AMOF_ncSuit

User Manual

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Use: freeware

Repository: https://github.com/barbarabrooks/NCAS-Data-Project-User-Tools/tree/master/GUI

Change History

| Version	Date	Comment
1.0	September 2020	Initial Commit

Introduction

AMOF_ncSuit is a GUI (graphical user interface) designed to aid inspection and visualisation of netCDF files produced by NCAS AMOF instrumentation. In principle any netCDF file can be opened and inspected using this interface but behaviour cannot be guaranteed. This interface allows the user to:

- Use an open file dialogue box to select the target file
- Inspect the global attributes, dimensions and variables defined in the file
- Select a particular variable and inspect this variables attributes and the data associated with it. Note data inspection is limited to m x n matrices.
- Plot a graph (and save to .png if required) of the selected variable.
- Extract the selected variable and save to and .xlsx file

It is assumed that python3 is installed.

Getting Started

Start up a Command Prompt or terminal window and type python <path if required>AMOF_ncSuit.py. If successful the following window should appear:
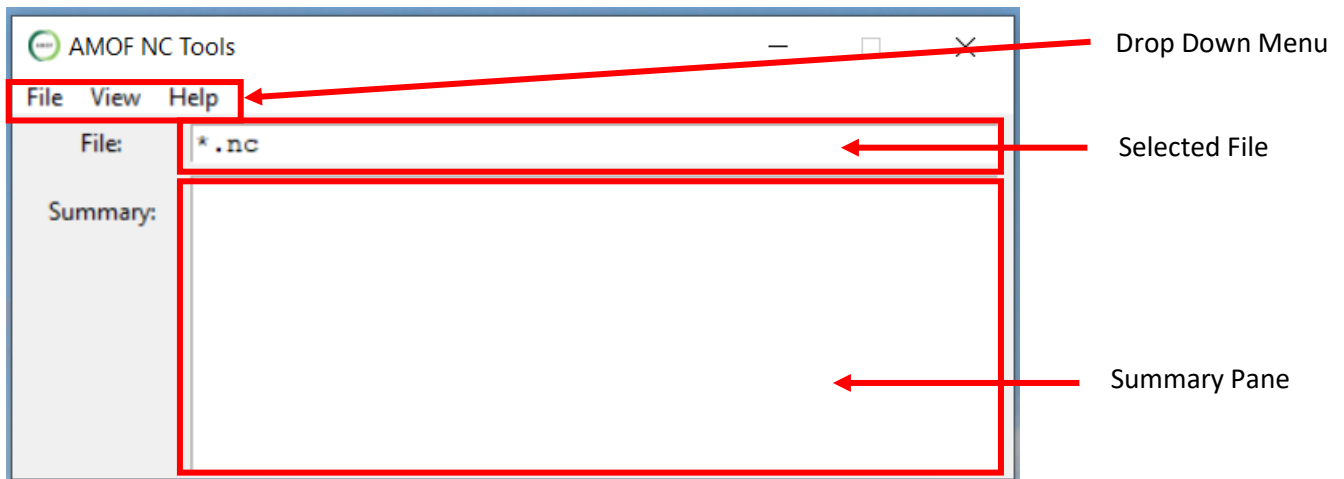
The three drop down menus are File, View and Help.

- File
    - o Open: Opens a dialogue box and allows navigation to the target file – see Open File section for further details.
    - o Close: Selecting this will close all child windows and clear the Summary Pane
    - o Exit: Selecting this will close all child windows and exit the application. The same functionality is provided by clicking the X in the top right hand corner
- View
    - o Inspect File: If a file has been selected then clicking this will open the inspection child window. This inspection child window should be opened automatically but this menu allows it to be reloaded if it has accidentally been closed
- Help
    - o About: This will open an information popup window – click ok to close.
    - o Version: This will open an information popup window – click ok to close.

