



PROTEZIONE CIVILE
Presidenza del Consiglio dei Ministri
Dipartimento della Protezione Civile



CONFERENZA DELLE REGIONI E
DELLE PROVINCE AUTONOME

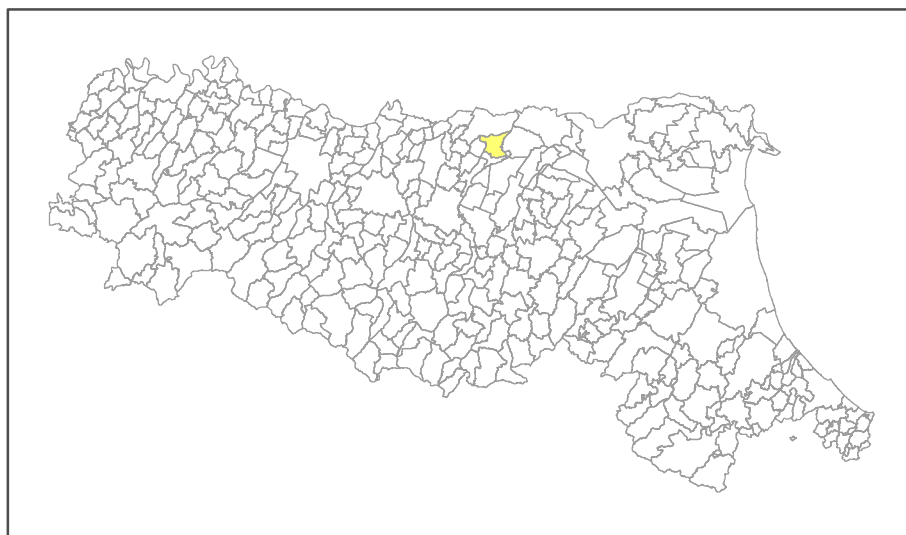
Attuazione dell'articolo 11 della legge 24 giugno 2009, n.77

MICROZONAZIONE SISMICA

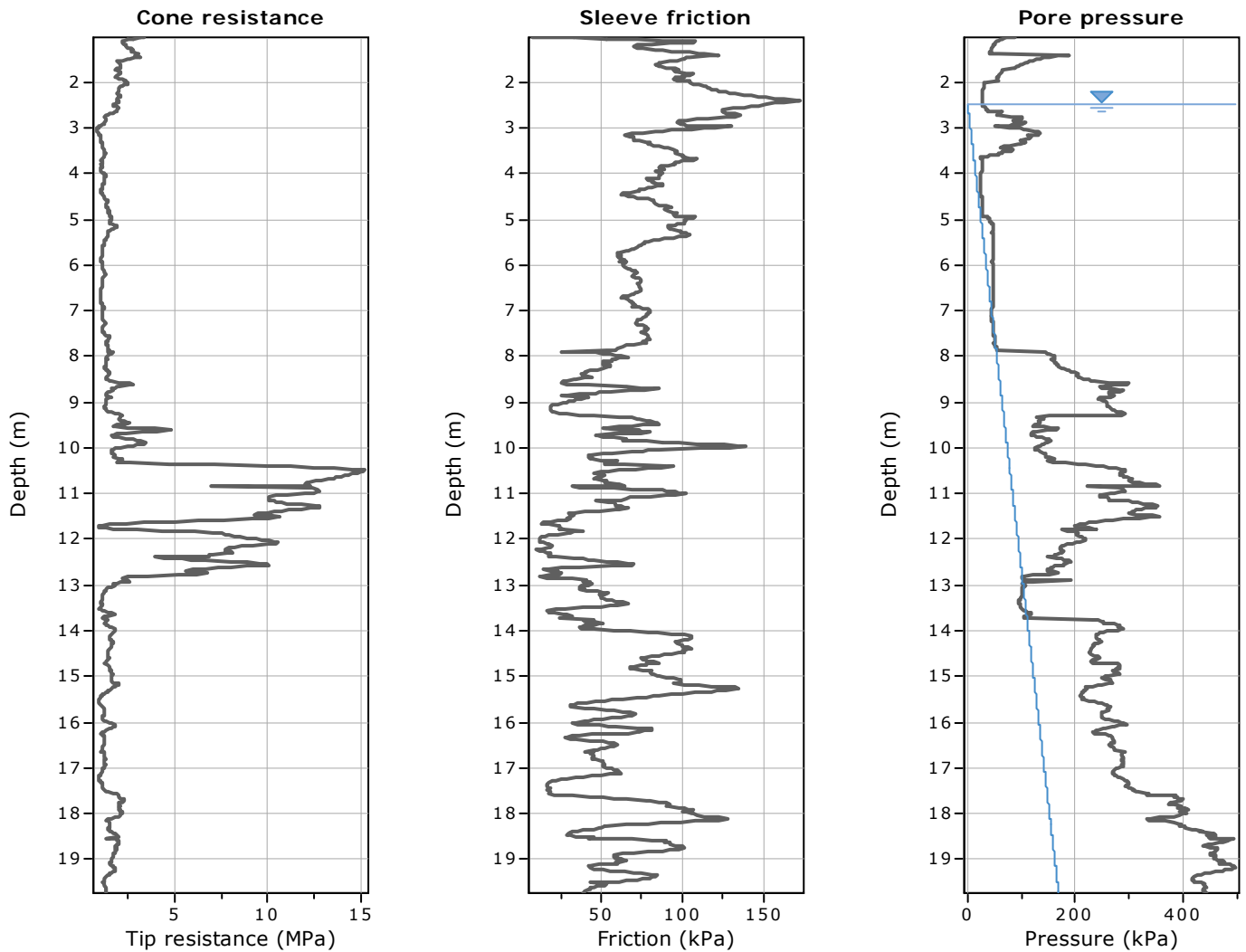
Livello 3

Rapporti di prova

Regione Emilia-Romagna
Comune di San Felice sul Panaro

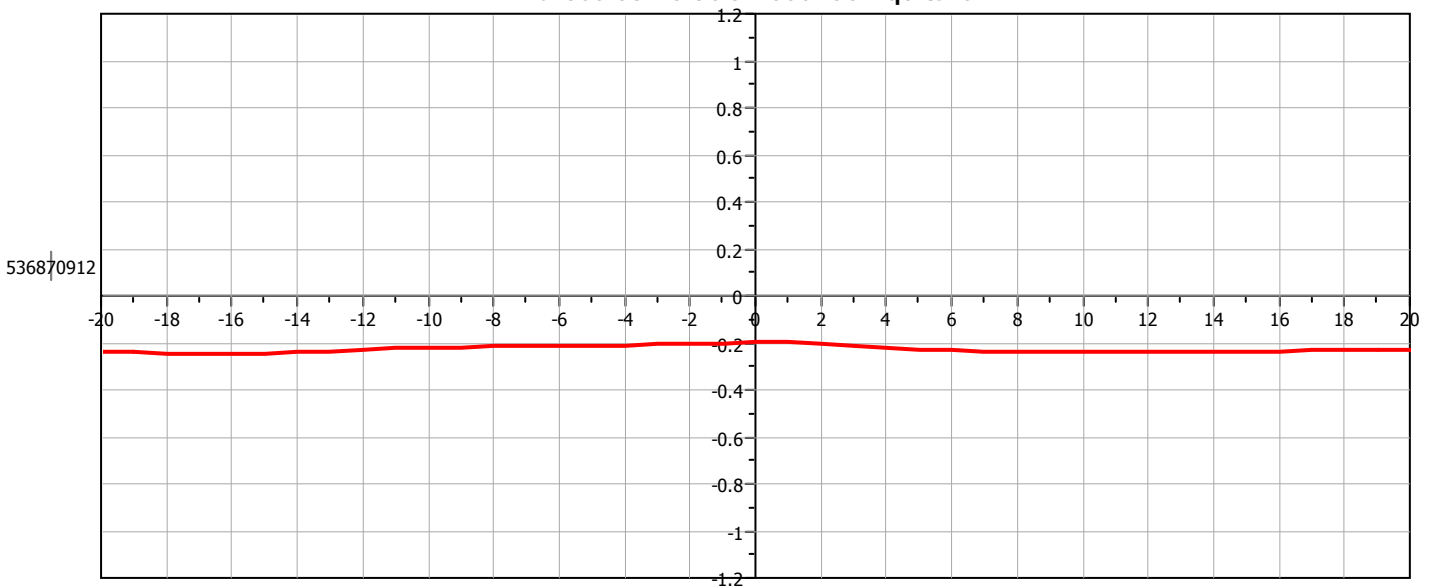


Regione Emilia-Romagna	Soggetto realizzatore Dott. Geol. Valeriano Franchi	Data Marzo 2022
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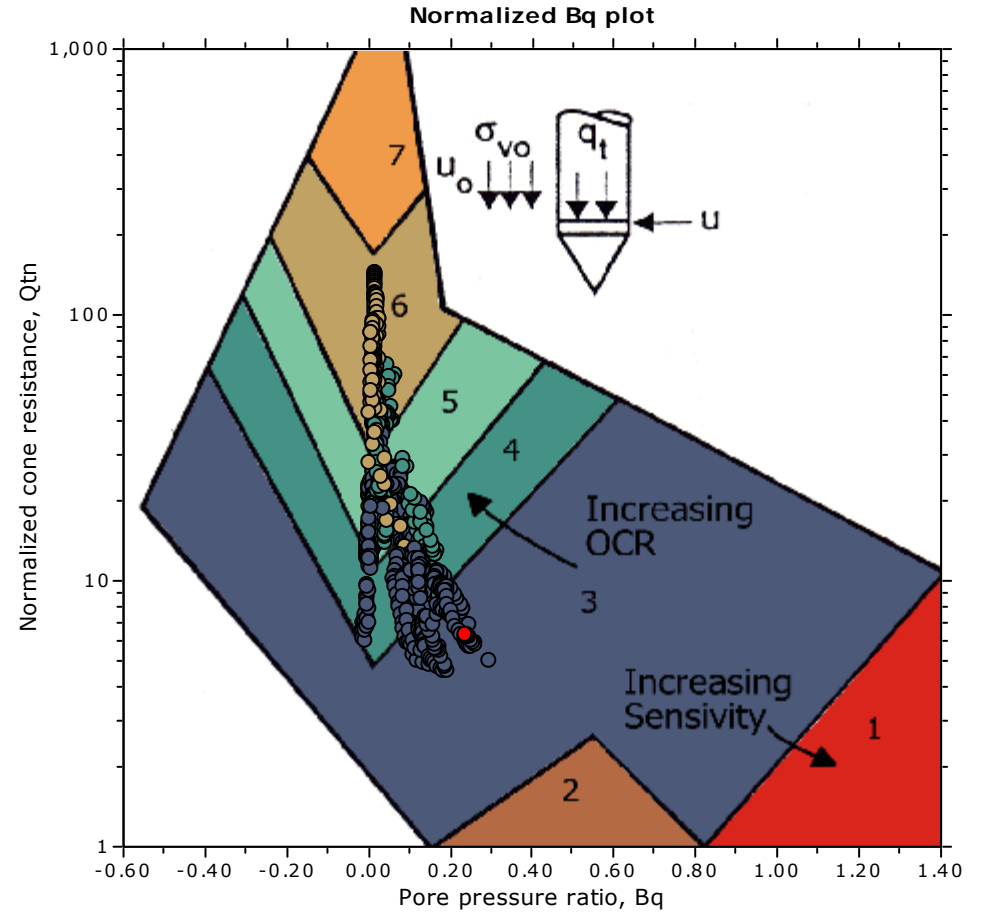
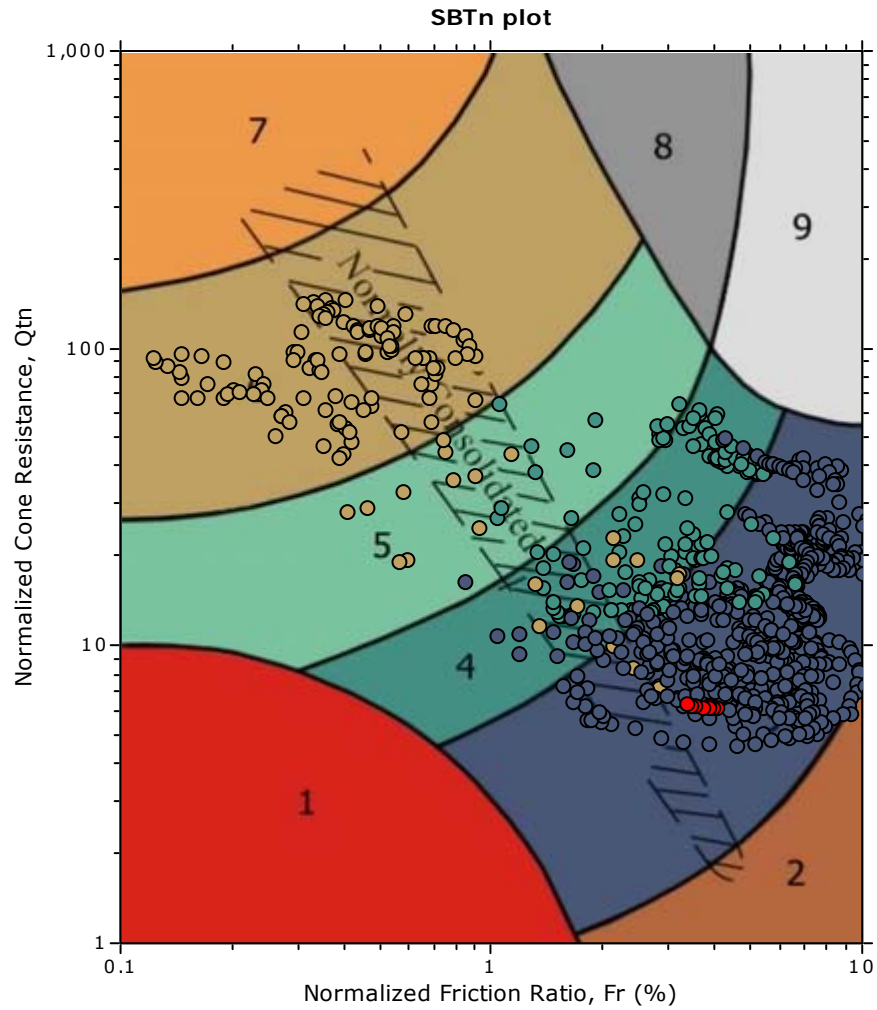


The plot below presents the cross correlation coefficient between the raw q_c and f_s values (as measured on the field). X axes presents the lag distance (one lag is the distance between two successive CPT measurements).

Cross correlation between q_c & f_s

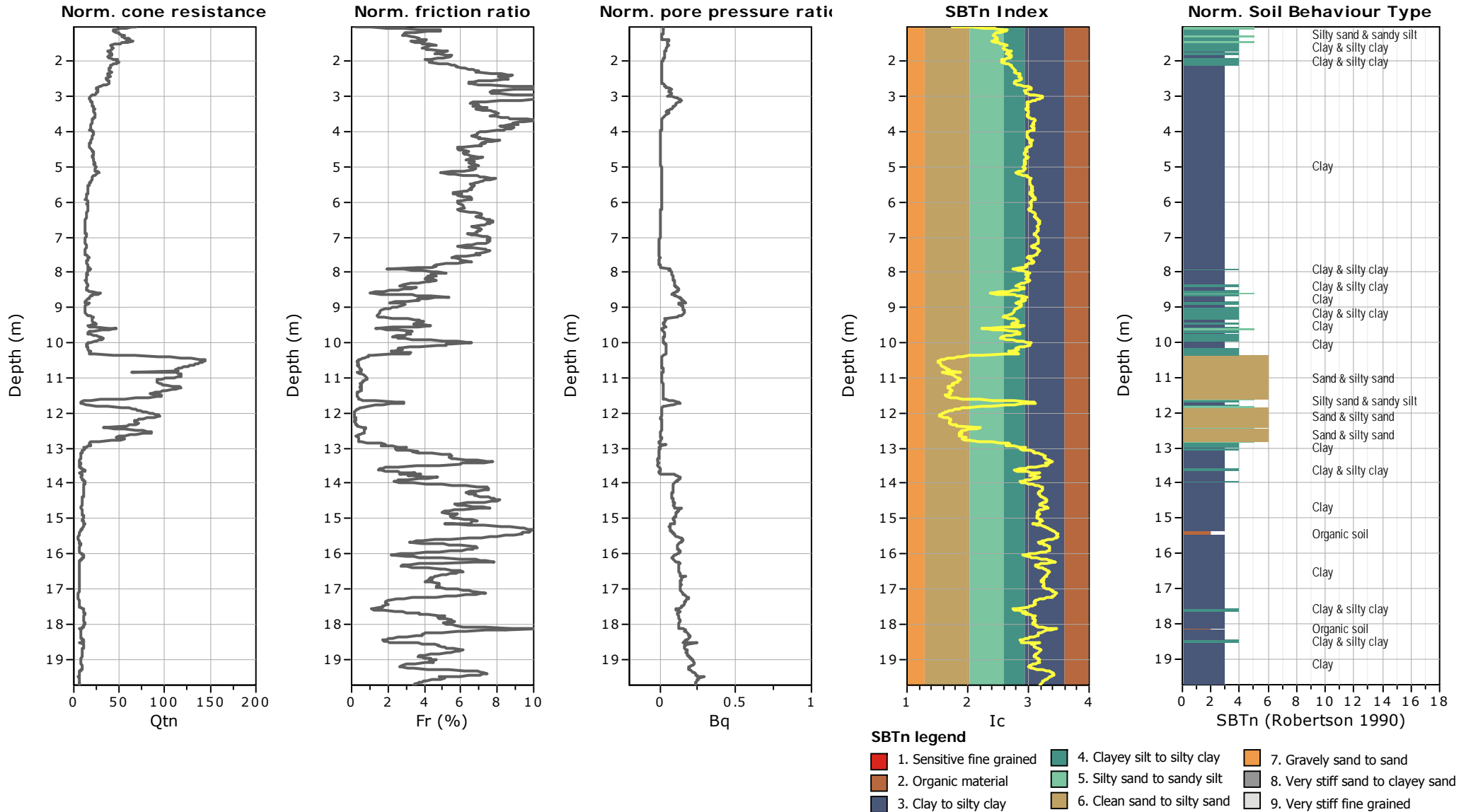


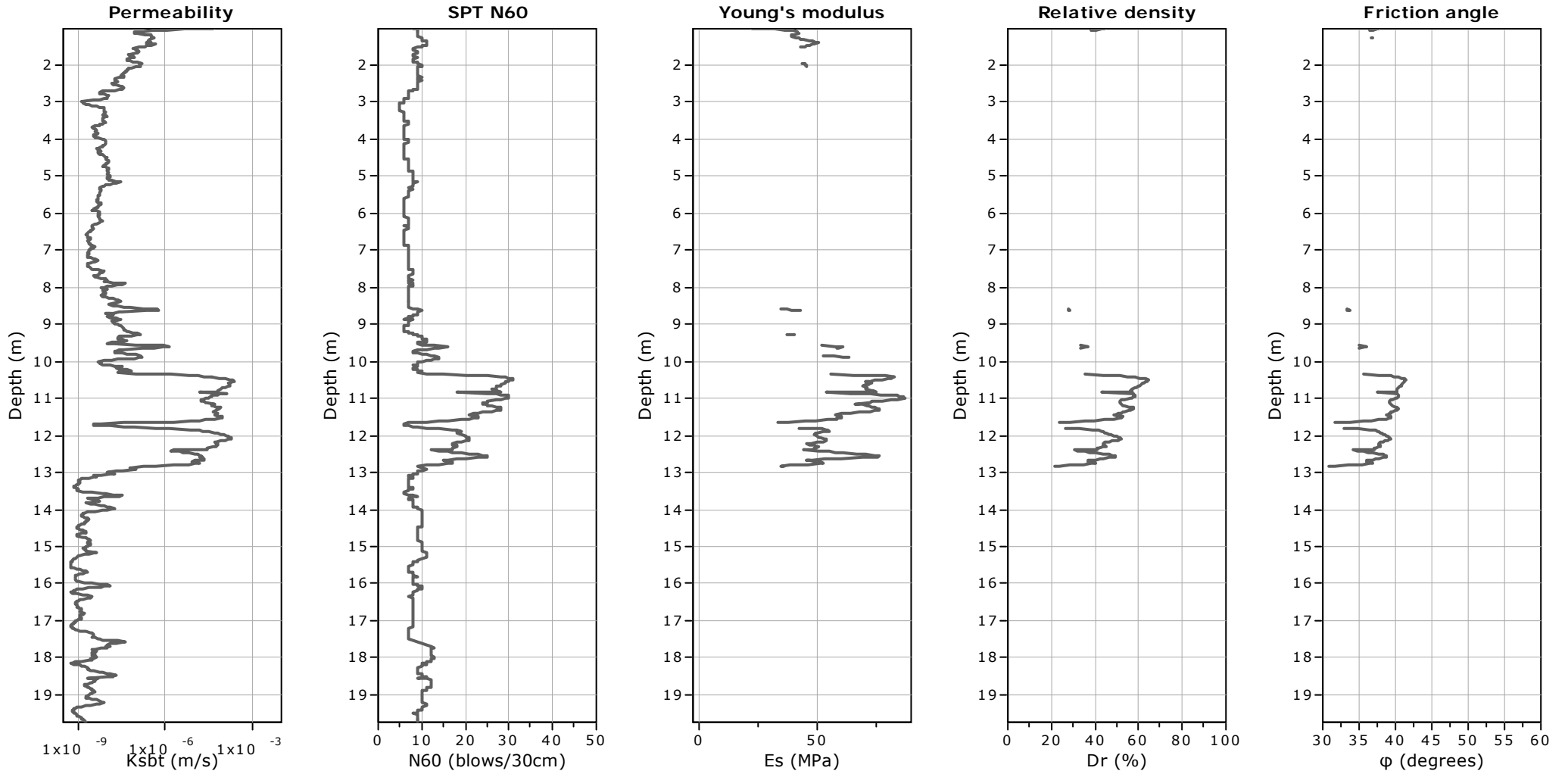
SBT - Bq plots (normalized)



SBTn legend

- | | | |
|--|---|---|
| ■ 1. Sensitive fine grained | ■ 4. Clayey silt to silty clay | ■ 7. Gravely sand to sand |
| ■ 2. Organic material | ■ 5. Silty sand to sandy silt | ■ 8. Very stiff sand to clayey sand |
| ■ 3. Clay to silty clay | ■ 6. Clean sand to silty sand | ■ 9. Very stiff fine grained |





