

# Geoplot 4.0 Instruction Manual

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29 November 2024 v1.3

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# 1 Introduction

## 1-1 Code and Manual

For a list of recent code changes and additions in this Build please see the Revision History towards the end of this document. Each release has a 'Build' number associated with it which you will see reported in 'About' on the Help menu.

Please do read the 'Geoplot 4.0 Overview' and subsequent sections below to avoid trying to use the few facilities that are not yet completed or are restricted – **such items are highlighted in red**. Apart from the few items highlighted in red, this code represents the completed version 4.0.

These interim instructions are principally aimed at those familiar with Geoplot 3.0 and previous Geoplot 4.0 builds. If you are new to Geoplot then you will benefit from following the tutorial in the Geoplot 3.0 manual, Chapter 3, since this will give you an appreciation of the structure of Geoplot 4.0 – see 'Running Geoplot 4.0'. New Users, below.

Help is available in the form of this manual, a Help Panel, Summary PDF sheets and Help buttons found on all forms. Clicking on a form help button  will either display a small panel with further information or will display a PDF file in your PDF reader. Please see Help in 'Running Geoplot 4.0' below for more detailed information.

## 1-2 Code Availability

Code and documentation are available from either the website or a Dropbox link emailed to you. This comprises (a) these instructions, (b) a full installer 'Geoplot\_4\_Setup\_xxxx.exe' where xxxx is the build number, (c) other PDF documents and (d) latest Geoplot 4.0 data sheet. If you are a new user, then install the new program. If have previously installed Geoplot 4.0 then, since the options file formats will have changed, you must uninstall the old code first and then install this latest build. **This will remove Scratchpad.txt, along with HelpGradiometer.txt, HelpMagnetometer.txt and HelpResistance.txt. The latter 3 files may have been modified by course tutors for their students and/or Scratchpad.txt may contain notes of work in progress. So, if you wish to preserve any of these files for the latest installation, please make copies and then paste them back over the newly installed versions.**

If this is the first copy you have received, then you may also have received a separate Dropbox link to update your dongle if it is not already configured to run Geoplot 4.0 (only dongles with numbers equal to or later than GP151286 are able to run Geoplot 4.0 without requiring an update). Refer to the section below to update your dongle and then go to the section after for instructions for full program installation.

## 1-3 Operating System and PC Text Size Setting

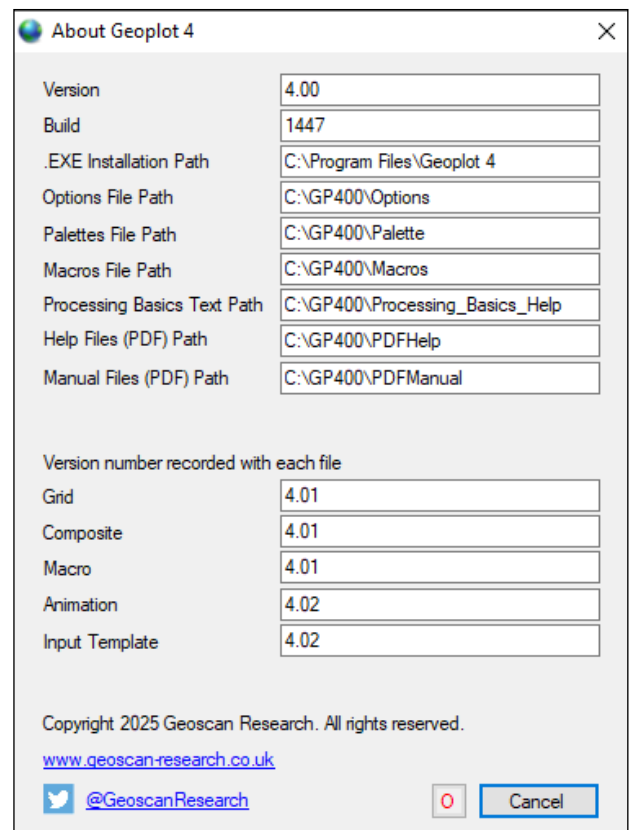
This code will run on Windows XP, Vista, 7, 8, 8.1, 10 and 11, 32 bits or 64 bits. Touch screens can be used.

**Please note that the forms and code are designed for use on PC's with Normal/Smaller (100%) resolution/text.** Windows 10 allows you to adjust resolution/text size to suit your preference whilst preserving the intended Geoplot 4.0 form design. However, if you choose to use larger fonts/text (125% or 150%) with XP, 7, 8 or 8.1 then the form design layout will not be correct in some cases: some controls may be put in the wrong place and there may not be room in text boxes for all text in some cases. The effect will be different on XP, 7 and 8.

Some forms require you to set 'Windows Screen Scaling (%)' according to the PC Text Size setting to operate correctly. These are associated with screen saves: 'Save Palette and Scale Image', 'Desktop Image Save / Print' and 'Save Palette and Scale Image'.

## 1-4 Dongle Update

Geoplot 4.0 will only work with the blue coloured Matrix USB dongles. However, these dongles first need to be updated/reprogrammed to work with Geoplot 4.0 if their serial number is smaller than GP151286. Once we know the serial number of your dongle, and you have purchased an upgrade, we can send you a DropBox link to a small executable program.



Plug the dongle into a USB port, run the executable and this will update the dongle (the executable will only work with that specific dongle serial number). The dongle will then allow you to run either Geoplot 3.0 or Geoplot 4.0. Dongles with numbers equal to or later than GP151286 are able to run Geoplot 4.0 directly without requiring an update.

## 1-5 Installation Preparation - .NET Framework

Geoplot 4.0 is a 32 bit program that requires the Microsoft NET 2.0 and 3.5 frameworks in order to run. Note that these are separate from the NET 4.0 and NET 4.5 frameworks typically found on modern computers – 2.0 and 3.5 will most likely not be already installed. The NET 2.0 and 3.5 frameworks can typically be found in C:\Windows\Microsoft.NET\Framework as v2.0.xxxxx and v3.5 where xxxxx depends on the update installed. If 2.0 and 3.5 are not installed then, when you try to run Geoplot 4.0 (see below), you will see an error message saying NET 2.0 or NET 3.5 is not installed. To cater for such situations the Geoplot 4.0 installer places a small program called dotNetFx35setup.exe in the c:\gp400\NET\_Framework\_Web\_Installer directory that can be run to download and install NET frameworks 2.0 and 3.5 from the Microsoft website (it will also install 1.0, 1.1 and 3.0 frameworks at the same time). The framework download is 60Mb and will take some time to download and install – this may take 5 to 15 minutes to complete depending on the speed of your internet connection and computer.

## 1-6 Program Installation

### 1 Updating an existing Geoplot 4 installation

It is very important that you uninstall any existing beta version of Geoplot 4.0 first. **Note that this will remove Scratchpad.txt, along with HelpGradiometer.txt, HelpMagnetometer.txt and HelpResistance.txt. The latter 3 files may have been modified by course tutors for their students and/or Scratchpad.txt may contain notes of work in progress. So, if you wish to preserve any of these files for the latest installation, please make copies and then paste them back over the newly installed versions.**

Use the Uninstall program placed on the start menu alongside the Run Geoplot 4.0 item or if you are using Windows 10 then use the Windows uninstaller. **After uninstallation check in C:\GP400\Options to see if there is a residual file called RecentFilePaths.txt – if there is then please delete this file to avoid problems with Geoplot 4.0.** In future, the uninstaller should remove this file. If you see an MRUFiles.txt file present, then this may be left in place since this is a list of recent files that you have opened and will be displayed at the bottom of the File menu.

After uninstallation run the 'Geoplot\_4-0\_Setup\_xxxx.exe' program (where xxxx refers to the Build Number) to install Geoplot 4.0 on your system. This will install all necessary files, some demo data files and macros, along with shortcuts on the Start button and the Desktop.

### 2 Fresh Installation

If you are installing on Windows 11 then you will need to switch off S mode before installation. Run the 'Geoplot\_4-0\_Setup\_xxxx.exe' program (where xxxx refers to the Build Number) to install Geoplot 4.0 on your system. This will install all necessary files, some demo data files and macros, along with shortcuts on the Start button and the Desktop.

### 3 Installation Problems

If you encounter difficulties in getting Geoplot to install correctly, consider the effect of Anti-Virus or Malware programs – for example McAfee or MalwareBytes can sometimes quarantine installation files. In this case you do not need to disable the virus checker in its entirety, just exclude GP400mx.exe from the real time scanning. Under 'Change settings', 'Real Time Scanning', just add GP400mx.exe to the list of excluded files. Then it leaves it alone and does not quarantine it every time it is run. You may also need to reboot the laptop or PC after installation.

## 2 Running Geoplot 4.0

### 2-1 Introduction

Click on the Start Menu or Desktop short-cut to run Geoplot 4.0. A splash screen will be displayed and then the main program will open up with a central grey area and most of the surrounding toolbar items greyed out. A yellow message form will appear and behind that a Help panel. See section 1-5, above, if you see an error message saying NET 2.0 or NET 3.5 is not installed.


### 2-2 Region and Language Settings


If you are using a European operating system then it is very important to ensure the Region and Language setting (Formats, Additional Settings..., Numbers) in Control Panel is set so that **decimal separator is Decimal Symbol and not a comma**. In addition, Digit Grouping Symbol should be comma. If these changes are not made then parts of Geoplot 4.0 will not function correctly, especially Import. There is a yellow reminder form when you first run Geoplot 4.0 – see right which you can stop from reappearing by ticking the checkbox.

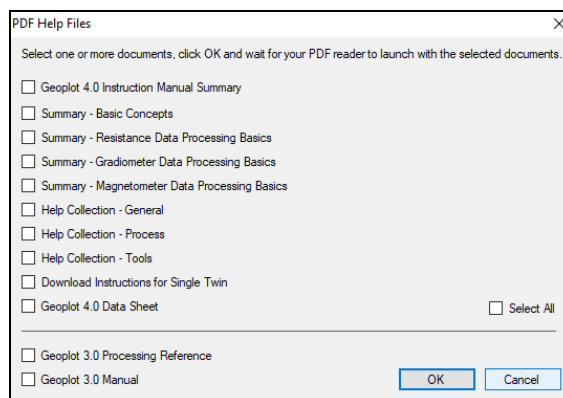
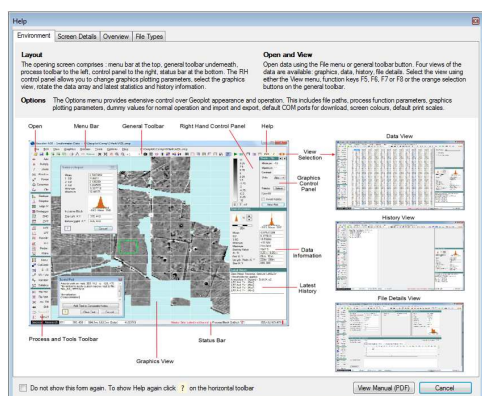
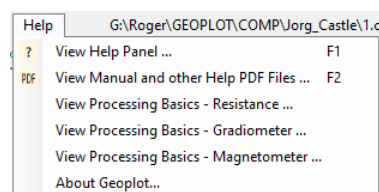



### 2-3 Help

General help is available in the form of a Help Panel, Manual and other PDF files, plus individual Help PDF's for all Geoplot 4 functions. In addition, floating Help forms are available that introduce the basics of processing Resistance, Gradiometer and Magnetometer data – see section 13 for details.

