
DATA PROVA:	13/01/2015	**APPARECCHIATURA HVSR:**	SARA SL 07
LONGITUDINE:	676176.30 m	**N°CANALI**	24
LATITUDINE:	4978096.72 m	**SPACING**	5 m.
QUOTA (m.s.l.m.):	9	**RECORD TIME (min)**	18
AZIMUT	45°		

PROFILO VELOCITÀ ONDE DI TAGLIO



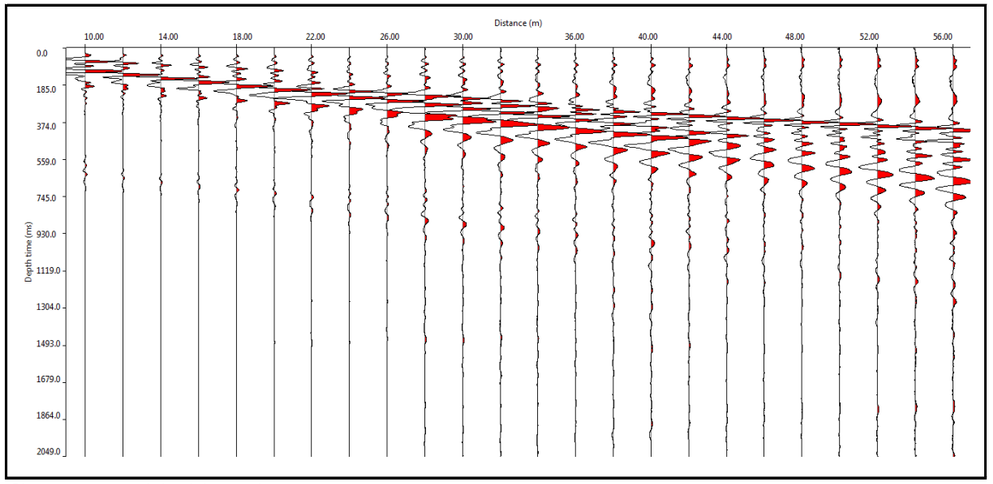
CALCOLO VS 30

SPESSORE	PROFONDITA'	Vs	SPESSORE/Vs
2.15	0	96	0.022395833
1.13	2.15	152	0.007434211
4.65	3.28	163	0.028527607
22.07	7.93	253	0.087233202
	30		
			0.145590853

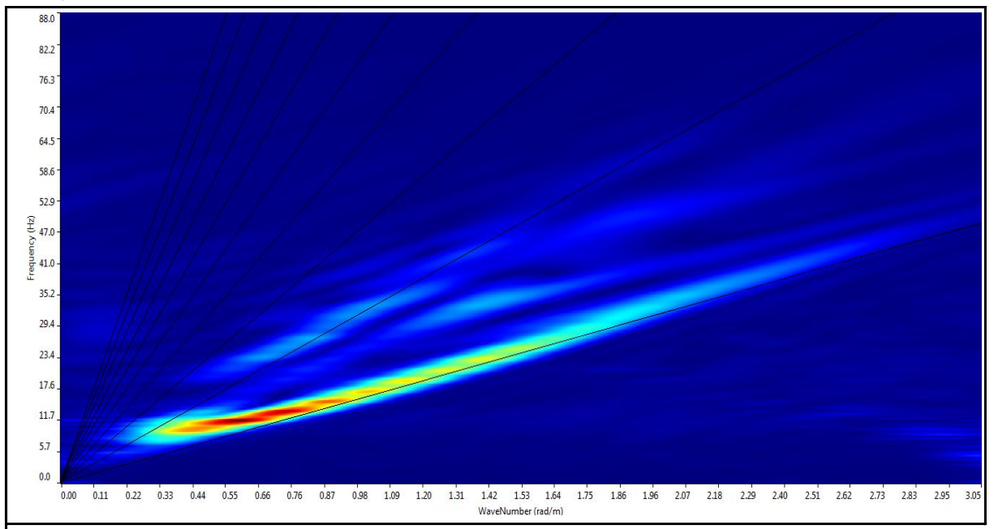
Vs_{30} = **206**

Seismic classification of soils
(It. D.M. 14/01/2008)

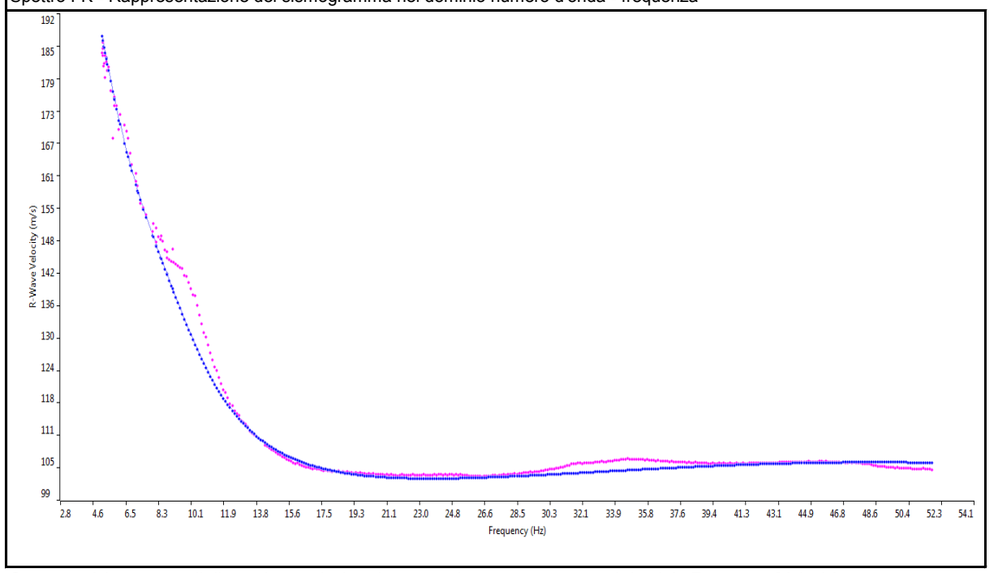
C



Sismogramma nel dominio spazio - tempo



Spettro FK - Rappresentazione del sismogramma nel dominio numero d'onda - frequenza



Sovrapposizione curva di dispersione calcolata /curva teorica rappresentata nel dominio Frequenza/Velocità

V_{S30} calcolata in base al art. 3.2.2. del NTC08

Prof. posa fondazione in m da pc= ***0***

$V_{S\ 0\ /\ 30}$ = 185 m/sec

PROFONDITA' FONDAZIONE COMUNICATA DAL PROGETTISTA/COMMITTENTE

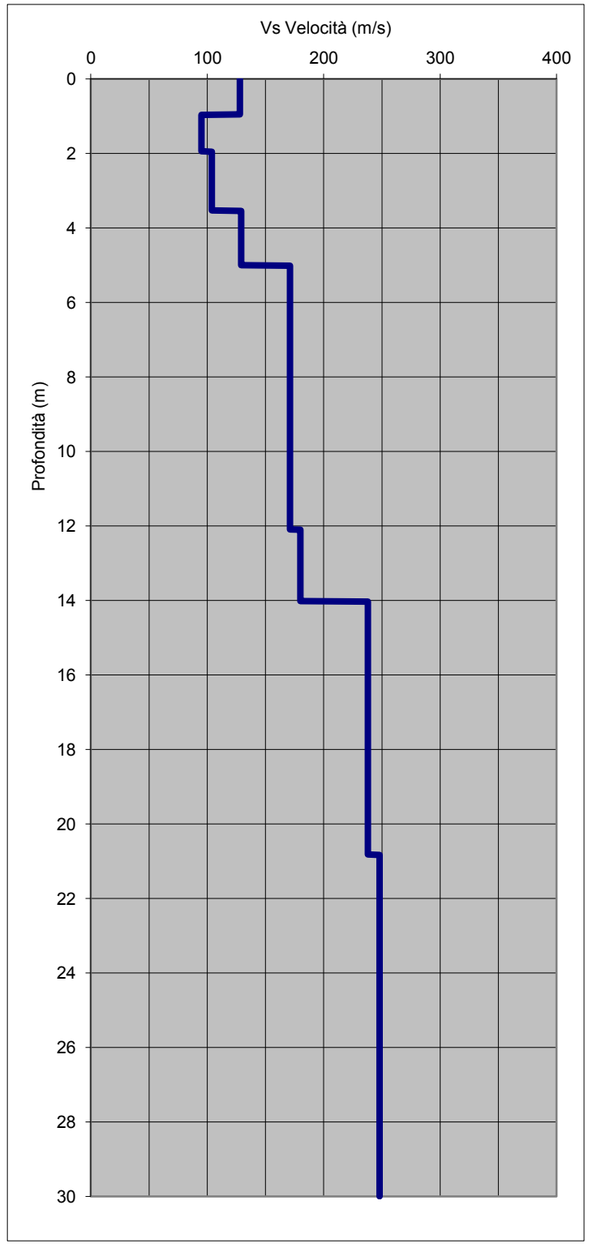


Grafico velocità/profondità onde di taglio Vs

Risultati elaborazione

Strato	Profondità da	Profondità a	Spessore m	Vel m/sec
Strato1	0,00	0,95	0,95	**128**
Strato2	0,95	1,94	0,99	**95**
Strato3	1,94	3,53	1,59	**104**
Strato4	3,53	5,00	1,47	**129**
Strato5	5,00	12,09	7,09	**171**
Strato6	12,09	14,02	1,93	**180**
Strato7	14,02	20,82	6,80	**238**
Strato8	20,82	30,00	9,18	**248**

$$Vs_{30} = \frac{30}{\sum_{i=1,N} \frac{h_i}{Vs_i}}$$

Vs_{30} = 185 m/sec

velocità calcolata dal p.c. naturale

Si ricorda che in base all'art 3.2.2 del DM 14 gennaio 2008 la Vs 30 di progetto è riferita al piano di imposta delle fondazioni superficiali o alla testa dei pali in caso di fondazioni profonde od opere di sostegno di terreni naturali.

