DELOS – EVK3-CT2000-0041
Deliverable No 5 for WP1.1
LCS Inventory statistics

- Second draft, December 17th 2001 -

This document summarizes statistics on LCS's geometry mainly within EU. The information is collected for DELOS WP1.1 "Inventory of engineering properties of LCS". At the Internet www.delos.dk all collected data and documents produced within WP 1.1 can be downloaded. In the Microsoft Excel Workbook "LCS_Inventory_Statistics.xls" parameters and calculations used in this document can be found.

A database is assembled from 175 completed questionnaires; 150 are about schemes within EU, 24 from USA and 1 from Japan. The database contains only geometrical information due to the fact that too limited information has been available about e.g. morphological changes and hydrodynamic conditions. However in most cases the large waves will be depth limited. Therefore in the subsequent graphs the water depth multiplied by a factor of approximately 0.5 to 0.7 can be replaced by the significant wave height.

In Japan a statistical analysis of detached breakwaters exists. The information was presented by Takaaki UDA at 21st ICCE in the paper "Statistical analysis of detached breakwaters in Japan", 1988. Pp. 2028-2042. Information from this paper is used for comparison.

The information about U.S. breakwater projects is mostly based on structures in the report "Engineering Design Guidance for Detached Breakwaters as Shoreline Stabilization Structures" by Monica A Chasten, Julie D Rosati, John W McCormick. Coastal Engineering Research Center. U.S. Army Corps of Engineers. Waterways Experiment Station. CERC-93-19. December 1993.

Types of LCS's in the Inventory

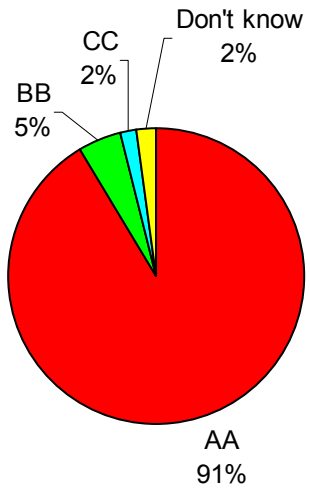
Each completed questionnaire is denoted a *scheme*. All schemes have been categorized with respect to *purpose* of construction and *type* of structures. In total 175 schemes have been investigated.

Main purpose

AA) Beach and land protection against erosion
BB) Coastal protection for ecological reasons
CC) Protection of harbours, inlets, outlets, channels etc

Table 1 Main purpose of the investigated LCS's

Country	AA	BB	CC	Don't know	Total
DK	4	0	0	0	4
NL	2	2	2	0	6
IT (UR3/MOD)	18	0	0	0	18
IT (UB)	56	0	0	0	56
GR	4	0	0	0	4
ES	28	0	0	0	28
UK	27	2	1	4	34
US	20	4	0	0	24
Japan	1	0	0	0	1
Total	160	8	3	4	175

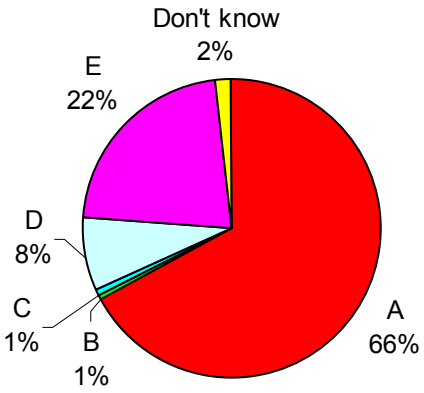


Construction types

A) Detached LCS
B) T-shaped LCS
C) L-shaped LCS
D) Groins
E) Combinations/other

Table 2 Construction types

Country	A	B	C	D	E	Don't know	Total
DK	2	1	0	0	1	0	4
NL	0	0	0	1	5	0	6
IT (UR3/MOD)	10	0	0	0	8	0	18
IT (UB)	49	0	0	0	7	0	56
GR	4	0	0	0	0	0	4
ES	18	0	0	0	10	0	28
UK	11	0	1	13	6	3	34
US	22	0	0	0	2	0	24
Japan	1	0	0	0	0	0	1
Total	117	1	1	14	39	3	175



In Table 1 it is seen that most structures are built for beach protection against erosion (AA). It is also clear from Table 2 that most of the investigated schemes contain only detached LCS's.

More information can be found in the document "LCS_Inventory_Summary". In this document typical information is specified for the LCS's in each country.

Structural layout in selected schemes

The LCS's in the Netherlands are rather atypical; only one scheme is actually for beach protection. The structural parameters are very diffuse and are not interesting for comparison with other layouts. Therefore the schemes in NL are not included in the statistics.

Many schemes in UK have been excluded due to the fact that too limited information is available, or only simple groins are present.

The scheme in Japan is excluded because only one scheme cannot give a representative statistics. Further the structural layout in the scheme is not a typical Japanese scheme.

Almost all of the remaining schemes contain segmented detached breakwaters. Therefore all schemes with parameters to be described by Figure 2 are included in the subsequent statistics.

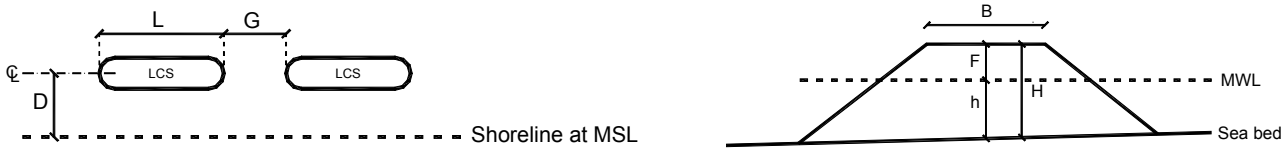


Figure 1 Description of parameters for the selected cases

The following symbols are used:

D: Distance between the shore line preproject and the centre line of the LCS
L: Typical length of the segments at crest level
G: Length of the gaps between the structures at crest level
B: Width of LCS at crest level
F: Freeboard, the distance from crest level to MWL (negative if submerged)
h: Water depth at MWL
tr: Tidal range

The height of the structure is: H = h + F.

Some schemes contain different types of structures e.g. both detached breakwaters and groynes. Only the detached breakwaters are included in the statistics. The detached breakwaters are grouped in *cases* defined as structures with almost the same main structure geometry and lay-out-geometry (geometrical parameters do not differ more than app. 10%). In total the presented statistics is based on 185 cases containing 1483 structures. The parameters for these structures can be found subsequent in *Appendix: Table with parameters in the selected cases* (page 11).

Locational distribution of collected information

The following shows in which countries the schemes are located.

Table 3 : Locational distribution of information

Country	Partner	Schemes	Selected cases	Structures in selected cases
DK	DHI	4	3	40
NL	INF	6	0	0
IT	UR3/MOD	18	25	62
IT	UB	56	83	1038
GR	AUTH	4	4	11
ES	UPC	28	37	66
UK	UoS	34	9	31
US	UCA	24	24	235
Japan	UCA	1	0	0
Total		175	185	1483

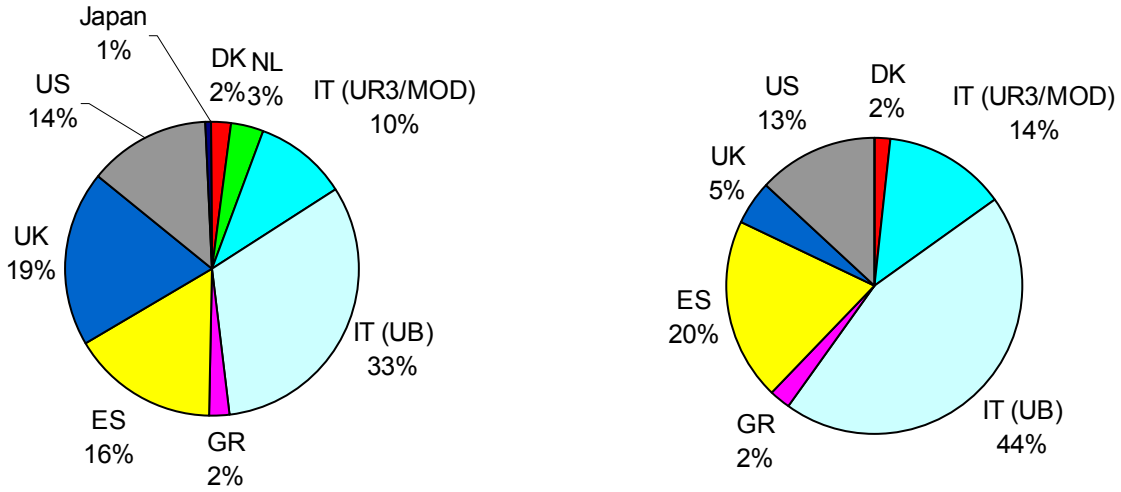


Figure 2: Left: Distribution of schemes. Right: Distribution of selected cases.

