

EA Graphic Tools 2022

Users' Manual for

Degree-Day Calculation Tool

“DDWin”

Meteorological Data System Co. Ltd.

May, 2022

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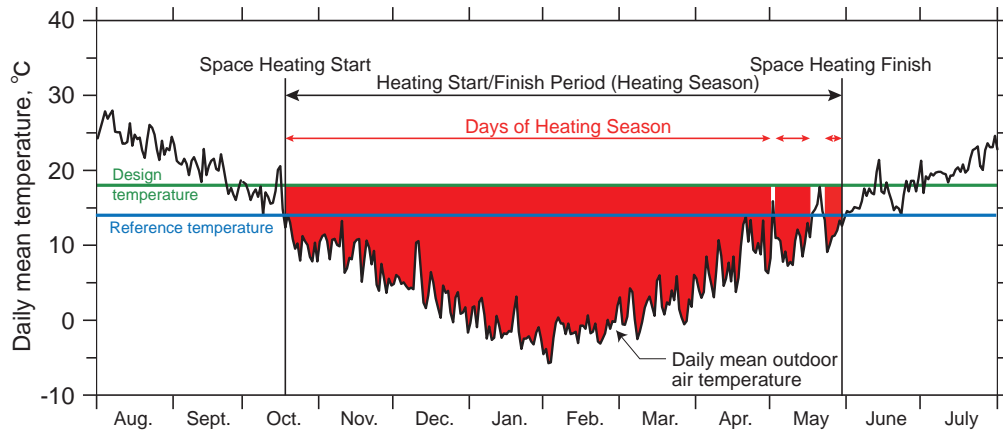
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# 1 Introduction

## 1.1 What's Degree-Days?

The definition of “degree-days” may be understood by a graphical image like Fig.1, which is showing “heating” degree-days with the red-filled area.



**Fig. 1 Explanation of (Heating) Degree-Days**

Technical terms, Design temperature, Reference temperature, Heating season, and Days of heating season, in the figure are described as follows. The Design temperature, which can be said as “set temperature”, is a typically assumed indoor air temperature to be kept by space heating/cooling. For space heating, we can use “heating design temperature” or “heating set temperature”, and “cooling design temperature” or “cooling set temperature” for space cooling. The timing of space heating/cooling is decided day by day on the basis of “reference temperature”. The “reference temperature” is daily mean outdoor air temperature, whose level must be referred to determine turning on space heating/cooling. If mean outdoor temperature of a day is lower than the reference temperature, then that day must be considered to belong to heating season and the difference between heating design temperature and daily mean outdoor temperature is added to a sum. Similarly, if mean outdoor temperature of a day is higher than the reference temperature, then that day must be considered to belong to cooling season and the difference between daily mean outdoor temperature and cooling design temperature is added to another sum. Imagine that such temperature comparisons are done through whole days of a year. You can get a sum for heating season and a sum for cooling season. These are **heating degree-days** and **cooling degree-days**, respectively. In Fig.1, the heating degree-days means the red-colored area.

You can find the start day and finish day for space heating in the figure easily. The period between these two days is defined as the **heating season**. And you may count days requiring space heating. The total days for space heating is called as **days of heating season**. Maybe, it is easy to understand the words of **cooling season** and **days of cooling season** from explanation mentioned in the above on space heating.

## 1.2 Outline of DDWin


This program, DDWin, calculates heating/cooling degree-days for your target AMeDAS station, whose weather data are recorded in **wea2** file, *i.e.*, past reference year file, future reference year file, or existent year file.

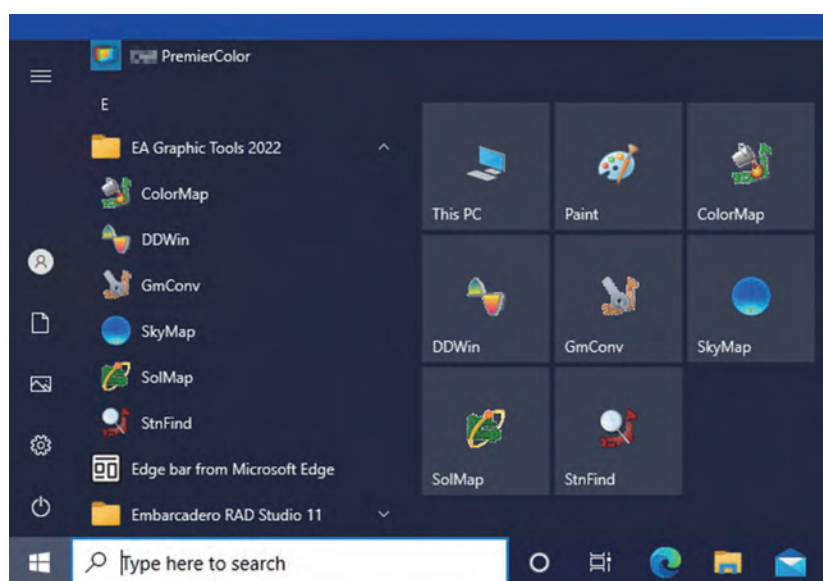
DDWin has the following features:

- Not just calculating degree-days, the heating period (season), days of heating season, cooling period (season), days of cooling season can be calculated simultaneously;
- Calculated results difference due to settings of the design temperature and the reference temperature can be displayed as a graph drawn by real-time processing;
- A series of calculations for several AMeDAS stations can be done continuously with graphical viewer;
- A series of calculations for several AMeDAS stations can be done continuously without graphical viewer, like batch mode calculations; and
- Calculated results are printable and recordable as files. Graphics are also printable and recordable as files formatted by the enhanced metafile style etc.

## 2 How-to-Use of DDWin — Tutorial

### 2.1 Startup

As shown in Fig.2, the initial main window of DDWin will be displayed when you click  ([Start]button) and show the program list, choose [E | EA Graphic Tools] sub-list to display the DDWin program menu.



**Fig. 2 Startup of DDWin from [ Program Menu ]**

Figure 3 is the initial main window of DDWin soon after invoking. We will explain how-to-

use of DDWin with tutorial style documentation. Please follow the tutorial and master the fundamental usage.

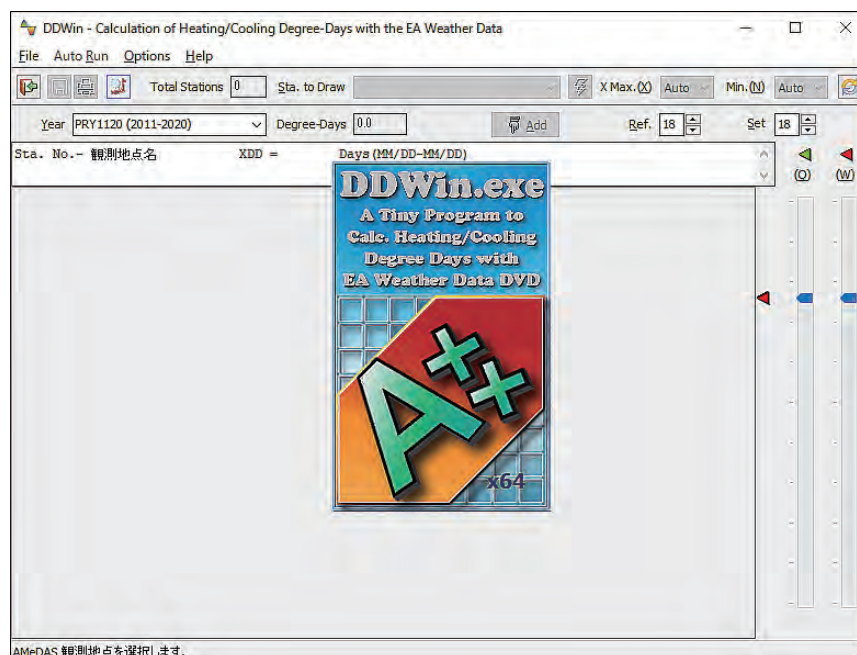


Fig. 3 The initial main window of DDWin

## 2.2 Selection of Wea2 File

At first, access to a pull-down type list box labeled [Year] to choose a file “PRY1120 (2011-2020)” (past reference year 2020 Ed.)\*<sup>1</sup>.

It is strongly recommended that you should register all the wea2 files via a dialog window displayed by [File | Env. Set... ] menu explained later.

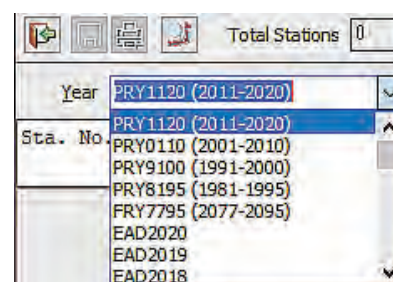



Fig. 4 List Box for Selecting Wea2 File (Example)

## 2.3 Display [ Selection of Weather Stations ] Dialog Window

In order to display [ Selection of Weather Stations ] dialogue window (sub window), select [File | Open...Ctrl+O] menu from the menu bar of the main window or click . After the menu selection or the speed button clicking, a dialog sub window as shown in Fig.6 (a) or (b).

