GEBCO Digital Atlas Manager Report

Submitted by UK / British Oceanographic Data Centre (BODC) of the National Oceanography Centre (NOC)

SUMMARY

Executive Summary: This report covers the work carried out at BODC in support of GEBCO since the previous GEBCO meetings in November 2018. Annex I includes statistics on the distribution of GEBCO's data sets. Annex II includes information on access to the GEBCO and the Nippon Foundation-GEBCO Seabed 2030 web sites.

Action to be taken: 7

To note: statistics relating to the number of downloads of GEBCO's data sets and access to its web sites are given for the reporting period: 1st October 2018 – 30th September 2019. This is the approximate 12 months since the last GDA manager's report to the Guiding Committee.

Introduction

BODC, a part of the UK National Oceanography Centre, acts as the Global Center for the Nippon Foundation-GEBCO Seabed 2030 Project.

The primary role of the Global Center is to compile the global GEBCO grid from data provided by the Seabed 2030 Regional Centers, and to maintain and deliver the grid on behalf of the GEBCO project. Further details about the role of and work carried out at the Global Center for Seabed 2030 can be found in the Seabed 2030 Year 2 report to the Guiding Committee (GGC36-6.1).

The Center also maintains and updates the GEBCO and Seabed 2030 web sites and carries out a number of activities in support of GEBCO's work. This work is detailed below.

Staff involved in work for GEBCO at BODC:

- Dr Helen Snaith, Head of the Seabed 2030 Global Center
- Dr Chris Thompson, IT Developer
- Ms Pauline Weatherall, GEBCO Digital Atlas Manager
- Plus additional IT support from BODC's IT team

1. Development of the GEBCO Global grid: GEBCO_2019

The latest GEBCO grid, GEBCO_2019, a global grid at 15 arc-second intervals, was released in April 2019. Acting as the Seabed 2030 Global Center, BODC was responsible for compiling the grid from input from the Regional Centers and other sources and making the grid available for access via the internet.

Further details about the development of the grid are given in the report to the GEBCO Guiding Committee (GGC36-6.1).

A list of the contributed data sets included in the grid can be found on GEBCO's web site: https://www.gebco.net/about_us/acknowledgements/our_data_contributors/

The data set is accompanied by a grid that indicates what type of source data the corresponding grid cells in the GEBCO_2019 Grid are based on. Originally called the Source Identifier (SID) Grid, after consultation with the GEBCO TSCOM Sub-Committee, it was decided that a more appropriate name for this data set would be Type Identifier (TID) Grid.

2. Updating the web application for delivering the GEBCO global grid

Delivering the GEBCO_2019 Grid

The grid application used to the deliver the 30 arc-second GEBCO_2014 Grid was updated to accommodate delivery of the 15 arc-second GEBCO_2019 Grid. The changes included the capability of downloading the global GEBCO grids in netCDF format as 'one click downloads'. https://www.gebco.net/data_and_products/gridded_bathymetry_data/

Development of a new grid download application

In January 2019, Dr Chris Thompson joined BODC to work as an IT developer for GEBCO and Seabed 2030 work at BODC.

Chris has developed a new application that provides a faster mechanism for directly selecting and downloading user-defined areas of the GEBCO grid without the need to register and login. The application is currently in beta test (https://download.gebco.net/beta). It is aimed that it will become the main application for accessing user-defined areas of the GEBCO grid by end of November 2019.

3. Development of a Web Map Service (WMS) based on the GEBCO_2019 Grid

A new WMS has been developed based on the GEBCO_2019 Grid and accompanying Type Identifier Grid. The WMS includes two layers based on the bathymetric grid, i.e. a shaded relief layer and a 'flat map' layer colour-coded for elevation. The 'flat map' layer supports GetFeatureInfo calls, allowing users to retrieve elevation information from the grid via the WMS.

Below are example 'GetMap' calls to the bathymetric layers in the WMS – this should displayed the grid as an image.

https://www.gebco.net/data_and_products/gebco_web_services/2019/mapserv?request=getmap&service=wms&BBOX=-90,-180,90,360&crs=EPSG:4326&format=image/jpeg&layers=gebco_2019_grid&width=1200&height=600&version=1.3.0

https://www.gebco.net/data_and_products/gebco_web_services/2019/mapserv?request=getmap&service=wms&BBOX=-90,-180,90,360&crs=EPSG:4326&format=image/jpeg&layers=gebco_2019_grid_2&width=1200&height=600&version=1.3.0

4. Maintenance and update of GEBCO's web sites

GEBCO's web site (https://www.gebco.net) and the sub-web site for the Nippon Foundation-GEBCO Seabed 2030 Project (https://seabed2030.gebco.net) are maintained and updated at BODC.