Calculation parameters

Permeability: Based on SBT_n

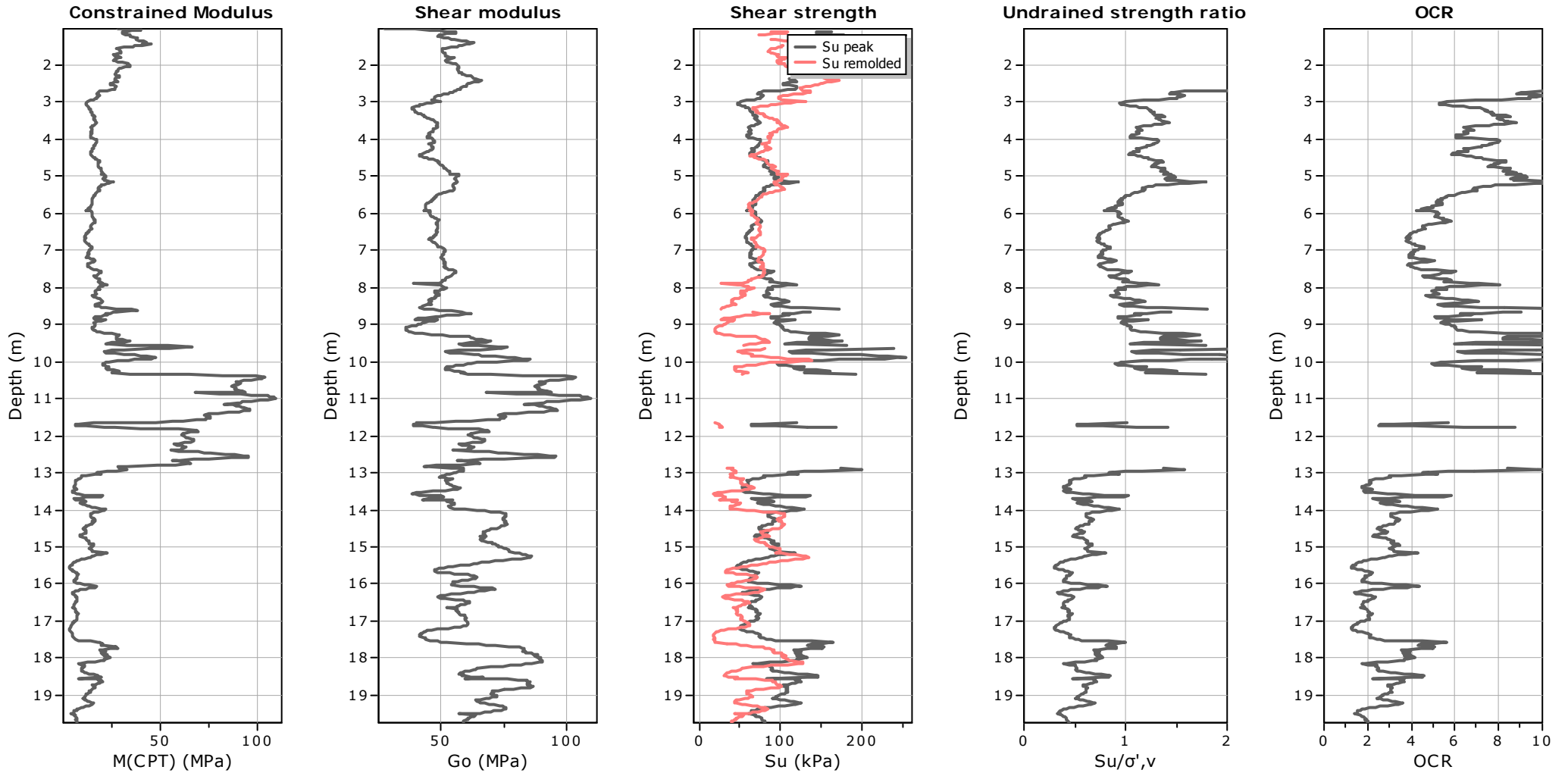
SPT N_{60} : Based on I_c and q_t

Young's modulus: Based on variable alpha using I_c (Robertson, 2009)

Relative density constant, C_{Dr} : 350.0

Phi: Based on Kulhawy & Mayne (1990)

● — User defined estimation data



Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_m (Robertson, 2009)

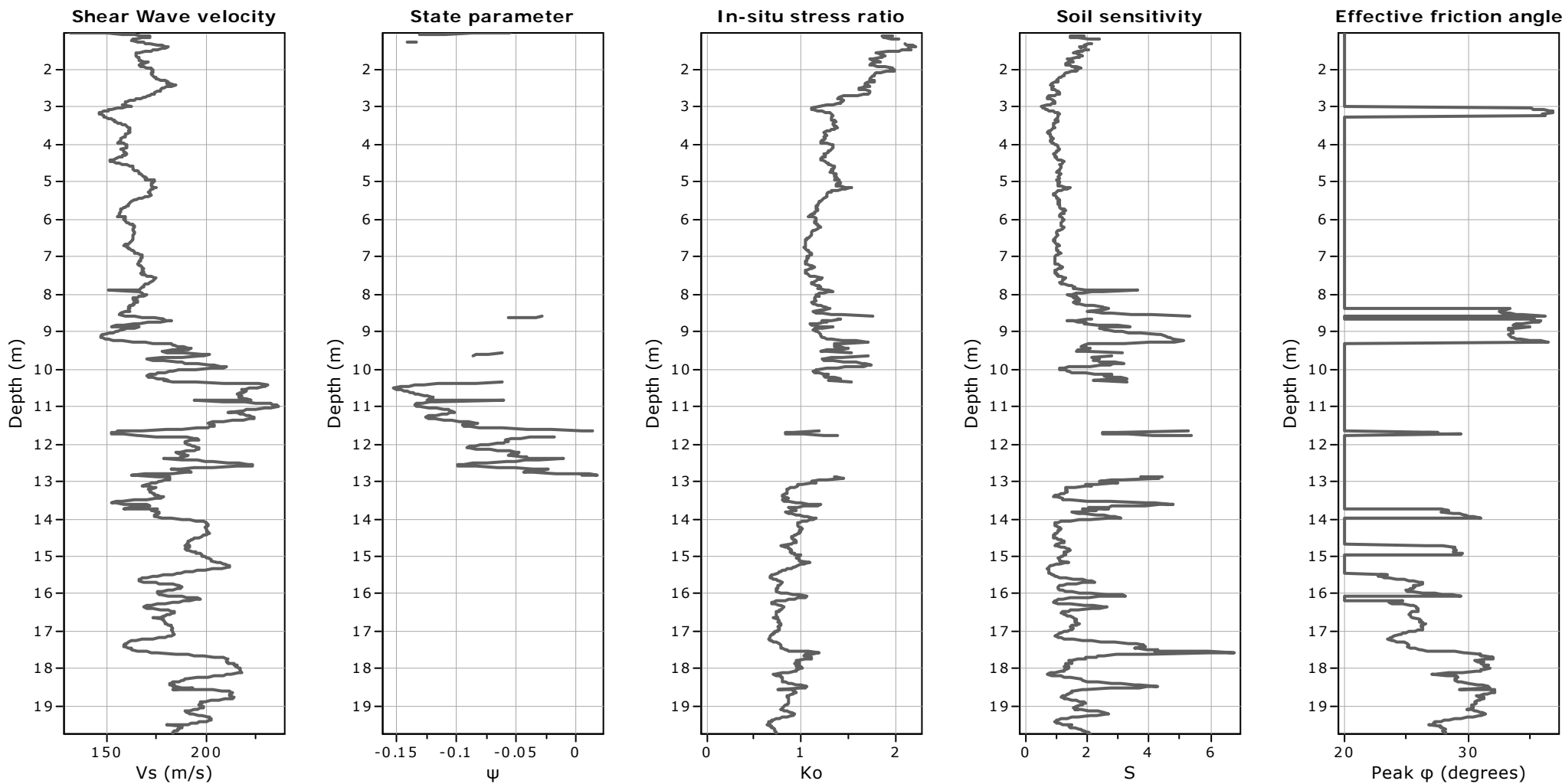
Go: Based on variable *alpha* using I_c (Robertson, 2009)

Undrained shear strength cone factor for clays, N_{kt} : Auto

OCR factor for clays, N_{kt} : Auto

● User defined estimation data

● Flat Dilatometer Test data



Calculation parameters

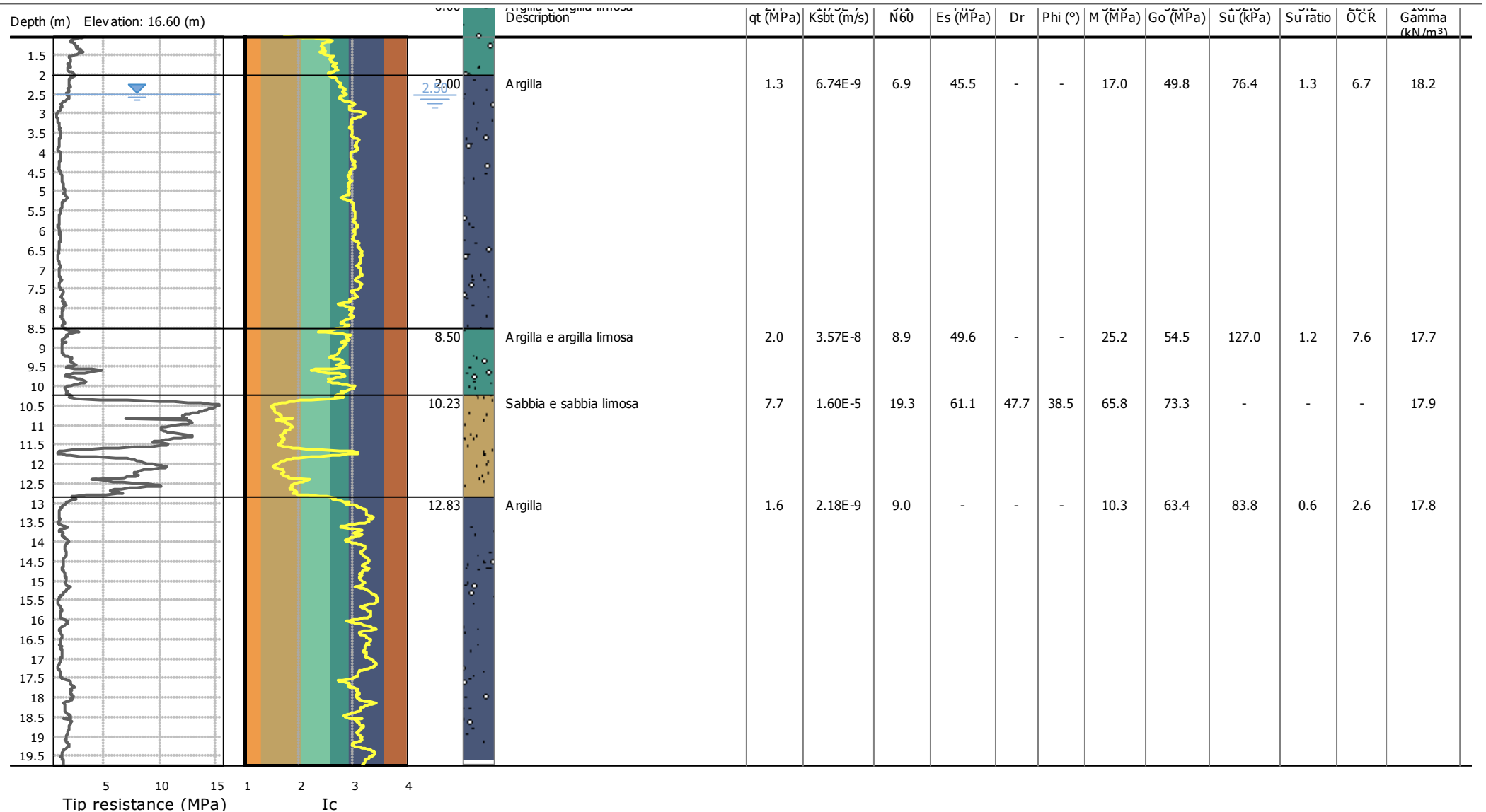
Soil Sensitivity factor, N_s : 7.10

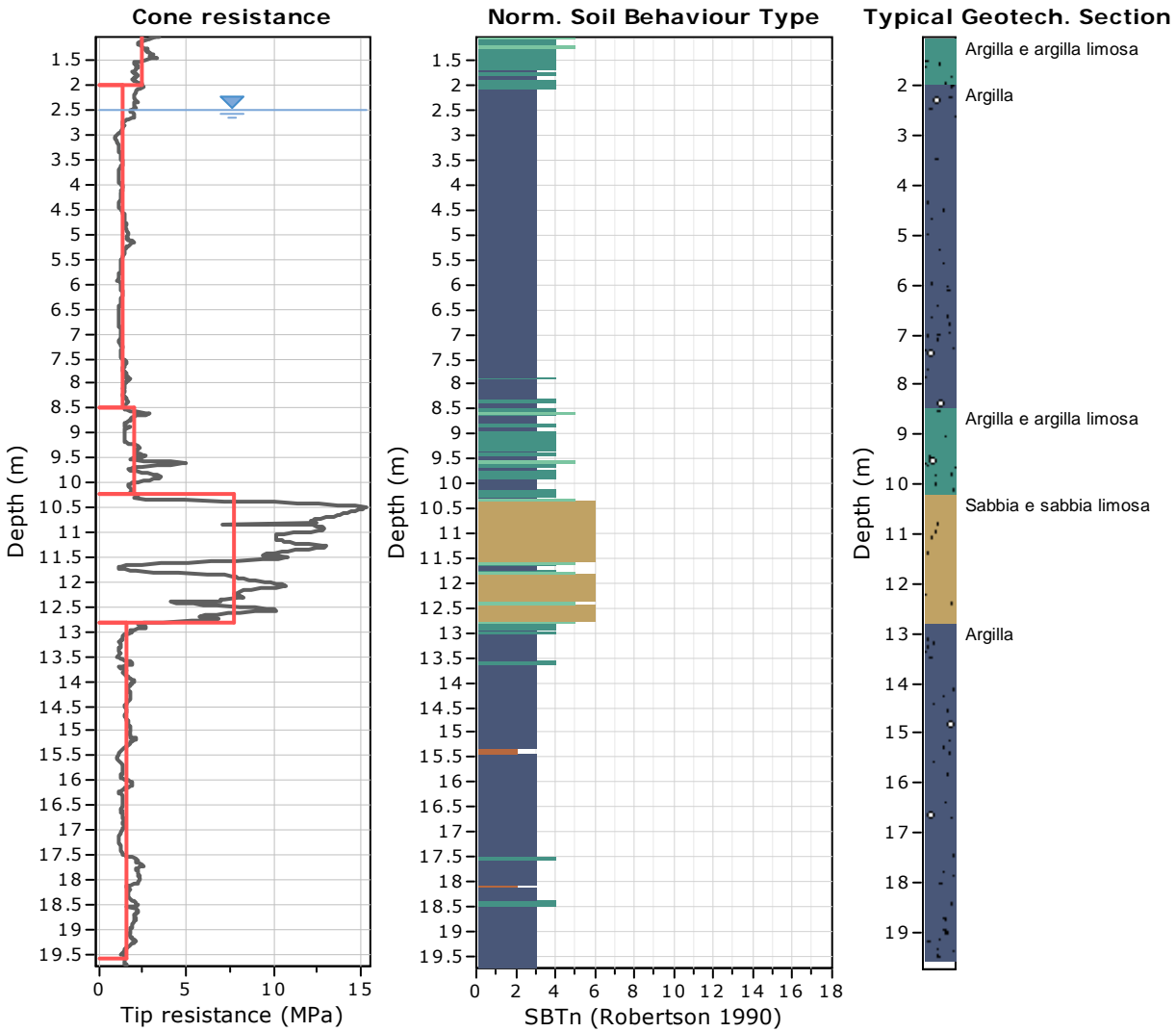
—●— User defined estimation data

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Project: MS3 S.Felice s/P
 Location:

CPT: SFelice1
 Total depth: 19.74 m





Tabular results

::: Layer No: 1 :::		
Code: 1	Start depth: 0.00 (m), End depth: 2.00 (m)	
Description: Argilla e argilla limosa		
Basic results		
Total cone resistance:	2.39 ±0.41 MPa	
Sleeve friction:	86.99 ±19.90 kPa	
SBT _n :	4	
SBT _n description:	Clay & silty clay	
Estimation results		
Permeability:	1.73E-07 ±6.41E-06 m/s	Constrained Mod.: 32.61 ±5.26 MPa
N60:	9.07 ±0.96 blows	Go: 52.79 ±5.49 MPa
Es:	44.26 ±3.33 MPa	Su: 152.77 ±27.45 kPa
Dr (%):	0.00 ±0.00	Su ratio: 3.25 ±0.50
φ (degrees):	0.00 ±0.00 °	O.C.R.: 22.85 ±5.22
Unit weight:	18.46 ±0.43 kN/m ³	

.: Layer No: 2 .:

Code: 2 Start depth: 2.00 (m), End depth: 8.50 (m)

Description: Argilla

Basic results

Total cone resistance: 1.33 ±0.30 MPa

Sleeve friction: 81.00 ±24.88 kPa

SBT_n: 3

SBTn description: Clay

Estimation results

Permeability: 6.74E-09 ±1.69E-08 m/s

N60: 6.86 ±1.05 blows

Es: 45.50 ±0.27 MPa

Dr (%): 0.00 ±0.00

φ (degrees): 0.00 ±0.00 °

Unit weight: 18.15 ±0.36 kN/m³

Constrained Mod.: 17.00 ±4.57 MPa

Go: 49.77 ±5.16 MPa

Su: 76.36 ±20.86 kPa

Su ratio: 1.33 ±0.58

O.C.R.: 6.74 ±4.04

.: Layer No: 3 .:

Code: 3 Start depth: 8.50 (m), End depth: 10.23 (m)

Description: Argilla e argilla limosa

Basic results

Total cone resistance: 2.01 ±0.76 MPa

Sleeve friction: 49.69 ±29.02 kPa

SBT_n: 4

SBTn description: Clay & silty clay

Estimation results

Permeability: 3.57E-08 ±2.13E-07 m/s

N60: 8.86 ±2.38 blows

Es: 49.62 ±11.48 MPa

Dr (%): 0.00 ±0.00

φ (degrees): 0.00 ±0.00 °

Unit weight: 17.75 ±0.68 kN/m³

Constrained Mod.: 25.20 ±10.97 MPa

Go: 54.51 ±13.07 MPa

Su: 126.96 ±40.09 kPa

Su ratio: 1.24 ±0.37

O.C.R.: 7.61 ±2.99

.: Layer No: 4 .:

Code: 4 Start depth: 10.23 (m), End depth: 12.83 (m)

Description: Sabbia e sabbia limosa

Basic results

Total cone resistance: 7.70 ±3.90 MPa

Sleeve friction: 36.18 ±24.34 kPa

SBT_n: 6

SBTn description: Sand & silty sand

Estimation results

Permeability: 1.60E-05 ±6.81E-05 m/s

N60: 19.34 ±6.81 blows

Es: 61.06 ±13.12 MPa

Dr (%): 47.69 ±9.36

φ (degrees): 38.46 ±2.03 °

Unit weight: 17.90 ±0.81 kN/m³

Constrained Mod.: 65.78 ±24.65 MPa

Go: 73.26 ±18.04 MPa

Su: 0.00 ±0.00 kPa

Su ratio: 0.00 ±0.00

O.C.R.: 0.00 ±0.00

.: Layer No: 5 .:

Code: 5 Start depth: 12.83 (m), End depth: 19.60 (m)

Description: Argilla

Basic results

Total cone resistance: 1.56 ±0.36 MPa

Sleeve friction: 57.04 ±28.26 kPa

SBT_n: 3

SBTn description: Clay

Estimation results

Permeability: 2.18E-09 ±2.83E-08 m/s

N60: 8.98 ±1.56 blows

Es: 0.00 ±0.00 MPa

Dr (%): 0.00 ±0.00

φ (degrees): 0.00 ±0.00 °

Unit weight: 17.81 ±0.59 kN/m³

Constrained Mod.: 10.31 ±6.28 MPa

Go: 63.41 ±12.38 MPa

Su: 83.77 ±27.80 kPa

Su ratio: 0.58 ±0.17

O.C.R.: 2.63 ±1.23

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Project: MS3 S.Felice s/P

Location:

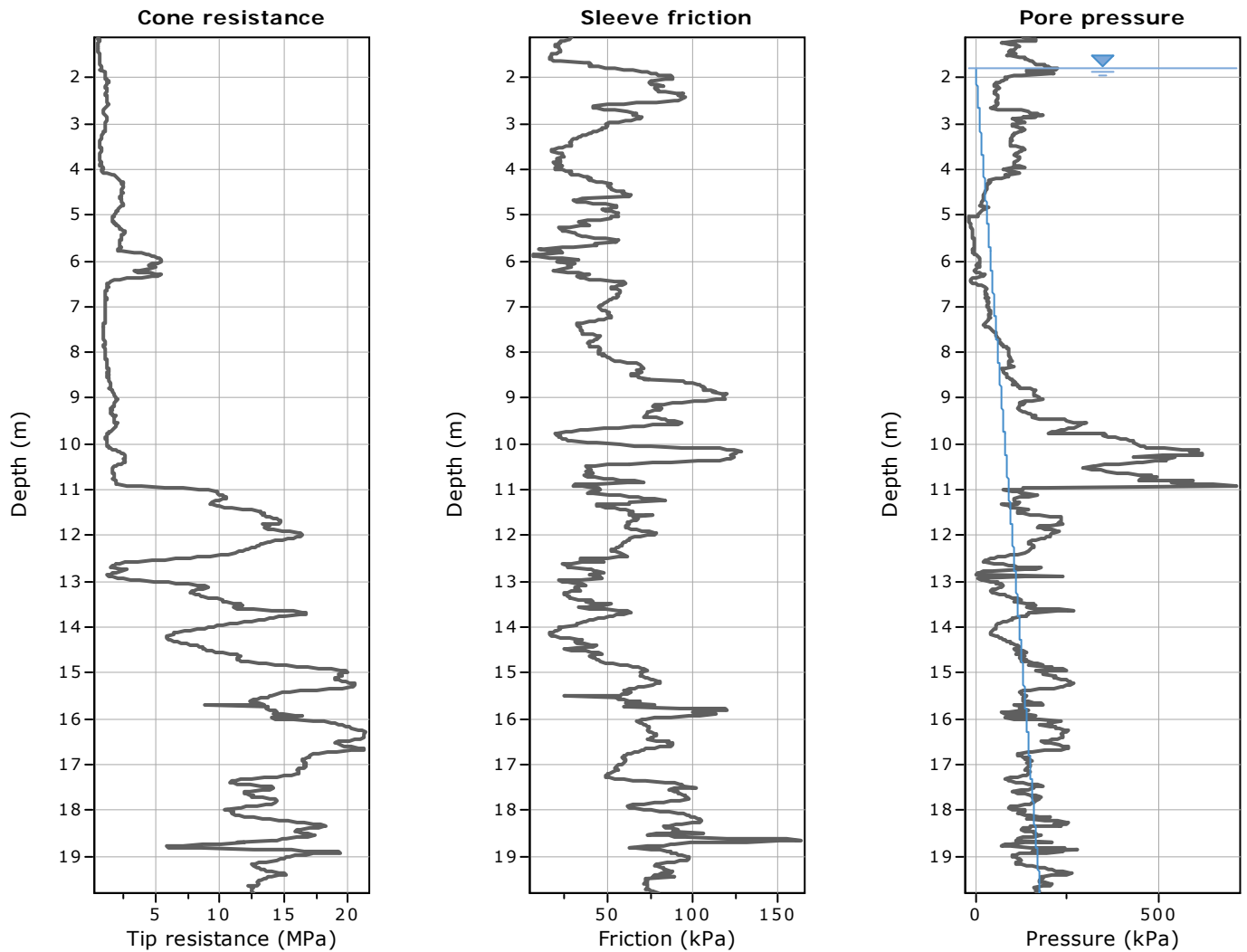
CPT: SFelice1

Total depth: 19.74 m, Date: 06/11/2019

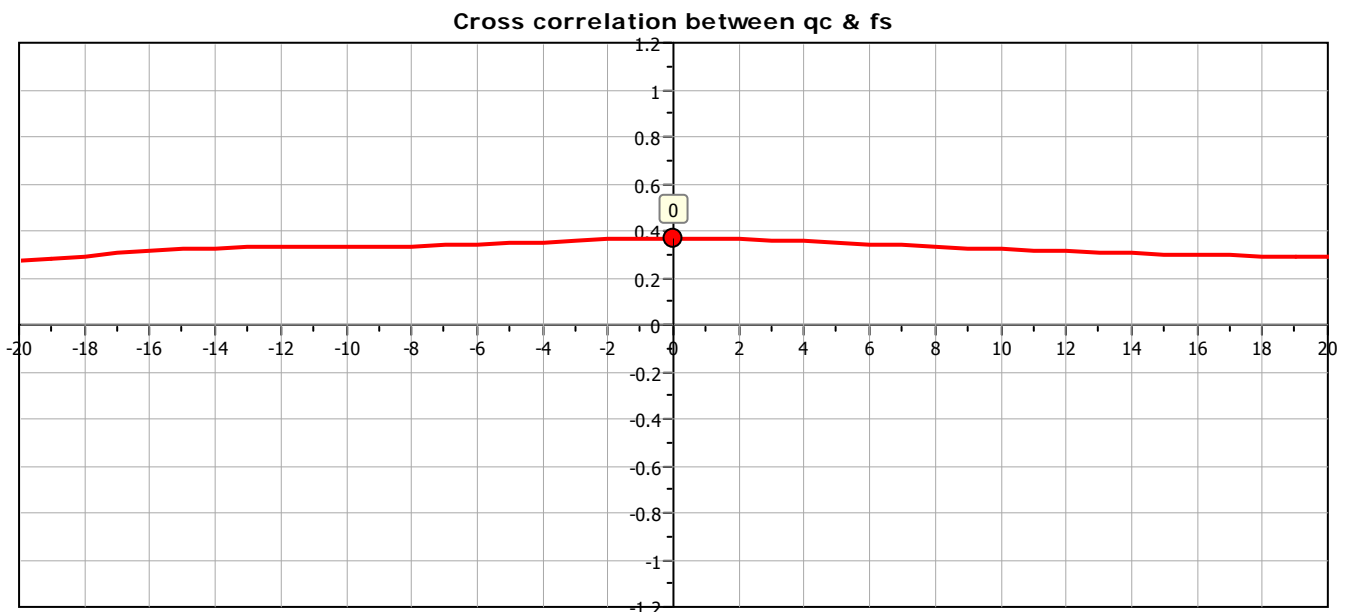
Summary table of mean values

From depth To depth (m)	Thickness (m)	Permeability (m/s)	SPT _{N60} (blows/30cm)	E _s (MPa)	D _r	Friction angle	Constrained modulus, M (MPa)	Shear modulus, G ₀ (MPa)	Undrained strength, S _u (kPa)	Undrained strength ratio	OCR	Unit weight (kN/m ³)
0.00	2.00	1.73E-07	9.1	44.3	0.0	0.0	32.6	52.8	152.8	3.2	22.9	18.5
2.00		(±6.41E-06)	(±1.0)	(±3.3)	(±0.0)	(±0.0)	(±5.3)	(±5.5)	(±27.4)	(±0.5)	(±5.2)	(±0.4)
2.00	6.50	6.74E-09	6.9	45.5	0.0	0.0	17.0	49.8	76.4	1.3	6.7	18.2
8.50		(±1.69E-08)	(±1.0)	(±0.3)	(±0.0)	(±0.0)	(±4.6)	(±5.2)	(±20.9)	(±0.6)	(±4.0)	(±0.4)
8.50	1.73	3.57E-08	8.9	49.6	0.0	0.0	25.2	54.5	127.0	1.2	7.6	17.7
10.23		(±2.13E-07)	(±2.4)	(±11.5)	(±0.0)	(±0.0)	(±11.0)	(±13.1)	(±40.1)	(±0.4)	(±3.0)	(±0.7)
10.23	2.60	1.60E-05	19.3	61.1	47.7	38.5	65.8	73.3	0.0	0.0	0.0	17.9
12.83		(±6.81E-05)	(±6.8)	(±13.1)	(±9.4)	(±2.0)	(±24.6)	(±18.0)	(±0.0)	(±0.0)	(±0.0)	(±0.8)
12.83	6.77	2.18E-09	9.0	0.0	0.0	0.0	10.3	63.4	83.8	0.6	2.6	17.8
19.60		(±2.83E-08)	(±1.6)	(±0.0)	(±0.0)	(±0.0)	(±6.3)	(±12.4)	(±27.8)	(±0.2)	(±1.2)	(±0.6)

