



HAL
open science

Colour Palettes for Digital Elevation Models

Owein Thuillier, Nicolas Le Josse, Alexandru-Liviu Olteanu, Marc Sevaux,
Hervé Tanguy

► **To cite this version:**

Owein Thuillier, Nicolas Le Josse, Alexandru-Liviu Olteanu, Marc Sevaux, Hervé Tanguy. Colour Palettes for Digital Elevation Models. 2024, 10.5281/zenodo.10530295 . hal-04427802

HAL Id: hal-04427802

<https://hal.science/hal-04427802>

Submitted on 31 Jan 2024

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution 4.0 International License

Colour Palettes for Digital Elevation Models: User Guide

Owein THUILLIER^{a,b,*}, Nicolas LE JOSSE^a, Alexandru-Liviu OLTEANU^b,
Marc SEVAUX^b, Hervé TANGUY^a

^a*Thales, Defence and Mission Systems, Brest, France*

{owein.thuillier, nicolas.lejosse, herve.tanguy}@fr.thalesgroup.com

^b*Université Bretagne-Sud, Lab-STICC, UMR CNRS 6285, Lorient, France*

{owein.thuillier, alexandru.olteanu, marc.sevaux}@univ-ubs.fr

Abstract

This document provides a user guide to this collection of 18 colour palettes made publicly available for the efficient visualisation of Digital Elevation Models (DEMs), for example in the form of heatmaps. More precisely, we propose a combination of palettes from our own production and palettes extracted from the GEneral Bathymetric Chart of the Oceans (GEBCO), including their most recent charts as well as first editions of their paper charts from 1910-1930, 1932-1966, 1958-1973 and 1973-1982. These colour palettes have been harmonised in order to span a wide range of elevations, extending from the lowest depth of 11 000 metres, found in the Challenger Deep of the Mariana Trench, to the greatest height of 9 000 metres, reached at Mount Everest. Moreover, these 18 colour palettes are supplied in the following 5 colour spaces: RGB (Red, Green, Blue), RGB 01, Hexadecimal, HSL (Hue, Saturation, Lightness) and HSV (Hue, Saturation, Value).



Keywords: visualisation; heatmaps; colour palettes; colour schemes; digital elevation models; elevation data; raster grids; topography; bathymetry

*Corresponding author.

Email address: owein.thuillier@fr.thalesgroup.com (Owein THUILLIER)



Table of contents		Page
1	Introduction	3
2	Organisation	4
2.1	Overall Organisation	4
2.2	Data	4
2.3	Documentation	5
2.4	Images	5
2.5	License	6
3	Colour Palettes	7
3.1	Classification	7
3.2	Naming Conventions	7
3.3	File Formats	9
3.4	Palettes Descriptions	10
3.4.1	Latest	10
3.4.2	Historical	12
4	Colour dictionaries	21
4.1	Latest Palettes	21
4.1.1	GEBCO	22
4.1.2	TOSLJT	23
4.2	Historical Palettes	24
4.2.1	GEBCO 2nd edition	24
4.2.2	GEBCO 3rd edition	25
4.2.3	GEBCO 4th edition	26
4.2.4	GEBCO 5th edition	27
5	Conclusion	28



1. Introduction

This repository is made up of 18 colour palettes that we are making publicly available in order to efficiently visualise Digital Elevation Models (DEMs), for example in the form of heatmaps. In particular, this repository enhances the catalog of 17 700 coastal instances (DEMs) available at the following address: <https://doi.org/10.5281/zenodo.10530247>¹. These colour palettes are divided into two groups: “historical” and “latest”. In the first group of 8 palettes, we propose palettes extracted from the first editions of the GEneral Bathymetric Chart of the Oceans (GEBCO) paper charts from the years 1910-1930, 1932-1966, 1958-1973 and 1973-1982. We have undertaken this digitisation work because we believe it is in the public interest that the work done by a number of individuals should not disappear over time. Then, in the “latest” group, we find both our 8 in-house colour palettes, and the 2 colour palettes of GEBCO’s current charts. As GEBCO palettes are not publicly available (to the best of our knowledge), we have also taken the extra effort to digitise them and make them freely available, knowing that it can be widely beneficial. These palettes encompass a broad range of elevation values, extending from the deepest point at 11 000 metres in the Challenger Deep of the Mariana Trench to the highest point at 9 000 metres atop Mount Everest. This required a certain amount of harmonisation effort, particularly with regard to historical palettes.

In addition, our colour palettes have a few notable advantages over GEBCO palettes. First, they offer a wider range of colours, and therefore nuances, when it comes to representing DEMs, whether on a global or local scale. Then, we developed a range of palettes to meet a variety of needs: some are polychromatic, others monochromatic or bichromatic, some with discrete colours and others with continuous colours (gradients). Lastly, our colour palettes are less saturated² than GEBCO’s palettes, making possible to add graphic elements on top, without altering overall legibility and aesthetics. This was important to us, since it is often useful to be able to add graphic elements, such as lines, markers or even text over the image.

Finally, we deliver these 18 colour palettes in the following 5 colour spaces: RGB (Red, Green, Blue), RGB 01, Hexadecimal, HSL (Hue, Saturation, Lightness) and HSV (Hue, Saturation, Value). This matters because some colour spaces have advantages over others. For example, it is quite easy to adjust the saturation of a colour using HSL and HSV spaces, or to

¹Thuillier, O., Le Josse, N., Olteanu, A.-L., Sevaux, M., & Tanguy, H. (2024). Catalogue of Coastal-Based Instances [Data set]. Zenodo. <https://doi.org/10.5281/zenodo.10530247>

²Saturation refers to the intensity or purity of a colour. Colours with high saturation are vivid and intense, while those with low saturation are more subdued and muted.



increase the presence of red, blue or green using RGB and RGB 01 spaces, to mention a few.

The purpose of this document is to serve as a user guide to the use of this repository and the palettes we supply. To this end, a first section will be dedicated to the organisation of the present repository. Then, in a second section dedicated to palettes, we discuss their specific classification, the naming conventions adopted, the file formats and the actual description of the various palettes (including didactic visualisations). Next, in the third, we provide a complete dictionary of all the colours used, with their equivalents in the closest named colours and pantone format colours. Finally, in the 4th and last section, we give a conclusion to this work.

2. Organisation

In this first section, we will describe the structural organisation of the present repository to facilitate navigation.

2.1. Overall Organisation

First, at the root level, we find the 4 main folders “data”, “documentation”, “images”, and “license”. This organisation can be seen in Figure 1.

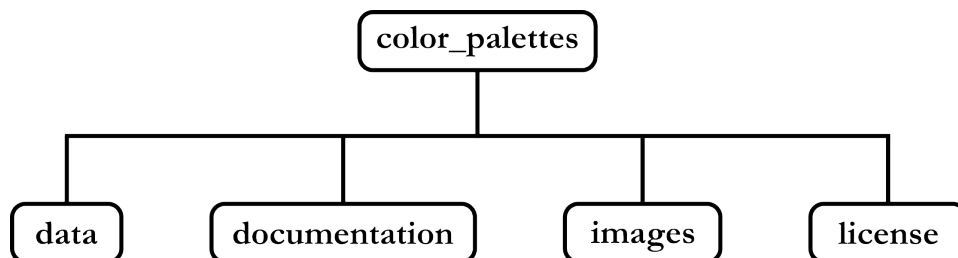


Figure 1: Overall organisation.

2.2. Data

In the “data” folder, we find the two subfolders “historical” and “latest” for the two main categories of colour palettes, comprising respectively 8 and 10 palettes (see Section 3.4 for more details). More precisely, in each of these two sub-folders, we find 5 sub-folders for the different colour spaces in which the various palettes are provided in “.cpt” format (see Section 3.3 for more details), i.e.: “hex”(hexadecimal), “hsl”, “hsv”, “rgb” and “rgb-01”. Figure 2 shows this organisation, and the reader is referred to Section 3.2 for more information on the naming conventions.