Caratteristiche Indagine

Ubicazione indagine

Sismografo	*PASI SG24*	
Geofoni	*Geospace*	
N° geofoni a 4,5Hz	*24*	
Spaziatura geofoni	*2,0*	*m*
Lunghezza stendimento geofonico	*46*	*m*
Energizzazione	*10*	*m*
Lunghezza totale stendimento	*56*	*m*

PROSPEZIONE SISMICA DI SUPERFICIE
METODOLOGIA MASW

COMMITTENTE:
Comune di Mirandola (MO)

LOCALITA':
Mirandola (MO)

CANTIERE:
PSC via Bosco

DATA: Febbraio 2015
FILE: MW_Mirandola
Dir. Lavori:
Dr. Geol. Gabriele Tarabusi
Rif. 012_15

TECNOGEOFISICA snc
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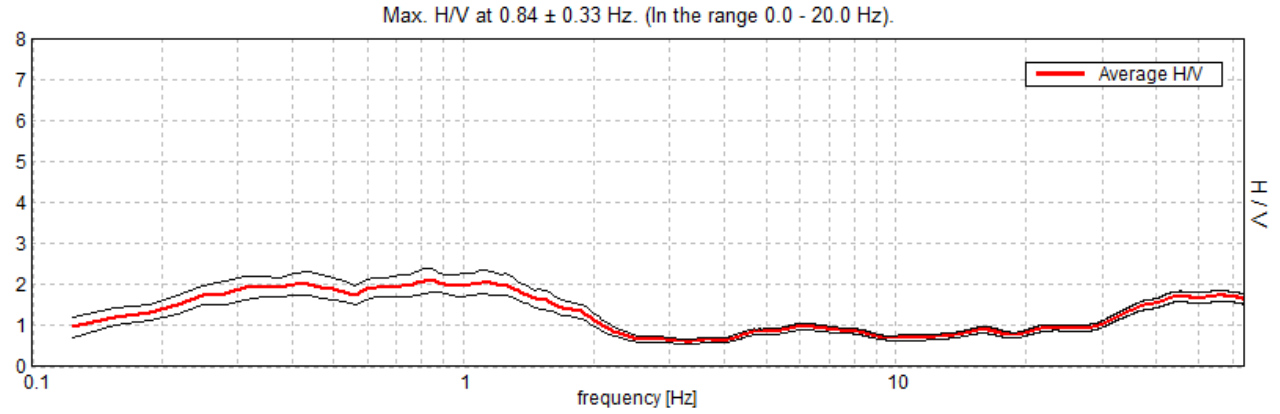
MIRANDOLA PSC, HVSR1 (Area ANS_2.2)

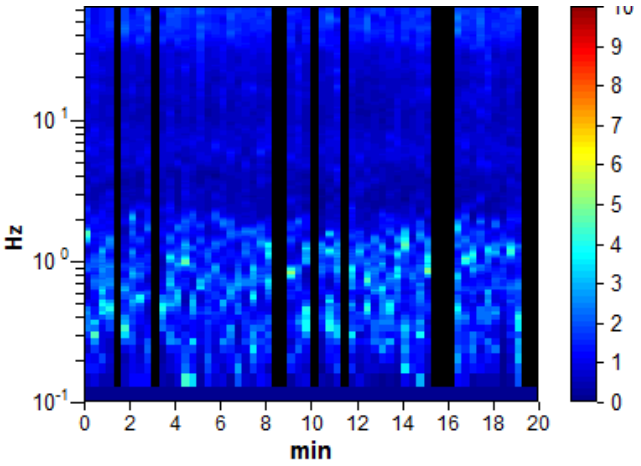
Instrument: TRS-0025/01-07
Data format: 16 byte
Full scale [mV]: n.a.
Start recording: 26/01/15 10:44:08 End recording: 26/01/15 11:04:09
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN
GPS data not available

Trace length: 0h20'00". Analyzed 85% trace (manual window selection)
Sampling rate: 128 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

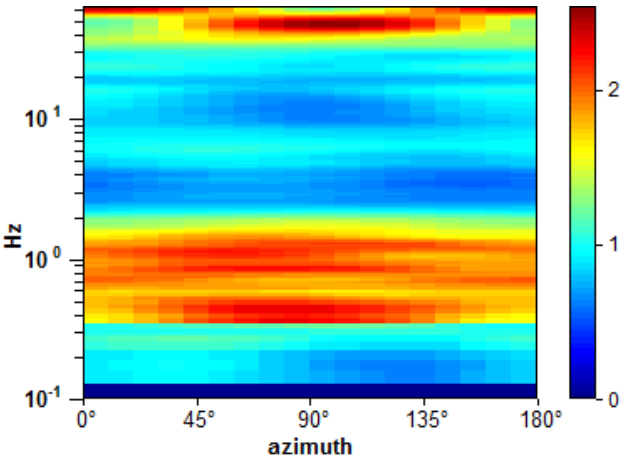
HORIZONTAL TO VERTICAL SPECTRAL RATIO



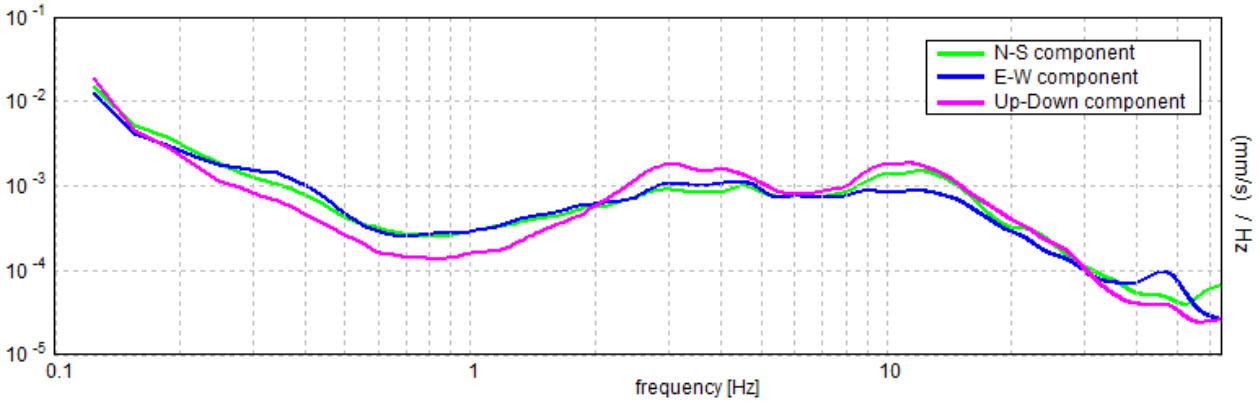
H/V TIME HISTORY



DIRECTIONAL H/V



SINGLE COMPONENT SPECTRA



[According to the SESAME, 2005 guidelines. **Please read carefully the *Grilla* manual before interpreting the following tables**.]

Max. H/V at 0.84 ± 0.33 Hz (in the range 0.0 - 20.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	0.84 > 0.50	OK	
$n_c(f_0) > 200$	826.9 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 42 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$			NO
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$	2.063 Hz	OK	
$A_0 > 2$	2.12 > 2	OK	
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.39046| < 0.05		NO
$\sigma_f < \varepsilon(f_0)$	0.32945 < 0.12656		NO
$\sigma_A(f_0) < \theta(f_0)$	0.2814 < 2.0	OK	

L_w	window length
n_w	number of windows used in the analysis
$n_c = L_w n_w f_0$	number of significant cycles
f	current frequency
f_0	H/V peak frequency
σ_f	standard deviation of H/V peak frequency
$\varepsilon(f_0)$	threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
A_0	H/V peak amplitude at frequency f_0
$A_{H/V}(f)$	H/V curve amplitude at frequency f
f^-	frequency between $f_0/4$ and f_0 for which $A_{H/V}(f^-) < A_0/2$
f^+	frequency between f_0 and $4f_0$ for which $A_{H/V}(f^+) < A_0/2$
$\sigma_A(f)$	standard deviation of $A_{H/V}(f)$, $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
$\sigma_{logH/V}(f)$	standard deviation of log $A_{H/V}(f)$ curve
$\theta(f_0)$	threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$

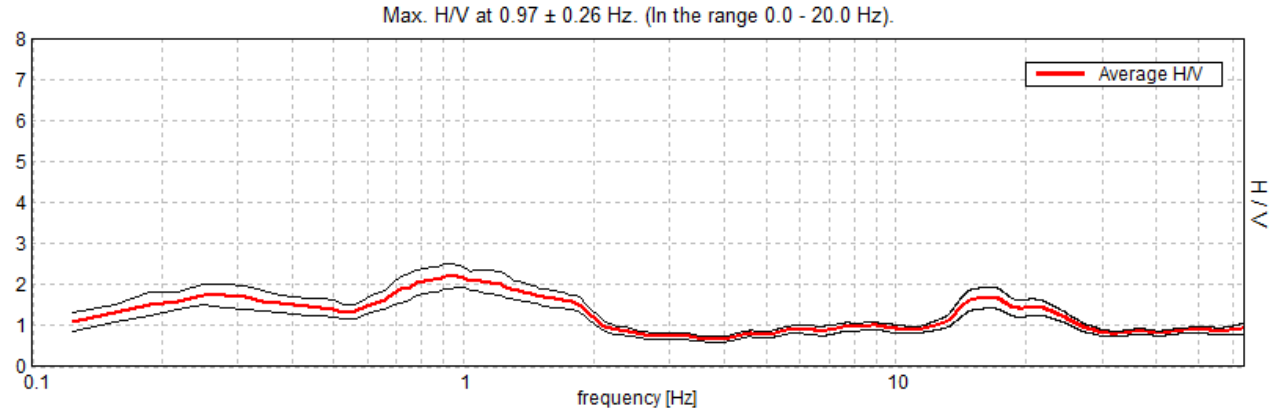
Threshold values for σ_f and $\sigma_A(f_0)$					
Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	0.25 f_0	0.2 f_0	0.15 f_0	0.10 f_0	0.05 f_0
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
log $\theta(f_0)$ for $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

MIRANDOLA PSC, HVSR2 (Area ASP_N1)

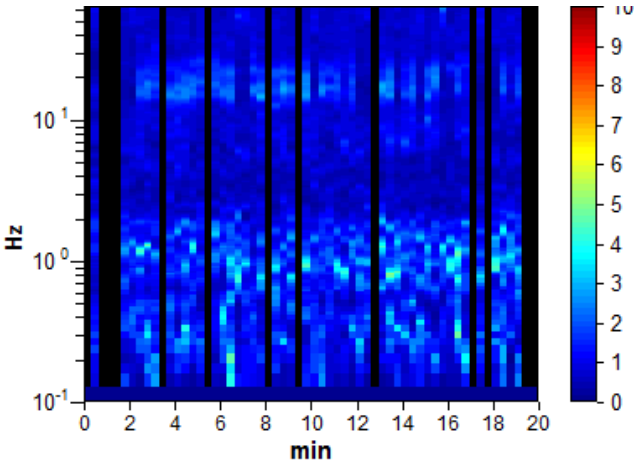
Instrument: TEN-0029/01-07
Data format: 16 byte
Full scale [mV]: n.a.
Start recording: 26/01/15 10:11:07 End recording: 26/01/15 10:31:08
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN
GPS data not available

Trace length: 0h20'00". Analyzed 82% trace (manual window selection)
Sampling rate: 128 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

