
FUGRO NV / UNIVERSITY OF EDINBURGH
GREECE - KEFALONIA
ODYSSEUS UNBOUND PROJECT - DRILLING FOR ITHACA
GEOLOGICAL INVESTIGATION REPORT

folder n° 10P-0096-a00

Mission carried out at the request of : **UNIVERSITY OF EDINBURGH**
Grant Institute of Earth Science
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Scotland, U.K.

Mission carried out for the account of : **FUGRO NV**
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Date of investigations : September 2010 to February 2011

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1 GENERAL INFORMATIONS

1.1 HISTORICAL CONTEXT

Over the past seven years, Geological, Geophysical and Geomorphological Evidence has been collected by a team of geoscientists from the University of Edinburgh and Fugro NV, world experts in geo-technical methods, in the quest to test whether there is a basis for the relocation of Odysseus' Homeland, Ancient Ithaca to the Western Kefalonian peninsula of Paliki. The investigation has focused upon understanding the surface geology and the subsurface character of the Thinia Valley that separates Paliki from the main body of Kefalonia, through traditional fieldwork and geophysical investigation. For the theory to be valid, the Thinia Valley would have had to have lain below sea-level as recently as 2000-3000 years ago, as described by Strabo and in Homer's epic poem, The Odyssey. Because of the description in his work Geography, the marine channel being investigated is refereed to hereafter as "Strabo's Channel".

One borehole drilled 4 years ago to ground-truth the subsurface and the occurrence of Holocene marine sediments in the top 40m (67.5-107.5m above present sea-level) suggested that the theory was worthy of further investigation. Subsequent field studies have verified the possibility that a marine channel did once run through the valley and that it has since been uplifted and transected by faults primarily as a result of slope collapse and rotational slumping.

The project team led by John Underhill, and which Fugro NV is actively supporting, has recently submitted and been granted a marine permit to drill and core in the Gulf of Livadi to further understand the development and evolution of Strabo's Channel. The team is now proposing to undertake an onshore drilling programme in the Thinia Valley and neighbouring Paliki Peninsula, during September to December 2010 to supplement and enhance the offshore borehole studies. These onshore boreholes will be the critical test of whether "Strabo's Channel" existed or not.

1.2 ADMINISTRATIVE CONTEXT

Following our estimate n° 1011D581 of the 03/09/2010, Fugro NV entrusted to Fugro Geotechnique the realization of geological investigation on the island of Kefalonia in Greece.

The services of Fugro Géotechnique have been carried out within the framework of French standard NF P94-500 of December 2006 about the classification of the geotechnical engineering services.

1.3 LOCATION

The island of Kefalonia is located on Ionian sea, in the north-west of Peloponnese peninsula (*cf. situation map below*).



Boreholes locations are shown on aerial view provided on **Appendix n° 1**.

2 CARRIED OUT WORK

2.1 SUM UP

Geological investigation realized on Kefalonia island included :

- 2 destructive drilling (drill out method) : these boreholes are identified with a “**B**” letter.
- 17 continuous coreholes with soil samples collection : these boreholes are identified with a “**C**” letter.

Drilling program (boreholes location and depth) has been defined, day after day, by Professor John Underhill (from University of Edinburgh) in accordance with Steve Poulter (project manager from Fugro Engineering Services Ltd) and Fugro Geotechnique staff.

Boreholes data are synthesized on the following table :

location	n°	COORDINATES (WGS 84 - Zone 34S)			depth (m)	date
		Easting (X)	Northing (Y)	Altitude (Z)*		
Fakimia hilltop	B1	448790	4241865	199	90.0	from 05 to 08/01/2011
Lakties hillside	B2	449264	4240882	295	103.0	from 31/01 to 03/02/2011
Thinia quarry anomaly	C1	453255	4236865	212	19.7	from 14 to 15/01/2011
Agia Kiriaki area	C2	453851	4239838	56	67.9	from 07 to 15/10/2010
River valley south of Zola	C3	-	-	-	-	-
Agia Sotira	C4a	453030	4236211	179	120.0	from 02 to 15/12/2010
	C4b	452938	4236135	166	90.5	from 20/10 to 02/11/2010
	C4c	453053	4236064	192	42.7	from 10 to 13/01/2011
Katachori paleo-lakebed	C5a	452924	4236652	178	30.0	from 17 to 20/12/2010
	C5b	452886	4236474	174	23.7	from 16 to 19/10/2010
	C5c	452751	4236115	164	102.2	from 03/11 to 01/12/2010
	C5d	452724	4236552	172	14.5	from 15 to 17/12/2010
	C5d2	452791	4236597	171	24.0	from 20 to 22/12/2010
	C5e	452847	4236168	160	22.2	from 27 to 28/01/2011
Livadi raised harbour	C6a	449569	4237613	-2	26.4	from 27 to 30/09/2010
	C6b	449583	4237086	-3	24.7	from 01 to 04/10/2010
	C6c	449729	4236722	-4	39.0	from 05 to 07/10/2010
Atheras valley	C7a	448472	4243008	10	15.0	from 29 to 31/01/2011
	C7b	-	-	-	-	-
2006 borehole calibration	C2006	452797	4234580	101	58.5	from 17 to 24/01/2011
	C2006-2	452795	4234620	99	21.4	from 25 to 26/01/2011

** altitude data are provided for information.
these measures can't be considered as reliable towards the equipment used*

The rig used during this campaign is a 6 tons weight Ecofore CE-603.

The length of the sample steel barrels is max. 1,6 m long for a ø 100 mm large diameter.

Boreholes layout and coreboxes pictures are provides on **Appendix n° 2 & 3**.

2.2 DATA COLLECTION

Some samples were dispatched to Fugro-Robertson in order to realize paleontological studies.

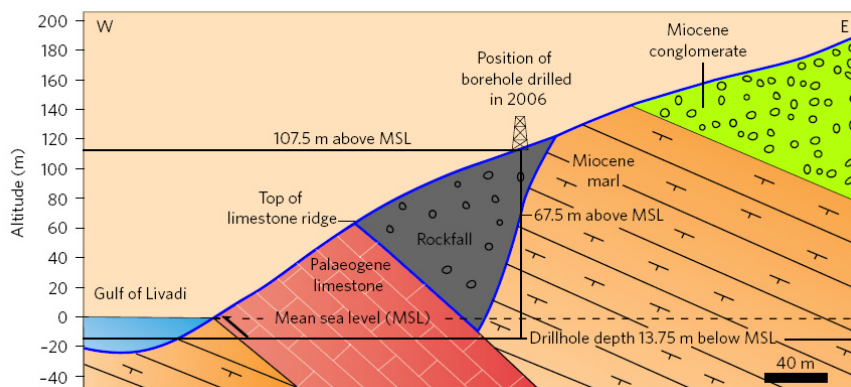
These studies aim to define the age of the formations encountered, by using a biostrat or nanofossil method.

The listing of Fugro Robertson results is provided on **Appendix n° 4 & 5**.

3 GEOLOGICAL CONTEXT

As precise in our offer, the geological context of the site can be describes as follows :

- Rockfall - Miocene conglomerate - Miocene marl - Palaeogene limestone.



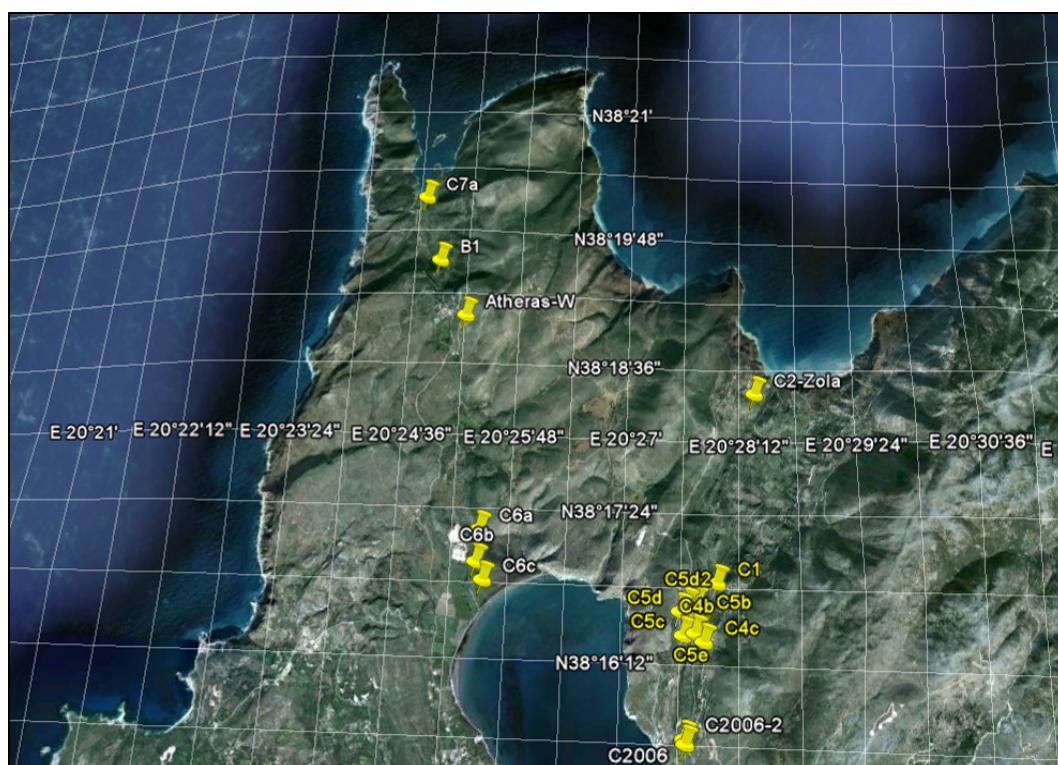
Extract from Nature Geoscience, July 2009.

Some lake sediments (from Katachori paleo-lake) and raised marine sediments (from Strabo's Channel) were also expected to be found.

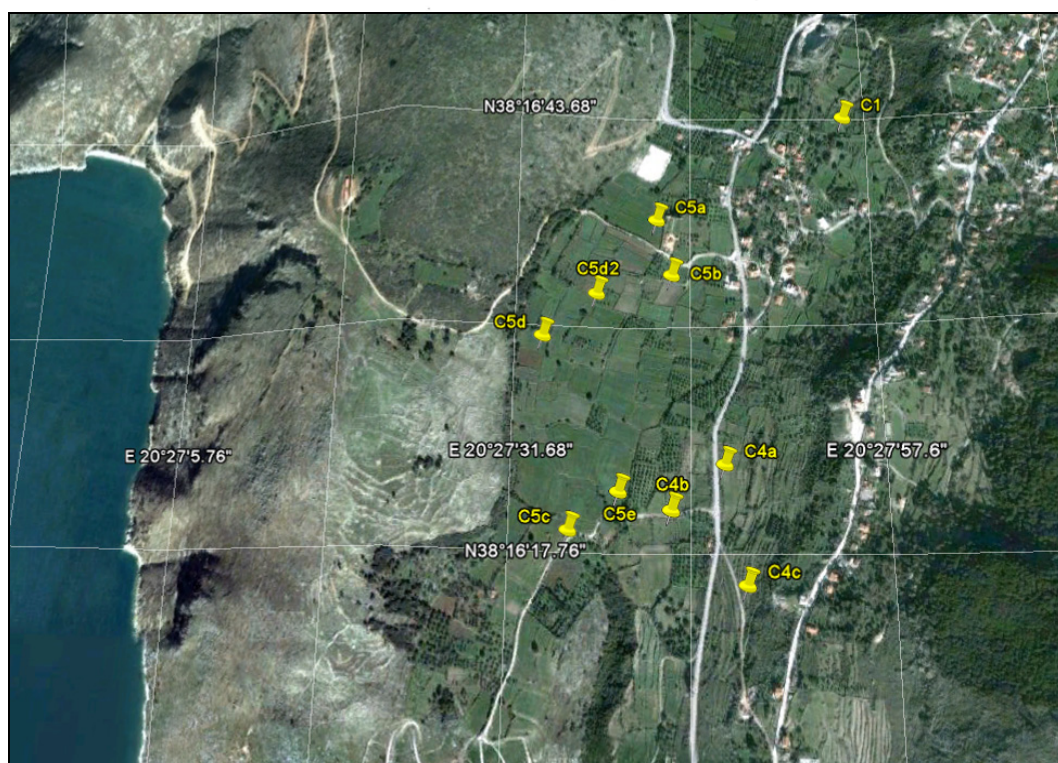
In Nanterre, the 14th March of 2011
ESA / PHE / PBU

APPENDIX

APPENDIX 1 : BOREHOLES LOCATION



Overview



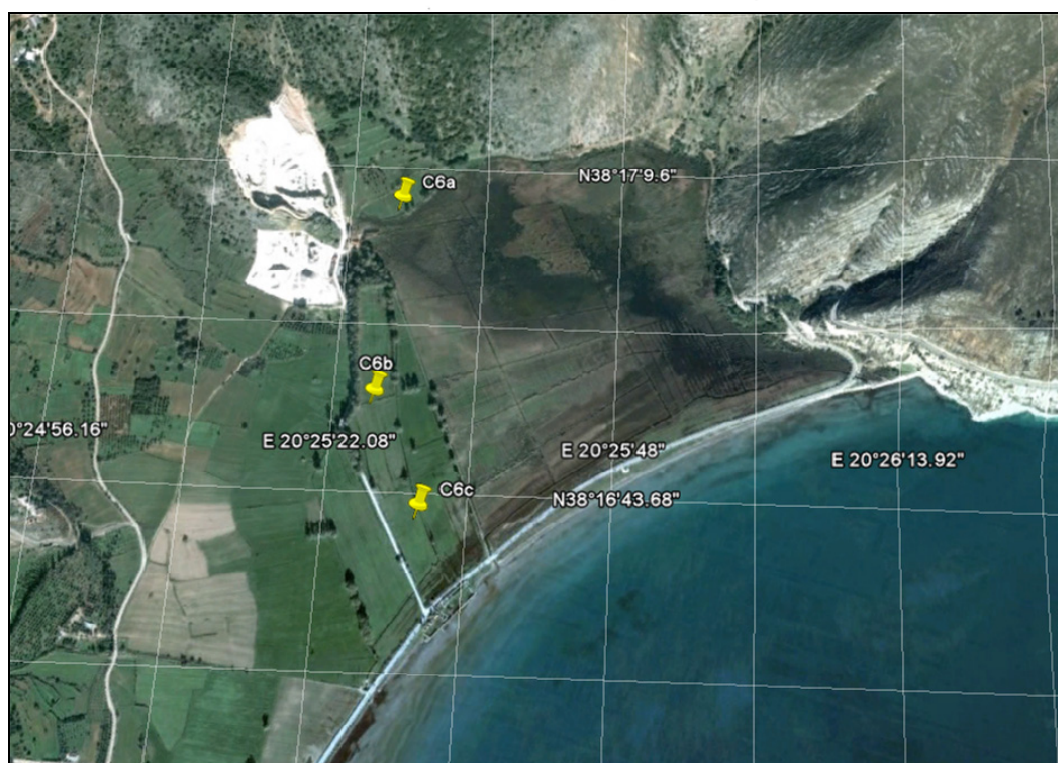
Thinia
(C1)

Agia
Sotira
(C4)

Katachori
paleo-
lakebed
(C5)



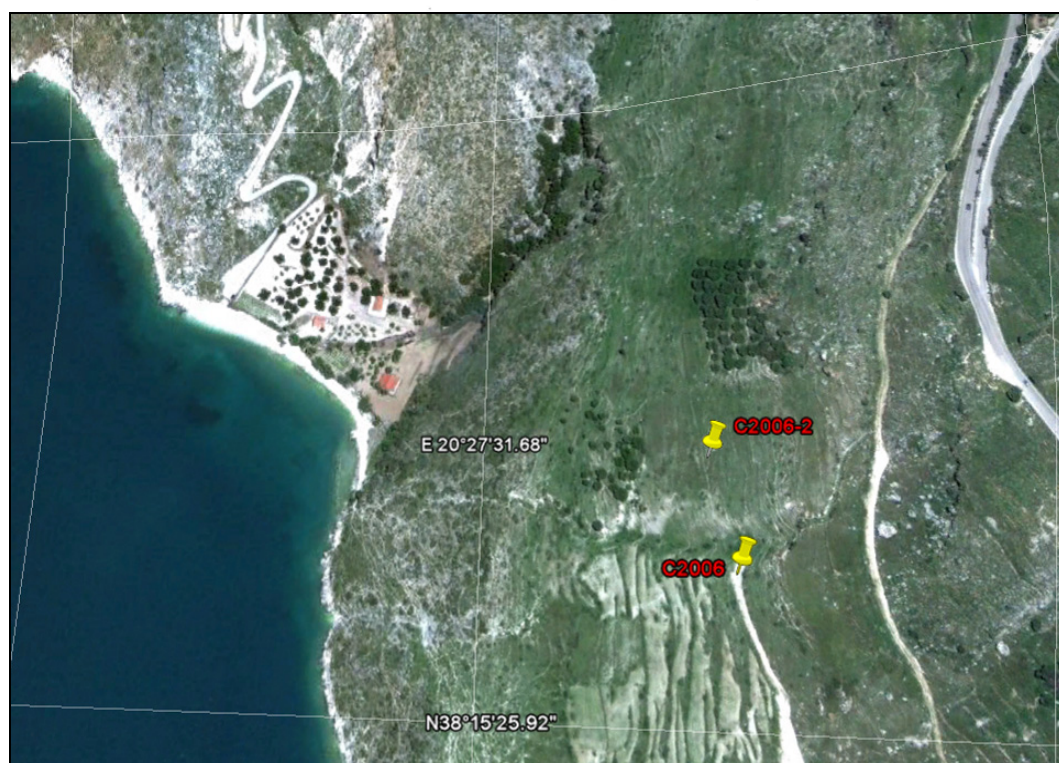
Zola
(C2)



Livadi
(C6)



Atheras
(C7)
(B1/B2)



2006
Borehole
calibration
(C2006)

APPENDIX 2 : BOREHOLES LAYOUT



KEFALONIA

ODYSSEUS Unbound Project GREECE

Contract No : 10P-096-a00

CORE DRILLING

Sampling as french standard XP P94-202

Scale 1:100e

Page : 1/1

C1-Thinia

Drilling machine : LOUISE
Drilling realized from 14/01/2011 to 15/01/2011
X : 453255.00 m Y : 4236865.00 m
Z : +212.00 m LOCAL

End depth : 19.70 m

Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	RQD (%)	Ground water level (m)	Tools	Casing	Geologic time
BOXE	0.00	HUMUS followed by CLAY, calcareous with angular white gravel. Grey			212						
	2.00				211						
	2.00				210						
BOXE	2.40	LIMESTONE, chalky, fractured, brecciated. White			209						
	3.00	LIMESTONE, very hard. Fractured (60° to subvertical), extremely closely to closely spaced, rough and open, infilled with clay and occasionally with crystalline calcite. White-cream			208						
BOXE	3.60	CLAY, gravely, dark. ?Infill of dissolution cavity ?			207						
	3.90	LIMESTONE, very hard. Fractured (60° to subvertical), extremely closely to closely spaced, rough and open, infilled with clay and occasionally with crystalline calcite. White-cream. Diacase+stylolite...			206						
BOXE	6.00	LIMESTONE. Heavily weathered- gravel size			205						
	6.30	LIMESTONE, very hard. Fractured (60° to subvertical), extremely closely to closely spaced, rough and open, infilled with clay and occasionally with crystalline calcite. White-cream / Diacase+stylolite			204						
BOXE	6.80	LIMESTONE. Heavily weathered, gravel size			203						
	7.20	LIMESTONE, very hard. Fractured (60° to subvertical), extremely closely to closely spaced, rough and open, infilled with clay and occasionally with crystalline calcite. White-cream / Diacase+stylolite			202						
BOXE	8.00	CLAY, gravely, dark. ?Infill of dissolution cavity ?			201						
	8.40	LIMESTONE, fractures in random planes, infilled as above. Cream-white / Diacase +stylolite....			200						
BOXE	8.40	LIMESTONE, fractures in random planes, infilled as above. Cream-white / Diacase +stylolite....			199						
	9.60	LIMESTONE, fractures in random planes, infilled as above. Cream-white / Diacase +stylolite....			198						
BOXE	9.80	LIMESTONE, fractures in random planes, infilled as above. Cream-white / Diacase +stylolite....			197						
	11.10	LIMESTONE, fractures in random planes, infilled as above. Cream-white / Diacase +stylolite....			196						
BOXE	11.30	LIMESTONE, fractures in random planes, infilled as above. Cream-white / Diacase +stylolite....			195						
	11.50	LIMESTONE, fractures in random planes, infilled as above. Cream-white / Diacase +stylolite....			194						
BOXE	13.10	LIMESTONE, fractures in random planes, infilled as above. Cream-white / Diacase +stylolite....			193						
	13.10	LIMESTONE, fractures in random planes, infilled as above. Cream-white / Diacase +stylolite....									
BOXE	15.10	LIMESTONE, fractures in random planes, infilled as above. Cream-white / Diacase +stylolite....									
	15.10	LIMESTONE, fractures in random planes, infilled as above. Cream-white / Diacase +stylolite....									
BOXE	15.70	LIMESTONE, fractures in random planes, infilled as above. Cream-white / Diacase +stylolite....									
	16.10	LIMESTONE, fractures in random planes, infilled as above. Cream-white / Diacase +stylolite....									
BOXE	16.70	LIMESTONE, fractures in random planes, infilled as above. Cream-white / Diacase +stylolite....									
	17.10	LIMESTONE, fractures in random planes, infilled as above. Cream-white / Diacase +stylolite....									
BOXE	17.10	LIMESTONE, fractures in random planes, infilled as above. Cream-white / Diacase +stylolite....									
	19.70	LIMESTONE, fractures in random planes, infilled as above. Cream-white / Diacase +stylolite....									

Specials remarks :



KEFALONIA

ODYSSEUS Unbound Project GREECE

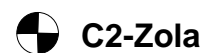
Contract No :10P-096-a00

CORE DRILLING

Sampling as french standard XP P94-202

Scale 1:100e

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Drilling machine : LOUISE
Drilling realized from 08/10/2010 to 15/10/2010
X : 453851.00 m Y : 4239838.00 m
Z : +56.00 m LOCAL

End depth : 67.90 m

Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	RQD (%)	Ground water level (m)	Tools	Casing	Geologic time
	0.00				56						
	0.70	HUMUS with gravel			55						
BOXE	1.80	CLAY with angular gravel. Chestnut brown-grey			54						
2.00	2.00	CLAY, weathered (oxidised) with ferruginous concretions. Grey			53						
BOXE	2.60				52						
4.00	4.00	CLAY, indurated. Light grey with brown patches			51						
BOXE	6.00				50						
6.00	6.70				49						
BOXE	8.00				48						
8.00					47						
BOXE	10.00				46						
10.00		MARL, thinly laminated. Grey / BIOSTRAT : Planktonics, including Orbulina universa / Neogene			45						
BOXE	12.00				44						
12.00					43						
BOXE	14.00				42						
14.00					41						
BOXE	15.30				40						
15.30	15.80	LIMESTONE, fossiliferous			39						
16.00					38						
BOXE	18.00				37						
18.00		MARL, hard, ?bedding planes subhorizontal ?. Grey			36						
BOXE	20.00										

Specials remarks :

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CORE DRILLING

Sampling as french standard XP P94-202

Scale 1:100e

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C2-Zola

Drilling machine : LOUISE
Drilling realized from 08/10/2010 to 15/10/2010
X : 453851.00 m Y : 4239838.00 m
Z : +56.00 m LOCAL
End depth : 67.90 m

Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	RQD (%)	Ground water level (m)	Tools	Casing	Geologic time
20.00	20.40	MARL, hard, ?bedding planes subhorizontal ?. Grey			36						
BOXE					35		12				
22.00	22.00				34						
BOXE					33						
24.00	24.00				32						
BOXE					31		10				
26.00	26.00				30		50				
BOXE		MARL, indurated, areas of the marl more calcareous and harder (on a meter scale), fractured (60°subvertical). Bedding seems sub-horizontal. Grey-chestnut brown / BIOSTRAT : Planktonics + Ostracods			29		40				
28.00	28.00				28						
BOXE					27						
30.00	30.00				26						
BOXE					25						
32.00	32.00				24						
BOXE					23						
34.00	34.00				22						
BOXE	34.80				21		50				
36.00	36.00				20						
BOXE					19						
38.00	38.00				18						
BOXE		LIMESTONE, very hard, frequent fossiliferous patches, bedding at 60°, fractured (calcite infill). Chestnut brown / BIOSTRAT : Planktonics + Ostracods			17						
40.00					16						

35.20
15/10/2010

Carottage avec tubage métalliq, Carottier PQ Ø 103 mm

Tubage temporaire, 114 mm

Specials remarks :



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CORE DRILLING

Sampling as french standard XP P94-202

Scale 1:100e

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C2-Zola

Drilling machine : LOUISE
Drilling realized from 08/10/2010 to 15/10/2010
X : 453851.00 m Y : 4239838.00 m
Z : +56.00 m LOCAL

End depth : 67.90 m

Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	RQD (%)	Ground water level (m)	Tools	Casing	Geologic time
BOXE	40.00	LIMESTONE, very hard, frequent fossiliferous patches, bedding at 60°, fractured (calcite infill). Chestnut brown / BIOSTRAT : Planktonics + Ostracods			16						
	42.00				15						
BOXE	42.00				14		60				
	44.00				13		30				
BOXE	44.00				12		30				
	46.00				11		30				
BOXE	46.00				10						
	48.00				9						
BOXE	48.00				8						
	50.00				7		30				
BOXE	50.00	CLAY with angular gravel - ?fault zone / BIOSTRAT : Ostracods + Planktonics, including Orbulina + Elphidium spp + Echinoid + micro bivalves.			6		40				
	52.00				5		16				
BOXE	52.00				4						
	54.00				3						
BOXE	54.00				2						
	56.00				1		30				
BOXE	56.00				0		20				
	57.70				-1						
BOXE	57.70				-2		100				
	58.00				-3		13				
BOXE	58.00	SAND, fine to medium grained, gravely and slightly clayey. Beige-grey - ?fault zone / BIOSTRAT : Planktonics, including Orbulina universa + Elphidium spp			-4		60				
	60.00				-4						
		MARL, indurated, fractured (60°). Grey / BIOSTRAT : fine biodebris									

Specials remarks :



