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 2019.
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: 3

Related documents: None

1.   Overview/Introduction

BODC, of the UK National Oceanography Centre (NOC), 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.

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

2.   Work done at BODC/NOC in support of GEBCO

2.1 Development and release of the GEBCO_2020 global grid

The GEBCO_2020 Grid was released in April 2020. It is a global terrain model for land and
oceans at 15 arc-second intervals. It is the second GEBCO grid produced through the
framework of the Nippon Foundation-GEBCO Seabed 2030 project. The grid is accompanied

by a Type Identifier (TID) Grid that indicates the type of data (e.g. multibeam, single beam or interpolated etc.) that the corresponding cell in the bathymetric grid is based on.

Acting as the Seabed 2030 Global Center, BODC was responsible for compiling the global bathymetric grid by combining regional bathymetric grids provided by the Seabed 2030 Regional Centers with a base grid (SRTM15_plus v2). Quality control checks were carried on the global grid before its release. The grid is made available via GEBCO's web site (hosted at BODC) for direct download in netCDF, data GeoTiff or Esri ASCII raster formats or via an application that allows download of the data, in these formats, for user-defined geographic areas.

The GEBCO_2020 Grid and accompanying Type Identifier (TID) Grid can be accessed from: https://www.gebco.net/data_and_products/gridded_bathymetry_data/ and via: https://download.gebco.net/

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

A Digital Object Identifier (DOI) has been minted for the data set by BODC on behalf of GEBCO: https://www.bodc.ac.uk/data/published_data_library/catalogue/10.5285/a29c5465-b138-234d-e053-6c86abc040b9/.

For the period, 1st October 2019 – 30th September 2020, there have been over 139,250 downloads of GEBCO's data sets via GEBCO's web site. This time scale has been chosen to match with those of previous years, for ease of comparison with previous statistics.

Statistics on downloads of GEBCO's data sets can be found in Annex I.

2.2 Delivery of the International Bathymetric Chart of the Arctic Ocean (IBCAO) V4 Grid

In January 2020, the then recently-released bathymetric grid for the Arctic Ocean area, IBCAO V4, was made available from GEBCO's website in netcdf and data GeoTiff formats: https://www.gebco.net/data_and_products/gridded_bathymetry_data/arctic_ocean/

A DOI for the IBCAO V4 release was minted by BODC on behalf of the IBCAO: https://www.bodc.ac.uk/data/published_data_library/catalogue/10.5285/a01d292f-b4a0-1ef7-e053-6c86abc0a4b2/

2.3 Development of a Web Map Service (WMS) for the GEBCO_2020 Grid and updating existing WMS

A WMS has been setup for the GEBCO_2020 Grid. This includes displaying layers showing:

shaded relief imagery

https://www.gebco.net/data_and_products/gebco_web_services/2020/mapserv?request=getmap&service=wms&BBOX=-90,-100,90,300&crs=EPSG:4326&format=image/jpeg&layers=gebco_2020_grid&width=1200&height=600&version=1.3.0

the areas of the seafloor that are mapped – i.e. the 15 arc-second grid cells that are based on measured data within the GEBCO_2020 Grid

https://www.gebco.net/data_and_products/gebco_web_services/2020/mapserv?request=getmap&service=wms&BBOX=-90,-100,90,300&crs=EPSG:4326&format=image/jpeg&layers=gebco_2020_grid_3&width=1200&height=600&version=1.3.0

The linux platform that the services run from was updated during the year and the driver files that run the services were revised accordingly. It is intended to maintain the existing WMS for the GEBCO_2019 and GEBCO_2014 grids for the time being but remove these services at some point in the future.

Development work has been done on the production of a test Web Coverage Service (WCS) for delivering data from the GEBCO_2020 Grid.

2.4 Maintaining and updating GEBCO's web site

GEBCO's web site (www.gebco.net) and the Nippon Foundation-GEBCO Seabed 2030 Project web site (https://seabed2030.org) are maintained and updated at BODC. During the report period over 503,550 pages have been accessed on GEBCO's web site.

News items and meeting information have been added to the web sites throughout the year.

The web sites for the majority of the International Bathymetric Chart series, previously hosted by the US National Centers for Environmental Information (NCEI), have been transferred to the GEBCO web site, at the request of NCEI. This is with the exception of the International Bathymetric Chart of the Southern Ocean (IBCSO)'s web site which is hosted by the Scientific Committee on Antarctic Research (SCAR). However, an IBCSO information page is included on the GEBCO web site, providing links to the IBCSO web site.

