

EA Graphic Tools 2022

Users' Manual for

Color Map Drawing Tool, "ColorMap"

& Gray Map Converter

(Template Map Preparation Tool), "GmConv"

Meteorological Data System Co. Ltd.

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## Preface

There is a very firm relationship between (a) the color map drawing tool named “ColorMap” and (b) the gray map converter (template map preparation tool) named “GmConv”. Due to this reason, this document is published as a kind of combo-manual for the both of two.

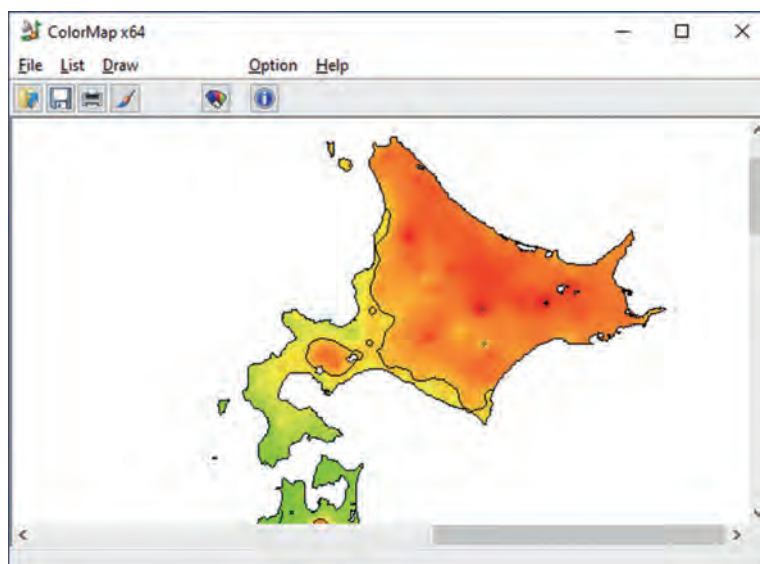
If you want to get just some color maps by using (a) ColorMap with prepared template bitmap files, please read the first chapter at least.

On the other hand, you want to make an original color contour map based on a gray image file, the `bmp` file prepared by yourself. In such case, (b) GmConv must be applied for you. You may read well the second chapter, too. It is expected that you understand how-to work the tool, (b) GmConv, on preparing the template data files for (a) ColorMap.

When you get fruitful experiences with GmConv, you may hope to create completely original template data files without GmConv. On such occasion, the appendices in this document may be helpful.

## 1 Color Map Drawing Tool — How-to-Use of ColorMap

ColorMap reads a text data file describing a series of meaningful data on some AMeDAS stations, interpolates value at every grayed pixel based on the data, paint a color for the interpolated value on the pixel, and finishes a colored map. Applied color gradation mode is “24 bits color mode\*1”. Output image files are limited to WINDOWS Bitmap files but contour lines can also be drawn.



**Fig. 1 Main Window of ColorMap (Screen Shot during a Processing Session)**

The following Section: 1.1 explains the how-to-use of this tool as a tutorial style at first. You can imagine what can be done by this tool, ColorMap. Then in order to get more information,

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\*1 Each color element of RGB (Red, Green, and Blue) has an intensity from zero to 255 ( $= 2^8 - 1$ ). And  $256 \times 256 \times 256 = 16,777,216$ , *i.e.*, 16 million colors are supported.


all functions of this tool are described in Section: 1.2. In Section: 1.3, some caution terms are mentioned. At the end of this document, some technical matters related on the both tools are appended.

## 1.1 Fundamental Operation of ColorMap (Tutorial)

Now as a practice, input a file named `D18Jpn20.dat`, installed automatically and make a color map of all Japan distribution of the standard degree-days, HDD18–18\*<sup>2</sup>.

Try the following procedures expained in several sub-sub-sections. In this section, we assume that this is your first time use of ColorMap.

### 1.1.1 Start-Up and File Open

Now, click the  [Start] button on the desktop task bar to display a list of prigrams as shown in Fig.2. Then, select a folder icon labeled [EA Graphic Tools 2022], which folder includes some tool programs provided as the graphic tools set, and click the icon of ColorMap to invoke.

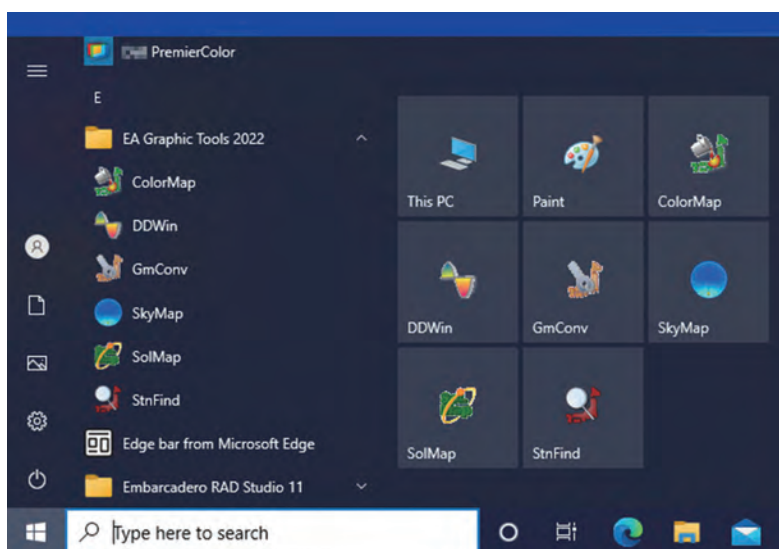




Fig. 2 Start Menu on WINDOWS® Desktop

Then, the main window as illustrated in Fig.1 pops up\*<sup>3</sup>.

Next, select and click a menu labeled [File | GKEYOpen...] on the menu bar. Clicking a speed button  is also available. Then, a window as shown in Fig.3 pops up. Now you can select the file named `textttD18Jpn20.dat` to open and read. ColorMap responses to your action by showing a message box shown in Fig.4 in the screen center.

After the message box disappears, the menu bar of the main window (Fig.1) changes its view. Now, [List] menu and [Draw] menu become enable and the speed button  becomes enable to be selected.

\*<sup>2</sup> This means that the design room air temperature is 18°C and the reference daily outdoor air temperature is also 18°C. The data are based on statics for recent 10 years from 2011 to 2020.

\*<sup>3</sup> The illustrated figure in Fig.1 is not a correct view of initial status soon after invoking.

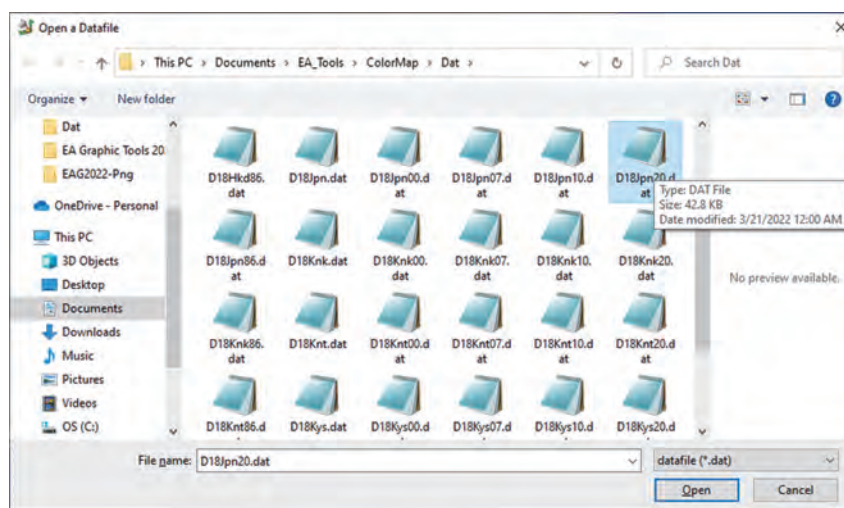


Fig. 3 [Open a Datafile] Window of ColorMap

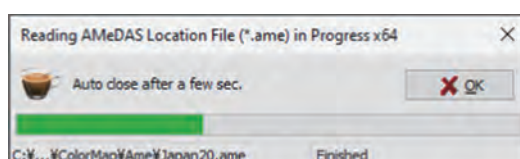



Fig. 4 Message Box Indicating under File Reading Progress of ColorMap

### 1.1.2 Start of Drawing

Now, click the [Draw] menu or the speed button  to display a dialog window as shown in Fig.5

