User manual for VgosDBpy

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1 How to start the program

The program is started by typing one of the following lines in the terminal from the location just outside the vgosDBpy folder.

- **python3 -m vgosDBpy **.wrp-path*** - The wrapper is parsed and its content displayed in the terminal
- **python3 -m vgosDBpy **.wrp-path* -g** - Opens the graphical interface with content from the wrapper file.
- **python3 -m vgosDBpy **.txt-path*** - Starts a script driven version of the program, no interface shown. Plots and tables produced according to the scripts instructions.

2 Running the program through the interface

Writing **python3 -m vgosDBpy **.wrp-path* -g** in the terminal will start the program using the interface.

2.1 The main features

The main features that are supported by the interface is,

- Using a file directory tree to navigate through the contents of a wrapper-file.
- Display information stored in netCDF files.
- Generate plots and export them in various image formats.
- Generate tables and export them in ASCII-format.
- Perform simple editing of the data displayed in tables and plots. The current capabities are to change the value of chosen data points or remove them. The changes can be saved which will also generate new netCDF files, a new history file and a new wrapper file.

2.2 How to navigate among the wrapper content

Navigating through the wrapper's content is with the file directory tree in the upper left corner of the program. When a netCDF-file is selected, it's variables will be displayed in the lower left corner.

There are two different tabs in which they are displayed. The first, which is labeled *Variables*, displays all variables with the folowing dimensions: *NumObs*, *NumScan* or *NumStation*. (OBS: The names of these dimensions will vary for different netCDF files). These variables can then be displayed in a table and if the data type (**dtype**) is not a string, *'S1'*, they can also be displayed in a plot.

2.3 Button guide

- **Buttons related to plotting**
  - **Plot** - Clears the plot canvas and then plots up the selected variables.
  - **Add to plot** -Expands the plot with one selected variable.
  - ***Checkbox:*** **Display time on x-axis** - Choose whether to display timestamps for each data point on x-axis.
  - ***Checkbox*****: Show lines** - Choose whether to show lines between data points.
  - ***Checkbox:*** **Show marker** - Choose whether to show the markers at each data point.
  - ***Checkbox:*** **Show smooth curve** - choose wheter to show a approximated smooth curved of the data points or not.
- **Buttons related to the table displaying**
  - **Table** - Clears the table and creates a new one with the selected netCDF variable as content.
  - **Add to table** - Adds new columns with data to an existing table.
  - **Print Table** - Export the table to am ASCII file.
- **Buttons related to both plotting and table displaying**
  - **Clear** - Clears both the table and the plot figure.
- **Buttons related to editing**
  - **Clear all marked data** - Removes the markers on data that have been marked either in the plot or in the table.
  - **Remove all marked data** - Removes the selected data point and replaces them with *NaN*.
  - **Restore original data** - Restores the file being edited to how it was before any edits.
  - **Save Changes** - Saves all edits that have been done. This creathe new netCDF files, a new wrapper and a new history file. A confirmation windows will pop-up before any saves are made.

2.4 How the the plotting works

The plotting is done by using the Python package *matplotlib*.

2.4.1 Navigating in the plot

A navigation toolbar is located above the plot. It is used to zoom in the plot, move around and to save an image of the plot.

2.4.2 Example of how to use the plot buttons

This is what will be displayed in the plot-figure for different inputs:

- **One variable selected + time on axis** - The selected data will be plotted against time.
- **One variable selected + not time on axis** - The selected data will be plotted against index.
- **Two variables selected + time on axis** - The two data arrays will both be plotted against time in the same plot with different y-axis and colors.
- **Two variables selected + not time on axis**- The two selected arrays will be plotted against each other, the one first selected will be on x-axis.
- **Three variables chosen + time on x-axis**- To many input arguments, no plot created.
- **Three variables chosen + not time on x-axis** - The three arrays will be plotted, the first selected will end up on the x-axis, the second on the left y-axis and the third on the right y-axis.
- **Some variables holds two data-arrays stored, this will be handled equally as if two variables where chosen** - An example on such a variable is the *AzTheo* variable in *AzEl.nc* file.
- **More then three variables can not be displayed in one plot**

The choice of having the time on x-axis or not is done by a clicking on the check-box under the plot canvas. **Also note: Every time you select to plot a variable it will also be displayed in the table, this is not true the other way around.**

2.4.3 The *Add to plot* button

The *Add to plot* button expects **one** netCDF variable to be selected, then it will add the selected variable to an existing plot. This will be displayed following the same pattern as the list above. If the figure can not display more plots, nothing will happen.