The Help Panel, below left, is accessed by clicking on the  button on the horizontal toolbar or Help menu, View Help Panel or by pressing F1. It will be of use to new users and can be resized and positioned in the corner of the screen for reference. The panel has four tabs which cover the essentials: Environment, Screen Details, Overview and File Types. It contains the images that follow in the next section. If you want to show the panel again, click on the question mark on the horizontal toolbar. You can stop the form appearing again by ticking the 'Do not show...' checkbox or go to Options, Environment, General.

PDF Help documents can be accessed by clicking on the  button on the horizontal toolbar or by selecting Help menu and 'View Manual and other Help PDF Files' or by pressing F2 and this will display the form shown below, right. You can select a number of these, or all of them, and then click OK to open them up in your PDF reader.



There are also individual help buttons  on Geoplot forms, including Edit, Process and Tools, which you can click on to show either another descriptive form or launch a PDF document in your PDF reader.

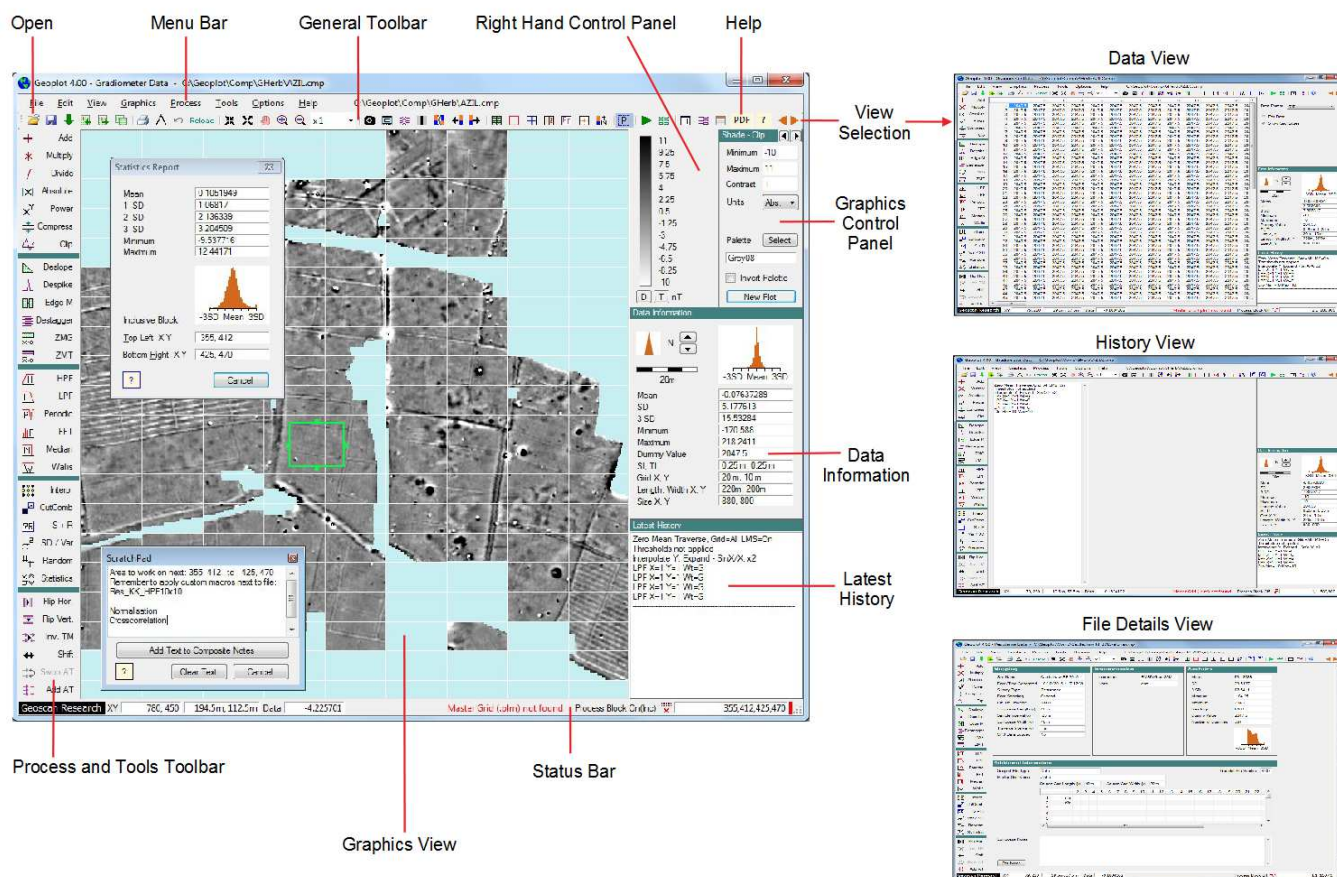
### 2-4 New Users

If you are new to Geoplot then you also may benefit from following the tutorial in the Geoplot 3.0 manual since this will give you a good idea of the structure of Geoplot 4.0. There will be slight differences, but it should give you a basic grasp of the underlying concepts of grid, composite and master grid and processing. You will not be able to follow all the tutorial since some features such as Publish are not included in Geoplot 4.0. The manual is installed with Geoplot 4.0, accessible as described above.

### 2-5 Run Simultaneous copies of Geoplot

Note that you can have several copies of Geoplot 4.0 running at the same time. This can be useful if you want to compare different data sets side by side.

# 3 Geoplot 4.0 Overview



## 3-1 Introduction

The latest Geoplot 4.0 data sheet gives a summary of Geoplot 4.0, available by clicking on the 'PDF Manual' button on the General Toolbar and selecting the data sheet. Above is a screenshot of the default environment with gradiometer data loaded – if you have a large LCD screen then other buttons may be visible on the General Toolbar and the Process and Tools Toolbar. The main elements of Geoplot 4.0 are: Menu Bar, General Toolbar, Horizontal Process and Tools Toolbar, Right Hand Control Panel (comprising Graphics Control Panel, Data Information and Latest History), Status Bar and Vertical Process and Tools Toolbars (wide and narrow versions). In the view above the Horizontal Process and Tools Toolbar (a copy of the vertical version) is not shown – see View menu for ways you can customise the layout. There are four views of the currently loaded data available: graphics, data, history and file details (images on the right); you can swop between these using either the View menu, function keys F5, F6, F7, F8 or cycle back and forward between them using the orange triangular buttons at the right end of the General toolbar. Note that this build adds some extra functions not shown in this section's graphics.

The right hand (RH) panel controls many functions, e.g. fast selection of shade plot palettes, change of plot type, rotation of data, etc.; you still have access to the Geoplot 3.0 style menu system as well. The panel also displays data information and latest history. Forms are designed to run on all screen sizes, from Netbooks through to desktops and they remember their last position so you can arrange the work area to your preference.

A more detailed view is shown below, giving the location of many toolbar buttons and examples of the different graphics views available. It also shows the range of palettes available. As the mouse is moved over a graphics plot the data value at that point is reported on the left-hand side of the Status Bar, along with its coordinates in units of metres and readings. If a process block is selected then its dimensions are reported in the bottom right-hand corner of the Status Bar, along with its status i.e. Inclusive, Exclusive and whether it has been "snapped to grid" or not. Note that this build adds some extra toolbar buttons not shown in this section's graphics.

Many of the colour schemes and graphics components can be changed in either the Environment or Graphics options. When colours in Graphics Options are changed, clicking the Apply button immediately updates the display.

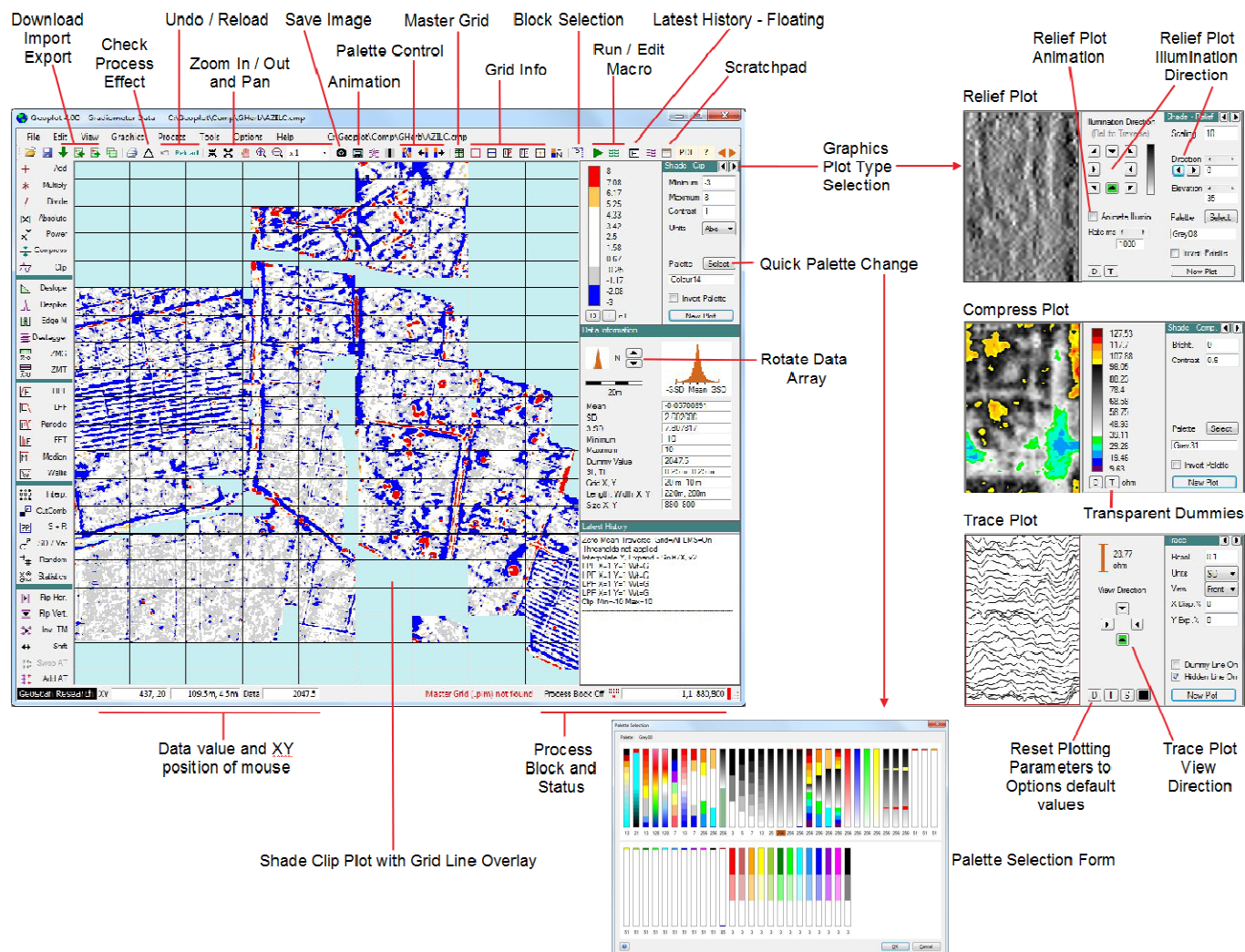
The Options Menu, described in more detail later, allows you to determine how Geoplot 4.0 is set up and operates. One of the most important of these is the COM port settings for download and you should explore and make sure that this setting, at least,



is correct at an early stage. This is done in the Environment Options, Download Tab, where you can set default COM ports separately for the RM85 and other instruments.