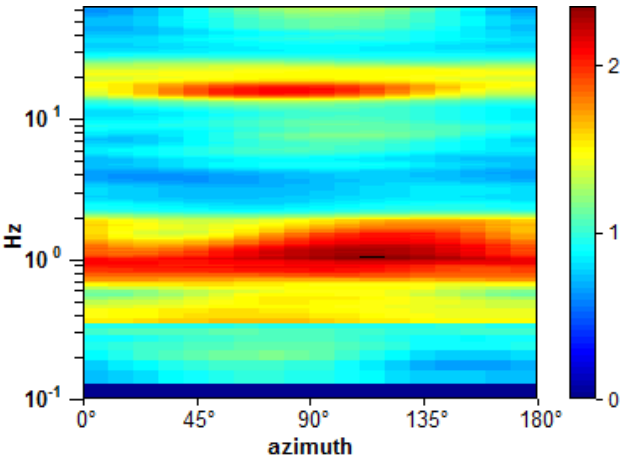
HORIZONTAL TO VERTICAL SPECTRAL RATIO



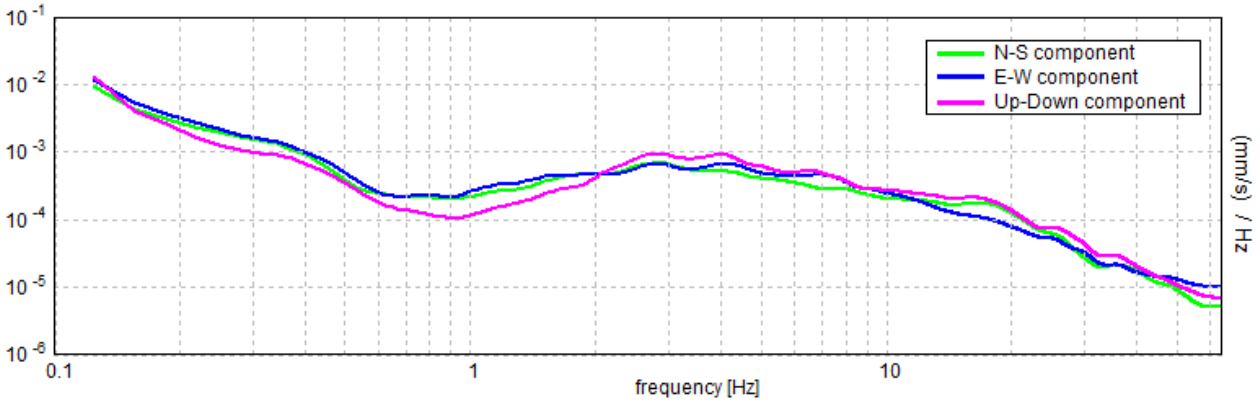
H/V TIME HISTORY



DIRECTIONAL H/V



SINGLE COMPONENT SPECTRA



[According to the SESAME, 2005 guidelines. **Please read carefully the *Grilla* manual before interpreting the following tables**.]

Max. H/V at 0.97 ± 0.26 Hz (in the range 0.0 - 20.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	0.97 > 0.50	OK	
$n_c(f_0) > 200$	910.6 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 48 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$			NO
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$	2.063 Hz	OK	
$A_0 > 2$	2.21 > 2	OK	
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.27279| < 0.05		NO
$\sigma_f < \varepsilon(f_0)$	0.26426 < 0.14531		NO
$\sigma_A(f_0) < \theta(f_0)$	0.2709 < 2.0	OK	

L_w	window length
n_w	number of windows used in the analysis
$n_c = L_w n_w f_0$	number of significant cycles
f	current frequency
f_0	H/V peak frequency
σ_f	standard deviation of H/V peak frequency
$\varepsilon(f_0)$	threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
A_0	H/V peak amplitude at frequency f_0
$A_{H/V}(f)$	H/V curve amplitude at frequency f
f^-	frequency between $f_0/4$ and f_0 for which $A_{H/V}(f^-) < A_0/2$
f^+	frequency between f_0 and $4f_0$ for which $A_{H/V}(f^+) < A_0/2$
$\sigma_A(f)$	standard deviation of $A_{H/V}(f)$, $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
$\sigma_{logH/V}(f)$	standard deviation of log $A_{H/V}(f)$ curve
$\theta(f_0)$	threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$

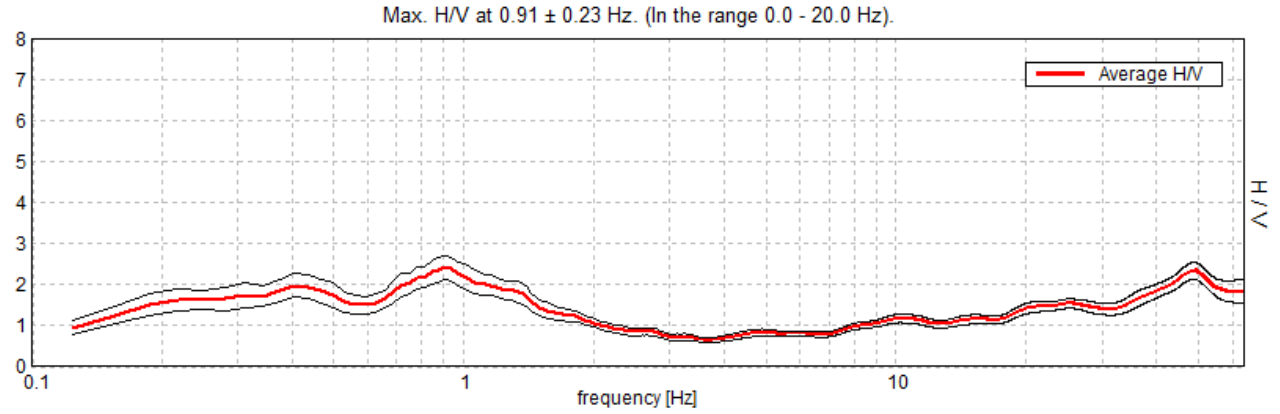
Threshold values for σ_f and $\sigma_A(f_0)$					
Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	0.25 f_0	0.2 f_0	0.15 f_0	0.10 f_0	0.05 f_0
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
log $\theta(f_0)$ for $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

MIRANDOLA PSC, HVSR3 (Area ASP_N4)

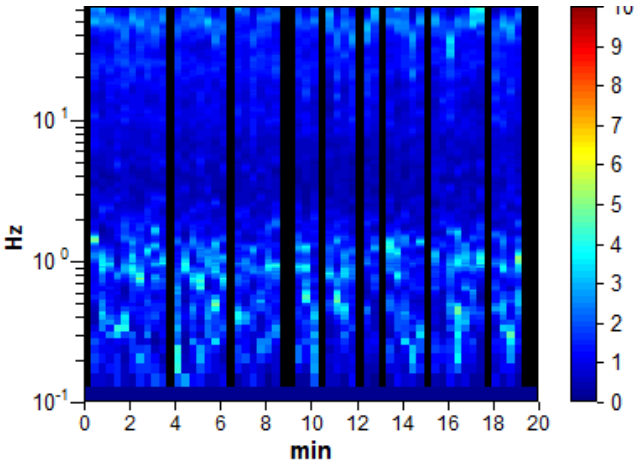
Instrument: TRS-0025/01-07
Data format: 16 byte
Full scale [mV]: n.a.
Start recording: 26/01/15 10:12:51 End recording: 26/01/15 10:32:52
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN
GPS data not available

Trace length: 0h20'00". Analyzed 83% trace (manual window selection)
Sampling rate: 128 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

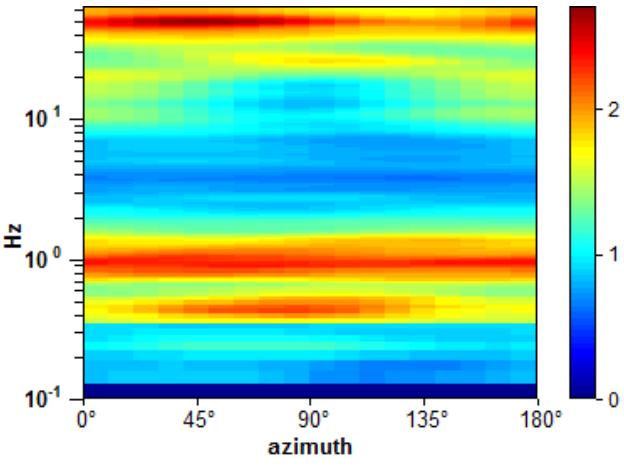
HORIZONTAL TO VERTICAL SPECTRAL RATIO



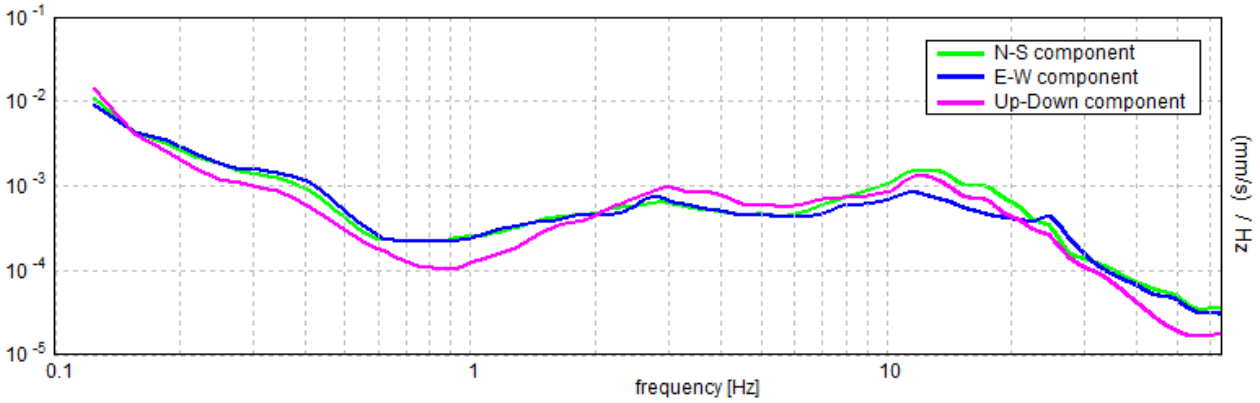
H/V TIME HISTORY



DIRECTIONAL H/V



SINGLE COMPONENT SPECTRA



[According to the SESAME, 2005 guidelines. **Please read carefully the *Grilla* manual before interpreting the following tables**.]

