

# Integrating ACUF and GEBCO gazetteers into Marine Regions



**SCUFN27-05.4A**

## 1. Introduction

This report summarises the approach undertaken to integrate ACUF and GEBCO data into Marine Regions, highlighting the different issues encountered and how these have been managed. The purpose of Marine Regions is to **create a standard, relational list of geographic names, coupled with information and maps of the geographic location of these features.**

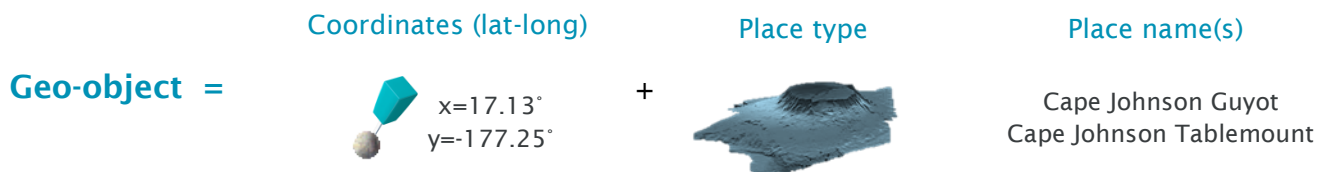
ACUF (Advisory Committee on Undersea Features) is part of the United States Board on Geographic Names (BGN), and was established to recommend standardization policy for names of undersea features.

The GEBCO (General Bathymetric Chart of the Oceans) Sub-Committee on Undersea Feature Names (SCUFN) maintains and makes available a digital gazetteer of the names, generic feature type and geographic position of features on the sea floor.

## 2. Methodology: the Geo-object approach

In the Marine Regions database each geographic entity, a Geo-object, is defined by:

- The coordinates (lat-long, calculated if the feature is a polygon, polyline or multipoint).
- The place type (bay, trench, seamount, anchorage, etc.).
- But it can have different names (synonym in original language, etc.).



With this in mind and with the purpose of detecting the geo-objects which might be already present in the Marine Regions database, different scenarios have been identified which are summarised in the table below. We therefore have to look at each of these attributes (place type, place name and coordinates) for every record within ACUF and GEBCO datasets and compare them to the Marine Regions records.

	Coord. (x,y)	Place type	Place name	Feature	Action
1	Equal	Equal	Equal	Same feature	This is a record that already exists in Marine Regions. Add context and synonym if relevant.
2	Equal	Equal	Different	Probably same feature	This could be a synonym of an existing feature (to be added if relevant). It can also be a different feature.
3	Similar	Equal	Equal	Probably same feature	Some discrepancy in coordinates can be expected for the same feature. Add context and synonym if relevant. It can also be a different feature, and a new geo-object has to be created.
4	Multipoint/ Polyline/ Polygon	Equal	Equal	Probably same feature	A special case for features not represented as points in GEBCO, when the calculated central point does not match the ACUF coordinates.
5	Equal	Different	Equal	Different feature	A new geo-object has to be created.
6	Different	Equal	Equal	Different feature	A new geo-object needs to be added to Marine Regions.
7	Similar	Equal	Different	??	Needs to be checked

## 2.1. Place types

The definition of marine features is not always straightforward and in some instances a different synonym can be used to express the same type of feature (e.g. guyot and tablemount). It is necessary to standardise the place types used by the different gazetteers. The definitions of the different feature types provided by ACUF and GEBCO have been compared and matched to those in MR. Some issues have been found in relation to the compatibility or consistency between the definitions provided by the three gazetteers, which are detailed in Appendix 1d. Besides, the cases in which certain place types are not used anymore, they are used but a definition is not given or the place type assigned seems incorrect have been documented (Appendix 1a, 1b and 1c).

## 2.2. Place names

### 2.1.1. ACUF

Different synonyms for the same feature appear in the ACUF dataset has separate records that share the same value for the [UFI] field (Undersea Feature Identifier). The table has been compressed by inserting the synonyms and their unique attributes into adjacent columns (figure below) by a series of iterative queries, basing the join in the [UFI] field. This way the number of records is reduced from 10196 to 5027.

	A	B	P	Q	R
1	RC	UFI	LC	FULL_NAME	FULL_NAME_ND
2	1	-2599252		Hurd Deep	Hurd Deep
3	3	-2123603		Le Trou sans Fond	Le Trou sans Fond
4	3	-2123603		Bottomless Pit	Bottomless Pit
5	3	-2123603		Le Trou Sans Fond Canyon	Le Trou Sans Fond Canyon
6	3	-2123603		The Bottomless Pit	The Bottomless Pit
7	3	-2123603		Trou sans Fond	Trou sans Fond
8	1	-1606824		Vee Shoal	Vee Shoal

UFI	UNI_q1f	name_q1f	UNI_q1l	name_q1l
-2599252	-3574885	Hurd Deep	-3574885	Hurd Deep
-2123603	-2938950	Bottomless Pit	12913590	Le Trou Sans Fond Canyon
-1606824	-2269610	Vee Shoal	-2269610	Vee Shoal
-1600760	-2262953	Sketty Belle	44325	Sketty Belle Shoal
-1594504	-2256182	Penguin Shoal	-2256182	Penguin Shoal

In Marine Regions, for each geographic entity and the available synonyms the place name language is provided. Within the ACUF records, the synonym appears with a language code associated in some cases. In others, however, the language will have to be added manually if known (whether it is a new geo-object or a synonym of an existing feature), or the 'Uncertain language' code will be added.