The new look web sites were launched in October 2018. Since then we have continued to update the contents of the pages, adding meeting and event information and news items: https://www.gebco.net/news_and_media/

A new section giving access to GEBCO's historical data sets has been included: https://www.gebco.net/data_and_products/historical_data_sets/

In addition, items of interest relating to GEBCO, Seabed 2030 and bathymetry data in general have been added to GEBCO's Facebook page: https://www.facebook.com/GEBCO/

5. Miscellaneous activities

- **Minting of a DOI for the GEBCO_2019 Grid**

  To help provide a means for users to cite/reference the GEBCO_2019 Grid, BODC minted a DOI for the data set, on behalf of the project, through its Published Data Library System https://www.bodc.ac.uk/data/published_data_library/.

  DOI for the data set: doi:10.5285/836f016a-33be-6ddc-e053-6c86abc0788e

  https://www.bodc.ac.uk/data/published_data_library/catalogue/10.5285/836f016a-33be-6ddc-e053-6c86abc0788e/

- **GEBCO Grid user support – answering enquires concerning GEBCO's data sets and products**

  During the year, BODC staff have answered 62 email enquiries concerning GEBCO's data sets and products. In addition, staff and have monitored and ensured that requests for GEBCO's gridded data sets through the download application are answered in a timely manner.

- **Controlled vocabularies for SID and TID terms**

  BODC colleagues have setup controlled vocabularies defining the codes used to define terms within the GEBCO Source Identifier (SID) Grid.

- **How to prepare a Type Identifier (TID) Grid – Section for the Cook Book**

  We have prepared a chapter for the IHO-IOC GEBCO Cook Book on the purpose and preparation of the Type Identifier Grid – aimed at helping with future data submissions to GEBCO.

6. Access to GEBCO's bathymetric data sets and products

GEBCO's gridded data sets

GEBCO's bathymetric data sets are made available, on behalf of GEBCO, by BODC via the internet (www.gebco.net/data_and_products/gridded_bathymetry_data/).

During the reporting period, October 2018 to end September 2019, there have been over 59,600 downloads of GEBCO's gridded data sets.

Downloads of GEBCO's grids from 1st October 2018 to 30th September 2019, split by grid type (* Released April 2019):

- GEBCO_2019 Grid* : 23,124
- GEBCO_2019 SID Grid* : 10,169
- GEBCO_2014 Grid : 18,663
- GEBCO_2014 SID Grid : 5,236
- GEBCO One Minute Grid : 2,483

Further statistics on data downloads are given in Annex I.

7. Action

The GGC is requested to note the information provided and take whatever action is deemed appropriate.

Annex I – Statistics on the access to GEBCO's data sets and products

Internet downloads of GEBCO's gridded bathymetric data sets

To note: statistics relating to the number of downloads of GEBCO's data sets and access to its web sites are given for the reporting period: 1st October 2018 – 30th September 2019.

GEBCO's latest bathymetric grid, the GEBCO_2019 Grid, was released on 4th April 2019.

GEBCO's previous grids: GEBCO_2014 and the GEBCO One Minute Grid are now made available as global grid files to download, through the 'historical data sets' section of GEBCO's web site.

Total number of downloads of GEBCO's gridded data sets during the reporting period: 59,675.

- GEBCO_2019 Grid: 23,124
- GEBCO_2019 SID Grid: 10,169
- GEBCO_2014 Grid: 18,663
- GEBCO_2014 SID Grid: 5,236
- GEBCO One Minute Grid: 2,483

The GEBCO_2019 Grid is available to download in netCDF, Esri ASCII raster and Data GeoTiff formats.

The table below shows the number of downloads per export format for the GEBCO_2019 Grid since its release in April 2019.