Throughout Geoplot 4.0 you will find buttons with a red 'O' in the centre – these remind you there are Options associated with this part of Geoplot 4.0 and if you click the button it takes you directly to the appropriate Options tab.

**If Geoplot 4 behaves in an unexpected manner at any stage, then it could be the Options files have become corrupted or are not compatible with a later build. To restore correct Options files, exit Geoplot 4.0 and delete the existing files in the Options directory C:\GP400\Options. On restarting Geoplot 4.0 will offer to create new default options files – these will be saved when you next exit Geoplot 4.0.**



## 3-2 Basic Concepts

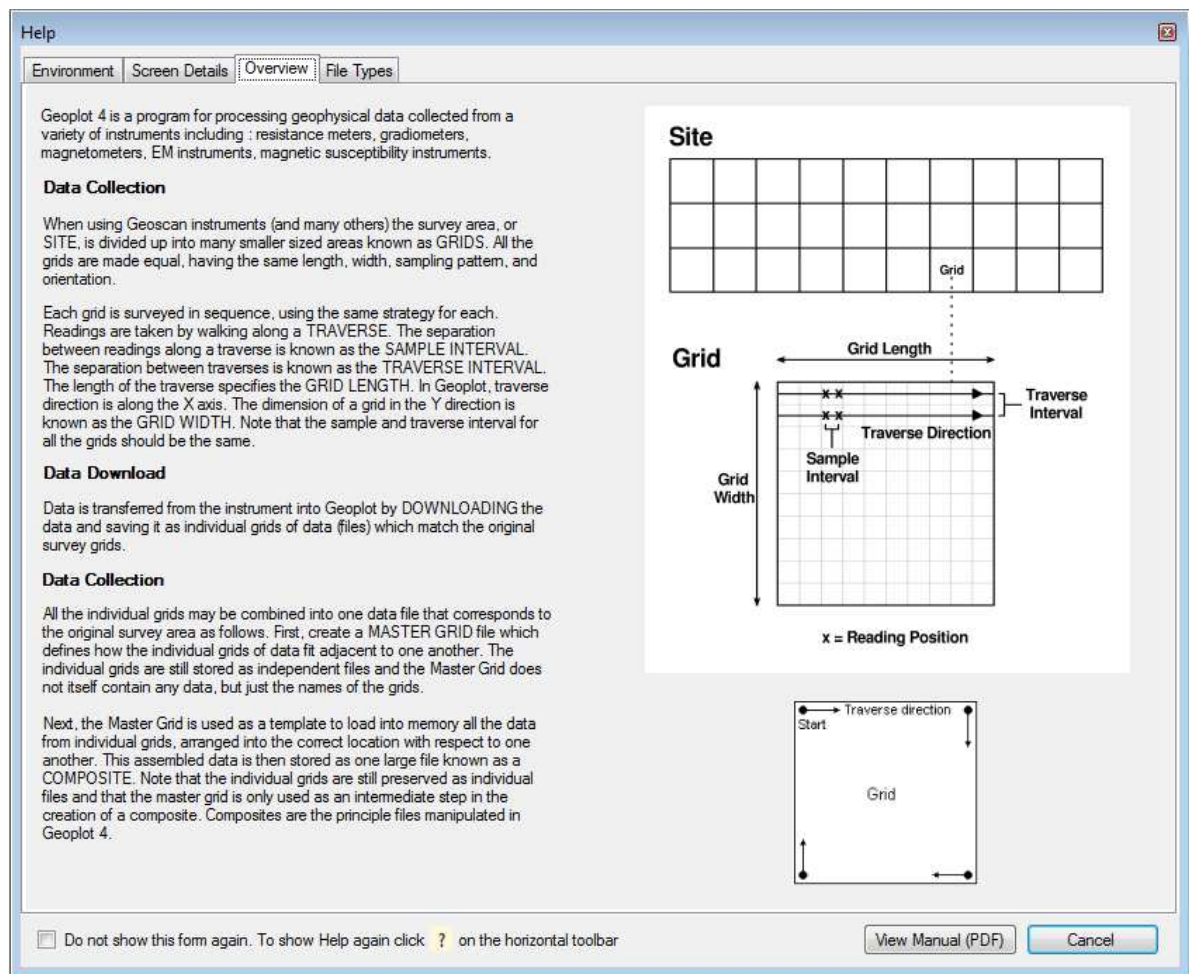
An overview of how data is organised, structured and referenced within Geoplot 4.0 is shown in the Help panel – image below.

In summary, a site is subdivided into smaller areas called grids. Data is collected by surveying each grid in turn. As shown in the panel below, for each grid we specify: (a) grid length and sample interval where these are measured in the X direction, (b) grid width and traverse interval where these are measured in the Y direction. The normal direction of the first traverse is clockwise.

Once several grids have been surveyed these are downloaded into Geoplot 4.0 as separate files. Next, a MasterGrid is defined which is a template that specifies how all the grids fit relative to one another – the grids are still separate files. The individual grid files are usually combined into one file called a composite for further data manipulation.

Dummy readings are used where an actual reading cannot be recorded. The default value set in Options, Environment, Data tab is 2047.5 and any reading with this value is ignored by statistics, editing, processing and graphics – by default it is shown as a turquoise colour in graphics (see above) but this colour can be changed in Graphics Options, General tab. Avoid using zero as a dummy reading, especially when working with gradiometer data.





There are some functions that can be applied to grid files, generally found in the Tools menu and are mainly aimed at correcting errors made during data collection or download. The main processing functions in the Process menu can only be applied to composites, along with some Tools. If a raw grid file is edited, then it must be saved with a new name to preserve the raw data.



### 3-3 View Menu

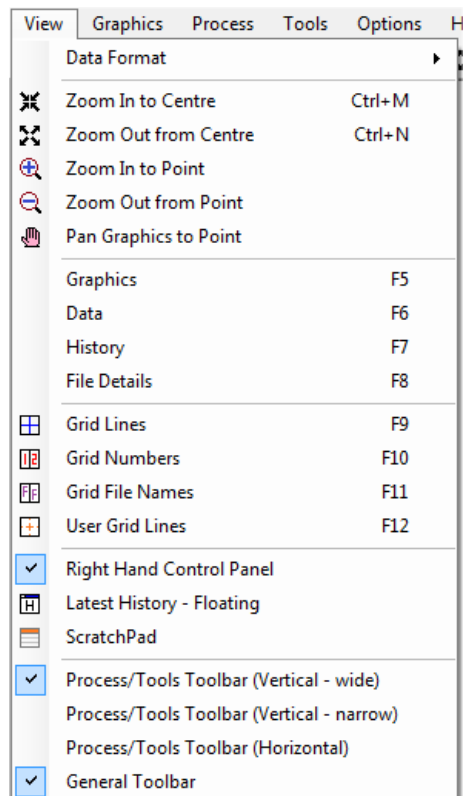
There are four different views of the data available: Graphics, Data, History, and File Details. You can cycle through the views by clicking on the left and right orange arrows in the top right-hand corner. Alternatively, you can use this menu or press the F5, F6, F7 or F8 functions keys to select a view.

The View menu is used to control which of the following items are visible: two vertical and one horizontal Process/Tools Toolbars, General Toolbar, Right Hand Control Panel, Latest History (floating) and Scratchpad. Preferences for these and other View items can be set in Options, General tab.

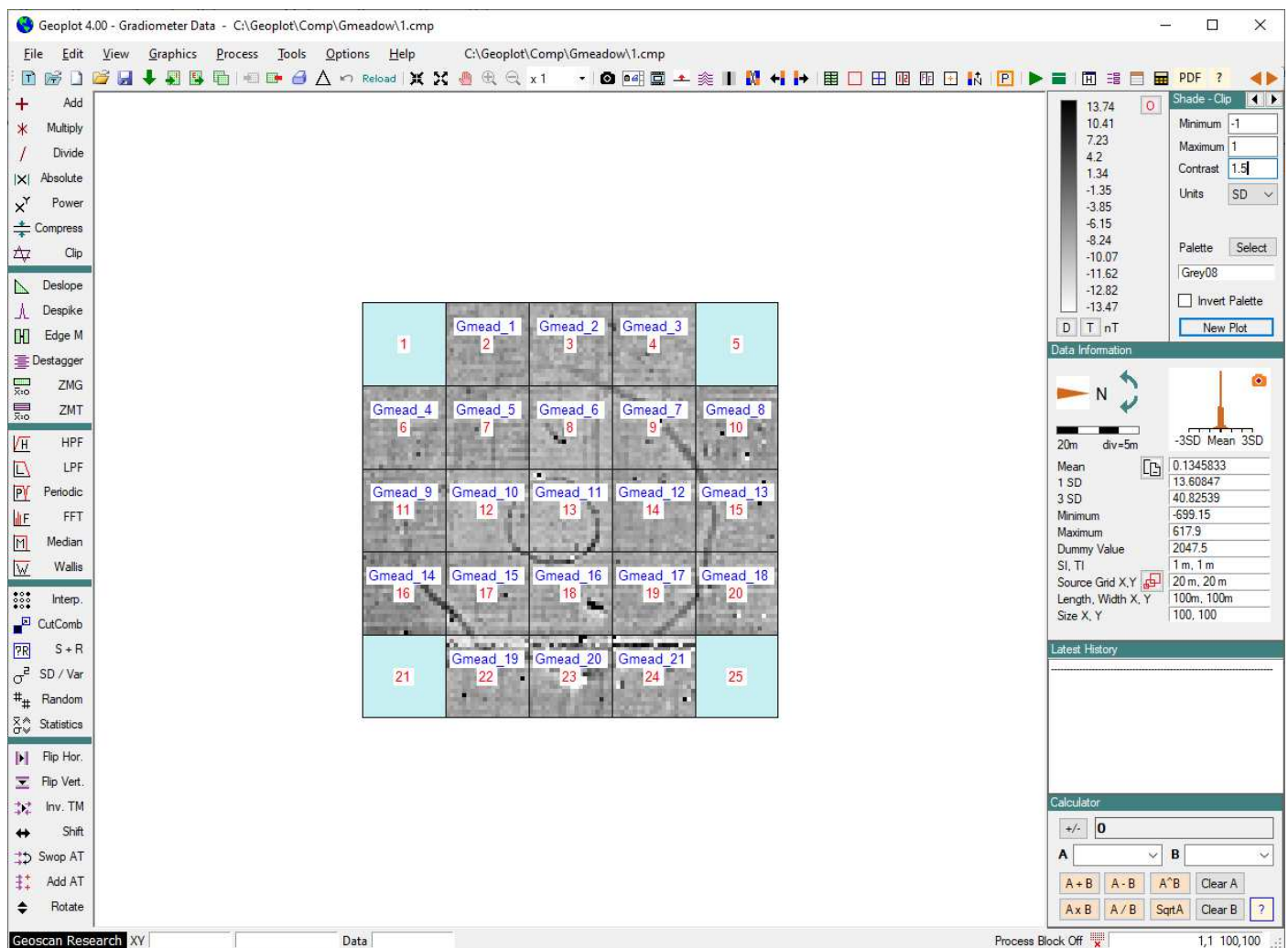
The menu can also be used to turn on and off Grid Lines , Grid Numbers , Grid File Names  and User Grid Lines , though these can also be controlled via the F9, F10, F11 or F12 function keys or usually more conveniently from the General Toolbar at the top.