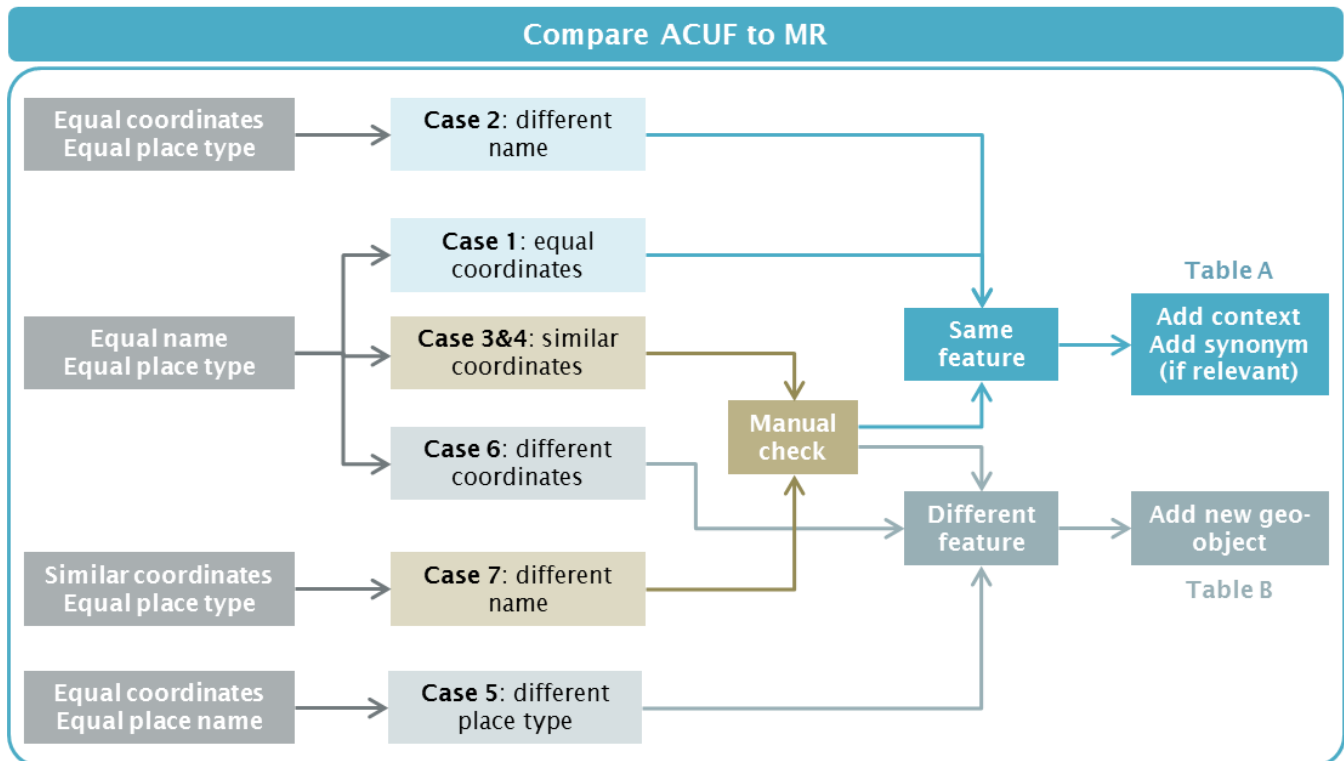
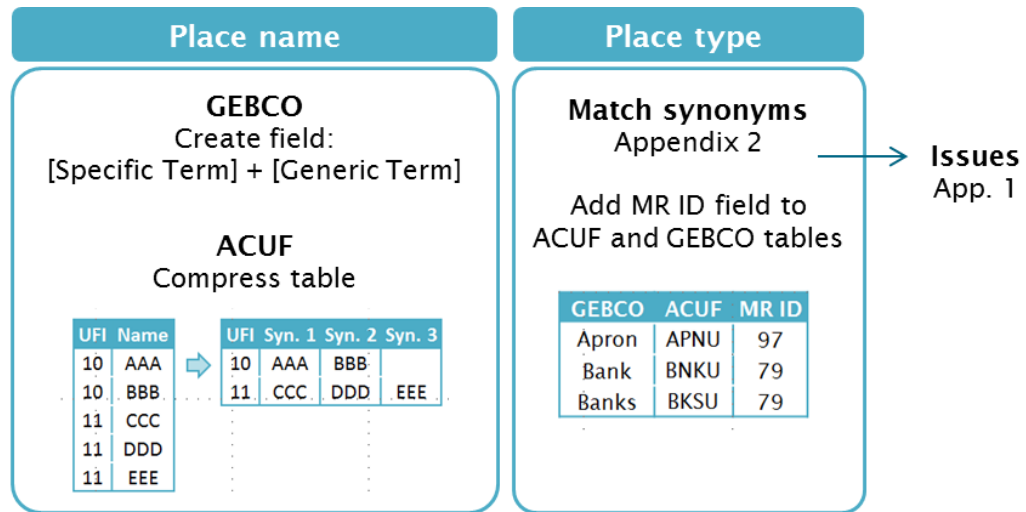
### 2.2.2. GEBCO

The place name of the features imported from GEBCO are obtained by joining the fields [Specific term] and [Generic term]. Although the specific term might appear in the original language (e.g. Agulhas; Portuguese), the generic term is always in English (e.g. Agulhas bank, Agulhas ridge).

### 2.3. Coordinates

Features in ACUF are represented always as points. However, undersea features in Marine Regions and GEBCO can be represented either as points, multipoints, lines or polygons. This raises some problems with regards to automatizing the comparison of the already existing features in the different gazetteers. Some case examples of the same feature having different coordinates are shown in Appendix 3a and 3b.

### 3. Flow chart



## Appendix 1. Issues related to place type definitions and matching.

### Observations

- The date of data download:  
ACUF: 16th May 2014  
GEBCO: 8th May 2014
- The source for place type and definitions:  
ACUF: <http://geonames.nga.mil/namesgaz/>, Look up tables / Designation codes  
GEBCO: <http://www.kosbidb2.co.kr:8080/recommend/>
- GEBCO place types are shown in the field [Generic Term], whereas for ACUF data these are indicated by a feature designation code in the field [DSG].
- Place types and definitions in Marine Regions are undergoing revision.

#### a) The place type exists/is defined but it is not used (does not appear in the records).

ACUF	GEBCO
Abyssal Hill	
Archipelagic Apron	BNCU undersea bench
Continental Margin	CRSU continental rise
Continental Rise	FLTU undersea flat
Continental shelf	FRKU undersea fork
Fracture Zone Province	FRSU undersea forks
Median Valley	GLYU undersea gully
Mid-Ocean Ridge	LDGU undersea ledge
Moat	LEVU undersea levee
Pinnacle	MDVU undersea median valley
Salt dome	MTSU undersea mountains
Sand ridge	MTU undersea mountain
Scarp	PKSU undersea peaks
Sea valley	PLFU undersea platform
Shelf break	RAVU undersea ravine
Zone	RMPU undersea ramp
Shelf edge	RNGU undersea range
Submarine valley	

#### b) GEBCO. The place type is used but a definition is not given.

Several place types have been found for which a definition is not given and that, in most cases, are only used once:

Place type	N° of records	Comments
Basin and ridge province	1	Kobayashi Basin and ridge province
Cap	1	Flemish Cap →Gap?
Seachannel	32	There is also a place type 'Sea channel' (with space) with 1 record. Sea channel = Seachannel!
Continental Slope	1	Aktivneset Continental Slope
Discordance	1	Australian-Antarctic Discordance
Fracture Zone System	1	Eltanin Fracture Zone System →Fracture zone?
Ground	1	Fairweather Ground
Pass (Passage?)	1	Flemish Pass →Passage?
Plain (Abyssal plain)	1	
Seabight	1	Porcupine Seabight
Seamount Group	1	Marcus-Wake Seamount Group →Seamounts?
Seamount Province	3	C&GS Seamount Province Gulf of Alaska Seamount Province Baja California Seamount Province

c) **ACUF. The feature code assigned to the geographic entity seems incorrect.**

For the meaning of the code and the definition of the each place type a table can be downloaded at <http://geonames.nga.mil/namesgaz/>. The undersea features are recognisable because the [Feature Class] field is filled with 'U - Undersea'. However, for the following entities, the feature code assigned does not belong to the Undersea feature class:

Feat. desig. code	Place type	Definition	Feature class	Records	Should be...?
CHNM	Marine channel	That part of a body of water deep enough for navigation through an area otherwise not suitable.	H - Hydrographic	-North Sahul Passage	SEACHANNEL
RF	Reef(s)	A surface-navigation hazard composed of consolidated material.	H - Hydrographic	-Star Reefs	RFSU (Reefs) or RFU (Reef)
SHOL	Shoal(s)	A surface-navigation hazard composed of unconsolidated material	H - Hydrographic	-Bellona Bank	SHLU (Shoal) or SHSU (Shoals)
TRR	Terrace	A long, narrow alluvial platform bounded by steeper slopes above and below, usually overlooking a waterbody.	T - Hypsographic	-Kuchеров Terrace -Voronov Terrace	???