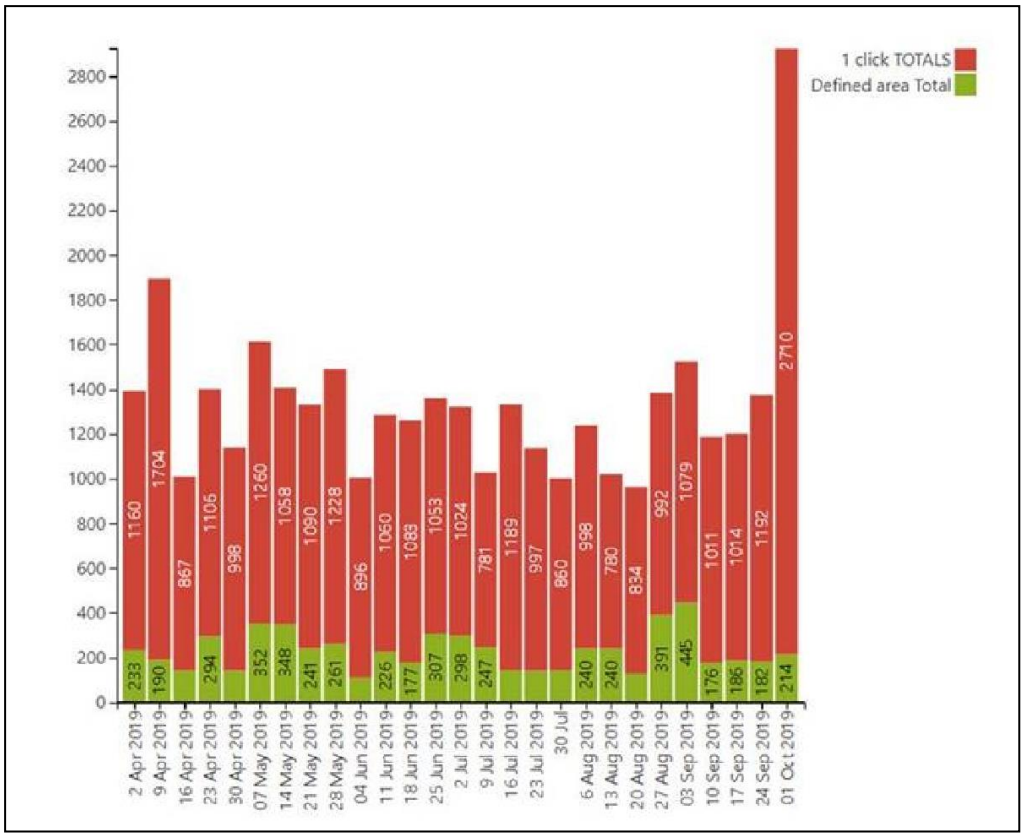
Data set	NetCDF (global)	NetCDF (user-defined area)	Esri ASCII raster	Data Geotiff
GEBCO_2019	18,974	1,181	1,575	1,394
GEBCO_2019 SID	8,340	510	641	678

Explanation of formats:

In netCDF format, GEBCO's grids are available in the form of two-dimensional (2D) 32-bit float values. The 2D gridded data set uses the netCDF Climate and Forecast (CF) Metadata Convention.

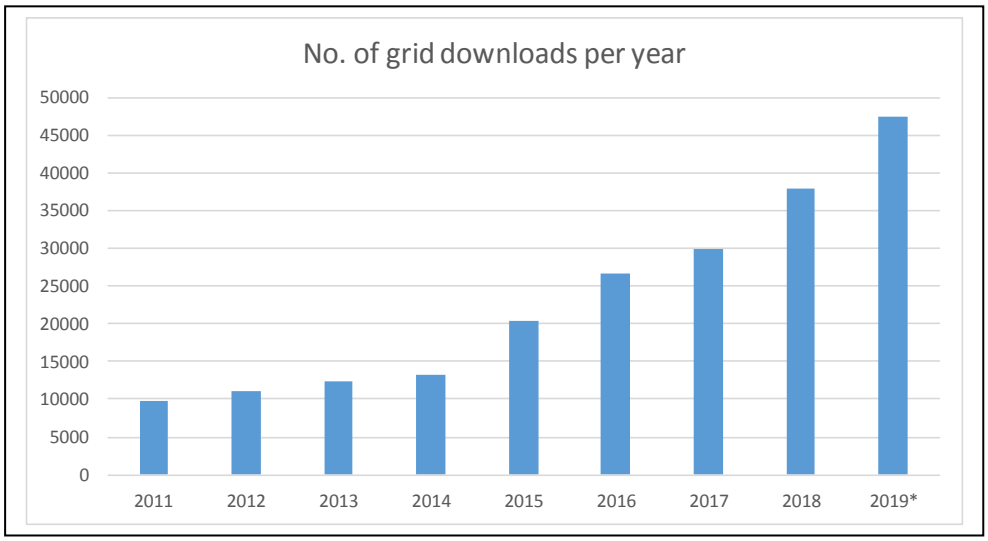
Esri ASCII raster format is an ASCII format developed for the export/exchange of Esri ARC/INFO rasters, it is used as an input format for a number of software packages. The GeoTiff format contains geo-referencing (geographic extent and projection) information embedded within a Tiff file.