#### 1 Grid Numbers, Grid File Names, User Grid

Grid numbers are used by process functions to refer to a particular grid within a composite and are numbered from left to right, top to bottom, regardless of original file names – see image below where the numbering goes from 1 to 25. Grid File Names, if available from a MasterGrid, are displayed just above the Grid numbers – see image below. A user grid can be used to add positional information of features and can be tailored to user requirements in Graphics Options, Grid Guides. The image below shows orange crosses, but the colour and format can be changed to lines, vertical and/or horizontal.



The View menu offers access to graphics control such as zooming or panning a graphics image though again it is usually more convenient to access them from the General Toolbar at the top or use Ctrl key combinations.




## 2 Scratchpad

A ScratchPad form can be used to make notes during a Geoplot session - the form can be resized and repositioned. Any text is saved when Geoplot is exited and is then reloaded when the program restarts to act as a reminder. Tab and Enter may be used. Closing or cancelling the form does not lose any information - use the Clear button to delete all the text. You can use the 'Add Text to Comp Notes' button to save the text with composite file notes.

Examples of use include (a) noting block statistics - click on a single Statistics Report value to place it in the Clipboard then paste into the Scratchpad or click on the 'Copy Summary to Clipboard' button to collect all values. ), (b) noting of block coordinates ready for entering into Cut and Combine - values can be copied and pasted, (c) the name of the current file loaded can be copied and pasted here from the menu bar, (d) recording a summary of all the Data Information from the RH Control Panel using the 'i' button (to the right of 'Mean') to first place the information on the clipboard. Reminders for present or future processing steps can be recorded and Process History can be copied here.

The ScratchPad dialog box is shown with a light blue border. It contains the following text: "Area to work on next: 355, 412 to 425, 470", "Remember to apply custom macros next to file: Res\_KK\_HPF10x10", "Macros to design: Normalisation, Correlation", and "Make all plotting parameters +/-2.5 SD KK\_HPF10x10 3SD = 4.6743". At the bottom, there are three buttons: "Add Text to Composite Notes", "?", "Clear Text", and "Cancel".




Any ScratchPad text can be pasted into the Composite Notes area if enabled - for example recording the logic behind specific steps taken to correct unusual survey defects.

Please see the Process Menu, Statistics Report, for further notes on copying a statistics summary to the clipboard using the 'Copy Summary to Clipboard' button. You can also 'Copy Data Information to Clipboard' using this button  in the RH control panel.



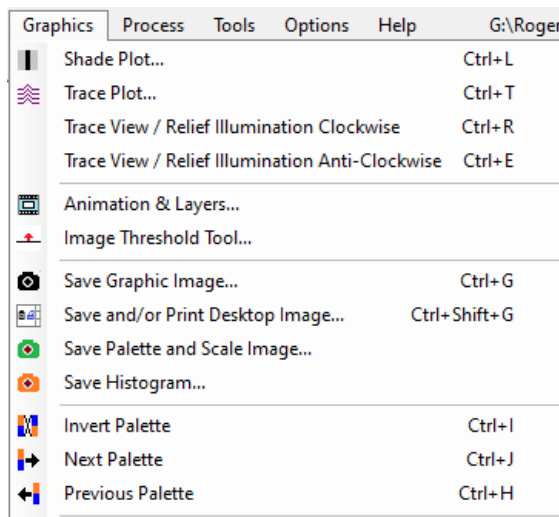
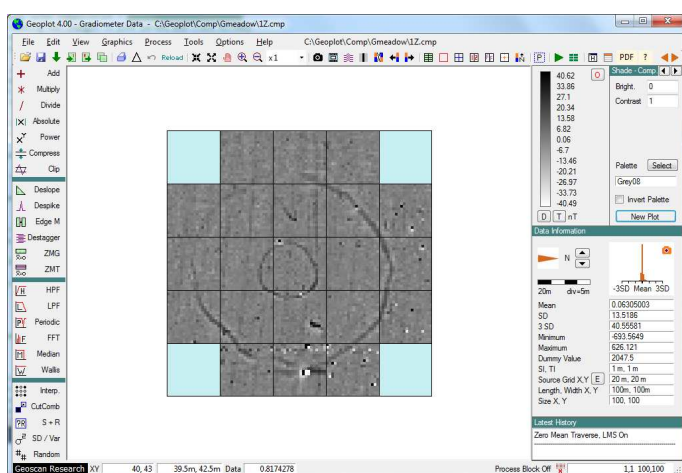
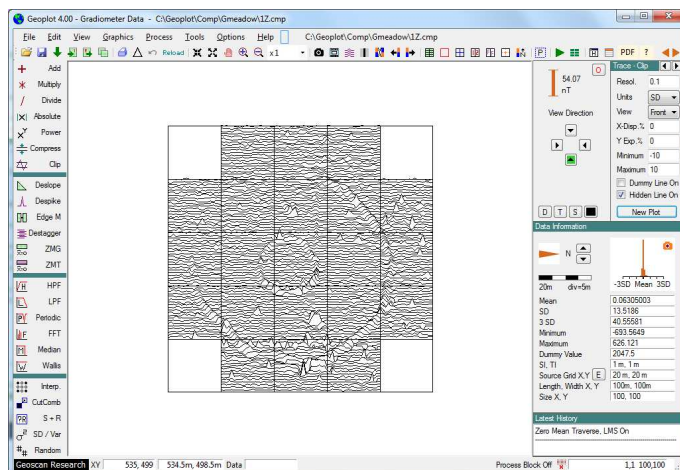
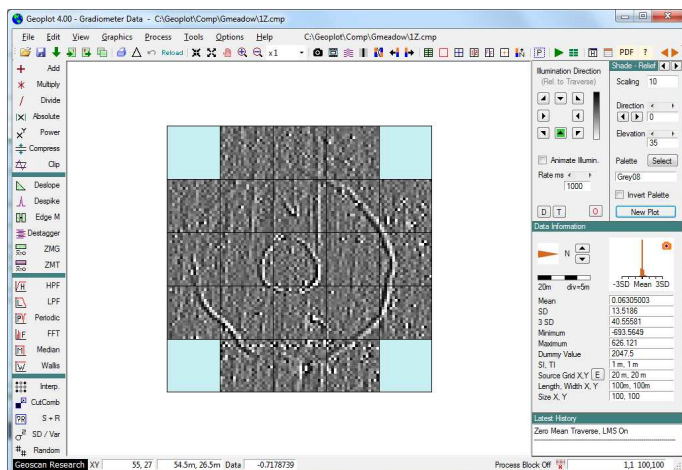
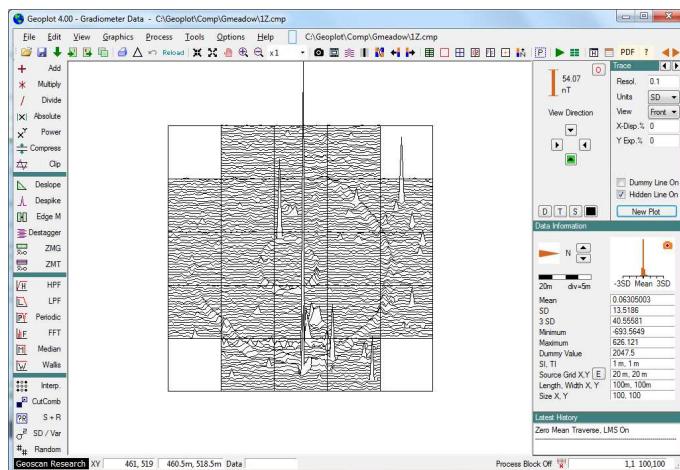
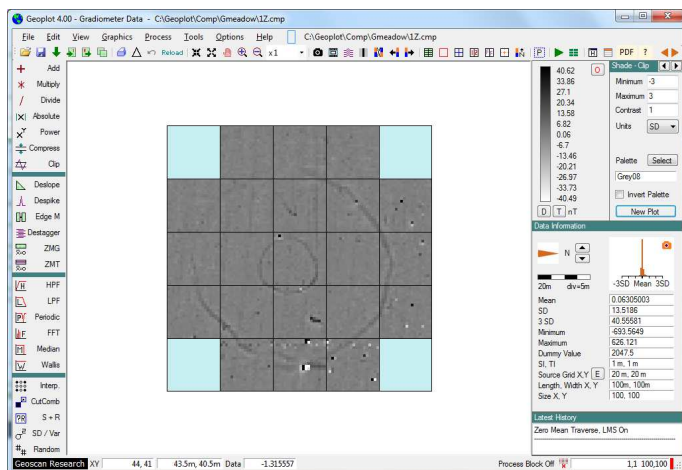
# 4 Graphics View (F5) and Graphics Menu

## 4-1 Overview


There are two main graphics views of the data available: Shade Plot and Trace Plot. The principal way to access the different views is to use the RH Control Panel to cycle through the Shade and Trace views, five in total, by clicking on the left and right black arrows  in the top right-hand corner of the RH control panel. The plotting parameter entry panels will change according to plot type. An alternative way to access the different graphics views is to use the two buttons on the general toolbar,  and  or use the Graphics Menu, resulting in the display of the appropriate plotting parameter form – see images below. There are three styles of Shade plot: Shade-Clip, Shade-Relief, Shade-Compress and two styles of Trace plot: Trace and Trace-Clip.