#### d) Incompatible or inconsistent definitions.

MR	<b>Place type ID</b>	Hill(s) 62
	<b>Definition</b>	An isolated (or group of) elevation(s), smaller than a SEAMOUNT. An area of upland smaller than a mountain but with no specific definition of absolute elevation
GEBCO	<b>Place type ID</b>	Hill / Hills
	<b>Definition</b>	A distinct elevation generally of irregular shape, less than 1000m above the surrounding relief as measured from the deepest isobath that surrounds most of the feature.
ACUF	<b>Place type ID</b>	Hill / hills HLLU / HLSU
	<b>Definition</b>	an elevation rising generally less than 500 meters

MR	<b>Place type ID</b>	Knoll(s) 84
	<b>Definition</b>	An elevation somewhat smaller than a SEAMOUNT and of rounded profile, characteristically isolated or as a cluster on the sea floor. A rounded hill of no great elevation.
GEBCO	<b>Place type ID</b>	Knoll / Knolls
	<b>Definition</b>	A distinct elevation with a rounded profile less than 1000m above the surrounding relief as measured from the deepest isobath that surrounds most of the feature.
ACUF	<b>Place type ID</b>	Knoll / Knolls KNLU / KNSU
	<b>Definition</b>	an elevation rising generally more than 500 meters and less than 1,000 meters and of limited extent across the summit

MR	<b>Place type ID</b>	Sill 113
	<b>Definition</b>	A sea floor barrier of relatively shallow depth restricting water movement between BASINS. · An intrusive body of solidified magma, that has been ejected as a near-horizontal sheet between the bedding-planes of the crustal rocks · A submarine bar or ridge across the mouth of a fjord
GEBCO	<b>Place type ID</b>	Sill
	<b>Definition</b>	The sloping region that deepens from a SHELF to the point where there is a general decrease in gradient.
ACUF	<b>Place type ID</b>	sill SILU
	<b>Definition</b>	The low part of a gap or saddle separating basins

MR	<b>Place type ID</b>	Slope 61
	<b>Definition</b>	The deepening sea floor out from the shelfedge to the upper limit of the continental rise, or the point where there is a general decrease in steepness. An inclined surface. A slope may be concave, straight or convex when seen in profile.
GEBCO	<b>Place type ID</b>	Slope
	<b>Definition</b>	A subordinate RIDGE protruding from a larger feature.
ACUF	<b>Place type ID</b>	slope SLPU
	<b>Definition</b>	the slope seaward from the shelf edge to the beginning of a continental rise or the point where there is a general reduction in slope (=continental slope?).

## Appendix 2. Place type matching (summary).

### a) Marine Regions – GEBCO.

The following list matches the place types used in GEBCO with the place types existing in the MR gazetteer. Clarification is necessary, before proceeding, with regards to:

	A definition is needed or the place type assigned needs to be reviewed. Appendix 1.b.
	Incompatible / inconsistent definitions. Appendix 1.d.

MR Place type	MR ID	GEBCO Place type	MR Place type	MR ID	GEBCO Place type
Abysal Plain	67	Abysal Plain	Mud Volcano	265	Mud Volcano
Apron	97	Apron	Passage	105	Pass
Bank(s)	79	Bank	Passage	105	Passage
Bank(s)	79	Banks	Peak(s)	106	Peak
Basin	25	Basin	Plain	63	Plain
Basin	25	Basin and Ridge Province	Plateau	38	Plateau
Borderland	99	Borderland	Promontory	108	Promontory
Caldera(s)	64	Caldera	Province (phys.)	320	Province
Caldera(s)	64	Calderas	Reef(s)	88	Reef
Canyon(s)	58	Canyon	Reef(s)	88	Reefs
Canyon(s)	58	Canyons	Ridge(s)	30	Ridge
Gap	140	Cap	Ridge(s)	30	Ridges
Continental Slope	123	Continental Slope	Rift	264	Rift
Deep	37	Deep	Rise	89	Rise
Deep	37	Deeps	Saddle	110	Saddle
Discordance	263	Discordance			Seabight
Escarpment	82	Escarpment	Seachannel(s)	81	Sea Channel
Fan	86	Fan	Seachannel(s)	81	Seachannel
Fan	86	Cone	Seachannel(s)	81	Channel
Fracture zone	55	Fracture Zone	Seamount(s)	57	Seamount
Fracture zone	55	Fracture Zone System	Seamount(s)	57	Seamounts
Gap	140	Gap	Seamount Chain	87	Seamount Chain
Ground	35	Ground	Seamount(s)	57	Seamount Group
Guyot(s)	66	Guyot	Seamount Province	141	Seamount Province
Guyot(s)	66	Guyots	Shelf	144	Shelf
Guyot(s)	66	Tablemount	Shoal(s)	112	Shoal
Hill(s)	62	Hill	Shoal(s)	112	Shoals
Hill(s)	62	Hills	Sill	113	Sill
Hole	74	Hole	Slope	61	Slope
Knoll(s)	84	Knoll	Spur	60	Spur
Knoll(s)	84	Knolls	Terrace	114	Terrace
Levee	102	Levee	Trench	91	Trench
Mound	317	Mound	Trough	59	Trough
Mound	317	Mounds	Valley(s)	83	Valley
			Valley(s)	83	Valleys



## b) Marine Regions – ACUF.

The following list matches the place types used in ACUF with the place types existing in the MR gazetteer. Clarification is necessary, before proceeding, with regards to:

Incompatible / inconsistent definitions. Appendix 1.d.

MR Place type	MR ID	Feat. Desig. Code	Feat. Desig. Name
Apron	97	APNU	undersea apron
Undersea arch	325	ARCU	undersea arch
Undersea arrugado	328	ARRU	undersea arrugado
Borderland	99	BDLU	undersea borderland
Bank(s)	79	BKSU	undersea banks
Bench	310	BNCU	undersea bench
Bank(s)	79	BNKU	undersea bank
Basin	25	BSNU	undersea basin
Cordillera	311	CDAU	undersea cordillera
Seachannel(s)	81	CHNM	marine channel
Canyon(s)	58	CNSU	undersea canyons
Canyon(s)	58	CNYU	undersea canyon
Continental rise	101	CRSU	continental rise
Deep	37	DEPU	deep
Shelf Edge	111	EDGU	undersea shelf edge
Escarpment	82	ESCU	undersea escarpment (or scarp)
Fan	86	FANU	undersea fan
Flat	131	FLTU	undersea flat
Fork(s)	312	FRKU	undersea fork
Fork(s)	312	FRSU	undersea forks
Fracture zone	55	FRZU	undersea fracture zone
Furrow	313	FURU	undersea furrow
Gap	140	GAPU	undersea gap
Gas field	94	GASF	gasfield
Gully	185	GLYU	undersea gully
Hill(s)	62	HLLU	undersea hill
Hill(s)	62	HLSU	undersea hills
Hole	74	HOLU	undersea hole
Knoll(s)	84	KNLU	undersea knoll
Knoll(s)	84	KNSU	undersea knolls
Ledge	314	LDGU	undersea ledge
Levee	102	LEVU	undersea levee
Median valley	103	MDVU	undersea median valley
Mesa	315	MESU	undersea mesa
Mound	317	MNDU	undersea mound
Moat	104	MOTU	undersea moat
Undersea mountain(s)	331	MTSU	undersea mountains
Undersea mountain(s)	331	MTU	undersea mountain
Oil field	93	OILF	oilfield
Peak(s)	106	PKSU	undersea peaks
Peak(s)	106	PKU	undersea peak
Platform	319	PLFU	undersea platform
Plain	63	PLNU	undersea plain
Plateau	38	PLTU	undersea plateau