KEFALONIA ODYSSEUS Unbound Project GREECE Contract No :10P-096-a00			CORE DRILLING Sampling as french standard XP P94-202 Scale 1:100e			C2-Zola Drilling machine : LOUISE Drilling realized from 08/10/2010 to 15/10/2010 X : 453851.00 m Y : 4239838.00 m Z : +56.00 m LOCAL End depth : 67.90 m					
Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	RQD (%)	Ground water level (m)	Tools	Casing	Geologic time
60.00 BOXE	61.50	MARL, indurated, fractured (60°). Grey / BIOSTRAT : fine biodebris			-4		75				
62.00 62.00 BOXE		LIMESTONE, sandy, conjugate fractures, calcite and occasionally clay infilled. 63.2-63.5m - ?fault zone. More weathered from 66.6m / BIO. : Planktonics, red algae, Operculina spp., Orbulina universa, Elphidium spp, Globigerinoides spp, Sphaerogypsina spp			-5		18		Carottage avec tubage métalliq, Carottier PQ Ø 103 mm	Tubage temporaire, 114 mm	
64.00 64.00 BOXE					-6		17				
66.00 66.00 BOXE					-7		24				
67.00 67.00 BOXE					-8		54				
67.90	67.90		MARL, indurated			-9		34			
					-10		50				
					-11		84				
Specials remarks :											



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CORE DRILLING

Sampling as french standard XP P94-202

Scale 1:100e

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C4a-Thinia

Drilling machine : LOUISE
Drilling realized from 30/11/2010 to 15/12/2010

X : 453030.00 m Y : 4236211.00 m
Z : +179.00 m LOCAL

End depth : 120.00 m

Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	RQD (%)	Ground water level (m)	Tools	Casing	Geologic time
	0.00				179						
	0.60	HUMUS with sand and gravel			178						
BOXE	2.00				177						
	2.00	CLAY weathered (oxidised) with ferruginous concretions. Yellowish-grey with brown patches			176						
BOXE	3.00				175						
	4.00	SILT-CLAY with angular gravel, weathered (oxidised). Dark-Grey			174						
	4.00				173						
BOXE	4.70				172						
	6.00	MARL, ?bedding planes subhorizontal ?. Grey / Biostrat: ostracods + Elphidium spp.			171						
	6.00				170						
BOXE	8.00				169						
	8.00				168						
BOXE	9.10				167						
	9.20	Very weathered LIMESTONE (gravel size)			166						
	10.00				165						
BOXE	10.00				164						
	12.00	MARL, moderately weak, ?bedding planes subhorizontal ?. Fractures planes are 40 to 60° (rare conjugate pairs and vertical). Grey			163						
	12.00				162						
BOXE	14.00				161						
	14.00				160						
BOXE	16.00				159						
	16.00	MARL, stiff, thinly bedded and laminated. Bedding planes 60° Smooth and undulating surface. Dark grey									
BOXE	16.80										
	18.00										
BOXE	18.00										
	18.00	MARL, stiff, medium to very thickly bedded. Bedding planes 60°. Dark grey									
BOXE	20.00										

Specials remarks :



KEFALONIA

ODYSSEUS Unbound Project GREECE

Contract No :10P-096-a00

CORE DRILLING

Sampling as french standard XP P94-202

Scale 1:100e

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C4a-Thinia

Drilling machine : LOUISE
Drilling realized from 30/11/2010 to 15/12/2010
X : 453030.00 m Y : 4236211.00 m
Z : +179.00 m LOCAL
End depth : 120.00 m

Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	RQD (%)	Ground water level (m)	Tools	Casing	Geologic time
BOXE	20.00	MARL, stiff, medium to very thickly bedded. Bedding planes 60°. Dark grey			159	100	12		Carottage avec tubage métalliq, Carottier PQ Ø 103 mm	Tubage temporaire, 114 mm	
	22.00				158						
BOXE	22.00				157						
	24.00				156						
BOXE	24.00				155		10				
	26.00				154		50				
BOXE	26.00				153		40				
	28.00				152						
BOXE	28.00				151						
	30.00				150						
BOXE	30.00	MARL, stiff, thinly bedded and laminated. Bedding planes 60°. Smooth and undulating surface. Dark grey			149	100					
	32.00				148						
BOXE	32.00				147						
	34.00				146						
BOXE	34.00	Hard MARL. Inter-bedded, alternating layers of thickly bedded very stiff marl and very thinly bedded hard marl. Bedding + Fractures planes are 40 to 60° (rare conjugate pairs). Grey to dark grey			145	100	50				
	36.00				144						
BOXE	36.00				143						
	38.00				142						
BOXE	38.00				141	100					
	40.00				140						
	40.00				139						

Specials remarks :



KEFALONIA

ODYSSEUS Unbound Project GREECE

Contract No :10P-096-a00

CORE DRILLING

Sampling as french standard XP P94-202

Scale 1:100e

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C4a-Thinia

Drilling machine : LOUISE
Drilling realized from 30/11/2010 to 15/12/2010
X : 453030.00 m Y : 4236211.00 m
Z : +179.00 m LOCAL

End depth : 120.00 m

Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	RQD (%)	Ground water level (m)	Tools	Casing	Geologic time
BOXE	40.00	Hard MARL. Inter-bedded, alternating layers of thickly bedded very stiff marl and very thinly bedded hard marl. Bedding + Fractures planes are 40 to 60° (rare conjugate pairs). Grey to dark grey			139				Carottage avec tubage métalliq, Carottier PQ Ø 103 mm	Tubage temporaire, 114 mm	
BOXE	42.00				138						
BOXE	44.00				137						
BOXE	46.00				136						
BOXE	48.00				135						
BOXE	50.00				134						
BOXE	52.00				133						
BOXE	54.00				132						
BOXE	56.00				131						
BOXE	58.00				130						
BOXE	60.00	Hard MARL. Inter-bedded, alternating layers of thickly bedded very stiff marl and very thinly bedded hard marl. Bedding + Fractures planes are 40 to 60° (rare conjugate pairs) / infilled with calcite 56.7m/59.4m). Light grey / Biostrat: same as 62.4/72.9m			129				Carottage avec tubage métalliq, Couronne diamant Carottier HQ Ø 74 mm	Tubage temporaire, 90 mm	
BOXE	62.00				128						
BOXE	64.00				127						
BOXE	66.00				126						
BOXE	68.00				125						
BOXE	70.00				124						
BOXE	72.00				123						
BOXE	74.00				122						
BOXE	76.00				121						
BOXE	78.00				120						
BOXE	80.00				119						

Specials remarks :



KEFALONIA

ODYSSEUS Unbound Project GREECE

Contract No :10P-096-a00

CORE DRILLING

Sampling as french standard XP P94-202

Scale 1:100e

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C4a-Thinia



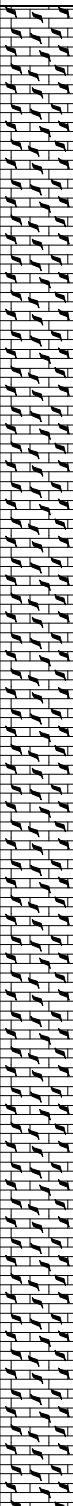
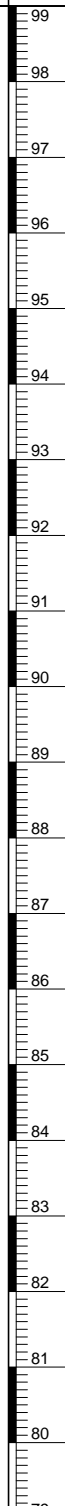
Drilling machine : LOUISE
Drilling realized from 30/11/2010 to 15/12/2010
X : 453030.00 m Y : 4236211.00 m
Z : +179.00 m LOCAL

End depth : 120.00 m

Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	RQD (%)	Ground water level (m)	Tools	Casing	Geologic time
60.00 BOXE	62.40	Hard MARL. Inter-bedded, alternating layers of thickly bedded very stiff marl and very thinly bedded hard marl. Bedding + Fractures planes are 40 to 60° (rare conjugate pairs/ infilled with calcite 56.7m/59.4m). Light grey / Biostrat: same as 62.4/72.9m			119 118 117 116 115 114 113 112 111 110 109 108 107 106 105 104 103 102 101 100 99	0 50 100	0 50 100				
62.00 62.00 BOXE											
64.00 64.00 BOXE											
66.00 66.00 BOXE											
68.00 68.00 BOXE		Hard to strong MARL. Inter-bedded, alternating layers of thickly bedded hard marl and very thinly bedded Stiff marl. Bedding + Fractures planes are 40 to 60° (rare conjugate pairs). Light grey / Biostrat: Orbulina universa + planktonic foram. + miliolids									
70.00 70.00 BOXE											
72.00 72.00 BOXE											
72.90 72.90 BOXE	72.90										
		MARL. Inter-bedded, alternating layers of thickly bedded hard marl and thinly bedded stiff (from 72.9m BH is continued by Open hole method = description is based on the visual cuttings & comportment of the gauges of the rig (injection pressure, speed..)									

Specials remarks :



KEFALONIA ODYSSEUS Unbound Project GREECE Contract No :10P-096-a00			CORE DRILLING Sampling as french standard XP P94-202 Scale 1:100e				C4a-Thinia Drilling machine : LOUISE Drilling realized from 30/11/2010 to 15/12/2010 X : 453030.00 m Y : 4236211.00 m Z : +179.00 m LOCAL End depth : 120.00 m				
Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%) 	RQD (%) 	Ground water level (m)	Tools	Casing	Geologic time
		 MARL. Inter-bedded, alternating layers of thickly bedded hard marl and thinly bedded stiff (from 72.9m BH is continued by Open hole method = description is based on the visual cuttings & comportment of the gauges of the rig (injection pressure, speed..))							Destructif en rotation, Drill bit Ø 90 mm		
Specials remarks :											



KEFALONIA ODYSSEUS Unbound Project GREECE Contract No :10P-096-a00			CORE DRILLING Sampling as french standard XP P94-202 Scale 1:100e			C4a-Thinia Drilling machine : LOUISE Drilling realized from 30/11/2010 to 15/12/2010 X : 453030.00 m Y : 4236211.00 m Z : +179.00 m LOCAL End depth : 120.00 m					
Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	RQD (%)	Ground water level (m)	Tools	Casing	Geologic time
	120.00	MARL. Inter-bedded, alternating layers of thickly bedded hard marl and thinly bedded stiff (from 72.9m BH is continued by Open hole method = description is based on the visual cuttings & comportment of the gauges of the rig (injection pressure, speed..))			79 78 77 76 75 74 73 72 71 70 69 68 67 66 65 64 63 62 61 60 59				Destructif en rotation, Drill bit Ø 90 mm		
Specials remarks :											



KEFALONIA

ODYSSEUS Unbound Project GREECE

Contract No : 10P-096-a00

CORE DRILLING

Sampling as french standard XP P94-202

Scale 1:100e

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C4b-Thinia

Drilling machine : LOUISE
Drilling realized from 20/10/2010 to 02/11/2010
X : 452938.00 m Y : 4236135.00 m
Z : +166.00 m LOCAL

End depth : 90.50 m

Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	RQD (%)	Ground water level (m)	Tools	Casing	Geologic time
	0.00				166						
	0.60	HUMUS			165						
BOXE	2.00				164						
	2.00	CLAY, calcareous with angular gravel White			163						
BOXE	2.80				162						
	4.00				161						
	4.00	LIMESTONE, very hard, fractured (60°subvertical) infilled with crystalline calcite, occasionally clay. White / BIOSTRAT : Planktonic, including Morozovella spp			160						
BOXE	6.40				159						
	6.60				158						
BOXE	6.80				157						
	8.40				156						
	8.40				155						
BOXE	10.40				154						
	10.40	LIMESTONE, fractured (inclined at 60°), infilled with calcite, fossiliferous from 9.7m. Cream-white / BIOSTRAT : Thaumatoporella, miliolids and ostracods			153						
BOXE	12.40				152						
	12.40				151						
BOXE	14.10				150						
	14.10				149						
BOXE	15.80				148						
	15.80				147						
BOXE	17.80										
	17.80	LIMESTONE, brecciated, fractures in random planes, infilled as above / BIOSTRAT : Thaumatoporella, miliolids and ostracods									
BOXE	19.70										

Specials remarks :



KEFALONIA ODYSSEUS Unbound Project GREECE Contract No :10P-096-a00			CORE DRILLING Sampling as french standard XP P94-202 Scale 1:100e			C4b-Thinia Drilling machine : LOUISE Drilling realized from 20/10/2010 to 02/11/2010 X : 452938.00 m Y : 4236135.00 m Z : +166.00 m LOCAL End depth : 90.50 m						
Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	RQD (%)	Ground water level (m)	Tools	Casing	Geologic time	
BOXE	19.70 21.70	LIMESTONE, brecciated, fractures in random planes, infilled as above / BIOSTRAT : Thaumapoporella, miliolids and ostracods			146 145 144 143 142 141 140	100	13 50		Carottage avec tubage métalliq, Carottier PQ Ø 103 mm	Tubage temporaire, 114 mm		
BOXE	23.60 25.50				139 138 137		16					
BOXE	27.20 29.20		LIMESTONE, brecciated, cargneule between 28.6 and 29.2m. Increase in fractures. White / BIOSTRAT : Thaumapoporella, ostracods			136 135 134 133 132 131 130 129 128 127	40 50 40 30 100 30 60 90 100 20 40	88 88				
BOXE	30.80 33.00 35.00		LIMESTONE, broken + recalcified area -?Fault zone									
BOXE	39.00	LIMESTONE, brecciated, cargneule between. Increase in fractures. White / BIOSTRAT : Thaumapoporella, ostracods							Carottage avec tubage métalliq, Couronne diamant Carottier HQ Ø 74 mm	Tubage temporaire, 90 mm		
Specials remarks :												



KEFALONIA

ODYSSEUS Unbound Project GREECE

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CORE DRILLING

Sampling as french standard XP P94-202

Scale 1:100e

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C4b-Thinia

Drilling machine : LOUISE
Drilling realized from 20/10/2010 to 02/11/2010
X : 452938.00 m Y : 4236135.00 m
Z : +166.00 m LOCAL
End depth : 90.50 m

Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	RQD (%)	Ground water level (m)	Tools	Casing	Geologic time
BOXE	39.00				127	60					
					126	50					
					125	40					
					124	20					
BOXE	42.90				123	100	10				
	42.90				122	100	13				
					121	40					
					120	60					
BOXE	44.90				119	40					
	44.90				118	30					
					117	50					
					116	100	11				
BOXE	50.60				115	100					
	50.60				114	50					
					113	40					
					112	70					
BOXE	52.60				111						
	52.60				110						
					109						
					108						

LIMESTONE, brecciated, cagneule between. Increase in fractures. White / BIOSTRAT : Thaumtoporella, ostracods

LIMESTONE, sandy, centimeter scale bedding (subhorizontal). White / BIOSTRAT : Thaumtoporella

LIMESTONE, brecciated. Increase in fractures. White. Fossiliferous at 74.9m / BIOSTRAT : Thaumtoporella, miliolids and ostracods

Carottage avec tubage metalliq, Couronne diamant Carottier HQ Ø 74 mm

Tubage temporaire, 90 mm

Specials remarks :



KEFALONIA

ODYSSEUS Unbound Project GREECE

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CORE DRILLING

Sampling as french standard XP P94-202

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C4b-Thinia

Drilling machine : LOUISE
Drilling realized from 20/10/2010 to 02/11/2010
X : 452938.00 m Y : 4236135.00 m
Z : +166.00 m LOCAL

End depth : 90.50 m

Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	RQD (%)	Ground water level (m)	Tools	Casing	Geologic time
57.00 BOXE	59.70 59.70	LIMESTONE, brecciated. Increase in fractures. White. Fossiliferous at 74.9m / BIOSTRAT : Thaumaporella, miliolids and ostracods			108 107	80	36		Carottage avec tubage métalliq, Couronne diamant Carottier HQ Ø 74 mm	Tubage temporaire, 90 mm	
64.00 64.00					106 105	25					
BOXE					104 103	30 40					
68.90 68.90					102 101	60 30					
BOXE					100 99	40					
68.90 68.90					98 97	40					
BOXE					96 95	60	13				
72.80 72.80					94 93	70	16				
BOXE					92 91	100 40	13				
74.80 74.80					90 89		88				
BOXE	77.40										

Specials remarks :

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ODYSSEUS Unbound Project GREECE

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CORE DRILLING

Sampling as french standard XP P94-202

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C4b-Thinia

Drilling machine : LOUISE
Drilling realized from 20/10/2010 to 02/11/2010
X : 452938.00 m Y : 4236135.00 m
Z : +166.00 m LOCAL
End depth : 90.50 m

Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	RQD (%)	Ground water level (m)	Tools	Casing	Geologic time
BOXE	77.40	LIMESTONE, brecciated. Increase in fractures. White. Fossiliferous at 74.9m / BIOSTRAT : Thaumatoporella, miliolids and ostracods			88	100	30		Carottage avec tubage métalliq, Couronne diamant Carottier HQ Ø 74 mm	Tubage temporaire, 90 mm	
	80.00				87	70					
BOXE	80.00				86	60					
	82.30				85	20					
BOXE	82.30	LIMESTONE, chalky, fractured, brecciated. White			84	100	100				
	82.30				83	70	20				
BOXE	84.30	LIMESTONE, brecciated. Increase in fractures. White			82	50	24				
	84.30				81	100					
BOXE	87.90				80	50					
	87.90				79	30					
BOXE	90.50				78	80					
	90.50				77	50					

Specials remarks :



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CORE DRILLING

Sampling as french standard XP P94-202

Scale 1:100e

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C4c-Thinia

Drilling machine : LOUISE
Drilling realized from 10/01/2011 to 13/01/2011

X : 453053.00 m Y : 4236064.00 m
Z : +192.00 m LOCAL

End depth : 42.70 m

Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	Ground water level (m)	Tools	Casing	Geologic time
	0.00				192					
	0.40	HUMUS with sand and gravel			191					
BOXE	1.70	CLAY weathered (oxidised) with ferruginous concretions. Grey with brown patches			190					
	2.00				189					
BOXE	3.50	MARL, very weathered (oxidised). Grey			188					
	4.00				187					
	4.30	MARL, moderately weak, ? Bedding plane difficult to determine. Grey			186					
BOXE					185					
	6.00				184					
BOXE					183					
	8.00				182					
BOXE					181					
	10.00				180					
BOXE					179					
	12.00				178					
BOXE					177					
	14.00				176					
BOXE					175					
	16.00				174					
BOXE					173					
	18.00				172					
BOXE										
	20.00									

Specials remarks :



KEFALONIA

ODYSSEUS Unbound Project GREECE

Contract No :10P-096-a00

CORE DRILLING

Sampling as french standard XP P94-202

Scale 1:100e

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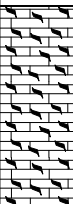
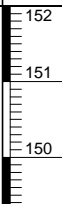
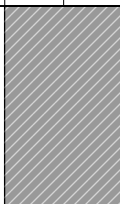
C4c-Thinia

Drilling machine : LOUISE
Drilling realized from 10/01/2011 to 13/01/2011
X : 453053.00 m Y : 4236064.00 m
Z : +192.00 m LOCAL
End depth : 42.70 m

Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	Ground water level (m)	Tools	Casing	Geologic time
BOXE	20.00	MARL, stiff, alternating with thinly layers of sandstone/sandy-limestone at 5.4m, 7.6m and from 12.8 to 13.4m. Unit is thinly bedded and laminated until 16m and from 16.5 to 20.5m. Bedding planes 60°. Dark grey			172			Carottage avec tubage metalliq, Carottier PQ Ø 103 mm	Tubage temporaire, 103 mm	
BOXE	22.00				171					
BOXE	22.80				170					
BOXE	24.00				169					
BOXE	24.00				168					
BOXE	26.00				167					
BOXE	26.00				166					
BOXE	28.00				165					
BOXE	28.00				164					
BOXE	30.00				163					
BOXE	30.00	Hard MARL. Inter-bedded, alternating layers of thickly bedded hard marl and very thinly bedded Clayey limestone (?Clast ? / centimetric scale limestone at 28.3, 24 & 27.4m). Bedding + Fractures planes are 40 to 60° (rare conjugate pairs). Light grey			162					
BOXE	32.00				161					
BOXE	32.00				160					
BOXE	34.00				159					
BOXE	34.00				158					
BOXE	36.00				157					
BOXE	36.00				156					
BOXE	38.00				155					
BOXE	38.00				154					
BOXE	40.00				153					
					152					

Specials remarks :



KEFALONIA ODYSSEUS Unbound Project GREECE Contract No :10P-096-a00			CORE DRILLING Sampling as french standard XP P94-202 Scale 1:100e				C4c-Thinia Drilling machine : LOUISE Drilling realized from 10/01/2011 to 13/01/2011 X : 453053.00 m Y : 4236064.00 m Z : +192.00 m LOCAL End depth : 42.70 m				
Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)		Ground water level (m)	Tools	Casing	Geologic time
40.00 BOXE 42.00 42.00 BOXE 42.70	42.70	 Hard MARL. Inter-bedded, alternating layers of thickly bedded hard marl and very thinly bedded Clayey limestone (?Clast ? / centimetric scale limestone at 28.3, 24 & 27.4m). Bedding + Fractures planes are 40 to 60° (rare conjugate pairs). Light grey							Carottage avec tubage métalliq, Couronne diamant Carottier HQ Ø 74 mm	Tubage temporaire, 74 mm	
Specials remarks :											



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ODYSSEUS Unbound Project GREECE

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CORE DRILLING

Sampling as french standard XP P94-202

Scale 1:100e

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C5a-Thinia

Drilling machine : LOUISE
Drilling realized from 17/12/2010 to 21/12/2010

X : 453924.00 m Y : 4236252.00 m
Z : +178.00 m LOCAL

End depth : 30.00 m

Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	Ground water level (m)	Tools	Casing	Geologic time
	0.00				178					
	0.70	HUMUS with sand and gravel								
BOXE	1.00	CLAY weathered (oxidised) with fine gravel			177					
	2.00				176					
BOXE	2.00	CLAY with calcareous concretions and angular gravel, weathered (oxidised). At 2m, becoming more gravelly. Dark-Grey			175					
	4.00				174					
BOXE	4.00				173					
	6.00				172					
BOXE	6.00	MARL, ?bedding planes subhorizontal ?. Light grey with brown patches / Biostrat: Cibicides spp + indeterminate planktonic			171					
	8.00				170					
BOXE	8.00				169					
	10.00				168					
BOXE	10.00	MARL, moderately weak, bedding and fractures planes are 40 to 60° (rare conjugate pairs). Grey / Biostrat: pyrite debris + Orbulina universa			167					
	12.00				166					
BOXE	12.00				165					
	14.00				164					
BOXE	14.00				163					
	16.00				162					
BOXE	16.00	MARL, sandy, stiff, thickly bedded. Bedding planes and fractures 60° (Smooth surface). Dark grey			161					
	18.00				160					
BOXE	18.00				159					
	20.00				158					

Specials remarks :



KEFALONIA ODYSSEUS Unbound Project GREECE Contract No :10P-096-a00			CORE DRILLING Sampling as french standard XP P94-202 Scale 1:100e			C5a-Thinia Drilling machine : LOUISE Drilling realized from 17/12/2010 to 21/12/2010 X : 453924.00 m Y : 4236252.00 m Z : +178.00 m LOCAL End depth : 30.00 m				
Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	Ground water level (m)	Tools	Casing	Geologic time
BOXE	20.00	MARL, sandy, stiff, thickly bedded. Bedding planes and fractures 60° (Smooth surface). Dark grey			158					
	22.00				157					
BOXE	22.00				156					
	24.00				155					
BOXE	24.00	MARL (more calcareous), sandy, very stiff, thickly bedded. Bedding planes and fractures 60°. Light grey			154					
	26.00				153					
BOXE	26.00				152					
	28.00				151					
BOXE	28.00				150					
	30.00				149					
	30.00				148					
Specials remarks :										



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CORE DRILLING

Sampling as french standard XP P94-202

Scale 1:100e

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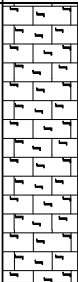

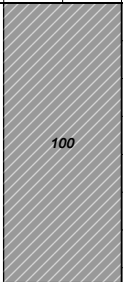
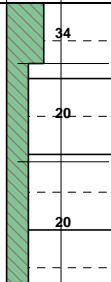
C5b-Thinia

Drilling machine : LOUISE
Drilling realized from 18/10/2010 to 20/10/2010
X : 452886.00 m Y : 4236474.00 m
Z : +174.00 m LOCAL
End depth : 23.70 m

Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	RQD (%)	Ground water level (m)	Tools	Casing	Geologic time
BOXE	0.00	CLAY, humus rich with gravel			174						
BOXE	2.00	CLAY, calcareous with angular limestone gravel. Beige with white patches. / Biostrat : Orbulina universa + indeterminate planktonics			173	100					
BOXE	4.50	CLAY, calcareous, very stiff, with decimeter scale bedding inclined at 60°. Beige grey with ochre patches. / Biostrat : shell debris + Cibicides lobatulus			172	60					
BOXE	6.50	MARL, dark grey			171	50					
BOXE	10.50	LIMESTONE, beige grey			170						
BOXE	12.50	MARL, indurated, decimeter scale bedding at ? 60°. Fracture planes (also 60°) are smooth - ?shear planes			169						
BOXE	14.40				168						
BOXE	16.10				167						
BOXE	18.10				166						
BOXE	20.00				165						

Specials remarks :



KEFALONIA ODYSSEUS Unbound Project GREECE Contract No :10P-096-a00			CORE DRILLING Sampling as french standard XP P94-202 Scale 1:100e				C5b-Thinia Drilling machine : LOUISE Drilling realized from 18/10/2010 to 20/10/2010 X : 452886.00 m Y : 4236474.00 m Z : +174.00 m LOCAL End depth : 23.70 m				
Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	RQD (%)	Ground water level (m)	Tools	Casing	Geologic time
20.00 BOXE 22.00 22.00 BOXE 23.70	23.70	 MARL, indurated, decimeter scale bedding at ? 60°. Fracture planes (also 60°) are smooth - ?shear planes							Carottage avec tubage métalliq, Carottier PQ Ø 103 mm	Tubage temporaire, 114 mm	
Specials remarks :											



KEFALONIA

ODYSSEUS Unbound Project GREECE

Contract No : 10P-096-a00

CORE DRILLING

Sampling as french standard XP P94-202

Scale 1:100e

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C5c-Thinia

Drilling machine : LOUISE
Drilling realized from 03/11/2010 to 29/11/2010

X : 452751.00 m Y : 4236115.00 m
Z : +164.00 m LOCAL

End depth : 102.20 m

Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	Ground water level (m)	Tools	Casing	Geologic time
BOXE	0.00 1.50	BACKFILL			164 163			Tubage à lavancement, Chelby Ø 114 mm		
BOXE	2.00 3.60	LIMESTONE, sandy, fractured, bedding plane dips at 60° / BIOSTRAT : Planktonic fragments + ostracods + benthic foraminifera			162 161					
BOXE	4.00 5.90	SANDSTONE, calcareous, fractured (fractures infilled with clay), bedding plane dips at 60°			160 159 158					
BOXE	6.30 6.90	CLAY, dark. Infill of dissolution cavity / BIOSTRAT : Benthic foraminifera			157					
BOXE	7.90 9.90	SANDSTONE, coarse grained, with fine white gravel. Unit is friable/poorly consolidated. Has a lenticular conglomerate zone from 9.8-10.3m			156 155 154 153					
BOXE	11.90 12.20	CLAY, sandy with angular gravel. Indurated / BIOSTRAT : Planktonic foraminifera, including Orbulina universa			152 151					
BOXE	13.30 13.90	BRECCIA, polygenic with sub rounded clasts in a clay matrix			150 149					
BOXE	15.70 15.80	SANDSTONE, medium coarse grained, fractured (friable along fractures), bedding plane dips at 60°. Yellowish			148 147 146 145					