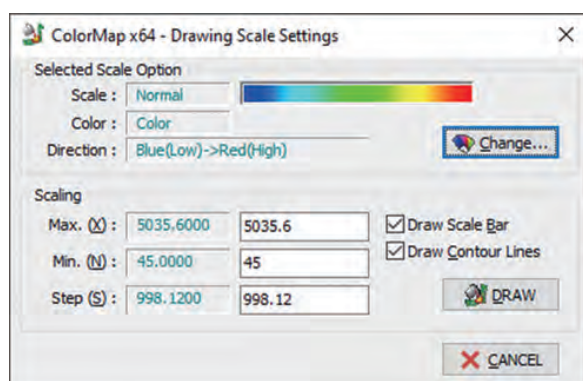


Fig. 5 [Drawing Scale Settings] Window of ColorMap

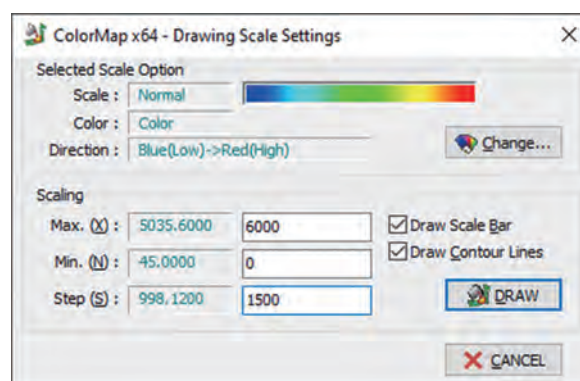



Fig. 6 Data Input for [Drawing Scale Settings] Window

You can set the value range to draw and/or contour interval by using this window illustrated in Fig.6. You can determine whether a legend bar is drawn or not and whether contour lines are drawn or not, too. Additionally, you can select coloring direction or modes (Color or B/W and Gradient or Tile).

In this time, input as they are as shown in Fig.6. Don't use return key to fix the input value in boxes. Tab key is suitable. After inputting, click a button labeled [Change...] . Then, the window in Fig.7, titled [Scale Option] pops up.

Now, change the radio button in a group box labeled [Color Direction (L)] as the same status as shown in Fig.7, *i.e.*, select [Red(Low) -> Blue(High)]. Next, click the [OK] button. Then, window shown in Fig.6 is displayed again to accept action of clicking the button labeled [DRAW]. Click it, please.

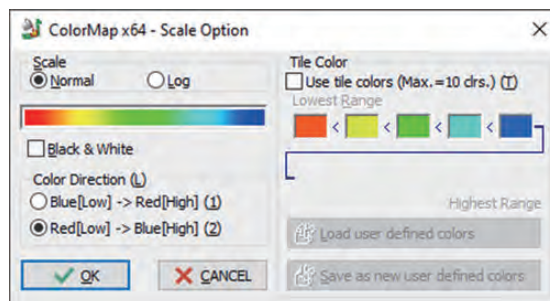


Fig. 7 [Scale Option]Window of CM

### 1.1.3 Drawing Finish and Post Processing

For a while, gray-colored map of Japan (bitmap file) will be displayed in the main window and message boxes as shown in Fig.8 will pop up again and again.

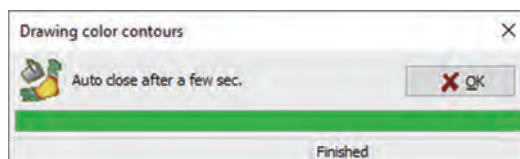





Fig. 8 Message Box Indicating the Progress of ColorMap

After the message box disappears, the gray-colored map becomes to colorful one\*<sup>4</sup>.

By the way, you can see that a menu labeled [File | Save...], a speed button  having the same function as the menu, and a speed button  and so on are now enabled. These means that you can save the image as a bmp file and print the image. In order to get more information on such functions, refer the next Section: 1.2.

### 1.1.4 Exit

Use a menu labeled [File | Exit] or the System icon  located on the right top of the main window.

Now, you have learned how-to-use of ColorMap briefly. In appendix, A.1 (p.19), data files for ColorMap are explained in detail. Maybe, you can understand that there are many template files you can use for your target drawing aims.

\*<sup>4</sup> This is a distribution map of the standard degree-days HDD18-18 as mentioned above. We drew the distribution color map ranged from 0 to 6,000 degree-days with contour lines separating every 1,500 degree-days, having color gradation changing from red to blue with value increasing.



## 1.2 Functions (Menus) of ColorMap and an Example


As shown in Fig.9, there are menu and speed button bars, which are common in general windows applications. Usually, speed buttons are alternative short-cut way to reach to deep-branched menu. So, we explain all the menus here with occasional description of alternative speed buttons.



Fig. 9 Main Menus and Speed Buttons of ColorMap

### 1.2.1 Sub-Menus under File Menu

Sub-menus of [File] menu are displayed in Fig.10.

[Open...] This menu calls a dialog window for selecting a datafile from [Documents\EA-Tools\ColorMap\Dat] folder (See Fig.3, p.3). Alternative speed button  is available.

[Save] This menu saves a bmp file with a default name with the same main filename as dat file and the extension “.bmp”<sup>\*5</sup>.

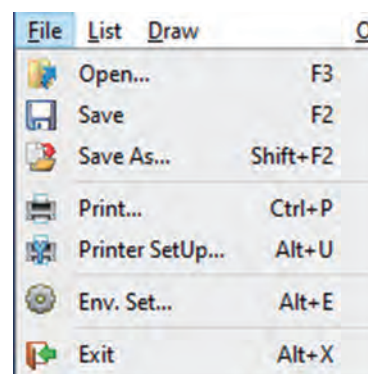



Fig. 10 File Sub-Menu of ColorMap

[Save As...] This menu saves the drawn image as a bmp file having unique filename. Using a dialog window shown in Fig.11 (a), give the destined filename.

[Print...] This menu calls a printer dialog window shown in Fig.11 (b) and prints the drawn image via printer. There is an alternative speed button  in the main window.

[Printer Setup...] Printers can be setup via common dialog window for printer setup. See Fig.11 (c).

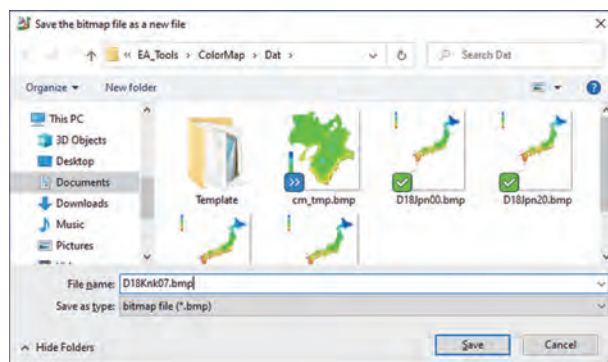
[Env. Set...] This menu calls another tool program as a child process. The child program is EA\_SetEnv2022 shown in Fig.11 (d). You can set up your computer environment for “EA Graphic Tools 2022”. See the another manual [1] for getting more information on the setup.

[Exit] Termination of ColorMap is done.

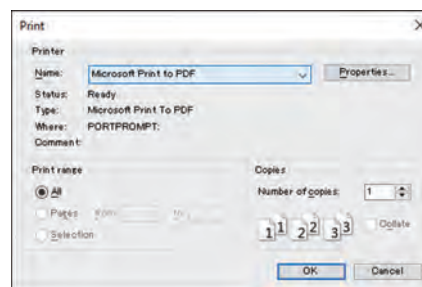
By the way, as you know, now WINDOWS supports PDF file output as a virtual printer device. So, you can save the drawn image as PDF file instead of bmp image.

<sup>\*5</sup> This rule may cause some trouble because the same name for template gray bmp file and resulted color bmp file is allowed. We recommend another menu [Save As...] for this reason.

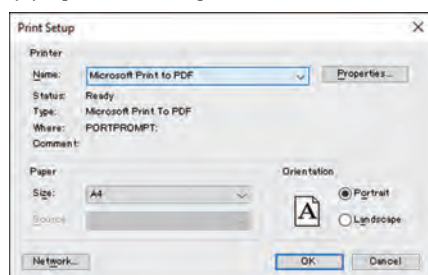
(a) [Save the bitmap file as a new file] Dialog Window



(b) [Print] Dialog Window



(c) [Print Setup] Dialog Window



(d) Main Window of EA.SetEnv2022

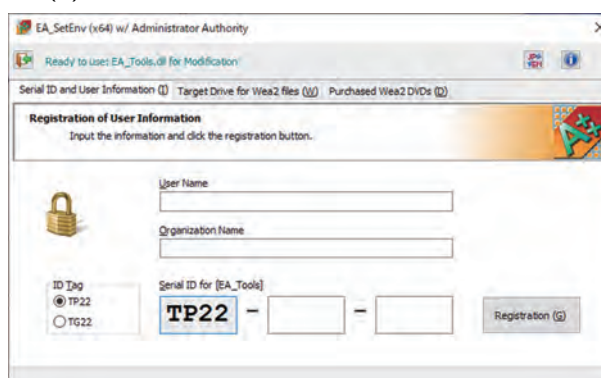


Fig. 11 Dialog Windows called by the Sub-Menus of File Menu

## 1.2.2 List Menu

This main menu does not have any sub-menu and just calls the following window.