Pinnacle	107	PNLU	undersea pinnacle
Province (phys.)	320	PRVU	undersea province
Ravine	323	RAVU	undersea ravine
Ridge(s)	30	RDGU	undersea ridge
Ridge(s)	30	RDSU	undersea ridges
Reef(s)	88	RF	reef(s)
Reef(s)	88	RFSU	undersea reefs
Reef(s)	88	RFU	undersea reef
Rise	89	RISU	undersea rise
Ramp	321	RMPU	undersea ramp
Range	322	RNGU	undersea range
Seachannel(s)	81	SCNU	seachannel
Seachannel(s)	81	SCSU	seachannels
Saddle	110	SDLU	undersea saddle
Shelf	144	SHFU	undersea shelf
Shoal(s)	112	SHLU	undersea shoal
Shoal(s)	112	SHOL	shoal(s)
Shoal(s)	112	SHSU	undersea shoals
Shelf valley	324	SHVU	undersea shelf valley
Sill	113	SILU	undersea sill
Slope	61	SLPU	undersea slope
Seamount(s)	57	SMSU	seamounts
Seamount(s)	57	SMU	seamount
Spur	60	SPRU	undersea spur
Terrace	114	TERU	undersea terrace
Guyot(s)	66	TMSU	tablemounts (or guyots)
Guyot(s)	66	TMTU	tablemount (or guyot)
Tongue	217	TNGU	undersea tongue
Trough	59	TRGU	undersea trough
Trench	91	TRNU	undersea trench
Terrace	114	TRR	terrace
Historical undersea feature	329	UFHU	historical undersea feature
Valley	83	VALU	undersea valley
Valley	83	VLSU	undersea valleys

## Appendix 3. Examples of coordinates issues.

### a) Coordinates of point features.

Geo Object ID	(from GEBCO)			Lat. ACUF	Long. ACUF	Name ACUF	Diff. Lat.	Diff. Long
	Geo Name	Lat.	Long.					
7722	Tenpo Seamount	27.160	139.633	27.163	139.628	Tempo Seamount	0.00	0.01
6778	Anna De Koningh Seamount	-53.367	24.983	-53.367	25.000	De Koningh Seamount	0.00	-0.02
4609	Atlantic Seamount	34.083	-30.250	34.000	-30.250	Atlantis Seamount	0.08	0.00
24813	Atlantis II Seamounts	38.390	-62.970	38.450	-63.117	Atlantis II Seamount Group	-0.06	0.15
25109	Zefirov Seamount	84.850	117.580	84.583	117.583	Gora Zefirova	0.27	0.00
7692	Nishinoomote Seamount	28.483	132.767	29.482	132.770	Nisinoomote Seamount	-1.00	0.00
5109	Mungo Park Seamounts	1.417	1.667	0.500	2.083	Mungo Park Seamounts	0.92	-0.42
5083	Whitney Seamount	9.000	-21.167	8.483	-20.250	Whitney Seamount	0.52	-0.92
6588	Yamato Seamount	38.867	136.000	39.333	135.000	Yamato-tai	-0.47	1.00
6927	Choju Seamounts	24.483	135.283	24.450	134.167	Tyozyu Seamounts	0.03	1.12
4565	New England Seamounts	37.500	-60.000	38.000	-61.000	Kelvin Seamounts	-0.50	1.00
5900	Solide Seamount	32.000	-174.167	30.933	-174.633	Solide Seamount	1.07	0.47
6307	Clipperton Seamounts	9.500	-111.000	8.000	-111.000	Clipperton Seamounts	1.50	0.00
7181	Pierre Brazza seamounts	-6.000	4.833	-4.750	3.917	Brazza Seamounts	-1.25	0.92
6031	Hooikaika Seamount	24.300	-171.850	22.350	-171.750	Hooikaika Seamount	1.95	-0.10
7061	Lowreenne Seamounts	-45.000	147.000	-45.417	145.083	Lowreenne Borderland	0.42	1.92
7907	Kaitoku Seamounts	26.050	140.950	25.133	149.133	Kaitoku Seamounts	0.92	-8.18
6054	Jones Seamount	52.417	-148.917	43.550	-132.583	Jones Seamount	8.87	-16.33
6177	Parker Seamount	52.583	-151.250	30.633	-162.183	Parker Seamount	21.95	10.93
5923	Walker Seamount	55.117	-140.333	18.100	-158.217	Walker Seamount	37.02	17.88
6370	Endeavour Seamount	48.250	-128.250	-18.933	-169.433	Endeavour Seamount	67.18	41.18
6677	Crawford Seamount	-38.667	-11.167	38.133	-62.283	Gosnold Seamount	-76.80	51.12
4066	Archimedes Seamount	34.350	18.000	13.317	-110.467	Archimedes Seamount	21.03	128.47
6699	Malloy Seamount	-27.917	8.833	83.967	105.167	Molloy Seamount	-111.88	-96.33
6380	Ewing Seamount	20.333	174.167	-23.333	8.750	Ewing Seamount	43.67	165.42
5146	Kiwi Seamount	39.317	-64.600	-30.783	173.867	Kiwi Seamount	70.10	-238.47
26644	Golovnin Seamount	14.440	-131.869	46.783	157.117	Gora Golovnina	-32.34	-288.99
24809	Ann Judge Seamount	30.517	172.433	30.233	-172.433	Judge Seamount	0.28	344.87