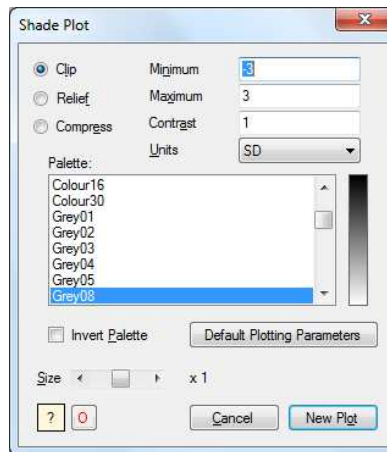
Shade Plot (default views of Clip, Relief, Compress)

Trace Plot (default views of Trace, Trace-Clip)

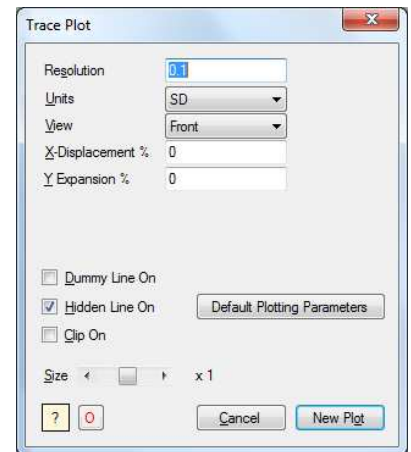


The Shade and Trace plotting parameter forms are shown to the right. These will track the settings on the RH panel and vice-versa. However, for Relief plots (see below) the RH panel will offer much more interactive flexibility so, in general, we recommend using the RH panel most of the time.

Whenever you change any of the RH control panel plotting parameters the New Plot button  will turn red indicating you need to either click it or simply press Enter to refresh the display. If you want to change the plotting parameters back to the default values set in Options press the 'D' button located in each graphics control panel.



Shade Plot parameter form. It includes radio buttons for Clip, Relief, and Compress. The Clip option is selected. Fields for Minimum (3), Maximum (3), Contrast (1), and Units (SD) are present. A palette list shows Colour16, Colour30, and various Grey shades (Grey01 to Grey08). There are buttons for Invert Palette, Default Plotting Parameters, Size (x1), and a New Plot button.



Trace Plot parameter form. It includes fields for Resolution (0.1), Units (SD), View (Front), X-Displacement % (0), and Y-Expansion % (0). There are checkboxes for Dummy Line On, Hidden Line On, and Clip On. A button for Default Plotting Parameters is also present. At the bottom, there are buttons for Size (x1), Cancel, and New Plot.




Shade and Trace Plotting parameter forms

## 4-2 Details

### 1 Shade Plots

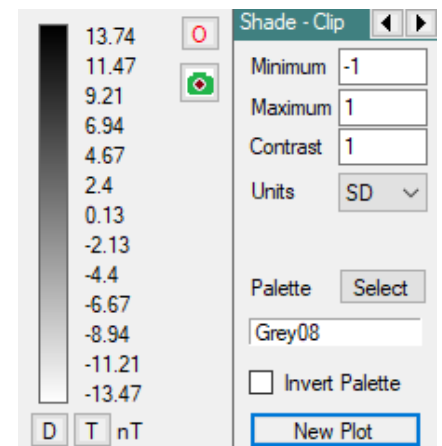
Shade plots can have between 2 and 256 different shades of grey or colour (palettes) to represent the data. Each Shade view can have a palette independent of the others. The three shade plot types can be either selected using the left and right arrows in the RH Control Panel or via the radio buttons on the shade plot form. Depending on which type is selected, the parameters offered will change. The colour of the dummy areas is set in Graphics Options and is by default a pale blue as shown above. A 'T' button in the RH Control Panel allows you to turn dummy areas transparent which can be useful when saving an image of the plot for publishing (see later). When 'T' is active it turns blue and dummy areas show as white.

### 2 Shade – Clip

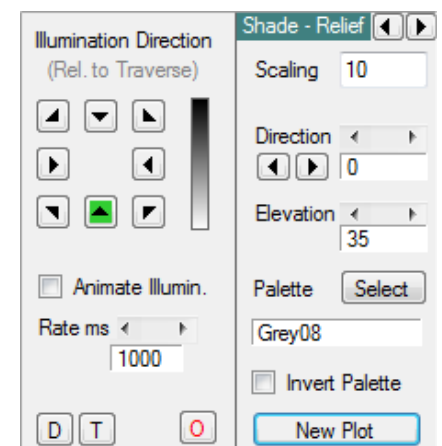
Shade-Clip plots are the most commonly used and as such are the default view. Plotting parameters Minimum and Maximum set the range of data that will be displayed as different shades – any data above and below these values will be clipped. The values can be either entered as absolute values or Standard Deviation (SD), values by setting Units. SD values are based on the statistics of the data set and is useful for an initial look at data, especially resistance data. Absolute values are more commonly used for gradiometer data. Contrast controls the linearity of the shade gradation. The palettes can be cycled forwards , backwards , or inverted  using the appropriate buttons on the general toolbar or by using the RH control panel. A specific palette can be selected using the select button – see below for further information. The palettes provided cater for presentation, data analysis and interpretation.

### 3 Shade – Relief

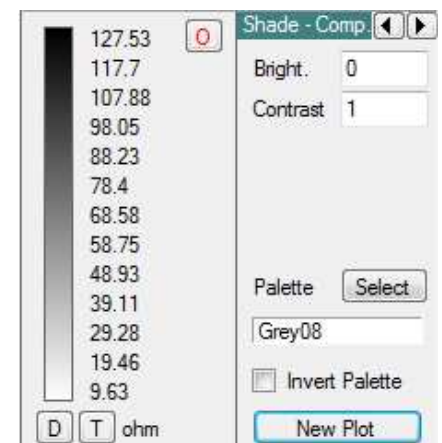
Shade Relief plots present an almost photographic style quality by simulating an artificial sun shining over an undulating surface. They are particularly effective at removing background resistance variations. Plotting parameters vary the effect of the artificial sun by changing its Direction and Elevation; there is also a Scaling parameter which acts as a contrast control. Example composite data for experimenting with Relief plots is located in the GHerb directory (file: Azi). Relief plots are usually better with smaller sampling intervals e.g. SI = TI = 0.25m. Plotting parameters can be adjusted on the far RH panel and then click New Plot (or hit Enter) for a graphics update. Alternatively, you can click either the left or right Direction arrow button which will then step through the directions, one-click at a time, clockwise or anticlockwise, and update the plot at the same time. (Tip: if you have previously used one of these buttons and then keep the Enter key pressed then the direction and plot will be rapidly updated until you release the key). You can also click any of the direction arrows on the left-hand part of the panel to select an individual direction. Finally, you can tick Animate Illumination, and the plot will then cycle through all the directions clockwise – adjust the rate by clicking on the slider bar. Whilst the animation is in progress you can alter scaling or elevation on the fly. Scaling works with positive, negative, zero. You can also change the palette using the horizontal toolbar buttons or invert the palette at the same time the animation is in progress. Note that the illumination angle is out by 90 degrees but will be fixed in a later build.



Shade - Clip parameter form. It includes a vertical color bar with values ranging from 13.74 to -13.47. Fields for Minimum (-1), Maximum (1), Contrast (1), and Units (SD) are present. There is a Select button for the Palette (Grey08) and an Invert Palette checkbox. At the bottom, there are buttons for D, T, nT, and New Plot.



Shade - Relief parameter form. It includes a section for Illumination Direction (Rel. to Traverse) with directional arrows and a vertical color bar. Fields for Scaling (10), Direction (0), and Elevation (35) are present. There is a Select button for the Palette (Grey08) and an Invert Palette checkbox. At the bottom, there are buttons for D, T, O, and New Plot.



Shade - Comp parameter form. It includes a vertical color bar with values ranging from 127.53 to 9.63. Fields for Bright (0) and Contrast (1) are present. There is a Select button for the Palette (Grey08) and an Invert Palette checkbox. At the bottom, there are buttons for D, T, ohm, and New Plot.



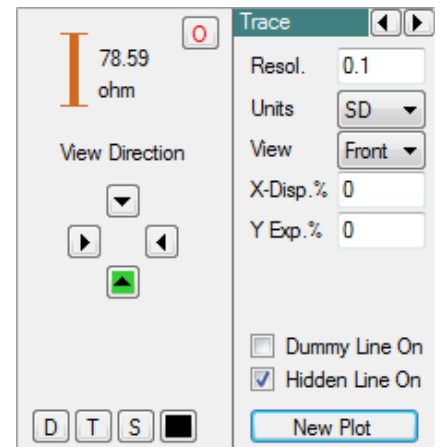
#### 4 Shade – Compress

Shade-Compress plots have a similar effect on the data to the Process Tool Compress when it is used with Arc Tangent compression, though of course the data remains unchanged in this case. In the graphics case Brightness is equivalent to Scaling Factor and Contrast is equivalent to Pre-Multiply Factor. See the graphical representation for the transfer function in the Process Reference Chapter. It provides a way of viewing low amplitude data to be seen in the presence of large noise spikes.

#### 5 Trace Plot and Trace-Clip Plot

Trace plots represent data by a series of line graphs stacked vertically. The two trace plot types, 'Trace' and 'Trace-Clip', can be either selected using the left and right arrows in the RH Control Panel or by setting Clip to 'On' or 'Off' in the trace plot plotting parameter form. Hidden Line can be set to 'On' or 'Off' and determines whether a line in the foreground blocks any lines appearing behind it.

The data may be viewed from all four sides by changing either the View drop-down box in the far-right hand panel or by clicking on one of the four View direction arrows in the left hand panel. Trace Resolution can be entered as either absolute or Standard Deviation (SD) values with SD values being most useful for an initial look at the data. The data set mean is subtracted for trace plots so that non-bipolar data (EG resistance) appears centrally. The trace angles can be adjusted to give a 3D style view by changing X-Disp. And Y Exp. **Please note that at present, when you set a non-zero X Displacement value and set Hidden Line to on, then the shadow cast by any spikes will not be correctly placed.**