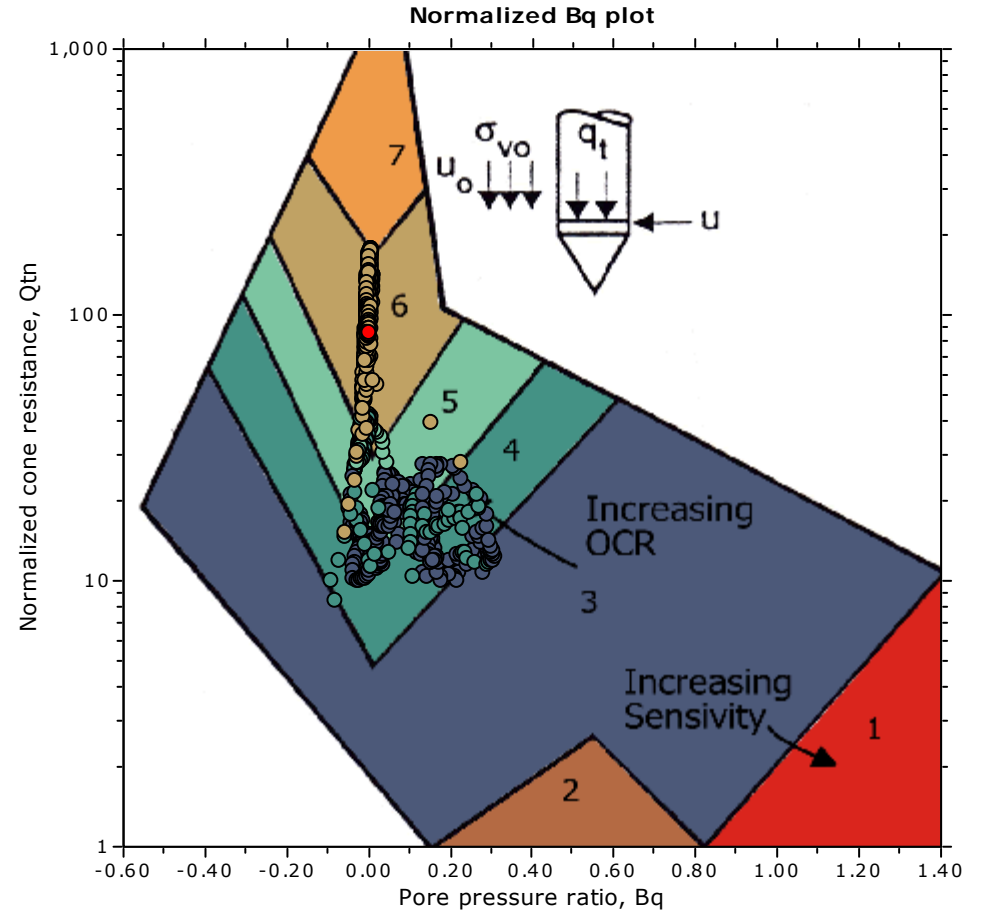
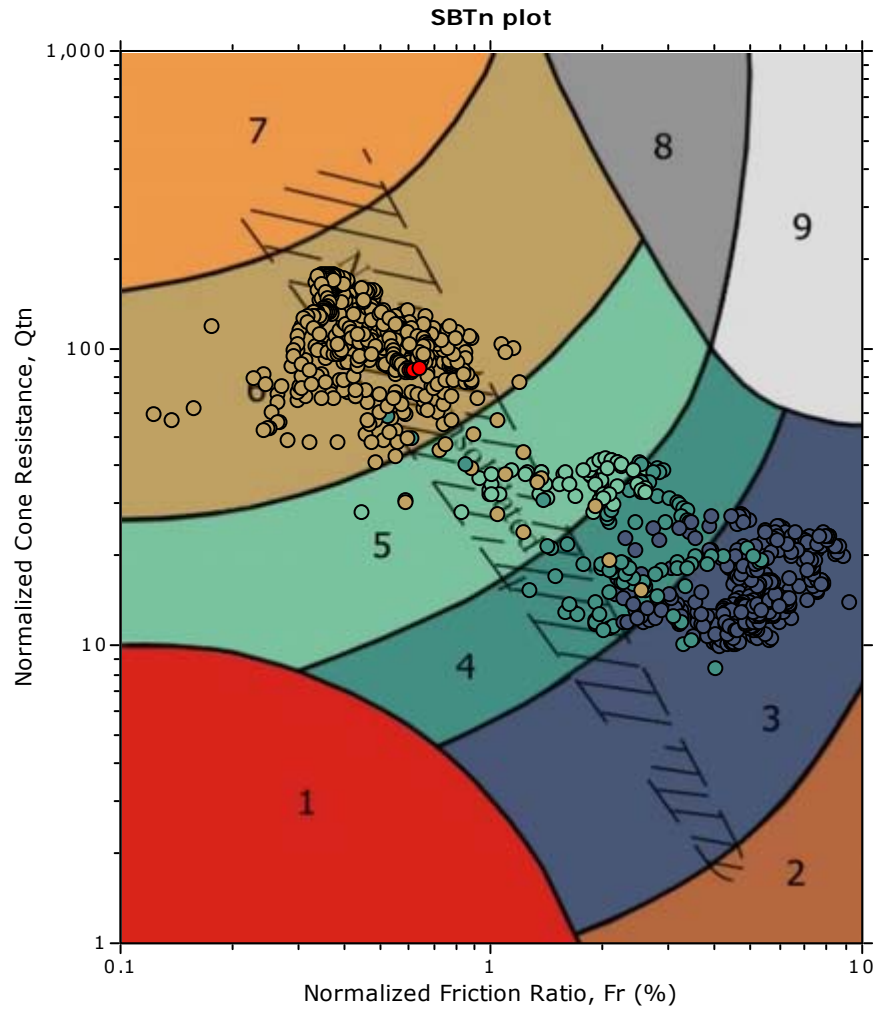
Depth values presented in this table are measured from free ground surface



The plot below presents the cross correlation coefficient between the raw q_c and f_s values (as measured on the field). X axes presents the lag distance (one lag is the distance between two successive CPT measurements).

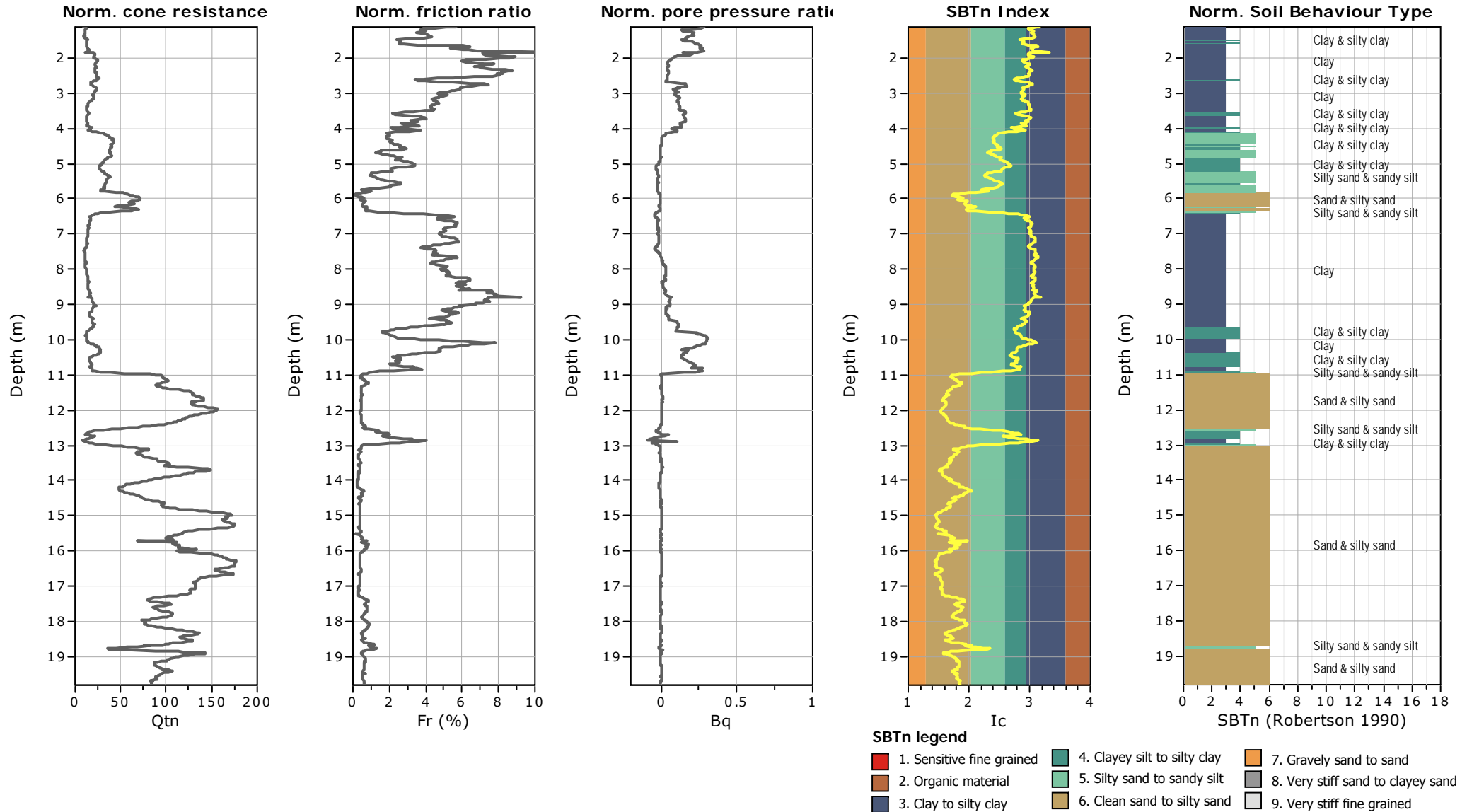


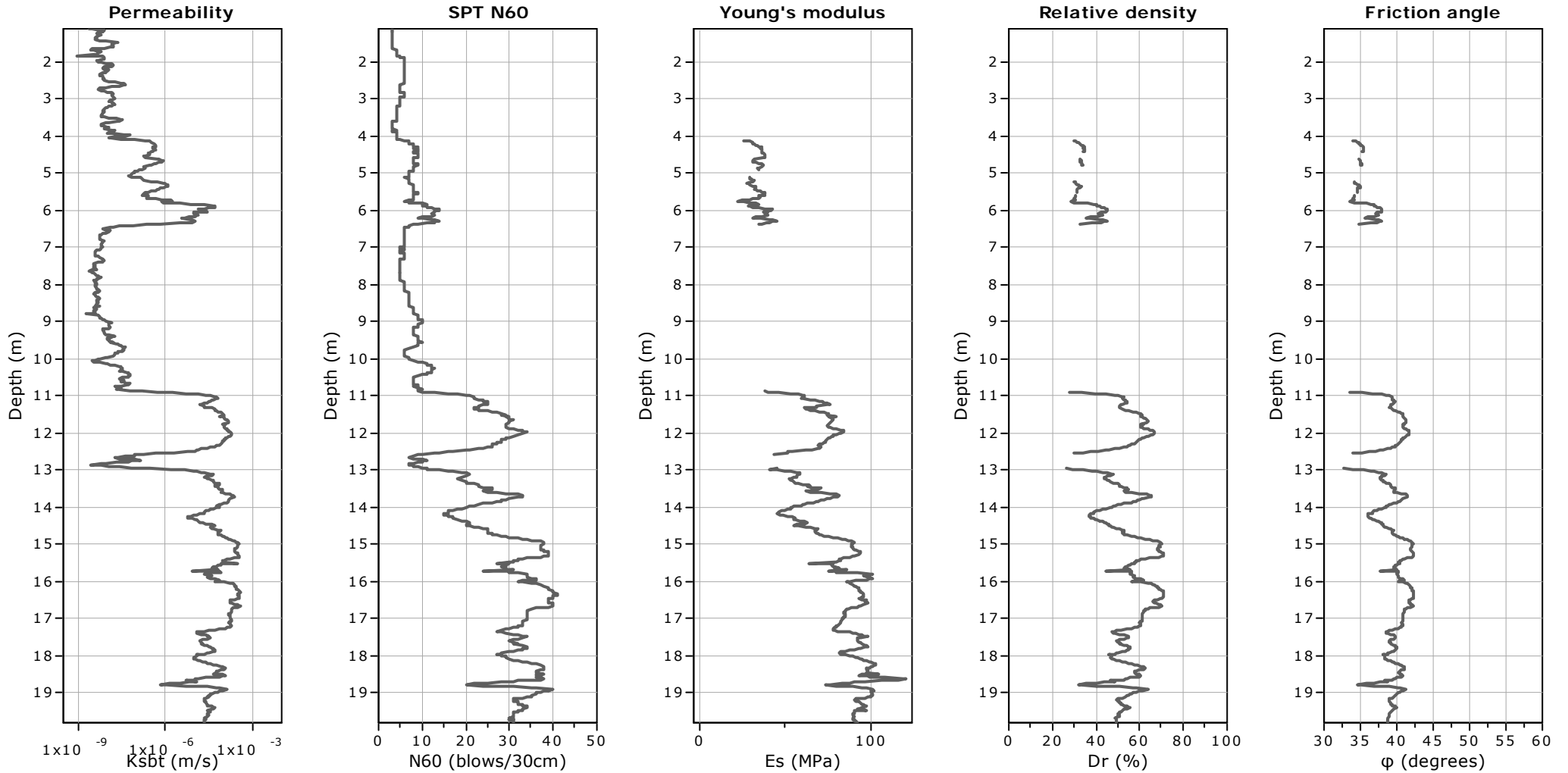
SBT - Bq plots (normalized)



SBTn legend

- | | | |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand |
| 2. Organic material | 5. Silty sand to sandy silt | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay | 6. Clean sand to silty sand | 9. Very stiff fine grained |





Calculation parameters

Permeability: Based on SBT_n

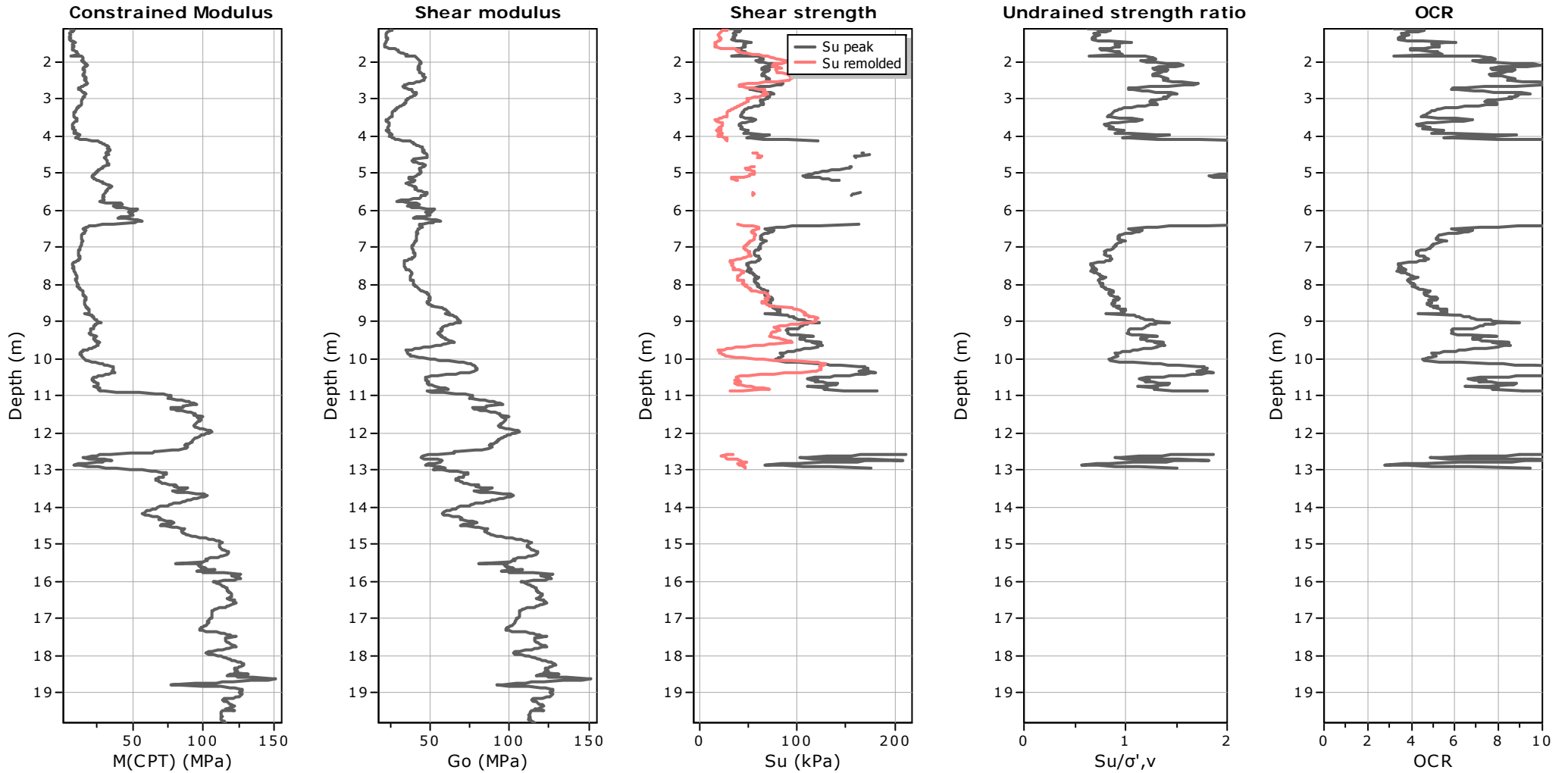
SPT N₆₀: Based on I_c and q_t

Young's modulus: Based on variable alpha using I_c (Robertson, 2009)

Relative density constant, C_{Dr}: 350.0

Phi: Based on Kulhawy & Mayne (1990)

● — User defined estimation data



Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_m (Robertson, 2009)

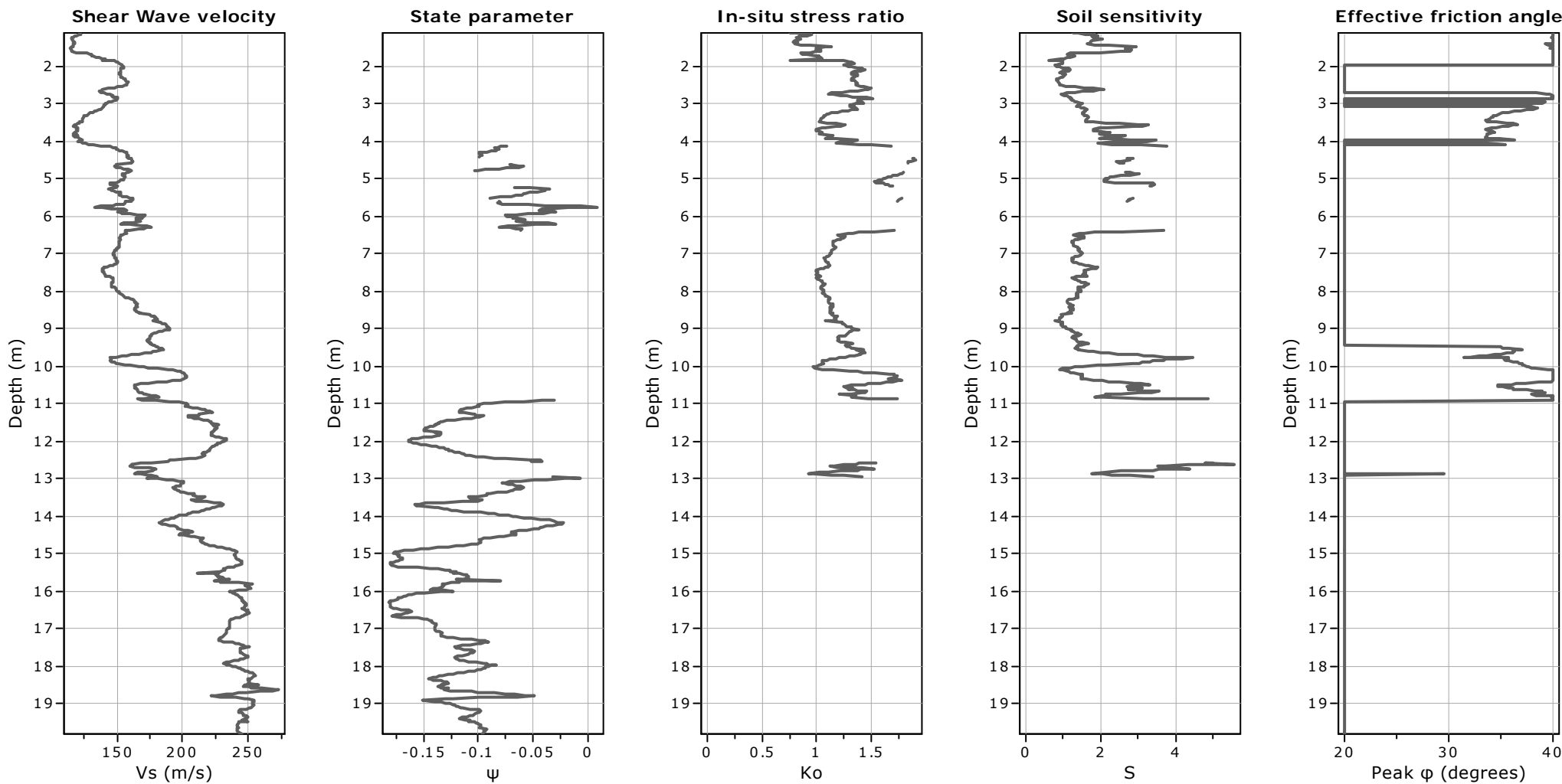
Go: Based on variable *alpha* using I_c (Robertson, 2009)