## b) Calculated coordinates (from polylines, polygons or multipoints).

Geo Object ID	(from GEBCO)			Lat.	Long.	Name	Diff.	Diff.
	Geo Name	Lat.	Long.	ACUF	ACUF		Lat.	Long
33466	Kosei Seamount	25.115	135.652	25.117	135.667	Kosei Seamount	0.00	-0.01
33512	Ngatoro Ridge	-37.106	177.313	-37.133	177.267	Ngatoro Ridge	0.03	0.05
33508	Lachlan Ridge	-39.531	177.762	-39.500	177.833	Lachlan Ridge	-0.03	-0.07
33528	Visscher Valley	-40.068	171.800	-39.967	171.833	Visscher Valley	-0.10	-0.03
33497	East Cape Ridge	-36.979	179.432	-37.083	179.517	East Cape Ridge	0.10	-0.09
33505	Karitane Canyon	-45.692	171.323	-45.633	171.167	Karitane Canyon	-0.06	0.16
33501	Hokitika Canyon	-42.397	169.920	-42.333	169.750	Hokitika Canyon	-0.06	0.17
33519	Pegasus Canyon	-43.086	173.756	-43.250	173.667	Pegasus Canyon	0.16	0.09
33513	North Maria Ridge	-33.776	171.951	-33.867	172.133	North Maria Ridge	0.09	-0.18
33492	Bellona Gap	-36.938	166.615	-36.750	166.500	Bellona Gap	-0.19	0.11
33523	Subantarctic Slope	-53.104	173.487	-51.000	177.917	Subantarctic Slope	-2.10	-4.43
33480	Woolsey Mound	-28.861	-88.488	28.850	-88.483	Woolsey Mound	-57.71	0.00

## Appendix 4. Place type and definition matching (extended).

<b>MR ID</b>	Abyssal Plain 67
<b>Def.</b>	An extensive, flat, gently sloping or nearly level region at abyssal depths. The bottom zone of the ocean, below 1800m and extending down to an abyssal plain at depths of 400 m on which abyssal deposits occur. At these depths the sea temperatures do not exceed 4°C.
<b>GEBCO Def.</b>	Abyssal Plain An extensive, flat or gently sloping region, usually found at depths greater than 4000 m.
<b>ACUF ID</b>	
<b>Def.</b>	
<b>MR ID</b>	Apron 97
<b>Def.</b>	A gently dipping surface, underlain primarily by sediment, at the base of any steeper slope. A very low angle outwash spread in front of an alluvial fan.
<b>GEBCO Def.</b>	Apron A gently dipping SLOPE, with a smooth surface, commonly found around groups of islands and SEAMOUNTS.
<b>ACUF ID</b>	apron APNU
<b>Def.</b>	a gentle slope, with a generally smooth surface, particularly found around groups of islands and seamounts
<b>MR ID</b>	Bank(s) 79
<b>Def.</b>	An elevation of the sea floor, over which the depth of water is relatively shallow, but sufficient for safe surface navigation. <ul style="list-style-type: none"> <li>· A colloquial term for a slope or hillside</li> <li>· A shoal-like feature covered intermittently by shallow sea water, composed of muddy, sandy or shelly (but not rocky) deposits</li> <li>· The margin of a river channel, beyond which lies the floodplain, which in turn occupies a river valley</li> </ul>
<b>GEBCO Def.</b>	Bank / Banks An elevation of the seafloor at depths generally less than 200 m, but sufficient for safe surface navigation commonly found on the continental shelf or near an island.
<b>ACUF ID</b>	Bank / Banks BNKU / BKSU
<b>Def.</b>	an elevation, typically located on a shelf, over which the depth of water is relatively shallow but sufficient for safe surface navigation
<b>MR ID</b>	Basin 25
<b>Def.</b>	A depression, in the sea floor, more or less equidimensional in plan and of variable extent <ul style="list-style-type: none"> <li>· A structural downfold (syncline) in the Earth's crust in which the younger rocks occupy the centre and older rocks may be exposed by erosion on the flanks</li> <li>· A small subsidence depression in the land surface due to solution of underlying deposits such as salt or gypsum, naturally or artificially created</li> <li>· A very large depression occupied with sea water, i.e. an oceanic basin</li> <li>· A large sediment filled depression, enclosed by higher land, with or without an outlet</li> <li>· The catchment area of a river system</li> </ul>
<b>GEBCO Def.</b>	Basin A depression more or less equidimensional in plan and of variable extent.
<b>ACUF ID</b>	basin BSNU
<b>Def.</b>	a depression more or less equidimensional in plan and of variable extent

MR ID Def.	
GEBCO Def.	Basin and Ridge Province NO DEFINITION
ACUF ID Def.	

MR ID	Borderland 99
Def.	A region adjacent to a continent, normally occupied by or bordering a shelf and sometimes emerging as islands, that is irregular or blocky in plan or profile, with depths well in excess of those typical of a shelf.
GEBCO Def.	Borderland A region adjacent to a continent, normally occupied by or bordering a SHELF and sometimes emerging as islands, that is irregular or blocky in plan or profile, with depths well in excess of those typical of a SHELF.
ACUF ID Def.	borderland BDLU a region adjacent to a continent, normally occupied by or bordering a shelf, that is highly irregular with depths well in excess of those typical of a shelf.

MR ID	Caldera 64
Def.	A collapsed or partially-collapsed seamount, commonly of annular shape. A large, circular, basin-shaped volcanic depression created by 1. Destruction of the upper part of the conical cone by an eruption of a great force 2. By collapse of the volcanic cone inwards 3. By gradual reduction of an extinct or dormant volcano by erosion. The criterion is that the diameter of the caldera should be many times that of the original volcanic vents.
GEBCO Def.	Caldera / Calderas A roughly circular, cauldron-like depression generally characterized by steep sides and formed by collapse, or partial collapse, during or following a volcanic eruption.
ACUF ID Def.	

MR ID	Canyon(s) 58
Def.	A relatively narrow, deep depression with steep sides, the bottom of which generally deepens continuously, developed characteristically on some continental slopes. A steep-walled gorge, ravine or chasm cut by river action, in which the depth considerable exceeds the width. Such a feature is common in areas of low precipitation, which inhibits local denudation of the valley sides, but where the river is supplied by an external source enabling downcutting to continue.
GEBCO Def.	Canyon / Canyons An elongated, narrow, steep-sided depression that generally deepens down-slope.
ACUF ID Def.	Canyon / Canyons CNYU / CNSU a relatively narrow, deep depression with steep sides, the bottom of which generally has a continuous slope

MR ID Def.	
GEBCO Def.	Cap NO DEFINITION
ACUF ID Def.	

MR ID	Continental Slope 123
Def.	The continuously sloping portion of the continental margin, seaward of the continental shelf, and extending down to the deep sea-floor of the Abyssal zone. It is characterized by gradients between 2° and 5° and by considerable submarine sliding and slumping of the marine sediments. It is cut through the submarine canyons, which debouch on to the deep sea-floor. It constitutes about 8.5% of the ocean floor.
GEBCO Def.	Continental Slope NO DEFINITION
ACUF ID Def.	

MR ID Def.	Cordillera 311 an entire mountain system including the subordinate ranges, interior plateaus, and basins (ACUF)
GEBCO Def.	
ACUF ID Def.	Cordillera CDAU an entire mountain system including the subordinate ranges, interior plateaus, and basins

MR ID	Deep 37
Def.	A small depression in the seafloor. (ocean), a trench of considerable depth on the deep-sea plain of the ocean floor. Its use is generally restricted to trenches which exceed depths of 5500 m. They occur either in association with island arcs or along coasts bounded by high mountain ranges, where they are termed foredeeps. The ocean deep is often associated with the subduction zone at the margins of two tectonic plates.
GEBCO Def.	Deep / Deepes A localized depression within the confines of a larger feature, such as a TROUGH, BASIN or TRENCH.
ACUF ID Def.	deep DEPU a localized deep area within the confines of a larger feature, such as a trough, basin or trench

MR ID Def.	Discordance 263 A geological term referring to a lack of parallelism between contiguous rock strata. This is termed an angular unconformity.
GEBCO Def.	Discordance NO DEFINITION
ACUF ID Def.	