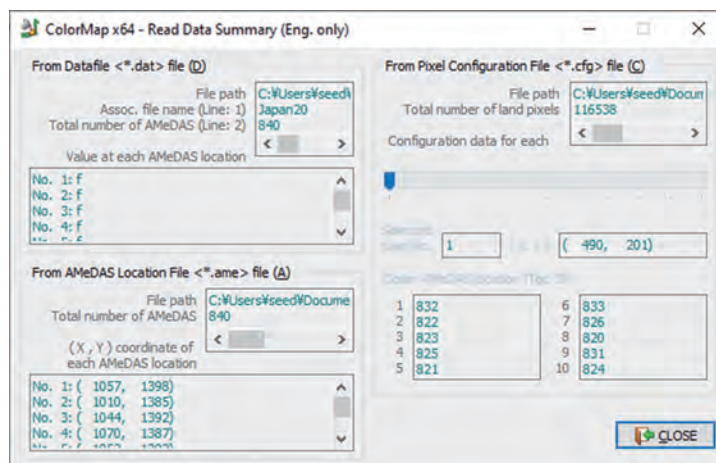


Fig. 12 [Read Data Summary] Window Opened by the List Menu


Contents of this window are not related to drawing map processing at all. However, if you can understand the description on appendix of this documents (A.1, p.19), you get useful information to know whether data files were read correctly or not.

On the left top of the window, input results of **dat** file are displayed: the first line's data of using main filename; the second line's data of total station (data) number; and following each

station's data. On the left bottom, pixel coordinate of each station is displayed.

On the right side of the window, you can see contents of `cfg` file. In this case, we know: there are 116,538 gray-colored pixels to be drawn; The first pixel is located (490, 201); Ten AMeDAS stations' relative number which are close to that pixel (832, 822, ..., 824).

### 1.2.3 Draw Menu

This main menu does not have any sub-menu and calls a window shown in Fig.5 by selecting the menu, too. The speed button  is alternative component for the menu. In order to explain clearly, we show the window again as Fig.13.

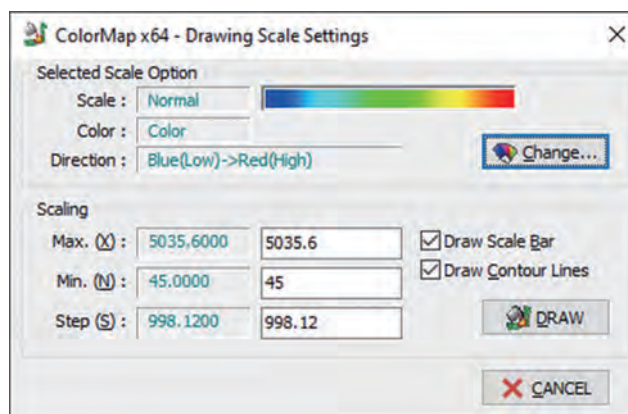



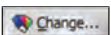
Fig. 13 [Drawing Scale Settings] Window called by Draw Menu

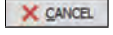
This window has function to setup color scales (its range and contour interval). In initial case, soon after reading data file, actual maximum and minimum values are filled in the input boxes. Moreover, automatic divided value is shown in the box labeled [Step], which is the difference divided by five.

You can refer these values to decide the prefer values. The input boxes accept ten key '0'-'9', '+', '-' signs, and decimal point '.'.

Additionally, you can control configuration of drawing elements by two check boxes.

- [Draw Scale Bar] Use check to draw scale bar (legend). Default is checked condition. Position of the scale bar is limited to four corners selected automatically.
- [Draw Contour Lines] Use check to draw the lines. Default is checked condition. Contour line color is limited to black. Thus in case of B/W scale mode, the contour lines are not so clear unfortunately.

After setting, in order to begin drawing, click the button labeled [DRAW] . When you click the button labeled [Change...] , another setting dialog window explained in the next subsection is displayed to change the scale coloring mode. After setting by newly displayed window, this window returns.

[CANCEL] button  makes invalid all changes in this dialog window and close it.

### 1.2.4 Sub-Menus under Option Menu

As shown in Fig.14, you can see that there are three sub-menus under the [Option] menu in the main window, in which a sub-menu labeled [Language] is expanded.

As you can see this expanded menus, these are selectors of display language for windows. However, if you use WINDOWS® US Edition, for example, it means that the primary supported language in the OS is not Japanese, these menus are invalid. The followings are explanations of the other sub-menus.

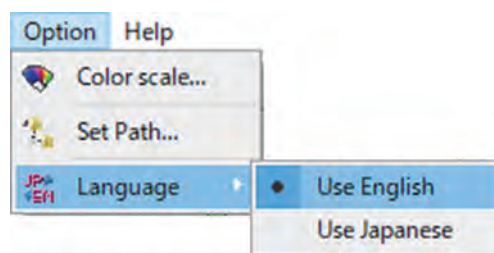




Fig. 14 Option Sub-Menus of ColorMap

[Color scale...] This sub-menu calls a dialog window illustrated in Fig.15 to set the scale in detail. You can select each of four options for the scale: (1) linear scale or log scale; (2) color scale changing from blue to red or color scale changing from red to blue; (3) B/W scale changing from white to black or B/W scale from black to white; (4) gradient scale or tile scale. The tile color is set with five colors as shown in the figure but you can choose ten colors at the maximum and preserve the data as a user-default. This sub-menu can be called by the alternative speed button .

[Set Path...] A dialog window shown in Fig.16(a) is displayed by selecting this sub-menu to setup the folder locations related to ColorMap. There are five setting items as shown in the figure.

To set each item, click the button . Then common dialog window shown in Fig.16(b) is invoked to set the folder location. Take care when you set [EA\_Tools DLL file] because the location affects to the other tool programs.

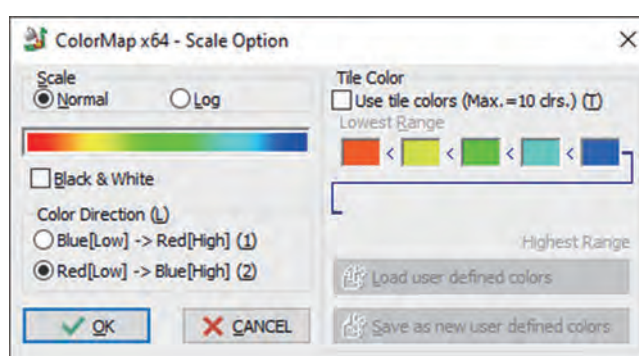


Fig. 15 [Scale Option] Dialog Window of ColorMap

### 1.2.5 Sub-Menus under Help Menu

There are two sub-menus under [Help] menu as shown in Fig.17. We explain the two sub-menus briefly.



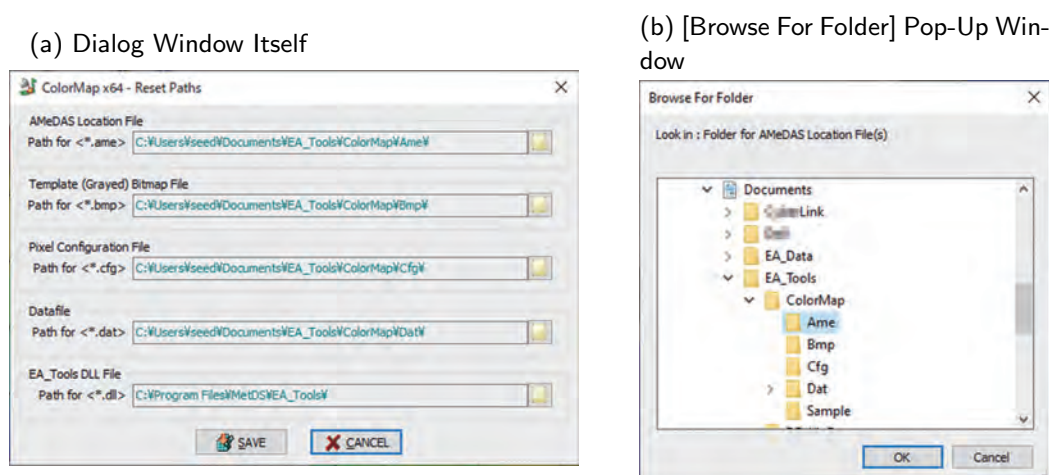


Fig. 16 [Reset Paths] Dialog Window of ColorMap

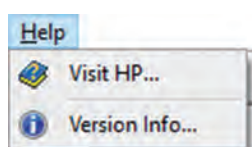


Fig. 17 Help Sub-Menus of ColorMap

When you select a sub-menu [Visit HP], our company's home page is displayed with your default HTML browser then. We wish that you can get the newest information on the tool programs from this media. Some bug fix information may be announced there.