Comparison of the number of grid downloads of the GEBCO_2019 Grid per week



The above graph shows the number of downloads of the GEBCO_2019 Grid per week – this helps to highlight if specific events have increased interest in GEBCO's data sets.

Comparisons of the number of downloads of GEBCO's grids per year



The graph above shows the number of downloads per year of GEBCO's gridded data sets - * note the data for 2019 is to 30th September 2019.

Access to GEBCO's Web Map Services (WMS)

On behalf of GEBCO, BODC have developed a number of WMS (a means of accessing geo-referenced map images over the internet): www.gebco.net/data_and_products/gebco_web_services/web_map_service/.

This includes imagery based on the GEBCO_2014 and GEBCO_2019 bathymetric grids as shaded relief and also as a 'flat map' coloured-coded for depth. The flat-map images also support 'GetFeatureInfo' requests, allowing users to query the elevation value in the grid.

The Source Identifier (SID) Grid is also available as a flat-map, coloured coded for SID value. The SID layer also support GetFeatureInfo requests – allowing users to retrieve information on the source data that each 30 arc-second grid cell is based on.

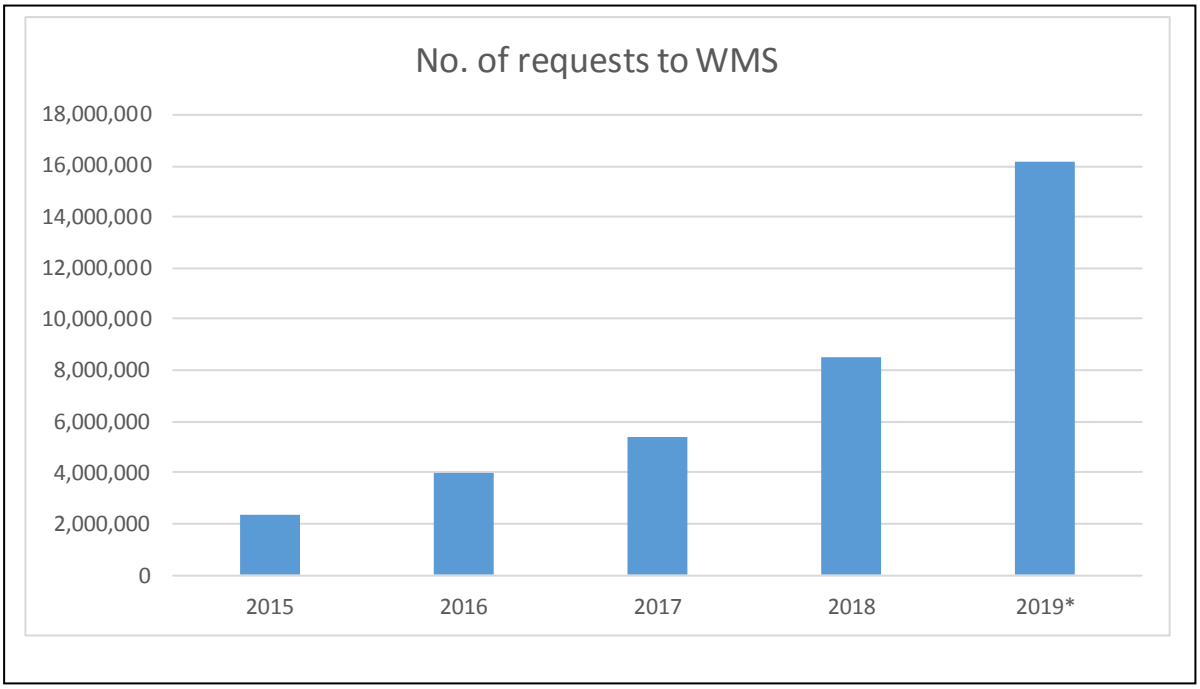
The GEBCO_2019 WMS service was made available in October 2019. The statistics given below are based on access to the GEBCO_2014 WMS layers.

There have been over 8,500,000 requests to the service in 2018. This includes requests from applications, such as external web sites, that use these services.

The table below shows the number of requests to the services since 2015.

Year	Request to the WMS
2019 (to 30th September)	16,123,478
2018	8,528,618
2017	5,362,520
2016	3,987,500
2015	2,375,100

The image below shows the number of requests to GEBCO's WMS per year, the number for 2019 is to 30th September 2019.