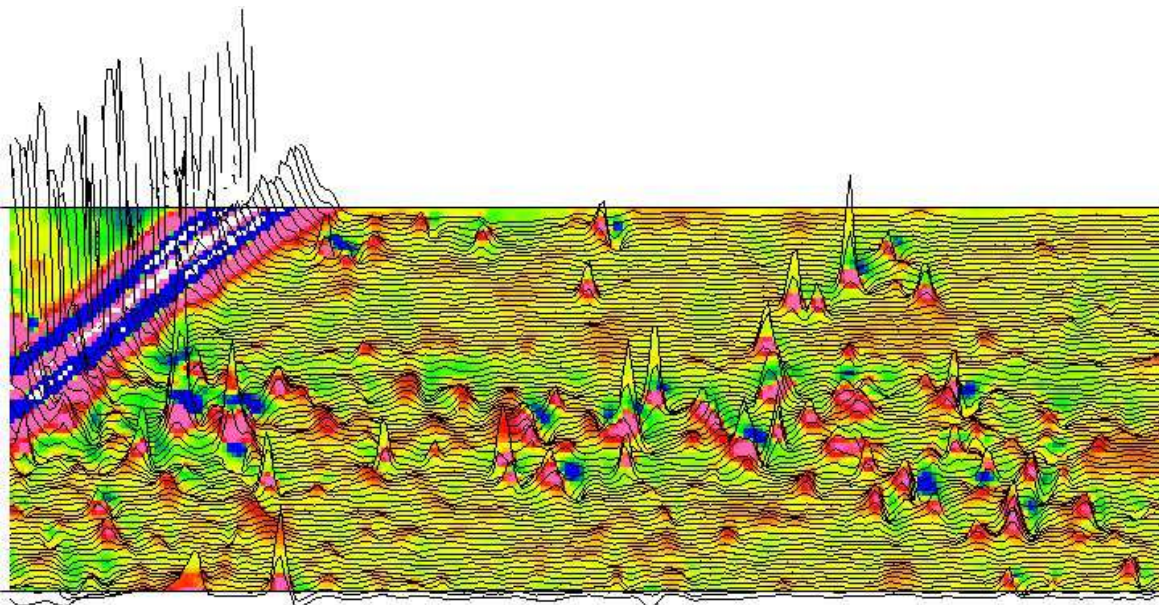
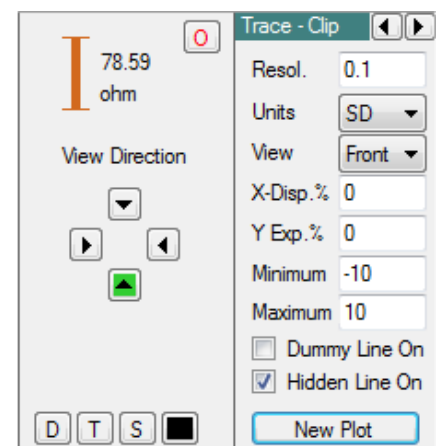
#### 6 Graphics Control Buttons

There is a line of four buttons under the four View Direction arrows that control various aspects of the display:

'D' allows you to quickly changes settings to the default values.

'T' allows you to turn background transparency on and off, used when saving an image of the plot. Transparent images can be overlain on corresponding shade plots in publishing documents. When 'T' is active it turns blue.

'S' allows you to show any existing Shade Clip plot in the background, underneath the traces. To change the shade plot, navigate back to the Shade plot view, change the plotting parameters and then return to the Trace plot view.



'L', the 4<sup>th</sup> button, allows the colour of the lines to be changed. The button changes colour to reflect Trace line colour – in the above example form it shows as solid black since that is the line colour. It can also be set in Graphics Options.

Dummy data is not usually shown as a line but if 'Dummy Line On' is checked then dummy data will appear as horizontal lines, red in colour by default (the colour can be changed in Options).

'Trace-Clip' plots adds Minimum and Maximum clipping values to the RH Control Panel, entered as absolute values, which are centred about the mean. They are usually used to suppress noise spikes in resistance data or ferrous spikes in gradiometer data.

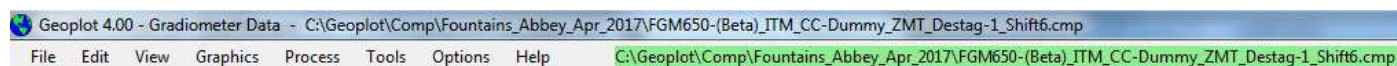
## 7 Grid Lines, Grid Numbers, Grid File Names, User Grid

Grid Lines, Grid Numbers, Grid File Names and a User grid, all accessible from the View menu or general toolbar, can be displayed. Grid numbers and grid filenames can now have a white background, set in Graphics Options. Grid filenames position can now be offset upwards by one line, so it does not overlap grid numbers – set in Graphics Options. A warning that grid names will be misleading is given if data is rotated and grid names are displayed – the message disappears if data is subsequently rotated back or round to the original position.

## 8 Save Image

Images can be saved by clicking on the Save Graphic Image button on the general toolbar or from the Graphics Menu. Images can be saved as jpg, bmp, png, tif and gif for use in publications - this includes any off-screen areas, so the image can be saved at high magnification / resolution. Transparency buttons, 'T', have been added to the RH control panel so that when an image is saved dummy readings can be saved as transparent areas for Shade plots. When 'T' is active it turns blue and dummy areas show as white. For Trace plots, when transparency is on, trace lines will be saved on a transparent background; when off the background will be white. Transparent images can only be saved as png or tif files since these support transparency whereas jpg, bmp and gif do not.

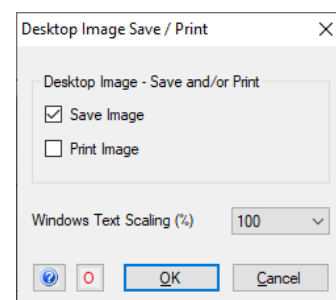
**Tip: Quick filename extraction.** You can single click on the text box (on the right of the menu bar) that shows the full file path of the current file loaded and this operation copies just the filename to the clipboard, discarding the other parts; the text box will have a green background for half a second to indicate this has happened.



This can be very useful for Save Image and Save Histogram when the file name is complex, e.g. "R\_HPFI0x10\_ZMT\_LPF1x1x6" and you wish to incorporate that in the image name. Normal Copy and Paste can also be used but the above method extracts the filename faster.

## 9 Save and/or Print Desktop Image

An image of the desktop can be either saved and/or printed by clicking on the 'Save and/or Print Desktop Image' button on the general toolbar or from the Graphics Menu. Images can be saved as jpg, bmp, png, tif and gif. A form appears that allows you to choose to save and/or print. In your Windows settings, if you are using a size of text. other than 100% (Windows Settings, "Scale and layout"), then set a matching size on the form so that the desktop image is correctly saved/printed. You can save this setting in Options for future use. When printing, set the paper to Portrait and A4 or letter and Geoplot will rotate the image to fit.



## 10 Save Histogram

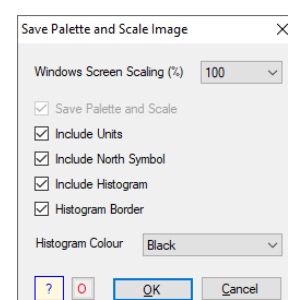
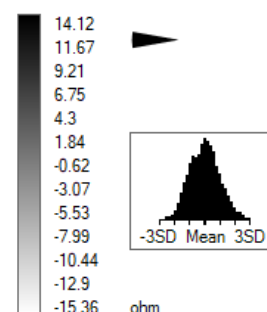
Histograms can be saved by clicking on the Save Histogram button just to the right of the histogram displayed on the RH panel or from the Graphics Menu. Histograms can be saved as jpg, bmp, png, tif and gif for use in publications.

## 11 Save Palette and Scale

You can save an image of the palette and scale shown in the Right-Hand Control Panel for inclusion in a survey report. Options are provided to save just the palette and scale, or additionally Units, the North symbol, the Histogram, a border for the histogram and choice of histogram colours. The defaults are shown to the right but can be changed in Graphics Options.

Saving the image can be selected either from the green camera symbol next to palette in the Right-Hand Control Panel or from the Graphics menu. When selected, a "Save Palette and Scale Image" form appears where you can make selections for what you would like to save. The first item, Windows Screen Scaling, refers to your Windows settings. If you are using a size of text. other than 100% (Windows Settings, "Scale and layout"), then set a matching size on this form so that the image is correctly saved. You can save this setting in Graphics Options for future use. "Save Palette and Scale" is permanently selected but you can change the other items to include.

When you click OK, a preview of what the palette and options will look like will appear at the top of the Right-Hand Control Panel, temporarily replacing the original palette etc. At the same time a save image form will appear where you select the image type from .jpg, .bmp, .png, .gif, or .tif. Select the save location, give the image a name and save, or if not satisfied then press Cancel to start the process again, this time selecting the elements you want. There is a range of colours that the



histogram can be drawn in apart from black: Black, Chocolate, Salmon, Dark Red, Dark Green, Dark Cyan, Steel Blue, Royal Blue, Purple.

## 12 Print

Shade and Trace plots can be printed out either as scaled plots (e.g. 1:1000) or as sized plots (e.g. x2); scale can be selected from a drop down list or set to any specific value. Optionally File Information, Statistics and History can be printed out with the plot. Trace plots additionally have a Quality setting, Coarse, Medium and Fine, corresponding to the view seen at x1, x2 and x4 respectively. Apply caution when printing scaled Trace plots since, depending on the data set, chosen scale and dpi, some small horizontal sections of the image may be missing; when printed using sized plots Trace plots are always complete. If PDFCreator is used as the printer, then the graphics can be saved as PDF files or as graphics files such as .png where very high resolutions can be set, e.g. 1200dpi.

## 13 Zoom and Pan

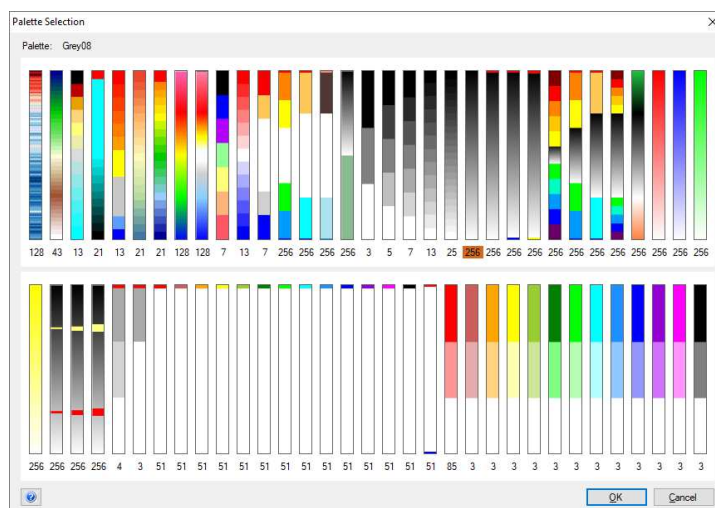
You can Zoom-In on a graphics at the centre point or Zoom-Out at the centre point. Clicking on Pan allows you to drag shade and trace images around the screen with the mouse – click Pan once to enable, click Pan again to disable (status is shown by a change in background colour). **However, Zoom-In To a Point and Zoom-Out From a Point are not properly working yet – for now they are disabled; instead use the normal zoom in / out to the level you require and then Pan.** Note that the block selection button and menu item is disabled whilst Pan is enabled – disabling Pan re-enables block selection.

## 14 Border

There is a Display Border button on the general toolbar to control whether this is shown or not around a plot, and the colour can be set in Graphics Options.

## 15 Palettes

There are 66 pre-set palettes available; at present you cannot design your own. Palettes can be changed by either using the Select button in the RH control panel, using the Graphics menu shade form or using the palette buttons on the general toolbar (see next). If you choose a palette from the form displayed using the Select button, then you can either just click OK or double click on a palette. In the former case only the control panel palette will update giving you chance to change the other parameters as well. If you double click, then a new plot will be made immediately using the new palette. The last 26 palettes are intended for simplifying a plot and then saving as a coloured image to be subsequently used as a layer in an Animation sequence – see below. The 2 palettes before that, when used with appropriate plotting parameters, can display data at 1SD, 2SD and 3SD significance compared to the SD of noise measured in a quiet area.