The main purpose of this button is to be able to plot data from different netCDF files in the same plot.

2.5 How does the table function work

The data that can be put into a table is all the data shown in the lower left corner in the tab *variable*. It is not possible to put variables with different dimensions in the same table.

To create a table mark the name of netCDF-variables, in the lower left tab, wanted in the table, and press table. Use the *add to table* button to expand the table with more data once it been created. The tables is saved to an ASCII-file if the button *print table* is pressed.

2.6 How to edit data

- The data can be edited by removed certain data points or change value of them.
- Most data types can be edited, but more generally is it the netCDF variables with one of the following dimensions: *NumObs*, *NumScan* or *NumStation*. In the current version, only numeric data can be edited. This means that the data can not be edited if the datatype is *S1*, strings but also if the variable is a multidimensional array.

When a variable is plotted, a table is generated with the content. When the data is marked in the plot the same data is marked in the table. Any changes in either the plot or the table will be mirrored to the other one. To remove a value, just use the button assigned to that purpose. To change a value, press any cell in the table to select it and type any given value.

3 Running the script-driven program

Writing **python3 -m vgosDBpy **.txt path*** in the shell terminal will execute the script driven utilities. The script driven version can create plots and tables. Editing data in not supported by the script driven part only through the interface. The script driven code parses the **.txt* file containing key with instructions on which plot images and ASCII-tables. The **.txt*-file needs to have a very specific format. An example of how it should look is given in the file *example_script.txt*, which is displayed below.

The plot images and ASCII-tables generated will look like the plots and tables made in the graphical user interface.

3.1 Format for script

```
1  !To use the script driven function the format of the input must be very exact.
2  !
3  ! Here is an example of how it can look:
4  !--------------------------------------------------------------------------------
5  !
6  !
7  ! '!' means line of comment and will not be read
8  ! Keywords: 'save_at', 'new_wrapper', 'begin_table', 'end_table', 'begin_plot', 'end_plot'
9  !
10 !
11 !
12 save_at ./../some_folder
13 !
```

```
14  new_wrapper ../../path_to_wrp
15  !
16  !
17  !Everything between begin_table and end_table is shown in ONE table,
18  ! if you want several just write many scopes like this:
19  !
20  begin_table
21  !
22  path_to_netCDF_from_wrapper -- name_of_variable_one -- name_of_variable_2 -- ... -- name_of_variable_n
23  path_to_netCDF_from_wrapper -- name_of_variable_one ...
24  !
25  end_table
26  !
27  !
28  !Everything between begin_plot and end_plot is shown in ONE plot,
29  ! if you want several just write many scopes like this:
30  !
31  begin_plot
32  !
33  path_to_netCDF_from_wrapper -- name_of_variable_one -- ... -- name_of_variabale_n
34  path_to_netCDF_from_wrapper -- name_of_variable_one ...
35  end_plot
36  !
37  !
38  !It is possible change wrapper just use the keyword 'new_wrapper' again
39  !
40  new_wrapper ../../path_to_wrp
41  !
42  begin_plot
43  path_to_netCDF_from_wrapper -- name_of_variable_one --- ... -- name_of_variable_n
44  path_to_netCDF_from_wrapper -- name_of_variable_one ...
45  end_plot
46  !
47  !
48  !
49  !-------------------------------------------------------------------------------
50  !
51  ! Here is an example of how it can look:
52  !-------------------------------------------------------------------------------
53  !
54  !
55  save_at ../saved
56  !
57  new_wrapper ../../Files/10JAN04XK/10JAN04XK_V005_iGSFC_kall.wrp
58  !
59  begin_table
60  !
61  TSUKUB32/Met.nc -- TempC -- RelHum
62  TSUKUB32/Met.nc -- AtmPres
63  !
64  end_table
65  !
66  !
67  !
68  begin_plot
69  !
70  TSUKUB32/Met.nc -- TempC
```

```
71  TSUKUB32/Met.nc -- AtmPres
72  end_plot
73  !
74  new_wrapper ../../Files/10JAN04XU/10JAN04XU_V005_iGSFC_kall.wrp
75  !
76  begin_plot
77  KOKEE/Met.nc -- AtmPres
78  end_plot
79  !
80  !
81  !
82  !
83  ! This will generate two plot figures saved on the format *.png and
84  ! one table saved as an ASCII *.txt file
85  ! The three files will be saved in the folder
86  ! '../saved' meaning '../saved/*.txt' for example
87
```