Undersea mountains – description of data and maps

This document provides a description of the content of three datasets and web-map layers that are the result of automated analysis of a compiled bathymetry dataset for the detection and delineation of undersea mountains.

Reference: Dolan, M., Bjarnadóttir, L.R., Lepland, A. 2025. Undersea mountains – description of data and maps. www.mareano.no, www.ngu.no.

In downloaded data the short Norwegian names appear as column headings in the attribute table. The user may replace these by the short English names as aliases if preferred. The full names and descriptions are given below for reference.

Undersea mountains - Peaks (point)

Attribute (short name)	Attribute (short name Norwegian)	Attribute full name	Description
Pk_ID	*Topp_ID*	Peak ID	Unique identifier
PkRelHt	*ToppRelH*	Relative height of peak	Maximum value of the height (m) above a directional median derivative of the bathymetry data within the closed contour polygon surrounding the peak
PkHtCl	*ToppHKl*	Peak Height class	Reclassified from height of peak u500 – < 500 m u1000 – < 1000 m o1000 – > 1000 m
PkNbourTCl	*ToppNaboKl*	Neighbouring terrain class	Results of hierarchical classification used to separate distinct/isolated undersea mountains occurring in otherwise flat areas from those in rugged terrain. The classification is based on the composition of geomorphon landform elements derived from bathymetry data within 20 km radius surrounding each peak. F – distinct peak with surrounding flat terrain R – peak in rugged terrain
DataQCl	*DataKvKl*	Data quality class	Indicates the quality of the bathymetry data in the vicinity of each peak. The class is based on the majority data type according to GEBCO TID grid and percentage within 20 km radius around each point location. Direct (dd): >90% majority direct Partial (di): 50%-90% majority direct Indirect (ii): majority (<50%) indirect TID class info here The GEBCO_2024 Grid | GEBCO
PkDepth	*Toppy*	Depth of peak	Depth value (m) at peak point location (shallowest depth value within closed contour)

DigiDate	*DigiDato*	First digitisation date	Date when a representation of the object in digital form was first established
Source	*Opphav*	Source	Reference to the original material, source material, organization/publication source

Undersea mountains - Mountains and ridges (Elevated terrain polygons)

Attribute (short name)	Attribute (short name Norwegian)	Attribute full name	Description
ETP_no	*Polygon_nr*	Elevated terrain polygon (ETP) reference number	Unique identifier
HtCl	*HKl*	Relative height class	Highest relative height class within each ETP. u500 – 200 - 500 m u1000 – 500 - 1000 m o1000 – > 1000 m
MaxRelHt	*MaksRelH*	Maximum value of relative height	Maximum value of the height (m) above a directional median derivative of the bathymetry data within each ETP
depthRange	*DypInterv*	Depth range	Total depth range (m) for each ETP from bathymetry data
maxDepth	*maksDyp*	Maximum depth	Deepest depth (m) for each ETP from bathymetry data
minDepth	*minDyp*	Minimum depth	Shallowest depth (m) for each ETP from bathymetry data
meanWidth	*GjBredde*	Mean width	The mean width (m) of each ETP, calculated from several cross-sections perpendicular to the orientation of the feature polygon*
sinLength	*SinLengde*	Sinuous length	The sinuous distance (m) between two ends of each ETP, along the long axis*
LengthWidth Ratio	*forholdLB*	Length - width ratio	Ratio of the sinuous length to the mean width of each ETP. Larger the value more elongate the feature polygon is*
Area	*Areal*	Area	Area of the ETP in square kilometres*
Convexity	*Konveksitet*	Convexity	Measure of the convexity of each ETP computed by the ratio of the convex hull perimeter to the polygon perimeter. More complex polygons have a lower convexity
ISGMmorph	*ISGMmorf*	ISGM morphological feature type	ETP morphological feature type based on GA-SaMMT morphology classification (ISGM) Mound Knoll Seamount Ridge