Max. H/V at 0.91 ± 0.23 Hz (in the range 0.0 - 20.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	0.91 > 0.50	OK	
$n_c(f_0) > 200$	870.0 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 44 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$			NO
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$	1.844 Hz	OK	
$A_0 > 2$	2.41 > 2	OK	
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.2566| < 0.05		NO
$\sigma_f < \varepsilon(f_0)$	0.23254 < 0.13594		NO
$\sigma_A(f_0) < \theta(f_0)$	0.3027 < 2.0	OK	

L_w	window length
n_w	number of windows used in the analysis
$n_c = L_w n_w f_0$	number of significant cycles
f	current frequency
f_0	H/V peak frequency
σ_f	standard deviation of H/V peak frequency
$\varepsilon(f_0)$	threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
A_0	H/V peak amplitude at frequency f_0
$A_{H/V}(f)$	H/V curve amplitude at frequency f
f^-	frequency between $f_0/4$ and f_0 for which $A_{H/V}(f^-) < A_0/2$
f^+	frequency between f_0 and $4f_0$ for which $A_{H/V}(f^+) < A_0/2$
$\sigma_A(f)$	standard deviation of $A_{H/V}(f)$, $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
$\sigma_{logH/V}(f)$	standard deviation of log $A_{H/V}(f)$ curve
$\theta(f_0)$	threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$

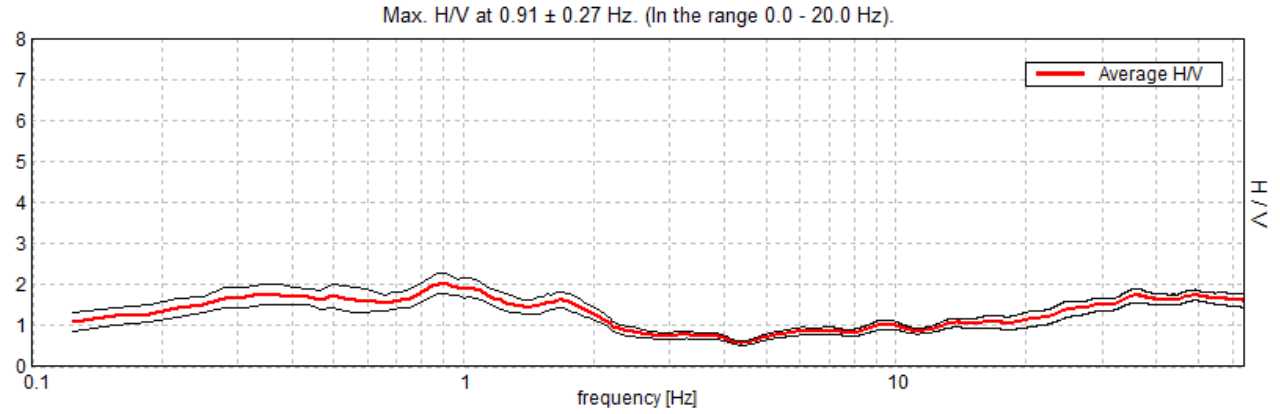
Threshold values for σ_f and $\sigma_A(f_0)$					
Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	0.25 f_0	0.2 f_0	0.15 f_0	0.10 f_0	0.05 f_0
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
log $\theta(f_0)$ for $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

MIRANDOLA PSC, HVSR4 (Area ASP_N5)

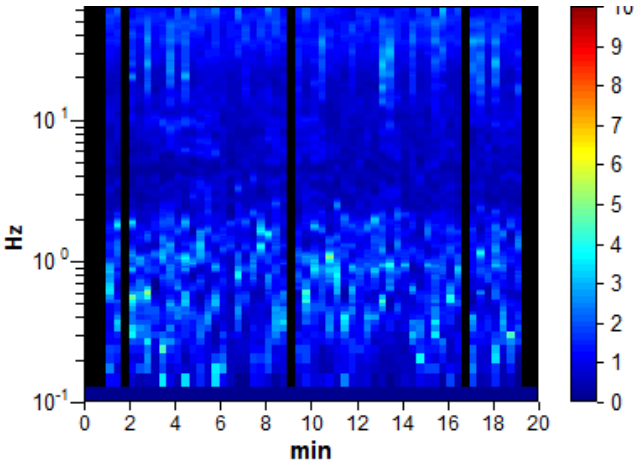
Instrument: TEN-0029/01-07
Data format: 16 byte
Full scale [mV]: n.a.
Start recording: 26/01/15 09:41:43 End recording: 26/01/15 10:01:44
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN
GPS data not available

Trace length: 0h20'00". Analyzed 90% trace (manual window selection)
Sampling rate: 128 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

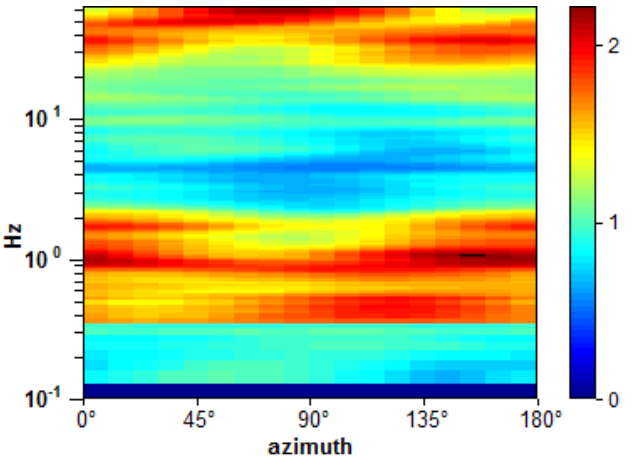
HORIZONTAL TO VERTICAL SPECTRAL RATIO



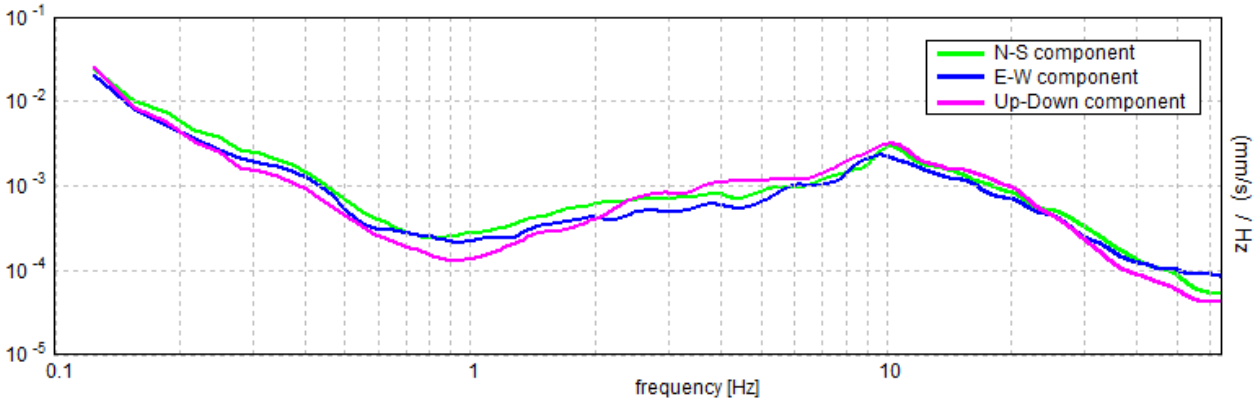
H/V TIME HISTORY



DIRECTIONAL H/V



SINGLE COMPONENT SPECTRA



[According to the SESAME, 2005 guidelines. **Please read carefully the *Grilla* manual before interpreting the following tables**.]

Max. H/V at 0.91 ± 0.27 Hz (in the range 0.0 - 20.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	0.91 > 0.50	OK	
$n_c(f_0) > 200$	942.5 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 44 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$			NO
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$	2.219 Hz	OK	
$A_0 > 2$	2.03 > 2	OK	
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.29509| < 0.05		NO
$\sigma_f < \varepsilon(f_0)$	0.26742 < 0.13594		NO
$\sigma_A(f_0) < \theta(f_0)$	0.2501 < 2.0	OK	

L_w	window length
n_w	number of windows used in the analysis
$n_c = L_w n_w f_0$	number of significant cycles
f	current frequency
f_0	H/V peak frequency
σ_f	standard deviation of H/V peak frequency
$\varepsilon(f_0)$	threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
A_0	H/V peak amplitude at frequency f_0
$A_{H/V}(f)$	H/V curve amplitude at frequency f
f^-	frequency between $f_0/4$ and f_0 for which $A_{H/V}(f^-) < A_0/2$
f^+	frequency between f_0 and $4f_0$ for which $A_{H/V}(f^+) < A_0/2$
$\sigma_A(f)$	standard deviation of $A_{H/V}(f)$, $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
$\sigma_{logH/V}(f)$	standard deviation of log $A_{H/V}(f)$ curve
$\theta(f_0)$	threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$

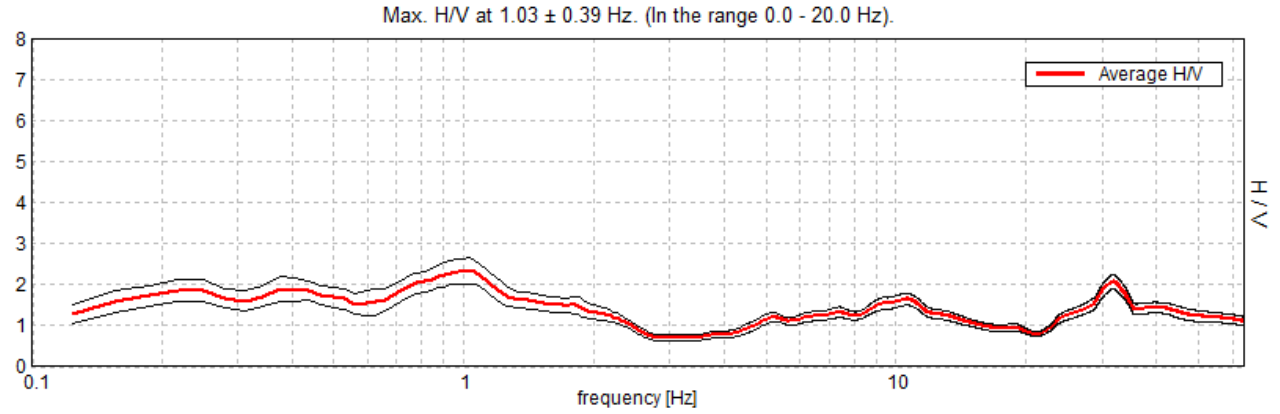
Threshold values for σ_f and $\sigma_A(f_0)$					
Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	0.25 f_0	0.2 f_0	0.15 f_0	0.10 f_0	0.05 f_0
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
log $\theta(f_0)$ for $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

MIRANDOLA PSC, HVSR5 (Area ANS_1.7)