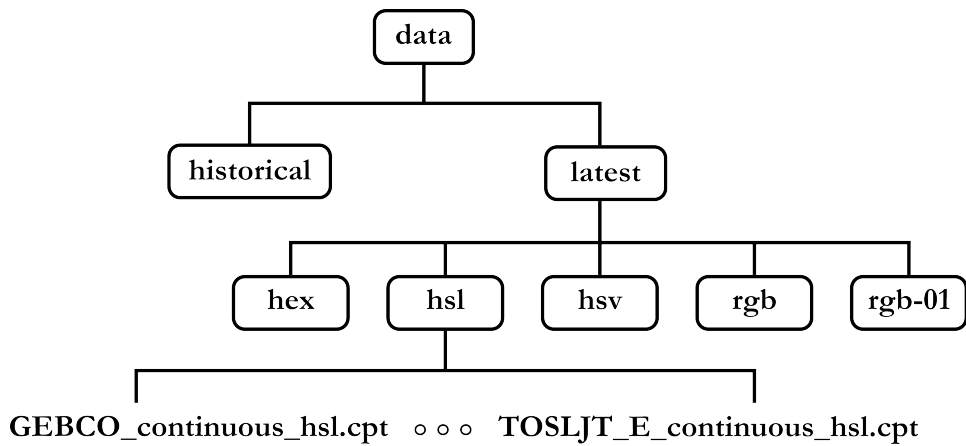


Figure 2: Organisation of the “data” folder.

2.3. Documentation

In the “documentation” folder, we find the PDF file of this user guide, as well as two plain-text files, “historical_palettes_colour_dictionary.txt” and “latest_palettes_colour_dictionary.txt”, corresponding respectively to the colour dictionaries used for the “historical” and “latest” palettes (see Section 4 for more informations). Figure 3 illustrates this hierarchy.

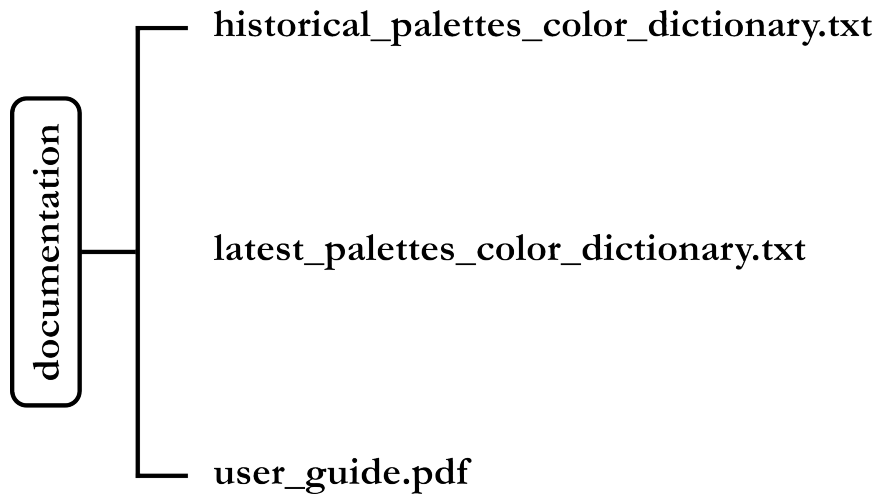


Figure 3: Organisation of the “documentation” folder.

2.4. Images

Next, in the “images” folder, we find two subfolders, “synthesis” and “individuals”. The overall organisation of this folder is illustrated in Figure 4.

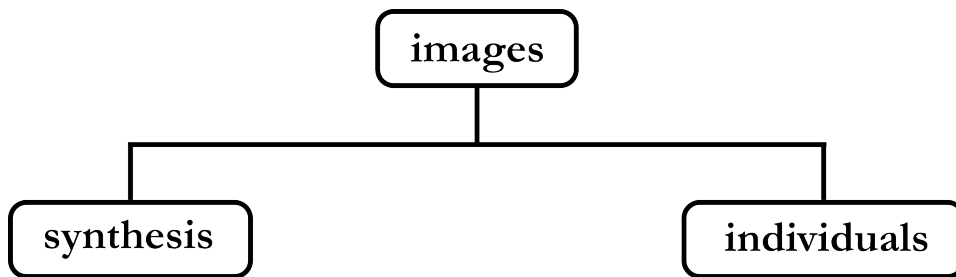


Figure 4: Organisation of the “images” folder.

The first subfolder “synthesis” consists of two images, “historical_palettes_overview.png” and “latest_palettes_overview.png”, showing respectively a synthesis of colour palettes for the “historical” and “latest” groups. The structure of this subfolder is illustrated in Figure 5.

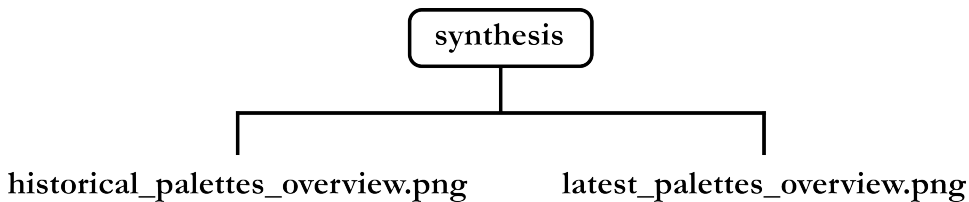


Figure 5: Organisation of the “synthesis” subfolder.

The second subfolder “individuals” has two subfolders, “historical” and “latest”, containing individual images of the 18 colour palettes (see Section 3.4 for further details). This entire organisation is illustrated in Figure 6.

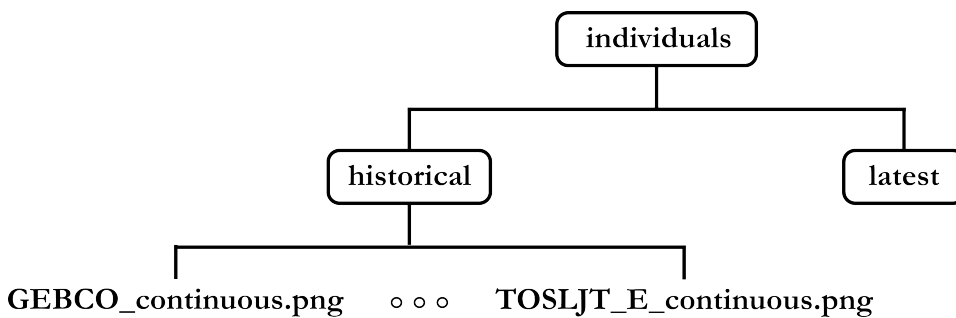


Figure 6: Organisation of the “individuals” subfolder.

2.5. License

Finally, in the last folder, named “license”, there are details about the catalogue’s licensing type. Specifically, it includes two files: “license.txt”, which outlines the chosen license, and “CC_by-4-0.txt”, providing the official text of this license. Additionally, the folder houses the logo of the chosen license: “CC.BY.png”. Figure 7 hereafter illustrates this structure.

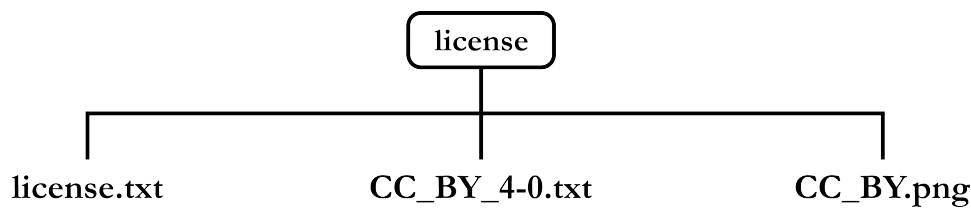


Figure 7: Organisation of the “license” folder.

3. Colour Palettes

In this section, we will take a detailed look at the colour palettes supplied, beginning with a classification system, then the naming conventions adopted, followed by the file formats and finally by a presentation of the palettes classified into two groups: “latest” and “historical”.

3.1. Classification

In addition to the two groups “historical” and “latest”, referring respectively to the palettes from GEBCO’s historical maps and to more recent palettes, both from GEBCO and from our own production, we are proposing an additional classification system to make it easier to find your way around. This system is based on the type of pallet handled: “continuous” or “discrete”.