It is clear that the main part (78%) of the LCS's are located in Spain and Italy.

General statistics in selected cases

The selected cases are categorised in EU cases and US cases. Parameters for the selected cases can be found in subsequent Appendix. In the following tables two average values are calculated:

1) Average value of the specified parameter in the selected cases
2) Average value of the specified parameter for all considered structures

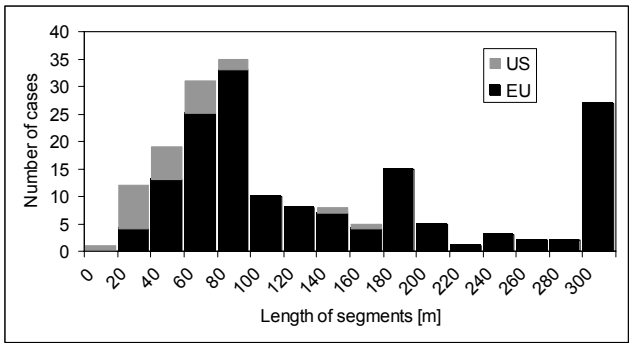
Table 4 General statistics, EU cases. Total no. Structures: 1248. Total no. of cases: 161

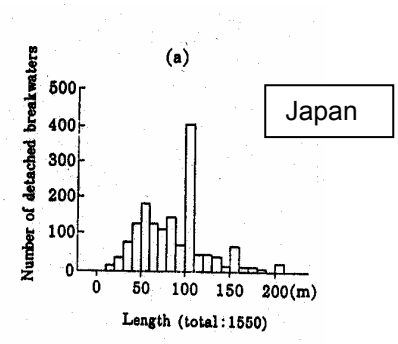
General statistics, EU cases						
Parameter	**Cases**	**Structures**	**Min**	**Average (case)**	**Average (structure)**	**Max**
Length L	159	1245	25	270.21	125.82	3000
Gap G	84	1102	10	40.64	38.30	300
Distance D	157	1243	15	120.89	120.29	350
Freeboard F	147	1098	-3	0.17	0.80	3.6
Width B	140	1076	2	7.48	5.05	25
Depth h	136	1018	1	3.74	3.05	8.5
Tidal range	159	1243	0	0.77	0.43	10

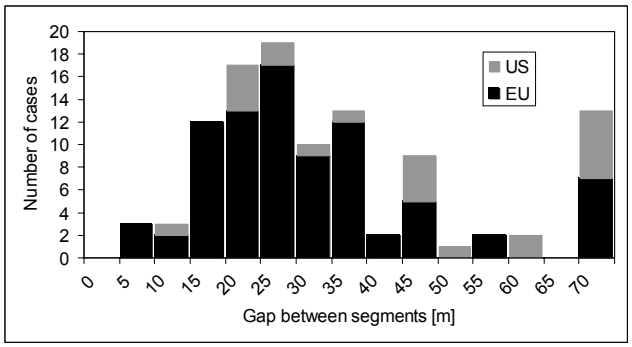
Table 5 General statistics, EU & US cases. Total no. Structures: 1483. Total no. of cases: 185

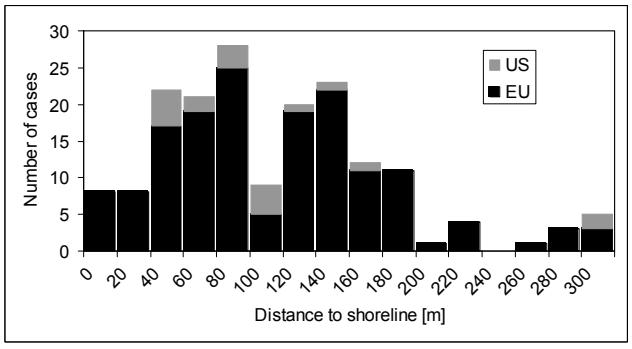
General statistics, EU & US cases						
Parameter	**Cases**	**Structures**	**Min**	**Average (case)**	**Average (structure)**	**Max**
Length L	183	1480	15	241.97	113.18	3000
Gap G	105	1334	10	42.95	44.44	300
Distance D	175	1433	15	120.42	118.75	370
Freeboard F	161	1299	-3	0.26	0.83	3.6
Width B	149	1200	2	7.45	5.38	25
Depth h	156	1237	0.45	3.48	2.79	8.5
Tidal range	175	1399	0	0.80	0.49	10

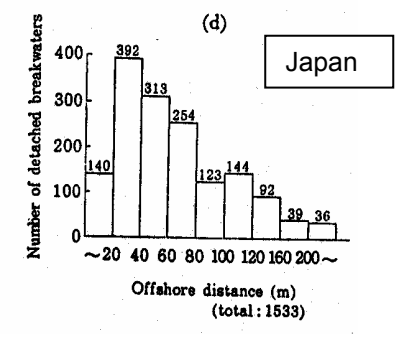
In the subsequent the figures to the right are from Takaaki's paper.