MR ID	Escarpment 82
Def.	An elongated, characteristically linear, steep slope separating horizontal or gently sloping sectors of the sea floor in non-shelf areas. Also abbreviated to scarp. - The steep slope terminating a plateau or any level upland surface - The steep face which terminates the stratified rocks of a cuesta The term SCARP is synonymous
GEBCO	Escarpment
Def.	An elongated, characteristically linear, steep SLOPE separating horizontal or gently sloping areas of the sea floor.
ACUF ID	escarpment (or scarp) ESCU
Def.	an elongated and comparatively steep slope separating flat or gently sloping areas

MR ID	Fan 86
Def.	A relatively smooth, fan-like, depositional feature normally sloping away from the outer termination of a canyon or canyon system. Also called cone. = ALLUVIAL FAN A fan- or cone-shaped mass of material, usually of sand and gravel, deposited by a stream where it emerges from the constriction of a narrow valley at a mountain front and debouches on to a plain or into a wide trunk valley.
GEBCO	Cone / Fan
Def.	CONE: A relatively smooth depositional feature continuously deepening away from a sediment source commonly located at the lower termination of a CANYON or canyon system. Also called FAN. ??? FAN: A relatively smooth depositional feature continuously deepening away from a sediment source commonly located at the lower termination of a CANYON or canyon system.
ACUF ID	fan FANU
Def.	a relatively smooth feature normally sloping away from the lower termination of a canyon or canyon system

MR ID	Fracture zone 55
Def.	An extensive linear zone of irregular topography, mountainous or faulted, characterized by steep-sided or asymmetrical ridges, clefts, troughs or escarpments. A zone where large-scale transform faults off-set plate structures on the floor of the oceans. The fracture zones also displace the palaeomagnetic patterns of the rocks on the sea-floor, indicating that there is a differential movement within the tectonic plates themselves.
GEBCO	Fracture Zone
Def.	A long narrow zone of irregular topography formed by the movement of tectonic plates associated with an offset of a spreading ridge axis, characterized by steep-sided and/or asymmetrical RIDGES, TROUGHS or ESCARPMENTS.
ACUF ID	Fracture zone FRZU
Def.	an extensive linear zone of irregular topography of the sea floor, characterized by steep-sided or asymmetrical ridges, troughs, or escarpments

MR ID	
Def.	
GEBCO	Fracture Zone System
Def.	NO DEFINITION
ACUF ID	
Def.	

MR ID	Furrow 313
Def.	a closed, linear, narrow, shallow depression
GEBCO	
Def.	
ACUF ID	*furrow FURU
Def.	a closed, linear, narrow, shallow depression



MR ID	Gap 140
Def.	A notch or break in a ridge (created by water, wind or ice)
GEBCO Def.	Gap A narrow break in a RIDGE, RISE or other elevation. Also called PASSAGE.
ACUF ID	Gap GAPU
Def.	a narrow break in a ridge or rise

MR ID	Ground 35
Def.	NO DEFINITION
GEBCO Def.	Ground NO DEFINITION
ACUF ID	
Def.	

MR ID	Guyot(s) 66
Def.	A seamount having a comparatively smooth flat top. Also called tablemount. A flat-topped variety of a seamount occurring mainly in the Pacific Ocean. Their summits are almost entirely at depths of more than 1000 m but rise up to 3 km from the ocean floor. Their summits are covered by sediments of various ages and of different derivation. = TABLEMOUNT
GEBCO Def.	Guyot / Guyots/ Tablemount GUYOT: A SEAMOUNT with a comparatively smooth flat top. TABLEMOUNT: A SEAMOUNT having a comparatively smooth flat top. Also called GUYOT.
ACUF ID	Tablemount (or guyot) / Tablemounts TMTU / TMSU
Def.	A seamount having a comparatively smooth, flat top

MR ID	Hole 74
Def.	A small local depression, often steep sided, in the sea floor.
GEBCO Def.	Hole A depression of limited extent with all sides rising steeply from a relatively flat bottom.
ACUF ID	hole HOLU
Def.	a small depression of the sea floor

MR ID	Mesa 315
Def.	An isolated, extensive, flat-topped elevation on the shelf, with relatively steep sides (ACUF)
GEBCO Def.	
ACUF ID	*mesa MESU
Def.	an isolated, extensive, flat-topped elevation on the shelf, with relatively steep sides

MR ID	Moat 104 (eliminate 316)
Def.	An annular depression that may not be continuous, located at the base of many SEAMOUNTS, oceanic islands and other isolated elevations. Around the base of the seamount is a slight "moat" where the sea-bottom is at a lower depth than the surrounding terrain.
GEBCO Def.	
ACUF ID	moat MOTU
Def.	an annular depression that may not be continuous, located at the base of many seamounts, islands, and other isolated elevations

MR ID	Mound 317
Def.	a low, isolated, rounded hill (ACUF) A distinct elevation with a rounded profile generally less than 500m above the surrounding relief as measured from the deepest isobath that surrounds most of the feature, commonly formed by the expulsion of fluids or by coral reef development, sedimentation and (bio)erosion (GEBCO)
GEBCO	Mound / Mounds
Def.	A distinct elevation with a rounded profile generally less than 500m above the surrounding relief as measured from the deepest isobath that surrounds most of the feature, commonly formed by the expulsion of fluids or by coral reef development, sedimentation and (bio)erosion.
ACUF ID	*mound MNDU
Def.	a low, isolated, rounded hill

MR ID	Mud Volcano 265
Def.	A small (< 50m) conical mound which simulates a true volcano but from which mud is ejected rather than lava. It is a type of injection structure, often created when liquid mud is forced upwards through fissures during an earthquake or a volcanic eruption. The cone thus created is usually short-lived.
GEBCO	Mud Volcano
Def.	A MOUND or cone-shaped elevation formed by the expulsion of non-magmatic liquids and gasses.
ACUF ID	
Def.	

MR ID	Pass 182
Def.	a low place in a mountain range allowing easier passage A mountain pass is a route through a mountain range or over a ridge. If following the lowest possible route, a pass is locally the highest point on that route.
GEBCO	Pass
Def.	<b>NO DEFINITION</b>
ACUF ID	
Def.	

MR ID	Passage 105
Def.	A narrow break in a RIDGE or a RISE. Also called GAP.
GEBCO	Passage
Def.	A narrow break in a RIDGE, RISE or other elevation. Also called GAP.
ACUF ID	
Def.	