In the case of a “continuous” colour palette, there is a gradient of colours for the topographic and bathymetric parts, whereas for a “discrete” colour palette, each range of elevation values shares a distinct and unique colour. Furthermore, in the case where one of the two parts is discrete and the other continuous, we refer to this as “hybrid”.

3.2. Naming Conventions

First of all, for the “latest” group, palettes from GEBCO are named according to the following format:

"GEBCO_type",

where, respectively, we have:

- GEBCO which means they are pallets extracted from GEBCO.
- type (*string*) corresponds to one of the following palette types: “continuous” or “hybrid”.

For example, the palette with the name

"GEBCO_hybrid"



reveals that this is the hybrid colour palette of GEBCO's latest edition. Concerning our in-house palettes, they are named in the following format:

"TOSLJT_name_type"

where, respectively, we have:

- TOSLJT which refers to the **initials** of the **authors** (Thuillier, Olteanu, Sevaux, Le Josse and Tanguy).
- name (*string*) which is the name of the palette, a palette being declined in two types.
- type (*string*) corresponds to one of the following palette types: "discrete" or "continuous".

For example, the palette with the name

"TOSLJT_B.continuous"

indicates that this is the continuous colour version of the palette B from our production. Finally, for the "historical" group, the palettes are named using the following format:

"GEBCO.edition-number.ed.type"

where, respectively, we have:

- GEBCO which means they are palettes extracted from GEBCO.
- edition-number (*string*) corresponding to the number of the historical edition from which the palette was extracted (see Section 3.4.2).
- ed (*string*) is an abbreviation of "edition".
- type (*string*) corresponds to one of the following palette types: "discrete" or "continuous".

For example, the palette with the name

"GEBCO_2nd.ed.continuous"

reveals that this is the continuous colour palette of GEBCO's historical second edition.



3.3. File Formats

Each of the colour palettes presented hereinafter are supplied in 5 colour spaces (i.e. colorimetric formats) and in the “.CPT” format (Colour Palette Table) which is used by the Generic Mapping Tools (GMT). Those colour spaces are:

1. RGB (Red, Green, Blue):
 - $(r,g,b) \in \llbracket 0, 255 \rrbracket^3$.
2. RGB 01³ (normalized Red Green Blue):
 - $(r,g,b) \in [0, 1]^3$.
3. HEX (hexadecimal):
 - $\text{hex}^4 \in \text{“}\#[0-9a-fA-F]\{6\}\text{”}$.
4. HSL (Hue, Saturation, Lightness):
 - $(h,s,l) \in [0, 360] \times [0, 1]^2$.
5. HSV (Hue, Saturation, Value):
 - $(h,s,v) \in [0, 360] \times [0, 1]^2$.

The name of a given file then corresponds to the palette name, to which the colour space is added along with the extension “.cpt”. For example, a colour palette in the RGB colour space takes the following form:

```
name-palette_rgb.cpt
# Commentary
:
:
# Commentary
elevation1 r g b elevation2 r g b
elevation2 r g b elevation3 r g b
:
:
elevationn-2 r g b elevationn-1 r g b
elevationn-1 r g b elevationn r g b
```

And a colour palette in the HEX colour space looks like this:

³Also known as Unit RGB.

⁴The format of a colour given in hexadecimal is here formalised using a regex (regular expression) in standard POSIX notation, e.g. #FFFFFF (pure white) or #000000 (pure black).



```
name-palette_hex.cpt
```

```
# Commentary
:
:
# Commentary
elevation1 hex_colour elevation2 hex_colour
elevation2 hex_colour elevation3 hex_colour
:
:
elevationn-2 hex_colour elevationn-1 hex_colour
elevationn-1 hex_colour elevationn hex_colour
```

For other colour spaces, the format is based on the same principle.

3.4. Palettes Descriptions

Concerning the description of the palettes themselves, we will first begin with the palettes in the “latest” group, i.e. those considered more recent and better suited to modern visualisation. Then, we will proceed with the palettes in the “historical” group, i.e. those extracted from GEBCO’s historical maps (i.e. the first paper charts⁵) and which might now be considered slightly outdated by modern standards⁶.

3.4.1. Latest

Firstly, we derived the polychromatic colour palettes used by GEBCO from the Web Map Service (WMS) and the online interface as of 2023⁷. The two GEBCO colour palettes are:

- “GEBCO_hybrid” a palette extracted from the images generated via the online interface (i.e. “Colour Map” and “Shaded Relief”) with a discrete polychromatic part for bathymetry and a continuous polychromatic part for topography.
- “GEBCO_continuous” a palette extracted from the WMS (“gebco_latest_2” grid)⁸ with continuous polychromatic parts for both bathymetry and topography.

Secondly, we are providing 8 colour palettes of our own design in pastel tones (i.e. with low saturation), as this is more suitable for displaying

⁵<http://iho-wms.net/gebco/>

⁶Note that this is not a value judgment, and that these palettes can also be used nowadays, which is something we warmly encourage since they have a particular appeal.

⁷Please note that these palettes have been extracted from material available online and are not versions officially distributed by GEBCO. Indeed, to the best of our knowledge, none currently exist: this has therefore been reverse-engineered and may contain inaccuracies.

⁸This palette is slightly different from its hybrid counterpart: it has a single shade of green for low altitudes (perhaps an artefact).



information using additional layers than compared with GEBCO's palettes, which are made up of highly saturated colours. The 8 palettes we propose are:

- "TOSLJT_A_discrete" a palette with two discrete polychromatic parts for bathymetry and topography.
- "TOSLJT_A_continuous" a palette with two continuous polychromatic parts for bathymetry and topography.
- "TOSLJT_B_discrete" a palette with a monochromatic part for bathymetry and a discrete polychromatic part for topography.
- "TOSLJT_B_continuous" a palette with a monochromatic part for bathymetry and a continuous polychromatic part for topography.
- "TOSLJT_C_discrete" a palette with a discrete polychromatic part for bathymetry and a monochromatic part for topography.
- "TOSLJT_C_continuous" a palette with a continuous polychromatic part for bathymetry and a monochromatic part for topography, and, finally.
- "TOSLJT_D_discrete" a palette with two monochromatic parts for bathymetry and topography.
- "TOSLJT_E_continuous" a palette with two continuous bichromatic parts.

Note that for the colour palettes provided, it was decided that elevation 0⁹ corresponded to the ocean (mean sea level) and so we set a threshold of 10⁻³ (an arbitrary and subjective choice). This means that any elevation below 10⁻³ will be shown as water and any elevation above 10⁻³ will be shown as land. As for the bathymetric part of the various palettes mentioned above, we have taken care to respect a coherent division according to the various oceanic layers which are (in order of increasing depth):

- epipelagic zone (or sunlight zone) between 0 metre and 200 metres,
- mesopelagic zone (or twilight/midwater zone) between 200 metres and 1 000 metres,
- bathypelagic zone (or midnight zone) between 1 000 and 4 000 metres,
- abyssopelagic zone (the abyss) between 4 000 metres and 6 000 metres,

⁹In the GEBCO grid, elevation 0 recurs regularly, which is why this choice was important for visualisation reasons.



- hadalpelagic zone (the trenches) between 6 000 metres and 11 000 metres (i.e. Mariana Trench).

Finally, these different colours palettes are illustrated synthetically in Figure 8 and with tangible examples in Figure 9, 10 and 11.

3.4.2. Historical

In order to be as complete as possible, and because we believe this to be of some importance, we have taken the time to extract the original colour palettes of the historical first editions of GEBCO paper charts¹⁰. However, out of the 5 editions of GEBCO paper charts (1903, 1910-1930, 1932-1966, 1958-1973, 1973-1982), only the last 4 are accompanied by a colour palette for the elevations¹¹. Furthermore, parts of some charts are missing because they have not been digitised or simply no longer exist, so we have done the best we could with the available materials. This means that certain colours have been inferred, in particular to standardise the boundaries between -11 000 and 9 000 metres. We thus provide the colour palettes of the last 4 editions in their original form, i.e. in discrete colours, but also in their continuous versions, giving us a total of 8 colour palettes named:

- “GEBCO_2nd_ed_discrete_hex”,
- “GEBCO_2nd_ed_continuous_hex”,
- “GEBCO_3rd_ed_discrete_hex”,
- “GEBCO_3rd_ed_continuous_hex”,
- “GEBCO_4th_ed_discrete_hex”,
- “GEBCO_4th_ed_continuous_hex”,
- “GEBCO_5th_ed_discrete_hex”,
- “GEBCO_5th_ed_continuous_hex”.