Specials remarks :



KEFALONIA

ODYSSEUS Unbound Project GREECE

Contract No :10P-096-a00

CORE DRILLING

Sampling as french standard XP P94-202

Scale 1:100e

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C5c-Thinia

Drilling machine : LOUISE
Drilling realized from 03/11/2010 to 29/11/2010

X : 452751.00 m Y : 4236115.00 m
Z : +164.00 m LOCAL

End depth : 102.20 m

Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	Ground water level (m)	Tools	Casing	Geologic time
BOXE	19.80	SANDSTONE, medium coarse grained, fractured (friable along fractures), bedding plane dips at 60°. Yellowish			144					
BOXE	21.70				143					
BOXE	22.70	SAND, coarse grained with gravel and clay. Becoming more gravel rich at 22.7m			142					
BOXE	24.00				141					
BOXE	26.40	SANDSTONE, friable, alternating thin layers of silt between 25.8 and 26.2m			140					
BOXE	26.80				139					
BOXE	29.00	CONGLOMERATE, rounded clasts in a sandy matrix			138					
BOXE	31.10				137					
BOXE	33.10	SANDSTONE, slightly silty. Ochre becoming dark grey-grey at 27.7m			136					
BOXE	35.10				135					
BOXE	36.90	CLAY, calcareous, indurated, intraclastic until 34.3m. Bedding plane difficult to determine. Grey-dark Grey / BIOSTRAT : Planktonic foraminifera			134					
BOXE	38.90				133					

Specials remarks :



KEFALONIA

ODYSSEUS Unbound Project GREECE

Contract No :10P-096-a00

CORE DRILLING

Sampling as french standard XP P94-202

Scale 1:100e

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C5c-Thinia

Drilling machine : LOUISE
Drilling realized from 03/11/2010 to 29/11/2010
X : 452751.00 m Y : 4236115.00 m
Z : +164.00 m LOCAL

End depth : 102.20 m

Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	Ground water level (m)	Tools	Casing	Geologic time
BOXE	38.90				125					
BOXE	40.80				124					
BOXE	40.80				123					
BOXE	42.80				122					
BOXE	42.80				121					
BOXE	43.80				120					
BOXE	44.80				119					
BOXE	44.80				118					
BOXE	47.50				117					
BOXE	47.50				116					
BOXE	49.00				115					
BOXE	50.60				114					
BOXE	50.60				113					
BOXE	51.30				112					
BOXE	55.00				111					
BOXE	55.50				110					
BOXE	55.50				109					
BOXE	56.70				108					
BOXE	58.80				107					
BOXE	58.80				106					

Specials remarks :



KEFALONIA			CORE DRILLING			C5c-Thinia					
ODYSSEUS Unbound Project			Sampling as french standard XP P94-202			Drilling machine : LOUISE					
GREECE						Drilling realized from 03/11/2010 to 29/11/2010					
Contract No :10P-096-a00			Scale 1:100e			Page : 4/6					
						X : 452751.00 m Y : 4236115.00 m					
						Z : +164.00 m LOCAL					
						End depth : 102.20 m					
Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)		Ground water level (m)	Tools	Casing	Geologic time
58.80	60.40	GRAVEL, fine-coarse grained, in a sandy matrix with thin layers of clay			105	90					
		104			10						
BOXE	61.80	SAND, very loose, medium-fine grained. Grey			103	0					
		102			10						
65.00	65.00				101	5					
					100						
BOXE					99						
					98	10					
BOXE					97						
					96						
70.50	70.50	CONGLOMERATE, with sandy cement. Poorly consolidated with cemented areas increasing from 70.6m / BIOSTRAT : Pyritised gastropod + Haplophragmoides spp + planktonic foraminifera			95	5					
					94	100					
BOXE					93	40					
					92	90					
76.50					91	100					
					90	70					
					89	30					
					88	80					
					87						
					86						
Specials remarks :											

**KEFALONIA****ODYSSEUS Unbound Project
GREECE**

Contract No :10P-096-a00

CORE DRILLING

Sampling as french standard XP P94-202

Scale 1:100e

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**C5c-Thinia**Drilling machine : LOUISE
Drilling realized from 03/11/2010 to 29/11/2010X : 452751.00 m Y : 4236115.00 m
Z : +164.00 m LOCAL

End depth : 102.20 m

Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	Ground water level (m)	Tools	Casing	Geologic time
BOXE	76.50	CONGLOMERATE, with sandy cement. Poorly consolidated with cemented areas increasing from 70.6m / BIOSTRAT : Pyritised gastropod + Haplophragmoides spp + planktonic foraminifera			86					
	82.00				85					
	82.00				84					
BOXE	86.20				83					
					82					
		MARL with inclusions of CONGLOMERATE clasts and intraclasts. ?Transition zone ? / BIOSTRAT : Small planktonics, with Orbulina universa			81					
	88.20				80					
BOXE	88.60	MARL, decimeter scale beds, bedding planes subhorizontal. Conjugate fractures, mainly around 60°. Grey			79					
	90.20				78					
	90.20				77					
BOXE	94.80				76					
	94.80				75					
BOXE	96.80				74					

Carottage avec tubage métallique, Couronne diamant Carottier HQ Ø 74 mm

Tubage temporaire, 90 mm

Specials remarks :



KEFALONIA ODYSSEUS Unbound Project GREECE Contract No :10P-096-a00			CORE DRILLING Sampling as french standard XP P94-202 Scale 1:100e Page : 6/6			C5c-Thinia Drilling machine : LOUISE Drilling realized from 03/11/2010 to 29/11/2010 X : 452751.00 m Y : 4236115.00 m Z : +164.00 m LOCAL End depth : 102.20 m				
Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	Ground water level (m)	Tools	Casing	Geologic time
96.80 BOXE	98.40 98.60	MARL, decimeter scale beds, bedding planes subhorizontal. Conjugate fractures, mainly around 60°. Grey			67 66 65 64 63 62	100		Carottage avec tubage métalliq, Couronne diamant Carottier HQ Ø 74 mm	Tubage temporaire, 90 mm	
98.80 BOXE	100.70 65.00	MARL, decimeter scale beds, bedding planes subhorizontal. Conjugate fractures, mainly around 60°. Grey / BIOSTRAT : Small planctonics, Orbulina spp, Cibicides spp								
102.20	102.20									
Specials remarks :										



KEFALONIA

ODYSSEUS Unbound Project GREECE

Contract No :10P-096-a00

CORE DRILLING

Sampling as french standard XP P94-202

Scale 1:100e

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C5d-K.P.Lakebed

Drilling machine : LOUISE
Drilling realized from 15/12/2010 to 17/12/2010
X : 452724.00 m Y : 4236552.00 m
Z : +172.00 m LOCAL
End depth : 14.50 m

Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	RQD (%)	Ground water level (m)	Tools	Casing	Geologic time
	0.00				172						
	0.60	HUMUS with sand and gravel			171						
BOXE	2.00	CLAY weathered (oxidised) with ferruginous concretions. Grey with brown patches			170						
BOXE	4.00	CLAY with angular limestone-gravel, weathered (oxidised). Dark-Grey / Biostrat : Planktonics foraminifera, ?Globigerinoides spp., Orbulina universa, Cibicides spp., Elphidium spp.			169						
BOXE	4.80	CLAY sandy with weathering (oxidation). Red to chestnut brown / Biostrat : ?Planktonics foraminifera, ?Radiolaria			168						
BOXE	6.00	SILT-CLAY slightly sandy, stiff, ?bedding planes subhorizontal ?, with rounded fine gravel and charcoal concretions, weathered (oxidised). Red-Brown becoming Red at 8m			167						
BOXE	8.00				166						
BOXE	9.00				165						
BOXE	10.00	LIMESTONE (heavily weathered), very hard, fractured infilled with clay. Bedding plane difficult to determine. White / Biostrat: bivalve (?rudist) debris, Orbitoides spp.			164						
BOXE	12.00	Heavily weathered LIMESTONE (gravel size) in clayey matrix, cagneule. White			163						
BOXE	14.00	LIMESTONE, very hard, fractured, cagneule. White			162						
BOXE	14.50				161						

Specials remarks :


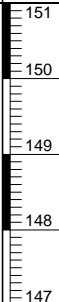
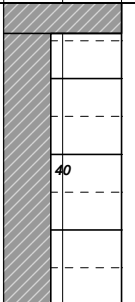


KEFALONIA			CORE DRILLING				C5d2-Thinia				
ODYSSEUS Unbound Project			Sampling as french standard XP P94-202				Drilling machine : LOUISE				
GREECE							Drilling realized from 21/12/2010 to 23/12/2010				
Contract No :10P-096-a00			Scale 1:100e				Page : 1/2				
							X : 452791.00 m Y : 4236597.00 m				
							Z : +171.00 m LOCAL				
							End depth : 24.00 m				
Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)		Ground water level (m)	Tools	Casing	Geologic time
						0 50 100					

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Specials remarks :



KEFALONIA ODYSSEUS Unbound Project GREECE Contract No :10P-096-a00			CORE DRILLING Sampling as french standard XP P94-202 Scale 1:100e				C5d2-Thinia Drilling machine : LOUISE Drilling realized from 21/12/2010 to 23/12/2010 X : 452791.00 m Y : 4236597.00 m Z : +171.00 m LOCAL End depth : 24.00 m				
Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)		Ground water level (m)	Tools	Casing	Geologic time
20.00 BOXE 22.00 22.00 BOXE 24.00	20.20 24.00	 <div>CLAY slightly sandy with weathering oxidation, with rounded very fine gravel and charcoal concretions (millimetric scale). Stiff. Red-Brown</div> <div>Heavily weathered LIMESTONE (gravel size) in clayey matrix. Very hard, fractured. White</div>							Carottage avec tubage métalliq, Carottier PQ Ø 103 mm		
Specials remarks :											



KEFALONIA

ODYSSEUS Unbound Project GREECE

Contract No :10P-096-a00

CORE DRILLING

Sampling as french standard XP P94-202

Scale 1:100e

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C5e-Thinia

Drilling machine : LOUISE
Drilling realized from 28/01/2011 to 29/01/2011
X : 452847.00 m Y : 4236168.00 m
Z : +160.00 m LOCAL

End depth : 22.20 m

Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	Ground water level (m)	Tools	Casing	Geologic time
BOXE	1.10	Back-filling (road) / Loam-Clay with limestone gravel			160	100				
	1.80	CLAY, Loam with gravel			159					
BOXE	2.00	GRAVEL in clayey matrix (Gravel is angular / Unit is very dense)			158	50				
BOXE	2.60				157					
BOXE	4.00				156					
BOXE	6.00				155					
BOXE	8.00				154					
BOXE	10.00				153					
BOXE	12.00				152					
BOXE	14.00				151					
BOXE	16.00				150					
BOXE	18.00				149					
BOXE	20.00				148					
BOXE	22.00				147					
BOXE	24.00				146					
BOXE	26.00				145					
BOXE	28.00				144					
BOXE	30.00				143					
BOXE	32.00				142					
BOXE	34.00				141					
BOXE	36.00				140					

Specials remarks :



KEFALONIA ODYSSEUS Unbound Project GREECE Contract No : 10P-096-a00		CORE DRILLING Sampling as french standard XP P94-202 Scale 1:100e				C5e-Thinia Drilling machine : LOUISE Drilling realized from 28/01/2011 to 29/01/2011 X : 452847.00 m Y : 4236168.00 m Z : +160.00 m LOCAL End depth : 22.20 m				
Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	Ground water level (m)	Tools	Casing	Geologic time
20.00		Very LOOSE coarse limestone SAND with rare intercalation (random) of sub-rounded gravel and boulders (limestone and breccia limestone elements). Unit is white (cream-white).			140			Carottage avec tubage métalliq. Couronne diamant Carottier HQ Ø 74	Tubage temporaire, 90 mm	
BOXE					139	30				
22.20	22.20				138					
Specials remarks :										



KEFALONIA

ODYSSEUS Unbound Project GREECE

Contract No :10P-096-a00

CORE DRILLING

Sampling as french standard XP P94-202

Scale 1:100e

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C6a-Livadi

Drilling machine : LOUISE
Drilling realized from 28/09/2010 to 30/09/2010
X : 449569.00 m Y : 4237613.00 m
Z : -2.00 m LOCAL

End depth : 26.40 m

Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	RQD (%)	Ground water level (m)	Tools	Casing	Geologic time
0.00					-2						
BOXE	0.80	HUMUS, with angular gravel			-3						
2.00					-4						
BOXE	3.00	CLAY, with angular gravel. Grey			-5						
4.00					-6						
BOXE	7.00	CLAY, sandy, with weathering (oxidation) between 4.0-5.0m and 6.4-7.0m / BIOSTRAT : Sponge spicules, shell debris, plant matter, ostracods, Orbulina universa, indeterminate planktonics, Elphidium spp.			-7						
6.00					-8						
BOXE	11.60	CLAY, sandy with weathering (oxidation). Chestnut brown			-9						
8.00					-10						
BOXE	13.50	SAND, medium fin grained, clay rich. Beige-ochre			-11						
10.00					-12						
BOXE					-13						
12.00					-14						
BOXE					-15						
14.00					-16						
BOXE					-17						
16.00					-18						
BOXE					-19						
18.00					-20						
BOXE					-21						
20.00					-22						

Specials remarks :



KEFALONIA ODYSSEUS Unbound Project GREECE Contract No :10P-096-a00			CORE DRILLING Sampling as french standard XP P94-202 Scale 1:100e			C6a-Livadi Drilling machine : LOUISE Drilling realized from 28/09/2010 to 30/09/2010 X : 449569.00 m Y : 4237613.00 m Z : -2.00 m LOCAL End depth : 26.40 m					
Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	RQD (%)	Ground water level (m)	Tools	Casing	Geologic time
BOXE	20.00	CLAY, slightly calcareous, firm/stiff. Beige, becoming orange			-22				Carottage avec tubage métalliq, Carottier PQ Ø 103 mm	Tubage temporaire, 114 mm	
22.00	-23										
22.00	-24										
BOXE	22.60	GRAVEL, calcareous, angular, in a sandy matrix			-25				Carottage avec tubage métalliq, Couronne diamant Carottier HQ Ø 74 mm	Tubage temporaire, 90 mm	
25.00	-26										
25.00	-27										
BOXE	26.40	LIMESTONE, heavily weathered / BIOSTRAT : Biodebris, ostracods, Valvulina spp.			-28	100	60				
Specials remarks :											

Specials remarks :



KEFALONIA

ODYSSEUS Unbound Project GREECE

Contract No : 10P-096-a00

CORE DRILLING

Sampling as french standard XP P94-202

Scale 1:100e

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C6b-Livadi



Drilling machine : LOUISE
Drilling realized from 01/10/2010 to 04/10/2010
X : 449583.00 m Y : 4237086.00 m
Z : -3.00 m LOCAL

End depth : 24.70 m

Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	Ground water level (m)	Tools	Casing	Geologic time
						0 50 100				
	0.00				-3					
BOXE	0.20	HUMUS			-4			Tubage à l'avancement, Chelby Ø 114 mm		
	1.80	CLAY, with angular gravel. Chestnut brown			-5					
BOXE	2.00				-6					
	2.00	CLAY, grey, with weathered areas (oxidised) / BIOSTRAT : Planktonics + Charcoal + Ammonia beccarii + Orbulina universa			-7					
BOXE	4.00				-8					
	4.00				-9					
BOXE	6.00				-10	100				
	6.00	SAND, gravel and clay rich, with lignite			-11					
BOXE	6.40				-12					
	8.00	SAND, medium grained, gravel rich, slightly clayey			-13					
	8.00				-14					
BOXE	8.30				-15					
	9.50	SAND, medium fine grained, with clay, gravel + shell debris / BIOSTRAT : Shell debris, Gastropods, Ammonia beccarii, Elphidium spp (same species as seen in C2), Hoeglundia elegans, Orbulina universa, Buccella tenerrima			-16					
BOXE	10.00				-17					
	10.00				-18					
BOXE	12.00				-19					
	12.00	SAND, coarse grained. Ochre, becoming white-ochre at 11.5m			-20					
	12.00				-21					
BOXE	12.70	CLAY, with sand and gravel			-22					
	12.70				-23					
BOXE	15.00				-24	40				
	15.00	CONGLOMERATE, monogenic, with rounded clasts in a whitish calcareous matrix. Becoming dissaggregated at 13.3m			-25	60				
	15.70				-26	30				
BOXE	16.30	CLAY, sandy. ?Infill of dissolution cavity			-27	100				
	16.30				-28	50				
BOXE	19.00	CONGLOMERATE monogenic, dissaggregated			-29	60				
	19.00				-30	30				

Specials remarks :



KEFALONIA ODYSSEUS Unbound Project GREECE Contract No :10P-096-a00			CORE DRILLING Sampling as french standard XP P94-202 Scale 1:100e Page : 2/2			 C6b-Livadi Drilling machine : LOUISE Drilling realized from 01/10/2010 to 04/10/2010 X : 449583.00 m Y : 4237086.00 m Z : -3.00 m LOCAL End depth : 24.70 m				
Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%) 	Ground water level (m)	Tools	Casing	Geologic time
19.00 BOXE	21.00	CONGLOMERATE monogenic, dissaggregated			-22 -23 -24	0 60 60				
22.00 22.00 BOXE	23.40	CONGLOMERATE, monogenic, cemented with a calcareous sand matrix			-25 -26	100				
24.00 24.00 BOXE 24.70	24.70	?BRECCIATED LIMESTONE / Limestone clasts in a calcareous sand matrix / BIOSTRAT : RARE Indeterminate calcareous benthic foraminifera			-27			Carottage avec tubage metalliq, Carottier PQ Ø 103 mm	Tubage temporaire, 114 mm	
Specials remarks :										



KEFALONIA

ODYSSEUS Unbound Project GREECE

Contract No :10P-096-a00

CORE DRILLING

Sampling as french standard XP P94-202

Scale 1:100e

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C6c-Livadi

Drilling machine : LOUISE
Drilling realized from 05/10/2010 to 07/10/2010
X : 449729.00 m Y : 4236722.00 m
Z : -4.00 m LOCAL

End depth : 39.00 m

Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	Ground water level (m)	Tools	Casing	Geologic time
BOXE	0.00	SAND, medium fine grained with rounded gravel. Ochre			-4					
	1.60				-5					
BOXE	2.00	SAND, coarse, slightly clayey			-6					
	2.00				-7					
BOXE	3.80	SAND, fine grained with shell debris and charcoal. / Biostrat : sponge spicules, shell debris, Ammonia beccarii, gastropods, Elphidium spp, Peneroplis planatus.			-8					
	4.00				-9					
BOXE	4.80	SAND, fine grained with clay			-10					
	6.00				-11					
BOXE	6.00	CLAY, with decomposing plant material and lignite			-12					
	8.00				-13					
BOXE	8.00	SAND, fine grained with clay, shell debris and plant material. Dark grey, weathered (oxidised)			-14					
	10.00				-15					
BOXE	12.00	SAND, fine grained with clay, dense, with shell debris. Light grey. / Biostrat: shell debris, Gastropods, planktonics, Cibicides spp., Ammonia beccarii, Elphidium spp, miliolids.			-16					
	14.00				-17					
BOXE	16.00				-18					
	18.00				-19					
BOXE	18.00	CLAY, with sand and shell debris. Grey-brown			-20					
	19.00				-21					
BOXE	20.00	CLAY, with fine grained, rounded gravel. Light grey, weathered (oxidised)			-22					
	20.00				-23					
	20.00	GRAVEL, sandy, slightly clayey. White-light brown			-24					

Specials remarks :



KEFALONIA

ODYSSEUS Unbound Project GREECE

Contract No :10P-096-a00

CORE DRILLING

Sampling as french standard XP P94-202

Scale 1:100e

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C6c-Livadi

Drilling machine : LOUISE
Drilling realized from 05/10/2010 to 07/10/2010
X : 449729.00 m Y : 4236722.00 m
Z : -4.00 m LOCAL
End depth : 39.00 m

Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	Ground water level (m)	Tools	Casing	Geologic time
BOXE	20.00	CLAY, sandy with rare gravel and shell debris. Ochre brown			-24					
BOXE	22.00				-25					
BOXE	24.00	SAND, with clay, fine gravel and shell debris, becoming more gravelly from 24.7m. Beige-ochre. / Biostrat : Elphidium spp + planktonics + Ammonia beccarii.			-26					
BOXE	26.00				-27					
BOXE	28.00	SAND, slightly clayey, becoming cemented from 27.3m and with gravel from 28.6m. Ochre			-28					
BOXE	30.00				-29					
BOXE	32.00	CLAY, sandy with white concretions between 33.6 and 34m. White to yellowish. / Biostrat : shell debris, ostracods + echinoid debris, Ammonia beccarii, Elphidium spp, Cibicides lobatulus			-30					
BOXE	34.00				-31					
BOXE	36.00				-32					
BOXE	38.00	MARL, sandy, slightly indurated. / Biostrat : Ammonia beccarii, Elphidium spp, echinoid debris, Planulina spp, miliolids, ostracods			-33					
BOXE	39.00				-34					

Specials remarks :



KEFALONIA

ODYSSEUS Unbound Project GREECE

Contract No :10P-096-a00

CORE DRILLING

Sampling as french standard XP P94-202

Scale 1:100e

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C7a-Atheras

Drilling machine : LOUISE
Drilling realized from 29/01/2011 to 31/01/2011

X : 448472.00 m Y : 4243008.00 m
Z : +10.00 m LOCAL

End depth : 15.00 m

Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	Ground water level (m)	Tools	Casing	Geologic time
	0.00				10					
BOXE	0.60	HUMUS with sand and gravel			9					
	2.00				8					
BOXE	2.00	CLAY weathered with angular limestone-gravel. Brown-Grey			7	100				
	4.00				6					
BOXE	4.50				5					
	6.00	GRAVEL in clayey matrix. Gravel is angular (limestone)			4					
BOXE	6.80				3	90				
	9.10	GRAVEL in clayey and sandy matrix (coarse grained) becoming more sandy at 9.5m. Gravel is angular. White			2	50				
BOXE	10.00				1					
	11.50	GRAVEL in clayey and slightly sandy matrix. ?Heavily weathered LIMESTONE ?. White			0					
BOXE	11.50				-1	40				
	15.00				-2					
					-3					
					-4	20				
					-5	50				

Specials remarks :



KEFALONIA

ODYSSEUS Unbound Project GREECE

Contract No :10P-096-a00

CORE DRILLING

Sampling as french standard XP P94-202

Scale 1:100e

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C2006-Thinia

Drilling machine : LOUISE
Drilling realized from 17/01/2011 to 24/01/2011
X : 452797.00 m Y : 4234580.00 m
Z : +101.00 m LOCAL
End depth : 58.50 m

Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	Ground water level (m)	Tools	Casing	Geologic time
0.00					101					
BOXE	1.00	Loam-Clay with gravel			100					
2.00					99					
BOXE	3.30	CLAY , sandy, weathered (oxidised) with millimetric ferruginous concretions. Grey with brown patches			98					
4.00					97					
BOXE	5.70	MARL, weathered, Bedding plane difficult to determine. Grey			96					
6.00					95					
BOXE	8.00				94					
8.00					93					
BOXE	10.00	MARL, stiff, medium to very thickly bedded. Bedding planes 60°. Dark grey			92					
10.00					91					
BOXE	12.00				90					
12.00					89					
BOXE	14.00				88					
14.00					87					
BOXE	16.00				86					
16.00					85					
BOXE	18.00	Stiff MARL with sandy-limestone intercalation (15.5, 16.5m /?Clast ?). Inter-bedded, alternating thickly bedded stiff marl and very thinly bedded hard marl. Bedding + Fractures planes are 40 to 60° (rare conjugate pairs / 18.8m). Grey to dark grey			84					
18.00					83					
BOXE	20.00				82					
					81					

Specials remarks :

DE01x_V1_SC_10P96a00_KEFALONIA_20101209 - FGSA- GeODin®



KEFALONIA

ODYSSEUS Unbound Project GREECE

Contract No :10P-096-a00

CORE DRILLING

Sampling as french standard XP P94-202

Scale 1:100e

Page : 2/3



C2006-Thinia

Drilling machine : LOUISE
Drilling realized from 17/01/2011 to 24/01/2011

X : 452797.00 m Y : 4234580.00 m
Z : +101.00 m LOCAL

End depth : 58.50 m

Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	Ground water level (m)	Tools	Casing	Geologic time
BOXE	20.00	<p>Stiff MARL with sandy-limestone intercalation (15.5, 16.5m /?Clast ?). Inter-bedded, alternating thickly bedded stiff marl and very thinly bedded hard marl. Bedding + Fractures planes are 40 to 60° (rare conjugate pairs / 18.8m). Grey to dark grey</p>			81			Carottage avec tubage métalliq, Carottier PQ Ø 103 mm	Tubage temporaire, 114 mm	
	22.00				80					
BOXE	22.00				79					
	24.00				78					
BOXE	24.00				77					
	26.00				76					
BOXE	26.00				75					
	28.00				74					
BOXE	28.00				73					
	30.00				72					
BOXE	30.00				71					
	32.00				70					
BOXE	32.00				69					
	34.00				68					
BOXE	34.00				67					
	36.00				66					
BOXE	36.00				65					
	38.00				64					
BOXE	38.00				63					
	40.00				62					
	39.80				61					
		Stiff MARL with LIMESTONE gravel and boulders ?thrust/Fault area ?. Unit is Grey to dark grey						Carottage avec tubage métalliq, Couronne diamant Carottier HQ Ø 74 mm	Tubage temporaire, 90 mm	

Specials remarks :