## 16 Palette Invert Previous Palette Next Palette

A cluster of three button on the general toolbar allow you to quickly change the palette, either inverting the current palette or selecting the previous or next one from the sequence shown above. The name and invert status will change on the RH Control Panel to reflect this.

## 17 Graphics Block Selection

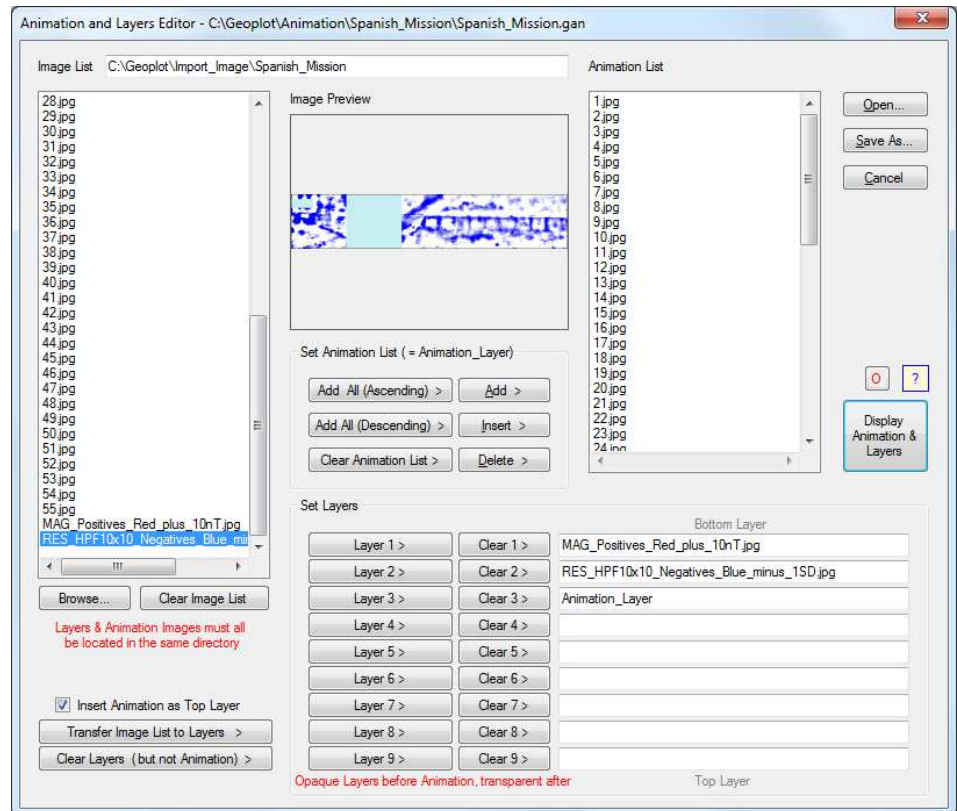
We are not proposing to provide a Graphics block selection in this first release. In the meantime, please save an image and use a third party graphics program to extract the part you require.



### 4-3 Interactive Interpretation using Overlays and Animation

An Animation and Overlay Editor, right, provides archaeological feature analysis and interpretation based on multi-method geophysical survey. The Animation component is primarily in support of GPR time slice data though it can also be used to compare different survey methods, such as resistance, magnetics and EM. The Overlay component supports static data. The animation can be paused at any convenient point, run forwards or backwards either continuously or in single steps. The opacity of any selected overlay image can be interactively adjusted to help in understanding data sets, their spatial relationship, complementary nature and to develop an interpretation from a variety of sources - including resistance, magnetics, GPR, LiDAR, topography, EM etc. Images can be .jpg, .bmp, .png, .gif, or .tif in any combination but must cover the same survey area. Up to 9 images can be selected for overlay on the animation and each image can be turned on or off and its ordering position relative to other layers changed.

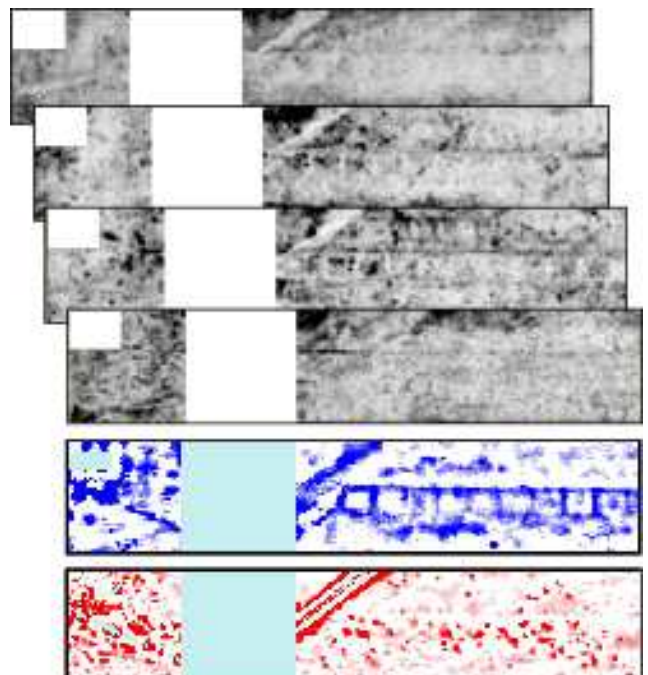
All pre-processing and graphics creation can be done within Geoplot 4.0 using the Processing and Save Graphic Image capability. The display form supports transparency so images saved as .png or .tif that have transparent areas defined will show layers behind. The Display form can be resized to suit user preference.



Opaque layers are usually selected first as bottom layers, followed by the animation; transparent layers are usually selected after the animation, towards the top. Add layers to the Image list on the left-hand side by using the Browse button. An image preview can be made by clicking on a file name. Highlight a file name and then add it as a layer by clicking on one of the Layer buttons in the Set Layers group box. If you have a few layers, then they can be inserted in one go by clicking on the Transfer Image List to Layers button. Once you have all the required layers clear the image list then browse and select the files you want to animate – they must be in the same directory as the layers. Files from this list can be added, inserted or deleted from the animation list on the right, either singly or in blocks of ascending or descending names. If you intend to add file names in blocks only, add only names to the left-hand list that will be part of the block. It can sometimes be useful to use both the ascending and descending buttons to create an animation list. Further images can be added to the Image list and can be individually selected for addition to the animation list. As soon as you click on any of the Add buttons this will create a layer after any other layers called 'Animation\_Layer'. You can continue to add more animation files if you wish or further overlay layers after the 'Animation\_Layer', especially if they are transparent. If desired, an animation does not have to be created and just the Overlay Images can be used in the Display view or vice versa.

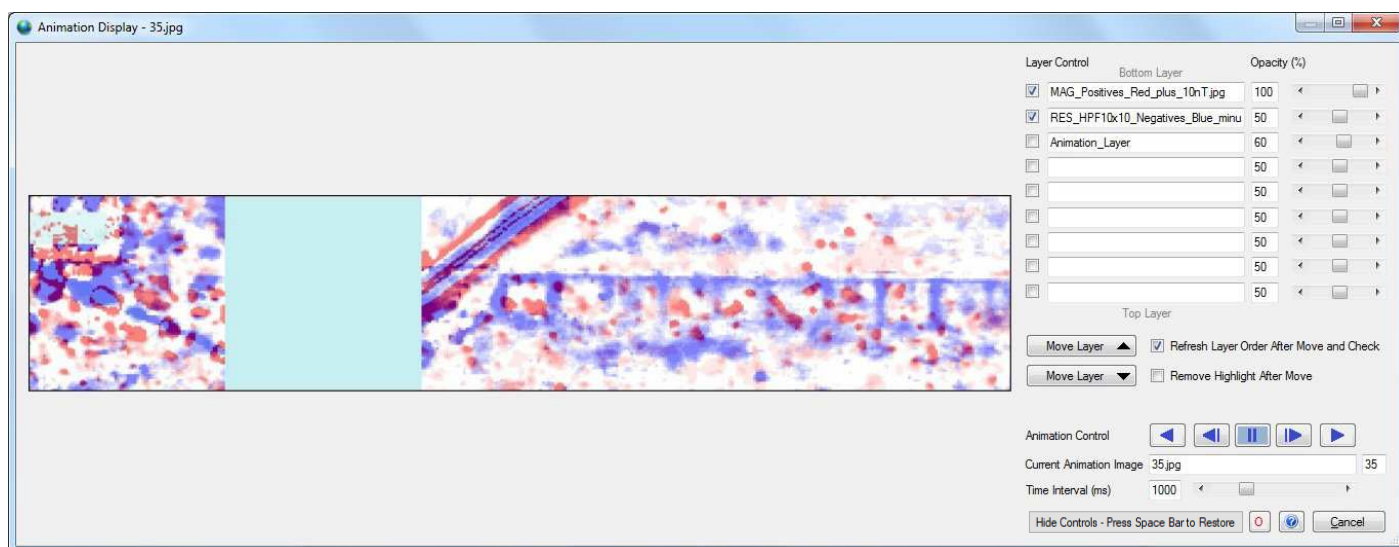
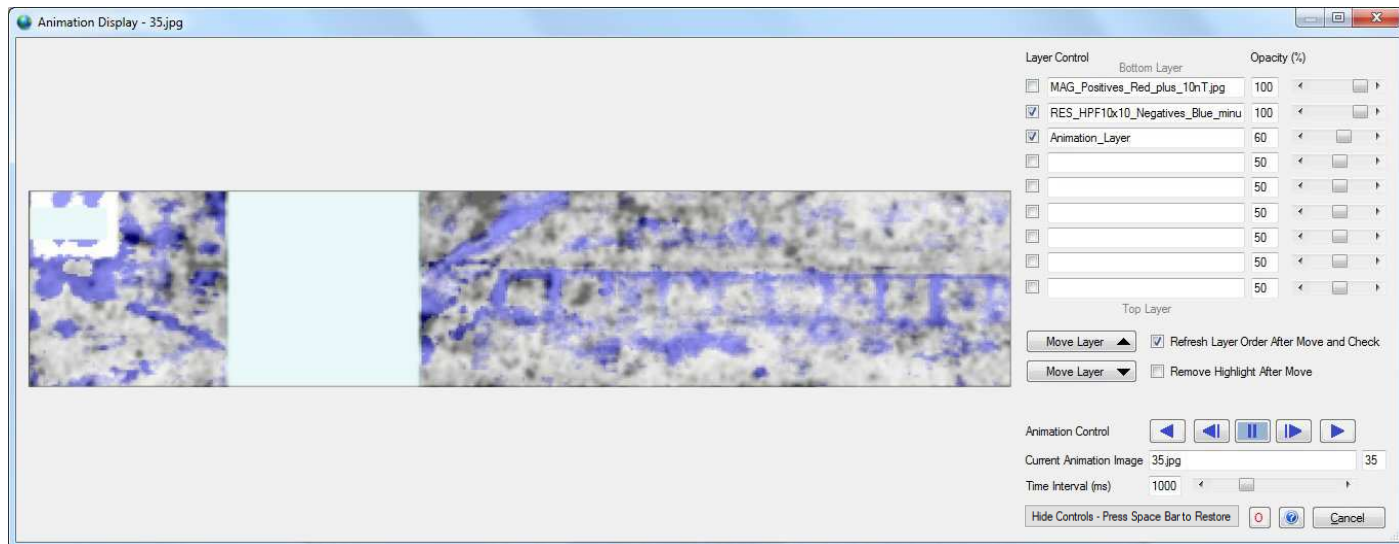
Click 'Display Animation and Layers' to start the sequence.