Finally, the various palettes are presented synthetically in Figure 12 and with concrete examples in Figures 13, 14 and 15.

¹⁰<http://iho-wms.net/gebco/>

¹¹In those days, people were talking of bathymetric tints and hypsometric (i.e. topographic) tints for colour palettes.

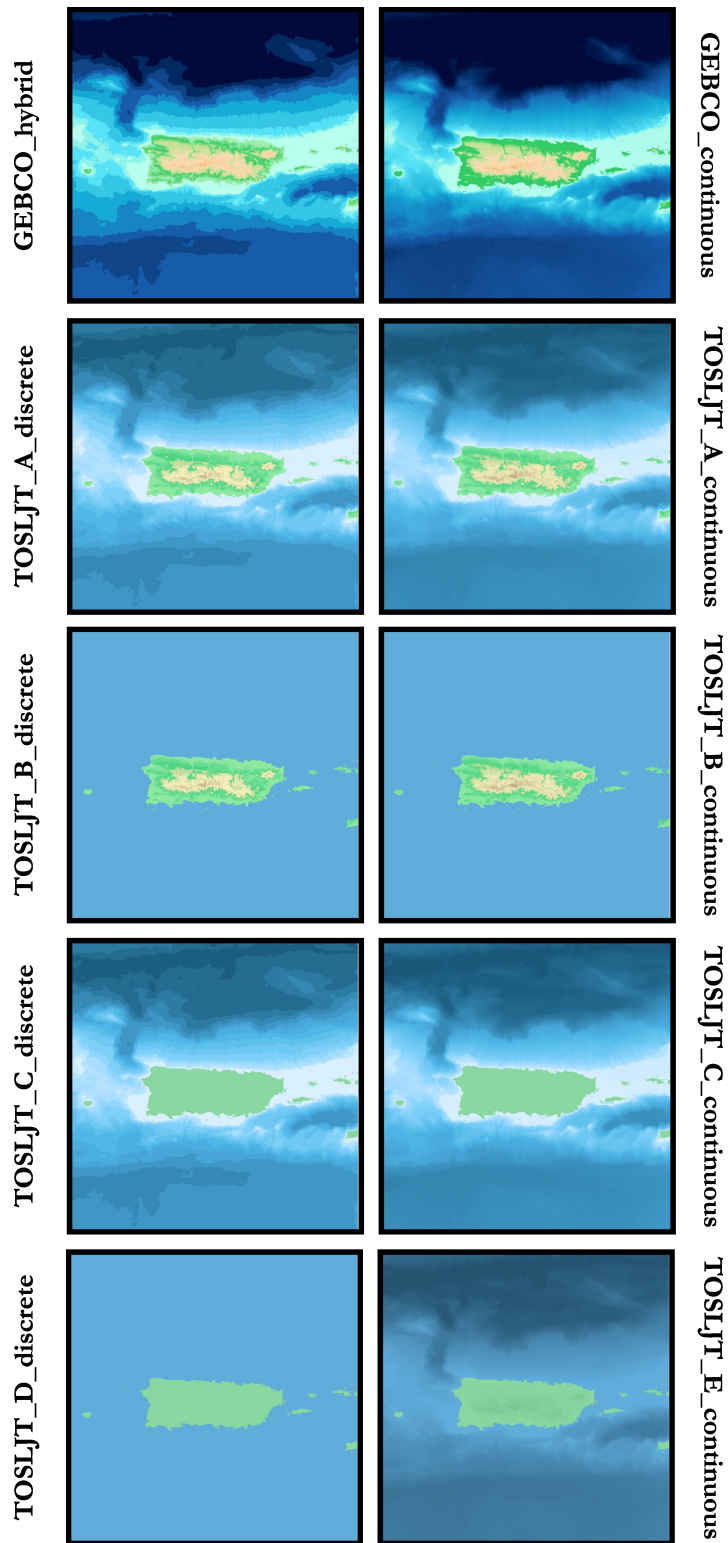


Figure 9: Illustration of the different colour palettes on part of the Caribbean.

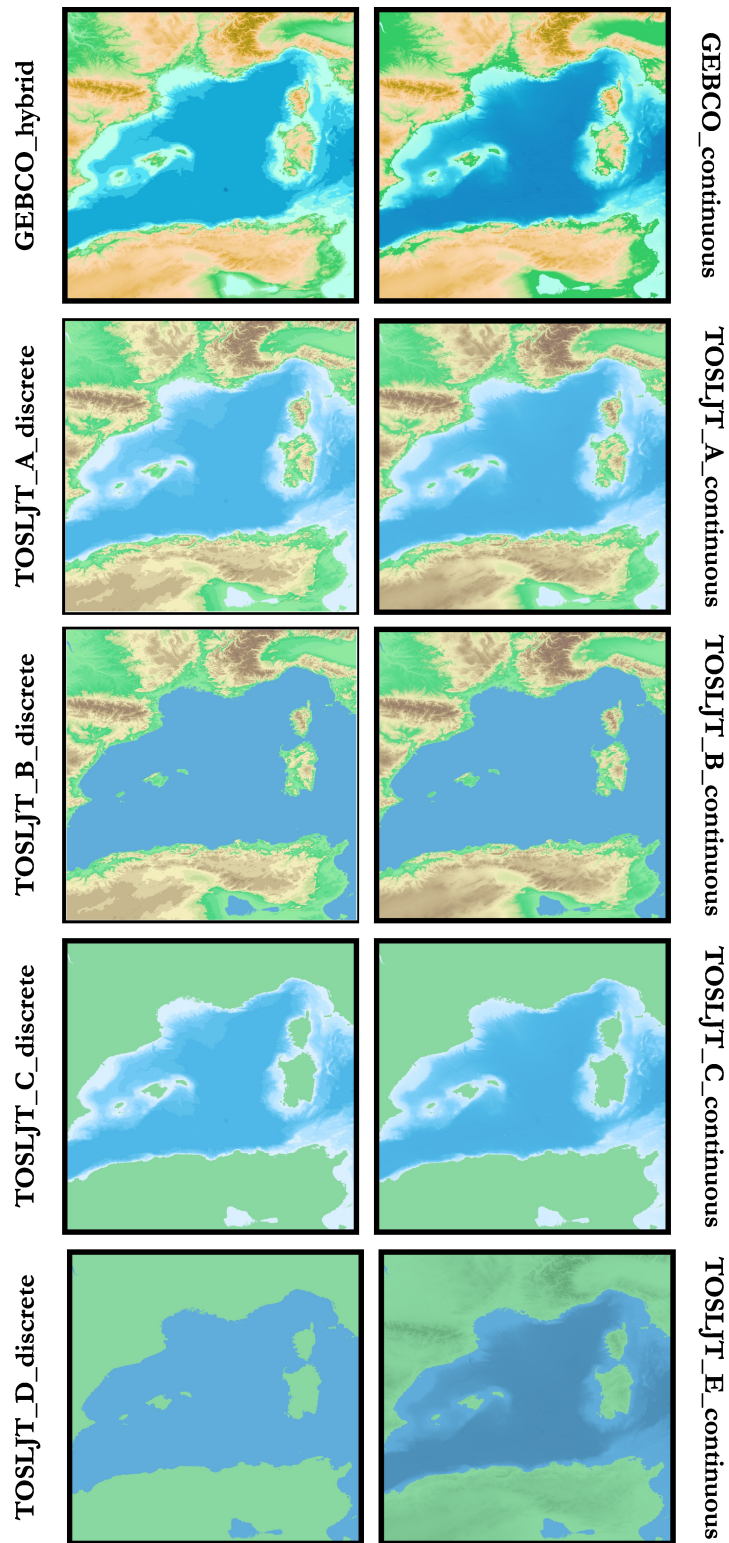


Figure 10: Illustration of the different colour palettes on part of the Mediterranean Basin.