KEFALONIA

ODYSSEUS Unbound Project GREECE

Contract No : 10P-096-a00

CORE DRILLING

Sampling as french standard XP P94-202

Scale 1:100e

Page : 3/3



C2006-Thinia

Drilling machine : LOUISE
Drilling realized from 17/01/2011 to 24/01/2011

X : 452797.00 m Y : 4234580.00 m
Z : +101.00 m LOCAL

End depth : 58.50 m

Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	Ground water level (m)	Tools	Casing	Geologic time
40.00 BOXE					61					
42.00 42.00					60					
42.00 BOXE		Stiff MARL with LIMESTONE gravel and boulders ?thrust/Fault area ?. Unit is Grey to dark grey			59					
44.00 44.00	44.00				58					
44.00 BOXE					57					
46.00 46.00					56					
46.00 BOXE					55					
48.00 48.00					54					
48.00 BOXE					53					
50.00 50.00					52					
50.00 BOXE		Hard MARL. Inter-bedded, alternating layers of thickly bedded very hard marl and very thinly bedded stiff marl. Bedding + Fractures planes are 60°. Grey to light grey			51					
52.00 52.00					50					
52.00 BOXE					49					
54.00 54.00					48					
54.00 BOXE					47					
56.00 56.00	55.60				46					
56.00 BOXE					45					
58.00 58.00					44					
58.00 BOXE	58.50	Hard to strong MARL. Bedding + ?Fractures planes are 20 to 40°. Grey to light grey			43					
58.50										

Specials remarks :

DE01x_V1_SC_10P96a00_KEFALONIA_20101209 - FGSA- GeODir®



KEFALONIA

ODYSSEUS Unbound Project GREECE

Contract No :10P-096-a00

CORE DRILLING

Sampling as french standard XP P94-202

Scale 1:100e

Page : 1/2



C2006-2-Thinia

Drilling machine : LOUISE
Drilling realized from 25/01/2011 to 27/01/2011
X : 452795.00 m Y : 4234620.00 m
Z : +99.00 m LOCAL
End depth : 21.40 m

Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	Ground water level (m)	Tools	Casing	Geologic time
	0.00	Loam-Clay with gravel			99					
BOXE	0.60				98					
	2.00	CLAY , sandy, weathered (oxidised). Red-Grey			97					
BOXE	2.00				96					
	3.60				95					
	4.00	MARL, weathered, Bedding plane difficult to determine. Grey			94					
BOXE	4.00				93					
	5.00				92					
	6.00				91					
BOXE	6.00				90					
	8.00	Stiff MARL. Inter-bedded, alternating thickly bedded stiff marl and very thinly bedded hard marl. Bedding plane difficult to determine. Grey to dark grey			89					
BOXE	8.00				88					
	10.00				87					
BOXE	10.00				86					
	12.00				85					
BOXE	12.00				84					
	13.20	Stiff MARL with LIMESTONE gravel ?thrust/Fault area ?. Unit is Grey to dark grey			83					
	14.00				82					
BOXE	14.00				81					
	16.40	Stiff MARL with sandy-limestone intercalation (15.6-16.1m /?Clast ?). ?Bedding planes are 20°. Unit is grey to light grey			80					
BOXE	16.40				79					
	18.40									
BOXE	18.40									
	20.40									
	21.40									

Specials remarks :



KEFALONIA		CORE DRILLING				C2006-2-Thinia				
ODYSSEUS Unbound Project		Sampling as french standard XP P94-202				Drilling machine : LOUISE				
GREECE						Drilling realized from 25/01/2011 to 27/01/2011				
Contract No : 10P-096-a00		Scale 1:100e				Page : 2/2				
End depth : 21.40 m										
Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Core recovery (%)	Ground water level (m)	Tools	Casing	Geologic time
20.40 BOXE										
21.40	21.40	Stiff MARL with sandy-limestone intercalation (15.6-16.1m /?Clast ?). ?Bedding planes are 20°. Unit is grey to light grey			78	100		Carottage avec tubage métallique, Couronne diamant	Cavallier, Hémoré, 90 mm	
Specials remarks :										



KEFALONIA

ODYSSEUS Unbound Project GREECE

Contract No :10P-096-a00

CORE DRILLING

Sampling as french standard XP P94-202

Scale 1:500e

Page : 1/1



B1-Atheras

Drilling machine : LOUISE
Drilling realized from 05/01/2011 to 10/01/2011

X : 448790.00 m Y : 4241865.00 m
Z : +199.00 m LOCAL

End depth : 90.00 m

Coreboxes	Depth (m)	Soil description	Samples	Depositional environment	Elevation mLOCAL	Ground water level (m)	Tools	Geologic time
	9.00	Limestone / BH made with open-hole method = the description is based on the cuttings (only up to 9m).			199 198 195 194 193 192 191 190 189 188 187 186 185 184 183 182 181 180 179 178 177 176 175 174 173 172 171 170 169 168 167 166 165 164 163 162 161 160 159 158 157 156 155 154 153 152 151 150 149 148 147 146 145 144 143 142 141 140 139 138 137 136 135 134 133 132 131 130 129 128 127 126 125 124 123 122 121 120 119 118 117 116 115 114 113 112 111 110 109			
	72.00	LIMESTONE moderately strong. The total loss of drilling-water (return) does not allow direct visual description. These descriptions are based on the comportment of the gauges of the rig (injection pressure, speed,...) + driller'experience..						
	90.00	LIMESTONE moderately weak. The total loss of drilling-water (return) does not allow direct visual description. These descriptions are based on the comportment of the gauges of the rig (injection pressure, speed,...)+ driller'experience..						

Specials remarks :

APPENDIX 3 : BOREHOLES PICTURES



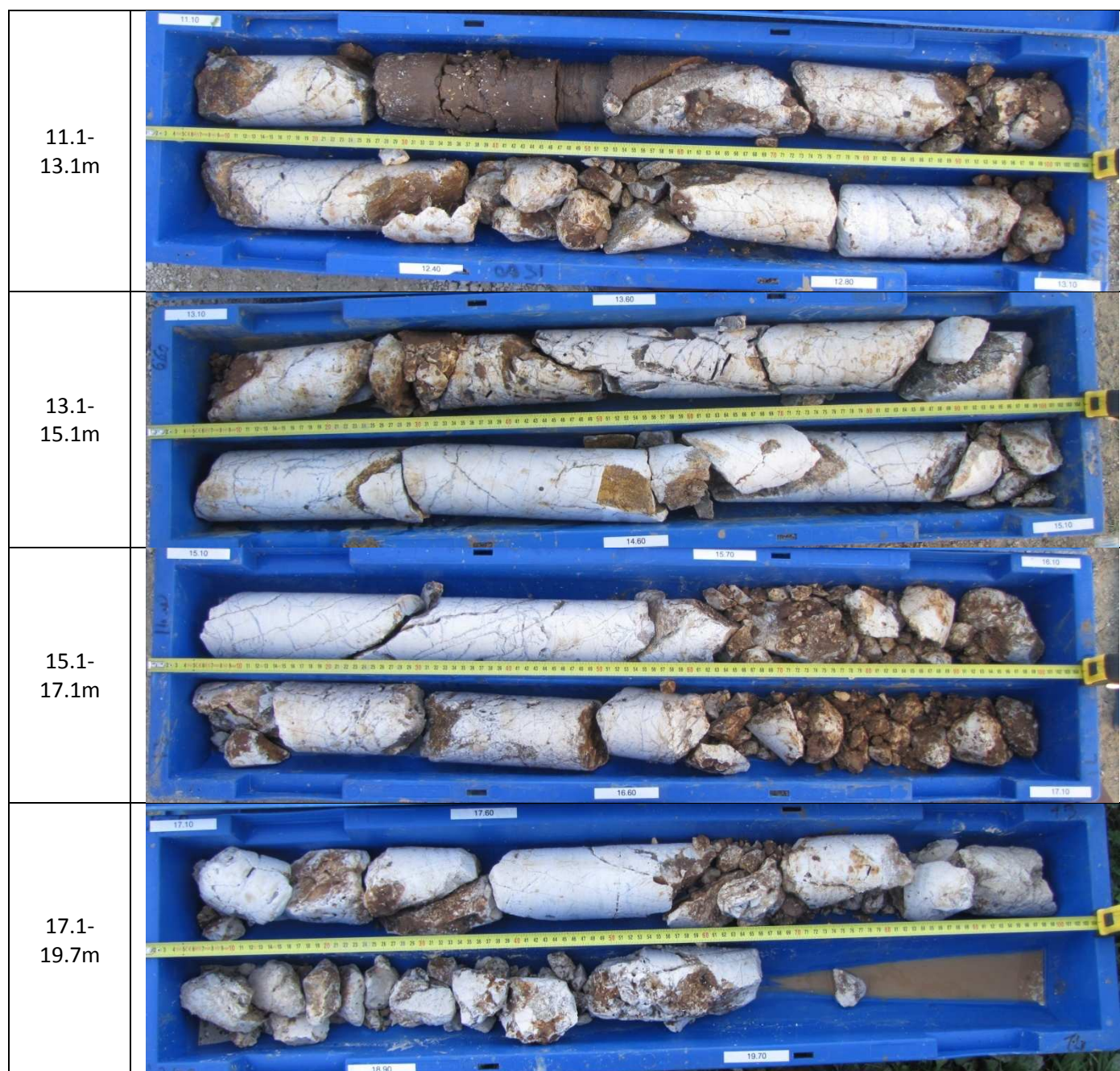
KEFALONIA-ODYSSEUS

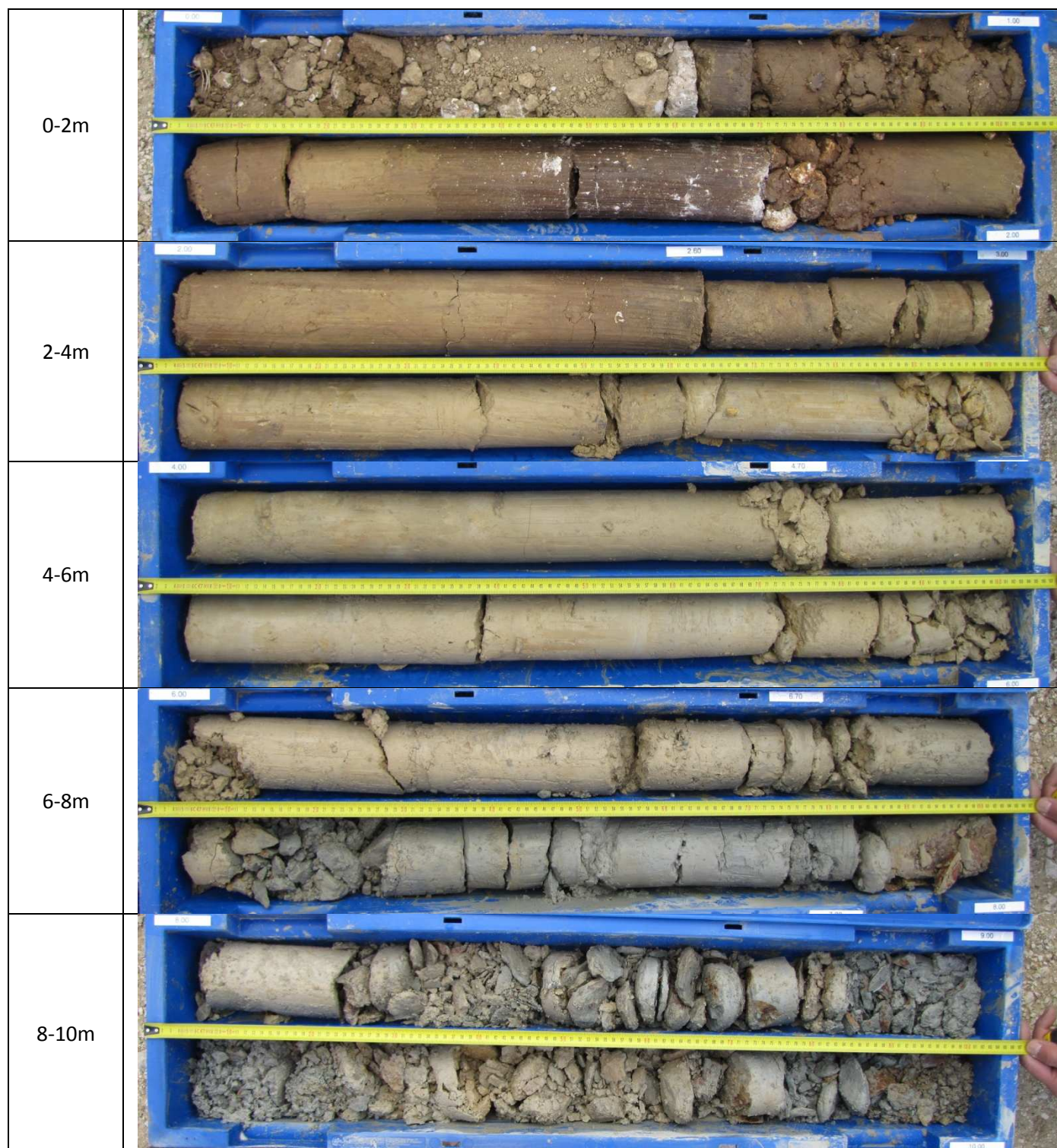
BH C1

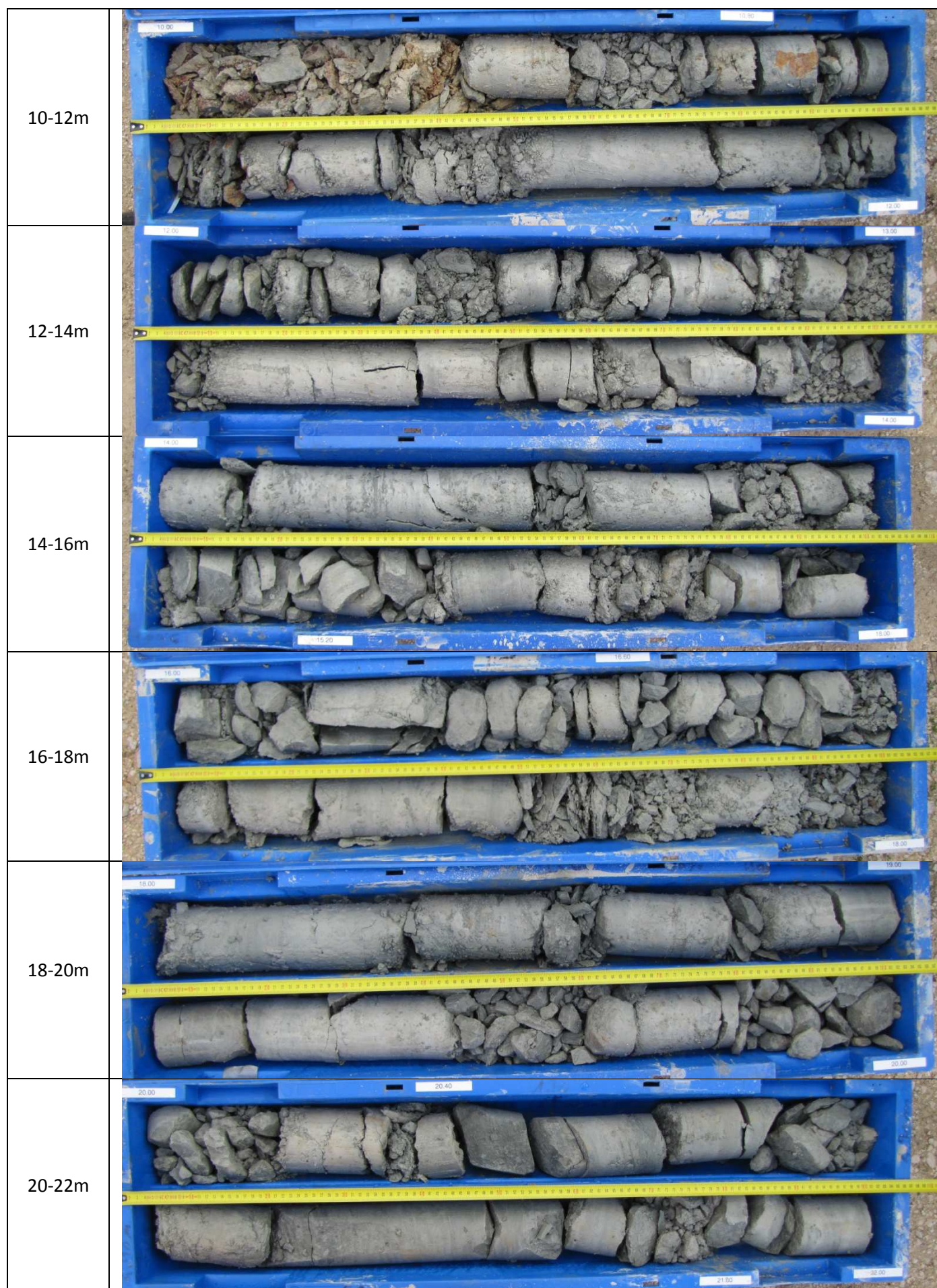


0-2m	
2-4m	
4-6m	
6-8.4m	
8.4-11.1m	





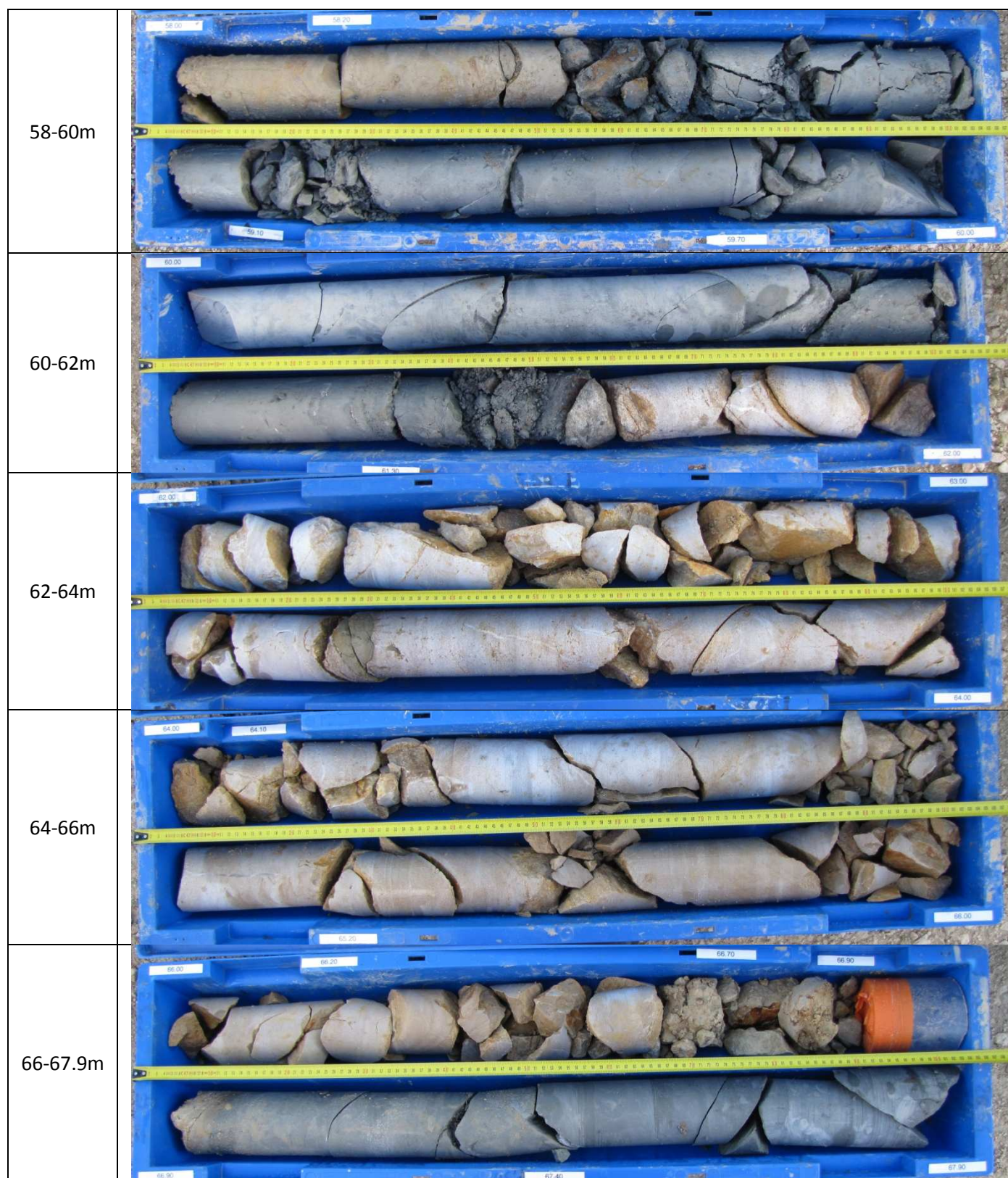


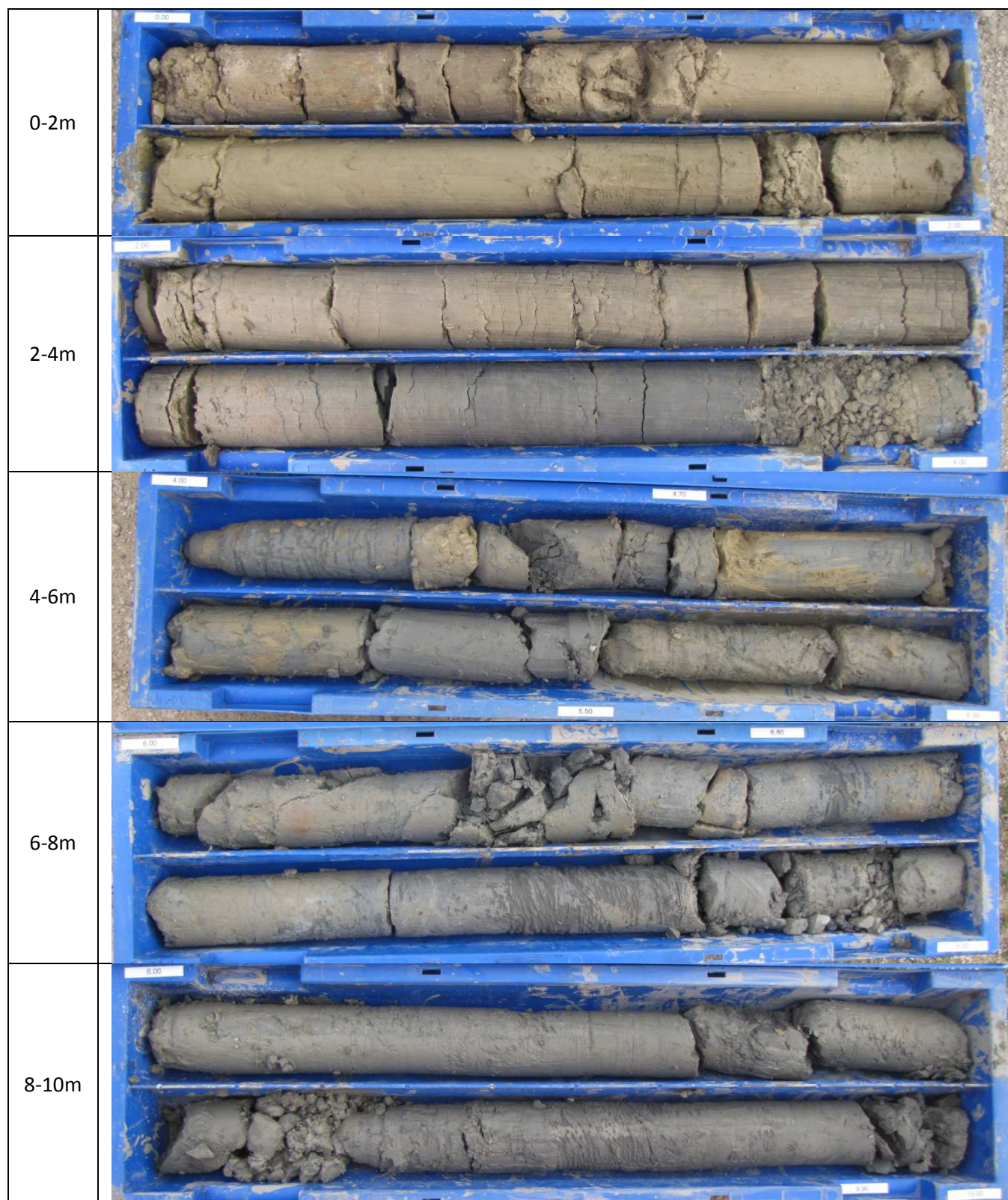







22-24m	
24-26m	
26-28m	
28-30m	
30-32m	
32-34m	






34-36m	
36-38m	
38-40m	
40-42m	
42-44m	
44-46m	

46-48m	
48-50m	
50-52m	
52-54m	
54-56m	
56-58m	










10-12m	
12-14m	
14-16m	
16-18m	
18-20m	

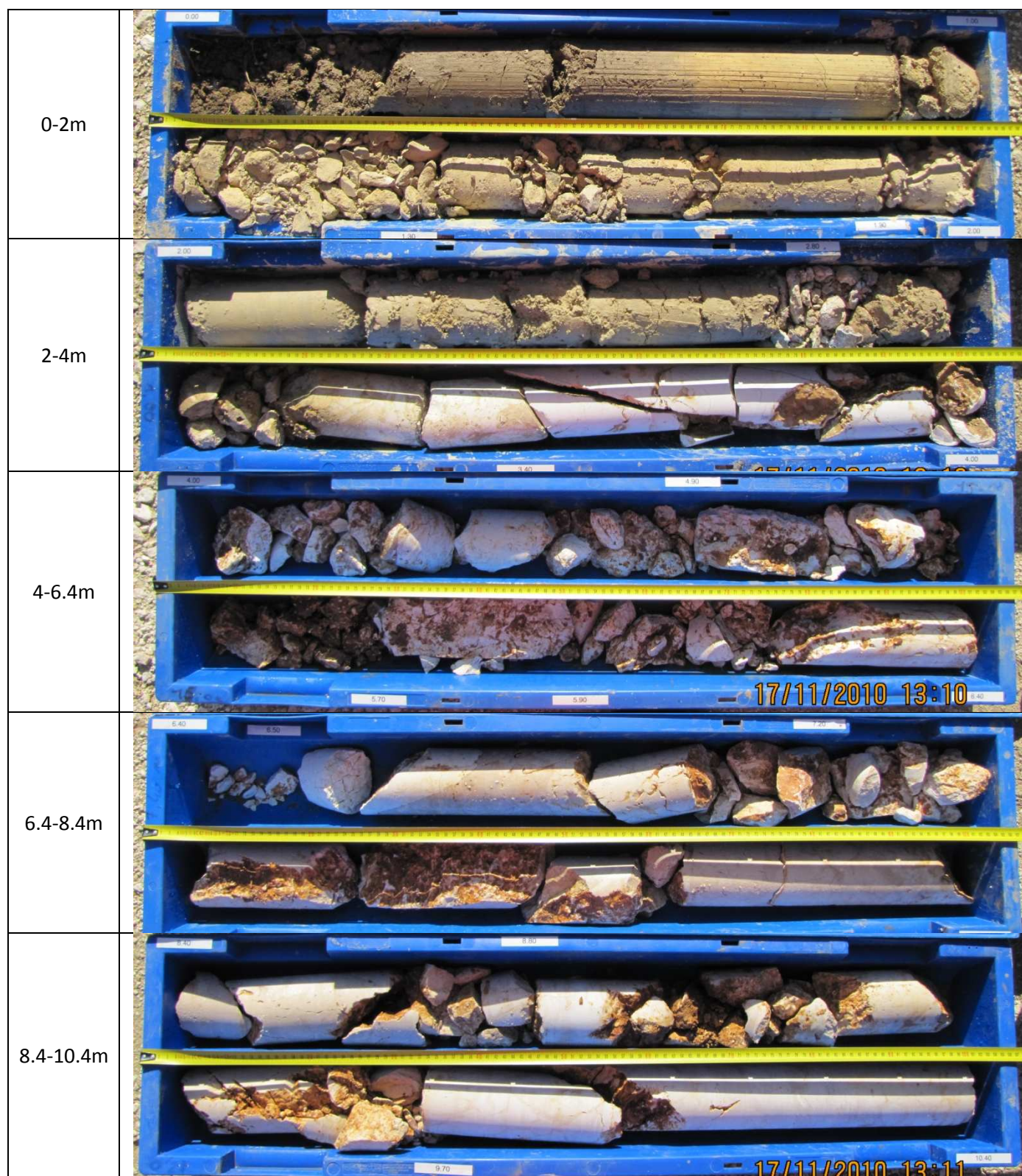
20-22m	
22-24m	
24-26m	
26-28m	
28-30m	







30-32m	
32-34m	
34-36m	
36-38m	
38-40m	

40-42m	
42-44m	
44-46m	
46-48m	
48-50m	
50-52m	

52-54m	 <p>Photograph of sediment core 52-54m. The core is dark grey, fragmented, and contained in a blue plastic box. A yellow measuring tape is placed above the core. The box has labels '52.4' and '54.00'.</p>
54-56m	 <p>Photograph of sediment core 54-56m. The core is dark grey, fragmented, and contained in a blue plastic box. A yellow measuring tape is placed above the core. The box has labels '54.00' and '55.50'.</p>
56-58m	 <p>Photograph of sediment core 56-58m. The core is dark grey, fragmented, and contained in a blue plastic box. A yellow measuring tape is placed above the core. The box has labels '56.00' and '57.00'.</p>
58-60m	 <p>Photograph of sediment core 58-60m. The core is dark grey, fragmented, and contained in a blue plastic box. A yellow measuring tape is placed above the core. The box has labels '58.00' and '59.00'.</p>
60-62m	 <p>Photograph of sediment core 60-62m. The core is dark grey, fragmented, and contained in a blue plastic box. A yellow measuring tape is placed above the core. The box has labels '60.00' and '61.00'.</p>