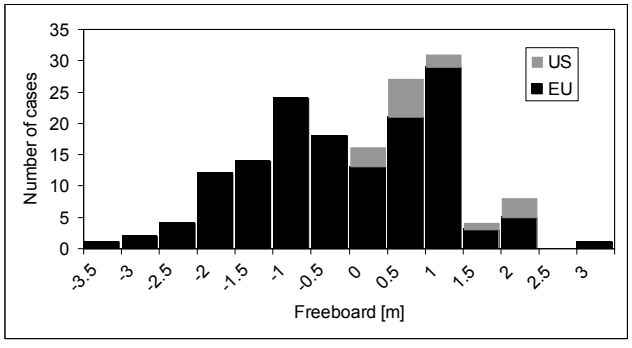


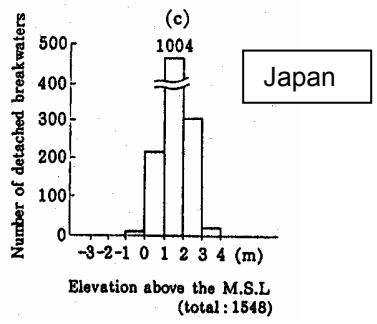












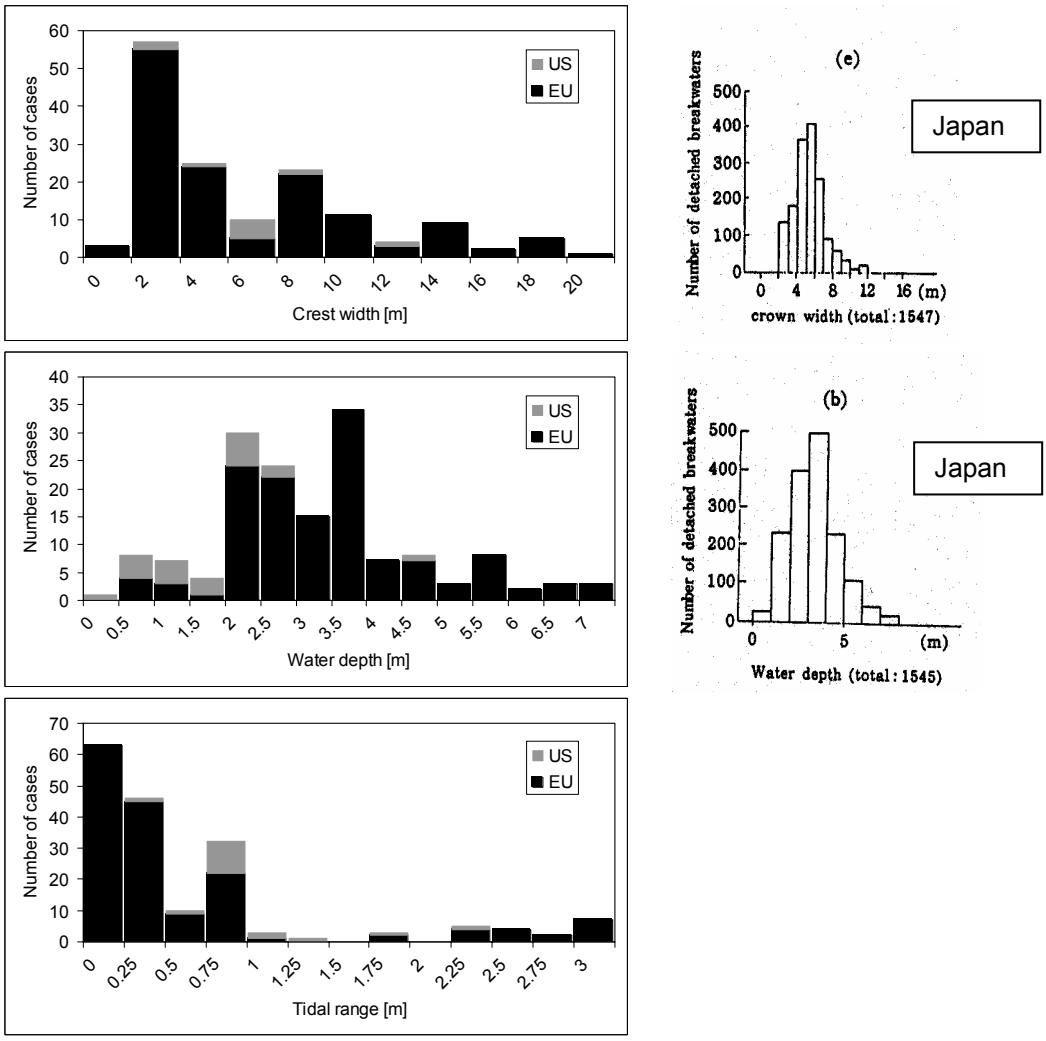


Figure 3 Distribution of investigated parameters

Distribution of structural ratios

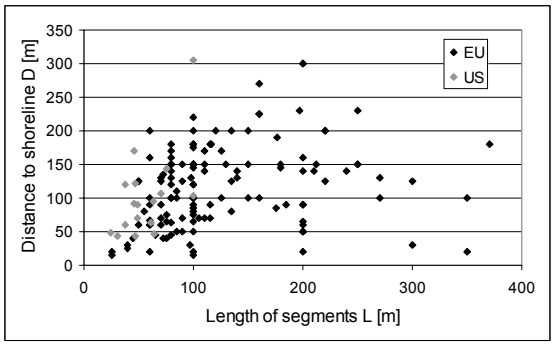
7 different structural ratios have been investigated as indicated in Table 6 and Table 7.

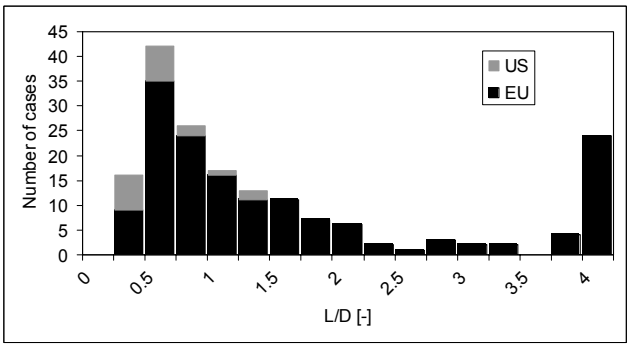
Table 6 Structural ratios, EU cases. Total no. Structures: 1248. Total no. of cases: 161

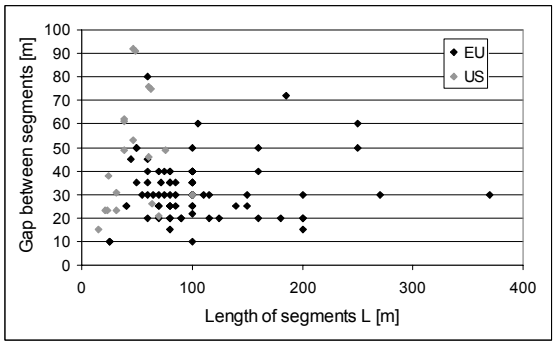
Structural ratios, EU cases						
Ratio	**Cases**	**Structures**	**Min**	**Average (case)**	**Average (structure)**	**Max**
L/D	157	1243	0.30	2.99	1.39	46.67
L/G	84	1102	0.20	3.74	3.09	13.33
F/B	140	1076	-0.83	0.06	0.25	0.65
H/B	127	976	0.06	0.71	0.95	2.25
F/h	134	998	-0.80	0.10	0.33	2.00
B/h	127	976	0.55	2.12	1.73	8.33
F/tr	91	470	-10.00	-0.30	1.07	5.00

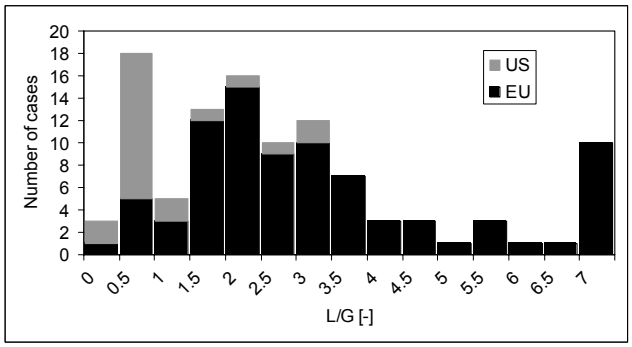
Table 7 Structural ratios, EU & US cases. Total no. Structures: 1494. Total no. of cases: 186

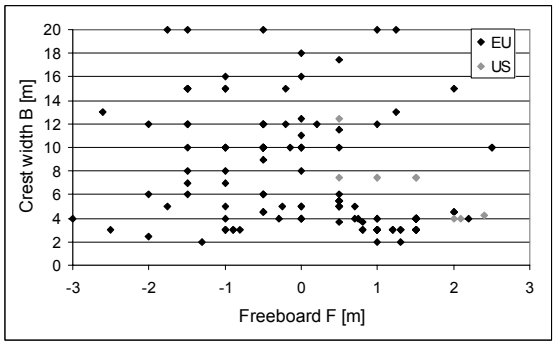
Structural ratios, EU & US cases						
Ratio	**Cases**	**Structures**	**Min**	**Average (case)**	**Average (structure)**	**Max**
L/D	176	1444	0.27	2.75	1.27	46.67
L/G	106	1345	0.20	3.22	2.70	13.33
F/B	150	1211	-0.83	0.08	0.24	0.65
H/B	135	1109	0.06	0.71	0.89	2.25
F/h	146	1197	-0.80	0.15	0.39	2.00
B/h	135	1109	0.55	2.35	2.58	27.78
F/tr	100	609	-10.00	-0.15	1.14	6.58