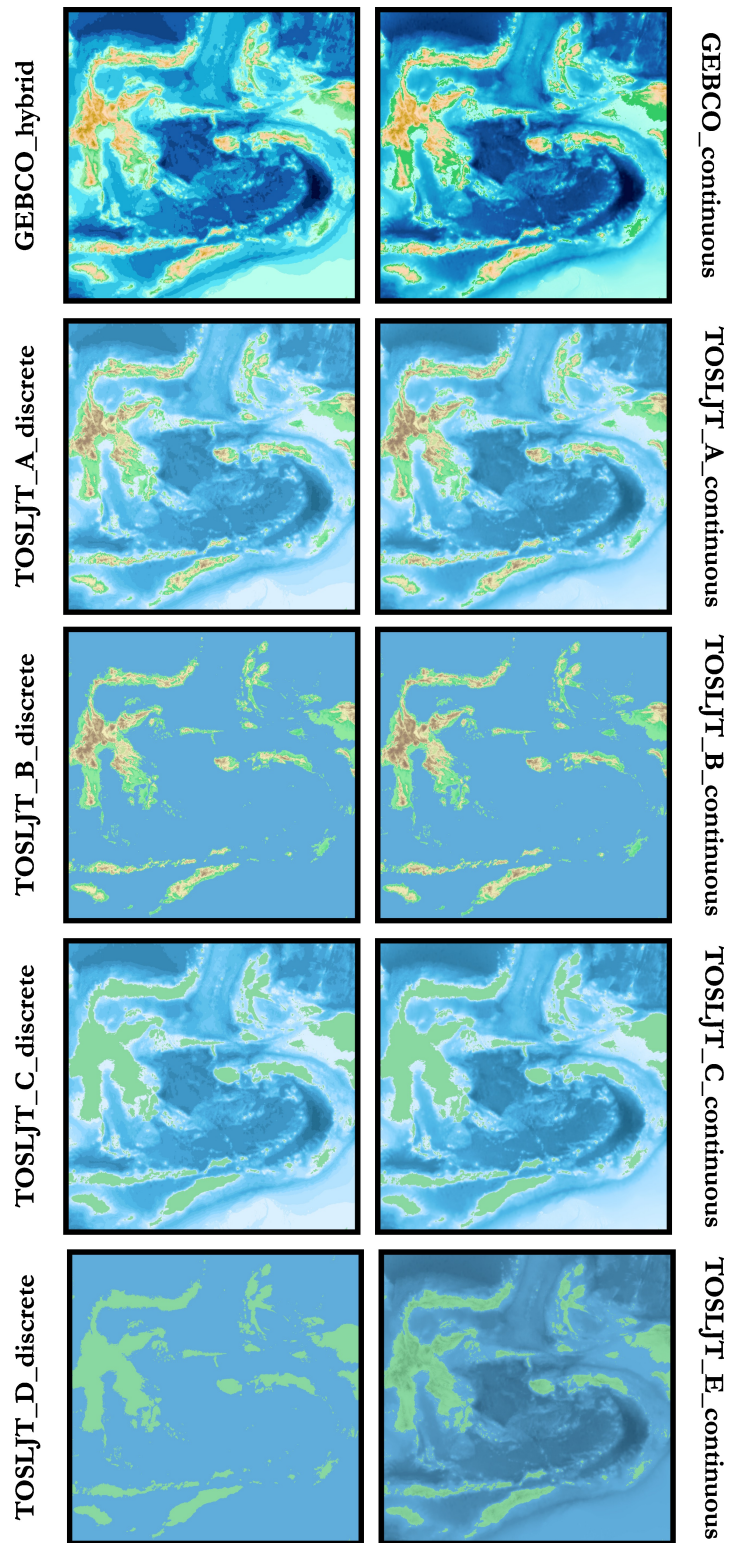


Figure 11: Illustration of the different colour palettes on the Banda Arc region.

Elevation (m)

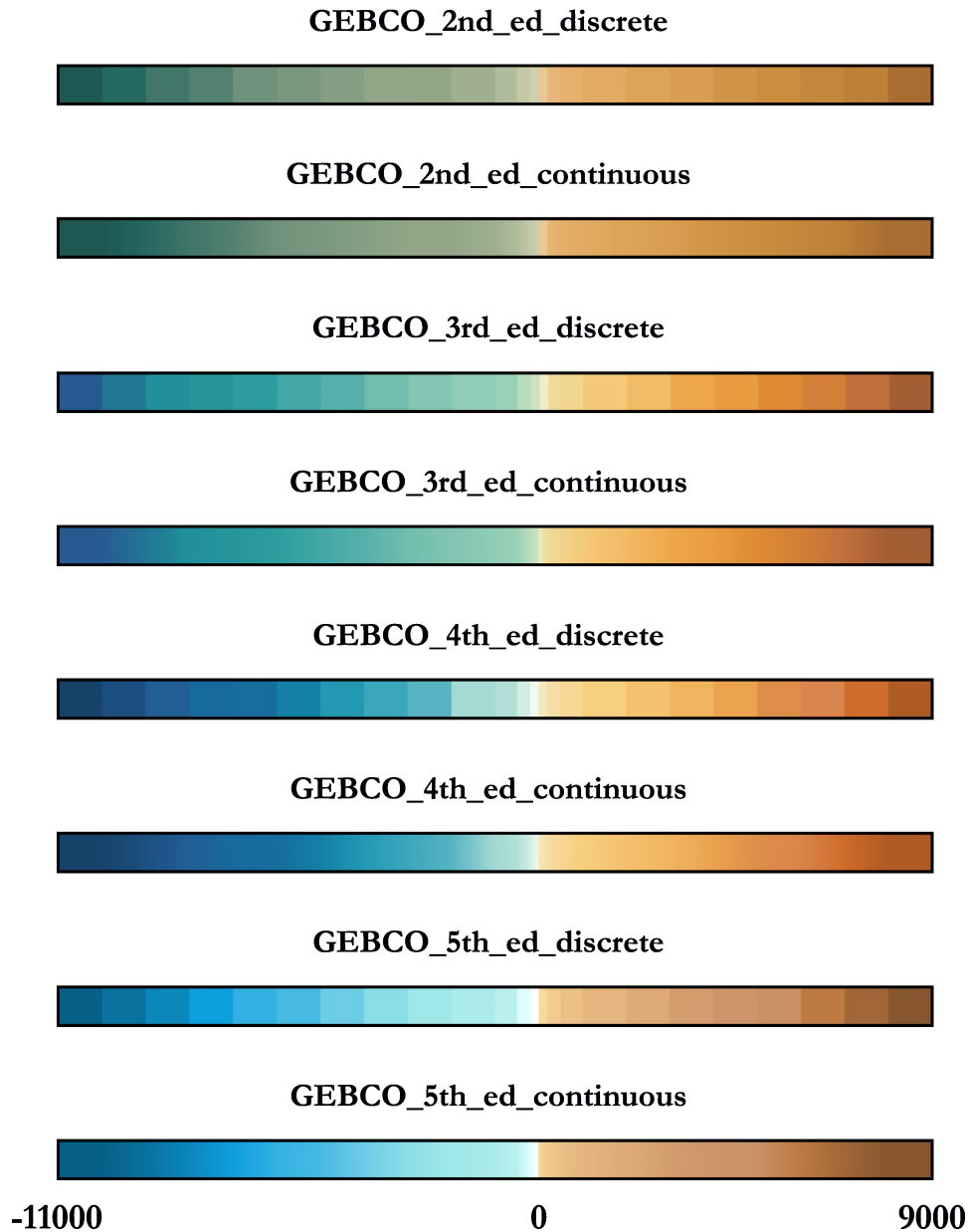


Figure 12: Synthetic illustration of the different historical colour palettes available in this catalogue.