The commonly called “About” box, the version information window pops up by the [Version Info...] menu.

### 1.2.6 Drawing Example of ColorMap

Figure 18 is a drawn example by ColorMap. This map is based on calculated statics data of the standard degree-days in Kinki district. The **dat** file was applied as an input dataset for ColorMap. After getting bmp image file by ColorMap, the file was retouched by a commercial image editing application tool. During processing in ColorMap, monochrome and tile scale was selected. See Fig.7 again for understanding such scale.

It may be obvious that selecting stations data surrounding the displayed area is very important to draw. When you want to make original color map, such thing is taken into account by using a tool program, GmConv.

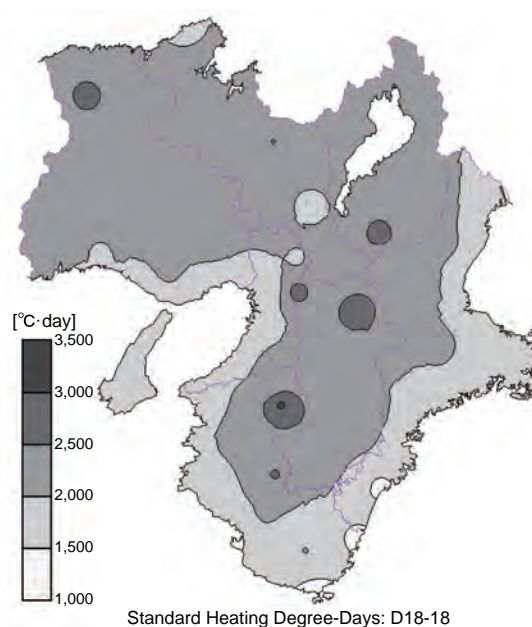


Fig. 18 HDD18-18 Distribution Map in Kinki

### 1.3 Precaution for Use of ColorMap

Please read following six points on precaution before starting ColorMap.

- (1) This tool program, ColorMap supports only true color (1.677 million color) bitmap file format for saving images. If your display device cannot support this true color mode, drawn images may be different from actual one. When you need to use the other format files, use commercial or free application tools for image data conversion. Additionally, if more higher resolution image data are required, you should prepare bigger bitmap files which can work with GM, gray map converter tool. However, the size may be unsuitable for ColorMap. You may make some investigations before applying such big files.
- (2) The file to be saved as bitmap file (\*.bmp) may have a size of over 3 MB. In processing, temporary work file having similar size is created in the user folder. Thus take care to capacity of free memory size on your HDD or SSD.
- (3) This tool program does not have functions to put the letters on the image and control the color precisely. If you need, use commercial or free software for editing graphical images after reading the bmp file obtained by CM.
- (4) When you print a drawn image via physical printer device by selecting [Print...] menu, especially in case of monochrome printer, image detail may be lost. Some other software may be useful for such case.
- (5) This tool program, ColorMap uses a dynamic link file named EA\_Tools.dll. There are other important files to work with ColorMap:

Japan00,	Japan07,	Japan10,	Japan20,	Japan86,
Hokkaido00,	Hokkaido07,	Hokkaido10,	Hokkaido20,	Hokkaido86,
Tohoku00,	Tohoku07,	Tohoku10,	Tohoku20,	Tohoku86,
Kanto00,	Kanto07,	Kanto10,	Kanto20,	Kanto86,
Chubu00,	Chubu07,	Chubu10,	Chubu20,	Chubu86,
Kinki00,	Kinki07,	Kinki10,	Kinki20,	Kinki86,
Chushi00,	Chushi07,	Chushi10,	Chushi20,	Chushi86,
Kyushu00,	Kyushu07,	Kyushu10,	Kyushu20,	Kyushu86

The files with the above main filenames and extension names of **ame**, **bmp**, and **cfg** are such kinds of files and the names are reserved by the EA Graphic Tools 2022\*<sup>6</sup>.

At the installation time of EA Graphic Tools 2022, a user folder named [EA\_Tools] and its branch folder named [ColorMap] are created. The [ColorMap] folder has sub-folders: [Ame], [Bmp], [Cfg] and [Dat]. The files explained here are classified and stored in each

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\*<sup>6</sup> The main filename consist of one of the region names (① Japan—All Japan, ② Hokkaido, ③ Tohoku, ④ Kanto, ⑤ Chubu, ⑥ Kinki, ⑦ Chushi—Chugoku and Shikoku, ⑧ Kyushu—excepting Nansei Islands) and one of two numerical letters:

00; 842 stations for present 20 years from 1981 to 2000, and past reference year 1995/2000,  
 07; 836 stations for present 7 years from 2001 to 2007, and past reference year 2010,  
 10; 831 stations for present 3 years from 2008 to 2010,  
 20; 841 stations for present 10 years from 2011 to 2020, and past reference year 2020,  
 86; 841 stations for future reference year 2086.

folder. The location of these four folders can be changed by using the menu [Option | Set Path...] as mentioned in 1.2.4 (p.8).

- (6) Settings of folders' location in item (5) and the main window's position are saved as registry data. The restore location is [DllPath] key value of [HKEY\_CURRENT\_USER\Software\MetDS\EA\_Tools] key. and all key values in [HKEY\_CURRENT\_USER\Software\MetDS\EA\_Tools\ColorMap] key. The change of [DllPath] key value is not recommended to avoid some trouble in other tool programs.

## 2 Gray Map Converter—How-to-Use of GmConv

Tool program GmConv (Gray Map Converter) is a program to prepare a set of template files for ColorMap, which are based on any user's gray colored true color bitmap file. Because input gray map file products some other files<sup>\*7</sup> as outputs, we can say that GmConv is a “gray map converter”.

In this chapter, we give a tutorial instruction for using GmConv at the first section. Then, all the functions are explained in the following section.

### 2.1 Fundamental Operation of GmConv (Tutorial)

#### 2.1.1 Outline of Tutorial Operations

GmConv is a specialized tool for ColorMap and is not general software dealing with some usual tasks. In this section, a tutorial style description on how-to-use of GmConv is given in order to master the usage. The itemized procedures of this tutorial is shown below:

- (1) To prepare a template (draft) bitmap file with gray pixels in order to use for ColorMap. That bitmap image should be a map drawn in rectangular coordinate System with  $x$ -axis for the longitude and  $y$ -axis for the latitude;
- (2) To input the bitmap file;
- (3) To select one of periodic series options on AMeDAS Stations and to start the processing by clicking the run button or [Run].
- (4) To input data of the longitude and latitude of the bitmap file input in the procedure (2).
- (5) To select AMeDAS stations to be included as interpolation points in ColorMap.
- (6) After a while, confirm created files as templates for ColorMap.

Finally, if you prepare some data file(s) related to the AMeDAS stations selected in the procedure (5), you are ready to start to use ColorMap to draw color maps (See Section: 1.3, p.10).

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<sup>\*7</sup> There are two kinds of files: “\*.ame” and \*.cfg files. If you input a gray bitmap file named “foobar.bmp”, files named “foobar.ame” and “foobar.cfg” are created. Each file is absolutely essential to operate with ColorMap. Role of each file is explained in Section: A.1 in the appendix part.

## 2.1.2 Step 1 — Preparation of Bitmap File

### (a) Required Size

Before using GmConv, you must prepare suitable template (draft) bitmap file. Map image of the bmp file should be based on rectangular coordinates with  $x$  for the longitude and  $y$  for the latitude\*<sup>8</sup>. It is strongly recommended that such data are used for writing a draft map. It is important for you to record or write down two dataset of the longitude and latitude for bottom-left and top-right corners of the image in order to set them lately.

The smallest size of bitmap images is approximately 400 pixels square and it must have open area of width: 80 pixels by height: 350 pixels on one of the four corners of the image\*<sup>9</sup>.

### (b) Reserved Colors and Settings of Coordinate

Follow the reserved colors and the coordinate as follows:

- (1) Put gray color [R = G = B = 192 (0hC0)] on a pixel for coloring with gradient finally. It means the pixel is one of the land\*<sup>10</sup>.
- (2) Use any color excepting gray color for the land [R = G = B = 192 (0hC0)] to indicate for borders between prefecture, for shores of lakes, and for water of lakes. We prefer a pink color [R = B = 255 (0hFF), G = 0] for the borders, the solid black [R = G = B = 0] for the shore lines, and the pure white [R = G = B = 255 (0hFF)] for any void area excepting the land\*<sup>11</sup>.



**Fig. 19 Created Example of Bitmap File for GmConv and ColorMap**

- (3) There are many projection methods for mapping System of the Earth globe. In this tool, a simple rectangle coordinates on the right handed System is applied. If you need another

\*<sup>8</sup> It means the Conformal cylindrical projection (Mercator projection) map. There are many digital maps projected by this method in commercial and free resource sites.