Once a legitimate file has been selected and opened the full path to the file is shown in the "Selected File" area highlighted above and a brief summary of the file contents is listed in the "Summary Pane" area. An example is given below.
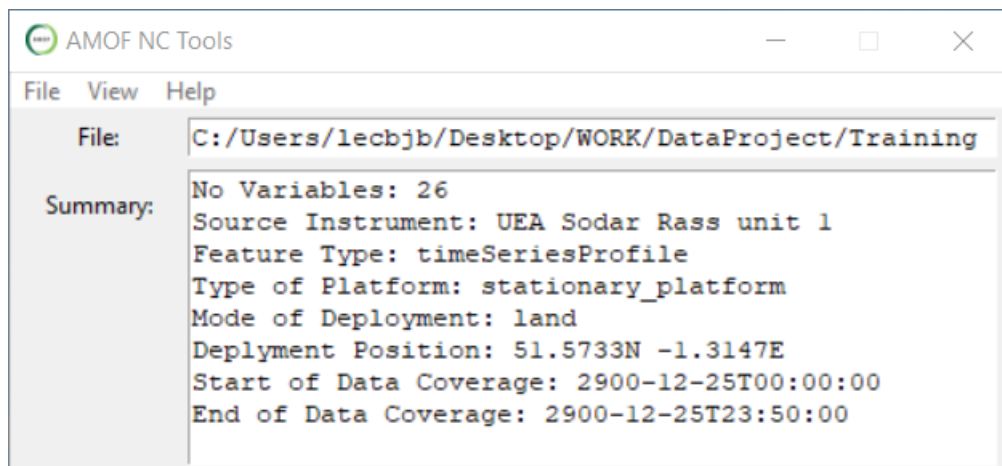
Should any error be encountered when trying to open a file an error popup window will appear and this can be cancelled by clicking "ok". This will return the user to the clear starting window described above.

Inspect File Contents

Once a file has been successfully been selected then the following inspection child window will appear: Global Attributes is the default tab selected.
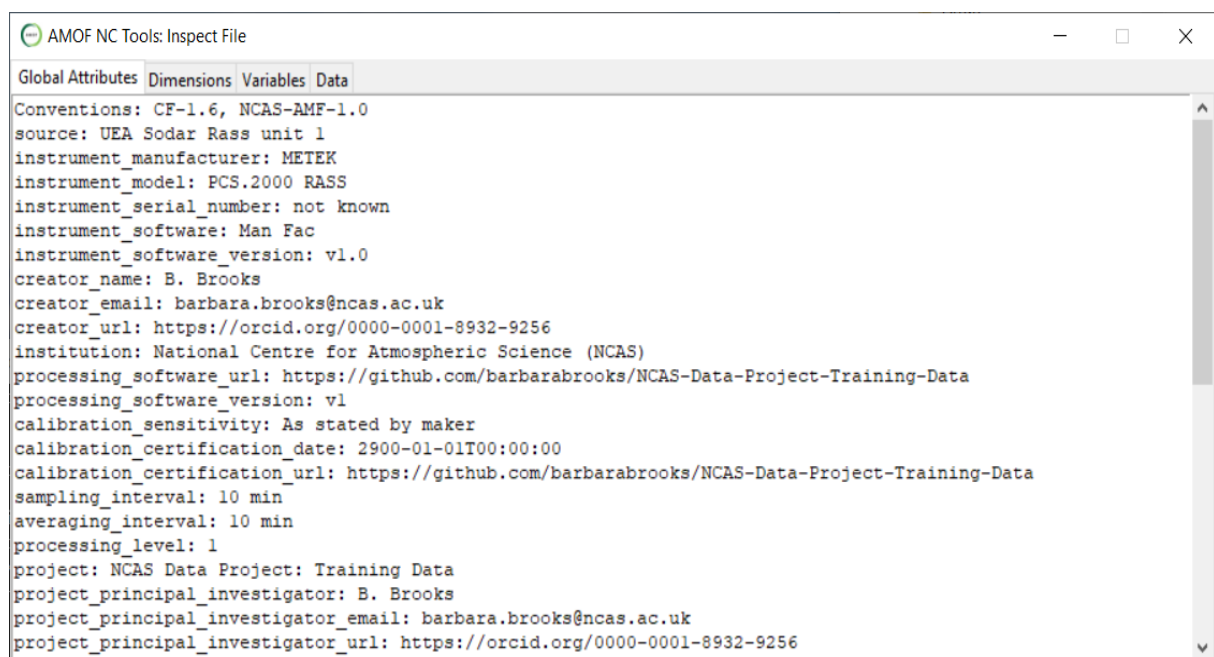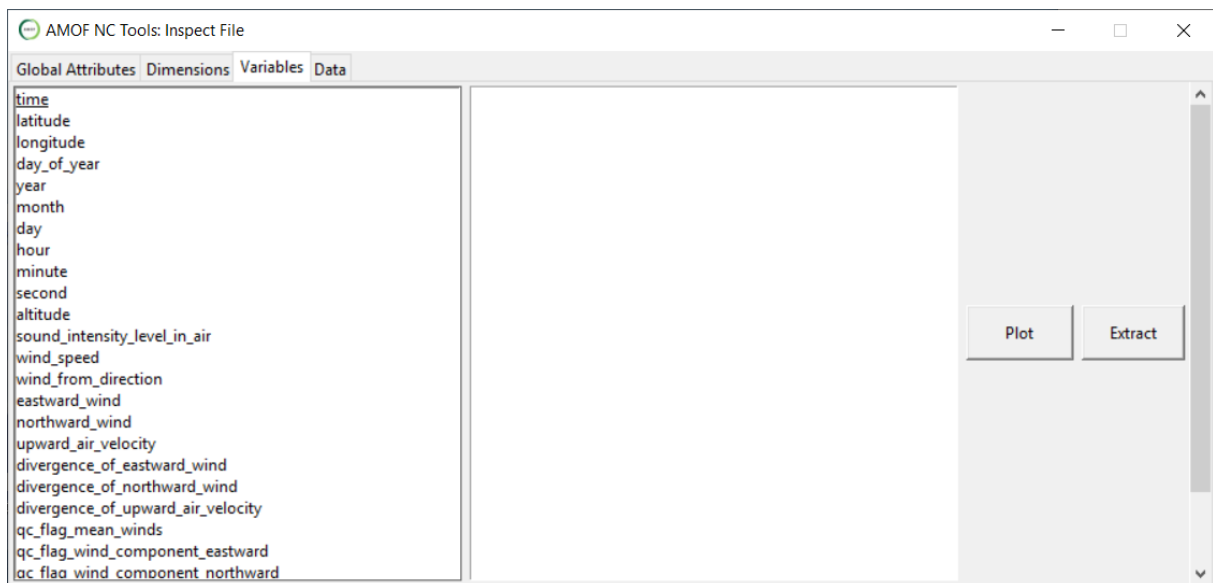