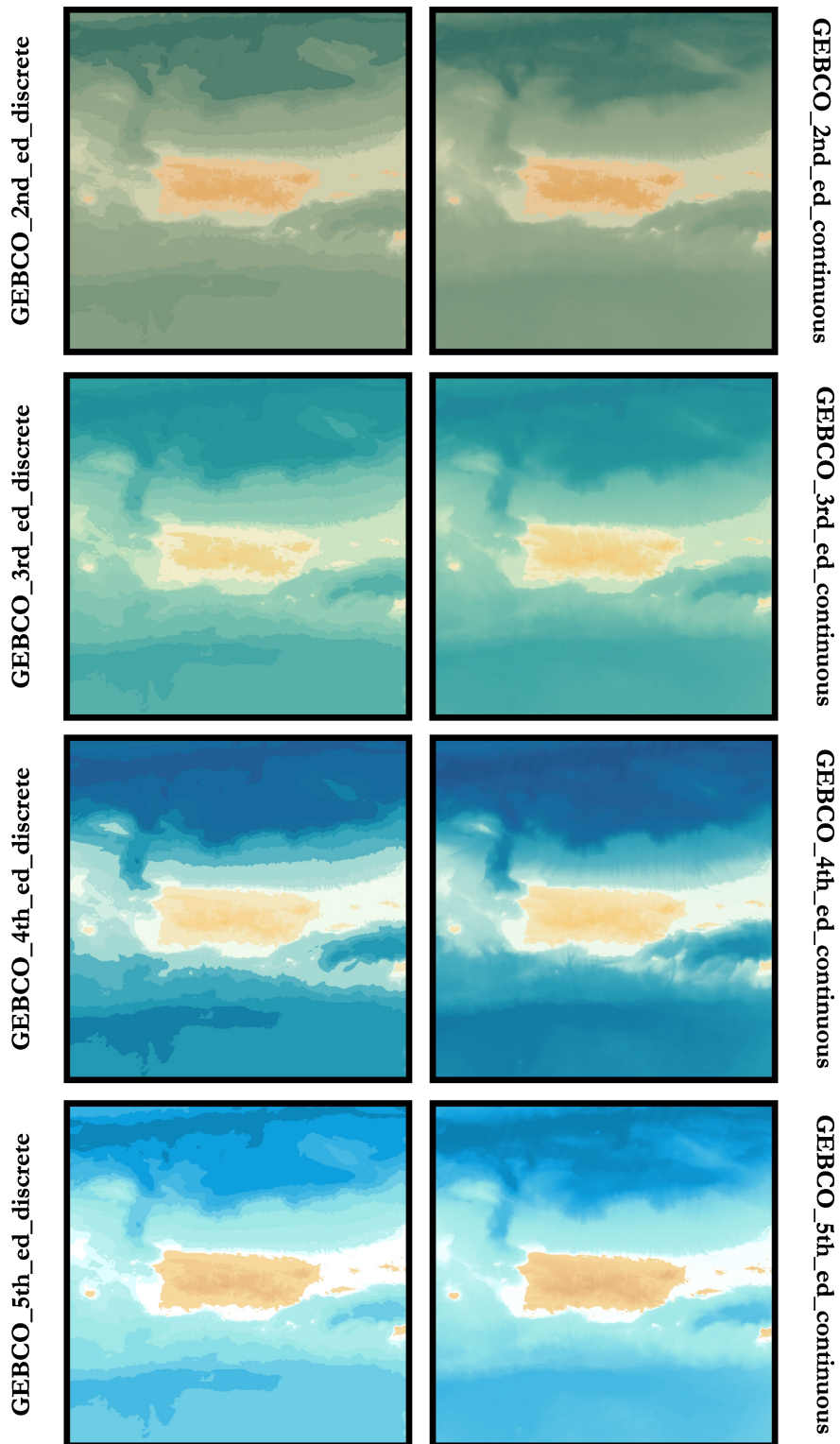


Figure 13: Illustration of the different historical colour palettes on part of the Caribbean.

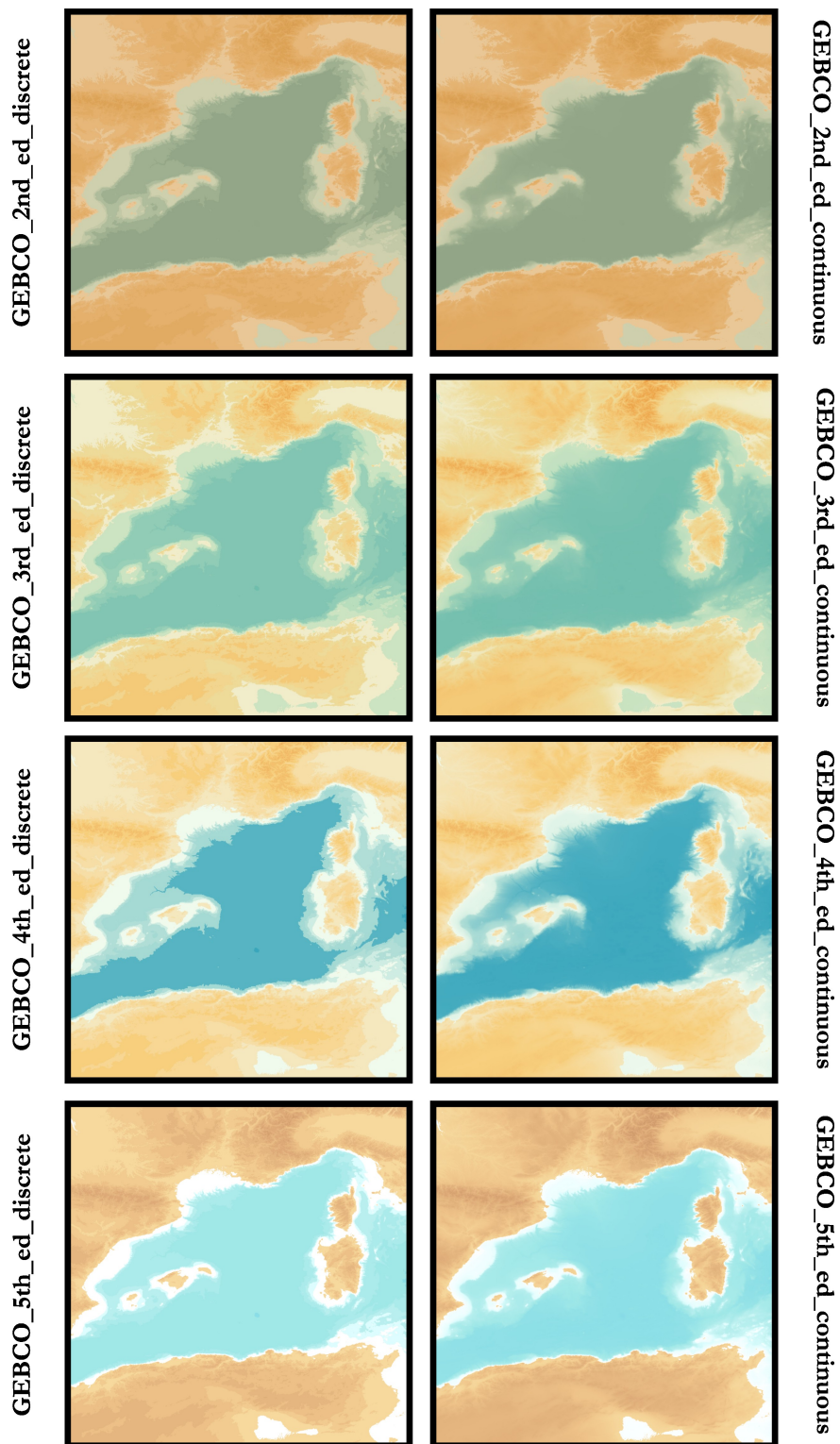


Figure 14: Illustration of the different historical colour palettes on part of the Mediterranean rim.