Undrained shear strength cone factor for clays, N_{kt} : Auto

OCR factor for clays, N_{kt} : Auto

● User defined estimation data

● Flat Dilatometer Test data



Calculation parameters

Soil Sensitivity factor, N_s : 7.10

—●— User defined estimation data

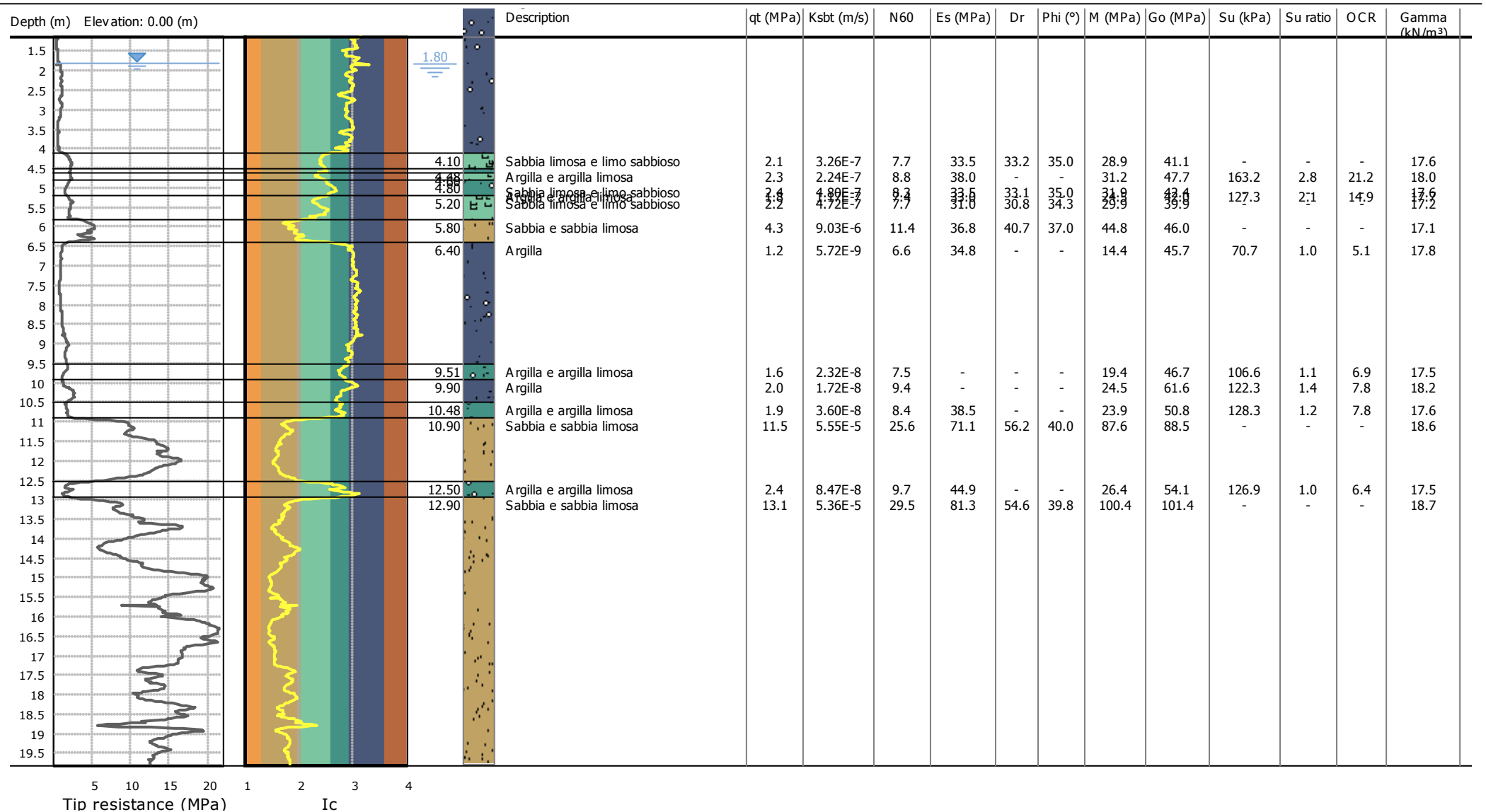
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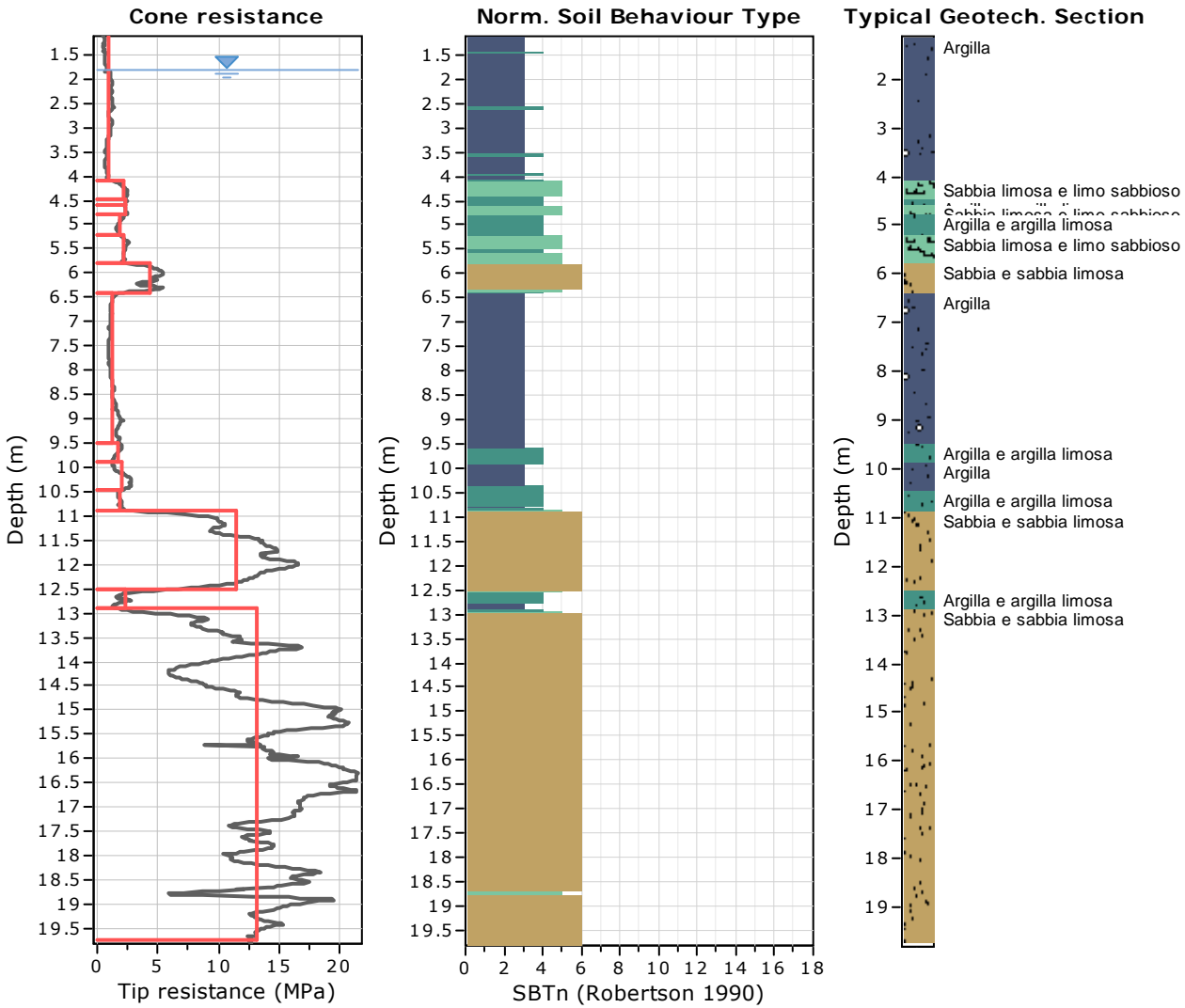
Project: MS3 S.Felice s/P

Location:

CPT: SFelice2

Total depth: 19.81 m





Tabular results

:: Layer No: 1 ::		
Code: 1	Start depth: 0.00 (m), End depth: 4.10 (m)	
Description: Argilla		
Basic results		
Total cone resistance:	0.86 ±0.24 MPa	
Sleeve friction:	38.95 ±26.69 kPa	
SBT _n :	3	
SBT _n description:	Clay	
Estimation results		
Permeability:	9.14E-09 ±9.07E-09 m/s	Constrained Mod.: 10.70 ±3.93 MPa
N60:	4.32 ±1.20 blows	Go: 30.97 ±8.58 MPa
Es:	0.00 ±0.00 MPa	Su: 53.41 ±13.65 kPa
Dr (%):	0.00 ±0.00	Su ratio: 1.16 ±0.34
φ (degrees):	0.00 ±0.00 °	O.C.R.: 6.14 ±1.99
Unit weight:	17.14 ±0.77 kN/m ³	

.: Layer No: 2 .:

Code: 2 Start depth: 4.10 (m), End depth: 4.48 (m)

Description: Sabbia limosa e limo sabbioso

Basic results

Total cone resistance: 2.14 ±0.34 MPa

Sleeve friction: 42.92 ±9.06 kPa

SBT_n: 5

SBTn description: Silty sand & sandy silt

Estimation results

Permeability: 3.26E-07 ±1.08E-07 m/s

N60: 7.66 ±1.17 blows

Es: 33.46 ±2.80 MPa

Dr (%): 33.15 ±1.57

φ (degrees): 35.03 ±0.46 °

Unit weight: 17.60 ±0.32 kN/m³

Constrained Mod.: 28.87 ±4.75 MPa

Go: 41.14 ±4.90 MPa

Su: 0.00 ±0.00 kPa

Su ratio: 0.00 ±0.00

O.C.R.: 0.00 ±0.00

.: Layer No: 3 .:

Code: 3 Start depth: 4.48 (m), End depth: 4.60 (m)

Description: Argilla e argilla limosa

Basic results

Total cone resistance: 2.31 ±0.07 MPa

Sleeve friction: 60.57 ±2.17 kPa

SBT_n: 4

SBTn description: Clay & silty clay

Estimation results

Permeability: 2.24E-07 ±4.11E-08 m/s

N60: 8.85 ±0.38 blows

Es: 38.02 ±0.41 MPa

Dr (%): 0.00 ±0.00

φ (degrees): 0.00 ±0.00 °

Unit weight: 18.03 ±0.04 kN/m³

Constrained Mod.: 31.24 ±0.97 MPa

Go: 47.66 ±0.47 MPa

Su: 163.17 ±5.94 kPa

Su ratio: 2.79 ±0.07

O.C.R.: 21.17 ±0.93

.: Layer No: 4 .:

Code: 4 Start depth: 4.60 (m), End depth: 4.80 (m)

Description: Sabbia limosa e limo sabbioso

Basic results

Total cone resistance: 2.36 ±0.07 MPa

Sleeve friction: 40.28 ±10.98 kPa

SBT_n: 5

SBTn description: Silty sand & sandy silt

Estimation results

Permeability: 4.80E-07 ±2.20E-07 m/s

N60: 8.26 ±0.47 blows

Es: 33.50 ±2.72 MPa

Dr (%): 33.09 ±0.45

φ (degrees): 35.02 ±0.13 °

Unit weight: 17.57 ±0.30 kN/m³

Constrained Mod.: 31.92 ±1.00 MPa

Go: 42.42 ±3.56 MPa

Su: 0.00 ±0.00 kPa

Su ratio: 0.00 ±0.00

O.C.R.: 0.00 ±0.00

.: Layer No: 5 .:

Code: 5 Start depth: 4.80 (m), End depth: 5.20 (m)

Description: Argilla e argilla limosa

Basic results

Total cone resistance: 1.83 ±0.22 MPa

Sleeve friction: 47.45 ±8.25 kPa

SBT_n: 4

SBTn description: Clay & silty clay

Estimation results

Permeability: 1.17E-07 ±6.21E-08 m/s

N60: 7.35 ±0.67 blows

Es: 32.96 ±2.86 MPa

Dr (%): 0.00 ±0.00

φ (degrees): 0.00 ±0.00 °

Unit weight: 17.66 ±0.24 kN/m³

Constrained Mod.: 24.47 ±3.11 MPa

Go: 41.99 ±3.06 MPa

Su: 127.34 ±16.03 kPa

Su ratio: 2.10 ±0.23

O.C.R.: 14.86 ±2.30

.: Layer No: 6 .:

Code: 6 Start depth: 5.20 (m), End depth: 5.80 (m)

Description: Sabbia limosa e limo sabbioso

Basic results

Total cone resistance: 2.23 ±0.18 MPa

Sleeve friction: 30.64 ±12.95 kPa

SBT_n: 5

SBTn description: Silty sand & sandy silt

Estimation results

Permeability: 4.72E-07 ±4.70E-07 m/s

N60: 7.68 ±0.64 blows

Es: 30.96 ±3.51 MPa

Dr (%): 30.79 ±1.26

φ (degrees): 34.33 ±0.39 °

Unit weight: 17.23 ±0.51 kN/m³

Constrained Mod.: 29.93 ±2.54 MPa

Go: 39.89 ±4.90 MPa

Su: 0.00 ±0.00 kPa

Su ratio: 0.00 ±0.00

O.C.R.: 0.00 ±0.00

.: Layer No: 7 .:

Code: 7 Start depth: 5.80 (m), End depth: 6.40 (m)

Description: Sabbia e sabbia limosa

Basic results

Total cone resistance: 4.31 ±0.93 MPa

Sleeve friction: 22.53 ±9.44 kPa

SBT_n: 6

SBTn description: Sand & silty sand

Estimation results

Permeability: 9.03E-06 ±1.51E-05 m/s

N60: 11.43 ±1.83 blows

Es: 36.76 ±4.61 MPa

Dr (%): 40.69 ±3.83

φ (degrees): 36.98 ±0.95 °

Unit weight: 17.13 ±0.58 kN/m³

Constrained Mod.: 44.76 ±7.14 MPa

Go: 45.99 ±5.71 MPa

Su: 0.00 ±0.00 kPa

Su ratio: 0.00 ±0.00

O.C.R.: 0.00 ±0.00

.: Layer No: 8 .:

Code: 8 Start depth: 6.40 (m), End depth: 9.51 (m)

Description: Argilla

Basic results

Total cone resistance: 1.24 ±0.32 MPa

Sleeve friction: 59.20 ±24.36 kPa

SBT_n: 3

SBTn description: Clay

Estimation results

Permeability: 5.72E-09 ±1.81E-08 m/s

N60: 6.55 ±1.45 blows

Es: 34.79 ±34.79 MPa

Dr (%): 0.00 ±0.00

φ (degrees): 0.00 ±0.00 °

Unit weight: 17.76 ±0.49 kN/m³

Constrained Mod.: 14.43 ±5.05 MPa

Go: 45.70 ±10.12 MPa

Su: 70.65 ±19.73 kPa

Su ratio: 1.03 ±0.23

O.C.R.: 5.14 ±1.63

.: Layer No: 9 .:

Code: 9 Start depth: 9.51 (m), End depth: 9.90 (m)

Description: Argilla e argilla limosa

Basic results

Total cone resistance: 1.62 ±0.30 MPa

Sleeve friction: 41.22 ±30.49 kPa

SBT_n: 4

SBTn description: Clay & silty clay

Estimation results

Permeability: 2.32E-08 ±1.01E-08 m/s

N60: 7.48 ±1.47 blows

Es: 0.00 ±0.00 MPa

Dr (%): 0.00 ±0.00

φ (degrees): 0.00 ±0.00 °

Unit weight: 17.45 ±0.79 kN/m³

Constrained Mod.: 19.41 ±5.10 MPa

Go: 46.73 ±11.83 MPa

Su: 106.64 ±13.98 kPa

Su ratio: 1.14 ±0.25

O.C.R.: 6.90 ±1.18

.: Layer No: 10 .:

Code: 10 Start depth: 9.90 (m), End depth: 10.48 (m)

Description: Argilla

Basic results

Total cone resistance: 2.00 ±0.61 MPa

Sleeve friction: 76.35 ±40.38 kPa

SBT_n: 3

SBTn description: Clay

Estimation results

Permeability: 1.72E-08 ±1.93E-08 m/s

N60: 9.40 ±2.36 blows

Es: 0.00 ±0.00 MPa

Dr (%): 0.00 ±0.00

φ (degrees): 0.00 ±0.00 °

Unit weight: 18.24 ±0.76 kN/m³

Constrained Mod.: 24.52 ±9.31 MPa

Go: 61.55 ±15.42 MPa

Su: 122.25 ±40.17 kPa

Su ratio: 1.37 ±0.44

O.C.R.: 7.79 ±3.08

.: Layer No: 11 .:

Code: 11 Start depth: 10.48 (m), End depth: 10.90 (m)

Description: Argilla e argilla limosa

Basic results

Total cone resistance: 1.89 ±0.16 MPa

Sleeve friction: 43.41 ±10.66 kPa

SBT_n: 4

SBTn description: Clay & silty clay

Estimation results

Permeability: 3.60E-08 ±2.87E-08 m/s

N60: 8.44 ±0.60 blows

Es: 38.52 ±38.52 MPa

Dr (%): 0.00 ±0.00

φ (degrees): 0.00 ±0.00 °

Unit weight: 17.57 ±0.26 kN/m³

Constrained Mod.: 23.92 ±2.22 MPa

Go: 50.78 ±4.33 MPa

Su: 128.26 ±15.68 kPa

Su ratio: 1.24 ±0.11

O.C.R.: 7.84 ±1.17

.: Layer No: 12 .:

Code: 12 Start depth: 10.90 (m), End depth: 12.50 (m)

Description: Sabbia e sabbia limosa

Basic results

Total cone resistance: 11.45 ±3.08 MPa

Sleeve friction: 58.00 ±11.32 kPa

SBT_n: 6

SBTn description: Sand & silty sand

Estimation results

Permeability: 5.55E-05 ±5.75E-05 m/s

N60: 25.64 ±4.95 blows

Es: 71.13 ±8.12 MPa

Dr (%): 56.17 ±7.29

φ (degrees): 40.05 ±1.39 °

Unit weight: 18.59 ±0.35 kN/m³

Constrained Mod.: 87.59 ±12.81 MPa

Go: 88.47 ±11.13 MPa

Su: 0.00 ±0.00 kPa

Su ratio: 0.00 ±0.00

O.C.R.: 0.00 ±0.00

.: Layer No: 13 .:

Code: 13 Start depth: 12.50 (m), End depth: 12.90 (m)

Description: Argilla e argilla limosa

Basic results

Total cone resistance: 2.37 ±1.84 MPa

Sleeve friction: 36.36 ±8.19 kPa

SBT_n: 4

SBTn description: Clay & silty clay

Estimation results

Permeability: 8.47E-08 ±3.62E-06 m/s

N60: 9.74 ±3.63 blows

Es: 44.93 ±1.78 MPa

Dr (%): 0.00 ±0.00

φ (degrees): 0.00 ±0.00 °

Unit weight: 17.45 ±0.37 kN/m³

Constrained Mod.: 26.39 ±20.93 MPa

Go: 54.06 ±9.01 MPa

Su: 126.90 ±43.80 kPa

Su ratio: 1.01 ±0.29

O.C.R.: 6.36 ±2.92

.: Layer No: 14 .:

Code: 14 **Start depth:** 12.90 (m), **End depth:** 19.73 (m)**Description:** Sabbia e sabbia limosa**Basic results**

Total cone resistance: 13.10 ±4.27 MPa

Sleeve friction: 61.04 ±26.09 kPa

SBT_n: 6SBT_n description: Sand & silty sand**Estimation results**

Permeability: 5.36E-05 ±1.10E-04 m/s

N60: 29.45 ±7.07 blows

Es: 81.31 ±15.89 MPa

Dr (%): 54.59 ±9.00

φ (degrees): 39.77 ±1.63 °

Unit weight: 18.70 ±0.62 kN/m³

Constrained Mod.: 100.39 ±21.47 MPa

Go: 101.39 ±20.33 MPa

Su: 0.00 ±0.00 kPa

Su ratio: 0.00 ±0.00

O.C.R.: 0.00 ±0.00

Dott. Geol. Valeriano Franchi

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Project: MS3 S.Felice s/P

Location:

CPT: SFelice2

Total depth: 19.81 m, Date: 09/12/2019

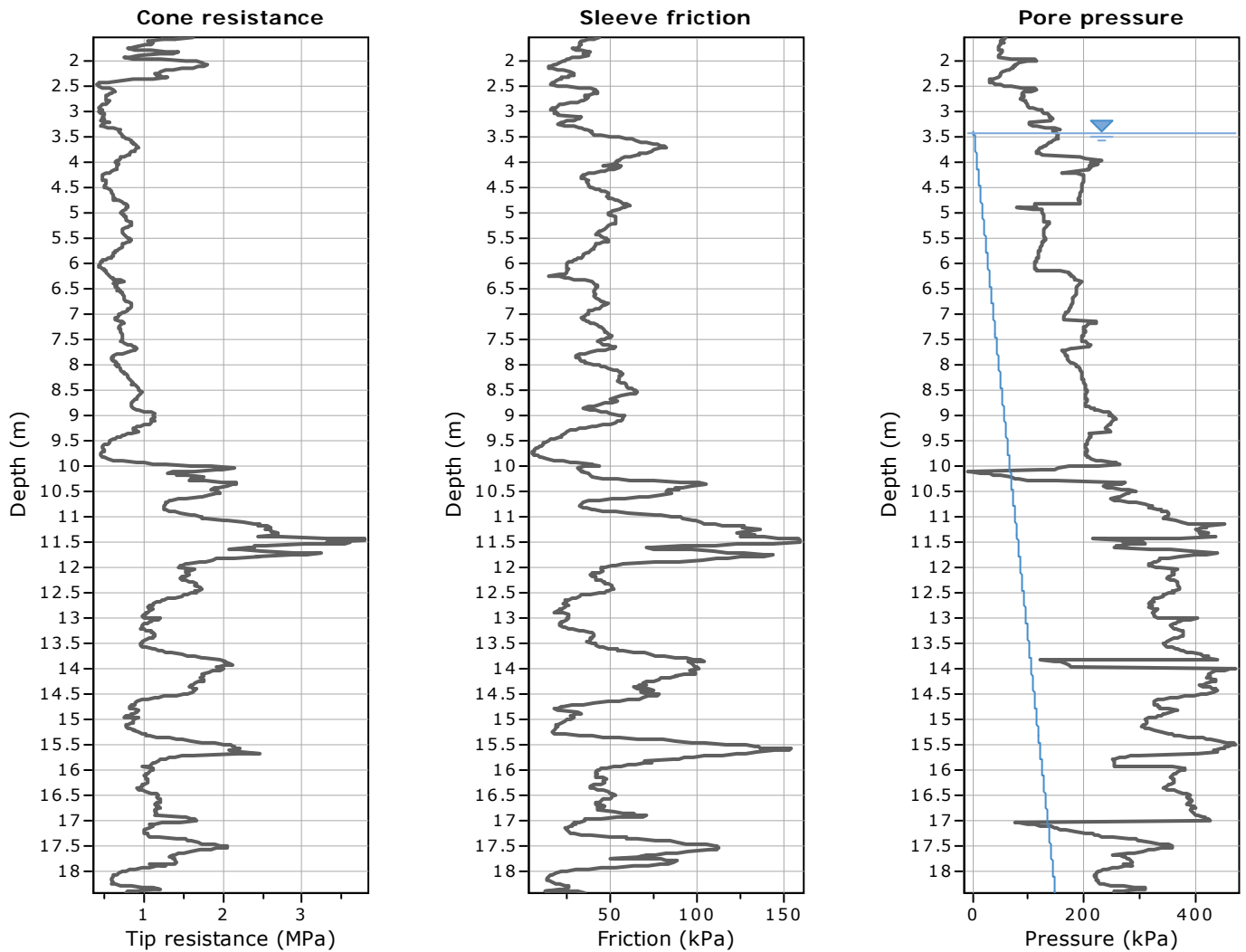
Summary table of mean values

From depth To depth (m)	Thickness (m)	Permeability (m/s)	SPT _{N60} (blows/30cm)	E _s (MPa)	D _r	Friction angle	Constrained modulus, M (MPa)	Shear modulus, G _o (MPa)	Undrained strength, S _u (kPa)	Undrained strength ratio	OCR	Unit weight (kN/m ³)
0.00	4.10	9.14E-09	4.3	0.0	0.0	0.0	10.7	31.0	53.4	1.2	6.1	17.1
4.10		(±9.07E-09)	(±1.2)	(±0.0)	(±0.0)	(±0.0)	(±3.9)	(±8.6)	(±13.7)	(±0.3)	(±2.0)	(±0.8)
4.10	0.38	3.26E-07	7.7	33.5	33.2	35.0	28.9	41.1	0.0	0.0	0.0	17.6
4.48		(±1.08E-07)	(±1.2)	(±2.8)	(±1.6)	(±0.5)	(±4.8)	(±4.9)	(±0.0)	(±0.0)	(±0.0)	(±0.3)
4.48	0.12	2.24E-07	8.8	38.0	0.0	0.0	31.2	47.7	163.2	2.8	21.2	18.0
4.60		(±4.11E-08)	(±0.4)	(±0.4)	(±0.0)	(±0.0)	(±1.0)	(±0.5)	(±5.9)	(±0.1)	(±0.9)	(±0.0)
4.60	0.20	4.80E-07	8.3	33.5	33.1	35.0	31.9	42.4	0.0	0.0	0.0	17.6
4.80		(±2.20E-07)	(±0.5)	(±2.7)	(±0.5)	(±0.1)	(±1.0)	(±3.6)	(±0.0)	(±0.0)	(±0.0)	(±0.3)
4.80	0.40	1.17E-07	7.4	33.0	0.0	0.0	24.5	42.0	127.3	2.1	14.9	17.7
5.20		(±6.21E-08)	(±0.7)	(±2.9)	(±0.0)	(±0.0)	(±3.1)	(±3.1)	(±16.0)	(±0.2)	(±2.3)	(±0.2)
5.20	0.60	4.72E-07	7.7	31.0	30.8	34.3	29.9	39.9	0.0	0.0	0.0	17.2
5.80		(±4.70E-07)	(±0.6)	(±3.5)	(±1.3)	(±0.4)	(±2.5)	(±4.9)	(±0.0)	(±0.0)	(±0.0)	(±0.5)
5.80	0.60	9.03E-06	11.4	36.8	40.7	37.0	44.8	46.0	0.0	0.0	0.0	17.1
6.40		(±1.51E-05)	(±1.8)	(±4.6)	(±3.8)	(±1.0)	(±7.1)	(±5.7)	(±0.0)	(±0.0)	(±0.0)	(±0.6)
6.40	3.11	5.72E-09	6.6	34.8	0.0	0.0	14.4	45.7	70.7	1.0	5.1	17.8
9.51		(±1.81E-08)	(±1.4)	(±34.8)	(±0.0)	(±0.0)	(±5.0)	(±10.1)	(±19.7)	(±0.2)	(±1.6)	(±0.5)
9.51	0.39	2.32E-08	7.5	0.0	0.0	0.0	19.4	46.7	106.6	1.1	6.9	17.5
9.90		(±1.01E-08)	(±1.5)	(±0.0)	(±0.0)	(±0.0)	(±5.1)	(±11.8)	(±14.0)	(±0.2)	(±1.2)	(±0.8)
9.90	0.58	1.72E-08	9.4	0.0	0.0	0.0	24.5	61.6	122.3	1.4	7.8	18.2
10.48		(±1.93E-08)	(±2.4)	(±0.0)	(±0.0)	(±0.0)	(±9.3)	(±15.4)	(±40.2)	(±0.4)	(±3.1)	(±0.8)
10.48	0.42	3.60E-08	8.4	38.5	0.0	0.0	23.9	50.8	128.3	1.2	7.8	17.6
10.90		(±2.87E-08)	(±0.6)	(±38.5)	(±0.0)	(±0.0)	(±2.2)	(±4.3)	(±15.7)	(±0.1)	(±1.2)	(±0.3)

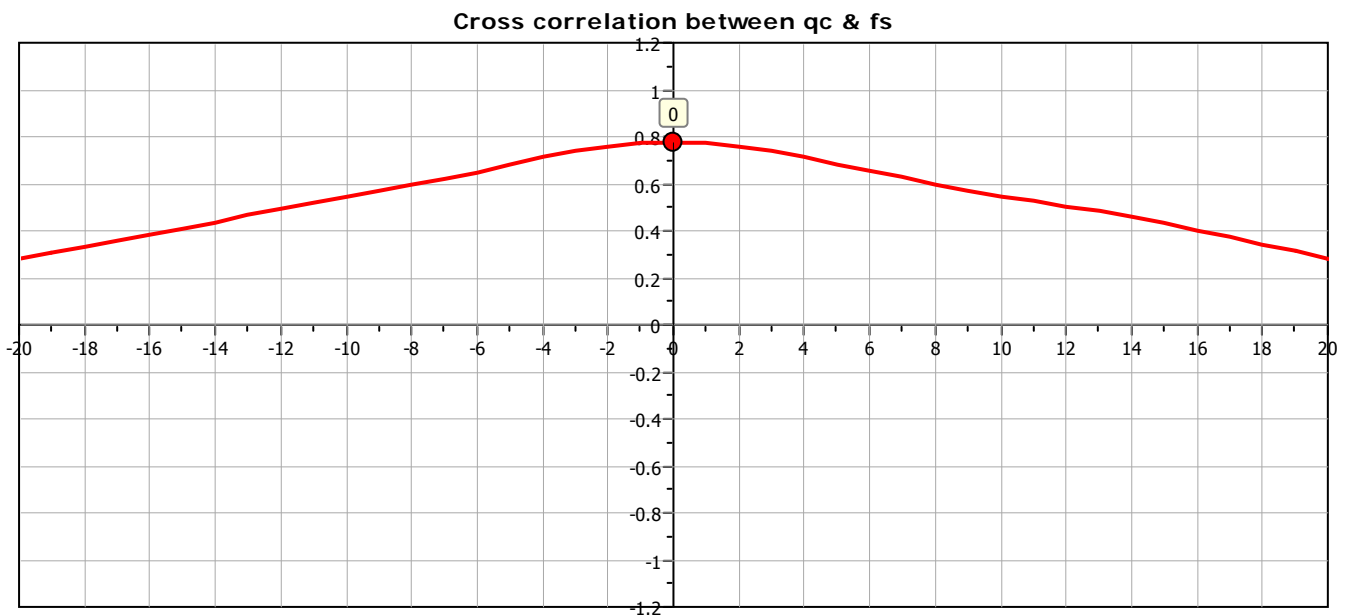
Summary table of mean values

From depth To depth (m)	Thickness (m)	Permeability (m/s)	SPT _{N60} (blows/30cm)	E _s (MPa)	D _r	Friction angle	Constrained modulus, M (MPa)	Shear modulus, G ₀ (MPa)	Undrained strength, S _u (kPa)	Undrained strength ratio	OCR	Unit weight (kN/m ³)
10.90	1.60	5.55E-05	25.6	71.1	56.2	40.0	87.6	88.5	0.0	0.0	0.0	18.6
12.50		(±5.75E-05)	(±4.9)	(±8.1)	(±7.3)	(±1.4)	(±12.8)	(±11.1)	(±0.0)	(±0.0)	(±0.0)	(±0.4)
12.50	0.40	8.47E-08	9.7	44.9	0.0	0.0	26.4	54.1	126.9	1.0	6.4	17.5
12.90		(±3.62E-06)	(±3.6)	(±1.8)	(±0.0)	(±0.0)	(±20.9)	(±9.0)	(±43.8)	(±0.3)	(±2.9)	(±0.4)
12.90	6.83	5.36E-05	29.5	81.3	54.6	39.8	100.4	101.4	0.0	0.0	0.0	18.7
19.73		(±1.10E-04)	(±7.1)	(±15.9)	(±9.0)	(±1.6)	(±21.5)	(±20.3)	(±0.0)	(±0.0)	(±0.0)	(±0.6)

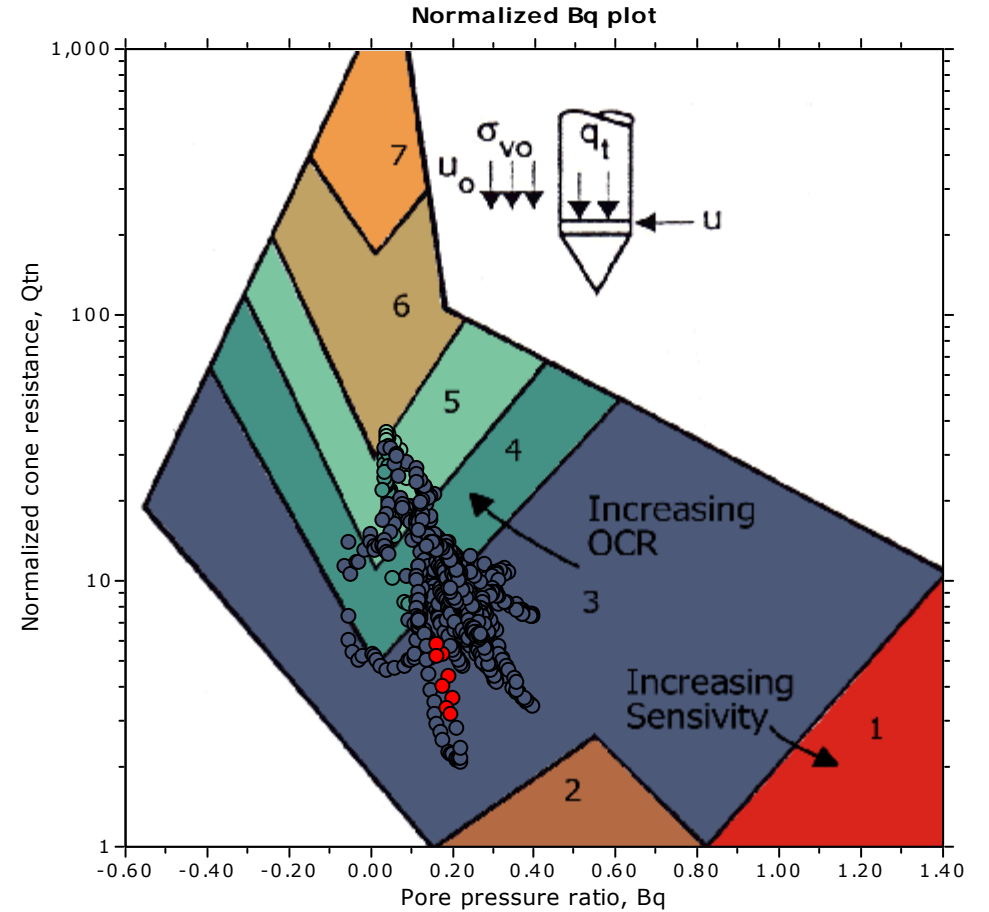
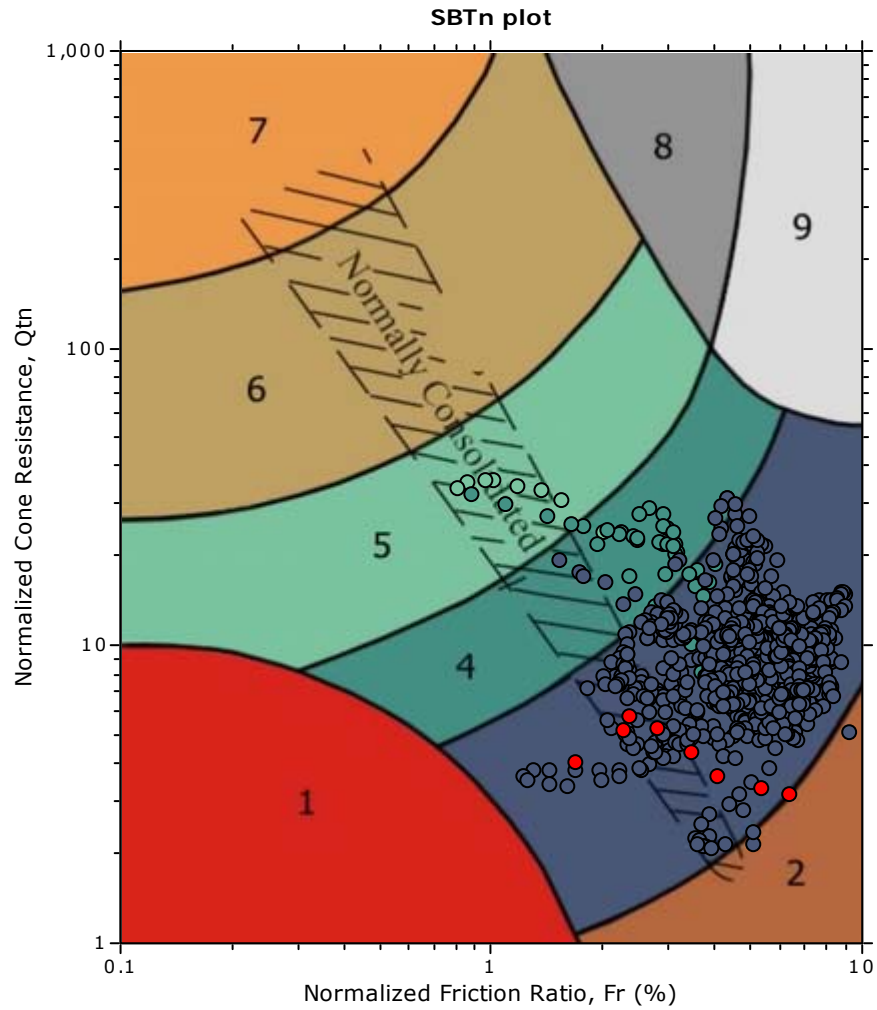
Depth values presented in this table are measured from free ground surface



The plot below presents the cross correlation coefficient between the raw q_c and f_s values (as measured on the field). X axes presents the lag distance (one lag is the distance between two successive CPT measurements).

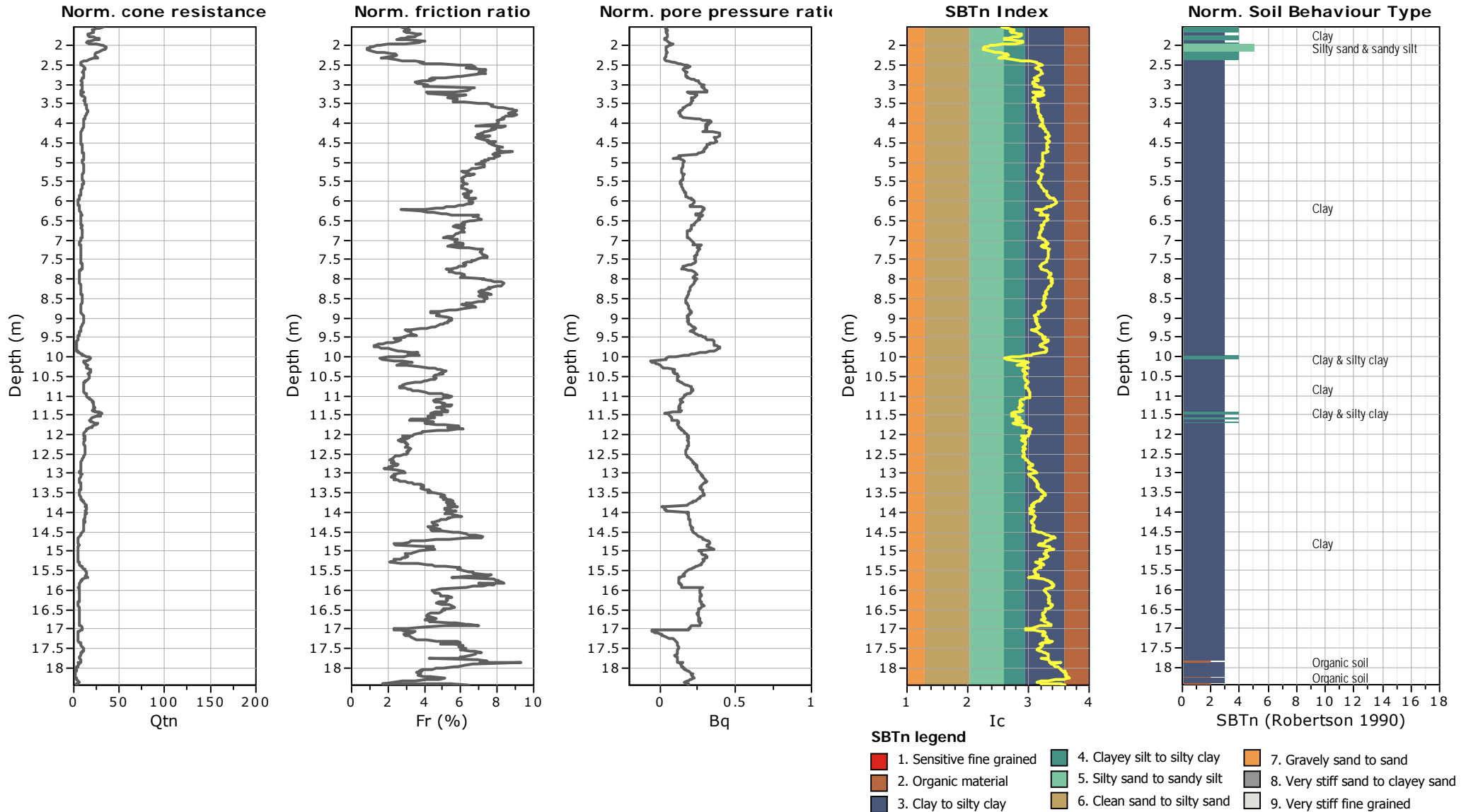


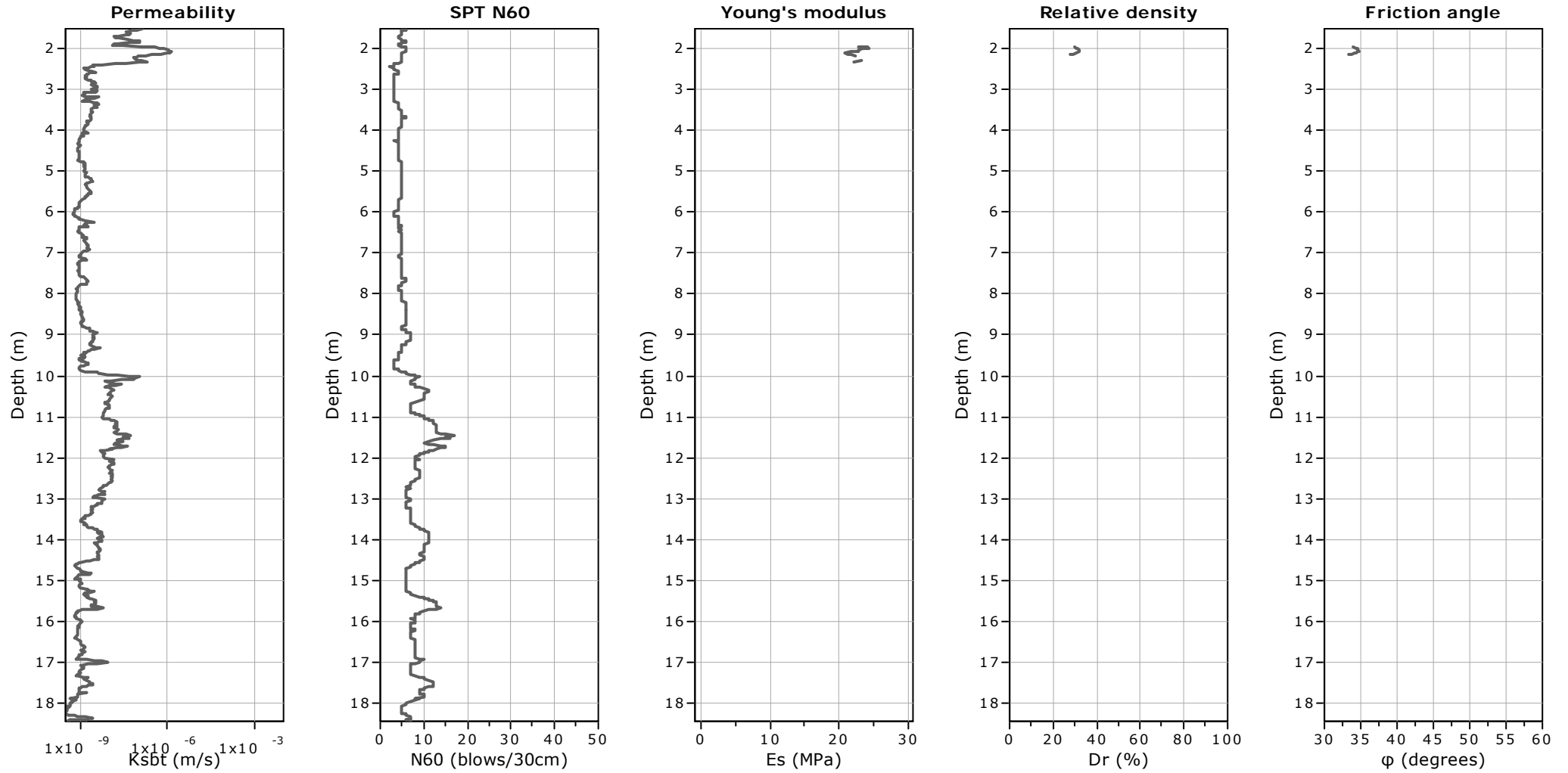
SBT - Bq plots (normalized)



SBTn legend

- | | | |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand |
| 2. Organic material | 5. Silty sand to sandy silt | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay | 6. Clean sand to silty sand | 9. Very stiff fine grained |