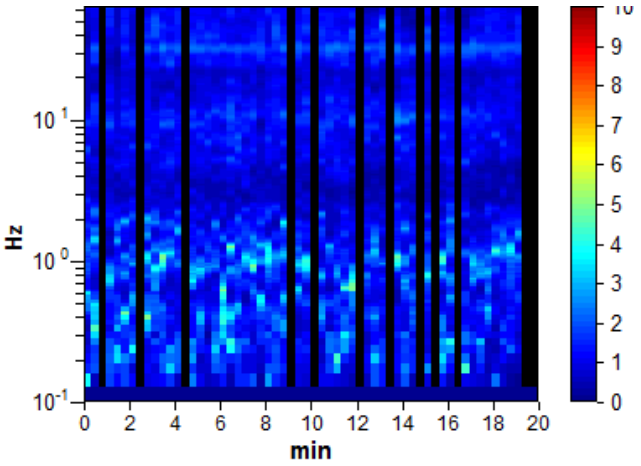
Instrument: TEN-0029/01-07
Data format: 16 byte
Full scale [mV]: n.a.
Start recording: 26/01/15 09:11:27 End recording: 26/01/15 09:31:28
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN
GPS data not available

Trace length: 0h20'00". Analyzed 83% trace (manual window selection)
Sampling rate: 128 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

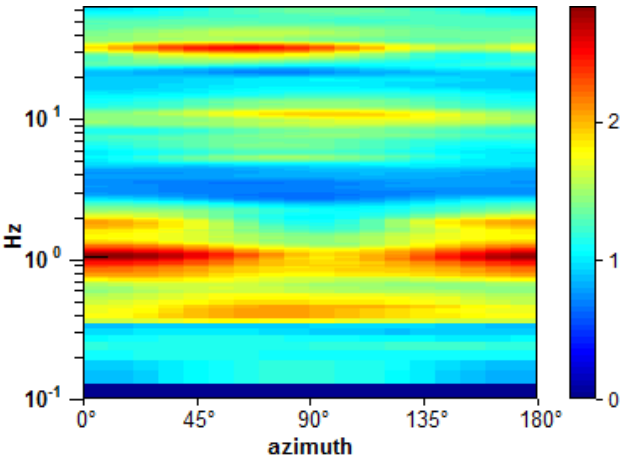
HORIZONTAL TO VERTICAL SPECTRAL RATIO



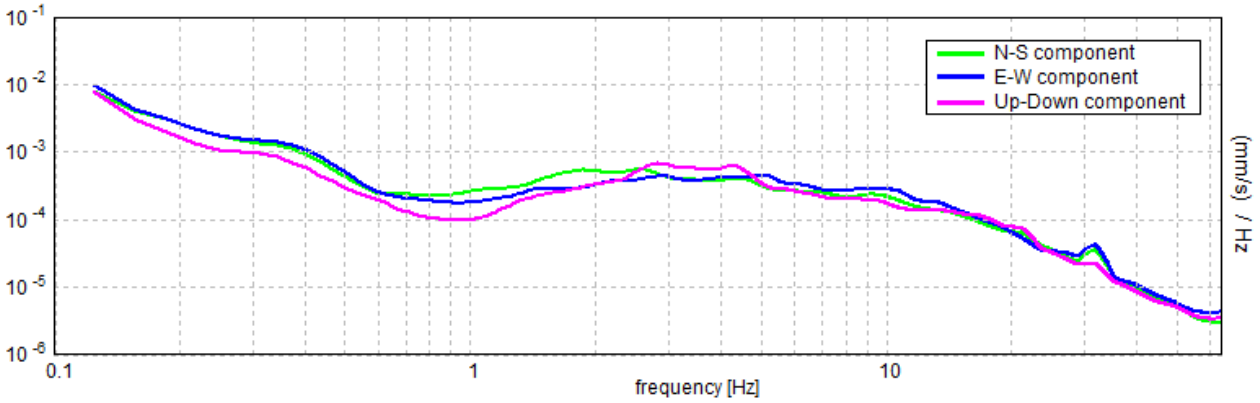
H/V TIME HISTORY



DIRECTIONAL H/V



SINGLE COMPONENT SPECTRA



[According to the SESAME, 2005 guidelines. **Please read carefully the *Grilla* manual before interpreting the following tables**.]

Max. H/V at 1.03 ± 0.39 Hz (in the range 0.0 - 20.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	1.03 > 0.50	OK	
$n_c(f_0) > 200$	990.0 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 50 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$			NO
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$	2.313 Hz	OK	
$A_0 > 2$	2.33 > 2	OK	
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.38108| < 0.05		NO
$\sigma_f < \varepsilon(f_0)$	0.39299 < 0.10313		NO
$\sigma_A(f_0) < \theta(f_0)$	0.3159 < 1.78	OK	

L_w	window length
n_w	number of windows used in the analysis
$n_c = L_w n_w f_0$	number of significant cycles
f	current frequency
f_0	H/V peak frequency
σ_f	standard deviation of H/V peak frequency
$\varepsilon(f_0)$	threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
A_0	H/V peak amplitude at frequency f_0
$A_{H/V}(f)$	H/V curve amplitude at frequency f
f^-	frequency between $f_0/4$ and f_0 for which $A_{H/V}(f^-) < A_0/2$
f^+	frequency between f_0 and $4f_0$ for which $A_{H/V}(f^+) < A_0/2$
$\sigma_A(f)$	standard deviation of $A_{H/V}(f)$, $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
$\sigma_{logH/V}(f)$	standard deviation of log $A_{H/V}(f)$ curve
$\theta(f_0)$	threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$

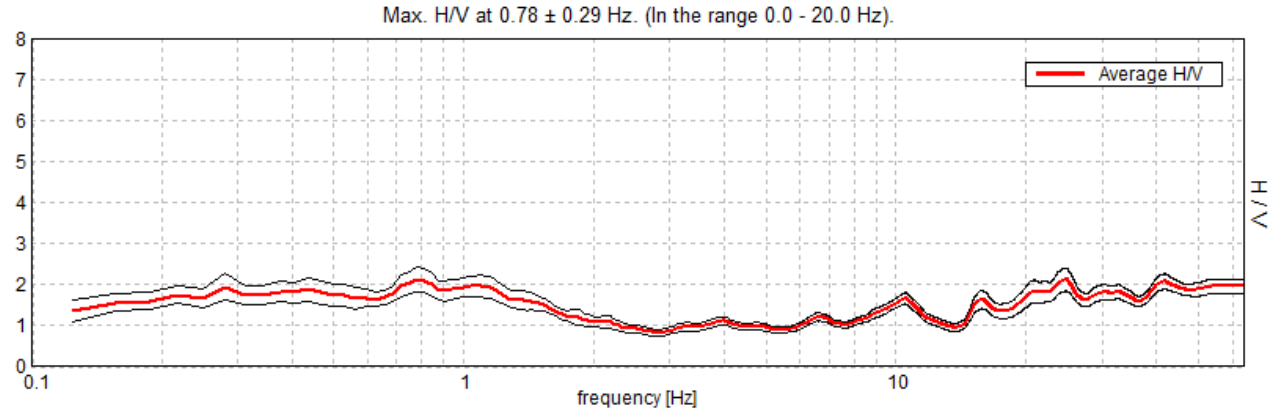
Threshold values for σ_f and $\sigma_A(f_0)$					
Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	0.25 f_0	0.2 f_0	0.15 f_0	0.10 f_0	0.05 f_0
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
log $\theta(f_0)$ for $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

MIRANDOLA PSC, HVSR6 (Area ASP_N7)

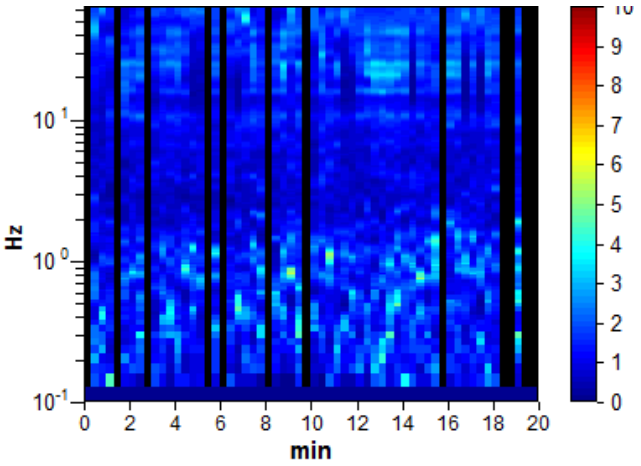
Instrument: TRS-0025/01-07
Data format: 16 byte
Full scale [mV]: n.a.
Start recording: 26/01/15 09:03:44 End recording: 26/01/15 09:23:45
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN
GPS data not available

Trace length: 0h20'00". Analyzed 82% trace (manual window selection)
Sampling rate: 128 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

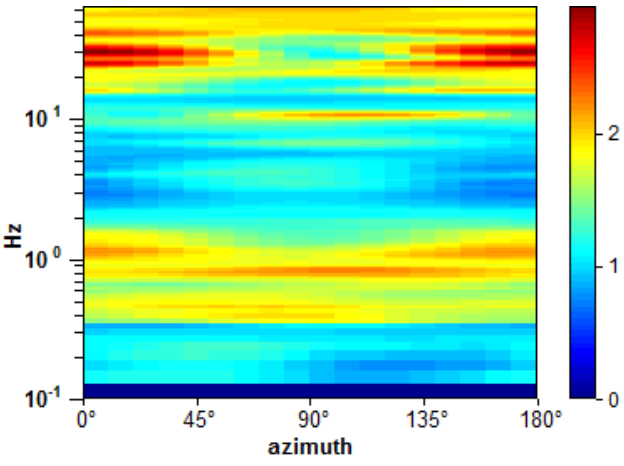
HORIZONTAL TO VERTICAL SPECTRAL RATIO



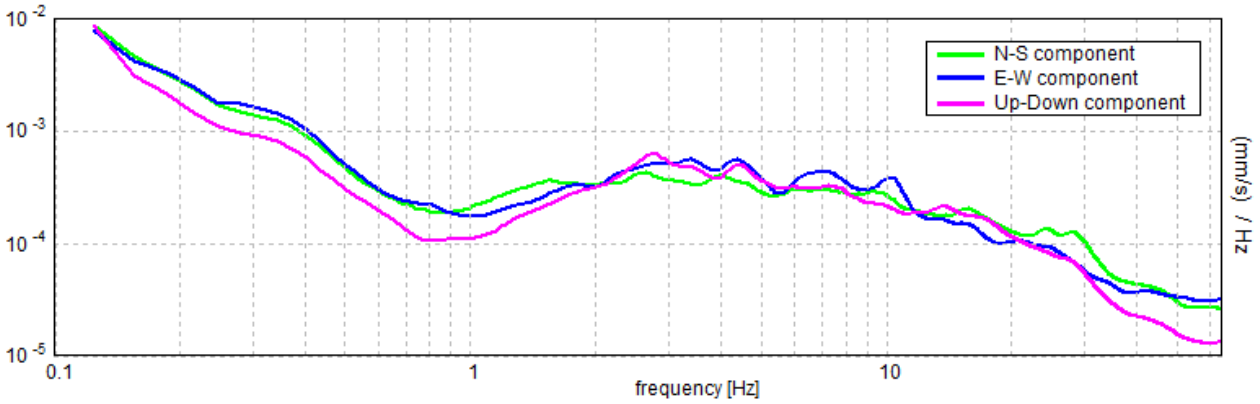
H/V TIME HISTORY



DIRECTIONAL H/V



SINGLE COMPONENT SPECTRA



[According to the SESAME, 2005 guidelines. **Please read carefully the *Grilla* manual before interpreting the following tables**.]