62-64m	
64-66m	
66-68m	
68-70m	
70-72m	
72-72.9m	








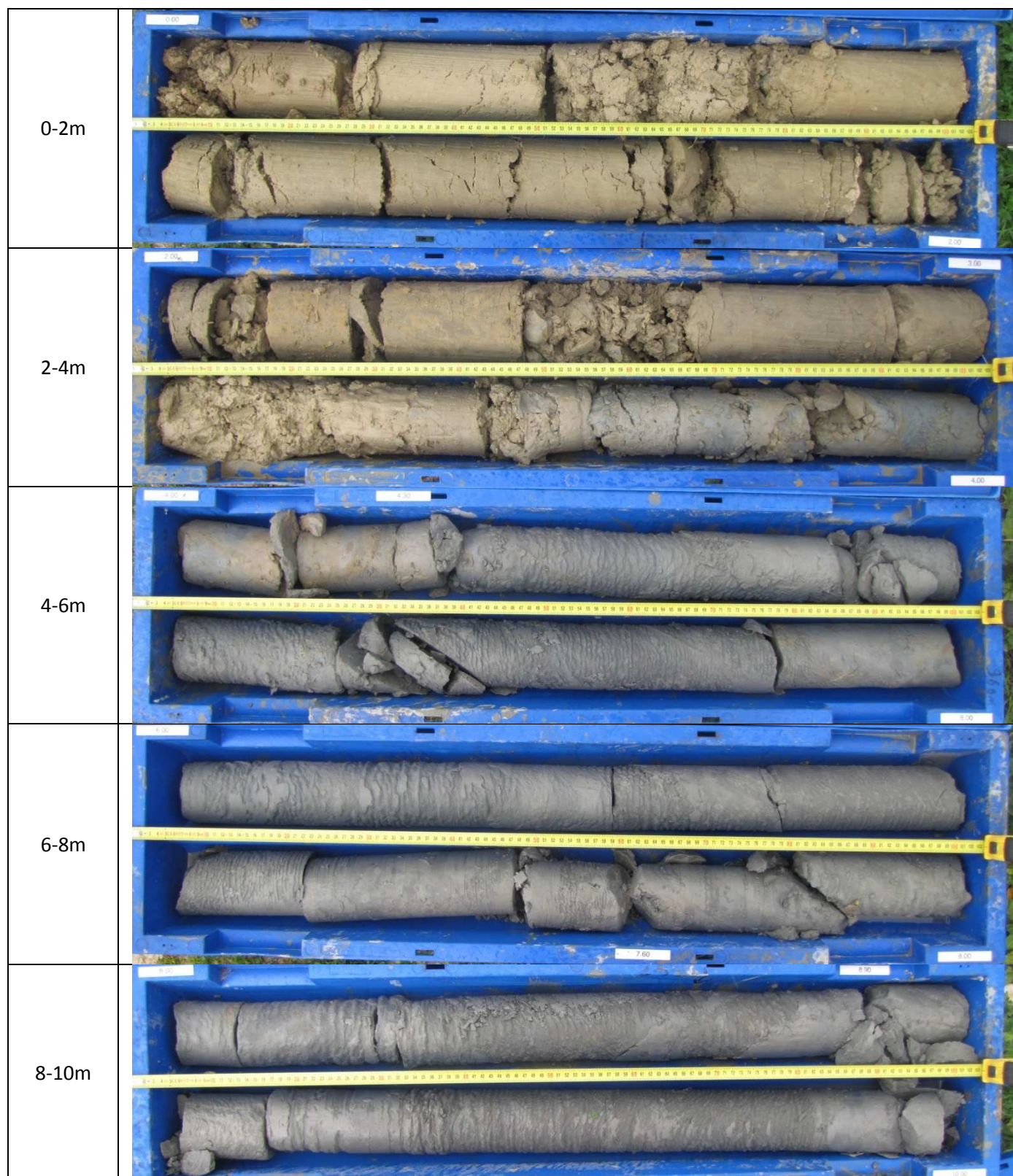
10.4-12.4m	
12.4-14.1m	
14.1-15.8m	
15.8-17.8m	
17.8-19.7m	
19.7-21.7m	

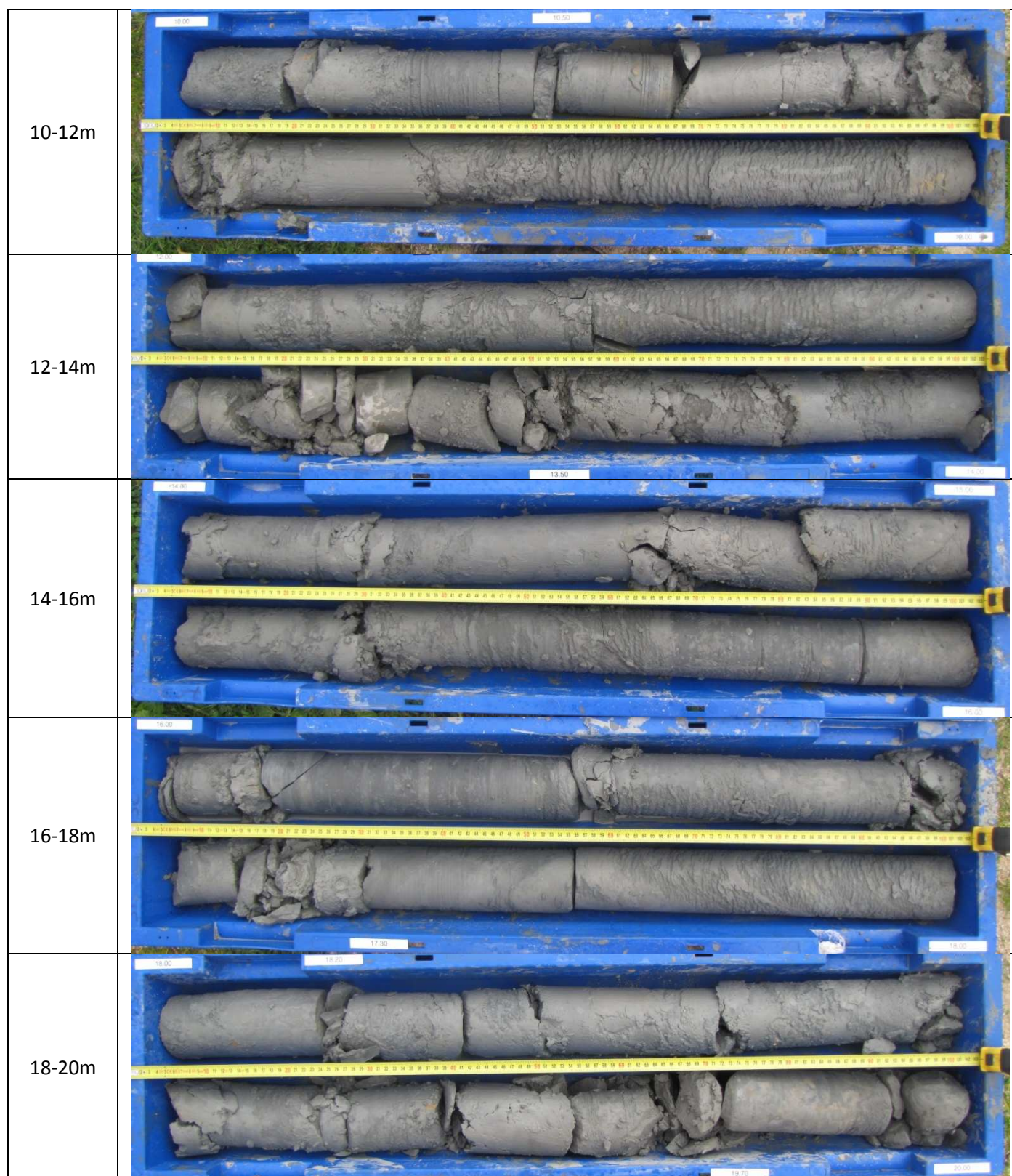
21.7-23.6m	
23.6-25.5m	
25.5-27.2m	
27.2-29.2m	
29.2-33m	
33-35m	