Many of the IBC pages contain historical information about these projects. It is intended to work with SCRUM to update the content of these pages.

IBC web pages now hosted on the GEBCO web site:

International Bathymetric Chart of the Arctic Ocean (IBCAO):
https://www.gebco.net/about_us/committees_and_groups/scrum/ibcao/

International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico (IBCCA):
https://www.gebco.net/about_us/committees_and_groups/scrum/ibcca/

International Bathymetric Chart of the Western Indian Ocean (IBCWIO):
https://www.gebco.net/about_us/committees_and_groups/scrum/ibcwio/

International Bathymetric Chart of the Central Eastern Atlantic (IBCEA):
https://www.gebco.net/about_us/committees_and_groups/scrum/ibcea/

International Bathymetric Chart of the Mediterranean Sea (IBCM):
https://www.gebco.net/about_us/committees_and_groups/scrum/ibcm/

International Bathymetric Chart of the Southeast Pacific (IBCSEP):
https://www.gebco.net/about_us/committees_and_groups/scrum/ibcsep/

2.5 Development of metadata storage/display system in support of the Seabed 2030 project

We are developing a system to store and display metadata information about the source data sets included in the GEBCO grid. It is intended that the system will use the metadata schema developed through the Seabed 2030 project and discussed with GEBCO Metadata Working Group colleagues.

2.6 Miscellaneous activities in support of GEBCO

Providing GEBCO data set user-support

At BODC, we answer enquiries relating to GEBCO's data sets and products. The enquiries may be of a number of forms:

• Feedback on the GEBCO grid/reporting errors – we work with the relevant Seabed 2030 Regional Center to investigate any errors reported in the grid and provide feedback to the enquirer. We keep a log of 'known issues' in the grid on GEBCO's web site and aim to fix them in subsequent grid releases.
• Technical – we respond to enquiries relating to how the grid was produced; the grid file formats or advice on how to use the data in particular systems
• Information on sources of bathymetry data – users may ask about the availability of source bathymetric data sets for a particular region, we endeavour to advise about available source data sets and provide links to where the data can be accessed.
• Request for imagery based on GEBCO's data sets – we receive requests for imagery generated from GEBCO's grids for use in publications, exhibitions, TV programmes etc.

Enquiries come from all parts of the world and all sectors, i.e. commercial companies, academic institutions, students and private individuals.

A form has been setup on the GEBCO web site to allow users to provide feedback on how they are using GEBCO's data sets:
https://www.gebco.net/data_and_products/gridded_bathymetry_data/feedback/

Maintenance of the gebco_folk mailing list

At the request of the US NCEI, the hosting and maintenance of the gebco_folk mailing list (gebco_folk@groups.gebco.net) is now maintained at BODC on behalf of GEBCO.

Email requests were sent out to the NCEI-held gebco_folk list to ask people to sign-up to the new mailing list to ensure GDPR compliance on the new list. Significant follow-up action was taken to ensure all active participant of the list were included in the new group.

3. **Action**

The GGC is requested to note the information provided.

Annex I - statistics on the distribution of GEBCO's data sets

Internet downloads of GEBCO's gridded bathymetric data sets

https://www.gebco.net/data_and_products/gridded_bathymetry_data/

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 2019 – 30th September 2020. This time scale has been chosen to match with those of previous years, for ease of comparison with previous statistics.

GEBCO's latest bathymetric grid, the GEBCO_2020 Grid, was released at the end of April 2020. GEBCO's previous grids: GEBCO_2019, GEBCO_2014 and the GEBCO One Minute Grid are made available as global grid files to download, through the 'historical data sets' section of GEBCO's web site.

Total number of downloads of data from GEBCO's gridded data sets during the reporting period (1st October 2019 – 30th September 2020):139,255. Total for period 1st October 2019 – 30th November 2020: 165,897

Downloads for reporting period (1st October 2019 – 30th September 2020) split by grid type:

- GEBCO_2020 Grid: 48,727 (global grids: 16,318)
- GEBCO_2020 TID Grid: 22,161 (global grids 8,876)

- GEBCO_2019 Grid: 49,265 (global grids 24,722)
- GEBCO_2019 TID Grid: 14,154 (global grids 4,074)

Historical data sets (global grids):

- GEBCO_2014 Grid: 1,761
- GEBCO_2014 SID Grid: 329
- GEBCO One Minute Grid: 2,858

The GEBCO_2020 Grid is available to download in netCDF, Esri ASCII raster and Data GeoTiff formats.