Annex II

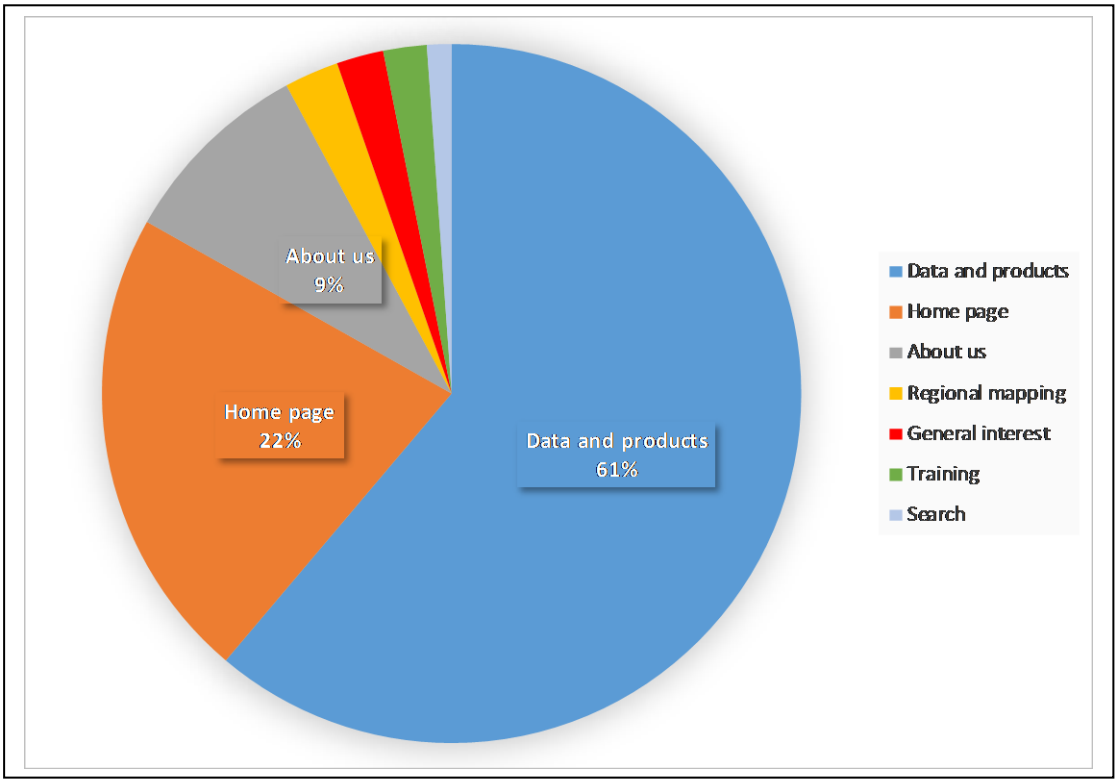
The GEBCO and Seabed 2030 web sites are maintained, on behalf of GEBCO, by BODC. The following tables and images provide information and statistics about access to these web sites for the reporting period (October 2018-September 2019).

Information is also provided at the end of this section on access to the Seabed 2030 sub web (http://seabed203.gebco.net).

Access to GEBCO's web site (www.gebco.net)

During the reporting period, 1st October 2018 – 30th September 2019 over 389,200 pages have been accessed on GEBCO's web site.

The image below shows the frequency of visits to the various areas of GEBCO's web site.

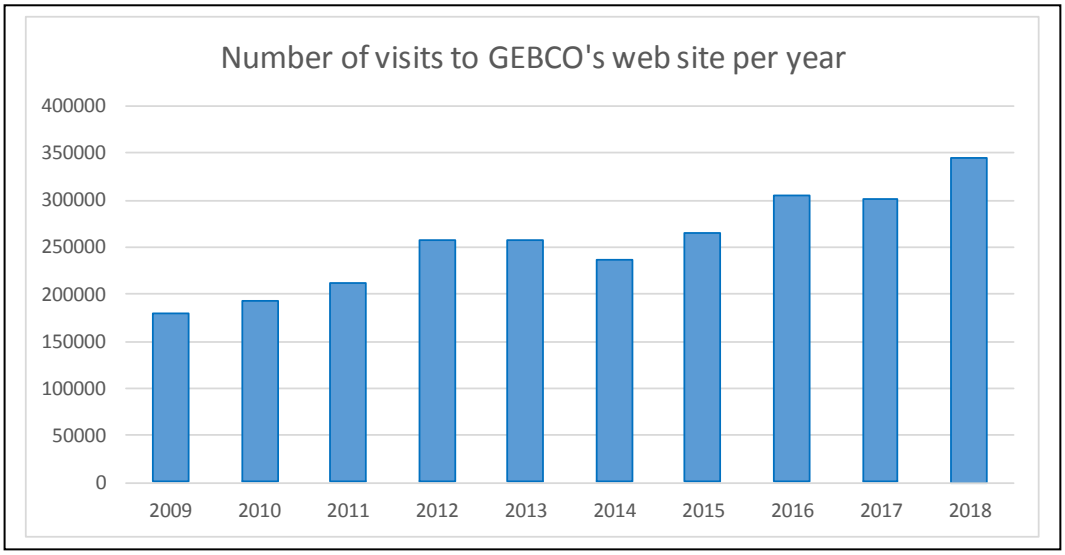


The table below shows the pages viewed and number of visitors per calendar year.