Calculation parameters

Permeability: Based on SBT_n

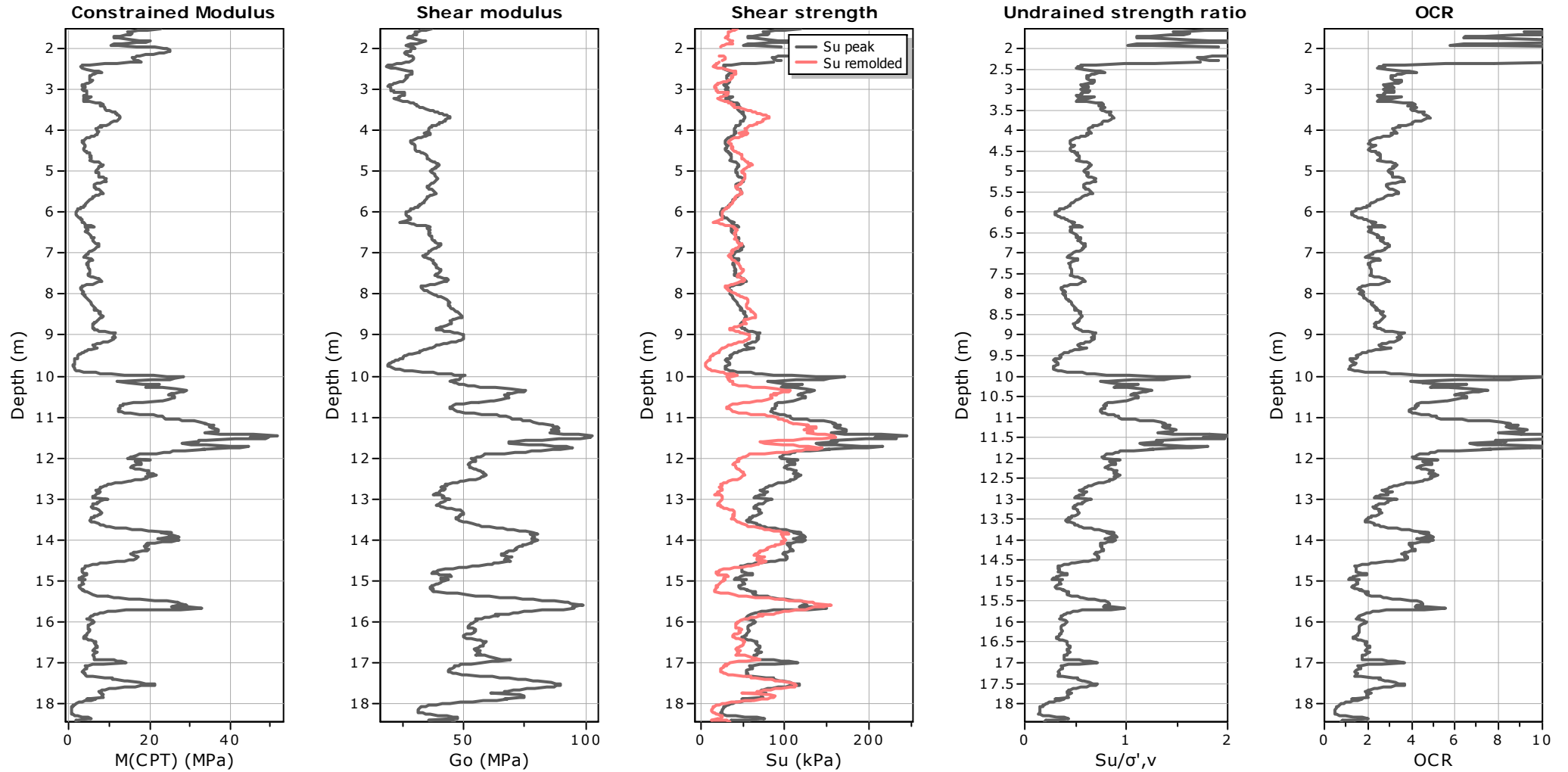
SPT N_{60} : Based on I_c and q_t

Young's modulus: Based on variable alpha using I_c (Robertson, 2009)

Relative density constant, C_{Dr} : 350.0

Phi: Based on Kulhawy & Mayne (1990)

● — User defined estimation data



Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_m (Robertson, 2009)

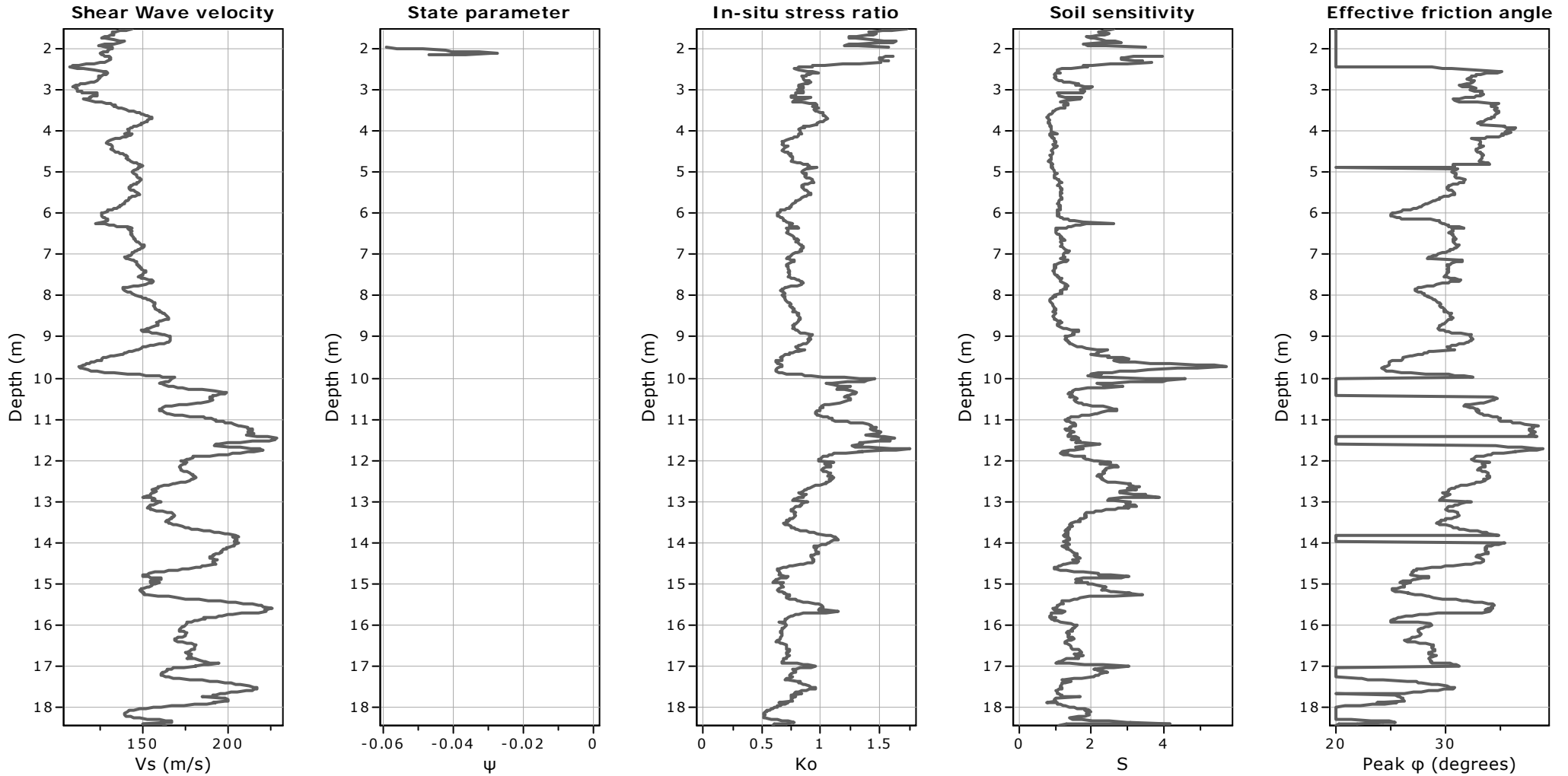
Go: Based on variable *alpha* using I_c (Robertson, 2009)

Undrained shear strength cone factor for clays, N_{kt} : Auto

OCR factor for clays, N_{kt} : Auto

● User defined estimation data

● Flat Dilatometer Test data



Calculation parameters

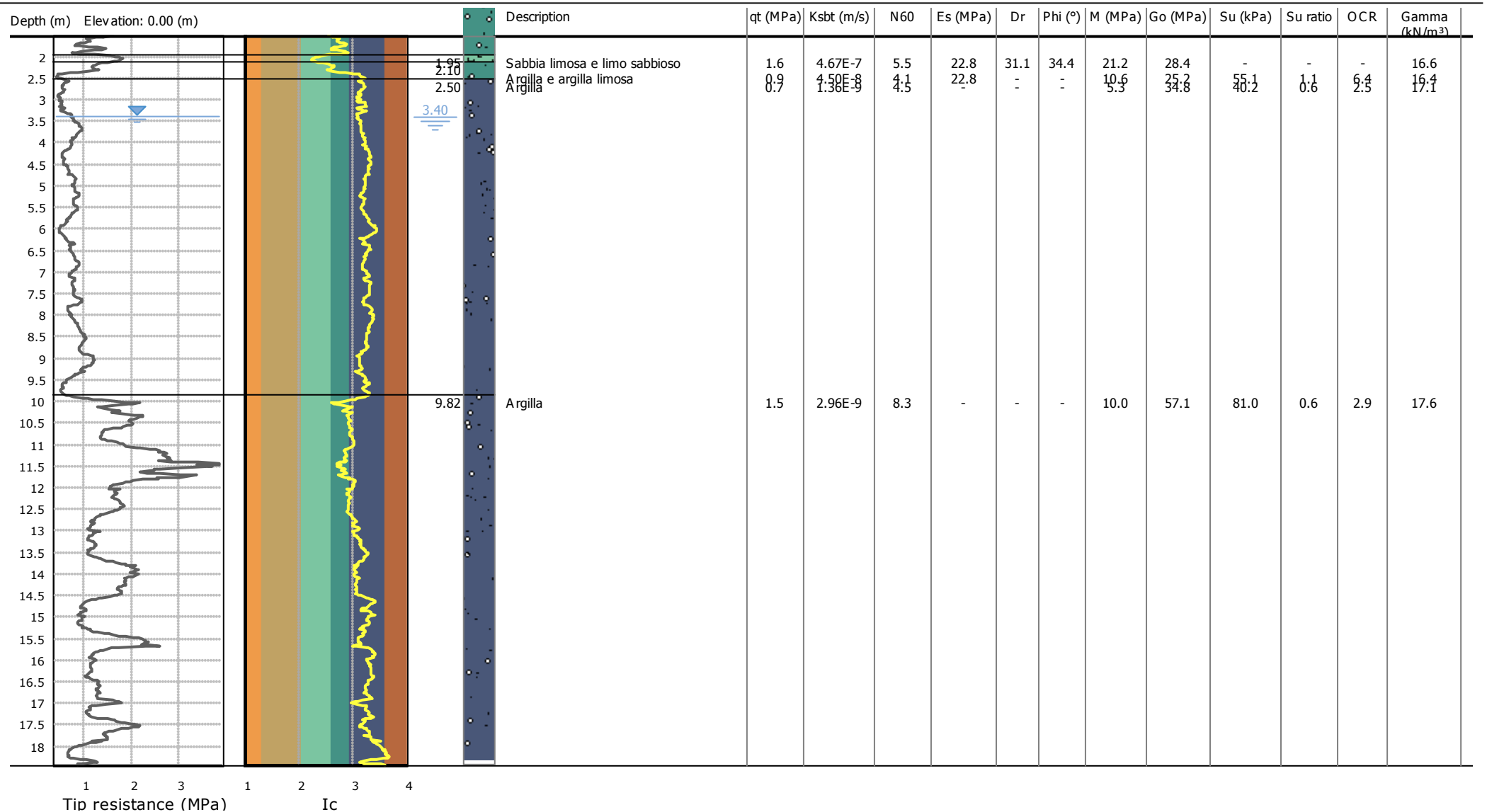
Soil Sensitivity factor, N_s : 7.10

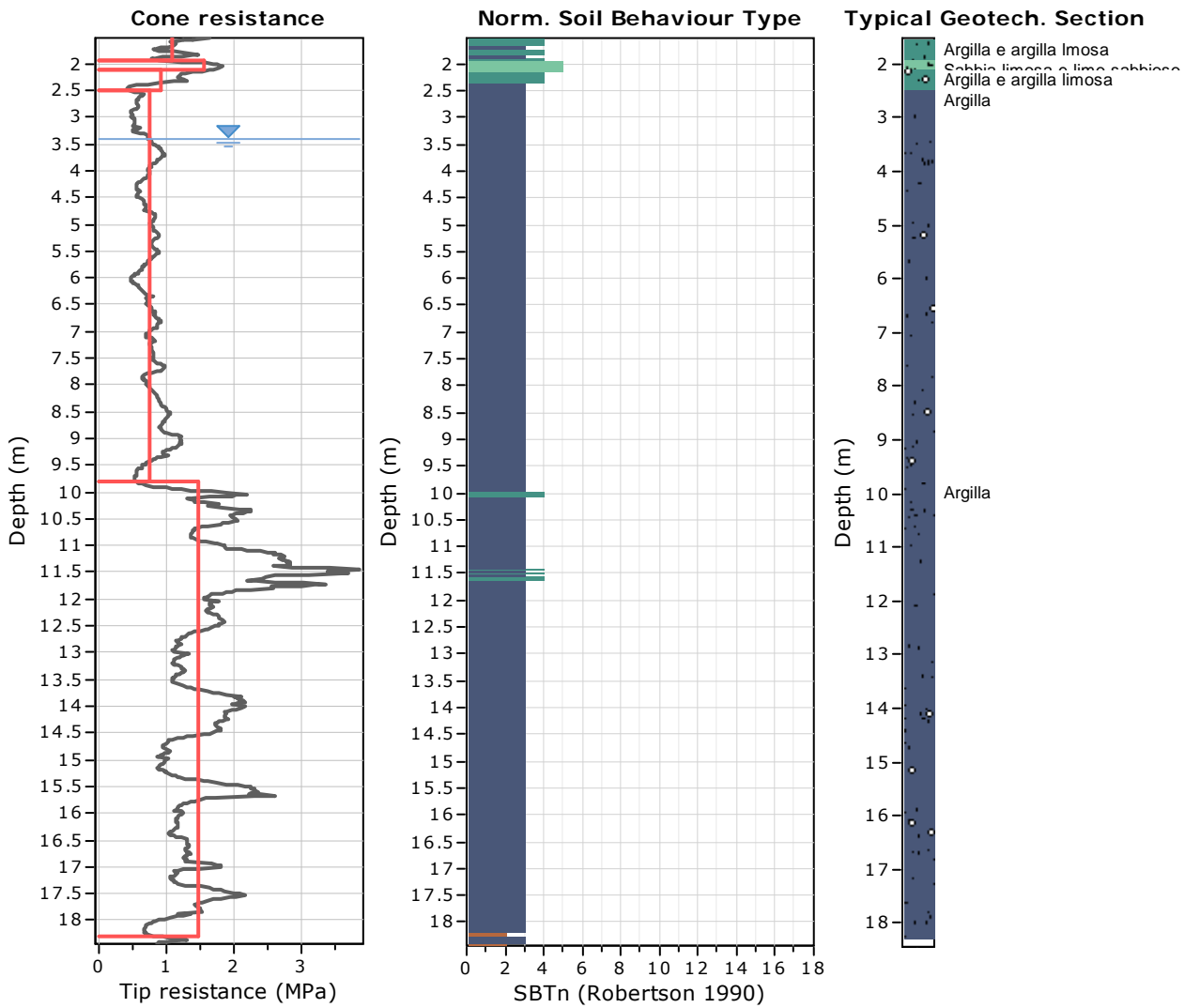
—●— User defined estimation data

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Project: MS3 S.Felice s/P
 Location:

CPT: SFelice3
 Total depth: 18.44 m





Tabular results

:: Layer No: 1 ::		
Code: 1	Start depth: 0.00 (m), End depth: 1.95 (m)	
Description: Argilla e argilla limosa		
Basic results		
Total cone resistance:	1.08 ±0.23 MPa	
Sleeve friction:	33.32 ±4.31 kPa	
SBT _n :	4	
SBT _n description:	Clay & silty clay	
Estimation results		
Permeability:	3.86E-08 ±3.74E-08 m/s	Constrained Mod.: 14.72 ±3.30 MPa
N60:	4.81 ±0.71 blows	Go: 30.87 ±2.78 MPa
Es:	29.75 ±29.75 MPa	Su: 75.10 ±18.76 kPa
Dr (%):	0.00 ±0.00	Su ratio: 1.50 ±0.34
φ (degrees):	0.00 ±0.00 °	O.C.R.: 9.41 ±3.00
Unit weight:	17.05 ±0.22 kN/m ³	

::: Layer No: 2 :::

Code: 2 Start depth: 1.95 (m), End depth: 2.10 (m)

Description: Sabbia limosa e limo sabbioso

Basic results

Total cone resistance: 1.55 ±0.32 MPa

Sleeve friction: 19.69 ±4.30 kPa

SBT_n: 5

SBTn description: Silty sand & sandy silt

Estimation results

Permeability: 4.67E-07 ±5.78E-07 m/s

N60: 5.51 ±0.73 blows

Es: 22.75 ±1.25 MPa

Dr (%): 31.15 ±0.84

φ (degrees): 34.44 ±0.26 °

Unit weight: 16.58 ±0.21 kN/m³

Constrained Mod.: 21.23 ±4.44 MPa

Go: 28.36 ±1.45 MPa

Su: 0.00 ±0.00 kPa

Su ratio: 0.00 ±0.00

O.C.R.: 0.00 ±0.00

::: Layer No: 3 :::

Code: 3 Start depth: 2.10 (m), End depth: 2.50 (m)

Description: Argilla e argilla limosa

Basic results

Total cone resistance: 0.93 ±0.44 MPa

Sleeve friction: 20.29 ±4.99 kPa

SBT_n: 4

SBTn description: Clay & silty clay

Estimation results

Permeability: 4.50E-08 ±3.79E-07 m/s

N60: 4.09 ±1.05 blows

Es: 22.80 ±0.53 MPa

Dr (%): 0.00 ±0.00

φ (degrees): 0.00 ±0.00 °

Unit weight: 16.42 ±0.37 kN/m³

Constrained Mod.: 10.65 ±7.41 MPa

Go: 25.20 ±3.85 MPa

Su: 55.11 ±31.60 kPa

Su ratio: 1.08 ±0.53

O.C.R.: 6.39 ±4.73

::: Layer No: 4 :::

Code: 4 Start depth: 2.50 (m), End depth: 9.82 (m)

Description: Argilla

Basic results

Total cone resistance: 0.74 ±0.17 MPa

Sleeve friction: 37.90 ±15.12 kPa

SBT_n: 3

SBTn description: Clay

Estimation results

Permeability: 1.36E-09 ±7.85E-10 m/s

N60: 4.50 ±0.98 blows

Es: 0.00 ±0.00 MPa

Dr (%): 0.00 ±0.00

φ (degrees): 0.00 ±0.00 °

Unit weight: 17.06 ±0.62 kN/m³

Constrained Mod.: 5.33 ±2.49 MPa

Go: 34.78 ±7.25 MPa

Su: 40.24 ±9.22 kPa

Su ratio: 0.60 ±0.16

O.C.R.: 2.54 ±0.77

::: Layer No: 5 :::

Code: 5 Start depth: 9.82 (m), End depth: 18.30 (m)

Description: Argilla

Basic results

Total cone resistance: 1.47 ±0.58 MPa

Sleeve friction: 50.20 ±36.40 kPa

SBT_n: 3

SBTn description: Clay

Estimation results

Permeability: 2.96E-09 ±1.07E-08 m/s

N60: 8.27 ±2.36 blows

Es: 0.00 ±0.00 MPa

Dr (%): 0.00 ±0.00

φ (degrees): 0.00 ±0.00 °

Unit weight: 17.64 ±0.82 kN/m³

Constrained Mod.: 9.97 ±11.22 MPa

Go: 57.08 ±16.58 MPa

Su: 80.95 ±39.23 kPa

Su ratio: 0.62 ±0.39

O.C.R.: 2.93 ±2.52

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Project: MS3 S.Felice s/P

Location:

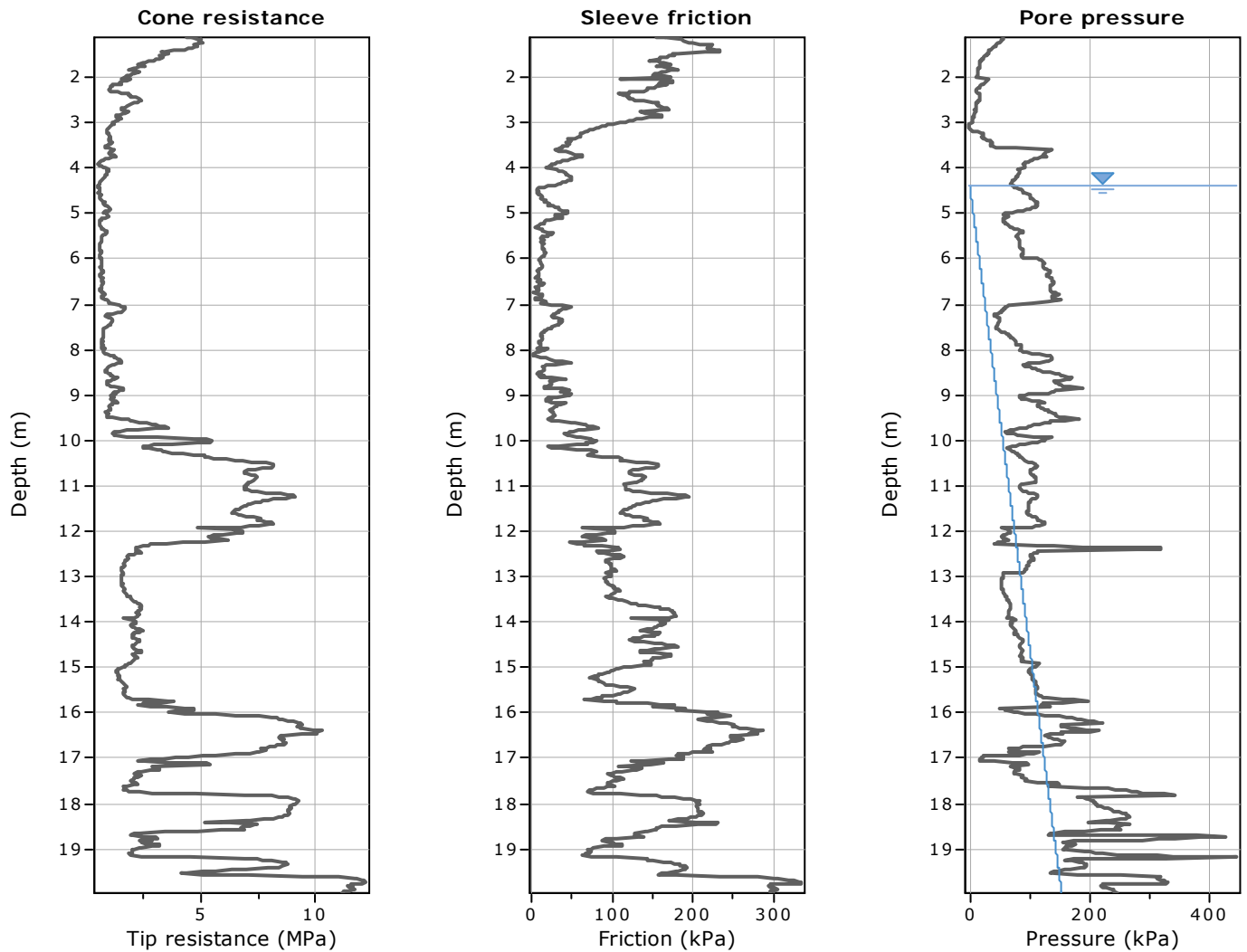
CPT: SFelice3

Total depth: 18.44 m, Date: 09/12/2019

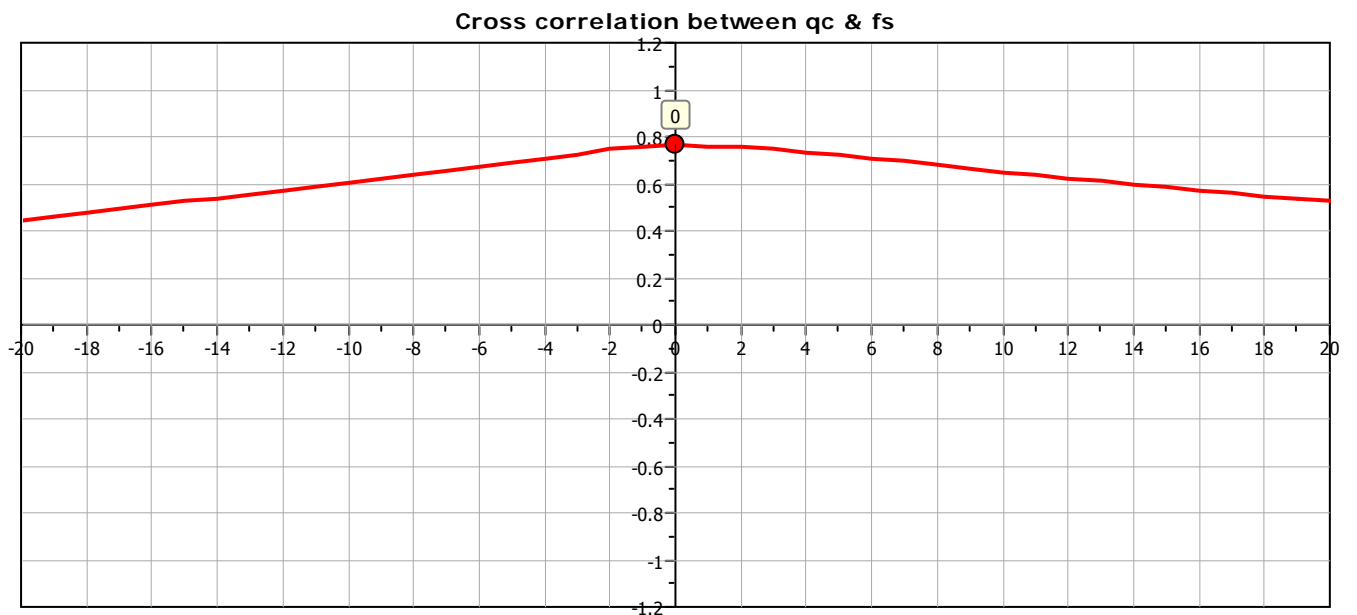
Summary table of mean values

From depth To depth (m)	Thickness (m)	Permeability (m/s)	SPT _{N60} (blows/30cm)	E _s (MPa)	D _r	Friction angle	Constrained modulus, M (MPa)	Shear modulus, G ₀ (MPa)	Undrained strength, S _u (kPa)	Undrained strength ratio	OCR	Unit weight (kN/m ³)
0.00	1.95	3.86E-08	4.8	29.8	0.0	0.0	14.7	30.9	75.1	1.5	9.4	17.1
1.95		(±3.74E-08)	(±0.7)	(±29.8)	(±0.0)	(±0.0)	(±3.3)	(±2.8)	(±18.8)	(±0.3)	(±3.0)	(±0.2)
1.95	0.15	4.67E-07	5.5	22.8	31.1	34.4	21.2	28.4	0.0	0.0	0.0	16.6
2.10		(±5.78E-07)	(±0.7)	(±1.2)	(±0.8)	(±0.3)	(±4.4)	(±1.5)	(±0.0)	(±0.0)	(±0.0)	(±0.2)
2.10	0.40	4.50E-08	4.1	22.8	0.0	0.0	10.6	25.2	55.1	1.1	6.4	16.4
2.50		(±3.79E-07)	(±1.1)	(±0.5)	(±0.0)	(±0.0)	(±7.4)	(±3.8)	(±31.6)	(±0.5)	(±4.7)	(±0.4)
2.50	7.32	1.36E-09	4.5	0.0	0.0	0.0	5.3	34.8	40.2	0.6	2.5	17.1
9.82		(±7.85E-10)	(±1.0)	(±0.0)	(±0.0)	(±0.0)	(±2.5)	(±7.2)	(±9.2)	(±0.2)	(±0.8)	(±0.6)
9.82	8.48	2.96E-09	8.3	0.0	0.0	0.0	10.0	57.1	81.0	0.6	2.9	17.6
18.30		(±1.07E-08)	(±2.4)	(±0.0)	(±0.0)	(±0.0)	(±11.2)	(±16.6)	(±39.2)	(±0.4)	(±2.5)	(±0.8)