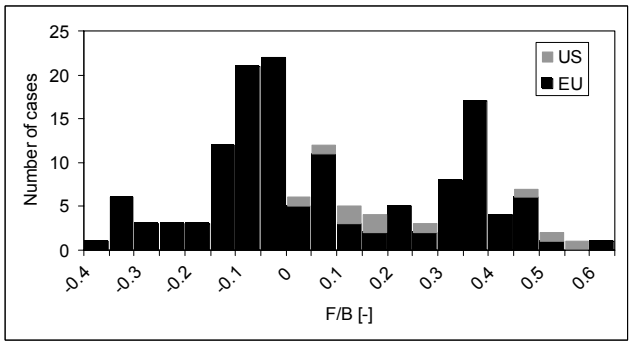


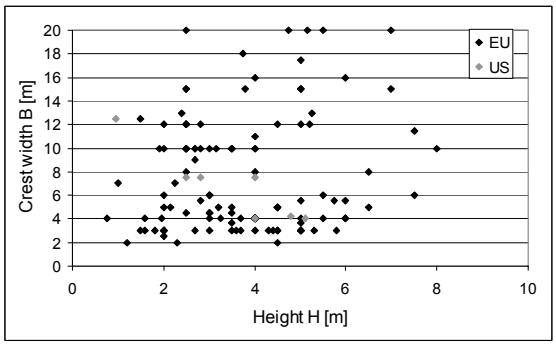


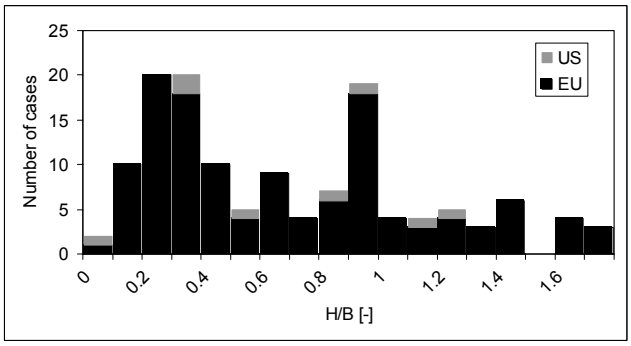












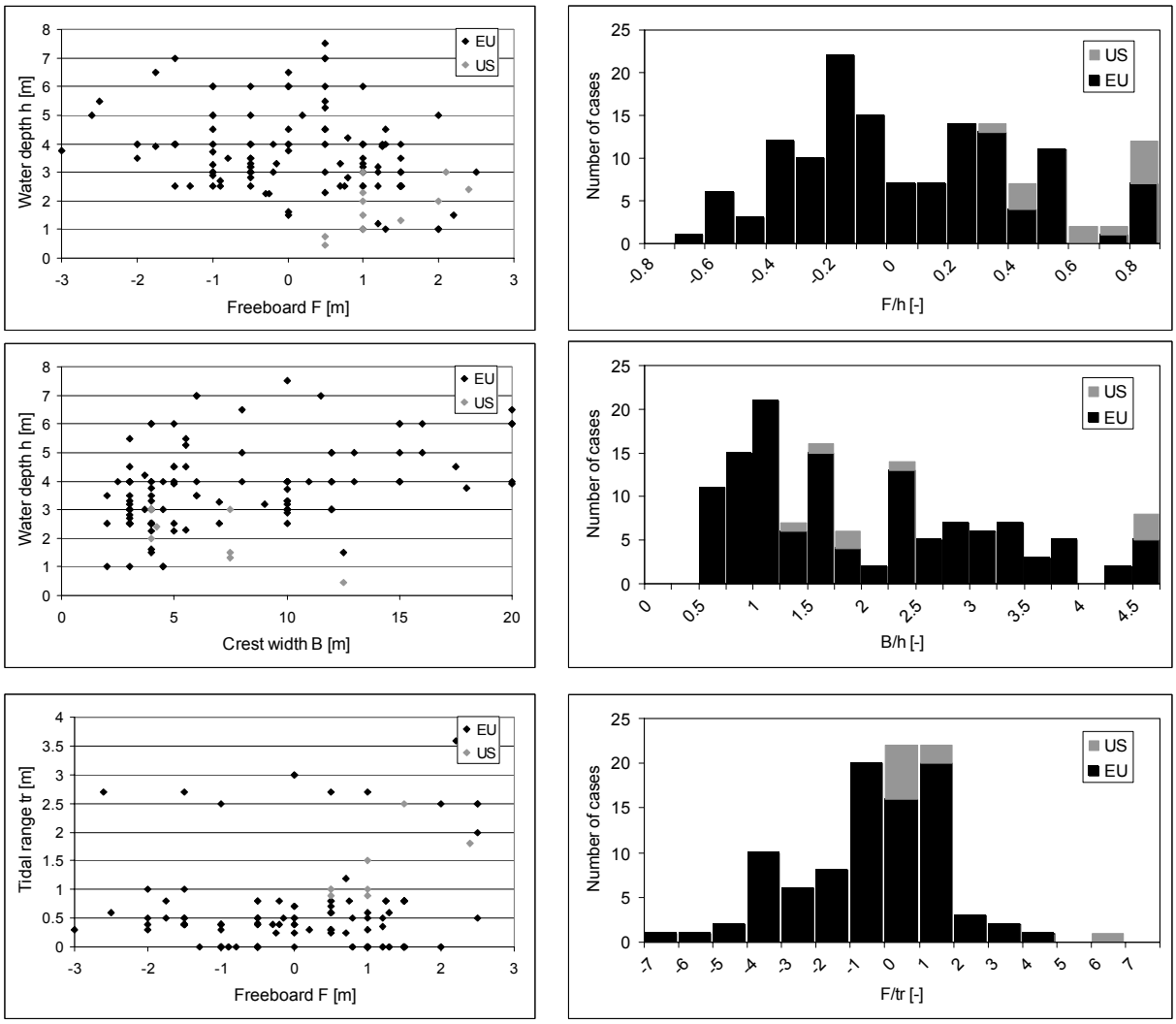


Figure 4 Distribution of structural ratios

The F/h ratio was expected to depend on the range of the tide. Therefore the cases have been divided in low-tide cases and in high tide cases. Definition of low tide: Astronomic range of the tide <1m (117 cases). Definition of high tide: Tidal range ≥ 1m (21 cases).

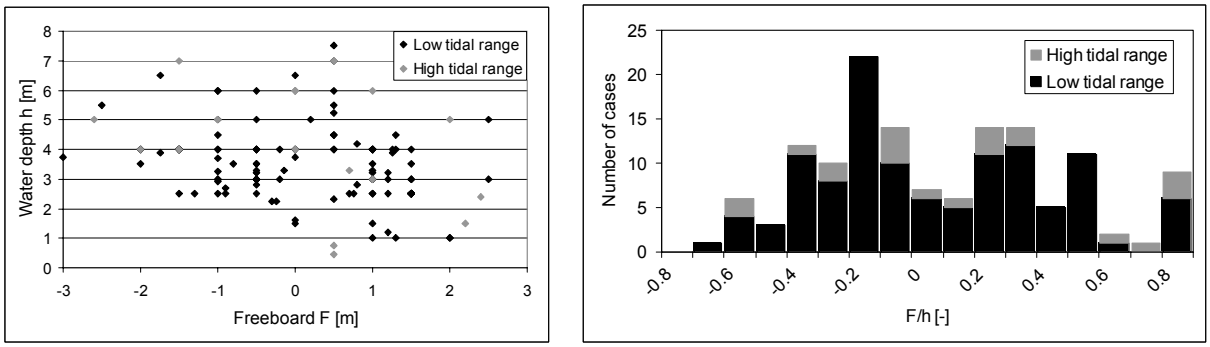
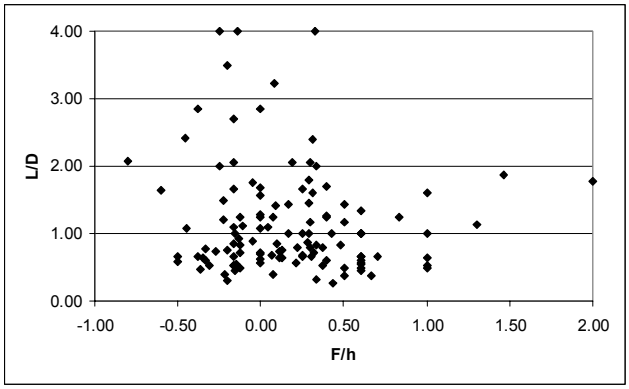
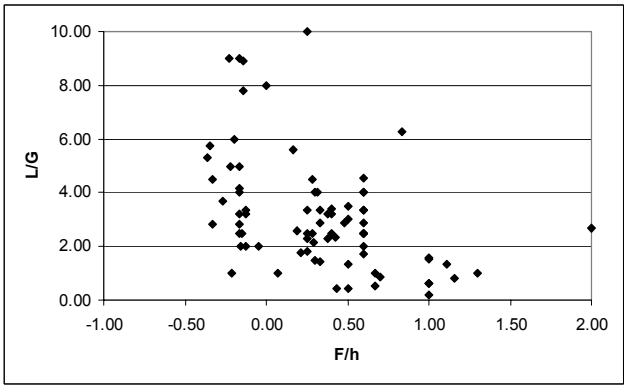
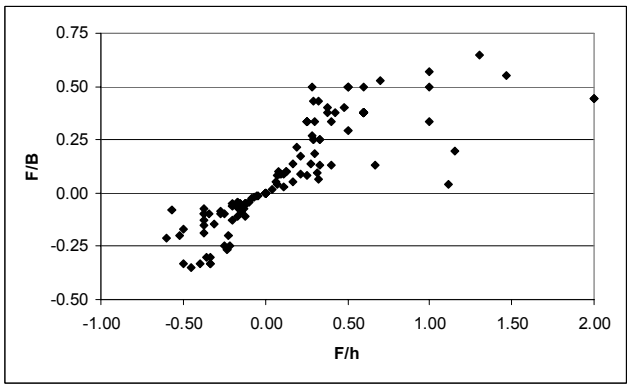


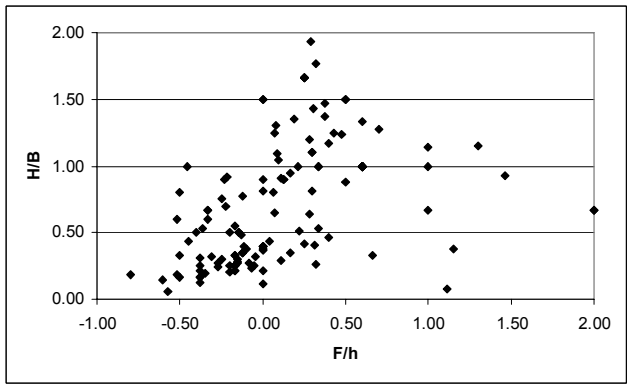
Figure 5 Distribution of height-ratio in cases of high and low tidal range

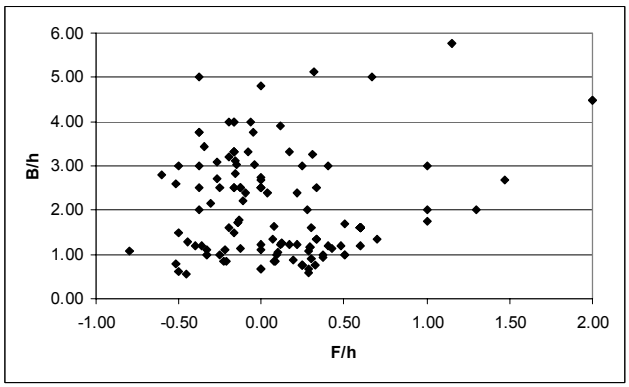
In order to find possible relations between the investigated structural ratios scatter diagrams have been made. Structures with F/h<0 have negative freeboard (submerged crest).