At first, look at the top of this window. There is a description with rather big font, [ To be loaded: ... ]

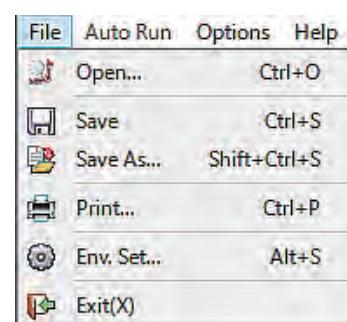


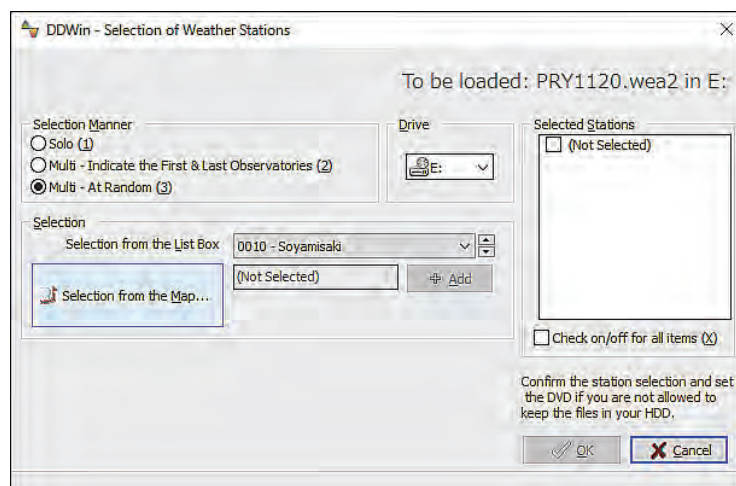
Fig. 5 Menu to Display the Selection of Weather Stations Dialog Window

\*<sup>1</sup> If you don't have the file explained here, please replace the name to a file you have.

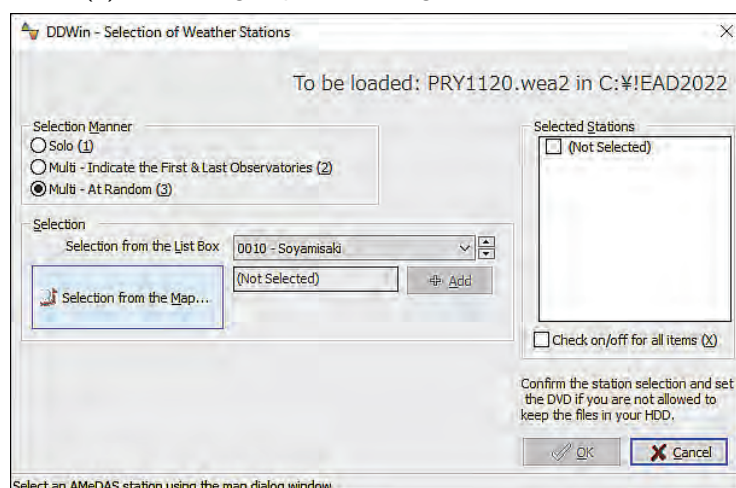
to show the destination `wea2` file to be read and the device (disk drive letter or folder name)\*<sup>2</sup>.

If you have a serial ID of “TP22–” series, the window appearance is like Fig.6 (a). Then check the dvd drive letter. If it is improper, click the [Cancel] button to close the window and return to the main window. Then set correct drive by [File | Env. | Set...] menu.

(a) In case of single user having a serial ID: TP22–...



(a) In case of group user having a serial ID: TG22–...



**Fig. 6 Selection of Weather Stations Dialog Window (Example)**

## 2.4 Choice of Weather Stations' Selection Way

Now we will explain the dialogue window illustrated in Fig.6 in detail. You can see a radio button group named [Selection Manner] including following three radio button alternatives:

- ① [Solo (1)] ..... To select only one station at once;
- ② [Multi – Indicate the First & Last Observatories (2)] ... To select several stations within assigned range; and
- ③ [Multi – At Random (3)] ..... To select several stations assigned each by each.

\*<sup>2</sup> As shown in Fig.6 (a) and (b), the windows appearances are different each other due to user's serial ID kinds.



If you can see only ① [Solo (1)], you option setting is different from our assuming one. In such case, please close this dialogue window and return to the main window to operate [Options | Multi-Selection ►][Yes] menu to be marked like Fig.7 showing. Then, come here again.

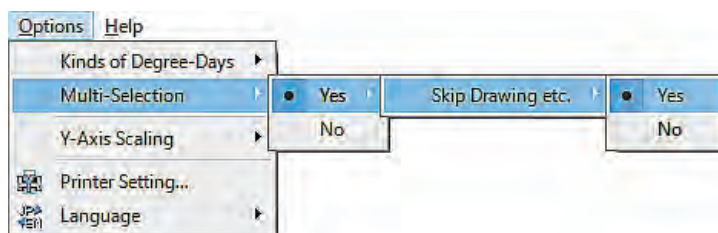


Fig. 7 Operation of Option Menu for Selecting Multi-Dtations

Now select an alternative radio button named [Multi – At Random (3)] at the bottom.