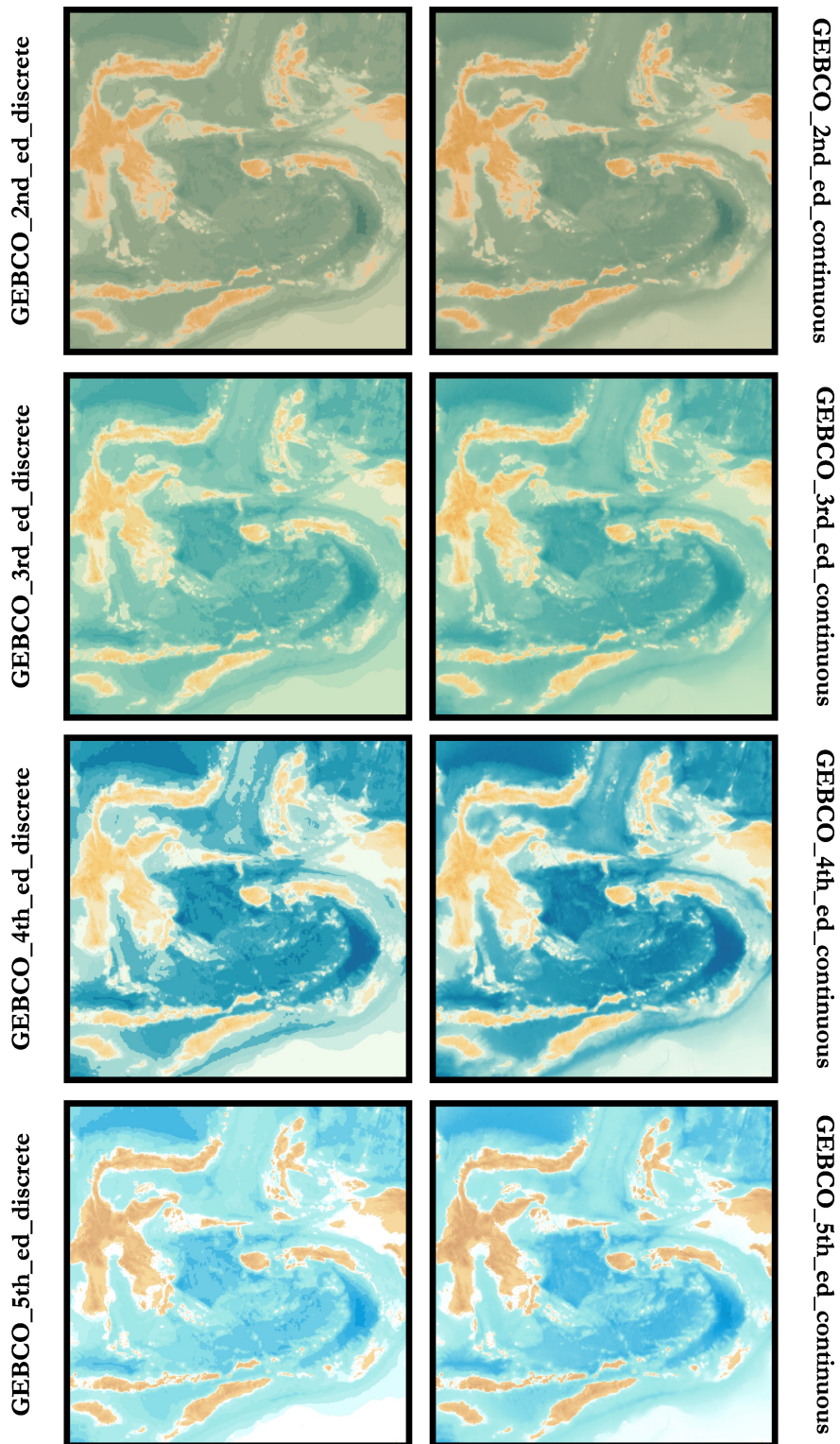


Figure 15: Illustration of the different historical colour palettes on the Banda Arc region.



4. Colour dictionaries

In this section, we provide dictionaries that maps a given colour (in hexadecimal format) to the nearest named colour and the nearest colour in pantone format, for both historical and latest colour palettes. Besides, for each colour, a thumbnail is available in order to preview the specific colour. A plain-text version of these dictionaries is also available in the provided documentation. On another level, it should be noted that this is an approximation, and that two different colours can be mapped to the same named colour and/or pantone colour. For this reason, although they can be useful, named and pantone colours should be handled with care.

4.1. Latest Palettes

Below are the colour dictionaries for the various latest palettes. They are divided into two groups: GEBCO and TOSLJT. For the GEBCO group, colours are subdivided into two subgroups for the topographic and bathymetric sections. As for the TOSLJT group, colours are subdivided into 4 subgroups, two groups for polychromatic topographic and bathymetric sections and 2 groups for monochromatic topographic and bathymetric sections.



4.1.1. GEBCO

Bathymetry Part.

1. ■ #010A3B, Stratos, 282 C
2. ■ #012A62, Midnight Blue, 648 C
3. ■ #104688, Torea Bay, 7687 C
4. ■ #175CAB, Fun Blue, 300 C
5. ■ #1784C4, Denim, 7689 C
6. ■ #16AAD6, Java, 638 C
7. ■ #36C6E6, Picton Blue, 298 C
8. ■ #56E2F7, Malibu, 305 C
9. ■ #8CF2EC, Spray, 318 C
10. ■ #B9FFED, Aero Blue, 317 C

Topography Part.

1. ■ #A7F0B2, Madang, 351 C
2. ■ #33CC66, Emerald, 7479 C
3. ■ #BBE492, Yellow Green, 7486 C
4. ■ #FFDCB9, Frangipani, 7506 C
5. ■ #F3CA89, Manhattan, 148 C
6. ■ #E6B858, Porsche, 7411 C
7. ■ #D9A627, Golden Grass, 7563 C
8. ■ #A89A1F, Lemon Ginger, 7767 C
9. ■ #A49019, Reef Gold, 112 C
10. ■ #A28613, Buttered Rum, 112 C
11. ■ #9F7B0D, Buttered Rum, 126 C
12. ■ #9C7107, Buttered Rum, 132 C
13. ■ #996601, Chelsea Gem, 132 C
14. ■ #A25959, Au Chico, 7523 C
15. ■ #B27676, Turkish Rose, 695 C
16. ■ #B79393, Thatch, 436 C
17. ■ #C2B0B0, Pink Swan, 435 C
18. ■ #CCCCCC, Silver, Cool Gray 2 C
19. ■ #E5E5E5, Mercury, 663 C
20. ■ #F2F2F2, Concrete, 663 C
21. ■ #FFFFFF, White, 7436 C



4.1.2. TOSLJT

Polychromatic Bathymetry Part.**Polychromatic Topography Part.**

- | | |
|-------------------------------------|-----------------------------------------|
| 1. ■ #10374C, Elephant, 2767 C | 1. ■ #8FEAA0, Granny Smith Apple, 352 C |
| 2. ■ #174B67, Chathams Blue, 7477 C | 2. ■ #83E59F, Pastel Green, 353 C |
| 3. ■ #1C5E82, Blumine, 7700 C | 3. ■ #67DE92, Pastel Green, 346 C |
| 4. ■ #256C91, Jelly Bean, 647 C | 4. ■ #4DD685, Emerald, 3385 C |
| 5. ■ #2D7AA3, Jelly Bean, 7683 C | 5. ■ #C6DD9D, Deco, 580 C |
| 6. ■ #3689B4, Boston Blue, 7459 C | 6. ■ #DCE6AD, Hampton, 7485 C |
| 7. ■ #3E97C6, Pelorous, 7688 C | 7. ■ #F3EEBC, Sidecar, 7499 C |
| 8. ■ #47A5D7, Shakespeare, 7688 C | 8. ■ #DDD2A5, Sapling, 7500 C |
| 9. ■ #4BAEE0, Picton Blue, 298 C | 9. ■ #C7B78E, Indian Khaki, 7502 C |
| 10. ■ #4FB8E8, Picton Blue, 637 C | 10. ■ #B09B78, Mongoose, 452 C |
| 11. ■ #5EC1EC, Picton Blue, 2985 C | 11. ■ #A18971, Donkey Brown, 7614 C |
| 12. ■ #6EC8F3, Malibu, 297 C | 12. ■ #937769, Cement, 7504 C |
| 13. ■ #7FD0F9, Malibu, Blue 0821 C | 13. ■ #846562, Sand Dune, 7615 C |
| 14. ■ #90D7FF, Anakiwa, 2975 C | 14. ■ #AD9F9C, Martini, Warm Gray 5 C |
| 15. ■ #A7DDFF, Anakiwa, 635 C | 15. ■ #BBB3AF, Tide, Warm Gray 3 C |
| 16. ■ #B3E2FF, French Pass, 290 C | 16. ■ #C8C6C3, Cloud, Cool Gray 3 C |
| 17. ■ #C2E8FF, Onahau, 2707 C | 17. ■ #D7D7D7, Alto, Cool Gray 1 C |
| 18. ■ #DAF0FF, Pattens Blue, 656 C | |

Monochromatic Bathymetry Part.**Monochromatic Topography Part.**

- | | |
|-------------------------------------|---------------------------------|
| 1. ■ #60ADDC, Havelock Blue, 2915 C | 1. ■ #89D7A1, Vista Blue, 345 C |
|-------------------------------------|---------------------------------|




4.2. Historical Palettes












Below are the colour dictionaries for the various historical palettes. They are divided into 4 groups for the 4 editions, with two sub-groups each for the topographic and bathymetric sections.