Year	Number of pages viewed
2009	176,759
2010	191,037
2011	210,188
2012	255,241
2013	254,804
2014	235,273
2015	263,689
2016	302,252

2017	299,654
2018	344,657
2019 (to 30th September)	296,297

The figure below shows the number of visits to GEBCO's web site per year since 2009.



Number of visits to individual web pages

The following table details the number of visits to the 'top 20' most popular pages on GEBCO's web site for the reporting period.

Explanation of terms used:

Page title and URL	Title of the GEBCO web page viewed with URL
No. page views	The total number of pages viewed during the reporting period
Average time on page (minutes)	The average amount of time that visitors spent viewing this set of pages or page.

Page title and URL	No. of page views	Avg. time on page (minutes)
Gridded bathymetry data* www.gebco.net/data_and_products/gridded_bathymetry_data/index.html	114,014	03:00
GEBCO home page **www.gebco.net/index.html**	89,855	01:05
Web Map Service (WMS) page https://www.gebco.net/data_and_products/gebco_web_services/web_map_service/index.html	32,257	02:20
GEBCO's data and products www.gebco.net/data_and_products/index.html	13,600	00:36
Printable Maps www.gebco.net/printable_maps/index.html	12,575	02:10
Undersea feature names www.gebco.net/data_and_products/undersea_feature_names/index.html	8,642	02:17

GEBCO_2019 Grid and GEBCO_2014 Grid info /data_and_products/gridded_bathymetry_data/gebco_2019/gebco_2019_info.html and /data_and_products/gridded_bathymetry_data/gebco_30_second_grid/index.html	27,822	01:21
Nippon Foundation-GEBCO Training Program page www.gebco.net/training/training_project/index.html	7,854	02:47
Imagery index page www.gebco.net/data_and_products/imagery/index.html	7,210	01:04
GEBCO Digital Atlas** www.gebco.net/data_and_products/gebco_digital_atlas/index.html	5,415	01:03
Grid Display Software** www.gebco.net/data_and_products/grid_display_software/index.html	4,870	01:34
Seabed 2030 Project www.gebco.net/about_us/seabed2030_project/index.html	4,255	01:12
Web Services www.gebco.net/data_and_products/gebco_web_services/index.html	3,403	00:37
GEBCO One Minute Grid www.gebco.net/data_and_products/gridded_bathymetry_data/gebco_one_minute_grid/index.html	3,392	00:44
Search function www.gebco.net/search/index.html	3,233	00:53
Contact www.gebco.net/contact/index.html	2,592	01:43
GEBCO Overview www.gebco.net/about_us/overview/index.html	2,461	02:01
Frequently Asked Questions (FAQ) www.gebco.net/about_us/faq/index.html	2,373	02:11
News and media www.gebco.net/news_and_media/index.html	2,322	00:50
IHO-IOC GEBCO Cook Book www/data_and_products/gebco_cook_book/index.html	2,089	02:04

* See Annex I for details on Internet downloads of GEBCO's gridded bathymetric data sets.
** These products have now been discontinued