## 2.5 Selection / Deletion of Weather Stations

Use the group box named [Selection] in the dialog window shown in Fig.6 to select target AMeDAS Stations to be calculated. See Fig.8. There are two ways to indicate one of the target AMeDAS stations: ① Use map(-style-browsing) dialog window (map GUI window) displayed by clicking [Selection from the Map] button; and ② Use the combo listbox.

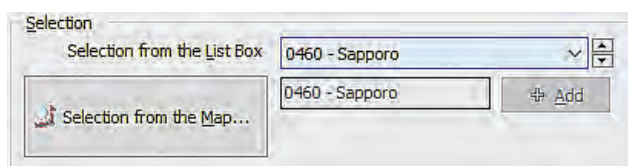


Fig. 8 Components for Selecting Single Weather Station

Now let's select "Sapporo" in Ishikari sub-prefecture of Hokkaido using the map GUI window. Click [Selection from the Map] button to display the window shown in Fig.9. Focus the central area of Hokkaido Island to find Sapporo.

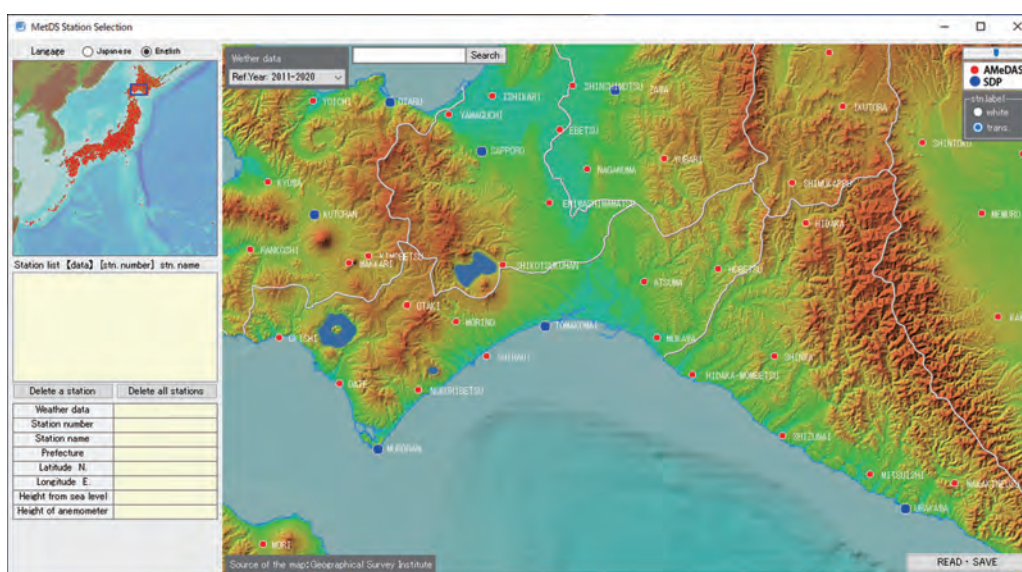

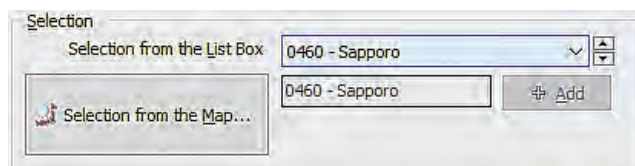


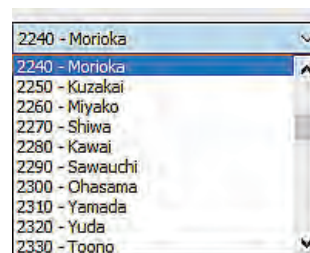
Fig. 9 Map GUI Window for Selecting AMeDAS Stations

Click "Sapporo" from the map and click [READ-SAVE] button to confirm the selection and


close the map GUI window. Check the display of [Selection] group box in the dialog window is similar with Fig.10 and click [Add] button (  Add ) in this group box.



**Fig. 10 Description of selected result in [Selection] group box**



**Fig. 11 Selection of an AMeDAS station from combo listbox**

We have finished selecting “Sapporo”. Next, let’s select “Morioka” (Station ID: 2240, in *Iwate* Prefecture) using the combo listbox. Select “Morioka” from the combo listbox like Fig.10. After the selection of “Morioka” list item, click  Add button in the [Selection] group box. Now “Morioka” has been selected.

Uncheck the item from the check listbox shown in Fig.12 (a), if you want to remove the selected station. As a practice, please uncheck the item of Tokyo now like shown in Fig.12 (b).

(a) Status with all checked items




(b) Status with an unchecked item



**Fig. 12 Displayed Items in Selected Station Check Listbox**

## 2.6 Confirmation of Selected AMeDAS Stations and Execution

Click [OK] button located in the right bottom of dialogue window shown in Fig.6 (p.4) to confirm the selected stations. After a few minutes, the main window will change the appearance as shown in Fig.13.