MR ID	Peak(s) 106
Def.	A prominent elevation either pointed or of a very limited extent across the summit. · The pointed top or summit of a mountain · The proper name of a plateau-like moorland in the Pennines
GEBCO	Peak
Def.	A conical or pointed elevation at the summit of a larger feature.
ACUF ID	Peak PKU
Def.	a prominent elevation, part of a larger feature, either pointed or of very limited extent across the summit

MR ID	Pinnacle 107
Def.	Any high tower or spire-shaped pillar of rock, or coral, alone or cresting a summit. A rock pinnacle, rock tower, rock spire or natural tower is an individual column of rock, isolated from other rocks or groups of rocks, in the shape of a vertical shaft or spire.
GEBCO Def.	
ACUF ID	pinnacle PNLU
Def.	a high tower or spire-shaped pillar of rock or coral, alone or cresting a summit
MR ID	Plain 63
Def.	An extensive, flat, gently sloping or nearly level undersea region. An extensive tract of flat land or a gently undulating terrain without prominent hills or depressions. Coastal plain: any gently sloping plain or lowland which borders the landward side of a coastline and which often continues off shore as the continental shelf Floodplain: the part of a river valley, adjacent to the channel, over which a river flows in times of flood. It is a zone of low relief and gentle gradients and may incorporate oxbow lakes, point bards, abandoned channels, scrolls, all indicative of the fact that the river channel has shifted its position continuously during the present regimen of the stream. The floodplain is composed of alluvium
GEBCO Def.	Plain <b>NO DEFINITION</b>
ACUF ID	plain PLNU
Def.	a flat, gently sloping or nearly level region
MR ID	Plateau 38
Def.	A flat or nearly flat elevation of considerable areal extent, dropping off abruptly on one or more sides. An elevated tract of relatively flat land, usually limited on at least one side by a steep slope falling abruptly to a lower land.
GEBCO Def.	Plateau A large, relatively flat elevation that is higher than the surrounding relief with one or more relatively steep sides.
ACUF ID	plateau PLTU
Def.	a comparatively flat-topped feature of considerable extent, dropping off abruptly on one or more sides
MR ID	Promontory 108
Def.	A major SPUR-like protrusion of the continental SLOPE extending to the deep seafloor. Characteristically, the crest deepens seaward. A rocky coastal headland projecting significantly into the sea.
GEBCO Def.	Promontory A major SPUR-like protrusion of the continental SLOPE extending to the deep seafloor. Characteristically, the crest deepens seaward.
ACUF ID	
Def.	

<b>MR ID</b>	Province (phys.) 320
<b>Def.</b>	A region identifiable by a group of similar physiographic features whose characteristics are markedly in contrast with surrounding areas (ACUF). A geographically distinct region with a number of shared physiographic characteristics that contrast with those in the surrounding areas. This term should be modified with the generic term that best describes the majority of features in the region (e.g., Seamount in “Baja California Seamount Province”). (GEBCO)
<b>GEBCO Def.</b>	Province A geographically distinct region with a number of shared physiographic characteristics that contrast with those in the surrounding areas. This term should be modified with the generic term that best describes the majority of features in the region (e.g., Seamount in “Baja California Seamount Province”).
<b>ACUF ID</b>	<b>province</b> PRVU
<b>Def.</b>	a region identifiable by a group of similar physiographic features whose characteristics are markedly in contrast with surrounding areas

<b>MR ID</b>	Reef(s) 88
<b>Def.</b>	A mass of rock or other indurated material lying at or near the sea surface that may constitute a hazard to surface navigation. · A line of rocks in the tidal zone of a coast submerged at high water but partly uncovered at low water. It can be composed of any type of rock · A coral reef, which may be in the form of an atoll · A quartz vein containing gold, or other precious metal · A line of hills in the SW of the USA
<b>GEBCO Def.</b>	Reef / Reefs A shallow elevation composed of consolidated material that may constitute a hazard to surface navigation.
<b>ACUF ID</b>	<b>Reef / Reefs / Reef(s)</b> RFU / RFSU / RF
<b>Def.</b>	a surface-navigation hazard composed of consolidated material

<b>MR ID</b>	Ridge(s) 30
<b>Def.</b>	(a) An elongated narrow elevation of varying complexity having steep sides. (b) An elongated narrow elevation, often separating ocean BASINS. (c) The linked major mid-oceanic mountain systems of global extent. Also called MIDOCEANIC RIDGE. · A linear, steep-sided upland · A narrow spur of a mountain which can be transformed in an arête by glacial modification · A median rise on the ocean floor (mid-oceanic ridge)
<b>GEBCO Def.</b>	Ridge / Ridges An elongated elevation of varying complexity, size and gradient.
<b>ACUF ID</b>	Ridge / Ridges RDGU / RDSU
<b>Def.</b>	a long narrow elevation with steep sides

<b>MR ID</b>	Rift 264
<b>Def.</b>	A linear depression or trough created by the sinking of the intermediate crustal rocks between two or more parallel strike-slip faults. The structure is also known as a graben, and the accompanying morphological feature as a rift valley.
<b>GEBCO Def.</b>	Rift An elongated depression bounded by two or more faults formed as a breach or split between two bodies that were once joined.
<b>ACUF ID</b>	
<b>Def.</b>	

MR ID	Rise 89
Def.	A broad elevation that rises gently and generally smoothly from the sea floor. In oceanography, a broad, gently sloping, elevated portion of the sea-floor, similar to a mid-oceanic ridge but without the median rift valley.
GEBCO Def.	Rise A broad elevation that generally rises gently and smoothly from the surrounding relief.
ACUF ID	rise RISU
Def.	a broad elevation that rises gently, and generally smoothly, from the sea floor

MR ID	Saddle 110
Def.	A broad pass or col, resembling in shape a riding saddle, in a RIDGE or between contiguous elevations. · A low point or col on a ridge connecting two summits · A structural feature associated with a sag in the crest of an anticline
GEBCO Def.	Saddle A broad pass or col in a RIDGE, RISE or other elevation.
ACUF ID	saddle SDLU
Def.	a low part, resembling in shape a saddle, in a ridge or between contiguous seamounts

MR ID	
Def.	
GEBCO Def.	Seabight NO DEFINITION? Basin?
ACUF ID	
Def.	

MR ID	Seachannel(s) 81
Def.	A continuously sloping elongated discrete depression found in fans or abyssal plains and customarily bordered by levees on one or both sides. = CHANNEL!!!!
GEBCO Def.	Sea Channel / Seachannel / <b>Channel</b> An elongated, meandering depression, usually occurring on a gently sloping plain or FAN.
ACUF ID	Seachannel / Seachannels / <b>marine channel</b> SCNU / SCSU / CHNM
Def.	a continuously sloping, elongated depression commonly found in fans or plains and customarily bordered by levees on one or two sides

MR ID	Seamount(s) 57
Def.	A discrete (or group of) large isolated elevation(s), greater than 1,000m in relief above the sea floor, characteristically of conical form. An isolated mountain rising abruptly some 1000 m from the ocean floor but without extending above sea-level. It is probably of volcanic origin and its conical summit contrasts with that of a guyot, which it otherwise resembles. Sea-mounts can be isolated, clustered into seamount groups, or in a linear pattern as a seamount range.
GEBCO Def.	Seamount / Seamounts A distinct generally equidimensional elevation greater than 1000m above the surrounding relief as measured from the deepest isobath that surrounds most of the feature.
ACUF ID	Seamount / seamounts SMU / SMSU
Def.	an elevation rising generally more than 1,000 meters and of limited extent across the summit

MR ID	Seamount Chain 87
Def.	A linear or arcuate alignment of discrete seamounts, with their bases clearly separated. SEAMOUNT RANGE, marked as seamount(s)
GEBCO Def.	Seamount Chain A linear or arcuate alignment of discrete SEAMOUNTS.
ACUF ID	
Def.	