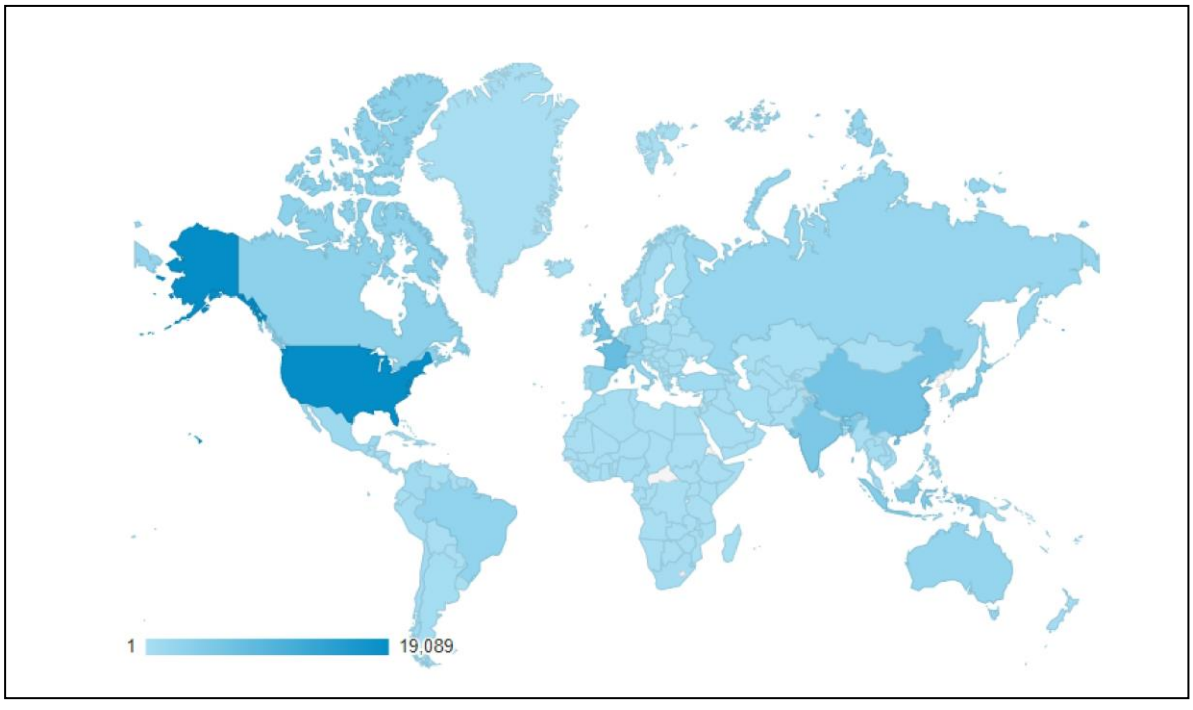
Geographic distribution of Internet Protocol (IP) addresses accessing GEBCO's web site

The table below details the geographic distribution by country (top 20 'number of visits' listed) of IP addresses accessing GEBCO's web site. Explanation of terms used:

Country/Territory	The name of the country or territory of the origin of the IP address accessing GEBCO's web site
Visits	The total number of visits to the site from this country/territory
Pages/visit	The number of pages viewed per visit
Average time on site (minutes)	The average amount of time that visitors spent on the site

Country / Territory	Visits	Pages / visit	Average visit duration (minutes)
United States of America	19,089	2.21	01:59
France	7,645	2.27	01:53
United Kingdom	6,520	2.89	03:30
China	6,187	2.55	03:09
India	5,263	2.29	02:48
Japan	4,539	2.51	02:41
Indonesia	4,336	2.94	05:08
Canada	3,344	2.50	02:38
Germany	2,923	2.52	02:43
Brazil	2,767	2.25	02:26
Spain	2,499	2.72	02:55
Australia	2,401	2.63	02:57
Italy	2,260	2.81	02:56
Russia	2,144	2.69	02:54
Netherlands	1,447	2.60	02:36
Mexico	1,438	2.84	03:48
South Korea	1,312	3.11	03:26
Norway	1,121	2.66	02:46
Turkey	1,029	2.53	02:33
Philippines	1,003	2.16	02:33

The image below shows the geographic distribution of IP addresses accessing GEBCO's web site during the reporting period. The colour indicates the number of web site visits for a particular country, from 0 (white) to 19,089 (dark blue).



Access to the Nippon Foundation GEBCO Seabed 2030 web site
(http://seabed2030.gebco.net)

The Seabed 2030 web site was setup to provide information specifically related to this project and to provide links back to the main GEBCO web site.

The table below shows the number of visits to the various sections of the web site from 1st October 2018 to 30th September 2019.

Page title and URL	Title of the Seabed 2030 web page viewed with URL
No. page views	The total number of pages viewed during the reporting period
Average time on page (minutes)	The average amount of time that visitors spent viewing this set of pages or page.