The DDWin has default settings of design (set) temperature and reference temperature, which are 18°C, respectively. Therefore, the program starts calculation for the first target station quickly. This is a reason why the graphics will be displayed as soon as the dialogue window closed. Of course, you can indicate to re-calculate and re-draw manually by clicking a speed button, , in the main window.

By the way, if your option setting of kind of degree-days is now CDD (for cooling degree-days), then the calculation result and graphics are quite different from those shown in Fig.13 as shown in Fig.14. Refer the following subsection (Subsection: 3.1, p.10) for getting information on how-to-change the option settings.

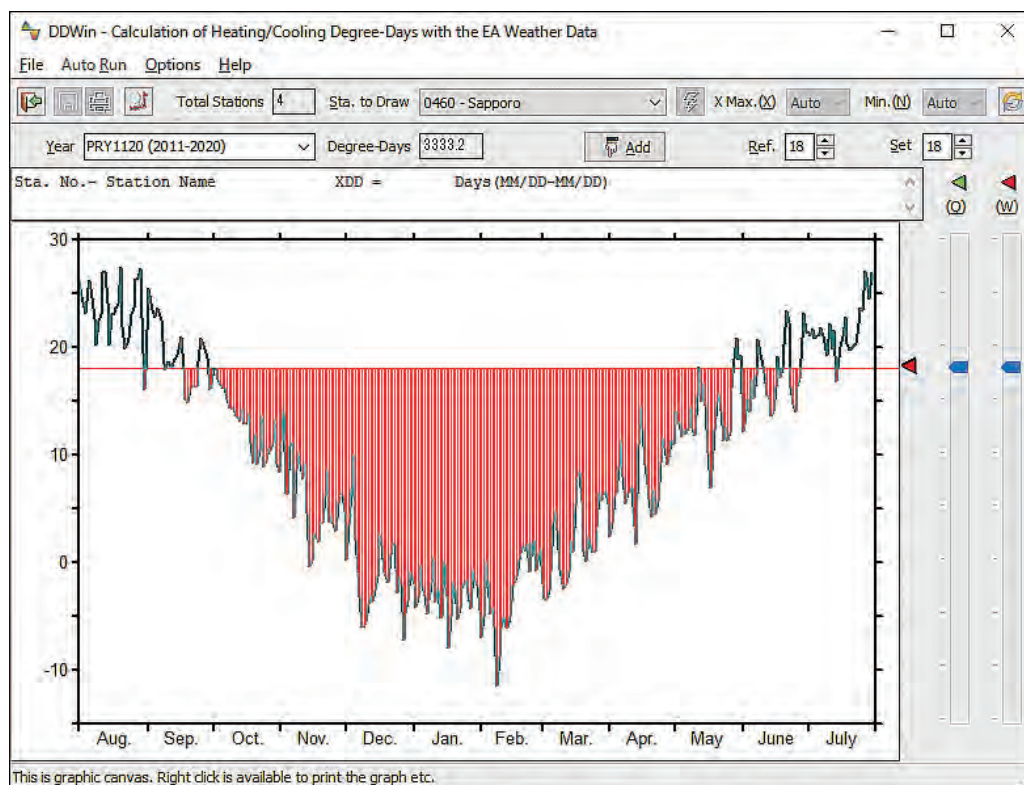


Fig. 13 Displayed Graphics after Calculation for a Station

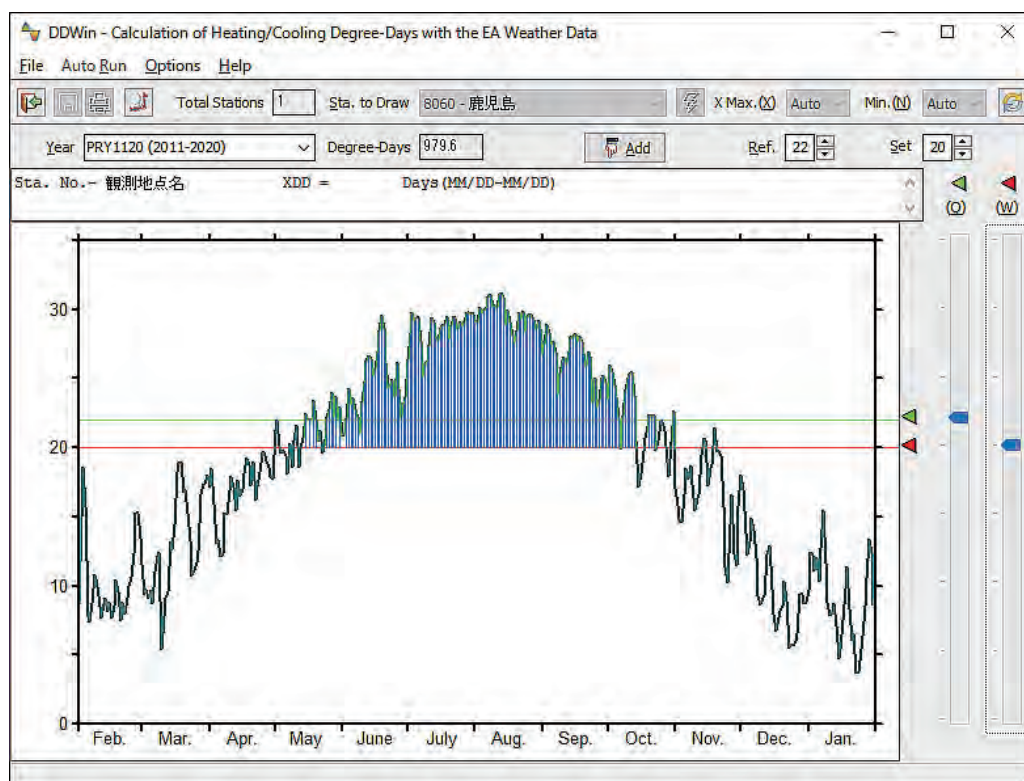


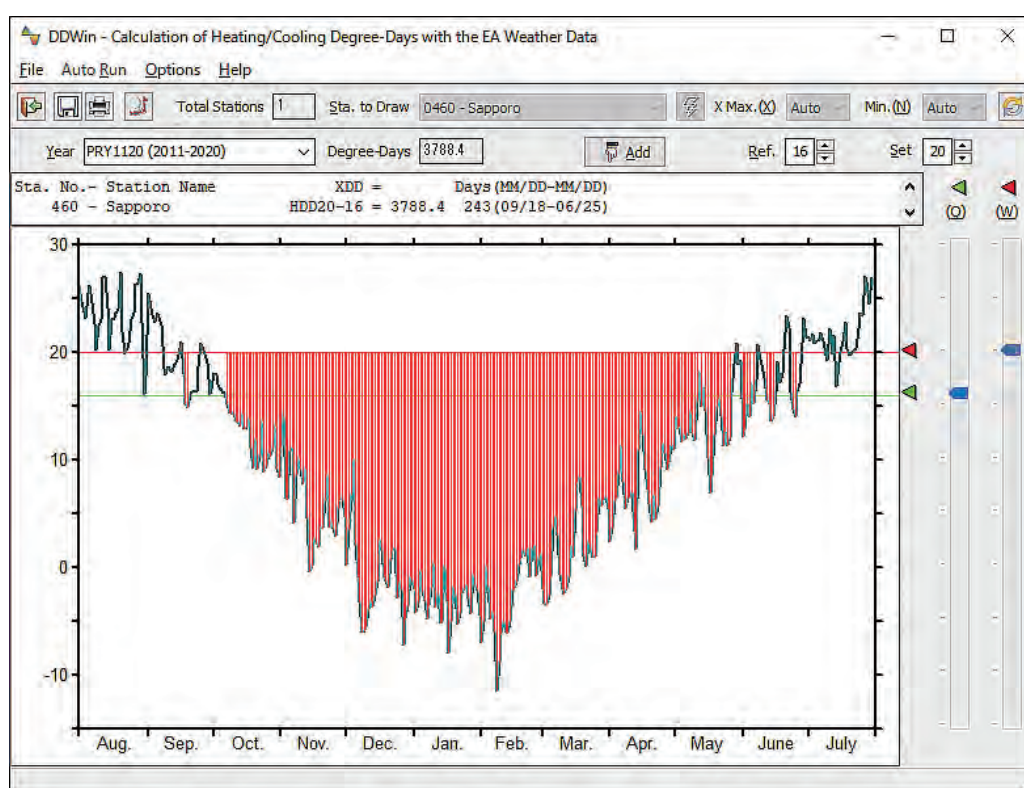
Fig. 14 Displayed Graphics after Cooling Degree-Days Calculation for a Station



## 2.7 Change of temperature settings


As you can see in Fig.14, there are two vertical slide bars in the right side of graphics drawing. When you operate a slider linked lime-colored mark, the reference temperature will change with 1°C interval. The same operation can be done by a up-down listbox labeled [Ref.]. Similarly, you can operate another slider linked red-colored mark, which is a controller of the design (set) temperature. The same operation can be done by a up-down listbox labeled [Set]. Try now freely the explained components in the main window with displayed graphics of heating degree-days for Sapporo (Fig.13).

And set the design temperature to be 20°C and the reference temperature to be 16°C finally to confirm whether the result displayed in the top of the main window is correct or not by comparing with Fig.15.






**Fig. 15 Displayed Graphics of HDD20-16 for Sapporo (by "PRY1120.wea2")**

## 2.8 Recording of Calculated Results in the Memo Box

If you have followed the tutorials mentioned in the above, you are now getting the calculation result for Sapporo with design and reference temperatures of 20°C and 16°C, respectively. You can display the results explicitly into memo box located narrow and widely on the top of the main window. To write the results in the memo box, click  button.