You can find free datafile of xy coordinate series for shoreline of Japan, too. Actually, we prepared all the template bitmap files included in the zip file of EA\_Graphic Tools 2022 by such datafile.

\*<sup>9</sup> This is determined by the fixed scale bar size, which has width of 32 pixels by height of 300 pixels, to avoid overhanging the image or masking the land image. ColorMap tests automatically such problem and avoid it by searching on the top-left, the bottom-left, the bottom right, and the top-right corners in described order. If there is no space to write the scale bar, ColorMap never put it even if the option is given to draw it.

\*<sup>10</sup> There are some islands which are too small to draw with a pixel. If it is important to draw, enlarge such islands by ignoring actual scale size.


\*<sup>11</sup> As you know, our preferring colors are not special ones because all the colors can be reserved more low-resolution color format. However, 24 bits true color (16 million colors) bitmap format is only one to be treated in ColorMap and GmConv. It means that the image files must have its file extension name of "bmp".



projection map, you convert the coordinates by some software after finishing work with ColorMap.

A bitmap image “miyagi07.bmp” illustrated in Fig.19 was created from license-free map data with a commercial drawing software\*<sup>12</sup>.

### 2.1.3 Step 2 —Reading of the Prepared Bitmap File

Figure 20 is a screen shot of a main window of GC started up. By clicking a sub-menu labeled [File | Open...] or a speed button , a dialog window titled [Select a bitmap file to read...] wakes up to select your destination bitmap file as shown in Fig.21

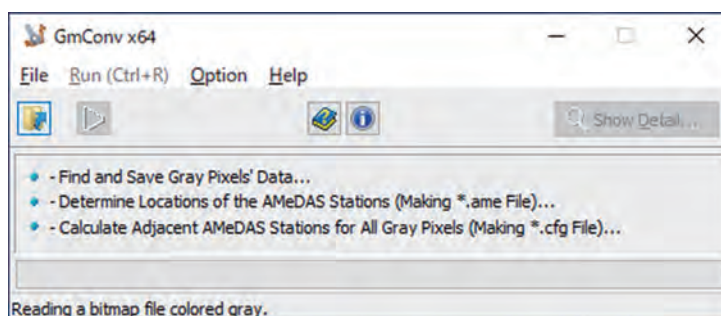


Fig. 20 Main Window of GmConv at the Start Up Status

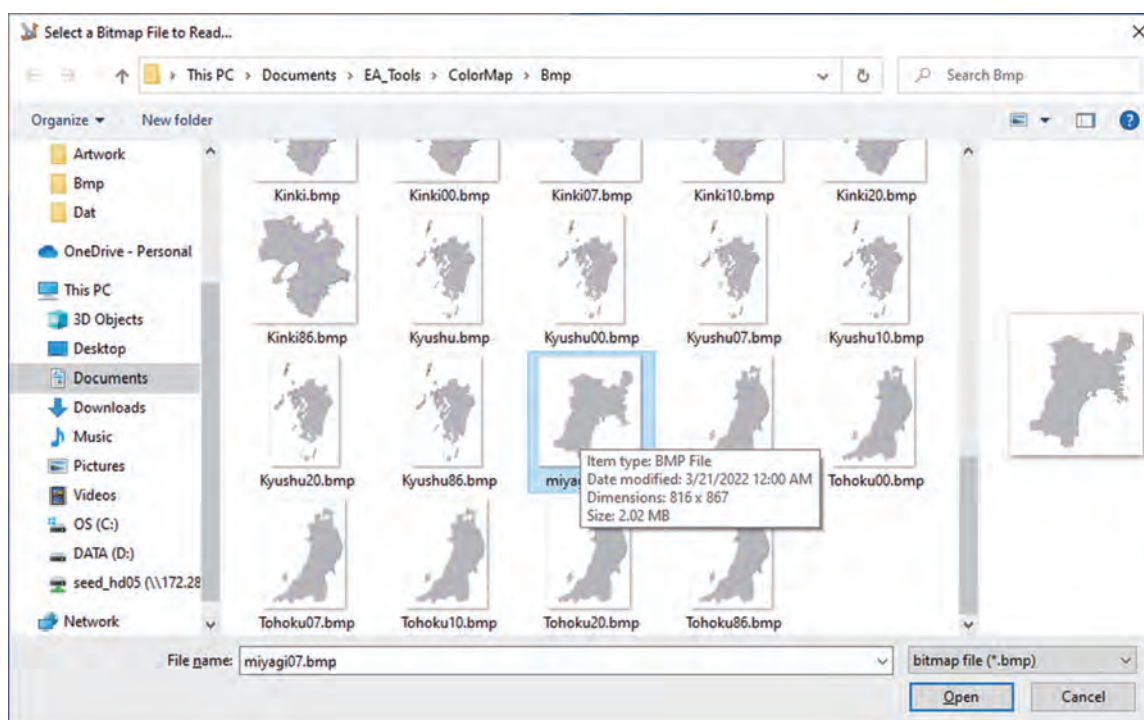



Fig. 21 Bitmap file (\*.bmp) Selection Window of GmConv

\*<sup>12</sup> Take care that sometime the file size of color pixel image goes too big with the higher resolution. Gm-Conv uses temporary files as memory restore media with approximately double size of the image file in [Documents] folder.

### 2.1.4 Step 3 —Start of Processing

As illustrated in Fig.21, select the file `miyagi07.bmp`<sup>\*13</sup> and click [OK] button to fix the destination file and close the dialog window. Then, the main window changes its appearance like shown in Fig.22. You can see enabled menu labeled [Run (Ctrl+R)] and speed button . When you click one of them, processing to read the given file start quickly. However, you should check and/or set one important option as described below.

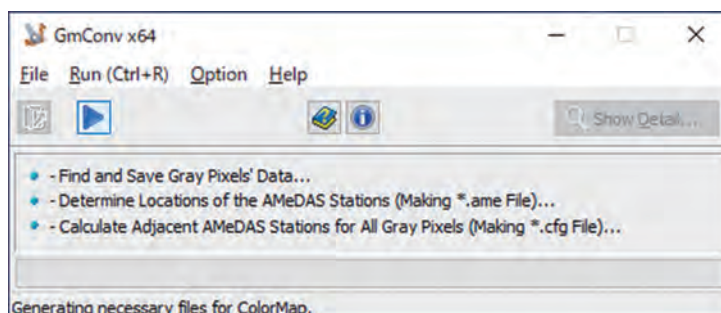



Fig. 22 Main Window of GmConv after Reading the Target Bmp File

User should confirm the the radio button setting is suitable by selecting the sub-menu displayed in Fig.23. In this figure, the radio button “●” indicates the sub-menu of [836 Stations for 2001-2007 (P)] because `miyagi07.bmp` has been selected to use statistical data during the years from 2001 to 2007. After such option setting and confirmation, click the [Run (Ctrl+R)] menu or the speed button  to start the reading process. Status of data reading is displayed as a sentence in the status bar and a animation in the progress bar.

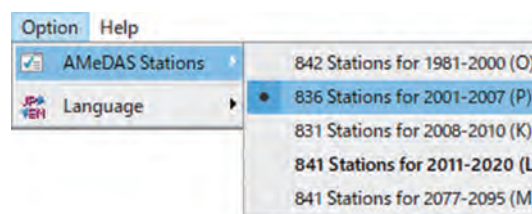


Fig. 23 AMeDAS Stations Option of GmConv

### 2.1.5 Step 4 —Input of Latitude and Longitude Data

When the datafiles were completed to read, a window shown in Fig.24 appears. For this window's input boxes, put correct values which were memorized at the bmp file creation time and click [OK] button. By the way, Fig.24 shows the real value settings for

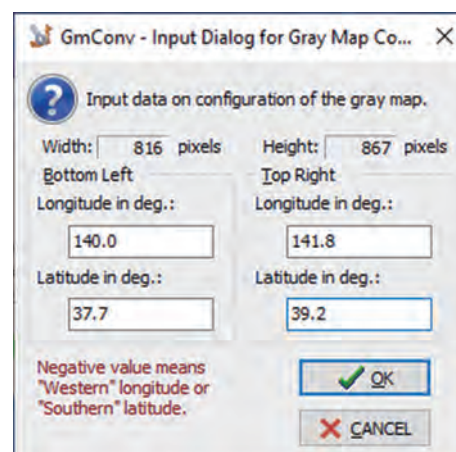
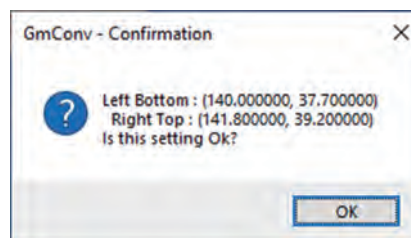


Fig. 24 Latitude / Longitude Input Window of GmConv

<sup>\*13</sup> `miyagi07.bmp` is stored in the sub-folder named [Samples] branched under [ColorMap] folder. You can follow this operation actually.

miyagi07.bmp (See Fig.19 again).