The table below shows the number of grid downloads per export format for the global GEBCO_2020 Grid since its release in April 2020 to 30th September 2020.

Data set	NetCDF	Esri ASCII raster	Data Geotiff
GEBCO_2020	16,622	11,300	20,805
GEBCO_2020 TID	6,441	6,849	8,871

Explanation of formats:

In netCDF format, GEBCO's grids are available in the form of two-dimensional (2D) integer 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.
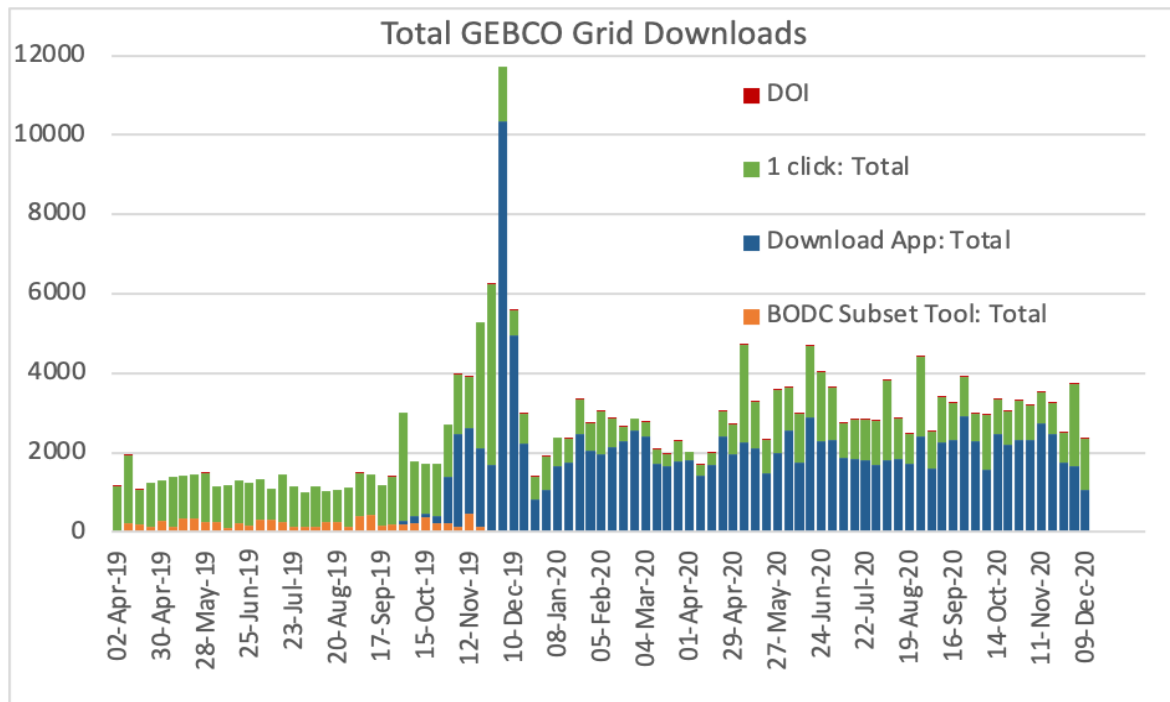
Weekly Downloads of the GEBCO Grids since release of the GEBCO 2019 product
The Subset tool was removed in December 2019, after official release of the new GEBCO download app in November 2019. Since there the number of subset products downloaded has incrased by a factor of 10, with fewer downloads of the full grid.

Access to the IBCAO V4 Grid

In January 2020, the IBCAO V4 grid was made available from GEBCO's web site, on behalf of the IBCAO project.

https://www.gebco.net/data_and_products/gridded_bathymetry_data/arctic_ocean/.

The data set is made available in netCDF and GeoTiff formats in polar stereographic projection co-ordinates. Versions of the data set are available with and without elevation information for the Greenland Ice Sheet.

There have been over 6,000 downloads of the data set since its release.

Annex II – Access to the GEBCO and Seabed 2030 web sites

The GEBCO and Seabed 2030 web sites are maintained by BODC on behalf of the projects.

The following tables and images provide information and statistics about access to these web sites for the reporting period (October 2019-September 2020).

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

During the period, 1st October 2019 – 30th September 2020 over 426,700 pages have been accessed on GEBCO's web site.