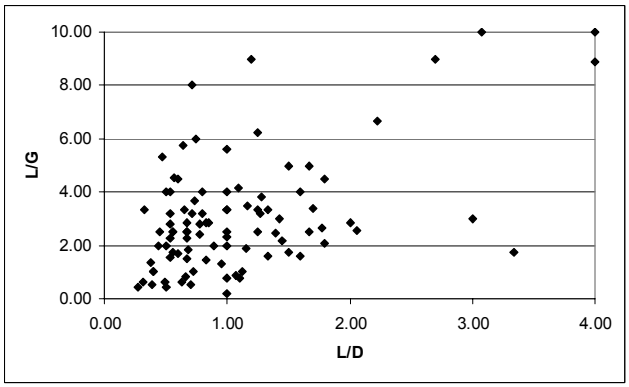

L/D
F/h
4.00
3.00
2.00
1.00
0.00
-1.00
-0.50
0.00
0.50
1.00
1.50
2.00

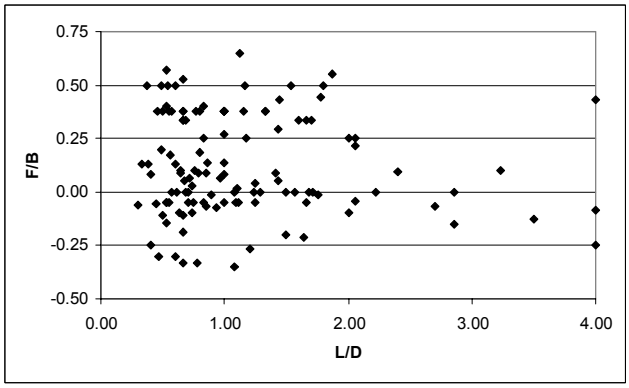

L/G
F/h
10.00
8.00
6.00
4.00
2.00
0.00
-1.00
-0.50
0.00
0.50
1.00
1.50
2.00

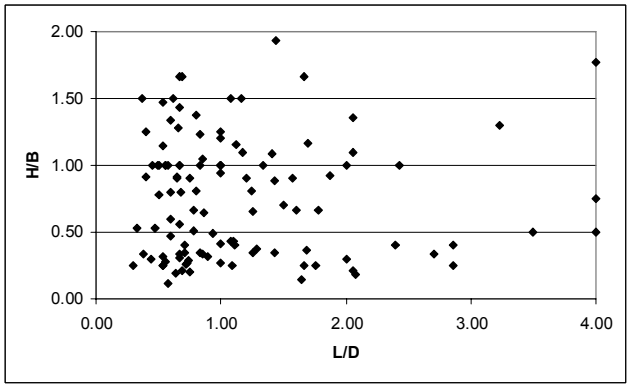

F/B
F/h
0.75
0.50
0.25
0.00
-0.25
-0.50
-1.00
-0.50
0.00
0.50
1.00
1.50
2.00

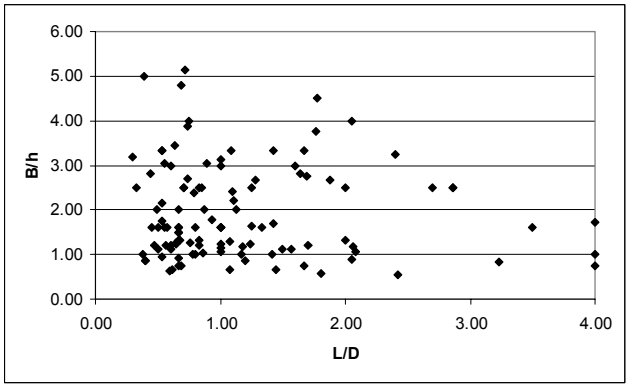

H/B
F/h
2.00
1.50
1.00
0.50
0.00
-1.00
-0.50
0.00
0.50
1.00
1.50
2.00

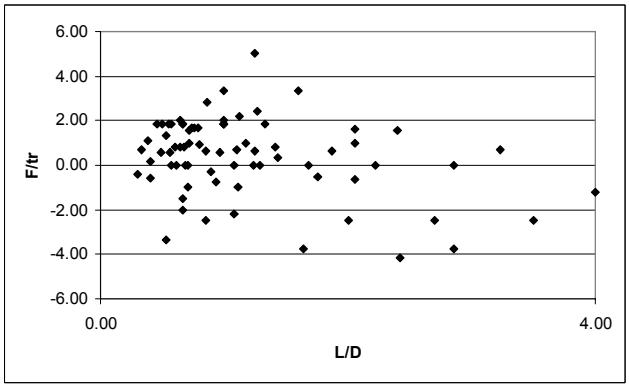

B/h
F/h
6.00
5.00
4.00
3.00
2.00
1.00
0.00
-1.00
-0.50
0.00
0.50
1.00
1.50
2.00

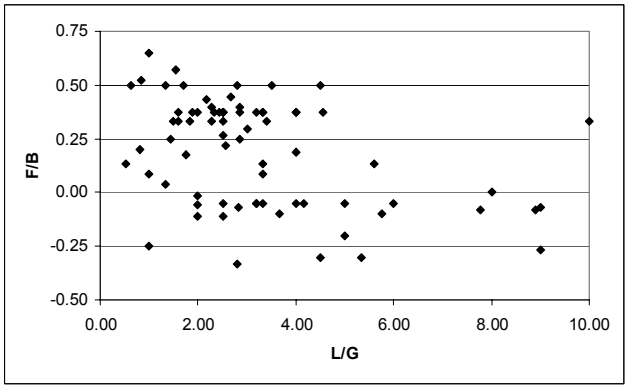

L/G
L/D
10.00
8.00
6.00
4.00
2.00
0.00
0.00
1.00
2.00
3.00
4.00

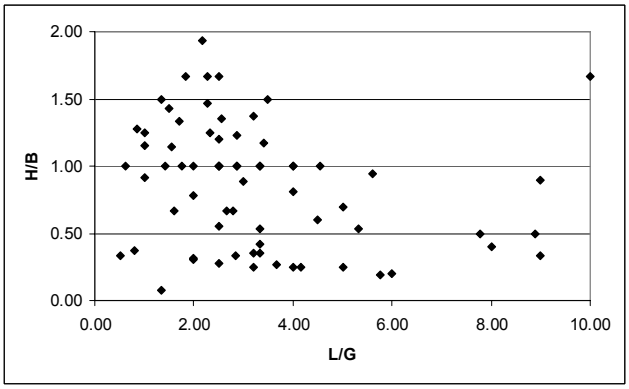

F/B
L/D
0.75
0.50
0.25
0.00
-0.25
-0.50
0.00
1.00
2.00
3.00
4.00

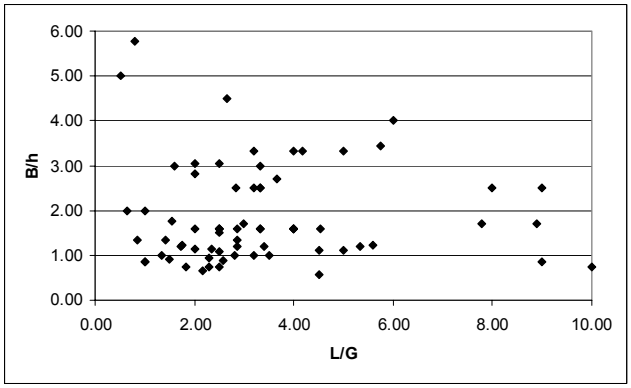

H/B
L/D
2.00
1.50
1.00
0.50
0.00
0.00
1.00
2.00
3.00
4.00

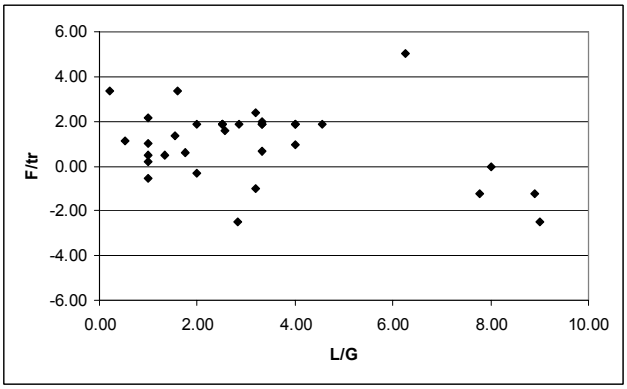

B/h
L/D
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0.00
1.00
2.00
3.00
4.00