The memo box has following character data now:

460 - Sapporo HDD20-16 = 3788.4 243(09/18-06/25)

After the speed button, , clicked, other speed buttons,  and  are enabled. Additionally, [File | Save] menu, [File | Save As...] menu, and [File | Print...] menu are enabled. These components are triggers for saving the calculated results as a text file or a printed sheet. Try these function as you like.

Additionally, graphics drawing can be printed or saved as a file. File formats for Enhanced Windows metafile (EMF file) and Encapsulated PostScript® (EPS) file are available.

In order to apply these functions, you should make pop-up menu displayed by right button clicking on the graphics drawing as shown in Fig.16.

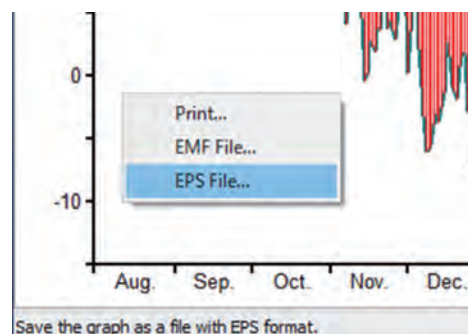


Fig. 16 Pop-Up Menu in the Main Window

## 2.9 Calculation for the Next Selected Station

It is assumed that we want to calculate the degree-days with similar settings for Morioka. Select the item of Morioka in [Sta. to Draw] combo listbox to do so as shown in Fig.17. Then, graphics and display will be changed after new calculation.

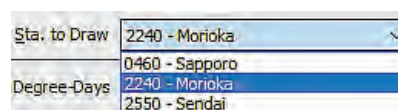




Fig. 17 Combo Listbox for Changing the Target Station

## 2.10 Termination

In order to terminate DDWin, select [File | Exit (X)] menu or click the System icon  of the main window. Speed button  is alternative component for the termination.

Note that almost optional settings excepting skipping drawing mentioned in Section 3.1 and main window position are saved at termination into windows registry System to be reused at the next startup time.

### 3 Additional Notes

#### 3.1 Option settings of DDWin



Option settings of DDWin are controlled via the [Options | m]enu on the menu bar of its main window. Each menu item is deeply branched and there are many sub menus but excepting [Options | Printer Setting...] sub menu, there is no menu to invoke another dialogue window.

The followings are brief explanations of option menus (also see Fig.18):

- **Kinds of Degree-Days** .... Selection of a kind of calculation of degree-days. You can select one of two submenu items, the one is the heating degree-days (HDD) and the other is cooling degree-days (CDD) (Selected one is shown with a button);
- **Multi-Selection** .. Setting calculation's reputation. You can select multi-calculation mode for several AMeDAS stations assigned by the dialogue window described in the previous page or solo calculation mode. If you choose the multi-calculation mode, you can select detail options that control the graphical display's on/off and applying the same design temperature and the reference temperature for all stations (Selected one is shown with a button);
- **Y-Axis Scaling** .. Selection of drawing manner of a vertical temperature scale. You can choose one of two submenu items, "Auto" or "Manual" (Selected one is shown with a button);
- **Printer Setting...** Configuration of Printers via a common dialogue window of operating System;
- **Language** ..... Selection of language for hint statements displayed in status bar etc. Selectable items are "Japanese" or "English".

#### 3.2 Auto Run Menu

When large amount of target stations to be calculated with the same temperature settings exist and no need to get graphic drawings at all, this function may be useful. The calculated results must be recorded in the memo box completely. Therefore, you can save the results as a text file and print out them (refer Section 2.8).

Check the radio button mark to [Skip Drawing etc. | Yes] sub-submenu of [Options | Multi- Selection] submenu to apply this function<sup>\*3</sup>. After this preparation, select target stations via the dialogue window and close the window to start the calculation. In that time, the main window's appearance is a little bit changed. Menu displayed like  **Auto Run** is now enabled and  speed button is also enabled to start quickly calculation. Note that you cannot change the temperature settings for each station's calculation.

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<sup>\*3</sup> After execution with this option setting, [Options] menu becomes disabled state. In order to make this menu re-enable, you should terminate DDWin at once and startup again.