Note for the period, 1st October – 30th November 2020, there have been an additional 76,845 visits to GEBCO's web site.

The image below shows the frequency of visits to the various areas of GEBCO's web site.
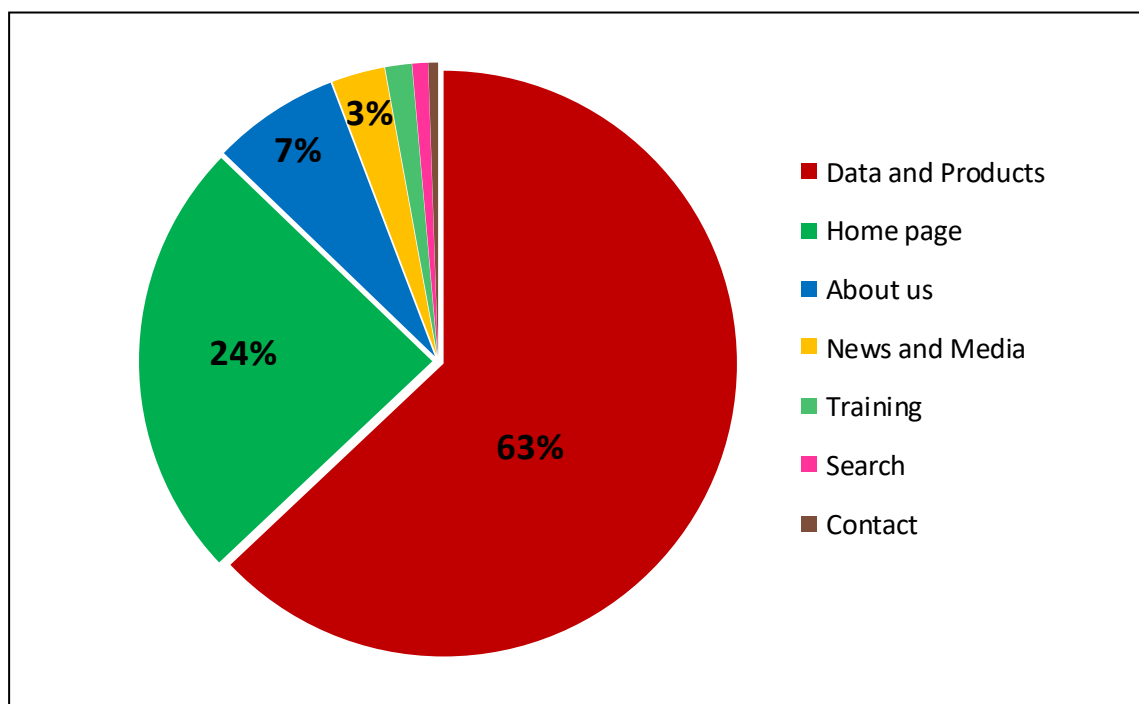
The table below shows the pages viewed and number of visitors per calendar year.

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	404,532
2020 (to 30th Nov. 2020)	395,317

The figure below shows the number of visits to GEBCO's web site per year since 2009. *
note that the data for 2020 is to 30th November 2020.
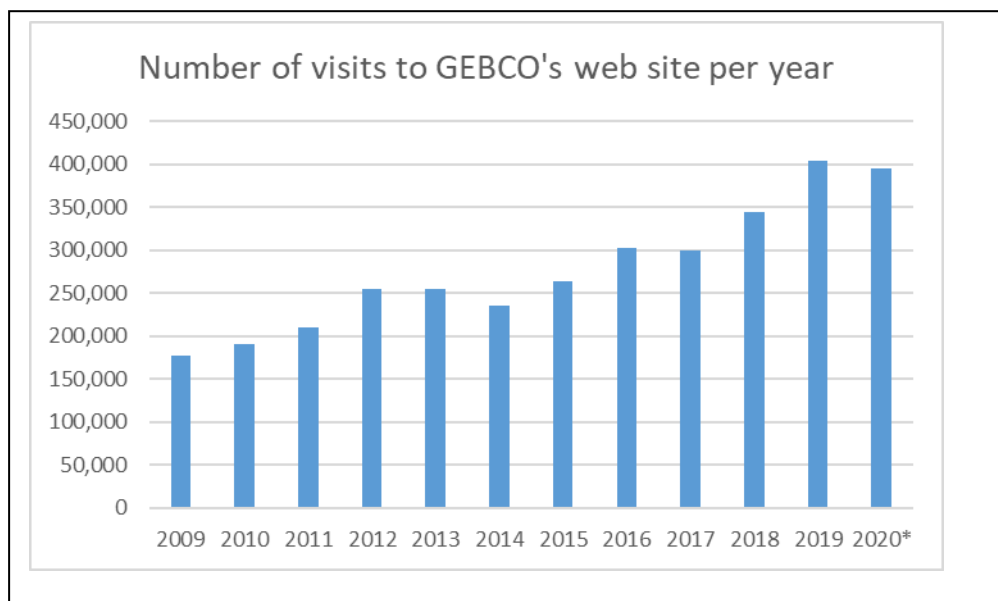
Number of visits to individual web pages