This window has four tabs and can be closed using the X in the top right hand corner of the window. If this window is accidentally closed then it can be reloaded by using the "Inspect File" option of the "View" dropdown menu as described above.

The Dimensions tab shows all the dimensions defined in the file:

The Variables tab shows all the variables defined in the file.

Clicking on a variable name on the left hand side selects that variable, the variable attributes are shown in the right hand pane:
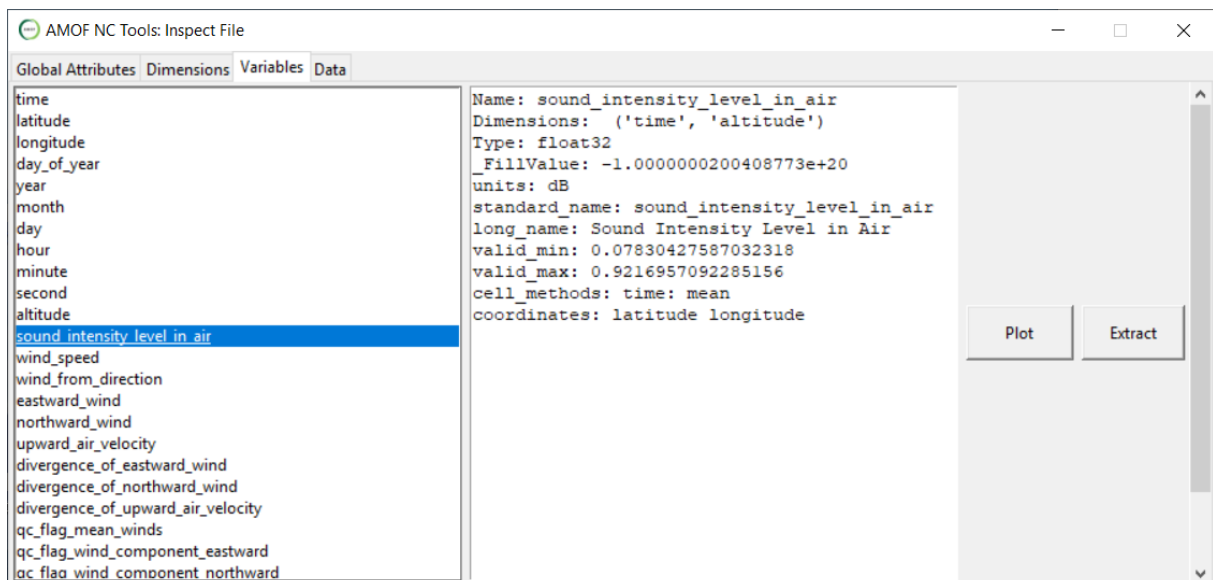
and the data associated with that variable is listed in the Data tab:

Note that data with more than 2 dimensions will not be displayed.