MR ID	
Def.	
GEBCO Def.	Seamount Group NO DEFINITION? SEAMOUNT(S)
ACUF ID	
Def.	

MR ID	Seamount Province 141
Def.	is = seamount(s)
GEBCO Def.	Seamount Province NO DEFINITION? SEAMOUNT(S)
ACUF ID	
Def.	

MR ID	Shelf 144
Def.	In general, a ledge or projecting layer. More specifically, the continental shelf. A zone adjacent to a continent (or around an island) that extends from the low water line to a depth at which there is usually a marked increase of slope towards oceanic depths (ACUF).
GEBCO Def.	Shelf The flat or gently sloping region adjacent to a continent or around an island that extends from the low water line to a depth, generally about 200m, where there is a marked increase in downward slope.
ACUF ID	Shelf SHFU
Def.	a zone adjacent to a continent (or around an island) that extends from the low water line to a depth at which there is usually a marked increase of slope towards oceanic depths

MR ID	Shelf Edge = shelf break 111
Def.	The line along which there is marked increase of slope at the seaward margin of a CONTINENTAL (or island) SHELF. Also called SHELF BREAK. The change of slope occurring between the continental shelf and the continental slope. NO RECORDS NOW.
GEBCO Def.	
ACUF ID	shelf edge EDGU
Def.	a line along which there is a marked increase of slope at the outer margin of a continental shelf or island shelf

MR ID	Shelf valley 324
Def.	A valley on the shelf, generally the shoreward extension of a canyon
GEBCO Def.	
ACUF ID	Shelf valley SHVU
Def.	A valley on the shelf, generally the shoreward extension of a canyon

MR ID	Shoal(s) 112
Def.	An offshore hazard to surface navigation with substantially less clearance than the surrounding area and composed of unconsolidated material. A bank of coastal sediment that rises almost to the surface of the sea, thereby creating a navigation hazard. The term is also used a verb to indicate a gradual shallowing of the sea.
GEBCO Def.	Shoal / Shoals A relatively shallow barrier between BASINS that may inhibit water movement.
ACUF ID	Shoal / Shoals SHLU / SHSU
Def.	a surface-navigation hazard composed of unconsolidated material

MR ID	Spur 60
Def.	A subordinate elevation or ridge protruding from a larger feature, such as a plateau or island foundation. The ridges which project downwards from the crests of mountains as water partings. If they intervene between cirques they may be fashioned into arêtes, and their lower ends may be cut off by a valley glacier. In hydrology, a term used for groynes built out from a river bank to divert the flow from a scoured section and encourage deposition elsewhere.
GEBCO Def.	Spur An elongated depression that generally widens and deepens down-slope. Also called VALLEY.
ACUF ID	spur SPRU
Def.	a subordinate elevation, ridge, or rise projecting outward from a larger feature

MR ID	Terrace 114
Def.	A relatively flat horizontal or gently inclined surface, sometimes long and narrow, which is bounded by a steeper ascending slope on one side and by a steeper descending slope on the opposite side. A flat or gently inclined land surface bounded by a steeper ascending slope on its inner margin and a steeper descending slope on its outer margin. (alluvial terrace, kame terrace, marine-built terrace, meander terrace, pluvial terrace, river terrace).
GEBCO Def.	Terrace A flat or gently sloping region, generally long and narrow, bounded along one edge by a steeper descending slope and along the other by a steeper ascending slope.
ACUF ID	Terrace / Terrace TERU / TRR
Def.	a relatively flat horizontal or gently inclined surface, sometimes long and narrow, which is bounded by a steeper ascending slope on one side and by a steep descending slope on the opposite side <b>TERRACE (TRR)</b> : a long, narrow alluvial platform bounded by steeper slopes above and below, usually overlooking a water body

MR ID	Trench 91
Def.	A long narrow, characteristically very deep and asymmetrical depression of the sea floor, with relatively steep sides. = <u>deep</u> A trench of considerable depth on the deep-sea plain of the ocean floor. Its use is generally restricted to trenches which exceed depths of 5500 m. they occur in association with island arcs or along coasts bounded by high mountain ranges, were they are termed foredeeps. The ocean deep is often associated with the subduction zone at the margins of two tectonic plates
GEBCO Def.	Trench A long, deep, asymmetrical depression with relatively steep sides, that is associated with subduction.
ACUF ID	trench TRNU
Def.	a long, narrow, characteristically very deep and asymmetrical depression of the sea floor, with relatively steep sides

MR ID	Trough 59
Def.	A long depression of the sea floor characteristically flat bottomed and steep sided and normally shallower than a trench. <ul style="list-style-type: none"> <li>· A valley that has been overdeepened by glacial erosion and which is termed a U-shaped valley.</li> <li>· The lowest part of a wave form between two crests</li> <li>· A term referring to cross-bedding in sedimentary structures</li> </ul>
GEBCO Def.	Trough A long depression generally wide and flat bottomed with symmetrical and parallel sides.
ACUF ID	trough TRGU
Def.	a long depression of the sea floor characteristically flat bottomed and steep sided, and normally shallower than a trench
MR ID	Tongue 217
Def.	A projection of the ice edge up to several km in length caused by wind and current An ice tongue is a long and narrow sheet of ice projecting out from the coastline. An ice tongue forms when a valley glacier moves very rapidly out into the ocean or a lake. An elongate (tongue-like) extension of a flat sea floor into an adjacent higher feature.
GEBCO Def.	
ACUF ID	tongue TNGU
Def.	An elongate (tongue-like) extension of a flat sea floor into an adjacent higher feature.
MR ID	Valley(s) 83
Def.	A relatively shallow, wide depression, the bottom of which usually has a continuous gradient. This term is generally not used for features that have canyon-like characteristics for a significant portion of their extent. Also called SUBMARINE VALLEY or SEA VALLEY. A linear depression sloping down towards a lake, sea or inland depression. It is initially created by fluvial erosion but may have been subsequently modified by glacial erosion. A sea valley is a linear depression on the seafloor with a broader cross-section and gentler slopes than a submarine canyon. It crosses the continental shelf as an extension of an estuary or as the seaward portion of a drowned valley, and may be kept open by submarine currents or a tidal scour. = Shelf valley = a valley on the shelf, generally the shoreward extension of a canyon (ACUF)
GEBCO Def.	Valley An elongated depression that generally widens and deepens down-slope. Also called SEA VALLEY or SUBMARINE VALLEY.
ACUF ID	Shelf valley SHVU
Def.	A valley on the shelf, generally the shoreward extension of a canyon