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* https://www.gebco.net/data_and_products/gridded_bathymetry_data/index.html	128,703	02:52
GEBCO home page https://www.gebco.net/index.html	102,593	01:08
Web Map Service (WMS) page https://www.gebco.net/data_and_products/gebco_web_services/web_map_service/index.html	38,988	01:57
Printable Maps https://www.gebco.net/data_and_products/printable_maps/	14,285	02:08
GEBCO's data and products https://www.gebco.net/data_and_products/index.html	13,707	00:33
GEBCO_2019 Grid info	13,367	02:14

https://www.gebco.net/data_and_products/gridded_bathymetry_data/gebco_2019/gebco_2019_info.html		
Undersea feature names https://www.gebco.net/data_and_products/undersea_feature_names/index.html	9,303	02:06
Imagery index page https://www.gebco.net/data_and_products/imagery/index.html	9,033	01:06
Arctic Ocean bathymetry (IBCAO) https://www.gebco.net/data_and_products/gridded_bathymetry_data/arctic_ocean/index.html	7,218	01:55
Seabed 2030 Project https://www.gebco.net/about_us/seabed2030_project/index.html	7,064	01:26
Training https://www.gebco.net/training/index.html	6,378	02:28
GEBCO web services https://www.gebco.net/data_and_products/gebco_web_services/index.html	4,353	00:33
Historical GEBCO data sets www.gebco.net/data_and_products/historical_data_sets/index.html	4,133	01:59
GEBCO grid terms of use information https://www.gebco.net/data_and_products/gridded_bathymetry_data/gebco_2019/grid_terms_of_use.html	4,132	03:05
Search https://www.gebco.net/search/index.html	3,819	00:56
GEBCO_2020 Grid information https://www.gebco.net/data_and_products/gridded_bathymetry_data/gebco_2020/index.html	3,250	03:07
Frequently Asked Questions (FAQ) https://www.gebco.net/about_us/faq/index.html	3,002	02:38
How to contribute data www/about_us/contributing_data/index.html	2,749	01:21
GEBCO Overview www/overview/index.html	2,366	01:59
Contact us www/contact/index.html	2,326	01:50

* See Annex I for details on Internet downloads of GEBCO's gridded bathymetric data sets.

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 time on site (minutes)
United States of America	26,533	1.99	01:42
United Kingdom	9,899	2.31	02:32
China	9,503	2.21	02:41
France	8,681	2.08	01:43
India	6,393	2.08	01:59
Japan	5,574	2.14	02:02
Indonesia	4,673	2.32	02:49
Canada	4,202	2.14	01:54
Germany	3,644	2.3	02:10
Spain	3,351	2.35	02:14
Australia	3,212	2.14	02:04
Italy	2,863	2.44	02:26
Brazil	2,782	2.1	02:05
Russia	2,292	2.47	02:45
Netherlands	1,843	2.22	01:59
Mexico	1,710	2.48	02:46
Norway	1,487	2.15	01:55
South Korea	1,341	2.74	02:52
Turkey	1,283	2.28	02:10
Philippines	1,110	2.13	02:24