35-39m	
39-42.9m	
42.9-44.9m	
44.9-50.6m	
50.6-52.6m	
52.6-57m	

57-59.7m	
59.7-64m	
64-68.9m	
68.9-72.8m	
72.8-74.8m	
74.8-77.4m	

77.4-80m	
80-82.3m	
82.3-84.3m	
84.3-87.9m	
87.9-90.5m	





20-22m	
22-24m	
24-26m	
26-28m	
28-30m	

30-32m	
32-34m	
34-36m	
36-38m	
38-40	

40-42	
42-42.7m	



0-2m	
2-4m	
4-6m	
6-8m	
8-10m	

10-12m	
12-14m	
14-16m	
16-18m	
18-20m	

20-22m	
22-24m	
24-26m	
26-28m	
28-30m	



0-2m	
2-4.5m	
4.5-6.5m	
6.5-8.5m	
8.5-10.5m	
10.5-12.5m	







12.5-14.4m	
14.4-16.1m	
16.1-18.1m	
18.1-20m	
20-22m	
22-23.7m	



0-2m	
2-4m	
4-5.9m	
5.9-7.9m	
7.9-9.9m	

9.9-11.9m	
11.9-13.9m	
13.9-15.8m	
15.8-17.8m	
17.8-19.8m	
19.8-21.7m	

21.7-24m	
24-26.5m	
26.5-29.1m	
29.1-31.1m	
31.1-33.1m	
33.1-35.1m	

35.1-36.9m	
36.9-38.9m	
38.9-40.8m	
40.8-42.8m	
42.8-44.8m	
44.8-47.5m	

47.5-50.6m	
50.6-55.5m	
55.5-58.8m	
58.8-65m	
65-70.5m	
70.5m-73.1m	

73.1-76.3m	
76.3-82m	
82-88.2m	
88.2-90.2m	
90.2-92.5m	

92.5- 94.8m	
94.8- 96.8m	
96.8- 98.8m	
98.8- 100.7m	
100.7- 102.2m EOH	



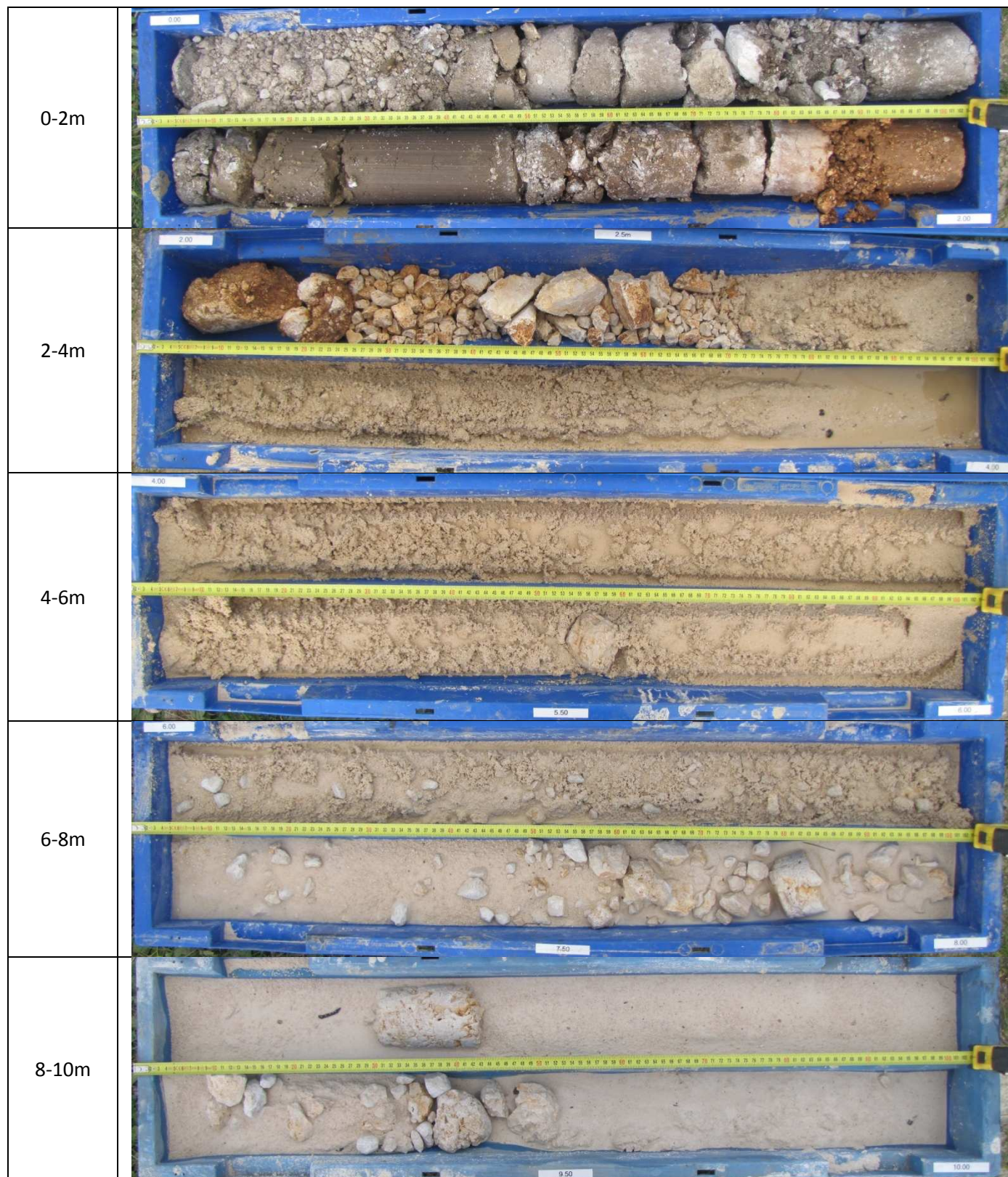
0-2m	
2-4m	
4-6m	
6-8m	
8-10m	

10-12m	
12-14m	
14-14.5m	

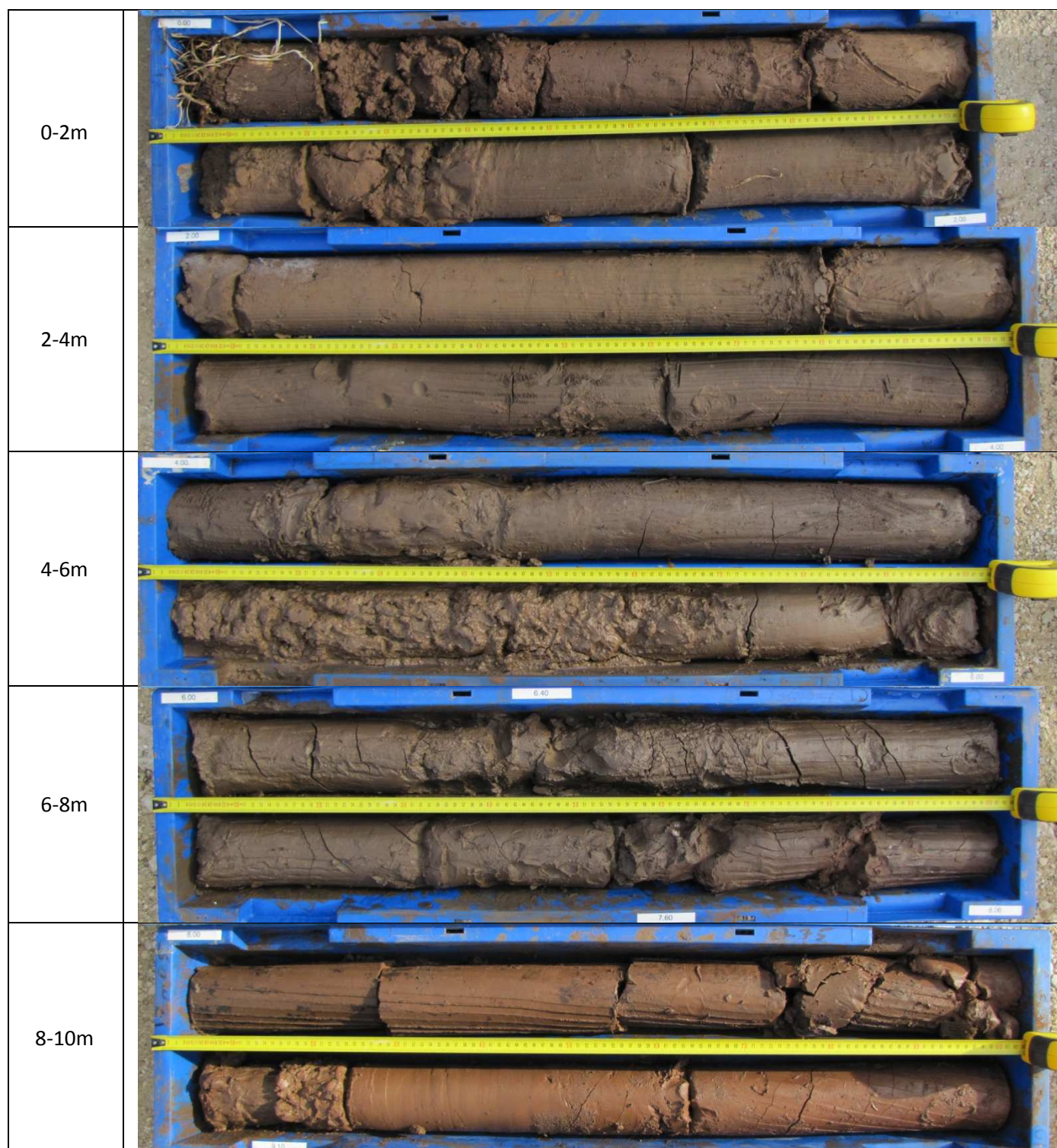








0-2m	
2-4m	
4-6m	
6-8m	
8-10m	
10-12m	



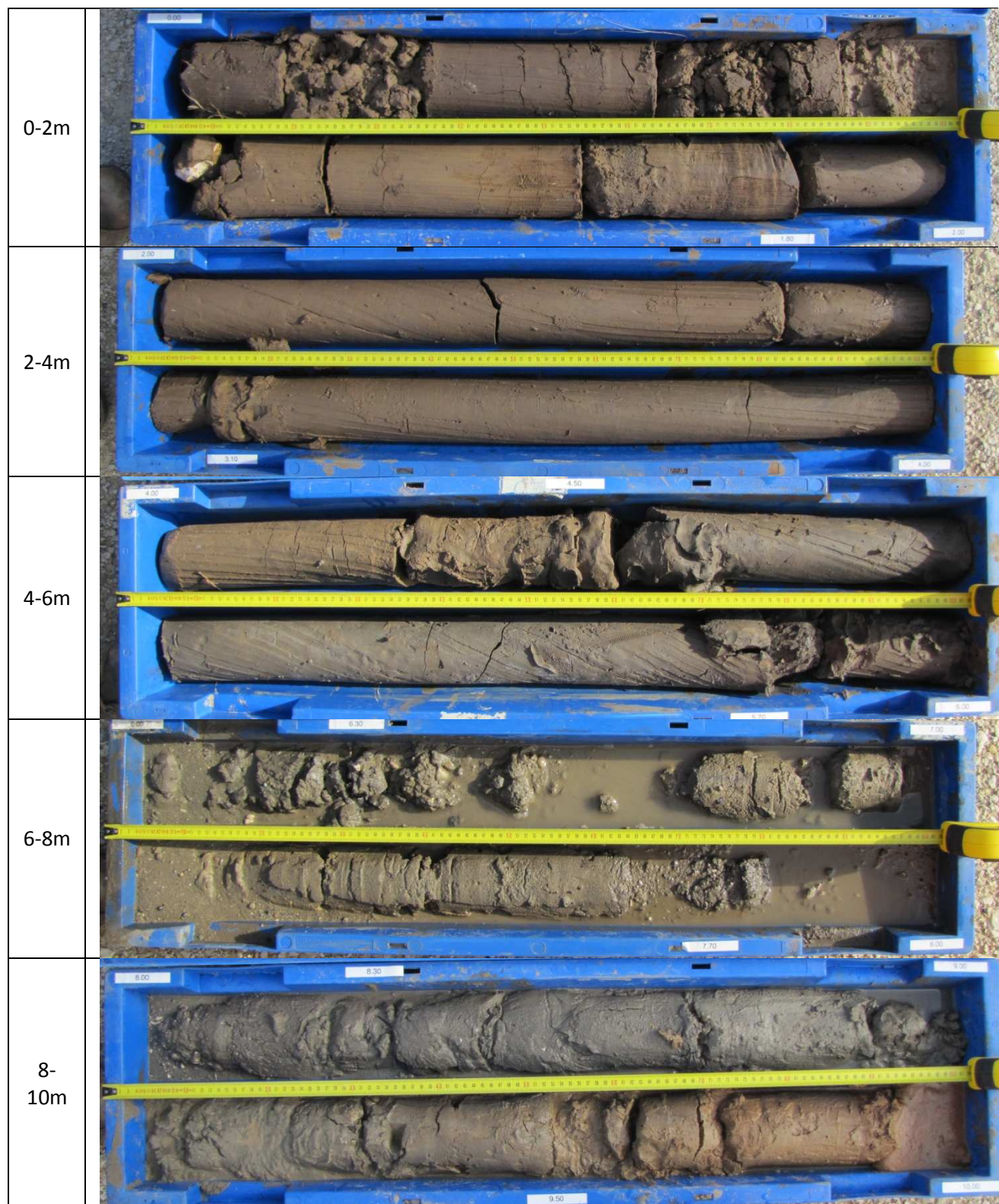








10-12m	
12-14m	
14-16m	
16-18m	
18-20m	
20-22.2m	



10-12m	
12-14m	
14-16m	
16-18m	
18-20m	
20-22m	



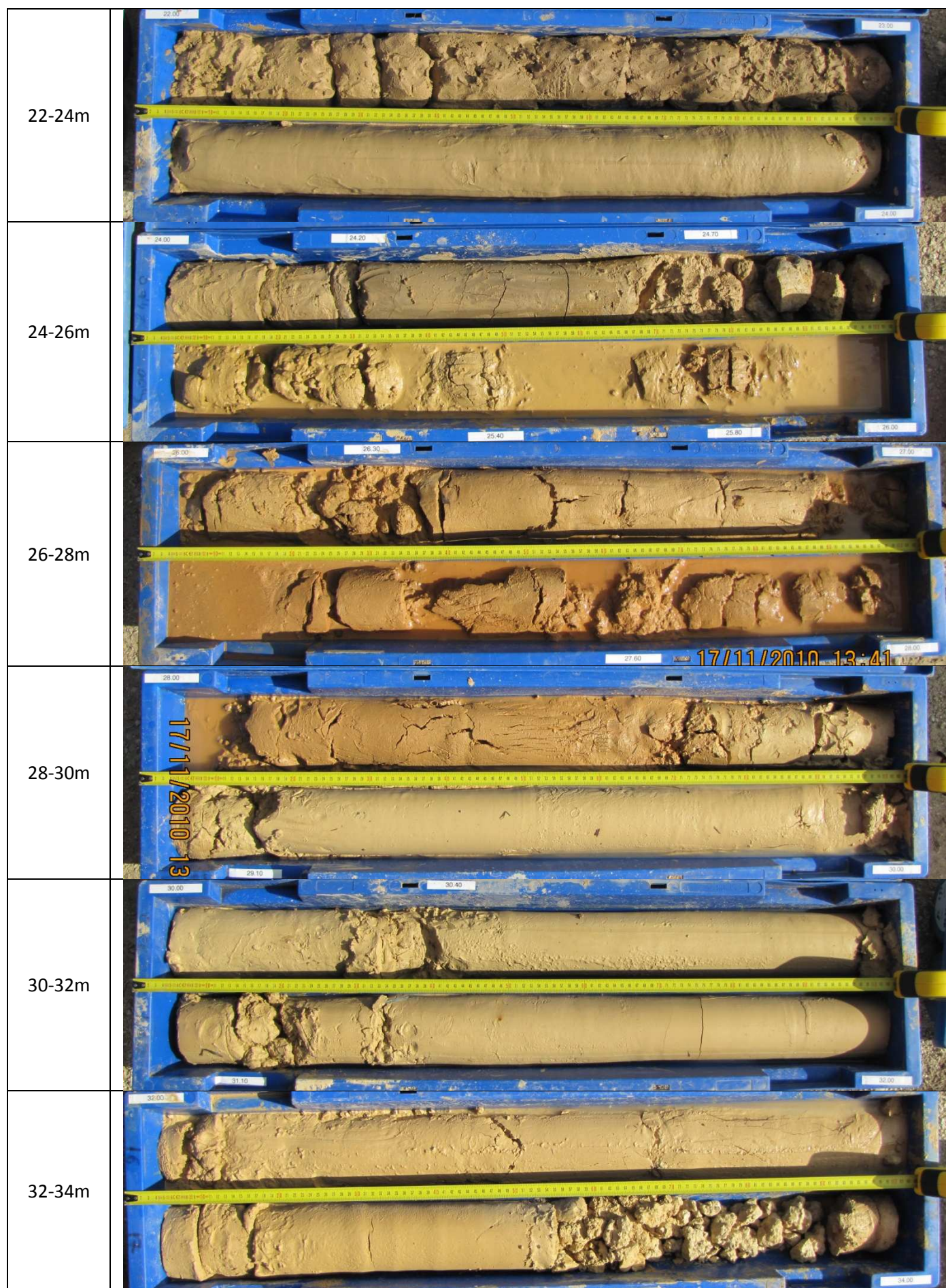


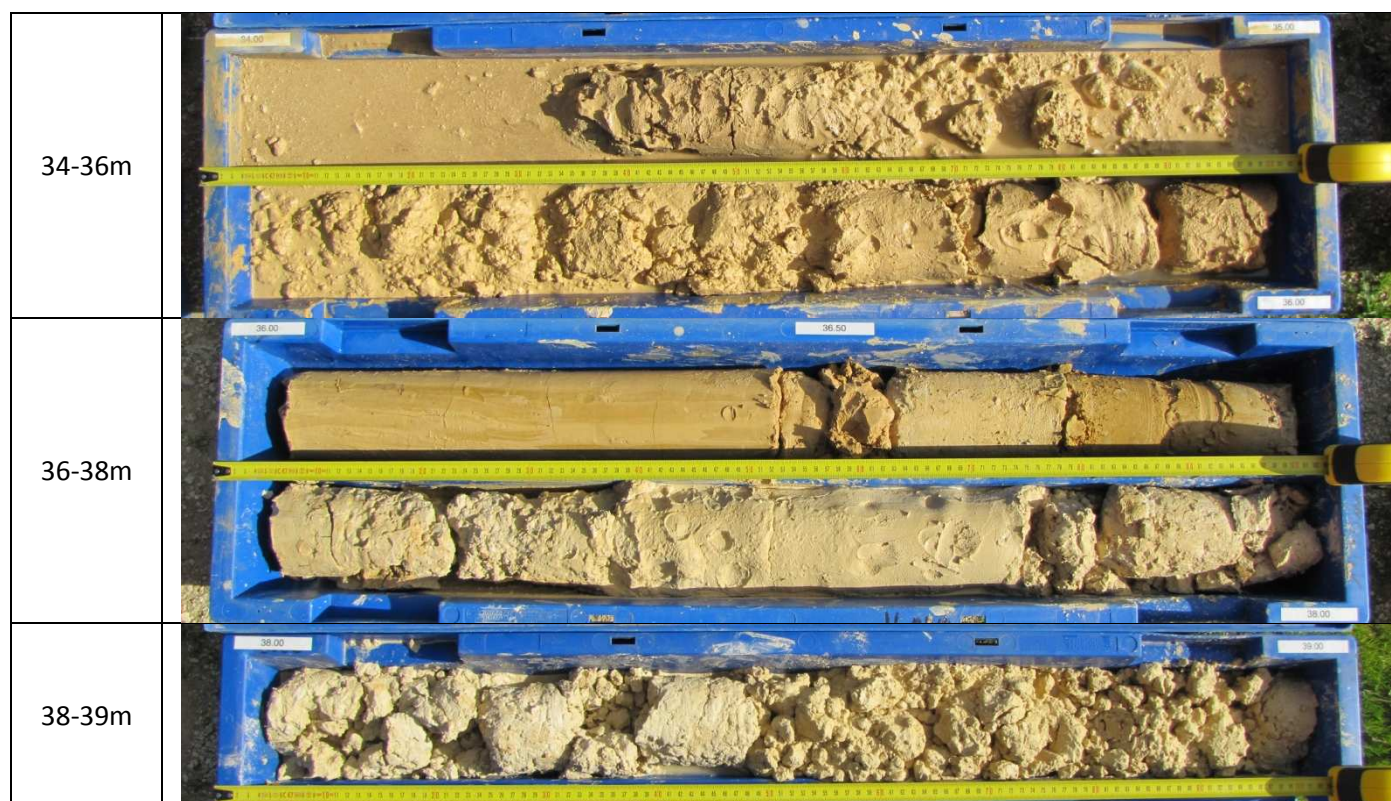
10-12m	
12-15m	
15-19m	
19-22m	
22-24m	
24-24.7 m	



0-2m	
2-4m	
4-6m	
6-8m	
8-10m	

10-12m	
12-14m	
14-16m	
16-18m	
18-20m	
20-22m	

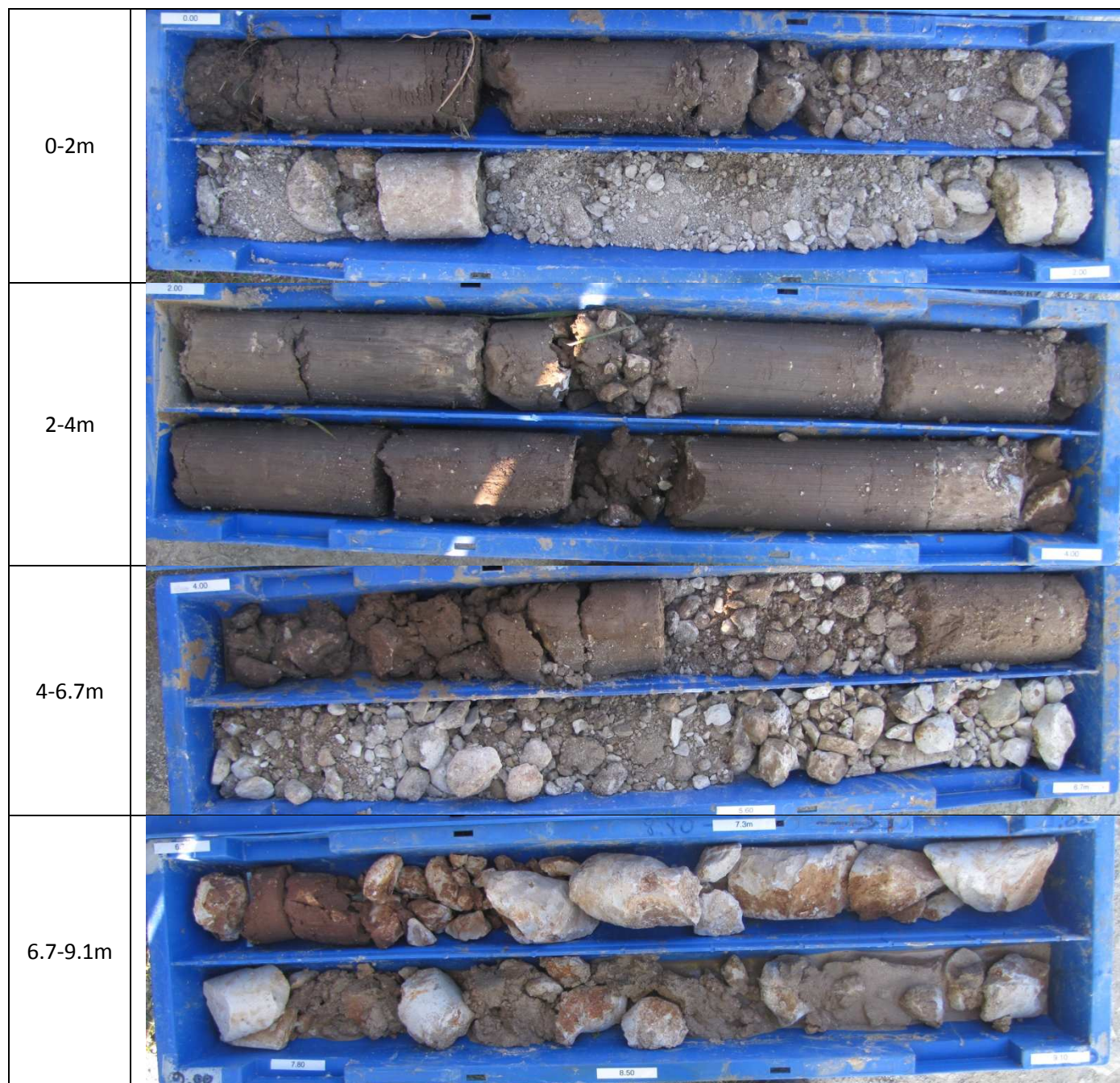




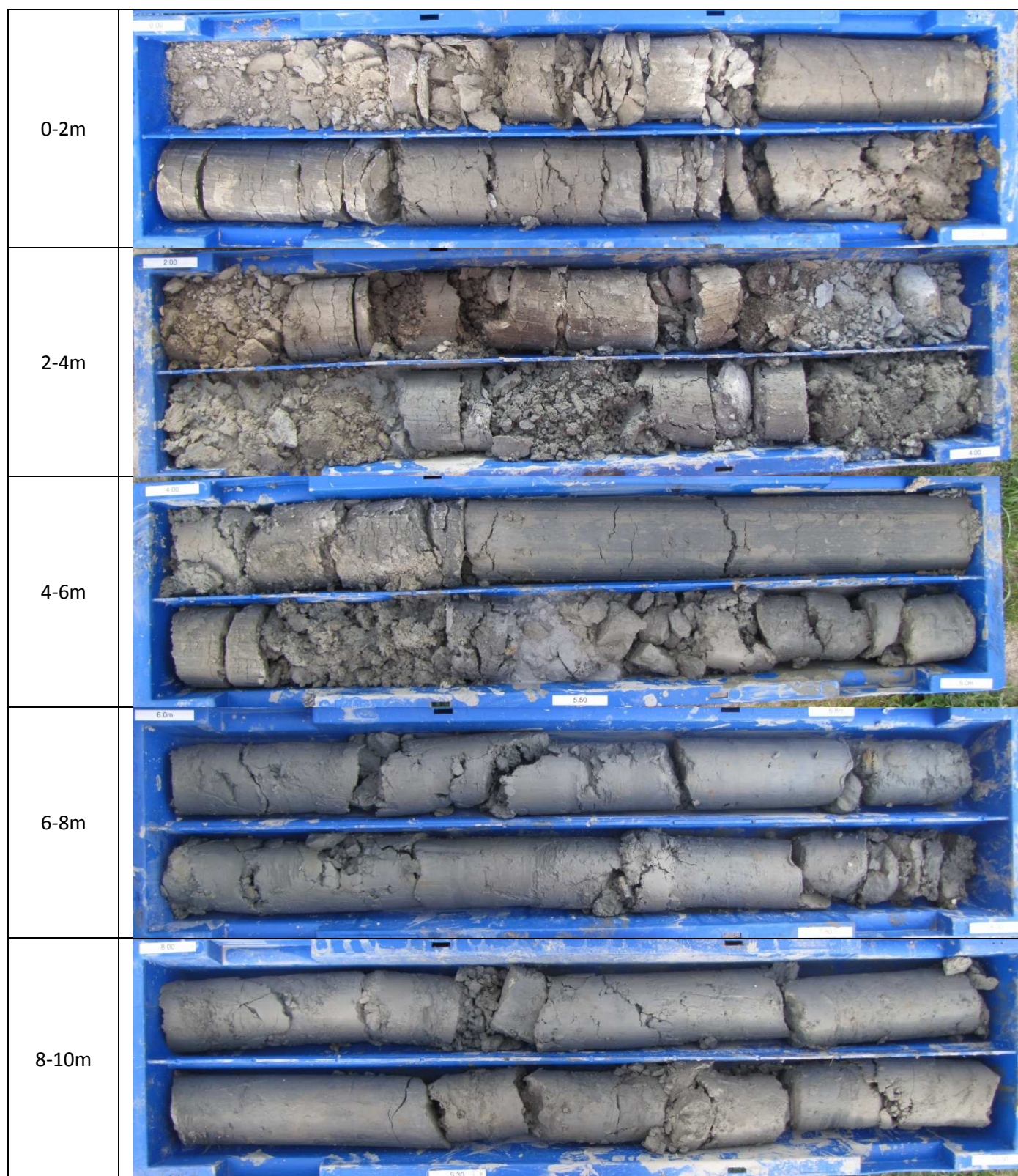


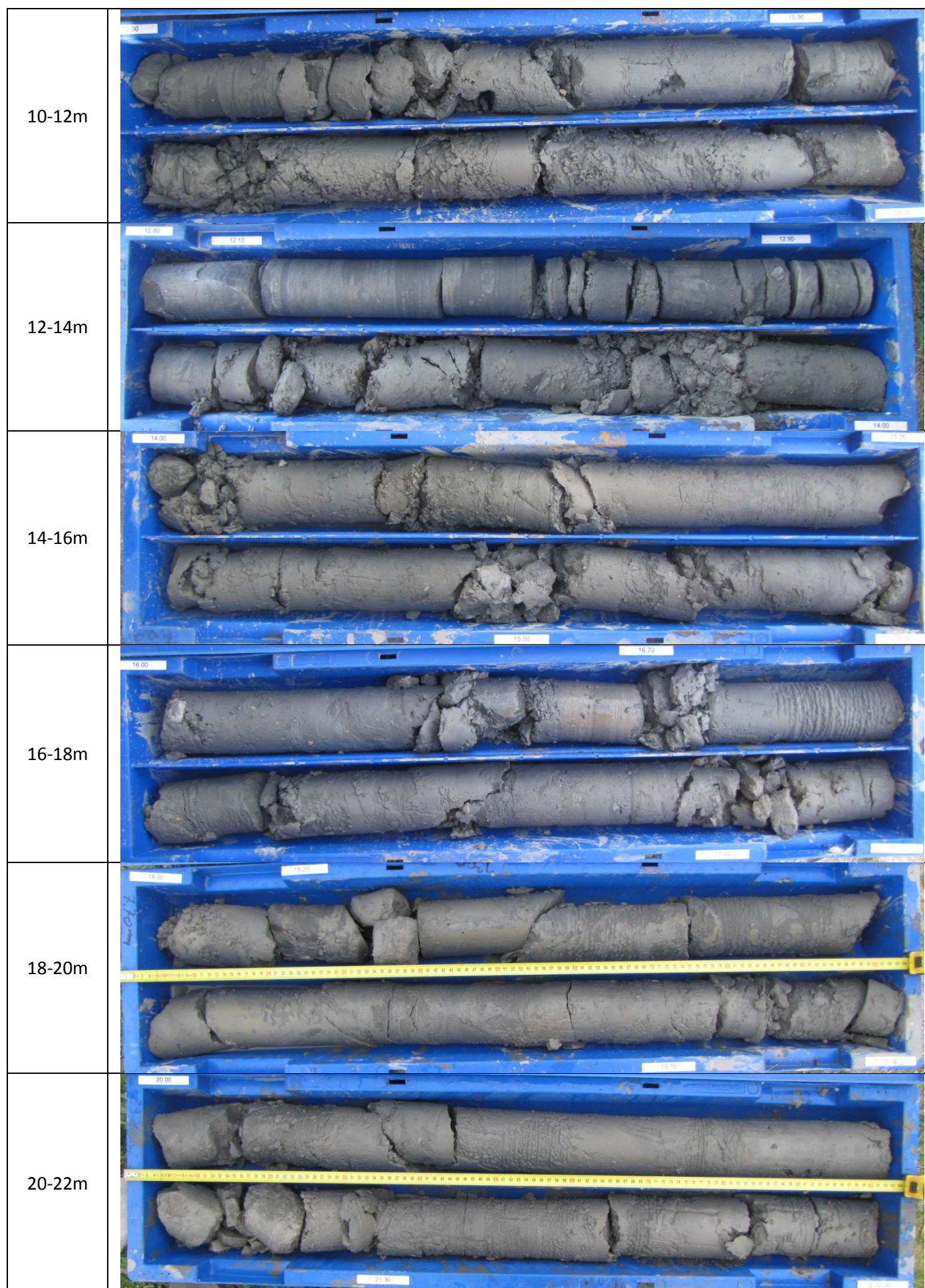
KEFALONIA-ODYSSEUS

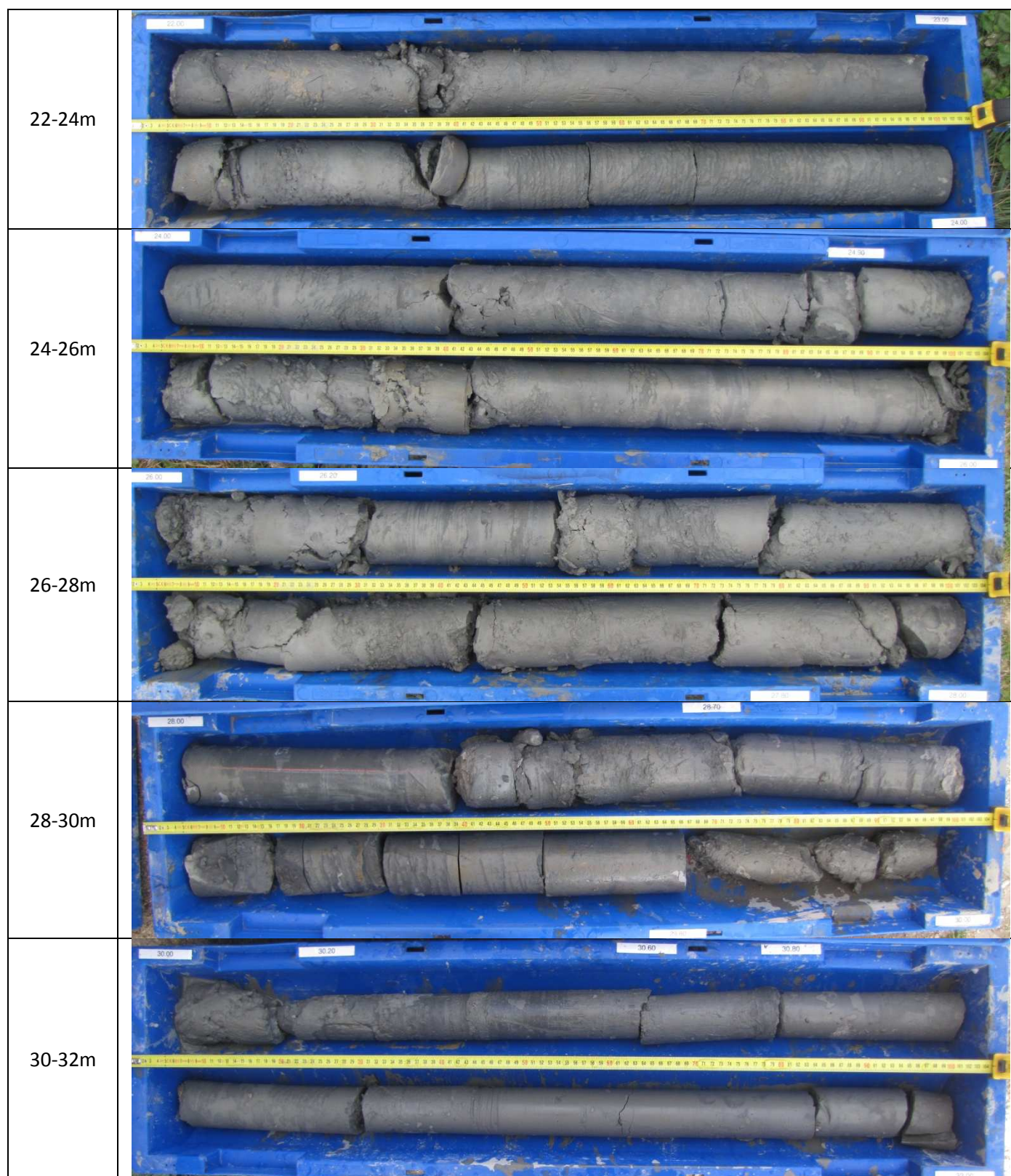
BH 7a












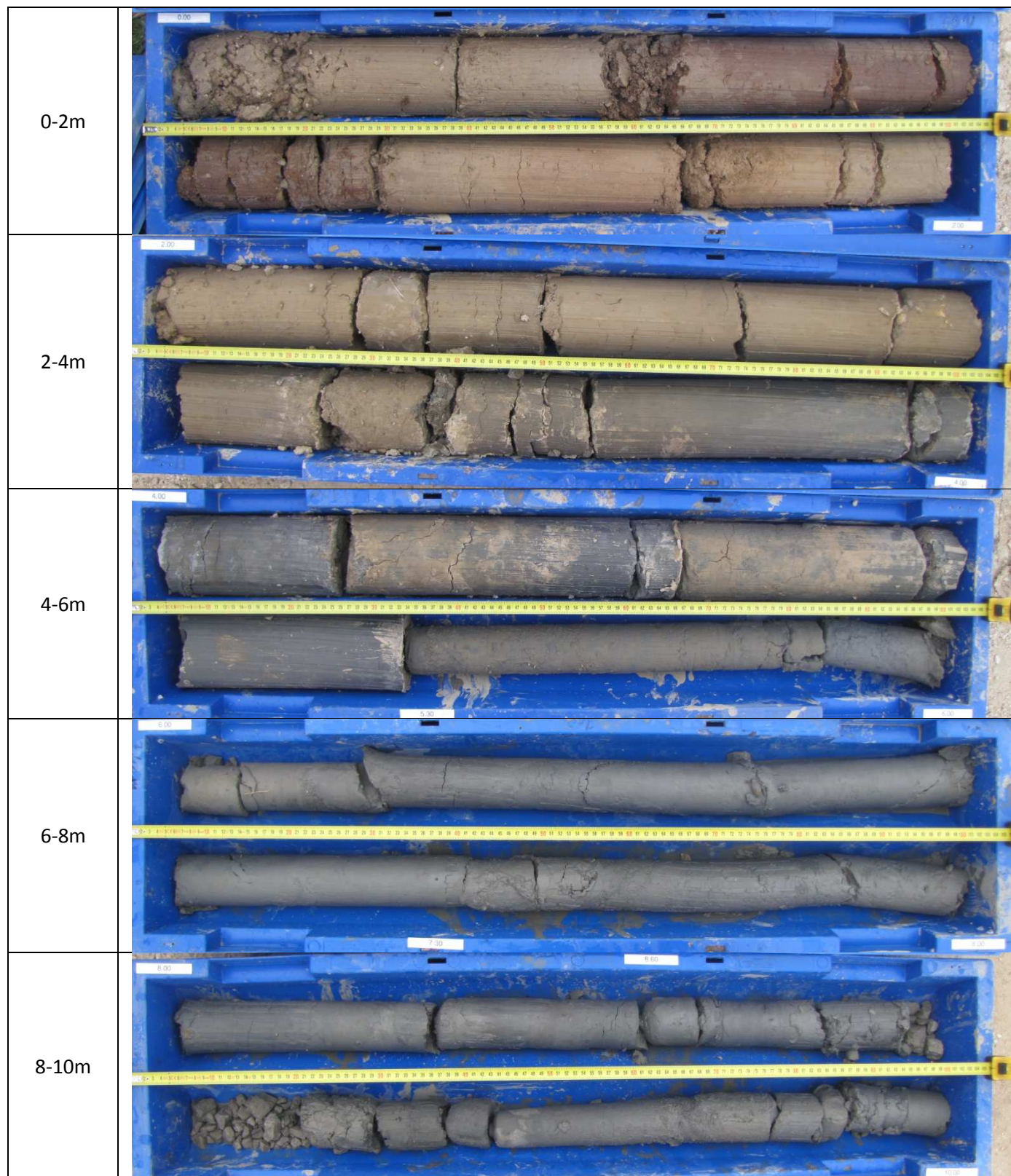




32-34m	
34-36m	
36-38m	
38-40m	
40-42m	

42-44m	
44-46m	
46-48m	
48-50m	
50-52m	

52-54m	
54-56m	
56-58m	
58-58.5m	



10-12m	
12-14.4m	
14.4-16.4m	
16.4-18.4m	
18.4-20.4m	
20.4-21.4m	

APPENDIX 4 : BIOSTRAT REPORT FROM FUGRO ROBERTSON

1. Biostratigraphic breakdown of Borehole C2, Kefalonia.

- **13.5m** – marl
 - Processed – SABN planktonics, including ABN *Orbulina universa*, indicates Neogene.
- **27.4m** – marl
 - T/S – SABN planktonics, none particularly distinctive, plus CMN ostracods
- **37.4m** – marl
 - T/S – CMN planktonics, none particularly distinctive, plus CMN ostracods. V. similar to 27.4m
- **56.7m** – sandy clay
 - Processed – SABN planktonics, including ABN *Orbulina universa*. All have a gray preservation, suggestive of the Neogene marl. Also seen ABN *Elphidium* spp with a ‘clean’ preservation. Previously seen only in JRU010, a sandstone tentatively placed in the Quaternary. ABN Echinoid debris and RARE micro bivalves also present.
- **57.3m** – limestone
 - T/S – SABN planktonics, ABN ostracods and a single ?*Elphidium* spp.
- **57.8m** – sand
 - Processed – SABN planktonics, including CMN *Orbulina universa*. All have a gray preservation, suggestive of the Neogene marl. Also seen RARE *Elphidium* spp with a ‘clean’ preservation.
- **60.6m** – marl
 - T/S – SABN v. fine biodebris, otherwise, barren.
- **62.7m** – limestone, fractured
 - T/S – ABN planktonics, CMN red algae, *Operculina* spp., OCC *Orbulina universa*, *Elphidium* spp, *Globigerinoides* spp, RARE *Sphaerogypsina* spp. Indicates Neogene age.

2. Biostratigraphic breakdown of C4a, Kefalonia.

- **6.5m:** - Marl (sample washed away leaving a very small residue.)
 - Processed – very poor recovery, only OCC ostracods and RARE *Elphidium* spp.
- **20.5m:** - Marl (sample washed away leaving a very small residue.)
 - Processed – BARREN
- **34.5m:** - Marl
 - T/S – very fine biodebris + ?silt
- **40.4m:** - Marl
 - Processed – very poor recovery, only RARE ?planktonic fragment
- **49.4m:** - Marl, pyritic - Neogene
 - T/S – ABN *Orbulina universa*, SABN small planktonic foraminifera, planktonic fragments
- **53.1m:** - Marl, pyritic - Neogene
 - T/S – CMN *Orbulina universa*, SABN small planktonic foraminifera, planktonic fragments, RARE miliolids
- **57.0m:** - Marl, pyritic - Neogene
 - T/S – CMN *Orbulina universa*, ABN small planktonic foraminifera, planktonic fragments.
- **60.6m:** - Marl, pyritic - Neogene
 - T/S – CMN *Orbulina universa*, SABN small planktonic foraminifera, planktonic fragments.
 -
- **66.0m:** - Marl, pyritic - Neogene
 - T/S – CMN *Orbulina universa*, ABN small planktonic foraminifera, planktonic fragments.
 -
- **72.8m:** - Marl, pyritic - Neogene
 - T/S – CMN *Orbulina universa*, ABN small planktonic foraminifera, SABN planktonic fragments.