Once a variable has been selected the user can click the "Plot" button to visualise the data and "Extract" to save that variable to a Microsoft Excel spreadsheet: see the following Extract a Variable section for further details.

Extract a Variable

Clicking the "Extract" button will open a "Save" dialogue box that will allow the user to navigate to the folder where the file is to be saved and for the user to provide a name. Note that although only one file format is supported (Microsoft Excel) the extension (.xlsx) is not automatically appended: the user needs to provide this.

If any error occurs then an error popup window will appear. This is cancelled by clicking "ok" and the user is returned to the Inspection window.

Once extraction is completed an information popup window will appear. This is cancelled by clicking "ok" and the user is returned to the Inspection window.

The resultant file is an Excel workbook with four worksheets named
- Global Attributes
- Variable Attributes
- Dependent Variable Data
- Variable Data

The Global Attributes are the same as shown on the Global Attribute tab of the inspection window, the Variable Attributes are the same as those shown on the right hand side of the Variable tab in the inspection window. All variable are have dimensions and the data associated with them. These are the dependent variables and the associated data is given on the Dependent Variable Data. The selected variable data is given on the Variable Data sheet. Where the data is 3D (I x j x k) the data is presented in 2D blocks (i x j). Each block (k) is separated by a blank line.

Plot a Variable

To plot a selected variable click the "Plot" buttona on the Variable tab in the inspection window. This will launch the following window:

Axes Frame: This allows the user to select which of the dependent variables are used as the x, y or z axis on a plot.

- When the data has only one dependent variable, that is the selected data is defined with only 1 dimension then the user can select if this is either the x or y axis (z is not active) and the "data" is used automatically as the other. The type of plot created is line plot.
- When the data has two dependent variables the user can again select which is the x or y axis. The data is automatically converted to a colour map and the resultant plot is psudo colour plot.
- For 3D data z is selectable and the user can select which is dimension is used for which axis. In this case a 2D plot is created but the surface plotted is determined by the value of the "start" slider.
- The range of each axis can be adjusted by using the start and end sliders. It is possible for the user to set the end to be less than the start and so when the figure is produced the start is defined as the minimum of these to values.

Data Frame: This allows the user to configure the plot. The default is for the data to be plotted on normal axis with no quality control (QC) applied. If the "Graph Variable" button was clicked at this point a new window would be produced looking like:
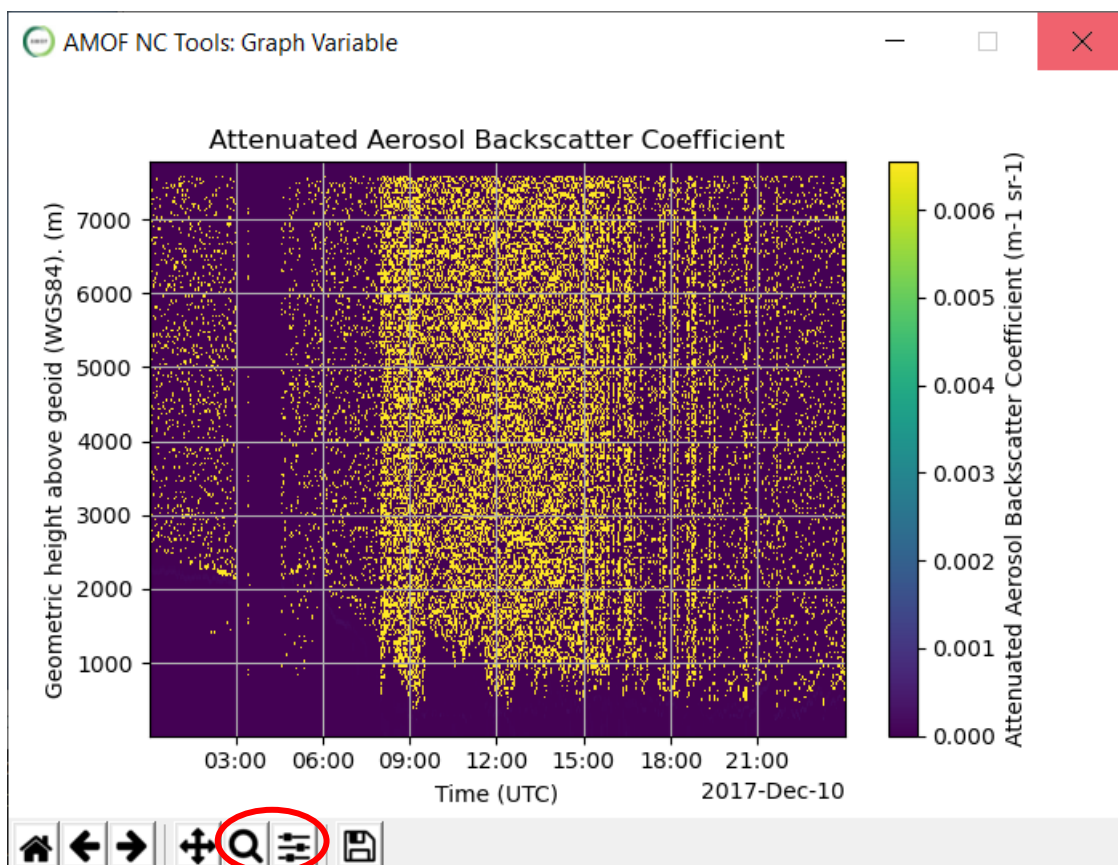
This figure can be save to .png by clicking the save button (circled in red in the above). The other icons allow the user to zoom in, adjust colour and pan around the image.