The image below shows the geographic distribution of IP addresses accessing GEBCO's web site. The colour indicates the number of web site visits for a particular country, from 0 (white) to 26,533 (dark blue).
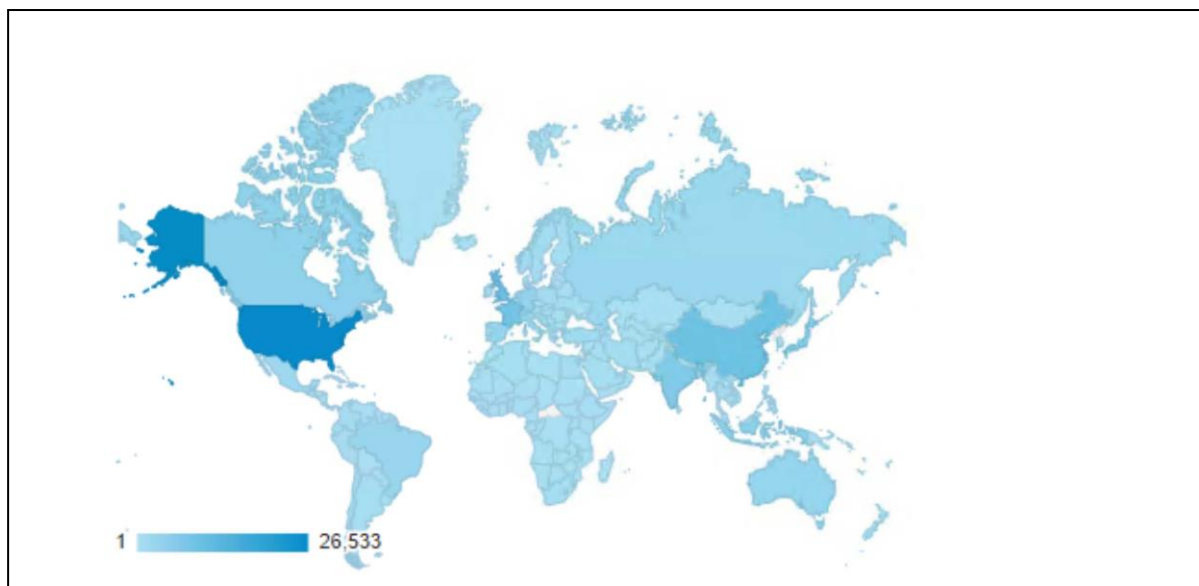
Visits to GEBCO's web site per country

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

The Seabed 2030 web site was setup to provide information specifically related to this project. During the period 1st October 2019 to 30th September 2020 there have been over 109,100 visits to the Seabed 2030 web site. The table below shows the number of visits to the various sections of the web site during this period.

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. page views	Average time on page (min)
Seabed 2030 Home page https://seabed2030.org	49,367	01:25
News item about GEBCO_2020 release https://seabed2030.org/news/gebco_2020_release.html	7,552	01:17
Resources for journalists https://seabed2030.org/resources_for_journalists/	6,131	01:21
About Seabed 2030 https://seabed2030.org/about_us/	6,127	02:02
Seabed Regional and Global Centers https://seabed2030.org/data_centers/	4,692	01:02
Atlantic and Indian Ocean Regional Center https://seabed2030.org/atlantic_indian/	4,041	00:41
Get involved https://seabed2030.org/get_involved/	3,261	01:12
Frequently Asked Questions https://seabed2030.org/faq/	2,915	02:32
News https://seabed2030.org/news/	2,401	00:58
South and West Pacific Ocean Regional Center https://seabed2030.org/pacific/	2,185	01:04
Arctic and North Pacific Regional Center https://seabed2030.org/arctic_pacific/	1,915	00:47
Global Center https://seabed2030.org/gdacc/	1,806	00:54
Seabed 2030 Partners https://seabed2030.org/get_involved/partners/	1,582	00:51
Southern Ocean Regional Center https://seabed2030.org/southern_ocean/	1,579	00:57
Seabed 2030 Partners in Industry https://seabed2030.org/get-involved/industry	1,068	00:55

The table below shows the visits per country to the Seabed 2030 web site from 1st October 2019 to 30th September 2020.

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 time on site (minutes)
United States	11,069	1.85	01:15
United Kingdom	5,034	2.31	01:57
India	4,206	1.7	01:05
China	2,202	1.5	00:44
Hungary	2,073	2.03	00:36
Japan	1,711	1.65	00:56
Canada	1,701	2	01:24
Spain	1,337	1.98	00:59
Germany	1,235	2.17	01:04
Australia	1,135	1.87	01:15
France	968	2.1	01:11
Indonesia	724	1.69	01:11
Italy	595	2.28	01:24
Netherlands	576	2.37	01:40
Brazil	469	2.12	02:07
Russia	467	2.1	01:25
New Zealand	430	2.21	01:54
Norway	413	2.12	01:23
Sweden	412	2.09	01:37

The image below shows the geographic distribution of IP addresses accessing the Seabed 2030 web site. The colour indicates the number of web site visits for a particular country, from 0 (white) to 11,069 (dark blue).

1 ▢ 11,069