Max. H/V at 0.78 ± 0.29 Hz (in the range 0.0 - 20.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	0.78 > 0.50	OK	
$n_c(f_0) > 200$	750.0 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 38 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$			NO
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$	2.219 Hz	OK	
$A_0 > 2$	2.13 > 2	OK	
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.37234| < 0.05		NO
$\sigma_f < \varepsilon(f_0)$	0.29089 < 0.11719		NO
$\sigma_A(f_0) < \theta(f_0)$	0.2997 < 2.0	OK	

L_w	window length
n_w	number of windows used in the analysis
$n_c = L_w n_w f_0$	number of significant cycles
f	current frequency
f_0	H/V peak frequency
σ_f	standard deviation of H/V peak frequency
$\varepsilon(f_0)$	threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
A_0	H/V peak amplitude at frequency f_0
$A_{H/V}(f)$	H/V curve amplitude at frequency f
f^-	frequency between $f_0/4$ and f_0 for which $A_{H/V}(f^-) < A_0/2$
f^+	frequency between f_0 and $4f_0$ for which $A_{H/V}(f^+) < A_0/2$
$\sigma_A(f)$	standard deviation of $A_{H/V}(f)$, $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
$\sigma_{logH/V}(f)$	standard deviation of log $A_{H/V}(f)$ curve
$\theta(f_0)$	threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$

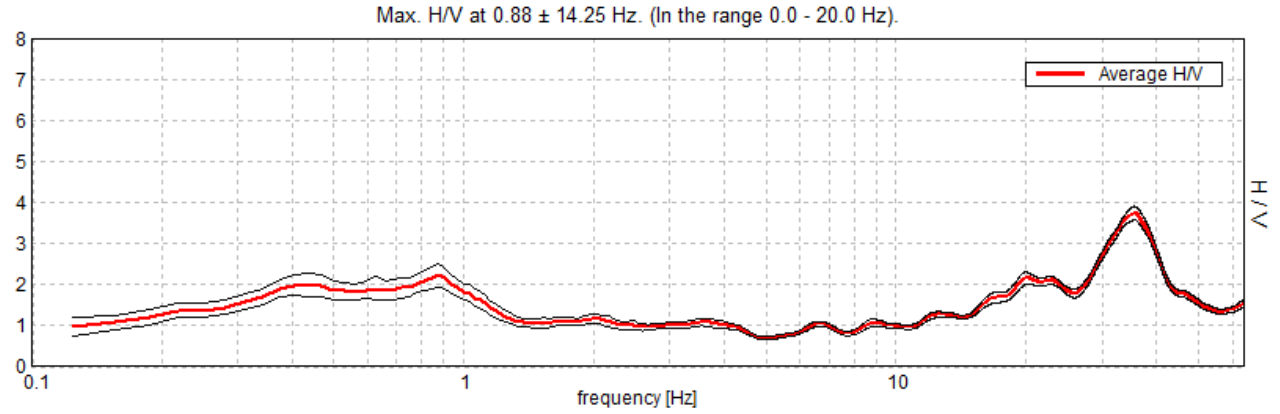
Threshold values for σ_f and $\sigma_A(f_0)$					
Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	0.25 f_0	0.2 f_0	0.15 f_0	0.10 f_0	0.05 f_0
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
log $\theta(f_0)$ for $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

MIRANDOLA PSC, HVSR7 (Area ANS_2.7)

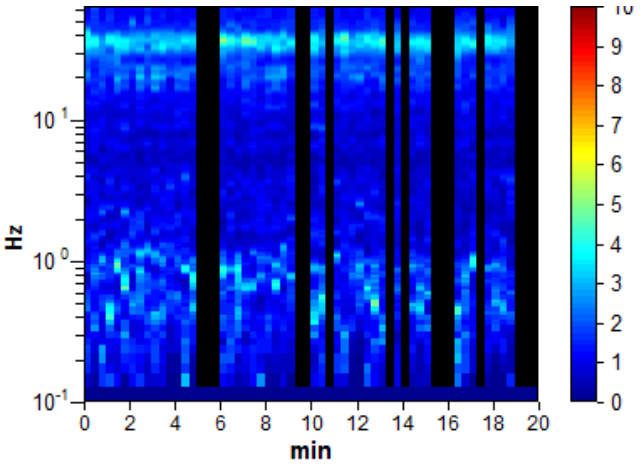
Instrument: TRS-0025/01-07
Data format: 16 byte
Full scale [mV]: n.a.
Start recording: 26/01/15 09:38:05 End recording: 26/01/15 09:58:06
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN
GPS data not available

Trace length: 0h20'00". Analyzed 75% trace (manual window selection)
Sampling rate: 128 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

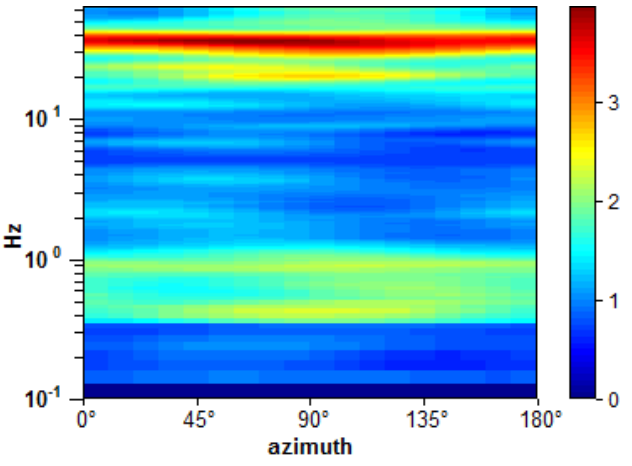
HORIZONTAL TO VERTICAL SPECTRAL RATIO



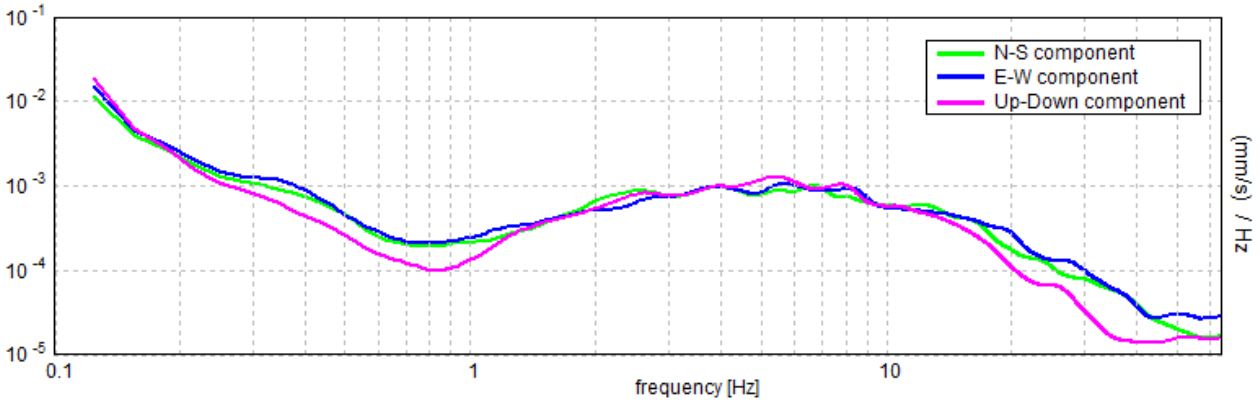
H/V TIME HISTORY



DIRECTIONAL H/V



SINGLE COMPONENT SPECTRA



[According to the SESAME, 2005 guidelines. **Please read carefully the *Grilla* manual before interpreting the following tables**.]

Max. H/V at 0.88 ± 14.25 Hz (in the range 0.0 - 20.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	0.88 > 0.50	OK	
$n_c(f_0) > 200$	787.5 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 43 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$			NO
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$	1.344 Hz	OK	
$A_0 > 2$	2.23 > 2	OK	
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|16.28093| < 0.05		NO
$\sigma_f < \varepsilon(f_0)$	14.24581 < 0.13125		NO
$\sigma_A(f_0) < \theta(f_0)$	0.2857 < 2.0	OK	

L_w	window length
n_w	number of windows used in the analysis
$n_c = L_w n_w f_0$	number of significant cycles
f	current frequency
f_0	H/V peak frequency
σ_f	standard deviation of H/V peak frequency
$\varepsilon(f_0)$	threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
A_0	H/V peak amplitude at frequency f_0
$A_{H/V}(f)$	H/V curve amplitude at frequency f
f^-	frequency between $f_0/4$ and f_0 for which $A_{H/V}(f^-) < A_0/2$
f^+	frequency between f_0 and $4f_0$ for which $A_{H/V}(f^+) < A_0/2$
$\sigma_A(f)$	standard deviation of $A_{H/V}(f)$, $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
$\sigma_{logH/V}(f)$	standard deviation of log $A_{H/V}(f)$ curve
$\theta(f_0)$	threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$

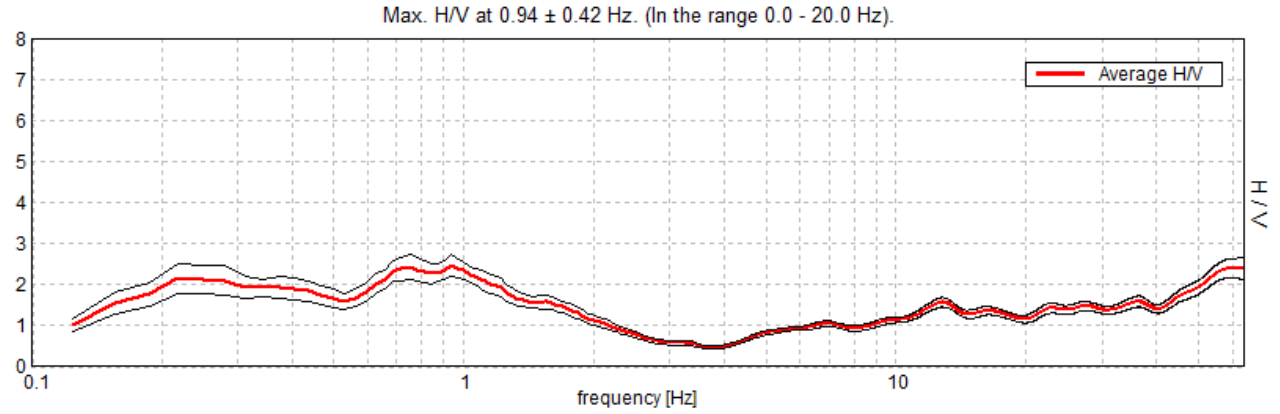
Threshold values for σ_f and $\sigma_A(f_0)$					
Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	0.25 f_0	0.2 f_0	0.15 f_0	0.10 f_0	0.05 f_0
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
log $\theta(f_0)$ for $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