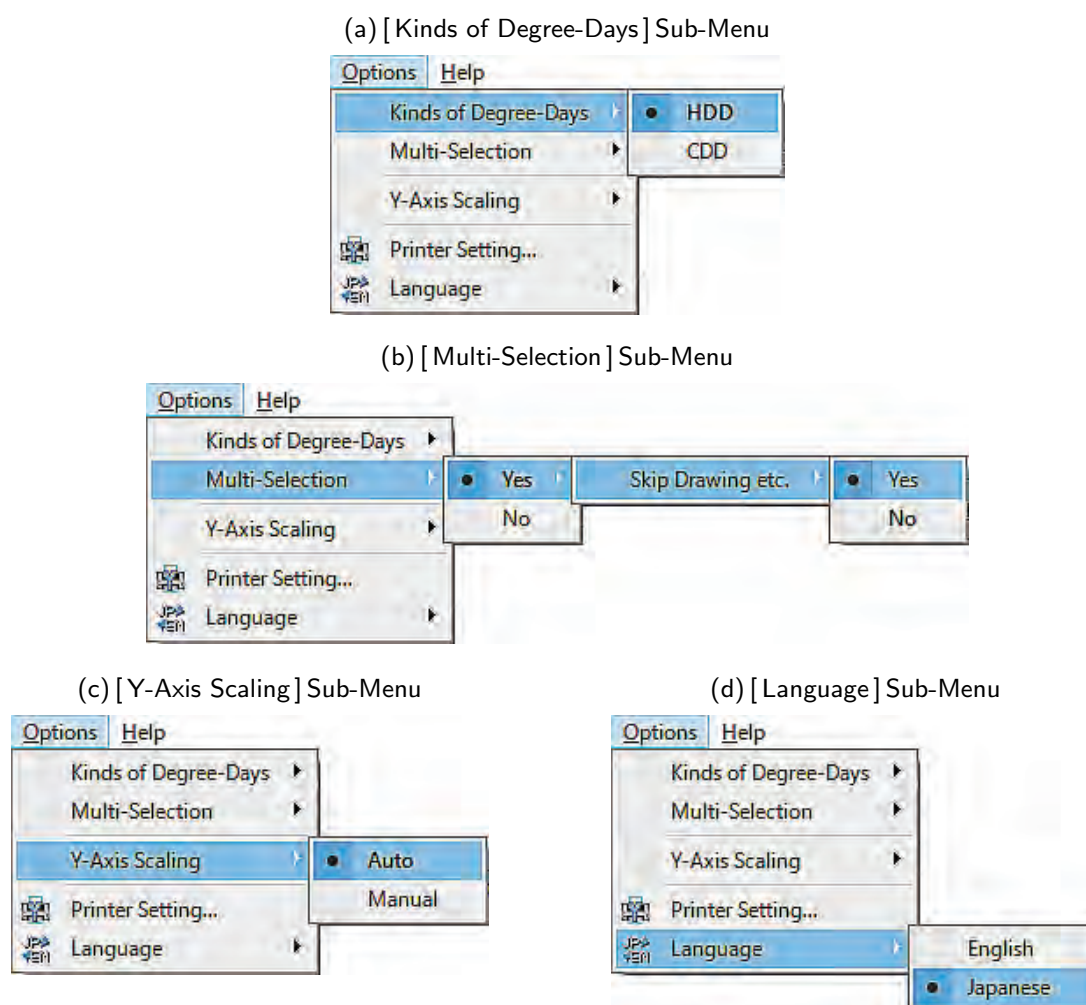


Fig. 18 Option Menus of DDWin

### 3.3 File Menu and Help Menu

#### 3.3.1 File Menus

- Open... . This menu calls the map GUI window (Fig.9, p.5) to select AMeDAS stations.
- Save .... This menu saves the calculated result as a text file named “DDWin.txt” in the default user folder [Users\ -Foobar\Documents\EA\_Tools\ -DDWinDat] .
- Save As... .... This menu saves the calculated result as a text file having unique user name.
- Printer... ..... This menu prints out the calculated result.
- Env. Set... .... This menu makes the other program’s main window, EA.SetEnv2022, wake up to setup several work conditons for EA Graphic Tools 2022 suite.
- Exit(X) ..... This menu terminates DDWin.

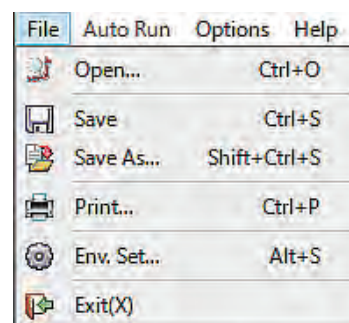
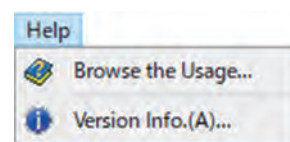


Fig. 19 File Menus of DDWin

### 3.3.2 Help Menus

- Browse the Usage... . This menu calls your default HTML browser to visit our company's home page to get something new information on the tool programs.
- Version Info.(A)... . This menu displays the version information message box of this program, DDWin.



**Fig. 20 Help Menus of DDWin**

## 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.

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EA Graphic Tools 2022  
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Degree-Day Calculation Tool  
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May 31, 2022 Ed.1, Rev.1

Written and Edited by  
Printed and Published by

Meteorological Data System Co. Ltd.  
Meteorological Data System Co. Ltd.  
10-19-1105 Koraicho, Kagoshima 890-0051, Japan  
URL <https://www.metds.co.jp/>

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