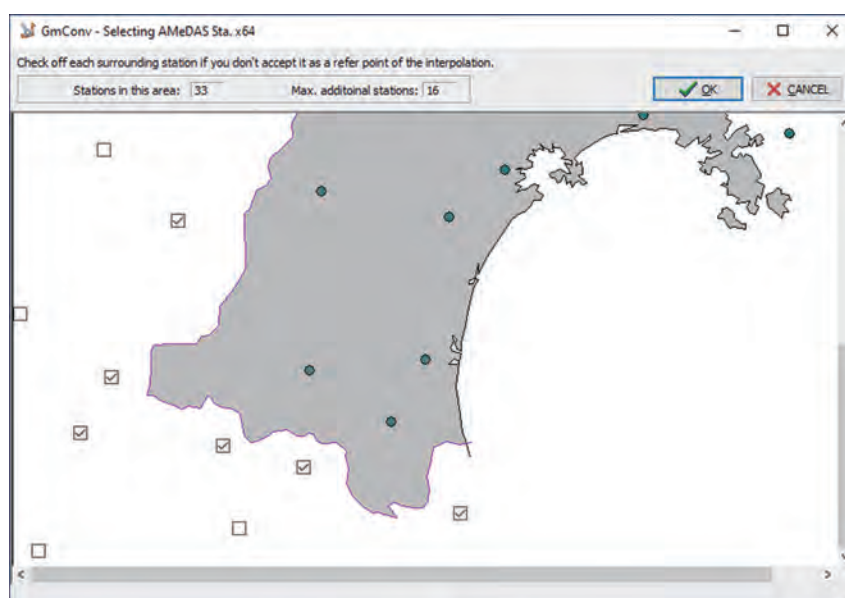
Simple input error can be detected automatically. In no error case, a confirmation message box is displayed as shown in Fig.25 to answer [OK] finally.



**Fig. 25 Confirmation Message Box for Input Latitude / Longitude Data**

### 2.1.6 Step 5 —Selection of AMeDAS Stations and Data Processing

Soon after, another window pops up as shown in Fig.26. This window is used to select AMeDAS stations which will be variables for interpolation.



**Fig. 26 Choice of AMeDAS Stations by Dialog Window of GmConv**

Solid black disk marks “●” indicate fixed and non-removable AMeDAS stations located in the land with gray colored pixels. On the other hand, there are some check boxes located AMeDAS stations at the external area of the land. These points are depended on users' decision to be used for interpolation. Thoroughly, check or uncheck each box by box. Then click [OK] button to finish the selection.

After clicking the [OK] button, rest processings are done automatically. Then a kind of log file named “foobar\_a.dat” for input file “foobar.bmp” is created automatically to record the processing. You can get information which AMeDAS stations are used for interpolation by reading this file. This file can be used as a draft input datafile in dat folder.

### 2.1.7 Step 6 —Finish of the Process

Sometime, it may be taken a little bit long time to process after clicking [OK] button of the window in Fig.26. Processing time depends on the size of bitmap file and the selected AMeDAS stations as the interpolation points due to huge steps are repeated for every gray-colored pixels to create a template AMeDAS information file (\*.cfg).

Several files are created during the process. After finishing the process, you can see that the [Show Detail...] button becomes enable to select (bluish one in the right side of the window as shown in Fig.27). If you click this button, a new information window is displayed as illustrated in Fig.28. This window contains log records of users' operation as text data in English. The record can be printed and saved as a file to be useful to memorize your work.

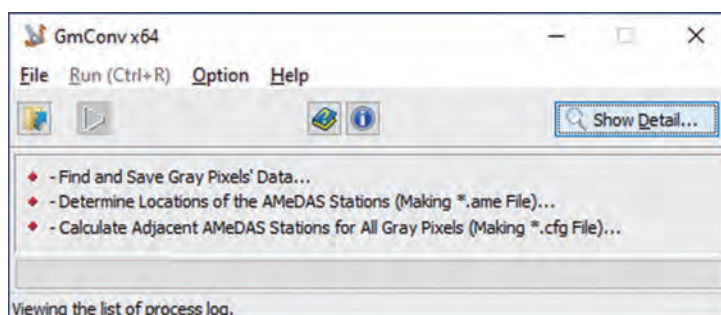


Fig. 27 Main Window of GmConv after Finishing the Process

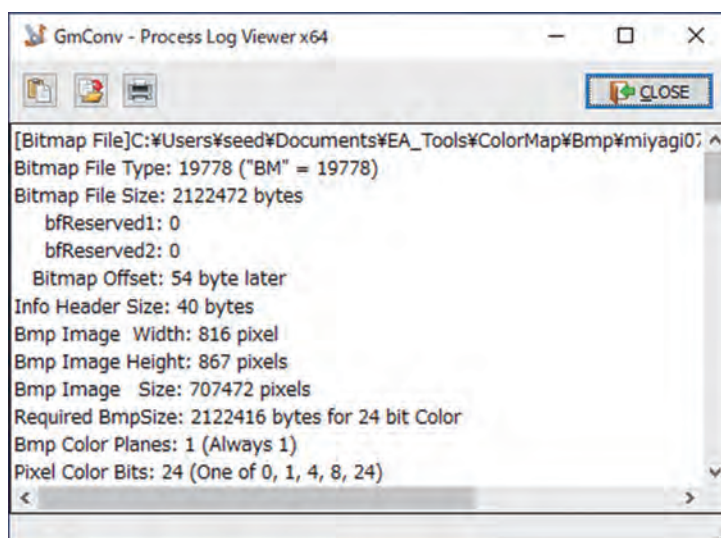


Fig. 28 [Process Log Viewer] Window Displayable after Processing with GmConv

## 2.2 Functions (Menus) of GmConv and the Batch Processing

You can see usual or classical menu bar and speed buttons bar in upper part of the main window as shown in Fig.29. Usually, as you know, speed buttons are alternative switches for deep-tree-branched sub-menus' functions. So we describes the menus mainly in this section: (1) [File], (2) [Option], and (3) [Help]. The menu of [Run (Ctrl+R)] has no sub-menu and we mentioned that function in 2.1.4 (p.14). Thus the explanation is omitted here.



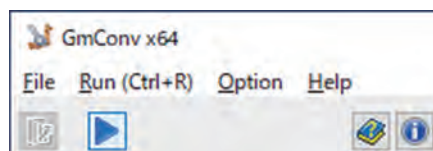



Fig. 29 Main Menus and Speed Buttons of GmConv

### 2.2.1 Sub-Menus under File Menu

Sub-menus under File menu is shown in Fig.30.

[Open...] This menu wakes up the dialog window to select a template bitmap file in which image is grayish (See figCM-11(d) again). The speed button  is an alternative function.

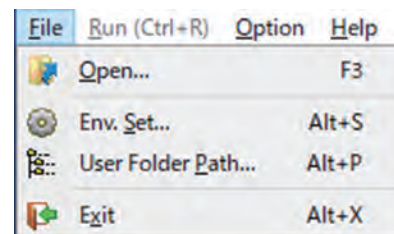



Fig. 30 File Sub-Menus of GmConv

[Env. Set...] This menu calls a common program named EA\_SetEnv2022 which is used by all the tool programs installed as “EA\_Graphic Tools 2022”. The invoked program saves the environmental conditions of the tools. See a manual for EA\_SetEnv2022 [1] to get information in detail.

[User Folder Path...] GmConv uses the user folder named [Documents\EA\_Tools\Color-Map] folder, which is also accessed from ColorMap, to create several files in the sub-folders. This menu calls a setting dialog window which is very similar to the window illustrated in Fig.16 (p.9).

[Exit] This menu terminates the program like clicking of  button.

### 2.2.2 Sub-Menus under Option Menu

By clicking [Option | AMeDAS Stations], you can see list menu with a radio button as shown in Fig.32. Select the correct one with consideration of statistical property for values set. This selection determines which information file should be read in processing the conversion. The information files (Gm\_Info file) to be read in [Program Files (or Program Files (x86))\MetDS\EA\_Tools] folder are:

Gm\_Info00.dat, Gm\_Info07.dat, Gm\_Info10.dat, Gm\_Info20.dat, Gm\_Info86.dat,  
Gm\_Info00J.dat, Gm\_Info07J.dat, Gm\_Info10J.dat, Gm\_Info20J.dat, Gm\_Info86J.dat

Of course, these files must exist for correct work of GmConv.