MorphHt	*MorfH*	Morphology and height class	Combined morphology and height class for each ETP MR_u500 – Mounds and ridges (200 - 500 m) KR_u1000 – Knolls and ridges (500 - 1000 m) SR_o1000 – Seamounts and ridges (over 1000 m)
PeaksInETP	*ToppIPoly*	Listing of peak points in ETP	List of peak IDs for all peaks occurring in each ETP
SCUFN	*SCUFN*	Name and type (registration meeting where given) of SCUFN registered undersea feature	Information extracted from point features registered in the Gazetteer of Undersea Features occurring within each ETP. Note that the location of the SCUFN registered peak may vary from the peak location from this study
OSPAR 2022	*OSPAR 2022*	OSPAR threatened/declining species and habitats 2022	Indicates if the ETP contains a seamount included in the OSPAR (2022) register of threatened and/or declining habitats Yes – registered in OSPAR 2022 No – not registered in OSPAR 2022
DigiDate	*DigiDato*	First digitisation date	Date when a representation of the object in digital form was first established
Source	*Opphav*	Source	Reference to the original material, source material, organization/publication source

* Values of these (dimension) attributes are based on North Pole Stereographic projection (EPSG:3995).

Undersea mountains – data coverage (polygon)

Attribute (short name)	Attribute (short name Norwegian)	Attribute full name	Description
objtype	objtype	Object type	Object type
model_yr	modell_aar	Modelling year	Year of analysis
geo_area	omraade	Geographical area	Marine areas where undersea mountains have been mapped
source	opphav	Source	Reference to the original material, source material, organization/publication source
doc_url	dok_url	Document url	Web address of the source material

WMS-layers

WebMapService: ModellertHavbunnsgeologiWMS

Layer name	Layer title	Abstract
SM_GROUP (group layer)	Undersea mountains	These maps comprise points and polygon layers indicating the location, extent and morphology of undersea mountains. The results are based on automated detection and delineation of undersea mountains from bathymetry data.
SM_fjelltoppdata	Peaks – data quality	Peak locations indicate the main summit(s) of the mapped undersea mountains. In this layer the peaks are symbolised to show differences in the quality of the underlying bathymetric data quality (given by the GEBCO_2024 Type Identifier (TID) grid) in the vicinity of each peak. This provides an indication of confidence in the mapped features. Peaks classified as directly mapped are mostly based on modern bathymetric soundings (e.g. with multibeam echosounder) and the true shape and extent of features is well resolved. Peaks classified as indirectly mapped occur within interpolated and/or satellite data. Such data indicate of the presence of undersea mountains but do not resolve its detailed morphology and may under- or over-estimate its height and extent. Those peaks classified as partially direct fall somewhere between these two extremes.
SM_fjelltoppdybde	Peaks – depth	Peak locations indicate the main summit(s) of the mapped undersea mountains. This layer symbolises the depth of each peak from the sea surface.
SM_fjelltoppnaboterreng	Peaks – neighbouring terrain	Peak locations indicate the main summit(s) of the mapped undersea mountains. In this layer peaks are symbolised to separate distinct/isolated peaks occurring in otherwise flat areas from those in rugged terrain.
SM_fjelltopphoyde	Peaks – relative height	Peak locations indicate the main summit(s) of the mapped undersea mountains. In this layer peaks are symbolised by their height above the surrounding seabed. For this study this relative height is approximated by the height above a measure of median depth in the local vicinity.
SM_fjellrygg	Mountains and ridges (Elevated Terrain Polygons)	The polygons in this map layer delineate elevated terrain associated with peaks. They are produced by automated methods, based on analysis of GEBCO_2024 bathymetry data. The polygons are symbolized by their height above the surrounding seabed (relative height). Additional characteristics are available as attributes in the data.
SM_skygge500	Shaded relief (500 m resolution)	Multidirectional shaded relief image for the study area based on the GEBCO_2024 bathymetry compilation (500 m resolution). The map serves as a background layer to accompany the thematic map layers for undersea

		mountains presented here. It shows the data on which the morphological analyses were based, highlighting undersea mountains as well as revealing differences in data quality across the study area. (Note that the data extend beyond the mapped area, this is to avoid edge-related issues in the analysis.)
SM_datadekning	Undersea mountains - data coverage	The polygon shows the outer limit of the study area for which undersea mountains have been mapped.