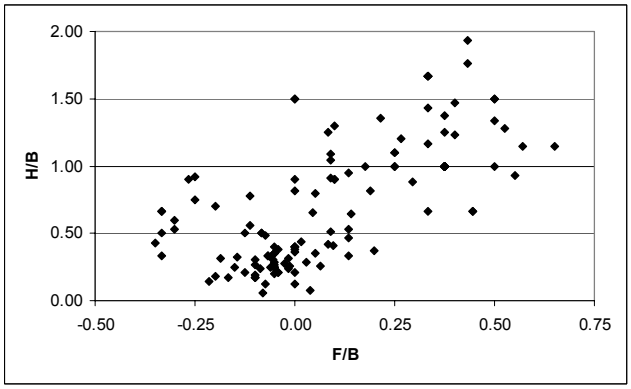

F/tr
L/D
6.00
4.00
2.00
0.00
-2.00
-4.00
-6.00
0.00
4.00

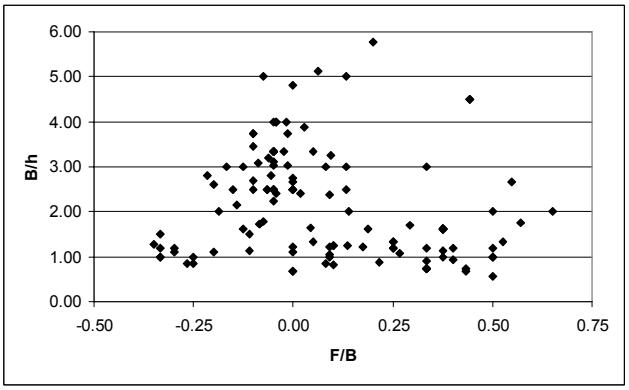

F/B
L/G
0.75
0.50
0.25
0.00
-0.25
-0.50
0.00
2.00
4.00
6.00
8.00
10.00


H/B
L/G
2.00
1.50
1.00
0.50
0.00
0.00
2.00
4.00
6.00
8.00
10.00


B/h
L/G
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0.00
2.00
4.00
6.00
8.00
10.00


F/tr
L/G
6.00
4.00
2.00
0.00
-2.00
-4.00
-6.00
0.00
2.00
4.00
6.00
8.00
10.00


H/B
F/B
2.00
1.50
1.00
0.50
0.00
-0.50
-0.25
0.00
0.25
0.50
0.75


B/h
F/B
6.00
5.00
4.00
3.00
2.00
1.00
0.00
-0.50
-0.25
0.00
0.25
0.50
0.75

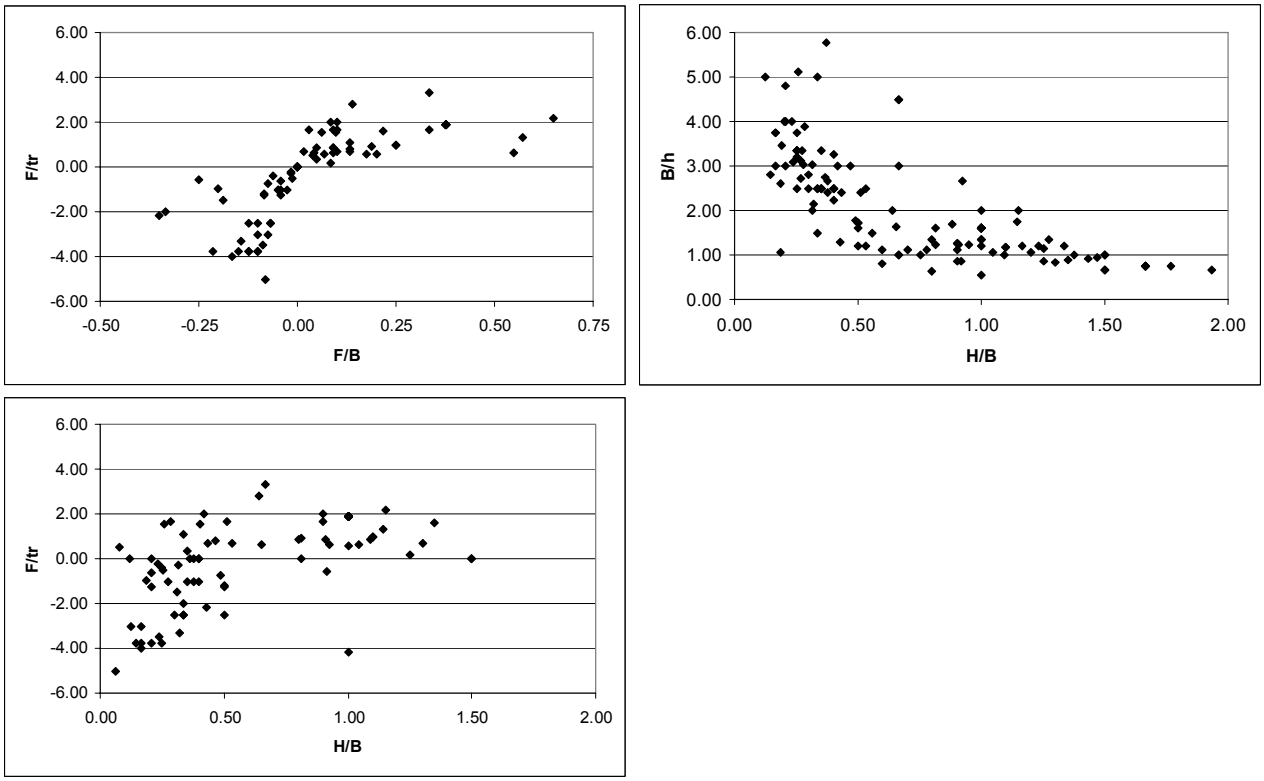


Figure 6 Scatter charts of structural ratios.

Conclusion

It is seen from the figures that there is generally a very weak correlation between the ratios of the structural parameters.

Appendix: Table with parameters in the selected cases

Country	Filename	Name of site	Purpose	Type	N_{umber}	$L_{segment}$	Gap	Dist.	Freeboard	Width	Depth	Tide
DK	DHI_DK_002	Skagen	AA/CC	E	24	40	25	25	1	3	1	0.3
DK	DHI_DK_003	Lønstrup	AA	A	10	45	45	40	1.3	2	1	0.6
DK	DHI_DK_004	Liseleje	AA	A	6	60	300	60	1.2		1.2	0.36
IT	UR3_MOD_EIT_01_01	Pellestrina	AA	E	8	200		300	-1.5	8	4	1
IT	-		AA	E	8	200		300	-2	6	4	1
IT	UR3_MOD_EIT_04_01	Silvi Marina	AA	A	6	160	20	225	0	10	4	0.5
IT	-		AA	A	3	160	50	225	-0.5	10	4	0.5
IT	UR3_MOD_EIT_04_02	Pescara Sud	AA	A	1	200		90	0	10		0.5
IT	UR3_MOD_EIT_04_03	Casalbordino	AA	E	1	1000		350	0	10	4	0.4
IT	-		AA	E	1	700		350	-1	10	4	0.4
IT	-		AA	E	1	1000		350	-1.5	10	4	0.4
IT	UR3_MOD_WIT_08_01	Guardia Piemo	AA	A	1	490		60	-1.5	15	4	0.5
IT	UR3_MOD_WIT_08_02	Diamante	AA	A	1	200			-1.5	15		0.4
IT	UR3_MOD_WIT_08_03	Paola	AA	A	1	500		60	-0.5	12	5	0.5
IT	UR3_MOD_WIT_08_04	Paola-San Luci	AA	E	17	500		55	-1.75	20	6.5	0.5
IT	UR3_MOD_WIT_08_05	Briatico	AA	A	1	530		80	-1.5	12	4	0.4
IT	UR3_MOD_WIT_08_06	Montebello Joni	AA	E	1	300		30	-1.5	12		0.4
IT	UR3_MOD_WIT_08_07	Amendolara	AA	A	1	700		80	-0.5	20	6	0.5
IT	UR3_MOD_WIT_09_01	Castel Volturno	AA	E	1	1700		80	-0.5	12	3	0.4
IT	UR3_MOD_WIT_10_01	Fiumicino-Foce	AA	E	1	1400		200	-2	25	3.5	0.4
IT	UR3_MOD_WIT_10_02	Ostia (I)	AA	E	1	3000		150	-1.5	15	4	0.4
IT	UR3_MOD_WIT_10_03	Ostia (II)	AA	E	1	2000		95	-1.5	20	4	0.5
IT	-		AA	E	1	2000		95	-2	12	4	0.5
IT	UR3_MOD_WIT_10_04	Nettuno	AA	A	1	700	90	150	-0.5	6	3.5	0.4
IT	-		AA	A	1	800	90	200	-0.5	6	3.5	0.41
IT	UR3_MOD_WIT_13_01	Golfo di Patti	AA	A	1	350		100	-1	8	5	0.4
IT	UR3_MOD_WIT_13_02	Agrigento	AA	A	1	270	30	100	-1	15	6	0.4
IT	-		AA	A	1	85	30	100	-1	15	6	0.4
IT	UB_EIT_2_1	From porto Gari	AA	A	60	100	40	150				0.8
IT	UB_EIT_2_2	Casal Borsetti	AA	A	10	100	40	150	1.5	4	2.5	0.8
IT	UB_EIT_2_3	Punta Marina	AA	E	1	3000		300	-0.2	12	3	0.8
IT	UB_EIT_2_4	Lido Adriano	AA	A	17	100	40	180	1.5	4	2.5	0.8
IT	UB_EIT_2_5	Lido di Dante	AA	A	2	370	30	180	-0.5	12	3	0.8
IT	UB_EIT_2_6	Lido di Savio-Li	AA	E	25	100	50	100	1.5	4	2.5	0.8