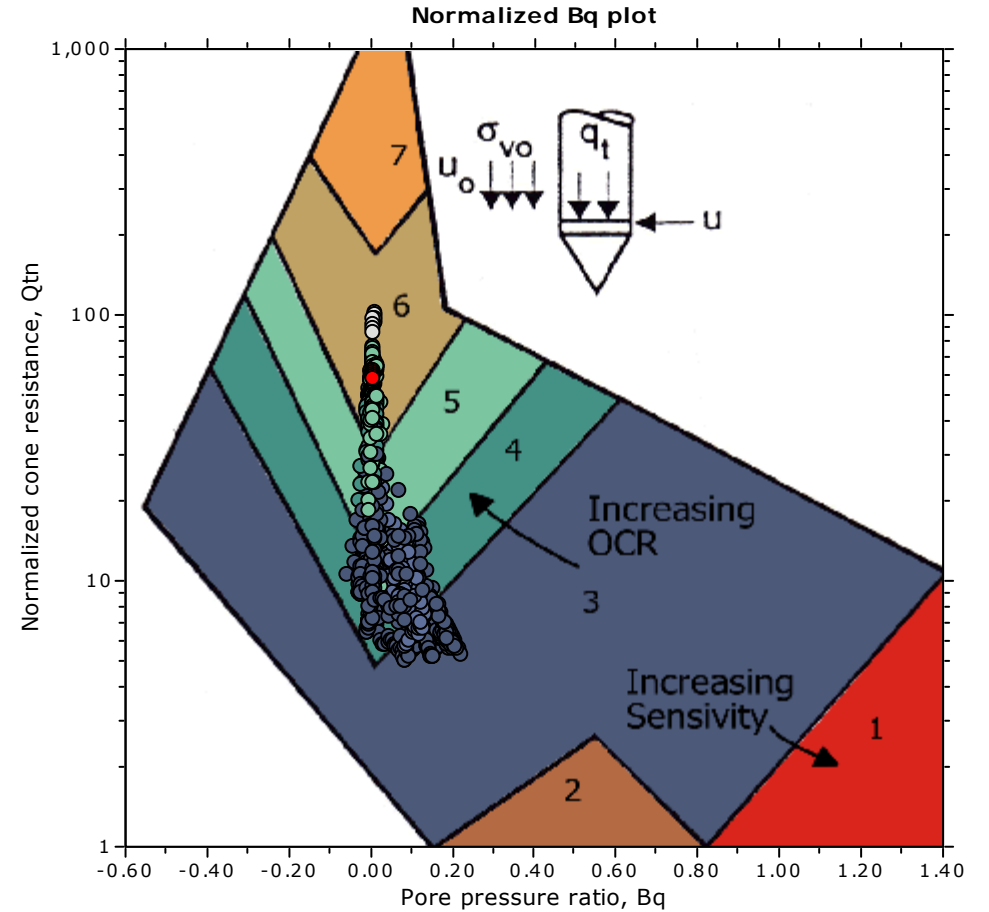
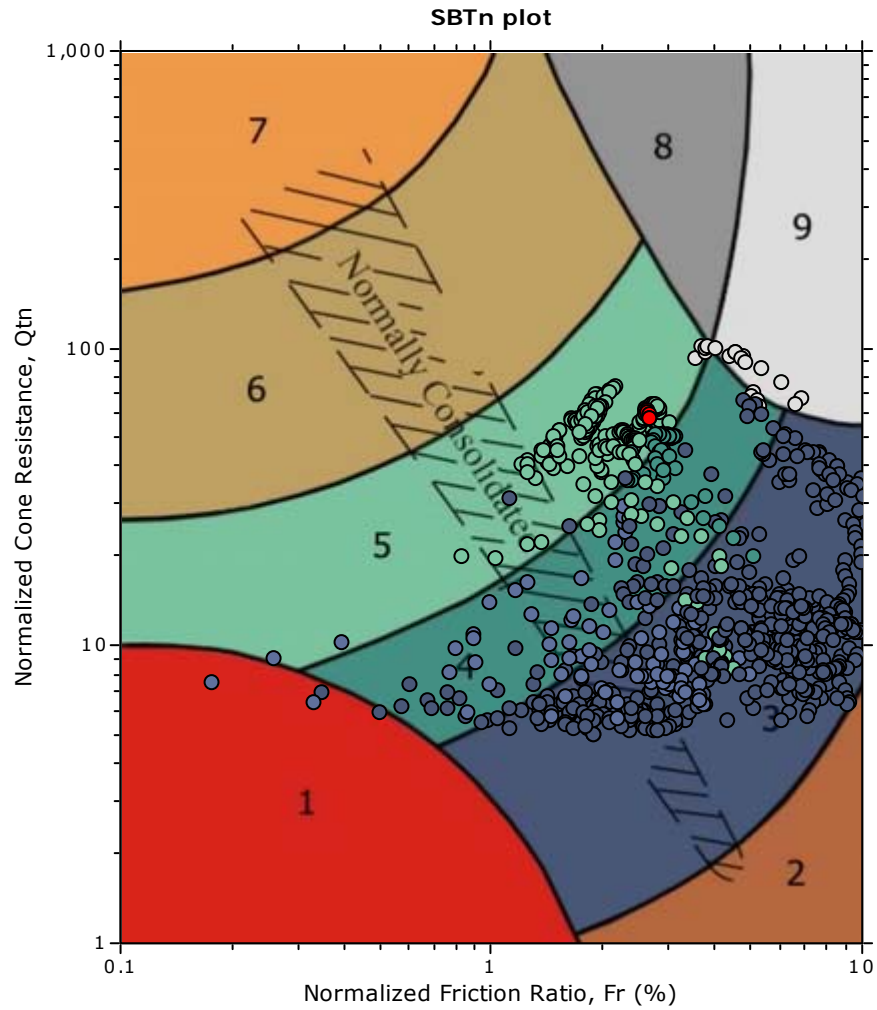
Depth values presented in this table are measured from free ground surface



The plot below presents the cross correlation coefficient between the raw q_c and f_s values (as measured on the field). X axes presents the lag distance (one lag is the distance between two successive CPT measurements).

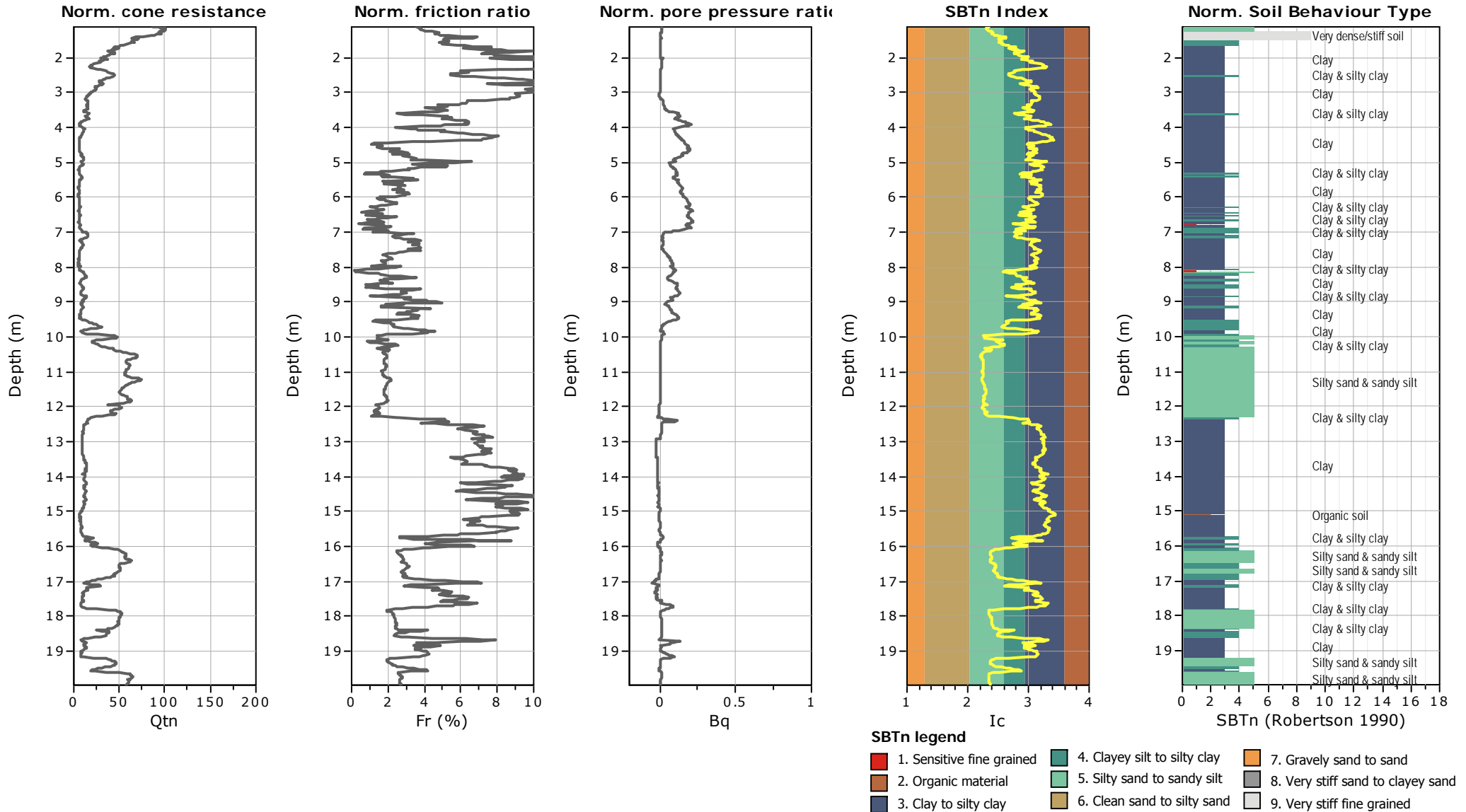


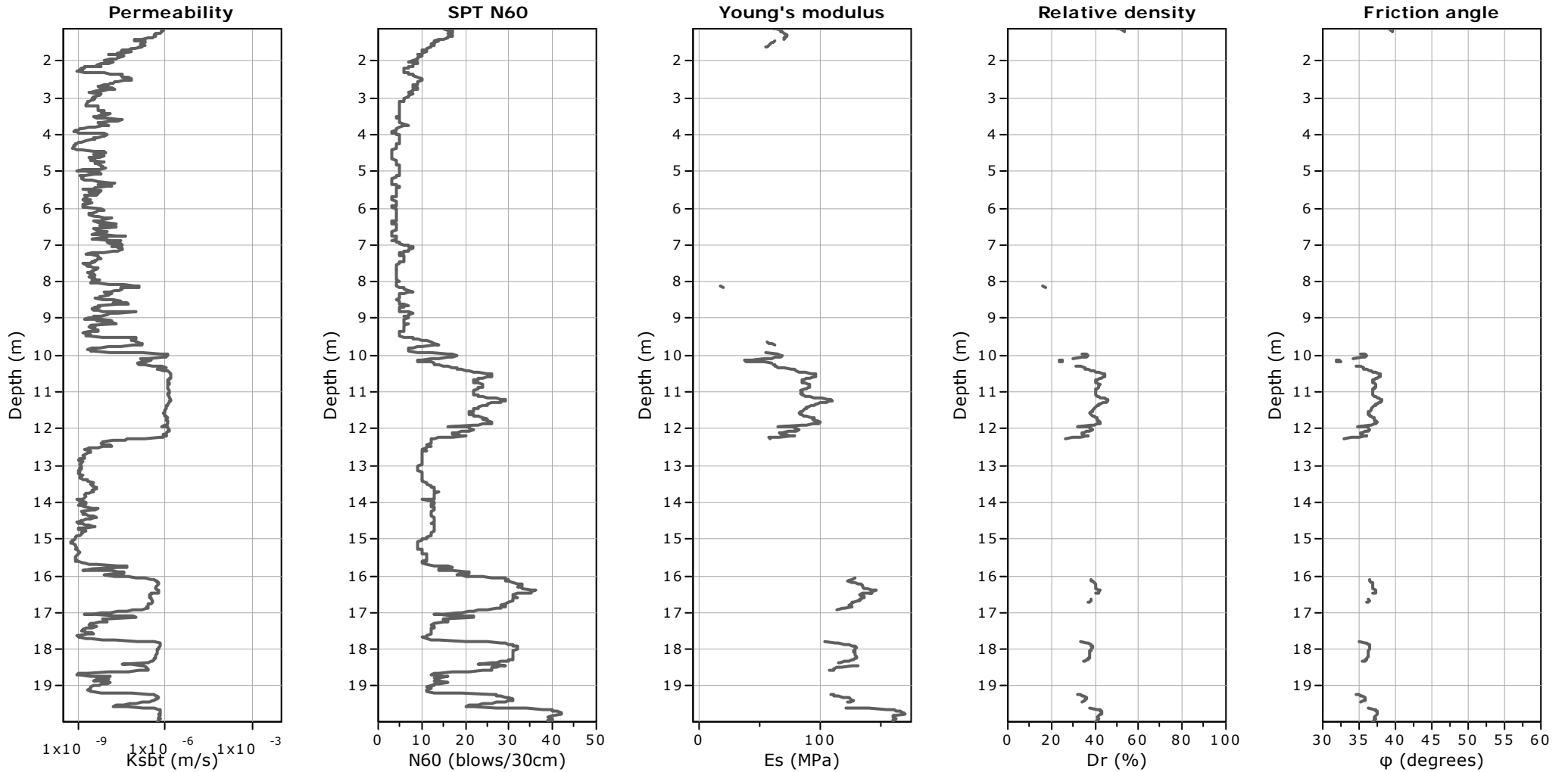
SBT - Bq plots (normalized)



SBTn legend

- | | | |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand |
| 2. Organic material | 5. Silty sand to sandy silt | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay | 6. Clean sand to silty sand | 9. Very stiff fine grained |





Calculation parameters

Permeability: Based on SBT_n

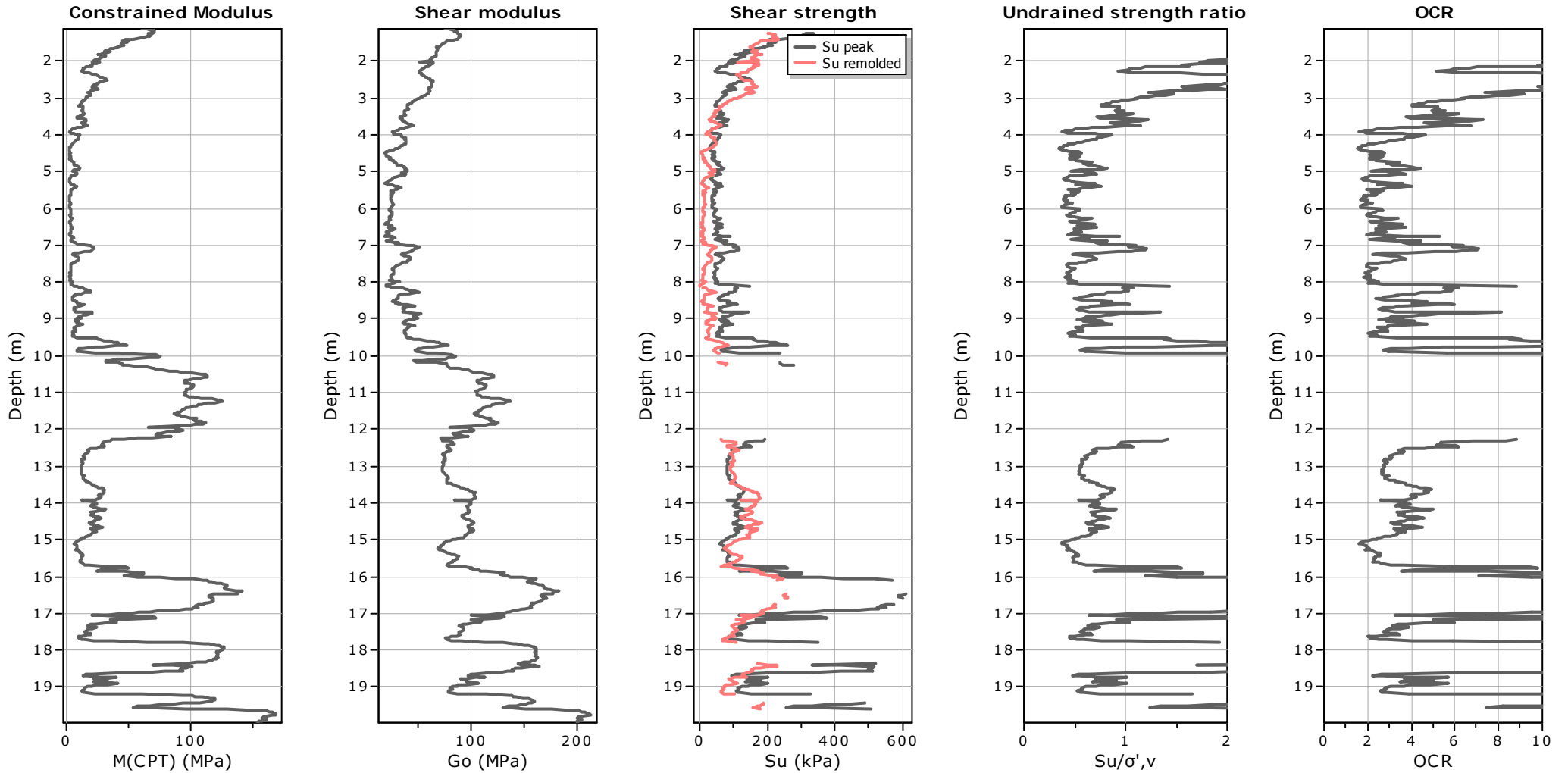
SPT N₆₀: Based on I_c and q_t

Young's modulus: Based on variable alpha using I_c (Robertson, 2009)

Relative density constant, C_D: 350.0

Phi: Based on Kulhawy & Mayne (1990)

● — User defined estimation data



Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_{tm} (Robertson, 2009)

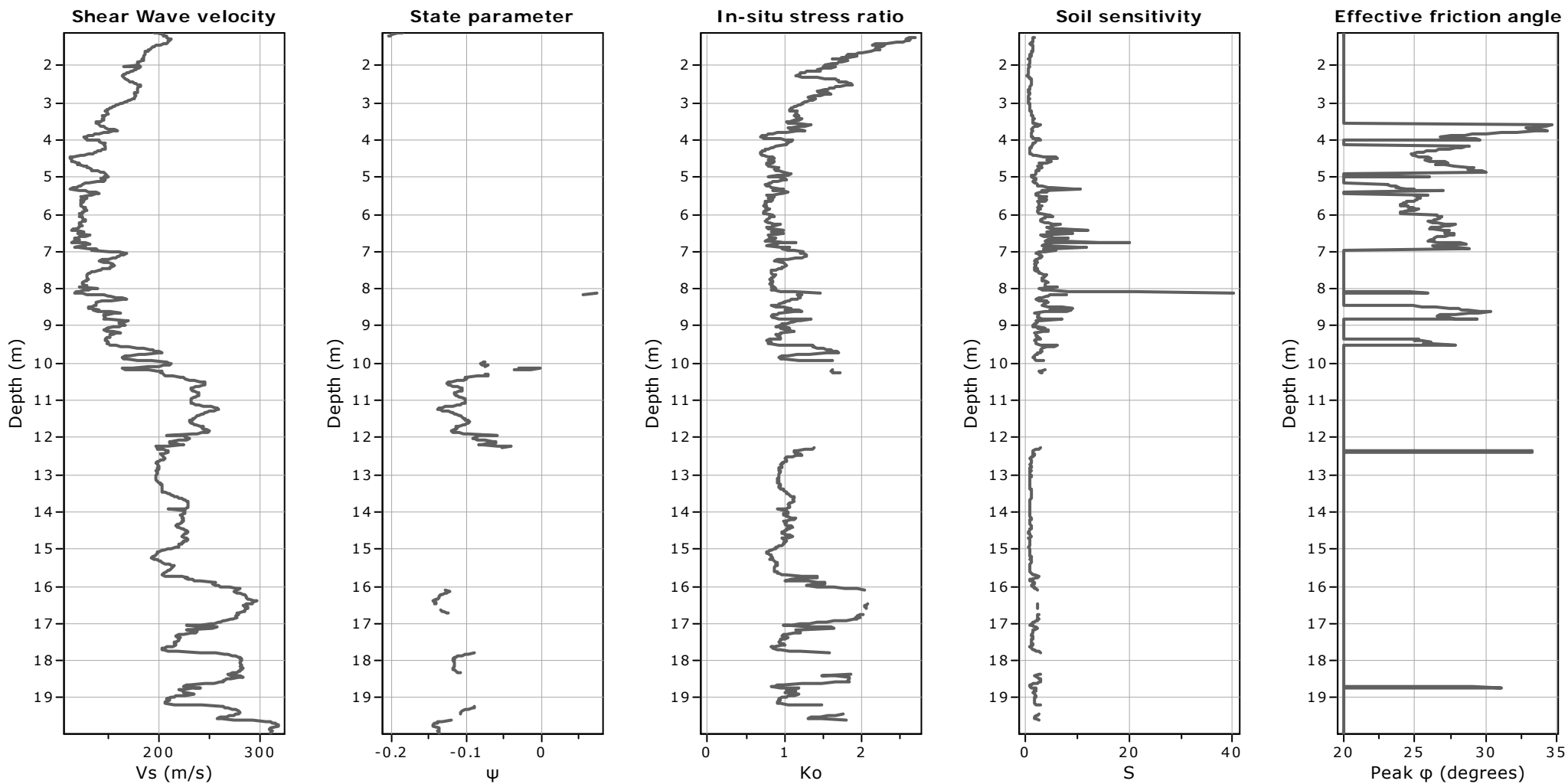
Go: Based on variable *alpha* using I_c (Robertson, 2009)