3. Biostratigraphic breakdown of C4b, Kefalonia.

- **6.0m:** - wackestone
 - T/S – Planktonic rich, including *Morozovella* spp, indicative of Eocene age samples. (Similar was seen in 914c of the previous studies)
- **8.0m:** - wackestone
 - T/S – *Thaumatoporella*, miliolids and ostracods, indicating shallow water Cretaceous.
- **18.0m:** - wackestone
 - T/S – *Thaumatoporella*, miliolids and ostracods, indicating shallow water Cretaceous.
- **28.0m:** - wackestone (peloidal/intraclastic?)
 - T/S – *Thaumatoporella*, ostracods and an increase in biodebris indicating shallow water Cretaceous.
- **33.0m:** - peloidal/intraclastic wacke/packstone
 - T/S – *Thaumatoporella*, Ostracods and a further increase in biodebris. Shallow water Cretaceous.
- **43.5m:** - peloidal/intraclastic packstone.
 - T/S – Further analysis required (slide too thick, only noticed when back at the hotel)
- **53.0m:** - peloidal wackestone/packstone
 - T/S – *Thaumatoporella*, indicative of shallow water Cretaceous.
- **63.0m:** - peloidal packstone
 - T/S – *Thaumatoporella*, miliolids and ostracods, indicating shallow water Cretaceous.

4. Biostratigraphic breakdown of Borehole C5a, Kefalonia.

- **6.5m** – Clay – sample washed away leaving very little residue
 - Processed – OCC *Cibicides* spp, RARE indeterminate planktonic.
- **9.0m** – Marl – sample washed away leaving very little residue - ?Neogene
 - Processed – CMN pyrite debris, OCC *Orbulina universa*
- **13.0m** – Silt/very fine biodebris rich clay
 - T/S – BARREN

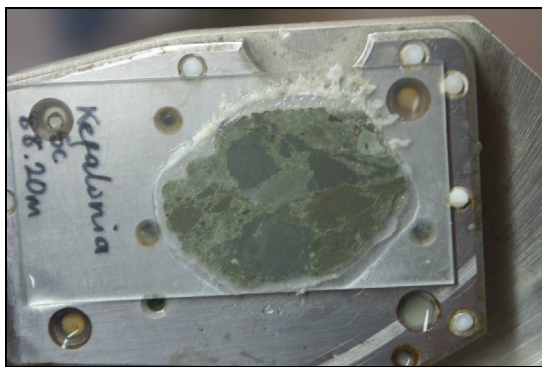
5. Biostratigraphic breakdown of Borehole C5b, Kefalonia.

- **5.5m** – Clay – very poor recovery – *Orbulina* = Miocene or younger
 - Processed – OCC *Orbulina universa*, indeterminate planktonics.
- **7.6m** – Clay – sample washed away leaving very little residue
 - Processed – OCC shell debris, RARE *Cibicides lobatulus*
- **14.1m** – Silty clay (grains ~18um = medium silt)
 - T/S – BARREN
- **18.6m** – Silty clay – sample washed away leaving very little residue
 - Processed – BARREN
- **22.5m** – Silty clay – sample washed away leaving very little residue
 - Processed – BARREN

6. Biostratigraphic breakdown of Borehole C5c, Kefalonia.

- **2.5m** – sandy limestone
 - T/S – seems to be clasts of limestone and quartz (up to 0.5mm). Within the clasts of limestone various fossils are found, including OCC planktonic fragments, ostracods and some very small benthic foraminifera. Unfortunately nothing age restricted was seen.
- **6.6m** - Clay
 - Processed – very little found within the sample, including 2 very poorly preserved benthic foraminifera
 - Nanno – found *Gephyrocapsa* spp which would indicate a Pliocene-Pleistocene age.
- **12.5m** – sandy clay
 - Processed – contains many planktonic foraminifera, including CMN *Orbulina universa*, which indicates Miocene and younger.
- **21.7m** – fine-very fine sandstone
 - T/S – barren of microfossils. Quartz grains between 150um and 40um.
- **31.4m** – marl
 - Processed – very poor recovery, found only 2 very small planktonic foraminifera. Due to their size it wasn't possible to speciate.
- **54.3m** – conglomerate
 - T/S – clasts of quartz, limestone plus others, ranging from 3.5mm-70um quartz in the matrix. Fossils found within the clasts include the foraminifera *Sphaerogypsina* spp, miliolids and echinoid debris.
- **65m** – sand
 - Processed – sand composed of a variety of different lithologies. Very few fossils were found in the large sample. Those found had very poor preservation, and include 1 pyritised gastropod, 1 *Haplophragmoides* spp and 3 ?planktonic foraminifera.

- **76m** – conglomerate
 - Unfortunately, this sample made a very poor thin section due to plucking of the sand grains from the thin section during processing. A number of attempts were made, with no better outcome. A nanno slide was attempted from scrapes of the sample, but the matrix was composed of sand, resulting in nothing for nanno analysis.
- **88.2m** – marl
 - T/S – CMN small planktonics, with OCC *Orbulina universa*. The lithology is not uniform, with varying different colours of marl (see picture below.)
- **99.8m** – marl
 - Processed – CMN *Orbulina* spp., CMN small planktonics, ABN Pyrite debris
- **102.2m** – marl
 - Processed – ABN Pyrite debris, OCC *Cibicides* spp.



7. Biostratigraphic breakdown of Borehole C5d, Kefalonia.

- **4.8m** – Clay – planktonic foraminifera rich – if in-situ, Neogene.
 - Processed – ABN small planktonics, CMN ?*Globigerinoides* spp., OCC *Orbulina universa*, *Cibicides* spp., RARE *Elphidium* spp.
- **9.0m** – Red Clay – very slightly sandy
 - Processed – CMN spherical/near spherical objects. Unsure if individual chambers of a large planktonic foraminifera, Radiolaria or something else entirely.
- **10.3m** – Limestone, heavily weathered looking, vuggy – Cretaceous
 - T/S – Packstone/recrystallised grainstone – SABN bivalve (?rudist) debris. CMN rudist debris, OCC *Orbitoides* spp.

8. Biostratigraphic breakdown of Borehole C6a, Kefalonia.

- **5.0m** – Clay/Sand - ?Recent
 - Processed – ABN sponge spicules, CMN shell debris, plant matter, ostracods, OCC *Orbulina universa*, indeterminate planktonics, RARE *Elphidium* spp.
- **12.3m** – Sandy clay
 - Processed – BARREN
- **17.2m** – Marl
 - Processed – BARREN
- **25.2m** – Limestone – wackestone.
 - T/S – ABN biodebris, ostracods, CMN *Valvulina* spp. The Valvulina-like forms are similar to those found in sample 802 of the first 2010 FRL study. That sample was placed as ?Palaeogene based on similarity with a Dasyclad algae rich sample.

9. Biostratigraphic breakdown of Borehole C6b, Kefalonia.

- **5.4m** – Clay - Recent
 - Processed – SABN small planktonics, ABN charcoal, CMN *Ammonia beccarii*, OCC *Orbulina universa*.
- **8.5m** – Sand - Recent
 - Processed – SABN shell debris, ABN Gastropods, CMN *Ammonia beccarii*, *Elphidium* spp (same species as seen in C2 previously), OCC *Hoeglundia elegans*, *Orbulina universa*, *Buccella tenerrima*.
- **16.0m** - Conglomerate
 - Processed – RARE *Cibicides* spp. Otherwise barren.
- **24.4m** – Limestone – lime mud.
 - T/S – RARE Indeterminate calcareous benthic foraminifera.

10. Biostratigraphic breakdown of Borehole C6c, Kefalonia.

- **2.5m** – Sand – Pliocene-Recent
 - Processed – SABN sponge spicules, shell debris, ABN *Ammonia beccarii*, CMN gastropods, *Elphidium* spp, *Peneroplis planatus*. Very rich sample
- **8.8m** – Sand - Pliocene-Recent
 - Processed – SABN shell debris, CMN Gastropods, *Ammonia beccarii*, *Elphidium* spp, miliolids.
- **13.5m** – Sand
 - Processed – SABN shell debris, OCC small planktonics, RARE *Cibicides* spp.
- **25.6m** – Sand – Pliocene-Recent
 - Processed – CMN *Elphidium* spp, small planktonics, OCC *Ammonia beccarii*.
- **31.6m** – Clay – Pliocene-Recent
 - Processed – SABN shell debris, *Ammonia beccarii*, ABN *Elphidium* spp, CMN echinoid debris, *Cibicides lobatulus*
- **33.7m** – Limestone - Peloidal packstone
 - T/S – CMN bivalve debris (dissolved out), ostracods, OCC echinoid debris
- **38.2m** – Marl - Pliocene-Recent
 - Processed – ABN *Ammonia beccarii*, CMN *Elphidium* spp, echinoid debris, OCC *Planulina* spp, miliolids, ostracods

Biostratigraphic breakdown of Outcrop samples, Kefalonia.

- **Sample 1:** Limestone from base of watchtower. T/S
 - Packstone – CMN Rudist debris, ABN Bivalve debris, RARE *Siderolites* spp. = CRETACEOUS, shallow marine (Similar to 718, 910 from previous studies)
- **Sample 4:** Limestone outcrop in farmers field (red box). T/S
 - ?Micropeloidal? packstone – ABN *Thaumatoporella*, OCC Miliolids = CRETACEOUS, shallow marine (Similar to the samples logged as hotshots from C4b, specifically sample 81.9m)
- **Sample 6:** Yellow marl from quarry below Petrikata (Photo 1). T/S
 - Fractured wackestone – SABN small planktonics, planktonic fragments, CMN *Orbulina* spp, OCC *Globigerinoides* spp = NEOGENE (Similar to K121 and K122)
- **Sample 7:** ‘Blue’ marl from quarry below Petrikata (Photo 1). Processed
 - Slightly sandy, yellow coloured when processed. SABN Planktonics, including CMN *Orbulina* spp, OCC *Orbulina bilobata*, CMN benthic foraminifera, including OCC *Cibicides* spp. = NEOGENE (?Similar to K11 01c from the last study. Preservation not as good)
- **Sample 9:** Limestone from quarry below Petrikata (Photo 1). T/S
 - Fractured wackestone – CMN *Thaumatoporella*, CMN Ostracods = CRETACEOUS, shallow marine.
- **Sample 10:** Limestone from quarry below Petrikata (higher up quarry face). T/S
 - Fractured wackestone – ABN *Thaumatoporella*, ostracods, OCC miliolids = CRETACEOUS, shallow marine.
- **Sample 11:** Limestone from road cutting below quarry at Petrikata. T/S
 - ?Brecciated, fractured wackestone – CMN *Thaumatoporella*, ostracods, miliolids = CRETACEOUS, shallow marine.
- **Sample 12:** Marl from road cutting below quarry at Petrikata. T/S
 - Wackestone/packstone – SABN planktonics, including CMN *Orbulina universa* = NEOGENE
- **Sample 13:** Hard inclusion found within the marl (location of sample 12). T/S
 - Wackestone – *Thaumatoporella*, miliolids, ostracods = CRETACEOUS, shallow marine.
- **Sample 14:** Breccia at turnoff for Kontogourata. T/S
 - Matrix – sand grains and ?clay
 - Clasts – Palaeogene (OCC *Alveolina* spp, Disco/*Lepidocyclus* spp. wackestone; SABN Rotalid calcareous benthonics, RARE *Operculina* spp, Disco/*Lepidocyclus* spp. Packstone.) Plus a clast composing only small planktonics in a wackestone.
- **Sample 15:** brecciated limestone at turnoff for Kontogourata (Photo 3 – left side). T/S - Palaeogene
 - Fragmented packstone – SABN Nummulites, CMN *Alveolina* spp, Disco/*Lepidocyclus* spp, with some peloidal packstone ‘clasts’. Similar to K106 etc.
- **Sample 16:** limestone next to sample 15 - ?faulted? (Photo 3 – right side). T/S - Cretaceous
 - Heavily brecciated wackestone – ABN *Thaumatoporella*, miliolids, OCC small calcareous benthic foraminifera.
- **Sample 17:** Marl from road to beach below watchtower (Photo 4). T/S – Neogene
 - Heavily weathered, wackestone – ABN small planktonics, OCC *Orbulina universa*
- **Sample 18:** Limestone road to beach below watchtower (Photo 5). T/S – Cretaceous
 - Grainstone – SABN bivalve (?rudist) debris, OCC rudist debris, miliolids. Similar to K109, 715 etc.
- **Sample 19:** Limestone road to beach below watchtower (Photo 5). T/S – Cretaceous
 - Fractured, partly recrystallised, partly wacke/packstone – ABN bivalve (?rudist) debris, OCC rudist debris

- **Sample 20:** Limestone at bottom of road to the beach (Photo 6). T/S – Indeterminate
 - Very strange texture, either an odd peloidal grainstone, or some kind of algal/biologically derived lithology.
- **Sample 21:** Limestone on western side of ridge between the two valleys at beach. T/S - ?Cretaceous
 - Wackestone – ABN bivalve (?rudist) debris, RARE miliolids. Texture is very similar to Thaumaporella rich samples.
- **Sample 22:** Limestone by extinct waterfall. T/S
 - Wackestone – Cretaceous shallow marine, SABN fine bioclastic debris, ABN Thaumaporella parvovesiculifera, OCC rudist debris
- **Sample 23:** ?Breccia in valley below Petrikata quarry (GPS: 0453267, 4237709, 160m).T/S
 - Wackestone – Cretaceous shallow marine, CMN Thaumaporella parvovesiculifera, ostracods, biodebris
- **Sample 24:** limestone at bottom of valley below Petrikata quarry (GPS: 0453250, 4237992, 139m) (Photo 7 – above hammer). T/S
 - Packstone – Palaeocene, medium grained biodebris, SABN ostracods, miliolids OCC Gypseina (Reverse side of sample cut contained 3 Nummulites)
- **Sample 25:** Marl at bottom of valley below Petrikata quarry (GPS: 0453250, 4237992, 139m) (Photo 7 – below hammer). T/S
 - Wackestone – ?Neogene, SABN Globigerina spp, planktonic fragments, RARE rotalid calcareous benthics
- **Sample 27:** Hard lithology along track from beach below Zola (GPS: 0453919, 4239404, 41m) (Photo 8). T/S
 - ?Grainstone/Recrystallised Marl? - ?Neogene – ABN Globigerina spp.
- **Sample 28:** Soft outcrop on elongate ridge near proposed C3 (GPS: 0453358, 4238625, 72m) (Photo 9). T/S
 - Wackestone - ?Neogene Globigerina spp rich (SABN) marl. Heavily weathered, altered sample.
- **Sample 31:** Limestone above sample of conglomerate (Sample 30). T/S
 - Wackestone – Very poorly fossiliferous, CMN biodebris and OCC ostracods
- **Sample 32:** Conglomerate on diagonal road (GPS: 453059, 4235865, 209m) (Photo 10)
 - Conglomerate – Includes clasts of peloidal grainstone, as well as CMN Nummulites spp., Miliolids spp, and OCC Alveolina spp. As well as ?Rudist debris – Main body of evidence indicates a Palaeogene age.
- **Sample 33:** limestone on hill John took photo from (GPS: 0452605, 4234552, 30m). T/S
 - Wackestone – Cretaceous shallow marine, SABN biodebris, ABN Thaumaporella parvovesiculifera, CMN Rudist debris
- **Sample 34:** Limestone at foot of ridge leading into sea at Agio Sotiro (GPS: 452425, 4234785, -4m(!)) (Photo 11). T/S
 - Half slide is recrystallised calcite, the other half is a biodebris rich wackestone. The recrystallised half looks like it may have relict coral/stromatoporoid texture.
- **Sample 35:** Marl below thrust at Agio Sotiro (GPS: 452557, 4234937, 51m) (Photo 12). T/S
 - Packstone - Neogene – SABN Globigerina spp., OCC Orbulina universa, Globigerinoides spp
- **Sample 36:** Limestone (heavily fractured) above thrust at Agio Sotiro (GPS: 452557, 4234937, 51m) (Photo 12). T/S
 - Shattered Lime mud/wackestone, very poorly fossiliferous – CMN ostracods
- **Sample 43:** Limestone below diagonal road that had bedding (GPS: 0453033, 4235823, 189m). T/S – Palaeogene (325°/45° WSW)
 - Packstone – ABN *Amphistegina* spp., CMN *Operculina* spp., *Gypseina* spp., *Disco/Lepidocyclina* spp., planktonic foraminifera (including OCC *Catapsydrax* spp.).

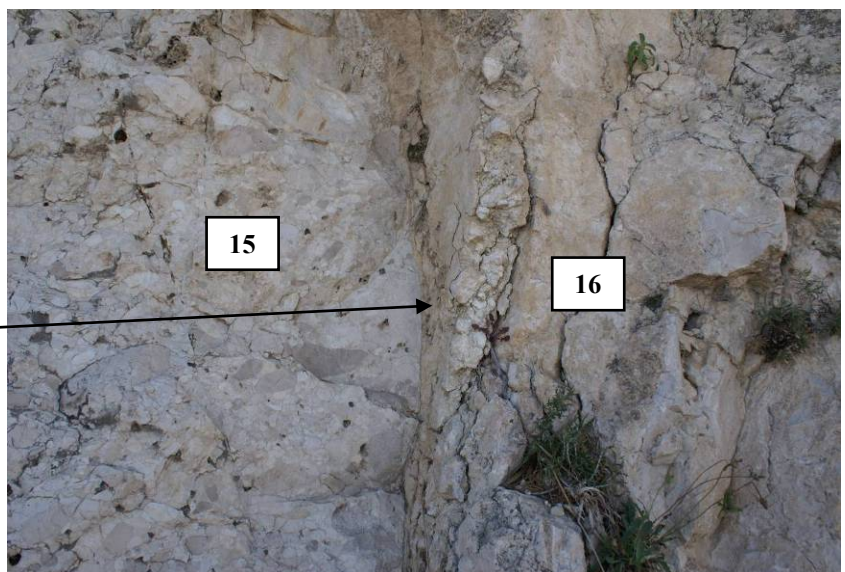
- **Sample 44:** Limestone below main road (GPS: 0452934, 4235116, 151m). T/S – Palaeogene.
 - Packstone – SABN *Nummulites* spp., CMN *Disco/Lepidocyclina* spp., OCC *Gypseina* spp., *Amphistegina* spp., RARE *Actinocyclus* spp.
- **Sample 45:** Marl in mound in middle of valley (GPS: 0452806, 4235162, 124m). T/S – Neogene.
 - Wacke/packstone – SABN Planktonic foraminifera (including OCC *Orbulina universa* spp.), SABN planktonic fragments
- **Sample 46:** Limestone with decimetre scale bedding next to Sample 45 (GPS: 0452742, 4235080, 96m). T/S – Palaeogene (Eocene) – (200°/45° ESE)
 - Wackestone, very hard, fractured – SABN planktonic foraminifera (including CMN *Acarinina* spp., OCC *Catapsydrax* spp.)
- **Sample 47:** Marl looking down at Agio Sotiro beach (GPS: 0452825, 4234601, ???m). T/S - ?Neogene.
 - Wacke/packstone – SABN planktonic fragments
- **Sample 48:** Marl further down gulley from sample 47 (GPS: 0452676, 4234622, 52m). T/S - Neogene.
 - Wacke/packstone – SABN planktonic foraminifera and fragments, CMN *Orbulina universa*
- **Sample 49:** Limestone??/Marl, hard sample (GPS: 0452751, 4234120, 16m). T/S - ?Neogene.
 - Packstone – SABN planktonic foraminifera, planktonic fragments, OCC sponge spicules
- **Sample 50:** Limestone??/Marl, soft sample (GPS: 0452751, 4234120, 16m). Processed - Indeterminate.
 - Barren of microfossils
- **Sample 51:** Conglomerate of angular limestone clasts in a red matrix, very hard lithology (GPS: 0452686, 4234172, 24m). T/S - Indeterminate.
- **Sample 52:** Limestone at boundary with conglomerate. T/S - ?Paleogene – GPS: 452633, 4234405, 43m. (237°/54° SSE)
 - Wackestone, very hard, fractured – ABN planktonic fragments, CMN planktonic foraminifera, OCC ?*Acarinina* spp.
- **Sample 53:** Marl higher up the hillside from sample 52 (GPS: 0452660, 4234429, 57m). T/S - Neogene.
 - Wacke/packstone – SABN planktonic foraminifera, planktonic fragments, ABN *Orbulina universa*.
- **Sample 54:** Clay from the conglomerate boulder beach (GPS: 0452630, 4234135, -3m(!)). Processed – If fossils are in-situ – Neogene
 - SABN planktonic foraminifera, CMN *Orbulina universa*.



photo n° 1 :



photo n° 2 :



distinct change in
coulour, texture etc.
? fault

photo n° 3 :



photo n° 4 :



photo n° 5 :

20



photo n° 6 :



photo n° 7 :



photo n° 8 :



photo n° 9 :



photo n° 10 :



photo n° 11 :



photo n° 12 :

APPENDIX 5 : NANOFOSSIL REPORT FROM FUGRO ROBERTSON

1. Nannofossil Report for Borehole C1**Depth: 2.75m(core)****Age:** Upper Palaeocene, Thanetian**Zone*:** NP9**Lithological comments:** Limestone- white, friable.

Nannofossils: An assemblage relatively poor in nannofossils and diversity, dominated by abundant *Coccolithus pelagicus* and *Sphenolithus* spp. The presence of marker species *Heliolithus kleinpelli* and *Fasciculithus tympaniformis* would restrict this sample to zones NP9 considering the evidence at 4.2m.

Reworking: None.**Depth: 4.2m(core)****Age:** Upper Palaeocene, Thanetian**Zone*:** NP8**Lithological comments:** Limestone- white,hard

Nannofossils: The sample is very rich and dominated by *Coccolithus pelagicus* and *Sphenolithus* spp., with subordinate numbers of *Fasciculithus tympaniformis*, *Cruciplacolithus* spp., *Toweius* spp. and *Zygodiscus sigmoides*. Many of the specimens show noticeable overgrowths often making identification to species level difficult. The presence of well preserved marker species *Heliolithus riedeli* and *Discoaster mohleri* however restrict this sample to zone NP8.

Reworking: None.**Depth: 8.5m(core)****Age:** Upper Palaeocene, Thanetian**Zone:** NP8-NP6**Lithological comments:** Limestone- white, hard

Nannofossils: The sample is very rich and dominated by *Coccolithus pelagicus* and *Sphenolithus* spp., with subordinate numbers of *Fasciculithus tympaniformis*, *Cruciplacolithus* spp., *Toweius* spp., and *Zygodiscus sigmoides*. Many of the specimens show noticeable overgrowths often making identification to species level difficult. The presence of well preserved marker species *Heliolithus cantabriae* and *Heliolithus kleinpelli* however would indicate a Thanetian age no older than zone NP6.

Reworking: None.**Depth: 17.1m(core)****Age:** Upper Palaeocene, Thanetian- ?'intra' Selandian**Zone:** NP8-?NP5**Lithological comments:** Limestone- white,hard

Nannofossils: The sample is moderately rich and dominated by *Coccolithus pelagicus* and *Sphenolithus* spp., with subordinate numbers of *Fasciculithus tympaniformis*, *Toweius* spp., and *Zygodiscus sigmoides*. Many of the specimens show noticeable overgrowths often making identification to species level difficult. The presence of well preserved marker species *Heliolithus cantabriae* and *Fasiculithus tympaniformis* however would indicate an age no older than 'intra' Selandian Zone NP5.

Reworking: Cretaceous – rare.

2. Nannofossil Report for Borehole C4c

Depth: 4.3m(core)

Age: Upper - uppermost Lower Pliocene, Piacenzian-uppermost Zanclean

Zone*: MNN18-MNN15 (+MNN7-?MNN4)

Lithological comments: Calcareous Clay/Marl (grey)

Nannofossils: The sample is dominated with *Reticulofenestra* spp., *Calcidiscus leptoporus*, *Coccolithus pelagicus* and *Sphenolithus* species. The background also contains abundant small *Gephyrocapsa* spp. The presence of small *Gephyrocapsa*, and the absence of large forms, is restricted to the Pliocene zones MNN18-MNN15.

This sample also contains occasional *Discoaster kugleri* (MNN7-MNN6) and also rare *Discoaster deflandrei* which has a range of MNN7-Paleogene. This together with the presence of *Sphenolithus moriformis*, *Cyclocargolithus floridanus* and *Reticulofenestra pseudumbilica* indicate the presence of Miocene aged sediments in the sample within zones MNN7-?MNN4.

Reworking:

Middle - Lower Miocene (Zones MNN5-MNN4) - abundant

No Cretaceous or Palaeogene restricted species observed.

Depth: 18.2m(core)

Age: Upper - uppermost Lower Pliocene, Piacenzian-uppermost Zanclean

Zone*: MNN16?-MNN15

Lithological comments: Calcareous Clay/Marl (grey)

Nannofossils: The sample is very rich and dominated by superabundant *Gephyrocapsa* spp. (small) and *Reticulofenestra* spp. with abundant *Coccolithus pelagicus*, *Calcidiscus leptoporus* and *Rhabdosphaera* spp. A subordinate number of *Discoaster*, *Helicosphaera*, *Pontosphaera* and *Sphenolithus* species are also present. The presence of the small *Gephyrocapsa*, and the absence of large forms, indicates a Pliocene age, Zones MNN18-MNN15. The presence of several specimens of *Discoaster variabilis* (MNN16-MNN5) may indicate a range of MNN16-MNN15 is more appropriate although these may be reworked from the Middle-Lower Miocene.

Rare Pleistocene contamination was also present.

Reworking: This sample contains several reworked assemblages:

Middle - Lower Miocene (Zones MNN5-MNN4) - abundant

Middle – Lower Eocene (Zones NP14-NP12) – rare

Maastrichtian-Campanian - rare

Depth: 24.0m(core)

Age: ?Oligocene-Eocene

Zone: ?NP-NP12

Lithological comments: Calcareous Clay/Marl (Light grey- hard, ?clast)

Nannofossils: The sample is highly impoverished and dominated by *Reticulofenestra* spp. and *Sphenolithus* species. Rare specimens of *Helicosphaera* spp. and *Coccolithus pelagicus* are also present. A complete absence of *Discoaster* spp. may reflect dissolution having taken place. The presence of *Reticulofenestra bisecta* if *in-situ* may suggest an Oligocene age in view of the absence of Eocene restricted species.