Country	Filename	Name of site	Purpose	Type	N_{umber}	$L_{segment}$	Gap	Dist.	Freeboard	Width	Depth	Tide
IT	UB_EIT_2_7	Cesenatico	AA	A	30	100	40	220	1.5	4	2.5	0.8
IT	UB_EIT_2_8	S. Mauro-Gatte	AA	A	14	100	22	175	1.5	4	2.5	0.8
IT	UB_EIT_2_9	Bellaria-Igea M	AA	A	27	100	25	100	1.5	4	2.5	0.8
IT	-		AA	A	27	100	25	200	1.5	4	2.5	0.8
IT	UB_EIT_2_10	Rimini	AA	A	55	100	35	150	1.5	4	2.5	0.8
IT	UB_EIT_2_11	Misano	AA	A	7	100	30	100	1.5	4	2.5	0.8
IT	UB_EIT_2_12	Cattolica	AA	A	18	100	30	75	1.5	4	2.5	0.8
IT	UB_EIT_3_1	Gabicce	AA	A	21	80	20	100	0.75	4	2.5	0.8
IT	UB_EIT_3_2	Gabicce	AA	A	1	700		15	-0.5			0.8
IT	UB_EIT_3_3	Casteldimezzo	AA	A	1	350		20	1	3		0.6
IT	UB_EIT_3_4	Fiorenzuola di	AA	A	9	115	20	180.00	-1	10	2.9	0
IT	UB_EIT_3_5	San Marino di P	AA	A	6	180	20	150	-0.8	3	3.5	0
IT	-		AA	A	3	90	20	50	1	2	3.5	0
IT	UB_EIT_3_6	Pesaro	AA	A	5	80	40	180	-0.5	9	3.2	0
IT	-		AA	A	2	160	40	100	1		3.2	0
IT	UB_EIT_3_7	Pesaro	AA	E	1	1500		200	-0.5		2.8	0
IT	UB_EIT_3_8	Pesaro-Fano	AA	A	90	85	25	50	1	3	2.5	0
IT	UB_EIT_3_9	Fano	AA	A	10	100	40	180	-0.5	10	3.3	0
IT	-		AA	A	11	60	40	90	1	3	3.3	0
IT	UB_EIT_3_10	Metaurilia	AA	A	4	80	30	45	2	4.5	1	0
IT	-		AA	A	7	200	15	20	2	4.5	1	0
IT	UB_EIT_3_11	Marotta	AA	A	2	25	10	20	1		2.5	0
IT	-		AA	A	3	150	25	200	-0.5	10	2.5	0
IT	-		AA	A	1	640		65	-1.3	2	2.5	0
IT	-		AA	A	30	250	60	230	-0.5	10	3	0
IT	UB_EIT_3_12	Senigallia	AA	A	4	80	20	150	-0.5	10	3	0
IT	-		AA	A	6	70	20	60	1.5	3	3	0
IT	-		AA	A	34	60	45	160	1.5	3	3	0
IT	-		AA	A	7	80	25	150	-0.5	10	3	0
IT	UB_EIT_3_13	Marina di Mon	AA	A	4	110	30	150	-1	10	3.7	0
IT	UB_EIT_3_14	Rocca Priora di	AA	A	11	70	25	90	-1	3	3	0
IT	UB_EIT_3_15	Falconara Marit	AA	A	65	70	25	130	1.5	3		0
IT	UB_EIT_3_16	Ancona	AA	A	1	100		20	0.8	3		0
IT	-		AA	A	1	100		65	1.5	3		0
IT	UB_EIT_3_18	Sirolo and Num	AA	A	2	200		50	1.3	3	4	0
IT	-				2	200		50	-1	4	4	0

Country	Filename	Name of site	Purpose	Type	N_{umber}	$L_{segment}$	Gap	Dist.	Freeboard	Width	Depth	Tide
IT	UB_EIT_3_19	Scossicci-Porto	AA	A	20	65	30	45	1.3	3	4.5	0
IT	-		AA	A	7	150	30	100	-1	5	4.5	0
IT	UB_EIT_3_20	Porto Potenza	AA	A	4	75	40	65	1.5	4		0
IT	-		AA	A	11	85	35	110	1.5	4		0
IT	-		AA	A	11	40	25	30	1.5	4		0
IT	UB_EIT_3_21	Fontespina-Port	AA	A	14	50	35	60	1	4	3	0
IT	-		AA	A	1	600		120	-1	3	3	0
IT	-		AA	A	8	100	35	50	1	4	3	0
IT	UB_EIT_3_22	Porto S.Elpidio	AA	A	2	750		40	-1	3	2.5	0
IT	-		AA	A	6	80	40	160	-0.5	4.5	4	0
IT	UB_EIT_3_23	From Lido di Fe	AA	A	62	60	35	100	1.5	3	2.5	0
IT	UB_EIT_3_24	Marina Palmen	AA	A	8	100	40	150	-0.5	4.5	3	0
IT	UB_EIT_3_25	Marina di Altido	AA	A	7	80	25	100	1.5	4	4	0
IT	-		AA	A	3	70	30	70	1.5	4	3.5	0
IT	UB_EIT_3_26	Pedaso	AA	A	3	100	30	80	-0.5	10	4	0
IT	-		AA	A	4	55	30	80	1	3	4	0
IT	-		AA	A	2	100	10	15	1	3	4	0
IT	-		AA	A	1	25	10	15	1	3	4	0
IT	UB_EIT_3_27	Marina di Camp	AA	A	9	80	35	120	1	3	4	0
IT	-		AA	A	1	100		120	-0.5	10	4	0
IT	UB_EIT_3_28	Cupramarittima	AA	A	50	80	35	150	1.2	3	3.2	0
IT	-		AA	A	5	150		150	-0.5	10	3.2	0
IT	UB_EIT_3_29	Grottammare	AA	A	10	90	20	150	-0.9	3	2.7	0
IT	-				4	75	30	75	0.8	3	2.8	0
IT	UB_EIT_3_30	Grottammare	AA	E	1	550		50	0	4	1.6	0
IT	-		AA	E	3	250	50	150	-0.5	10	3	0
IT	UB_EIT_3_31	San Benedetto	AA	A	9	80	15	170	-0.9	3	2.5	0
IT	-		AA	A	36	100	35	120	1.2	3	2.5	0
IT	UB_EIT_6_1	Bisceglie	AA	A	5	60	30	67	-0.15	10	3.3	0.5
IT	UB_EIT_6_2	Bisceglie	AA	A	2	185	72	90	0.8	3.7	4.2	0.5
IT	UB_EIT_6_3	Bari	AA	A	15	100	30	100	1	12	4	0.5
IT	UB_EIT_6_4	Brindisi	AA	A	6	125	20	100	2.5		3	0.5
IT	UB_WIT_11_1	Marina di Mass	AA	E	10	200	30	90			5	0.4
IT	UB_WIT_11_2	Marina di Pisa	AA	E	10	200	20	50			3	0.4
IT	UB_WIT_11_3	Prato_Ranieri	AA	A	8	60	20	20				0.4
IT	UB_WIT_11_4	Follonica	AA	A	8	72	35	40				0.4