MIRANDOLA PSC, HVSR8 (Area ANS_1.10)

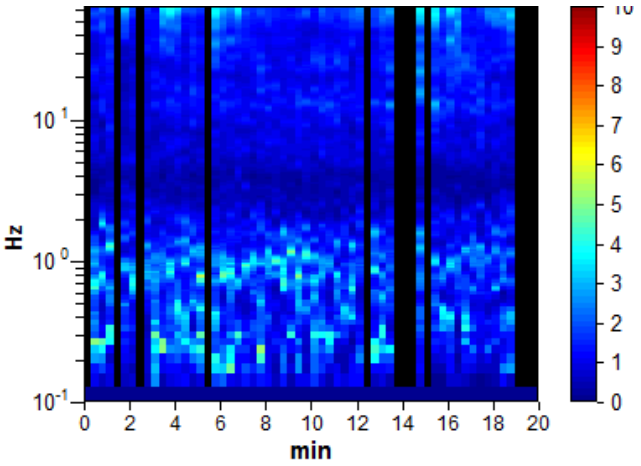
Instrument: TRS-0025/01-07
Data format: 16 byte
Full scale [mV]: n.a.
Start recording: 26/01/15 13:45:55 End recording: 26/01/15 14:05:56
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN
GPS data not available

Trace length: 0h20'00". Analyzed 80% trace (manual window selection)
Sampling rate: 128 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

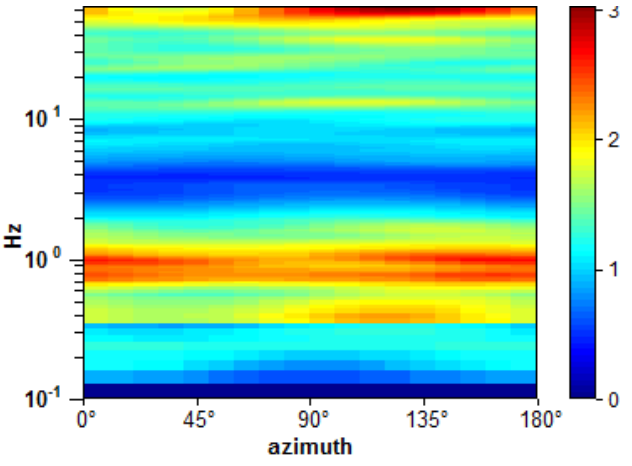
HORIZONTAL TO VERTICAL SPECTRAL RATIO



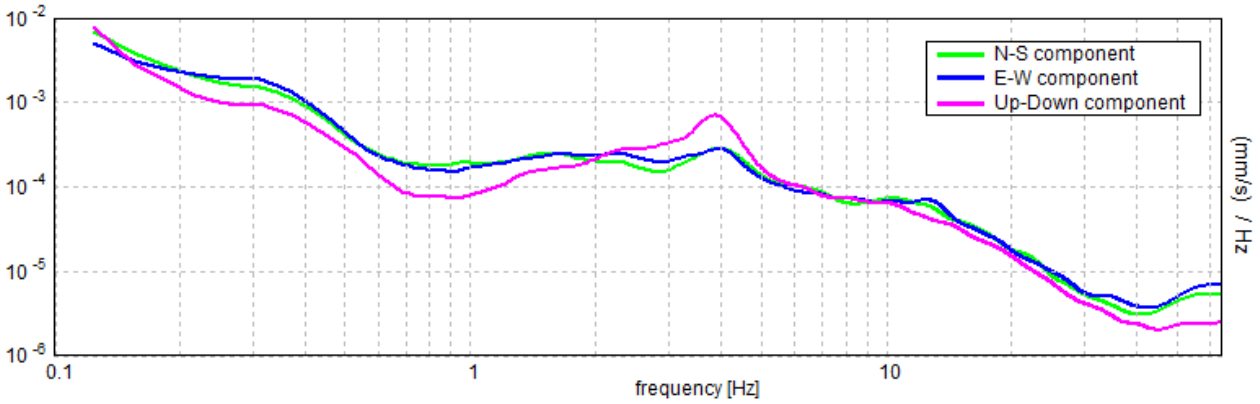
H/V TIME HISTORY



DIRECTIONAL H/V



SINGLE COMPONENT SPECTRA



[According to the SESAME, 2005 guidelines. **Please read carefully the *Grilla* manual before interpreting the following tables**.]

Max. H/V at 0.94 ± 0.42 Hz (in the range 0.0 - 20.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	0.94 > 0.50	OK	
$n_c(f_0) > 200$	900.0 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 46 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$			NO
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$	1.906 Hz	OK	
$A_0 > 2$	2.47 > 2	OK	
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.44959| < 0.05		NO
$\sigma_f < \varepsilon(f_0)$	0.42149 < 0.14063		NO
$\sigma_A(f_0) < \theta(f_0)$	0.2594 < 2.0	OK	

L_w	window length
n_w	number of windows used in the analysis
$n_c = L_w n_w f_0$	number of significant cycles
f	current frequency
f_0	H/V peak frequency
σ_f	standard deviation of H/V peak frequency
$\varepsilon(f_0)$	threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
A_0	H/V peak amplitude at frequency f_0
$A_{H/V}(f)$	H/V curve amplitude at frequency f
f^-	frequency between $f_0/4$ and f_0 for which $A_{H/V}(f^-) < A_0/2$
f^+	frequency between f_0 and $4f_0$ for which $A_{H/V}(f^+) < A_0/2$
$\sigma_A(f)$	standard deviation of $A_{H/V}(f)$, $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
$\sigma_{logH/V}(f)$	standard deviation of log $A_{H/V}(f)$ curve
$\theta(f_0)$	threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$

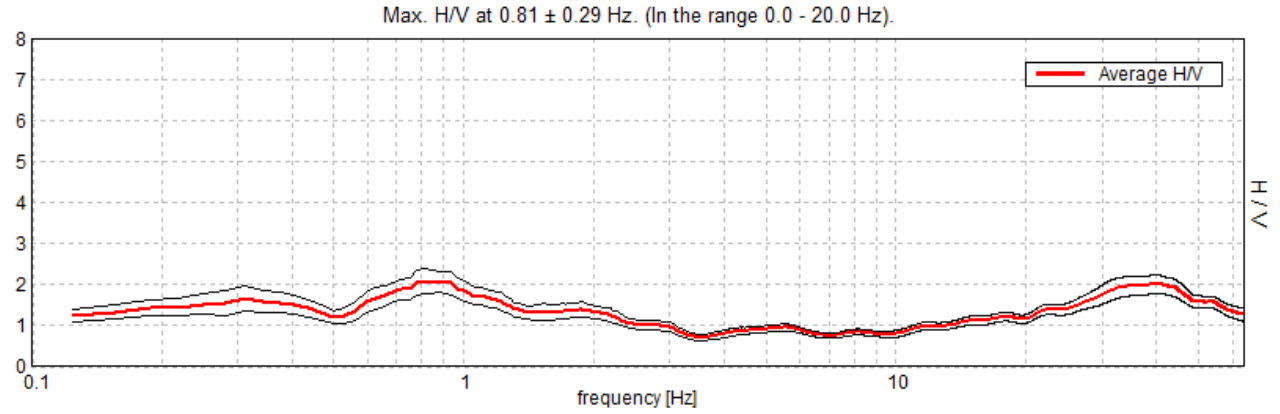
Threshold values for σ_f and $\sigma_A(f_0)$					
Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	0.25 f_0	0.2 f_0	0.15 f_0	0.10 f_0	0.05 f_0
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
log $\theta(f_0)$ for $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

MIRANDOLA PSC,HVSR9 (Area ANS_1.1)

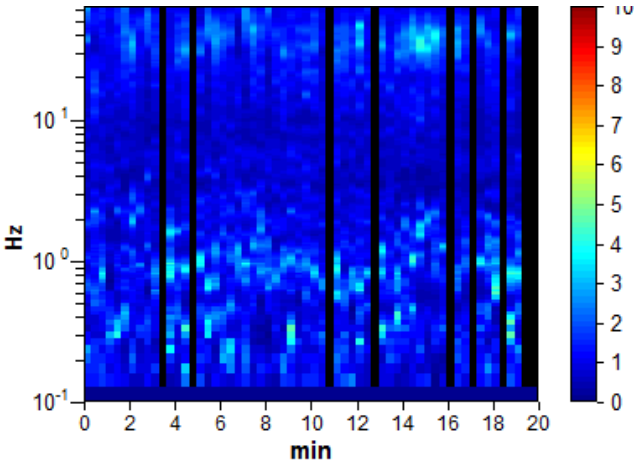
Instrument: TEN-0029/01-07
Data format: 16 byte
Full scale [mV]: n.a.
Start recording: 26/01/15 13:11:36 End recording: 26/01/15 13:31:37
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN
GPS data not available

Trace length: 0h20'00". Analyzed 88% trace (manual window selection)
Sampling rate: 128 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