Reworking: None.

Depth: 27.5m(core)**Age:** Upper - uppermost Lower Pliocene, Piacenzian-uppermost Zanclean**Zone:** MNN18-MNN15 (+MNN6-MNN4)**Lithological comments:** Calcareous Clay/Marl (grey - hard)

Nannofossils: The sample has mostly poor to moderate recovery and preservation and is dominated by superabundant *Gephyrocapsa* spp. (small) and *Reticulofenestra* spp. with abundant *Coccolithus pelagicus*. A subordinate number of *Sphenolithus* species are also present including the age restricted *Sphenolithus heteromorphus* (MNN5-MNN4). The presence of the small *Gephyrocapsa*, and the absence of large forms, indicates a Pliocene age, Zones MNN18-MNN15.

Reworking: None.**Depth: 28.3m(core)****Age:** ?Oligocene-Eocene**Zone:** ?NP-NP12**Lithological comments:** Calcareous Clay/Marl (Light grey- hard, ?clast)

Nannofossils: The sample has a moderate recovery but very poor diversity. The assemblage is dominated by *Reticulofenestra bisecta*, *Coccolithus pelagicus*, *Cyclocargolithus floridanus* and *Sphenolithus* species. Rare specimens of *Helicosphaera* spp. are also present. A complete absence of *Discoaster* spp. may reflect dissolution having taken place. The presence of *Reticulofenestra bisecta* if *in-situ* may suggest an Oligocene age in view of the absence of Eocene restricted species.

Reworking: None.**Depth: 38.0m(core)****Age:** Upper - uppermost Lower Pliocene, Piacenzian-uppermost Zanclean**Zone*:** MNN16?-MNN15 (+MNN5-MNN4)**Lithological comments:** Calcareous Clay/Marl (grey)

Nannofossils: The sample is very rich and dominated by superabundant *Gephyrocapsa* spp. (small) and *Reticulofenestra* spp. with abundant *Coccolithus pelagicus*, *Calcidiscus leptoporus* and *Cyclicargolithus floridanus*. A subordinate number of *Discoaster*, *Helicosphaera*, *Pontosphaera*, *Scyphosphaera* and *Sphenolithus* species are also present. The presence of the small *Gephyrocapsa*, and the absence of large forms, indicates a Pliocene age, Zones MNN18-MNN15. The presence of several specimens of *Discoaster variabilis* (MNN16-MNN5) may indicate a range of MNN16-MNN15 is more appropriate although these may be reworked from the Middle-Lower Miocene.

Reworking: This sample contains several reworked assemblages:

Middle - Lower Miocene (Zones MNN5-MNN4) - abundant

Lower Miocene- Middle Oligocene (Zones MNN1-NP23) – rare

Maastrichtian-Campanian - rare

3. Nannofossil Report for Borehole C5a**Depth: 9.8m(core)****Age:** Upper - uppermost Lower Pliocene, Piacenzian-uppermost Zanclean**Zone*:** MNN16-MNN15**Lithological comments:** Calcareous Clay/Marl (grey)

Nannofossils: The sample is dominated with *Reticulofenestra* spp., *Calcidiscus leptoporus*, *Coccolithus pelagicus* and *Sphenolithus* species. The background also contains abundant small *Gephyrocapsa* spp. The presence of the small *Gephyrocapsa*, and the absence of large forms, plus the presence of *Pseudoemiliana lacunosa* and *Discoaster variabilis* would suggest a Pliocene age, Zones MNN16-MNN15. This sample also contains occasional *Sphenolithus heteromorphus* (MNN5-MNN4) and *Discoaster deflandrei* which has a range of MNN7-Paleogene. This together with the presence of *Cyclocargolithus floridanus* would indicate the presence of Miocene aged sediments in the sample within Zones MNN5-MNN4.

Reworking:

Middle - Lower Miocene (Zones MNN5-MNN4) - abundant

Eocene (Zone NP15) - rare

4. Nannofossil Report for Borehole C5b

Depth: 7.0m(core)

Age: Upper - uppermost Lower Pliocene, Piacenzian-uppermost Zanclean

Zone*: MNN18-MNN15

Lithological comments: Calcareous Clay/Marl (cream-grey)

Nannofossils: The sample is dominated with *Reticulofenestra* spp., *Calcidiscus leptoporus* and *Coccolithus pelagicus*. A subordinate number of *Discoaster*, *Helicosphaera*, *Pontosphaera*, *Rhabdosphaera* and *Sphenolithus* species also occur. The background also contains common/abundant small *Gephyrocapsa* spp. The presence of small *Gephyrocapsa*, and the absence of large forms, is restricted to the Pliocene zones MNN18-MNN15. This is supported by the presence of *Pseudoemiliana lacunosa* which ranges no older than Zone MNN15. The presence of *Sphenolithus heteromorphus* and *Cyclicargolithus floridanus* indicate the presence of reworked Miocene aged sediments in the sample within zones MNN5-MNN4. The sample may also contain common reworking from the Middle-Upper Miocene but no age restricted taxa were observed to confirm this.

Reworking:

Middle - Lower Miocene (Zones MNN5-MNN4) - occasional

Oligocene (Zones NP25-NP23)- rare

Eocene (Zones NP20-NP12) – rare

Depth: 22.1m(core)

Age: Upper? - Lower Pliocene, Piacenzian?-uppermost Zanclean

Zone*: MNN16?-MNN15

Lithological comments: Calcareous Clay/Marl (grey)

Nannofossils: The sample is moderately rich and dominated by abundant *Reticulofenestra* spp. with abundant *Coccolithus pelagicus*, *Calcidiscus leptoporus*. A subordinate number of *Discoaster*, *Helicosphaera*, *Pontosphaera* and *Rhabdosphaera* and *Sphenolithus* species are also present. The background also contains occasional small *Gephyrocapsa* spp. The presence of small *Gephyrocapsa*, and the absence of large forms, is restricted to the Pliocene zones MNN18-MNN15. The presence of several specimens of *Discoaster variabilis* (MNN16-MNN9) may indicate a range of MNN16-MNN15 is more appropriate although these may be reworked from the Middle-Lower Miocene.

Reworking: This sample contains several reworked assemblages:

Middle - Lower Miocene (Zones MNN5-MNN4) - abundant

Eocene (Zones NP19-NP11) – rare

Maastrichtian-Campanian - occasional

5. Nannofossil Report for Borehole C5c**Depth: 2.5m(core)****Age:** Early-Middle Miocene**Zone*:** MNN5-MNN4**Lithological comments:** Calcareous Clay/Marl – cream

Nannofossils: The sample has a very poor recovery and diversity of nannofossils. It is dominated by *Reticulofenestra* spp., *Coccolithus pelagicus* and *Sphenolithus* spp. The presence of a single specimen of *Sphenolithus heteromorphus* indicates an age no older than Middle Miocene Zones MNN5-MNN4. This is supported by the presence of *Discoaster deflandrei* and *Cyclicargolithus floridanus* which range no younger than Middle Miocene.

Reworking: This sample contains the following reworked assemblages:

Oligocene - Paleocene (Zones NP25-?NP5) - occasional

Maastrichtian-Campanian - common

6. Nannofossil Report for Borehole C5d**Depth: 5.1m(core)****Age:** ?Pliocene - Miocene**Zone*:** ?MNN16-MNN1**Lithological comments:** Calcareous Clay/Marl - red (soft)

Nannofossils: The sample has a very poor recovery and diversity of nannofossils. It is dominated by *Reticulofenestra* spp. and *Coccolithus pelagicus*. The presence of a single specimen of *Discoaster variabilis* indicates an age no older than Miocene and no younger than Pliocene, Zones MNN16-MNN11. Some Miocene reworking is evident by the presence of *Discoaster deflandrei* and *Cyclocargilithus floridanus* which range no younger than Middle Miocene, zones MNN6 or older. This is consistent with that seen in nearby boreholes but the poor recovery/reworking prevents a more precise determination.

Reworking: This sample contains the following reworked assemblages:
Early-Middle Miocene (Zones MNN6-?MNN1) – rare

Depth: 14.5(core)**Age:** Indeterminate**Zone*:** Indeterminate**Lithological comments:** Limestone rubble – white (hard)

Nannofossils: This sample contains abundant calcite lathes but is barren of nannofossils.

Reworking: None

7. Nannofossil Report for Borehole C5e**Depth: 2.5m(core)****Age:** Indeterminate (Barren)**Zone*:****Lithological comments:** Limestone (cream-hard)**Nannofossils:** The sample consists of abundant calcite but is barren of nannofossils.**Reworking:** None**Depth: 9.2m(core)****Age:** Indeterminate (Barren)**Zone*:****Lithological comments:** Limestone (white-hard)**Nannofossils:** The sample consists of abundant calcite but is barren of nannofossils.**Reworking:** None.**Depth: 20.0m(core)****Age:** Indeterminate (Barren)**Zone*:****Lithological comments:** Limestone (white-hard)**Nannofossils:** The sample consists of abundant calcite but is barren of nannofossils.**Reworking:** None.

8. Nannofossil Report for Borehole C6c**Depth: 16.5m(core)****Age:** Pleistocene (Selinuntian)**Zone*:** MNN19b-MNN19f**Lithological comments:** Calcareous Clay/Marl (grey)

Nannofossils: The sample is very rich and contains much reworking of older strata. It is dominated by abundant *Gephyrocapsa* spp. (small) and *Reticulofenestra* spp. with abundant *Coccolithus pelagicus*, and *Calcidiscus leptoporus*. A subordinate number of *Discoaster*, *Helicosphaera*, *Pontosphaera*, *Rhabdosphaera* and *Sphenolithus* species are also present. The presence of the small *Gephyrocapsa* spp., with *Gephyrocapsa oceanica* and *Pseudoemiliana lacunosa* indicates an Early Pleistocene age, Zones MNN19b-MNN19f.

Reworking: This sample contains several reworked assemblages:

Upper Miocene (Zones MNN12-MNN11 b) - rare

Early-Middle Miocene (Zones MNN5-MNN4) – rare

Eocene- (Zones NP20-NP12) - rare

Depth: 33.3m(core)**Age:** Pleistocene (Selinuntian)**Zone*:** MNN19b-MNN19f**Lithological comments:** Silty clay-(yellowish)

Nannofossils: The sample has poor to moderate recovery and contains moderate reworking of older strata. It is dominated by *Gephyrocapsa* spp. (small) *Reticulofenestra* spp. and *Coccolithus pelagicus*. A subordinate number of *Calcidiscus leptoporus* and *Sphenolithus* species are also present. The presence of the small *Gephyrocapsa* spp., with *Gephyrocapsa oceanica* and *Pseudoemiliana lacunosa* indicates an Early Pleistocene age, Zones MNN19b-MNN19f.

Reworking:

Early-Middle Miocene (Zones MNN5-MNN4) – rare

Maastrichtian-Campanian - rare

Depth: 39.0m(core)**Age:** ?Pleistocene (Selinuntian)**Zone*:** ?MNN19b-MNN19f**Lithological comments:** Sand-(yellowish)

Nannofossils: The sample has poor to very recovery and contains some reworking of older strata. It is dominated by small *Reticulofenestra* spp. and *Coccolithus pelagicus*. Rare specimens of *Calcidiscus leptoporus* and *Sphenolithus* species are also present. The presence of a single specimen of *Gephyrocapsa oceanica*, if *in situ* would tentatively indicate an Early Pleistocene age, Zones MNN19b-MNN19f.

Reworking:

Miocene - common

Maastrichtian-Campanian - rare

9. Nannofossil Report for Borehole C7a**Depth: 7.3m(core)****Age:** Eocene – Middle Miocene**Zone*:** NP12 – MNN6**Lithological comments:** Limestone (cream-hard)

Nannofossils: The sample is highly impoverished with few age diagnostic species present. It does contain occasional *Reticulofenestra* spp., *Coccolithus pelagicus*, *Cyclicargolithus floridanus* and *Sphenolithus* spp. The presence of *Reticulofenestra* spp. and *Cyclicargolithus floridanus* however would restrict this sample to an Eocene to Middle Miocene age (Zones NP12 – MNN6).

Reworking: None**Depth: 11.8m(core)****Age:** Indeterminate**Zone*:****Lithological comments:** Limestone (cream-hard)

Nannofossils: The sample contains abundant calcite lathes but is barren of nannofossils.

Reworking: None**Pig Farm Quarry Outcrop sample (38.2683N 20.4592E)****Age:** Indeterminate**Zone*:****Lithological comments:** Limestone (cream-hard)

Nannofossils: The sample contains abundant calcite lathes but is barren of nannofossils.

Reworking: None

10. Nannofossil Report for Borehole C2006**Depth: 4.0m(core)****Age:** Upper Miocene, Tortonian-Messinian**Zone*:** MNN11-MNN10**Lithological comments:** Calcareous Clay/Marl (grey)

Nannofossils: The sample is moderately rich with a good recovery of nannofossils dominated by *Reticulofenestra* spp., *Calcidiscus leptoporus*, *Coccolithus pelagicus* and *Sphenolithus* species. The presence of *Sphenolithus abies*, *Sphenolithus moriformis*, *Reticulofenestra pseudoumbilica* and small 5 rayed *Discoaster* spp. would indicate the presence of Upper Miocene aged sediments in the sample within zones MNN11-MNN10. No positive younger aged species were observed in this sample but the presence of *Cyclocargolithus floridus* would indicate some reworking of older Palaeogene-Middle Miocene sediments.

Reworking: Palaeogene-Middle Miocene (MNN4 or older).**Depth: 10.5m(core)****Age:** Upper - uppermost Lower Pliocene, Piacenzian-uppermost Zanclean**Zone*:** MNN16-MNN15**Lithological comments:** Calcareous Clay/Marl (grey)

Nannofossils: The sample is very rich and contains much reworking of older strata. It is dominated by abundant *Gephyrocapsa* spp. (small) and *Reticulofenestra* spp. with abundant *Coccolithus pelagicus*, *Calcidiscus leptoporus* and *Rhabdosphaera* spp. A subordinate number of *Discoaster*, *Helicosphaera*, *Pontosphaera* and *Sphenolithus* species are also present. The presence of the small *Gephyrocapsa*, and the absence of large forms, plus the presence of *Discoaster asymmetricus* and *Calcidiscus macintyreii* indicates a Pliocene age, Zones MNN16-MNN15.

Reworking: This sample contains several reworked assemblages:

Upper Miocene (Zones MNN11-MNN8) - rare

Early-Middle Miocene (Zones MNN5-MNN4) – rare

Eocene- (Zones NP20-NP12) - rare

Maastrichtian-Campanian - rare

Depth: 20.1m(core)**Age:** Upper - uppermost Lower Pliocene, Piacenzian-uppermost Zanclean**Zone*:** MNN18-MNN15**Lithological comments:** Calcareous Clay/Marl (grey)

Nannofossils: The sample is very rich and contains much reworking of older strata. It is dominated by abundant *Gephyrocapsa* spp. (small) and *Reticulofenestra* spp. with abundant *Coccolithus pelagicus*, *Calcidiscus leptoporus* spp. A subordinate number of *Discoaster*, *Helicosphaera*, *Pontosphaera*, *Rhabdosphaera* and *Sphenolithus* species are also present. The presence of the small *Gephyrocapsa*, and the absence of large forms, Zones MNN18-MNN15.

Reworking: This sample contains several reworked assemblages:

Upper Miocene (Zones MNN11) - common

Early-Middle Miocene (Zones MNN5-MNN4) – common

Eocene- (Zones NP20-NP12) - rare

Maastrichtian-Campanian - rare

Depth: 27.9m(core)**Age:** Upper - uppermost Lower Pliocene, Piacenzian-uppermost Zanclean**Zone*:** MNN18-MNN15**Lithological comments:** Calcareous Clay/Marl (grey)

Nannofossils: The sample is very rich and contains much reworking of older strata. It is dominated by abundant *Gephyrocapsa* spp. (small) and *Reticulofenestra* spp. with abundant *Coccolithus pelagicus*, and *Calcidiscus leptoporus* spp. A subordinate number of *Discoaster*, *Helicosphaera*, *Pontosphaera*, *Rhabdosphaera* and *Sphenolithus* species are also present. The presence of the small *Gephyrocapsa*, and the absence of large forms indicates a Pliocene age, Zones MNN18-MNN15.

Reworking: This sample contains several reworked assemblages:

Upper Miocene (Zones MNN11) - rare

Early-Middle Miocene (Zones MNN5-MNN4) – common

Eocene- (Zones NP20-NP16) - rare

Depth: 39.1m(core)**Age:** Upper Pliocene (Piacenzian) – Upper Miocene (Tortonian)**Zone*:** MNN17-MNN11**Lithological comments:** Calcareous Clay/Marl (grey)

Nannofossils: The sample is relatively poor and contains much reworking of older strata. It is dominated by abundant *Reticulofenestra* spp., with abundant *Coccolithus pelagicus*. A subordinate number of *Calcidiscus leptoporus*, *Discoaster*, and *Sphenolithus* species are also present. The presence of a single specimen of *Discoaster variabilis* would indicate an age no younger than Upper Pliocene and no older than Upper Miocene, Zones MNN17-MNN15. The lack of good marker species in this sample and prevalence of reworked material prevents more refinement of the zones.

Reworking: This sample contains the following reworked assemblages:

Early-Middle Miocene (Zones MNN5-MNN4) – common

Eocene-Oligocene (Zones NP20-NP25) - common

Depth: 43.0m(core)**Age:** ?Oligocene – Earliest Miocene (Aquitania)**Zone*:** ?NP21-MNN1**Lithological comments:** Calcareous Clay/Marl (light grey)

Nannofossils: The sample has a very poor assemblage dominated by abundant *Reticulofenestra* spp., with abundant *Coccolithus pelagicus*. A subordinate number of *Sphenolithus* species are also present. The presence of common/abundant *Reticulofenestra bisecta* and *Cyclocargilithus floridanus* would indicate an age no younger than Zone 'intra' MNN1. This is also supported by the complete absence of *Calcidiscus* spp. and *Discoaster* spp. The complete absence of older Eocene restricted species would also suggest an Oligocene age is most appropriate.

Reworking: This sample contains the following reworked assemblages:

Eocene-Palaeocene (Zones NP20-NP1) - rare

Maastrichtian-Campanian - rare

Depth: C2006 (outcrop)**Age:** Late Miocene (Tortonian-Messinian)**Zone*:** MNN11-MNN8**Lithological comments:** Calcareous Clay/Marl (light grey)

Nannofossils: The sample has a moderate to poor assemblage, dominated by abundant *Reticulofenestra* spp., with abundant *Coccolithus pelagicus*. A subordinate number of *Calcidiscus leptoporus*, *Discoaster*, and *Sphenolithus* species are also present. The presence of rare specimens of small 5 rayed *Discoaster* species would indicate a Late Miocene age at youngest.

Reworking: Early-Middle Miocene, zones MNN5-MNN4 – common**Depth: 48.8m(core)****Age:** Upper - uppermost Lower Pliocene, Piacenzian-uppermost Zanclean**Zone*:** MNN18-MNN15**Lithological comments:** Calcareous Clay/Marl (grey)

Nannofossils: The sample is very rich and contains much reworking of older strata. It is dominated by abundant *Gephyrocapsa* spp. (small) and *Reticulofenestra* spp. with abundant *Coccolithus pelagicus*, and *Sphenolithus* spp. A subordinate number of *Calcidiscus leptoporus*, *Discoaster*, *Helicosphaera*, and *Pontosphaera* species are also present. The presence of the small *Gephyrocapsa*, and the absence of large forms, would indicate an age no younger than Pliocene, Zones MNN18-MNN15.

Reworking: This sample contains several reworked assemblages:

Upper Miocene (Zones MNN11) - common

Early-Middle Miocene (Zones MNN5-MNN4) – common

Eocene- (Zones NP20-NP12) - occasional

Maastrichtian-Campanian - occasional

11. Nannofossil Report for Borehole C2006-2**Depth: 7.3m(core)****Age:** Upper - Lower Pliocene, Piacenzian- Zanclean**Zone*:** MNN16-MNN15**Lithological comments:** Calcareous Clay/Marl (grey)

Nannofossils: The sample is very rich and contains much reworking of older strata. It is dominated by abundant *Gephyrocapsa* spp. (small) and *Reticulofenestra* spp. with abundant *Coccolithus pelagicus*, *Calcidiscus leptoporus* and *Rhabdosphaera* spp. A subordinate number of *Discoaster*, *Helicosphaera*, *Pontosphaera* and *Sphenolithus* species are also present. The presence of the small *Gephyrocapsa*, and the absence of large forms, plus the presence of a questionable specimen of *Discoaster asymmetricus* and *Calcidiscus macintyre* indicates a Pliocene age, Zones MNN16-MNN15.

Reworking: This sample contains several reworked assemblages:

Lower Pliocene - Upper Miocene (Zones MNN12) - rare

Early-Middle Miocene (Zones MNN5-MNN4) – common

Oligocene - Paleocene (Zones NP25-NP16) - rare

Depth: 15.1m(core)**Age:** Upper - Lower Pliocene, Piacenzian- Zanclean**Zone*:** MNN16-MNN15**Lithological comments:** Calcareous Clay/Marl (grey)

Nannofossils: The sample is very rich and contains much reworking of older strata. It is dominated by abundant *Gephyrocapsa* spp. (small) and *Reticulofenestra* spp. with abundant *Coccolithus pelagicus*, *Calcidiscus leptoporus* and *Rhabdosphaera* spp. A subordinate number of *Discoaster*, *Helicosphaera*, *Pontosphaera* and *Sphenolithus* species are also present. The presence of the small *Gephyrocapsa*, and the absence of large forms, plus the presence of *Discoaster asymmetricus* indicates a Pliocene age, Zones MNN16-MNN15.

Reworking: This sample contains several reworked assemblages:

Lower Pliocene - Upper Miocene (Zones MNN12) - rare

Middle Miocene (Zone MNN5) – common

Oligocene - Paleocene (Zones NP25-NP16) – rare

Maastrichtian-Campanian- occasional

Depth: 20.2m(core)**Age:** Upper - Lower Pliocene, Piacenzian- Zanclean**Zone*:** MNN18?-MNN15**Lithological comments:** Calcareous Clay/Marl (grey)

Nannofossils: The sample is very rich and contains much reworking of older strata. It is dominated by abundant *Gephyrocapsa* spp. (small) and *Reticulofenestra* spp. with abundant *Coccolithus pelagicus*, *Calcidiscus leptoporus*. A subordinate number of *Discoaster*, *Helicosphaera*, *Pontosphaera*, *Rhabdosphaera* spp and *Sphenolithus* species are also present. The presence of the small *Gephyrocapsa*, and the absence of large forms, plus the presence of *Discoaster brouweri* indicates a Pliocene age, Zones MNN18?-MNN15.

Reworking: This sample contains several reworked assemblages:

Upper Miocene (Zones MNN11) - occasional

Middle Miocene (Zone MNN5-MNN4) – common

Oligocene - Paleocene (Zones NP25-NP12) – rare

Maastrichtian-Campanian- rare

Depth: Outcrop Sample 2 (38.2624N, 20.4598E)
Age: Lower – Middle Miocene (Burdigalian-Serravalian)
Zone*: MNN5-MNN4

Lithological comments: Marl (cream)

Nannofossils: The sample is moderately rich with poor diversity. It is dominated by *Reticulofenestra* spp. with abundant *Coccolithus pelagicus* and *Sphenolithus* spp. The presence of common/abundant *Sphenolithus heteromorphus* in this sample restricts the age to zones MNN5-MMN4 (Lower-Middle Miocene) and is supported by the presence of *Discoaster deflandrei* and *Cyclicargolithus floridanus*. This sample is particularly notable by the almost complete absence of reworking.

Reworking: This sample contains several reworked assemblages:
 Maastrichtian-Campanian- rare

*Zonations

Fornaciari, E., & Rio, D., 1996. Latest Oligocene to early Middle Miocene quantitative calcareous nannofossil biostratigraphy in the Mediterranean region. *Micropaleontology*. 42. p. 1-37.

Fornaciari, E., Di Stefano, A., Rio, D. & Negri, A., 1996. Middle Miocene quantitative calcareous nannofossil biostratigraphy in the Mediterranean region. *Micropaleontology*. 42. p. 38-64.

Martini, E., 1971. Standard Tertiary and Quaternary calcareous nannoplankton zonation. In Farinacci, A. (Ed), *Proc. 2nd Int. Conf. Planktonic Microfossils* Roma: Rome (Ed Tecnosci.), 2. 739-785.

Raffi, I., Mozzato, C., Fornaciari, E., Hilgen, F. J. & Rio, D., 2003. Late Miocene calcareous nannofossil biostratigraphy and astrobiochronology for the Mediterranean region. *Micropalaeontology*. 49 (1). p. 1-26.

Rio, D., Raffi, I., & Villa, G., 1990. Pliocene-Pleistocene calcareous nannofossil distribution patterns in the Western Mediterranean. In Kastens, K.A., Mascle, J., et al., *Proc. ODP, Sci. Results*, 107: College Station, TX (Ocean Drilling Program), 513-533.

Zonal nomenclature

The standard zonation of Martini (1971) (NN zones) is used as a basis in the above references however, they have then further refined/supplemented it with events specific to the Mediterranean region and hence have prefixed zones with an M. The zonal prefix used is MNN (Mediterranean Nannoplankton Neogene). When mentioning reworking of Paleogene age the standard Martini prefix has been used – NP (Nannoplankton Paleogene).

APPENDIX 6 : SOME PICTURES TAKEN DURING DRILLING CAMPAIGN



Borehole B2 on Lakties hillside



Borehole C1 on Thinia quarry anomaly



Borehole C2 on Agia Kiriaki area



Borehole C4a on Agia Sotira



Borehole C5a on Katachori paleo-lakebed



Borehole C5b on Katachori paleo-lakebed



Borehole C5c on Katachori paleo-lakebed



Borehole C5d on Katachori paleo-lakebed



Borehole C5d2 on Katachori paleo-lakebed



Borehole C5e on Katachori paleo-lakebed



Borehole C6a on Livadi raised harbour



Borehole C6b on Livadi raised harbour



Borehole C6c on Livadi raised harbour



Borehole C7a on Atheras valley



Borehole C2006



Borehole C2006-2



Professor John Underhill & his students next to borehole C4b location



Inhabitants sharing coffee with Fugro Geotechnique drilling team (Clement Lefevre & Dimitri Mercier)



Rainbow from Katachori paleo-lakebed drilling location



Good-bye Kefalonia !