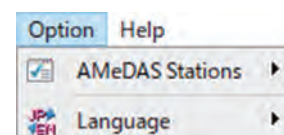


Fig. 31 Option Sub-Menus of GmConv

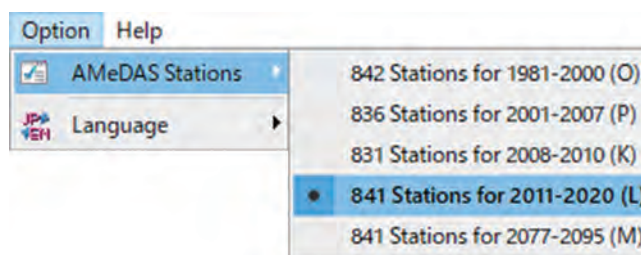


Fig. 32 [AMeDAS Stations] Sub-Menu of GmConv

[Language] sub-menu is not so specialized for this program to switch the displaying language to be Japanese and to be English. However, if your OS is not Japanese edition fundamentally, this sub-menu may have no effect.

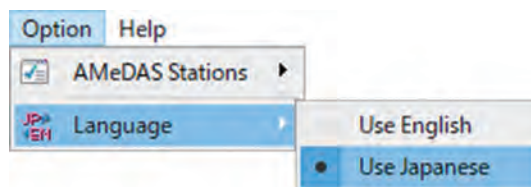


Fig. 33 [Language] SubMenu of GmConv

### 2.2.3 Sub-Menus under Help Menu

[Help] Menu has two sub-menus as shown in Fig.34.

When you click the sub-menu [Usage...], your default HTML browser invoke with showing our company's homepage.

And [Version Info...] sub-menu calls a message box of the version information of GmConv.

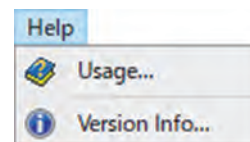


Fig. 34 Help Sub-Menus of GmConv

### 2.2.4 Batch Processing

If you are not familiar with “batch” work or does not know well keywords of “.bat” and “.cmd”, we are afraid for you to confuse the usage of GmConv. However, it is important to inform it well so that you may work with GC more simply.

How-to-make a batch file and to execute it is based on a little bit higher operation skill of WINDOWS® OS. However, there are many useful informations and instructions can be found by the internet search. Thus we expect for you to learn such things by yourself and just tell you an example of batch information file for GmConv, Hokkaido00.gmb located in [Program Files (or Program Files (x86))\MetDS\EA\_Tools] folder here.

That file is a text file written with ASCII characters and use like a command type in:

```
"C:/Program Files/MetDS/EA_Tools/GmConv.exe" Hokkaido00.gmb
```

It is a kind of command for GmConv to work in silent mode.

The followings are contents of the file but edited to be fit in this page width. So, each line's head begins with letter #n: which is not included in the file actually.

(contents of Hokkaido00.gmb)

```
#1: Hokkaido00      <- Main file name (NAME) for NAME.ame, NAME.cfg, and NAME.dat
                   --- 20 cols. for data and max. 127 cols.--->|
#2: 139.10 41.30    <- Longitude [deg.] & Latitude [deg.] for the left bottom of NAME.bmp
#3: 146.10 45.65    <- Longitude [deg.] & Latitude [deg.] for the right top of NAME.bmp
#4: 2000            <- Year for Station numbering (1981,...2020/8195/9100/110/1120/7795:
                   Following Station numbers means
#5: 1-162/          <- AMeDAS Stations block numbers '-' : continuous symbol, i.e.,
                   L1-L2 means numbers from L1 to L2
#6: 163/            <- '/' : separator of sta.nos' data to be continued to the next line, too.
#7: 164,165,166-169 <- ',' : simple separator of a sta.no's datum and '~' : end of data
```

The first line declares a main filename. GmConv understands that a grayish bit map file

“Hokkaido00.bmp” should be processed, “Hokkaido00.ame” and “Hokkaido00.cfg” files should be created as converted process. Of course, file Hokkaido00.bmp must exist already before applying this batch file.

You may understand what we say simply when you read a comment description from 21th column till 127th column: The second and third lines indicate the longitude and the latitude at bottom left corner and top right corner.

The forth line indicates which proid of AMeDAS Information files is read.

The fifth and later lines are description of using AMeDAS station. In this file, AMeDAS ID is determined as local serial numbers from 1 to 842 (841, 836, or 831). The letter / and ~ are important delimiters for numbers description.

## Appendix A

### A.1 External datafiles Required for Execurting ColorMap

The datafile which ColorMap explicitly demands for user is the file type of `[*.dat]` only, but in addition to this kind of file, ColorMap uses the following four kinds of files:

#### `[*.dat]` Datafile

The `[*]` part can be named with user’s own decision. User should prepare an ASCII text file in conformity with the specified format.

#### `[+.ame]` AMeDAS location file

The `[+]` part is usually either one of the follows:

Japan00,	Japan07,	Japan10,	Japan20,	Japan86,
Hokkaido00,	Hokkaido07,	Hokkaido10,	Hokkaido20,	Hokkaido86,
Tohoku00,	Tohoku07,	Tohoku10,	Tohoku20,	Tohoku86,
Kanto00,	Kanto07,	Kanto10,	Kanto20,	Kanto86,
Chubu00,	Chubu07,	Chubu10,	Chubu20,	Chubu86,
Kinki00,	Kinki07,	Kinki10,	Kinki20,	Kinki86,
Chushi00,	Chushi07,	Chushi10,	Chushi20,	Chushi86,
Kyushu00,	Kyushu07,	Kyushu10,	Kyushu20,	Kyushu86,

Either one name is specified by the data of `[*.dat]` file.

This file is composed of a binary format that describes one record (44 bytes) in a structure of AINF explained below, and gives the pixel coordinates of AMeDAS stations in the template bitmap file described below.

```
typedef struct {
    long x, y; // Location in x- and y-pixels, 8 bytes (4 + 4)
    char name[36]; // Location Name, 36 bytes
} AINF; // AMeDAS information data format 44 bytes (11 words)
```

#### `[+.bmp]` Template bitmap file

The `[+]` part is usually either one of the above files mentioned in the explanation of the AMeDAS location file. Either one name is specified by the data of `[*.dat]` file.

The data structure is the same as those bitmap files of general use, with the exception that it only responds to the data structure of 16 million color type.

## [+.cfg] Pixel configuration file

The [+] part is usually either one of the above files. Either one name is specified by the data of [\*.dat] file.

This file is composed of the binary format that describes one record (24 bytes) in a structure of GPIX data explained below. The one record contains coordinates data of a gray-colored (R=G=B=192) pixel to indicate that the pixel belongs to the land and a line data of the closest 10 AMeDAS stations' identification numbers for the pixel.

```
typedef struct {
    short x, y; // Location in x- and y-pixels, 4 bytes (2 + 2)
    short loc[10]; // 10 Closer AMeDAS obs. numbers, 20 bytes (2 * 10)
} GPIX; // Gray Pixel data format 24 bytes (6 words)
```

## A.2 Input data file format of [\*.dat]

although the data file can be prepared without any difficulties by user, remind that it can be read only in the following format<sup>\*14</sup>:

```
Kinki07 <- ame/bmp/cfg main filename This filename is [Kinki07.dat]
123 <- Total Stations ID Name Prefect. Ser.
1831.5 4790 Kuwana Mie 1
1858.2 4800 Yokkaichi Mie 2
2000.4 4810 Kameyama Mie 3
..... ....
1718.3 6720 Takamatsu Kagawa 121
1968.1 6740 Takinomiya Kagawa 122
1785.8 6750 Hiketa Kagawa 123
Data: Degree-days 18-18 for Kinki District (New Rev.1), Prepared by MetDS
Kinki07.bmp W680 X H722 pixels, Bottom Left(134.10E, 33.30N) - Top Right(137.10E, 35.80N)
```

The format is as follows:

## 1st line

The main filename that correspond to [+] of [+.ame], [+.bmp], and [+.cfg] files. The main filename is not path-name including the name of the directory (folder). It is specified within 80 alphanumeric characters written from left side end.

It is usually typed with one of the following 40 kinds:

Japan00,	Japan07,	Japan10,	Japan20,	Japan86,
Hokkaido00,	Hokkaido07,	Hokkaido10,	Hokkaido20,	Hokkaido86,
Tohoku00,	Tohoku07,	Tohoku10,	Tohoku20,	Tohoku86,
Kanto00,	Kanto07,	Kanto10,	Kanto20,	Kanto86,
Chubu00,	Chubu07,	Chubu10,	Chubu20,	Chubu86,
Kinki00,	Kinki07,	Kinki10,	Kinki20,	Kinki86,
Chushi00,	Chushi07,	Chushi10,	Chushi20,	Chushi86,
Kyushu00,	Kyushu07,	Kyushu10,	Kyushu20,	Kyushu86,

Alternatively, if an original template bitmap is prepared with GC explained in Chapter: 2, type the main filename that correspond to [+] parts of AMeDAS location file (+.ame), template bitmap file (+.bmp), and pixel configuration file (+.cfg), formed in the process with GmConv.