Country	Filename	Name of site	Purpose	Type	N_{umber}	$L_{segment}$	Gap	Dist.	Freeboard	Width	Depth	Tide
IT	UB_WIT_12_1	Ventimiglia	AA	A	3	200	115	60				0
IT	UB_WIT_12_2	Bordighera	AA	A	7	200	20	65				0
IT	UB_WIT_12_3	San Remo	AA	E	8	115	30	90				0
IT	UB_WIT_12_4	Arma di Taggia	AA	A	7	60	80	60				0
IT	UB_WIT_12_5	Santo Stefano	AA	A	10	105	60	70				0
GR	AUTH_GR_002	St. Nikolaos	AA	A	3	80	25	63	1.2		3	0.5
GR	AUTH_GR_003	Lakopetra	AA	A	3	70	40	125	0.7	4	3.3	1.2
GR	AUTH_GR_004	Paphos, Cyprus	AA	A	1	110		70	0	5	4.5	
GR	AUTH_GR_005	Alaminos, Larn	AA	A	4	140	25	140	0.5	3.7	3	
ES	UPC_ES_001	Playa de Cubel	AA	A	3	130		150	0.7	5	2.5	0.25
ES	-				2	100		90	-0.25	5	2.25	0.25
ES	UPC_ES_002	Playa de Altaful	AA	A	1	116		180	0.5	5	4	0.25
ES	UPC_ES_003	Playa del Puert	AA	A	2	80		140	0	12.5	1.5	0.25
ES	UPC_ES_004	Playa de Vinaro	AA	A	2	125		170	0.5	17.5	4.5	0.3
ES	UPC_ES_005	Playas Comín	AA	A	3	110		140	0.5	5.5	2.3	0.3
ES	UPC_ES_006	Playa de Altea	AA	A	1	220		200	0.2	12	5	0.3
ES	UPC_ES_007	Playa de Camp	AA	E	1	98		130	0.5	5	4	0.3
ES	-				1	72		135	-1	7	3.25	0.3
ES	-				1	270		130	-3	4	3.75	0.3
ES	UPC_ES_008	Playa del Posti	AA	A	1	160		270	-2	2.5	4	0.3
ES	UPC_ES_009	Playa de Los Al	AA	A	3	177		190	-0.3	4	2.25	0.4
ES	UPC_ES_010	Playa de la Erm	AA	A	1	115		70	-1.5	7	2.5	0.4
ES	UPC_ES_011	Playa del Rihu	AA	E	3	100		145	0	18	3.75	0.4
ES	UPC_ES_012	Playa de Ponie	AA	A	1	220		125	-0.2	15	4	0.4
ES	UPC_ES_013	Playa de La Ga	AA	E	2	135		200	0.5	10	7.5	0.6
ES	UPC_ES_014	Playa del Zapill	AA	E	1	412		170	-2.5	3	5.5	0.6
ES	-				1	212		150	0.5	5.5	5.5	0.6
ES	UPC_ES_015	Playas de Agua	AA	A	1	110		170	0.5	5.5	4.5	0.6
ES	UPC_ES_016	Playa de Castel	AA	A	3	97		30	0.5	5	6	0.7
ES	UPC_ES_017	Playa de Torren	AA	A	1				0	5		0.7
ES	UPC_ES_018	Playa de Fuent	AA	A	1	180		145	0	8	6.5	0.7
ES	UPC_ES_019	Playas del Rinc	AA	A	1	197		230	0.5	5.5	5.25	0.8
ES	UPC_ES_020	Playas del Palo	AA	A	4	135		125	-1.75	5	3.9	0.8
ES	-				3	90		125	1.25	20	3.9	0.8
ES	-				1	300		125	1.25	13	4	0.8
ES	UPC_ES_021	Playa de Bena	AA	A	1	200		160	0.5	11.5	7	0.8

Country	Filename	Name of site	Purpose	Type	N_{umber}	$L_{segment}$	Gap	Dist.	Freeboard	Width	Depth	Tide
ES	UPC_ES_022	Playa del Tablill	AA	E	1	135		80	0	11	4	3
ES	UPC_ES_023	Playa del Ancla	AA	E	1	90		70	0	16	6	3
ES	UPC_ES_024	Playa de La Laj	AA	A	1	200		140	1	20	6	2.7
ES	UPC_ES_025	Playa de Baja	AA	E	3	50	50	125	0.5	6	7	2.7
ES	-				3	50	50	125	-1.5	6	7	2.7
ES	UPC_ES_026	Playa de Güima	AA	E	2	175		85	2.5	10	8.5	2.5
ES	-				1	100		85	2.5	10	8.5	2.5
ES	UPC_ES_027	Playa de Fañab	AA	E	4	60		200	-1	16	5	2.5
ES	-				3	120		200	2	15	5	2.5
ES	UPC_ES_028	Playa Jardín	AA	E	1	560		100	-2.6	13	5	2.7
UK	UoS_UK_001	Elmer West Su	AA	A	3	140		130	0	4	6	6.3
UK	-				5	80		130	0	4	6	6.3
UK	UoS_UK_002	Monk's Bay det	AA	E	1	75		40	2.2	4	1.5	3.6
UK	UoS_UK_003	Milford on Sea	AA/BB	E	1	80			2.5			2
UK	UoS_UK_005	Sidmouth detac	AA	A	2				3.6		4.5	4.2
UK	UoS_UK_013	Rhos on Sea	AA	A	1	250		150				7
UK	UoS_UK_016	Leasowe Bay	AA	E	1	240		140		5		10
UK	-				1	210		140		6		10
UK	UoS_UK_025	Happisburgh to	AA	A	16	220	280	200				2
USA	UCAinventory_non_EU	Whinthrop	AA	A	6	100	30	305	1	7.5	3	1.5
USA	UCAinventory_non_EU	Colonial beach,	AA	A	4	61	46	64			1.2	1.2
USA	UCAinventory_non_EU	Colonial beach,	AA	A	3	64	26	46			1.2	1.2
USA	UCAinventory_non_EU	Elms Beach	BB	A	3	47	53	44			0.75	1
USA	UCAinventory_non_EU	Elk Neck State	BB	A	4	15	15		0.5		0.75	1
USA	UCAinventory_non_EU	Terrapin Beach	BB	A	4	23	23				0.75	1
USA	UCAinventory_non_EU	Eastern Neck	BB	A	26	31	23		0.5	12.5	0.45	1
USA	UCAinventory_non_EU	Bay ridge	AA	A	11	31	31	43	1			1
USA	UCAinventory_non_EU	Redington Shor	AA	A	1	100		104	0.5	7.5		0.9
USA	UCAinventory_non_EU	Holly beach 1	AA	A	6	49	91	70			2.5	0.9
USA	UCAinventory_non_EU	Holly beach 2	AA	A	76	47	92	122	1	7.5	1.5	0.9
USA	UCAinventory_non_EU	Grand Isle	AA	A	4	70	21	107			2	0.6
USA	UCAinventory_non_EU	Lakeview Park	AA	A	3	76	49	143	2.4	4.2	2.4	1.8
USA	UCAinventory_non_EU	Presque Isle 1	AA	A	3	38	62	60	1		1	
USA	UCAinventory_non_EU	Presque Isle 2	AA	A	55	46	107	92	1		2	
USA	UCAinventory_non_EU	Lakeshore Park	AA	A	3	38	61	120			2.1	
USA	UCAinventory_non_EU	East Harbor	AA	A	4	46	105	170	1		2.3	

Country	Filename	Name of site	Purpose	Type	N_{umber}	$L_{segment}$	Gap	Dist.	Freeboard	Width	Depth	Tide
USA	UCAinventory_non_EU	Maumee Bay	AA	A	5	61	76		1.5	7.5	1.3	
USA	UCAinventory_non_EU	Sims Park	AA	A	3	38	49				2.5	
USA	UCAinventory_non_EU	Forest Park	AA	E	3	63	75	95	2.1	4	3	
USA	UCAinventory_non_EU	Klode Park	AA	E	3	24	38	49	2	4	2	
USA	UCAinventory_non_EU	Venice, Californ	AA	A	1	180		370	1.5	7.5		2.5
USA	UCAinventory_non_EU	Haleiwa Beach	AA	A	1	49		90			2.1	0.9
USA	UCAinventory_non_EU	Sand Island	AA	A	3	21	23					0.8