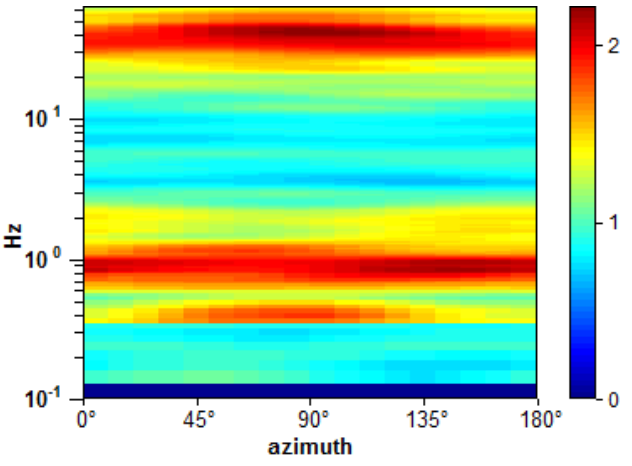
HORIZONTAL TO VERTICAL SPECTRAL RATIO



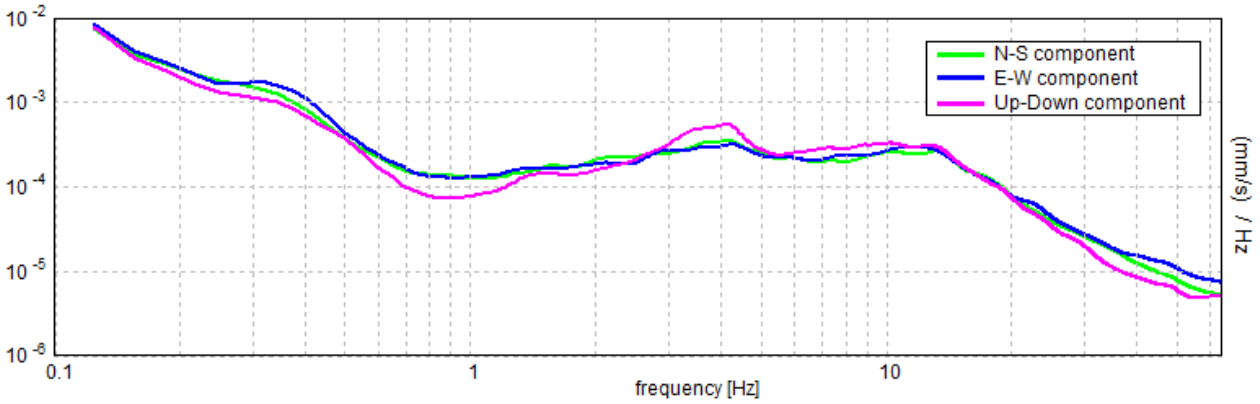
H/V TIME HISTORY



DIRECTIONAL H/V



SINGLE COMPONENT SPECTRA



[According to the SESAME, 2005 guidelines. **Please read carefully the *Grilla* manual before interpreting the following tables**.]

Max. H/V at 0.81 ± 0.29 Hz (in the range 0.0 - 20.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	0.81 > 0.50	OK	
$n_c(f_0) > 200$	828.8 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 40 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$			NO
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$	2.469 Hz	OK	
$A_0 > 2$	2.08 > 2	OK	
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.35923| < 0.05		NO
$\sigma_f < \varepsilon(f_0)$	0.29187 < 0.12188		NO
$\sigma_A(f_0) < \theta(f_0)$	0.2947 < 2.0	OK	

L_w	window length
n_w	number of windows used in the analysis
$n_c = L_w n_w f_0$	number of significant cycles
f	current frequency
f_0	H/V peak frequency
σ_f	standard deviation of H/V peak frequency
$\varepsilon(f_0)$	threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
A_0	H/V peak amplitude at frequency f_0
$A_{H/V}(f)$	H/V curve amplitude at frequency f
f^-	frequency between $f_0/4$ and f_0 for which $A_{H/V}(f^-) < A_0/2$
f^+	frequency between f_0 and $4f_0$ for which $A_{H/V}(f^+) < A_0/2$
$\sigma_A(f)$	standard deviation of $A_{H/V}(f)$, $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
$\sigma_{logH/V}(f)$	standard deviation of log $A_{H/V}(f)$ curve
$\theta(f_0)$	threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$

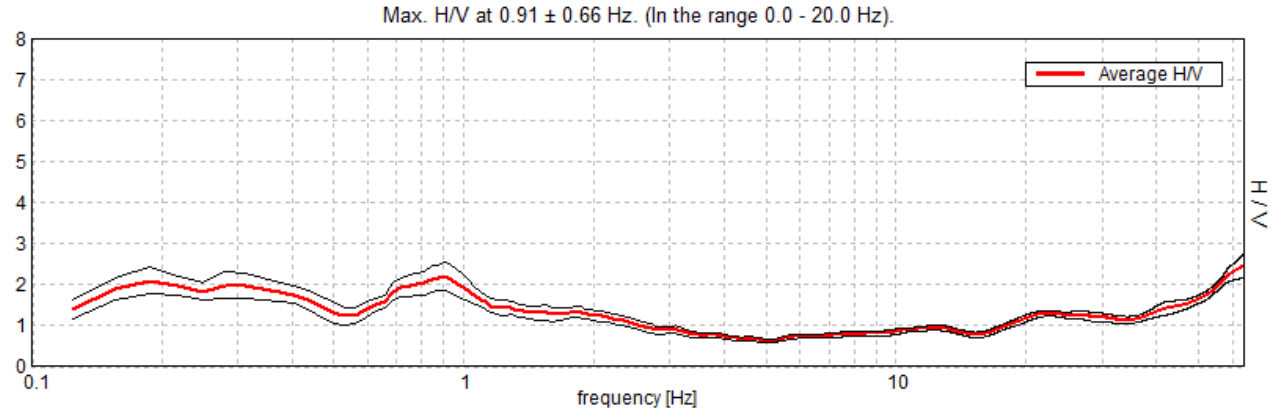
Threshold values for σ_f and $\sigma_A(f_0)$					
Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	0.25 f_0	0.2 f_0	0.15 f_0	0.10 f_0	0.05 f_0
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
log $\theta(f_0)$ for $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

MIRANDOLA PSC,HVSR10 (Area ANS_1.11)

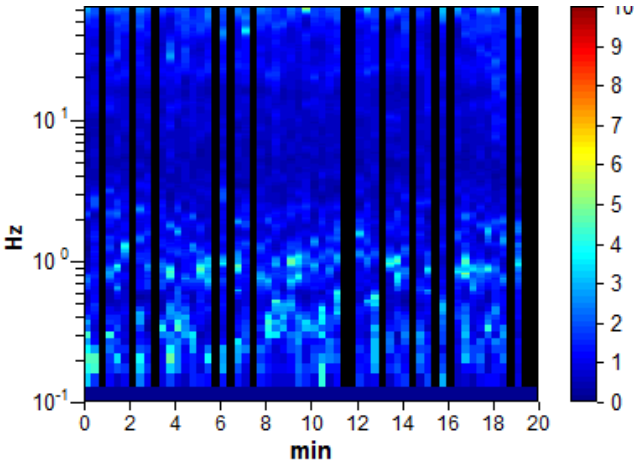
Instrument: TRS-0025/01-07
Data format: 16 byte
Full scale [mV]: n.a.
Start recording: 26/01/15 13:11:54 End recording: 26/01/15 13:31:55
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN
GPS data not available

Trace length: 0h20'00". Analyzed 75% trace (manual window selection)
Sampling rate: 128 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

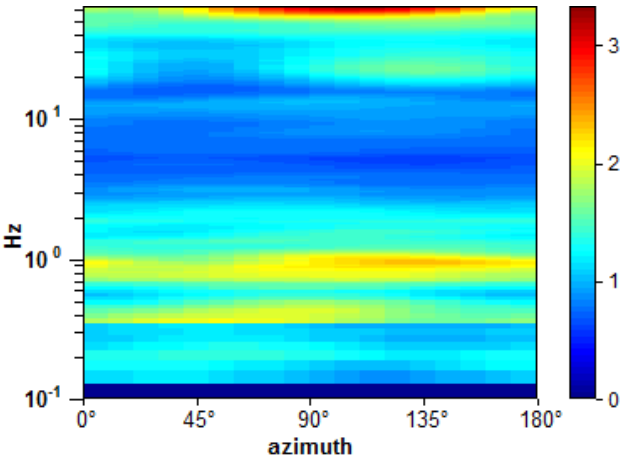
HORIZONTAL TO VERTICAL SPECTRAL RATIO



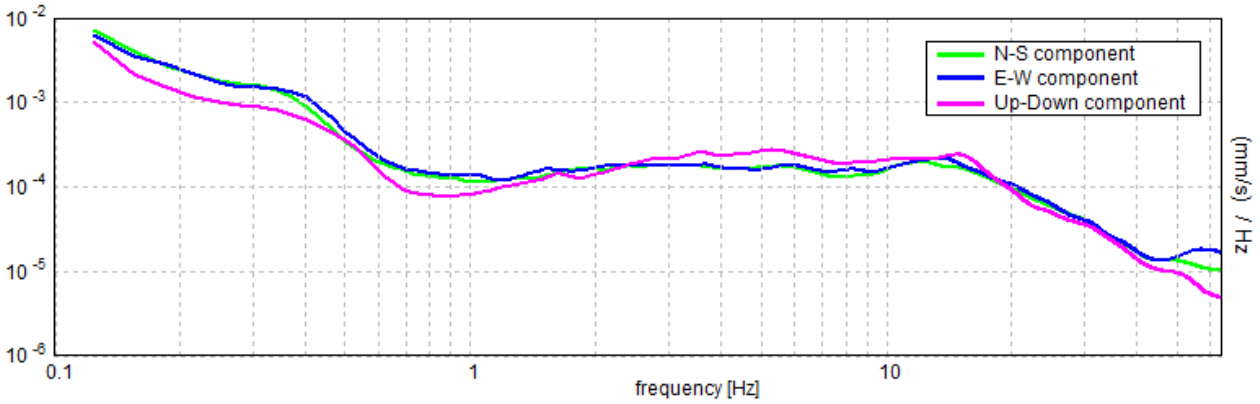
H/V TIME HISTORY



DIRECTIONAL H/V



SINGLE COMPONENT SPECTRA



[According to the SESAME, 2005 guidelines. **Please read carefully the *Grilla* manual before interpreting the following tables**.]

Max. H/V at 0.91 ± 0.66 Hz (in the range 0.0 - 20.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	0.91 > 0.50	OK	
$n_c(f_0) > 200$	815.6 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 44 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$			NO
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$	2.406 Hz	OK	
$A_0 > 2$	2.19 > 2	OK	
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.72881| < 0.05		NO
$\sigma_f < \varepsilon(f_0)$	0.66049 < 0.13594		NO
$\sigma_A(f_0) < \theta(f_0)$	0.3468 < 2.0	OK	

L_w	window length
n_w	number of windows used in the analysis
$n_c = L_w n_w f_0$	number of significant cycles
f	current frequency
f_0	H/V peak frequency
σ_f	standard deviation of H/V peak frequency
$\varepsilon(f_0)$	threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
A_0	H/V peak amplitude at frequency f_0
$A_{H/V}(f)$	H/V curve amplitude at frequency f
f^-	frequency between $f_0/4$ and f_0 for which $A_{H/V}(f^-) < A_0/2$
f^+	frequency between f_0 and $4f_0$ for which $A_{H/V}(f^+) < A_0/2$
$\sigma_A(f)$	standard deviation of $A_{H/V}(f)$, $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
$\sigma_{logH/V}(f)$	standard deviation of log $A_{H/V}(f)$ curve
$\theta(f_0)$	threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$

Threshold values for σ_f and $\sigma_A(f_0)$					
Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	0.25 f_0	0.2 f_0	0.15 f_0	0.10 f_0	0.05 f_0
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
log $\theta(f_0)$ for $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20