In this example what has been plotted is the data as it is in the file. The most basic level of QC is to apply the valid_min and valid_max attributes and by selecting "Apply QC", as shown below, this can be done.

The AMOF data files also contain QC flags: these are flag masks that indicate the quality of each element of data. By selecting to Apply QC the software will search the file and apply the appropriate QC flag mask and only data with a corresponding flag value of 1 will be plotted. For all AMOF data a flag value of 1 indicates "good" data, values greater than on indicate bad or suspect data, the value 0 is reserved. Using the above example applying QC results in:
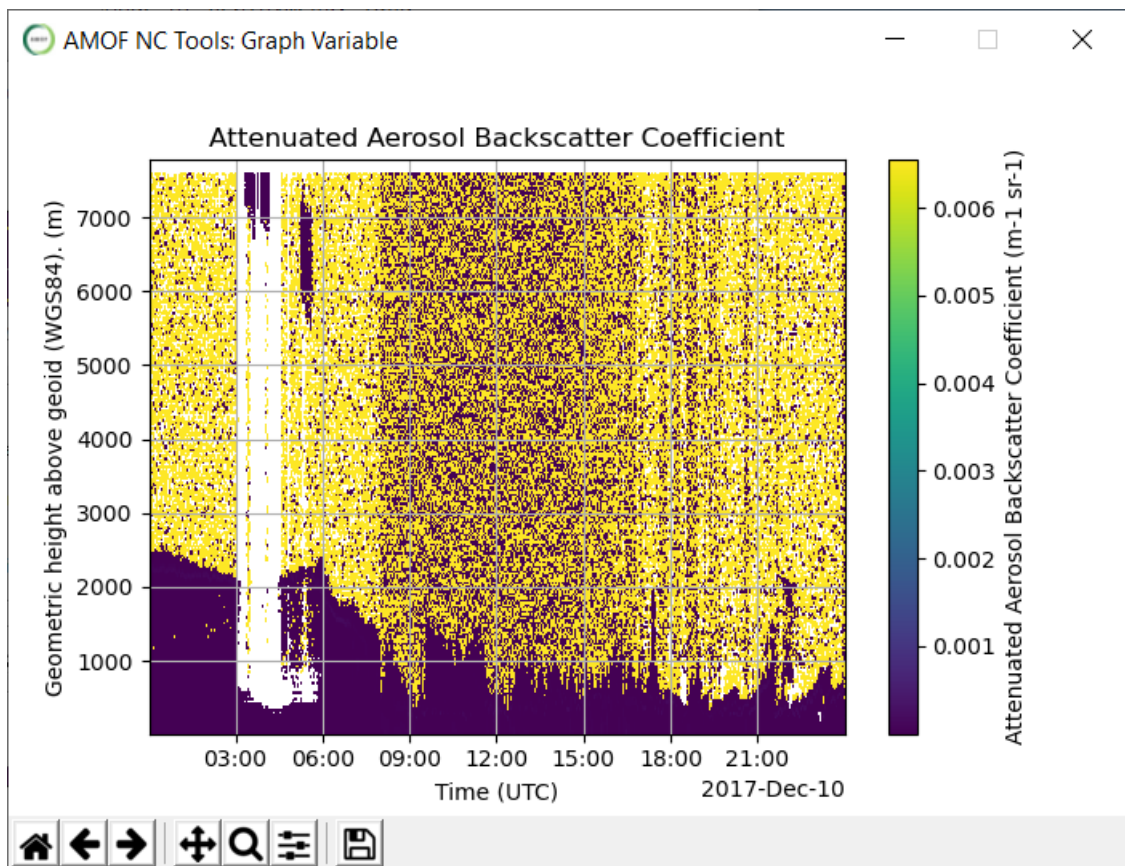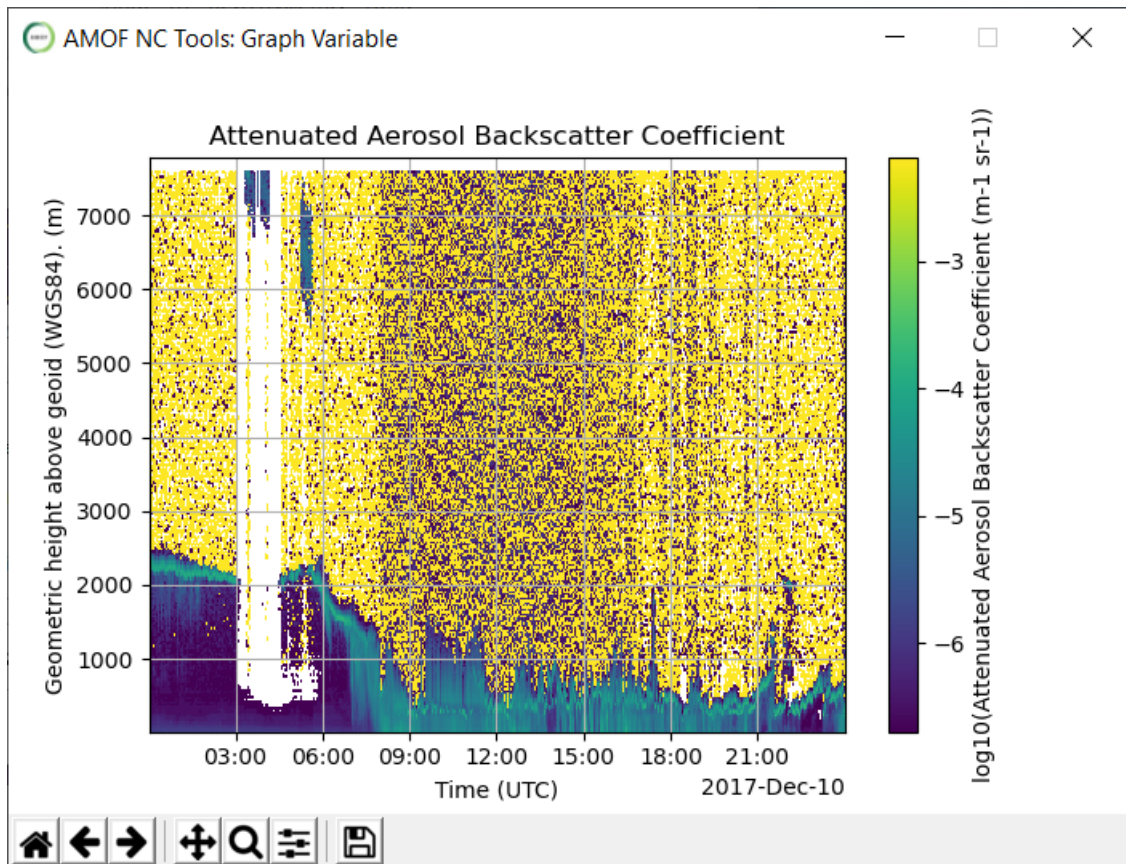
For some data type, such as this, it is advantageous to $\log_{10}$ the data. To do this "Log Data" would be selected as shown below:

The resultant figure would be:

Converting the axes from normal to $\log_{10}$ is achieved by checking the relevant check box.