## 2nd line

Total numbers of AMeDAS stations used as the known data, within five letters written from left side end.

<sup>\*14</sup> In the folder named Dat\Template, two layers below from the folder that includes ColorMap.exe, data files useful as templates are provided corresponding to the respective regions. These can be used as copies, for avoiding any read error involved in input format.



### 3rd line and after

Description of data in such a way as one line for one station's identification number, beginning from line for smaller number down to line for larger one, described with floating decimal point (F) by the use of numerical, negative sign, and period. Exponential description such as 0.1234e+56 is not accepted. Description should be within 120 orders of magnitude, written from left side end. Blank spaces in succession at the top and end of a column can be accepted. The presence of blank space letter(s) at the end of the described data makes the following letters non-readable. This is useful for describing comments that explain data.

## A.3 Interpolation Method of ColorMap and Its Boot Option

If you have read the previous part of this document, now you may understand that the gray colored pixel means a small portion of land and the destination point to get a estimated value by some interpolation method referring AMeDAS stations' values. As illustrated in Fig.35, generally we use the closest ten stations for a pixel to estimate its value.

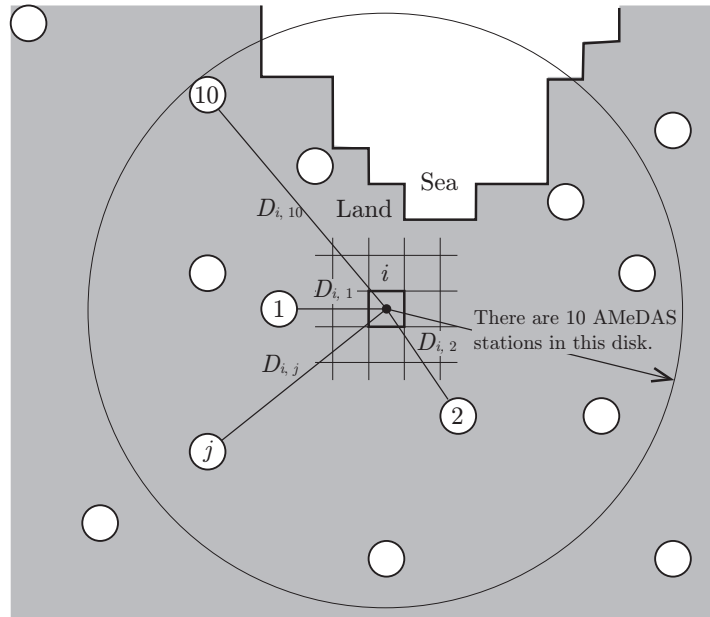
Now assuming that the target pixel number is given as  $i$ ,  $j$  is given for one of the closest stations (thus,  $j = 1, 2, \dots, 10$ ),  $V_j$  is a value at the station  $j$ , and  $D_{i,j}$  is the distance between the pixel  $i$  and the station  $j$ , then, estimated value for the pixel  $i$ ,  $v_i$  can be determined by Eq.(1) [2].

ColorMap uses ten stations for interpolating all the pixels ( $n = 10$ ). However, you can use  $n = 2, 3, \dots, 9$  instead of that default value. You can set the optional argument


$$v_i = \sum_{j=1}^n \frac{1}{D_{i,j}} V_j \bigg/ \sum_{j=1}^n \frac{1}{D_{i,j}} \quad (n = 10) \quad (1)$$

ColorMap uses ten stations for interpolating all the pixels ( $n = 10$ ). However, you can use  $n = 2, 3, \dots, 9$  instead of the default value of 10. In such cases, you can set the optional argument to run the program as described in the below:

"C:/Program Files/MetDS/EA\_Tools/ColorMap.exe" -4



**Fig. 35 Interpolation Method of ColorMap to Give a Color for Any Grayish Pixel**

This is an example for 64 bit version OS and for  $n = 4$ . Please replace “/” with “¥” or “\” in case by case depending on your OS status. An input box pops up around the [Windows Menu] window displayed by clicking  for accepting this command.

#### A.4 Pixel Color Scaling of ColorMap

In this section, we assume that the some values given for AMeDAS stations used in a map to draw distributes in a range between from the minimum border of  $\bar{V}_m$  and the maximum border of  $\bar{V}_M$ , which are determined with the window shown in Fig.13 (p.7). Furthermore, the value for the pixel  $i$  is estimated as  $v_i$ .

Then, we can determine the relative value,  $r_i$ , for pixel  $i$ :  $r_i = v_i / ((\bar{V}_M - \bar{V}_m))$ . For any  $r_i$ , because it varies from 0.0 to 1.0, we can apply the color with logical charts illustrated in Fig.36. In the figures,  $r_i = 0.8$  is assumed as an example. ColorMap can apply all the four gradient scales shown in Fig.36 (a)–(d). If you need, refer some explanations on the dialog window in Fig.15 (p.8).

The scaling logic is very simple so that coloring by ColorMap is not sophisticated for human color vision deficiency.

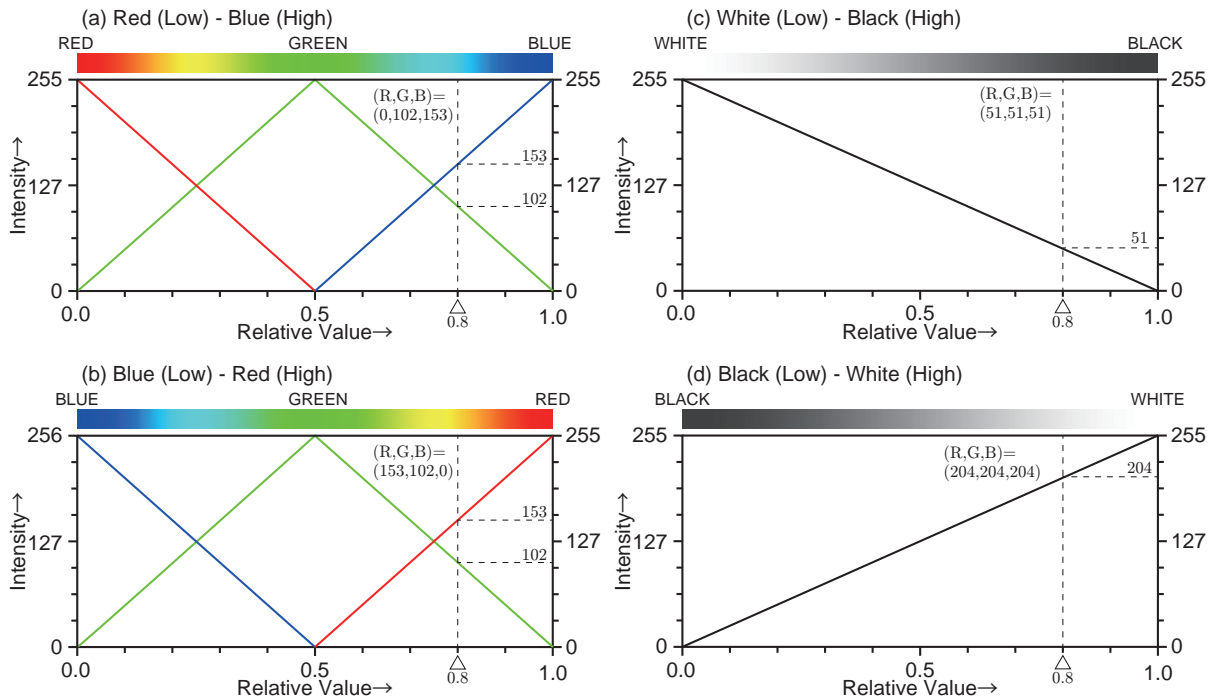


Fig. 36 Scaling of Color in ColorMap

## References

- [1] MetDS: EA Graphic Tools 2022 General Users' Manual with a Manual of the Environment Setting Program, EA \_SetEnv2022, Meteorological Data System Co. Ltd. (Kagoshima, e-book), 2022.5.
- [2] Kyushu University Computer Center (Ed.): Contour Mapping Assist Programs for Random Discrete Points' Data—Subroutine RNDMMS, Users' Manual, Kyushu University Computer Center.  
(Other detail information is not clear due to personal communication with the late professor Nobuhiro Miki, Osaka City University.)

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EA Graphic Tools 2022  
Users' Manual for  
Color Map Drawig Tool, "ColorMap" &  
Gray Map Converter (Template Map Preparation Tool), "GmConv"

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