Undrained shear strength cone factor for clays, N_{kt} : Auto

OCR factor for clays, N_{kt} : Auto

● User defined estimation data

● Flat Dilatometer Test data



Calculation parameters

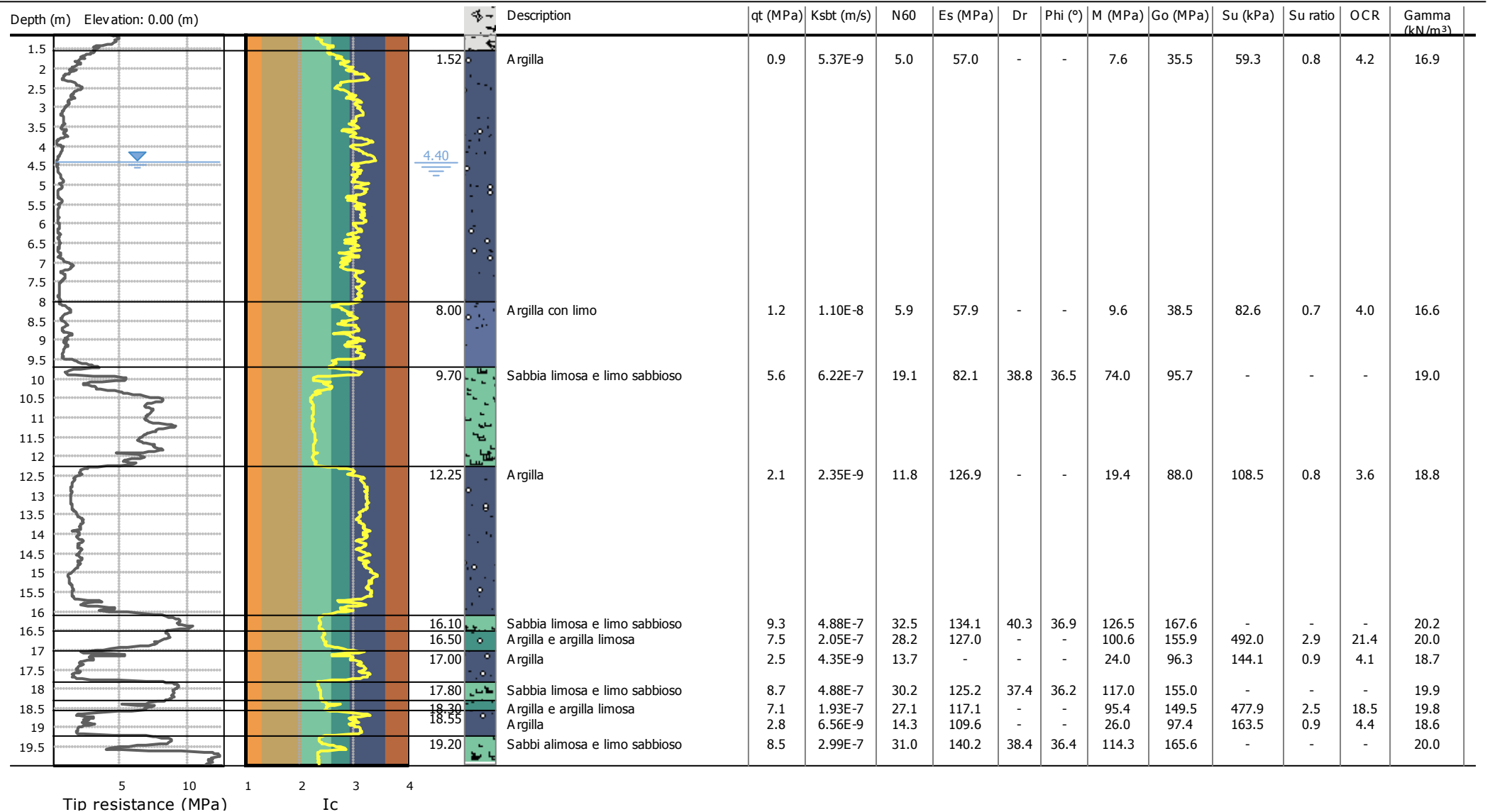
Soil Sensitivity factor, N_s : 7.10

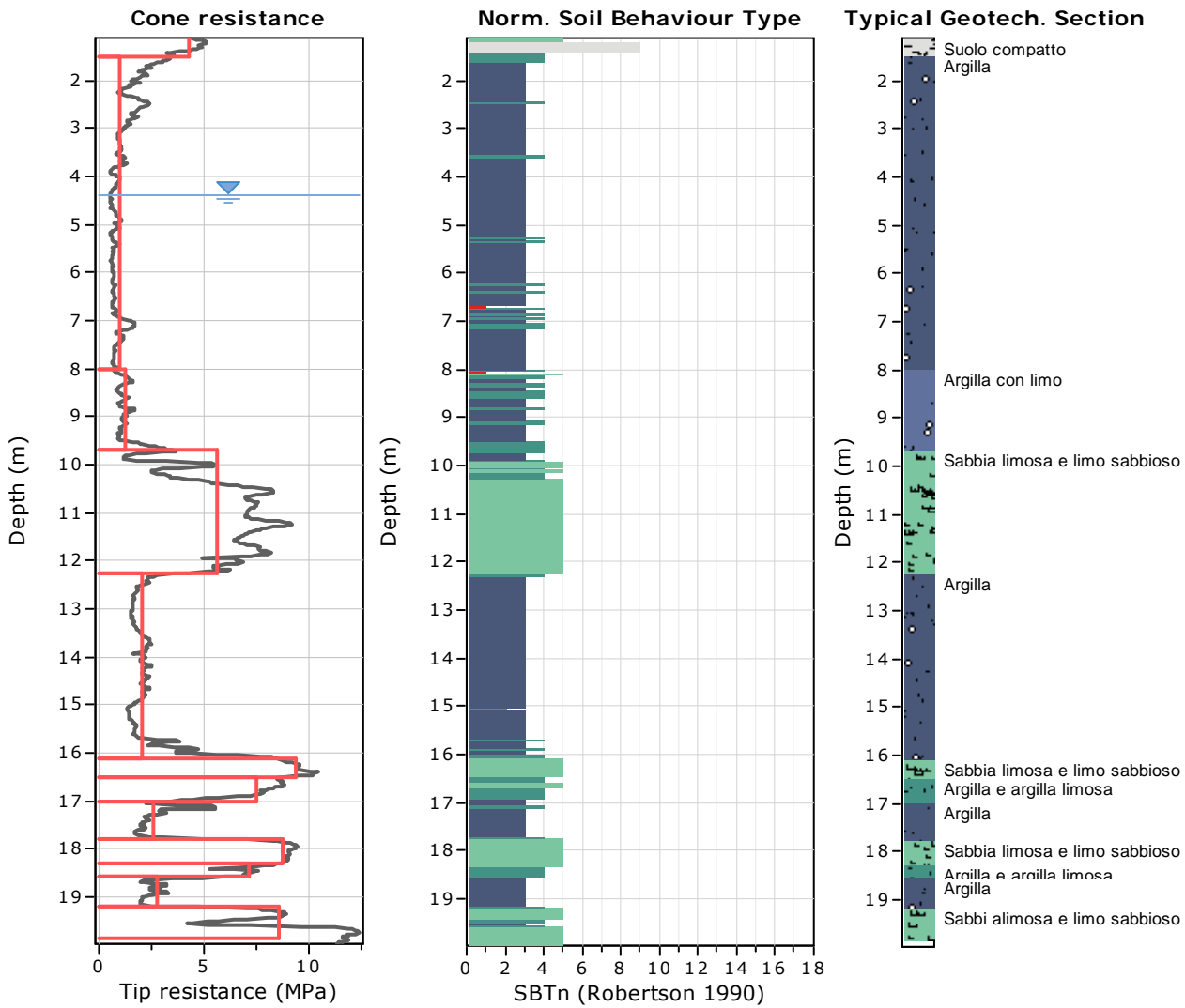
—●— User defined estimation data

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Project: MS3 S.Felice s/P
 Location:

CPT: SFelice4
 Total depth: 19.97 m





Tabular results

:: Layer No: 1 ::		
Code: 1	Start depth: 0.00 (m), End depth: 1.52 (m)	
Description: Suolo compatto		
Basic results		
Total cone resistance:	4.26 ±0.67 MPa	
Sleeve friction:	197.98 ±24.04 kPa	
SBT _n :	9	
SBT _n description:	Very dense/stiff soil	
Estimation results		
Permeability:	3.43E-07 ±2.73E-07 m/s	Constrained Mod.: 59.26 ±9.47 MPa
N60:	15.29 ±1.63 blows	Go: 83.68 ±5.54 MPa
Es:	67.35 ±5.16 MPa	Su: 260.27 ±50.25 kPa
Dr (%):	0.00 ±0.00	Su ratio: 5.75 ±0.97
φ (degrees):	0.00 ±0.00 °	O.C.R.: 44.48 ±10.78
Unit weight:	19.63 ±0.16 kN/m ³	

.: Layer No: 2 .:

Code: 2 Start depth: 1.52 (m), End depth: 8.00 (m)

Description: Argilla

Basic results

Total cone resistance: 0.95 ±0.57 MPa

Sleeve friction: 30.71 ±60.53 kPa

SBT_n: 3SBT_n description: Clay

Estimation results

Permeability: 5.37E-09 ±2.47E-08 m/s

N60: 4.99 ±2.24 blows

Es: 56.99 ±1.66 MPa

Dr (%): 0.00 ±0.00

φ (degrees): 0.00 ±0.00 °

Unit weight: 16.91 ±1.40 kN/m³

Constrained Mod.: 7.59 ±10.28 MPa

Go: 35.51 ±14.96 MPa

Su: 59.30 ±34.32 kPa

Su ratio: 0.79 ±0.97

O.C.R.: 4.15 ±6.40

.: Layer No: 3 .:

Code: 3 Start depth: 8.00 (m), End depth: 9.70 (m)

Description: Argilla con limo

Basic results

Total cone resistance: 1.20 ±0.55 MPa

Sleeve friction: 21.26 ±16.08 kPa

SBT_n: 3SBT_n description: Clay

Estimation results

Permeability: 1.10E-08 ±3.86E-08 m/s

N60: 5.94 ±1.93 blows

Es: 57.91 ±2.00 MPa

Dr (%): 0.00 ±0.00

φ (degrees): 0.00 ±0.00 °

Unit weight: 16.58 ±0.90 kN/m³

Constrained Mod.: 9.58 ±9.50 MPa

Go: 38.47 ±10.80 MPa

Su: 82.59 ±44.74 kPa

Su ratio: 0.68 ±0.34

O.C.R.: 4.00 ±2.89

.: Layer No: 4 .:

Code: 4 Start depth: 9.70 (m), End depth: 12.25 (m)

Description: Sabbia limosa e limo sabbioso

Basic results

Total cone resistance: 5.61 ±2.07 MPa

Sleeve friction: 100.50 ±39.19 kPa

SBT_n: 5SBT_n description: Silty sand & sandy silt

Estimation results

Permeability: 6.22E-07 ±5.83E-07 m/s

N60: 19.06 ±5.58 blows

Es: 82.13 ±13.76 MPa

Dr (%): 38.77 ±4.36

φ (degrees): 36.51 ±1.19 °

Unit weight: 18.95 ±0.66 kN/m³

Constrained Mod.: 74.04 ±29.84 MPa

Go: 95.72 ±22.07 MPa

Su: 0.00 ±0.00 kPa

Su ratio: 0.00 ±0.00

O.C.R.: 0.00 ±0.00

.: Layer No: 5 .:

Code: 5 Start depth: 12.25 (m), End depth: 16.10 (m)

Description: Argilla

Basic results

Total cone resistance: 2.06 ±0.98 MPa

Sleeve friction: 119.32 ±39.00 kPa

SBT_n: 3SBT_n description: Clay

Estimation results

Permeability: 2.35E-09 ±8.44E-08 m/s

N60: 11.75 ±3.16 blows

Es: 126.89 ±1.51 MPa

Dr (%): 0.00 ±0.00

φ (degrees): 0.00 ±0.00 °

Unit weight: 18.76 ±0.42 kN/m³

Constrained Mod.: 19.45 ±15.89 MPa

Go: 88.04 ±16.99 MPa

Su: 108.52 ±67.87 kPa

Su ratio: 0.81 ±0.40

O.C.R.: 3.61 ±3.15

.: Layer No: 6 .:

Code: 6 Start depth: 16.10 (m), End depth: 16.50 (m)

Description: Sabbia limosa e limo sabbioso

Basic results

Total cone resistance: 9.33 ±0.62 MPa

Sleeve friction: 247.63 ±24.41 kPa

SBT_n: 5

SBTn description: Silty sand & sandy silt

Estimation results

Permeability: 4.88E-07 ±8.28E-08 m/s

N60: 32.51 ±2.04 blows

Es: 134.10 ±7.18 MPa

Dr (%): 40.32 ±1.19

φ (degrees): 36.90 ±0.28 °

Unit weight: 20.18 ±0.14 kN/m³

Constrained Mod.: 126.51 ±8.69 MPa

Go: 167.58 ±8.84 MPa

Su: 0.00 ±0.00 kPa

Su ratio: 0.00 ±0.00

O.C.R.: 0.00 ±0.00

.: Layer No: 7 .:

Code: 7 Start depth: 16.50 (m), End depth: 17.00 (m)

Description: Argilla e argilla limosa

Basic results

Total cone resistance: 7.50 ±1.39 MPa

Sleeve friction: 221.96 ±26.25 kPa

SBT_n: 4

SBTn description: Clay & silty clay

Estimation results

Permeability: 2.05E-07 ±1.17E-07 m/s

N60: 28.21 ±3.59 blows

Es: 127.01 ±6.90 MPa

Dr (%): 0.00 ±0.00

φ (degrees): 0.00 ±0.00 °

Unit weight: 19.97 ±0.21 kN/m³

Constrained Mod.: 100.64 ±19.57 MPa

Go: 155.92 ±12.03 MPa

Su: 492.02 ±115.32 kPa

Su ratio: 2.89 ±0.70

O.C.R.: 21.36 ±6.73

.: Layer No: 8 .:

Code: 8 Start depth: 17.00 (m), End depth: 17.80 (m)

Description: Argilla

Basic results

Total cone resistance: 2.54 ±1.04 MPa

Sleeve friction: 108.85 ±29.88 kPa

SBT_n: 3

SBTn description: Clay

Estimation results

Permeability: 4.35E-09 ±2.93E-08 m/s

N60: 13.66 ±3.24 blows

Es: 0.00 ±0.00 MPa

Dr (%): 0.00 ±0.00

φ (degrees): 0.00 ±0.00 °

Unit weight: 18.74 ±0.39 kN/m³

Constrained Mod.: 23.96 ±18.15 MPa

Go: 96.34 ±15.28 MPa

Su: 144.06 ±79.97 kPa

Su ratio: 0.85 ±0.43

O.C.R.: 4.13 ±3.39

.: Layer No: 9 .:

Code: 9 Start depth: 17.80 (m), End depth: 18.30 (m)

Description: Sabbia limosa e limo sabbioso

Basic results

Total cone resistance: 8.69 ±0.90 MPa

Sleeve friction: 192.18 ±25.91 kPa

SBT_n: 5

SBTn description: Silty sand & sandy silt

Estimation results

Permeability: 4.88E-07 ±1.22E-07 m/s

N60: 30.17 ±2.51 blows

Es: 125.19 ±6.36 MPa

Dr (%): 37.43 ±1.13

φ (degrees): 36.19 ±0.30 °

Unit weight: 19.87 ±0.23 kN/m³

Constrained Mod.: 117.00 ±12.54 MPa

Go: 155.00 ±11.57 MPa

Su: 0.00 ±0.00 kPa

Su ratio: 0.00 ±0.00

O.C.R.: 0.00 ±0.00

.: Layer No: 10 .:

Code: 10 Start depth: 18.30 (m), End depth: 18.55 (m)

Description: Argilla e argilla limosa

Basic results

Total cone resistance: 7.15 ±0.83 MPa

Sleeve friction: 185.86 ±25.16 kPa

SBT_n: 4SBT_n description: Clay & silty clay

Estimation results

Permeability: 1.93E-07 ±1.09E-07 m/s

N60: 27.09 ±1.91 blows

Es: 117.15 ±7.11 MPa

Dr (%): 0.00 ±0.00

φ (degrees): 0.00 ±0.00 °

Unit weight: 19.75 ±0.16 kN/m³

Constrained Mod.: 95.39 ±11.64 MPa

Go: 149.45 ±8.17 MPa

Su: 477.90 ±61.14 kPa

Su ratio: 2.51 ±0.30

O.C.R.: 18.45 ±3.25

.: Layer No: 11 .:

Code: 11 Start depth: 18.55 (m), End depth: 19.20 (m)

Description: Argilla

Basic results

Total cone resistance: 2.77 ±1.37 MPa

Sleeve friction: 97.06 ±30.24 kPa

SBT_n: 3SBT_n description: Clay

Estimation results

Permeability: 6.56E-09 ±6.41E-08 m/s

N60: 14.33 ±4.07 blows

Es: 109.59 ±2.10 MPa

Dr (%): 0.00 ±0.00

φ (degrees): 0.00 ±0.00 °

Unit weight: 18.64 ±0.45 kN/m³

Constrained Mod.: 26.03 ±22.94 MPa

Go: 97.44 ±17.42 MPa

Su: 163.54 ±109.75 kPa

Su ratio: 0.87 ±0.54

O.C.R.: 4.44 ±4.72

.: Layer No: 12 .:

Code: 12 Start depth: 19.20 (m), End depth: 19.87 (m)

Description: Sabbia alimosa e limo sabbioso

Basic results

Total cone resistance: 8.54 ±2.68 MPa

Sleeve friction: 211.45 ±71.86 kPa

SBT_n: 5SBT_n description: Silty sand & sandy silt

Estimation results

Permeability: 2.99E-07 ±2.66E-07 m/s

N60: 31.03 ±7.41 blows

Es: 140.24 ±22.36 MPa

Dr (%): 38.43 ±3.71

φ (degrees): 36.44 ±0.93 °

Unit weight: 19.97 ±0.48 kN/m³

Constrained Mod.: 114.35 ±37.59 MPa

Go: 165.55 ±30.07 MPa

Su: 0.00 ±0.00 kPa

Su ratio: 0.00 ±0.00

O.C.R.: 0.00 ±0.00

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Project: MS3 S.Felice s/P

Location:

CPT: SFelice4

Total depth: 19.97 m, Date: 09/12/2019

Summary table of mean values

From depth To depth (m)	Thickness (m)	Permeability (m/s)	SPT _{N60} (blows/30cm)	E _s (MPa)	D _r	Friction angle	Constrained modulus, M (MPa)	Shear modulus, G _o (MPa)	Undrained strength, S _u (kPa)	Undrained strength ratio	OCR	Unit weight (kN/m ³)
0.00	1.52	3.43E-07	15.3	67.4	0.0	0.0	59.3	83.7	260.3	5.8	44.5	19.6
1.52		(±2.73E-07)	(±1.6)	(±5.2)	(±0.0)	(±0.0)	(±9.5)	(±5.5)	(±50.3)	(±1.0)	(±10.8)	(±0.2)
1.52	6.48	5.37E-09	5.0	57.0	0.0	0.0	7.6	35.5	59.3	0.8	4.2	16.9
8.00		(±2.47E-08)	(±2.2)	(±1.7)	(±0.0)	(±0.0)	(±10.3)	(±15.0)	(±34.3)	(±1.0)	(±6.4)	(±1.4)
8.00	1.70	1.10E-08	5.9	57.9	0.0	0.0	9.6	38.5	82.6	0.7	4.0	16.6
9.70		(±3.86E-08)	(±1.9)	(±2.0)	(±0.0)	(±0.0)	(±9.5)	(±10.8)	(±44.7)	(±0.3)	(±2.9)	(±0.9)
9.70	2.55	6.22E-07	19.1	82.1	38.8	36.5	74.0	95.7	0.0	0.0	0.0	19.0
12.25		(±5.83E-07)	(±5.6)	(±13.8)	(±4.4)	(±1.2)	(±29.8)	(±22.1)	(±0.0)	(±0.0)	(±0.0)	(±0.7)
12.25	3.85	2.35E-09	11.8	126.9	0.0	0.0	19.4	88.0	108.5	0.8	3.6	18.8
16.10		(±8.44E-08)	(±3.2)	(±1.5)	(±0.0)	(±0.0)	(±15.9)	(±17.0)	(±67.9)	(±0.4)	(±3.2)	(±0.4)
16.10	0.40	4.88E-07	32.5	134.1	40.3	36.9	126.5	167.6	0.0	0.0	0.0	20.2
16.50		(±8.28E-08)	(±2.0)	(±7.2)	(±1.2)	(±0.3)	(±8.7)	(±8.8)	(±0.0)	(±0.0)	(±0.0)	(±0.1)
16.50	0.50	2.05E-07	28.2	127.0	0.0	0.0	100.6	155.9	492.0	2.9	21.4	20.0
17.00		(±1.17E-07)	(±3.6)	(±6.9)	(±0.0)	(±0.0)	(±19.6)	(±12.0)	(±115.3)	(±0.7)	(±6.7)	(±0.2)
17.00	0.80	4.35E-09	13.7	0.0	0.0	0.0	24.0	96.3	144.1	0.9	4.1	18.7
17.80		(±2.93E-08)	(±3.2)	(±0.0)	(±0.0)	(±0.0)	(±18.1)	(±15.3)	(±80.0)	(±0.4)	(±3.4)	(±0.4)
17.80	0.50	4.88E-07	30.2	125.2	37.4	36.2	117.0	155.0	0.0	0.0	0.0	19.9
18.30		(±1.22E-07)	(±2.5)	(±6.4)	(±1.1)	(±0.3)	(±12.5)	(±11.6)	(±0.0)	(±0.0)	(±0.0)	(±0.2)
18.30	0.25	1.93E-07	27.1	117.1	0.0	0.0	95.4	149.5	477.9	2.5	18.5	19.8
18.55		(±1.09E-07)	(±1.9)	(±7.1)	(±0.0)	(±0.0)	(±11.6)	(±8.2)	(±61.1)	(±0.3)	(±3.2)	(±0.2)
18.55	0.65	6.56E-09	14.3	109.6	0.0	0.0	26.0	97.4	163.5	0.9	4.4	18.6
19.20		(±6.41E-08)	(±4.1)	(±2.1)	(±0.0)	(±0.0)	(±22.9)	(±17.4)	(±109.8)	(±0.5)	(±4.7)	(±0.4)

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Project: MS3 S.Felice s/P

Location:

CPT: SFelice4

Total depth: 19.97 m, Date: 09/12/2019

Summary table of mean values

From depth To depth (m)	Thickness (m)	Permeability (m/s)	SPT _{N60} (blows/30cm)	E _s (MPa)	D _r	Friction angle	Constrained modulus, M (MPa)	Shear modulus, G ₀ (MPa)	Undrained strength, S _u (kPa)	Undrained strength ratio	OCR	Unit weight (kN/m ³)
19.20	0.67	2.99E-07	31.0	140.2	38.4	36.4	114.3	165.6	0.0	0.0	0.0	20.0
19.87		(±2.66E-07)	(±7.4)	(±22.4)	(±3.7)	(±0.9)	(±37.6)	(±30.1)	(±0.0)	(±0.0)	(±0.0)	(±0.5)

Depth values presented in this table are measured from free ground surface