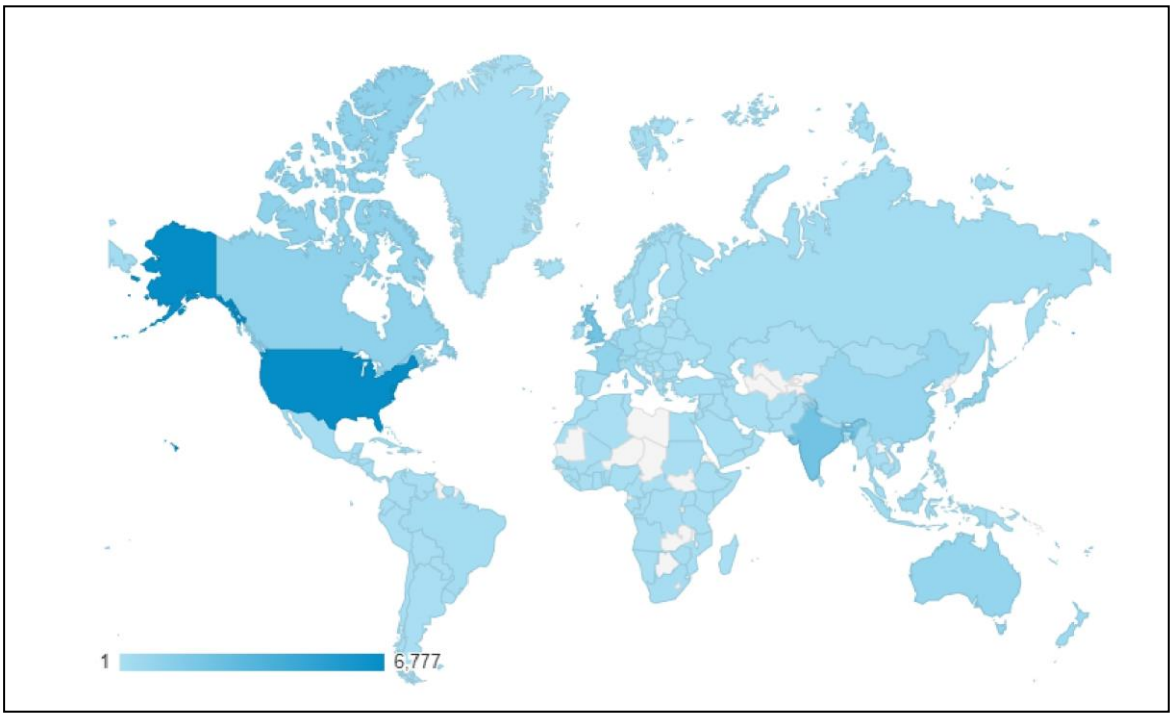
Page title and URL	No. of page views	Avg. time on page (minutes)
Home page https://seabed2030.gebco.net/	25,381	01:26
Data Centers **https://seabed2030.gebco.net/data_centers/**	6,166	01:32
News **https://seabed2030.gebco.net/news/**	5,195	01:40
Get involved **https://seabed2030.gebco.net/get_involved/**	4,829	01:15
Resources for journalists **https://seabed2030.gebco.net/resources_for_journalists/**	4,637	01:50
About **https://seabed2030.gebco.net/about_us/**	4,137	01:57
Atlantic and Indian Ocean Regional Center **https://seabed2030.gebco.net/atlantic_indian/**	3,489	00:40
FAQ **https://seabed2030.gebco.net/faq/**	2,422	02:26
South and West Pacific Center **https://seabed2030.gebco.net/pacific/**	2,399	01:07
Global Center **https://seabed2030.gebco.net/gdacc/**	2,292	00:42
Arctic and North Pacific Regional Center https://seabed2030.gebco.net/arctic_pacific/	2,290	01:18
Southern Ocean https://seabed2030.gebco.net/southern_ocean/	1,379	00:43

The table below shows the visits per country to the Seabed 2030 web site from 1st October 2018 to 30th September 2019.

Country/Territory	The name of the country or territory of the origin of the IP address accessing the Seabed 2030 web site
Visits	The total number of visits to the site from this country/territory
Pages/visit	The number of pages viewed per visit

Average time on site (minutes)	The average amount of time that visitors spent on the site

Country / Territory	**Visits**	**Pages / visit**	**Average visit duration (minutes)**
United States of America	6,777	1.94	01:18
India	2,314	1.62	01:02
United Kingdom	2,282	2.65	02:57
Canada	1,060	2.05	01:13
France	1,005	2.40	01:36
Japan	949	2.18	01:25
Australia	866	2.16	01:32
China	766	2.20	01:39
Germany	450	2.55	01:40
New Zealand	394	2.48	02:17
Netherlands	353	2.43	01:26
Norway	266	2.45	01:50
Spain	264	2.43	01:38
Brazil	252	2.55	02:53
Russia	232	2.59	01:40
Sweden	202	2.46	01:38
South Korea	200	3.06	02:37
Malaysia	156	2.34	01:29



The image above shows the geographic distribution of IP addresses accessing the Seabed 2030 web site from 1st October 2018 – 30th September 2019. The colour indicates the number of web site visits for a particular country, from 0 (white) to 6,777 (dark blue).