4.2.1. GEBCO 2nd edition

Bathymetry part.

1.  #1f5752, Blue Dianne, 626 C
2.  #256761, Casal, 555 C
3.  #417669, Faded Jade, 625 C
4.  #538170, Como, 625 C
5.  #71927a, Laurel, 5625 C
6.  #7a987e, Laurel, 556 C
7.  #849f83, Amulet, 5565 C
8.  #92a586, Sage, 7494 C
9.  #93a788, Sage, 7494 C
10.  #9eb090, Schist, 7494 C
11.  #b0bd9c, Norway, 5793 C
12.  #c3c8a6, Thistle Green, 5803 C
13.  #cfd0ae, Thistle Green, 5807 C


Topography part.

1.  #eac796, Putty, 473 C
2.  #e6b779, Harvest Gold, 7508 C
3.  #e4b06b, Equator, 721 C
4.  #e2ab64, Equator, 7411 C
5.  #dda357, Di Serria, 7411 C
6.  #d89d50, Di Serria, 7407 C
7.  #d09446, Raw Sienna, 7510 C
8.  #ca8e3e, Tussock, 7510 C
9.  #c3873c, Tussock, 7510 C
10.  #bc8037, Copper, 7571 C
11.  #aa6d31, Copper, 7566 C














4.2.2. GEBCO 3rd edition

Bathymetry part.

1.  #285a92, St Tropaz, 7685 C
2.  #227796, Jelly Bean, 647 C
3.  #21909b, Eastern Blue, 7473 C
4.  #26969c, Jelly Bean, 7473 C
5.  #2d9d9f, Lochinvar, 7473 C
6.  #43a8a6, Keppel, 7459 C
7.  #57b0a9, Tradewind, 7472 C
8.  #70beae, Tradewind, 563 C
9.  #82c5b2, Neptune, 564 C
10.  #91ccb6, Vista Blue, 337 C
11.  #99d0b7, Vista Blue, 344 C
12.  #b9debe, Pixie Green, 5595 C
13.  #cce4c2, Zanah, 7485 C


Topography part.

1.  #f1edca, Wheatfield, 7499 C
2.  #efdb99, Chalky, 7402 C
3.  #f2d58e, Buff, 7403 C
4.  #f4ca78, Golden Sand, 149 C
5.  #f2bb65, Rajah, 141 C
6.  #efa74c, Tulip Tree, 157 C
7.  #ea9c40, Tulip Tree, 157 C
8.  #df8c34, Fire Bush, 7413 C
9.  #d37f37, Raw Sienna, 7412 C
10.  #c16f3d, Copper, 7572 C
11.  #a45e33, Brown Rust, 470 C



4.2.3. GEBCO 4th edition

Bathymetry part.

1.  #17436b, Chathams Blue, 534 C
2.  #1c4f7f, Blumine, 7700 C
3.  #225e96, Matisse, 647 C
4.  #176a9e, Matisse, 647 C
5.  #166d9e, Matisse, 647 C
6.  #147fa7, Matisse, 314 C
7.  #2399b4, Eastern Blue, 7689 C
8.  #3ba7bd, Pelorous, 631 C
9.  #56b4c3, Fountain Blue, 7709 C
10.  #a4d9d4, Sinbad, 572 C
11.  #b1dfd7, Aqua Island, 573 C
12.  #cfede2, Jagged Ice, 7541 C
13.  #f0faed, Peppermint, 663 C

Topography part.

1.  #f5e8be, Sidecar, 7499 C
2.  #f6dea6, Maize, 7401 C
3.  #f7d793, Marzipan, 7507 C
4.  #f7cf7d, Golden Sand, 1345 C
5.  #f4c16f, Rajah, 1355 C
6.  #f1b560, Sandy brown, 150 C
7.  #eca350, Tulip Tree, 157 C
8.  #df8e4a, Di Serria, 7576 C
9.  #da854d, Raw Sienna, 7576 C
10.  #cf6c2b, Piper, 7578 C
11.  #af5b24, Desert, 1605 C














4.2.4. GEBCO 5th edition

Bathymetry part.

1.  #076087, Venice Blue, 7469 C
2.  #09729f, Blue Chill, 7468 C
3.  #0b87bc, Lochmara, 7460 C
4.  #0e9fde, Cerulean, 2925 C
5.  #33b1e2, Picton Blue, 298 C
6.  #47bae3, Picton Blue, 298 C
7.  #6dcce6, Turquoise Blue, 310 C
8.  #8adee7, Riptide, 318 C
9.  #a0e8e8, Water Leaf, 635 C
10.  #abebeb, Water Leaf, 317 C
11.  #b9f0ef, Mint Tulip, 317 C
12.  #ddfdfe, Baby Blue, 656 C
13.  #ffffff, White, 7436 C

Topography part.

1.  #f7d99d, Marzipan, 7507 C
2.  #f2cb90, Manhattan, 148 C
3.  #edc088, Tacao, 720 C
4.  #e5b680, Gold Sand, 7508 C
5.  #deab78, Tumbleweed, 721 C
6.  #d39d6e, Whiskey, 728 C
7.  #cd9569, Antique Brass, 7515 C
8.  #c99265, Antique Brass, 7515 C
9.  #bd7a43, Tussock, 722 C
10.  #a16738, Brown Rust, 7574 C
11.  #88572f, Mule Fawn, 7567 C



5. Conclusion

To conclude this work, we have provided a collection of 18 colour palettes for effective visualisation of Digital Elevation Models (DEMs). More specifically, these palettes are divided into 2 categories: “historical” and “latest”. In the first group, we find a series of 8 palettes extracted from the first editions of General Bathymetric Chart of the Oceans (GEBCO) paper charts dating from 1910-1930, 1932-1966, 1958-1973 and 1973-1982, thus marking the first time these palettes have been digitised. Then we have the 10 pallets in the “latest” group, of which 8 are of our own production and 2 are taken from the latest editions of GEBCO charts. Indeed, to the best of our knowledge, these are not publicly available at the time of writing, so we have gone through the trouble of extracting them, as we believe this is of public interest. In particular, these colour palettes have been standardised to encompass a broad range of elevations, ranging from the deepest point at 11 000 metres in the Challenger Deep of the Mariana Trench to the highest peak at 9 000 metres on Mount Everest. This required a certain amount of standardisation work, particularly with regard to historical palettes where some data was missing. In addition, they are supplied in the following 5 colour spaces: RGB (Red, Green, Blue), RGB 01, Hexadecimal, HSL (Hue, Saturation, Lightness) and HSV (Hue, Saturation, Value).

Moreover, our palettes offer a number of advantages over GEBCO palettes. Firstly, they offer more elevation intervals and therefore more colours, allowing for more nuance in the representation of a given area of interest. Secondly, we supply several variants depending on the intended application: some are monochromatic, others bimochromatic, others polychromatic, some in continuous colour (gradient) and others in discrete colour. Finally, we offer a less saturated colour palette than GEBCO’s palettes, which makes it easier to draw elements on top, such as lines, markers or text.

Last but not least, we also offer a number of visualisations, either on the colour palettes themselves or through didactic examples, enabling the user to fully appreciate the interest of this variety of proposals. A complete dictionary of all the colours used has also been derived to ensure that anyone can appropriate and modify the material made available to the community.