The animation display form allows you to control the speed of the animation by adjusting the Time Interval. The current file name is displayed at the top of the form and in a text box with a number to the right indicating its position in the list. If you pause an animation this allows the single step forward and back buttons either side of pause to be used. Animation can be resumed forward or backwards using the outer pair of buttons. Layers can be turned on or off using the checkboxes in Layer Control. Opacity of a layer can be controlled by adjusting either the number or slider. If a layer is high-lighted it can be moved to the Top or Bottom of the layer



sequence using the Move buttons. Typically, bottom layers need a higher opacity. The form can be resized to suit the application – full screen if more than one person is viewing it or small to enable the eye to more easily pick out patterns. Default speed and opacities can be set in Graphics Options.

The animation list, overlays and file location can be saved as an Animation .gan file. in the editor form for future recall. See the latest Geoplot 4.0 data sheet for examples of animation use. Example images from radar (55 layers), resistance and gradiometer for the Spanish Mission Settlement survey are provided with the Geoplot 4.0 installation for you to experiment with in the Import Image directory – see images to the left. Note that animation and overlay images must all be in the same directory. A button has been added to allow you to hide the Animation control panel and restore by pressing the Space Bar.

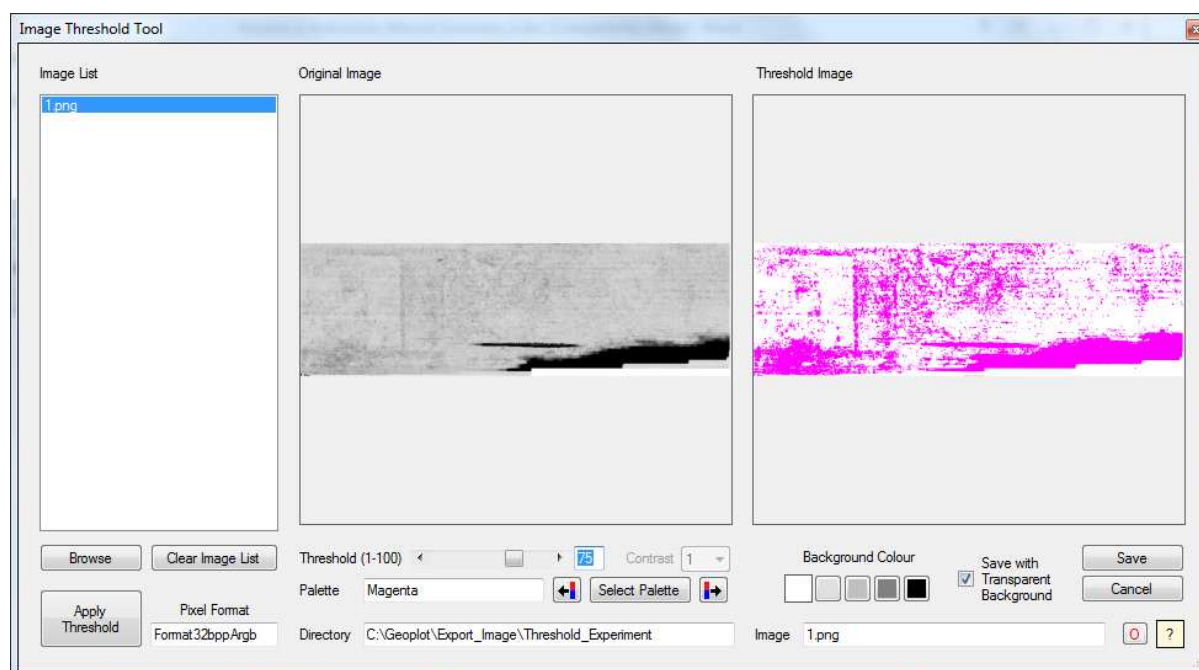


The typical image size of the example data is about 25Kb. On some slower computers significantly larger sizes (e.g. 1Mb) may not load fast enough so will need to be reduced in size. You can either use your favourite graphics program to do this in a batch or a fast and easy way to do this is to use Outlook. In Windows Explorer select a group of files, right click and from the menu select Send To and then Mail Recipient. A form will appear offering to set the picture size of an outlook attachment – it does not affect the original image size. Choosing the default size of Medium will typically reduce a 2.5Mb file down to 25Kb (the total size of all the images summed together is shown in the form, not the individual reduced size). Click OK and an email will appear with all the images appearing as attachments in jpg form but reduced in size. Select all these and save to a new directory for use in the animation; you can then discard the email.

On some networks or NAS drives, the images may not be fed through fast enough so you should then save the images you wish to work with on the local C drive.

## 4-4 Image Threshold Tool

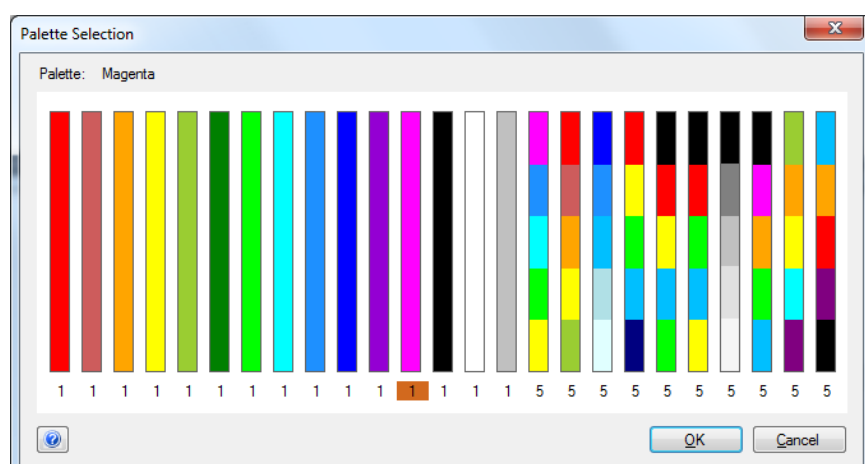
An Image Threshold Tool allows you to extract more information from an image, usually a grey scale, by setting a threshold level above which image information is displayed using a chosen palette colour, whilst below that level that part of the image will be typically white. This tool is useful for applying to radar images and the thresholded image can be subsequently used in the Animation as an interpretation layer. It can be used to give false colour to grey images as well. The tool is found on the Graphic menu or on the top General Toolbar, next to Animation.



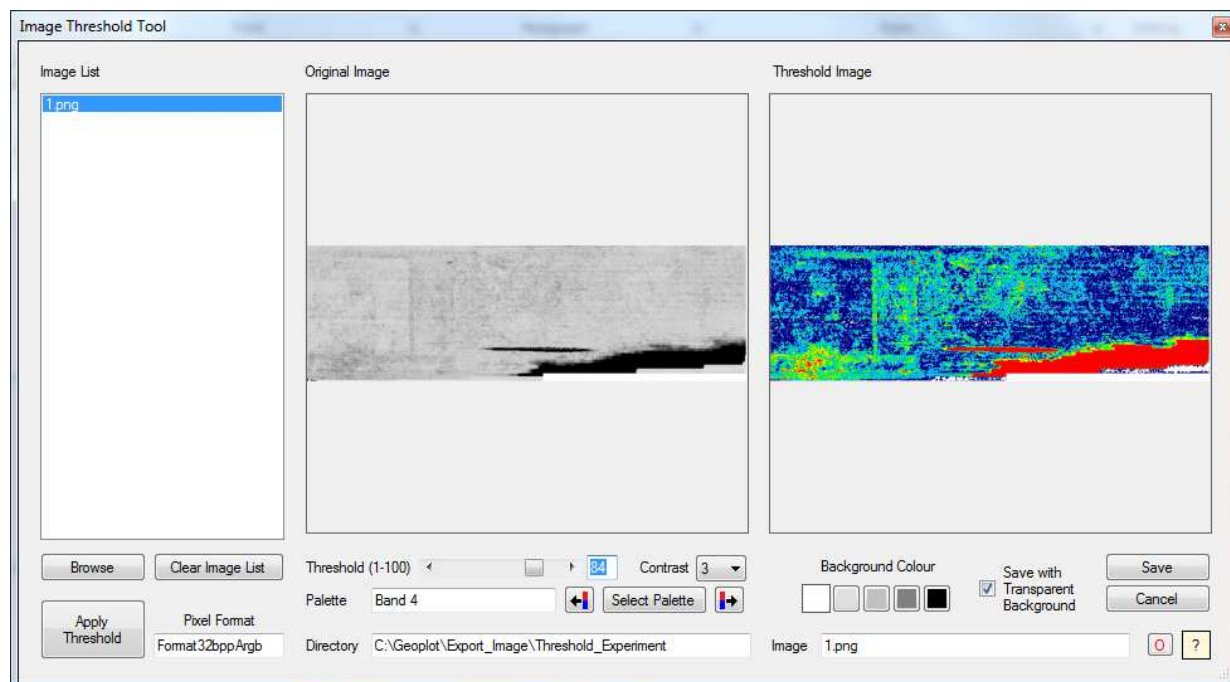
Files for processing can be selected by using the Browse button and choosing filenames that will appear in the Image List box. When you click on a filename in the Image List, the image will be displayed in the Original Image box and its bit level is reported in the Pixel Format text box. The tool only works with 32 bit images which can be BMP, PNG or TIF. If an image is 24 bit then you can convert it to 32 bit by opening and saving it in Paint to create a 32 bit version. Click on Apply Threshold to process the image which will appear after a short time in the Threshold Image box. The form can be resized to fill the screen if you wish.

The threshold level can be changed by either moving the Threshold slider to a new point or by changing the number that appears in a text box to the right of the slider, entering a value between 1 and 100. The Threshold Image is only updated once the mouse moving the slider is released whereas the Threshold Image starts updating as soon as the text value is changed. The background colour of the Threshold Image can be changed from the default white to one of three grey levels or black. Once a threshold has been applied, the threshold image can be saved, optionally with a transparent background if a white background is selected (even with original images which are BMP).

There are a range of single colour palettes which can be selected using either the Select Palette button or by using the forward and backward buttons either side of the button. There are also a number of 5 band palettes which can be used to set 20%, 40%, 60%, 80%, 100% levels above the threshold. In addition, if a 5 band palette is chosen, then a Contrast level of between 1 and 10 can be set above the default of 1 which will compress the image range above the threshold and improve visibility of some features. You may need to adjust the threshold level when moving from single to banded palettes and vice versa.



An example radar image can be found in c:\geoplot\import\_image\Radar\_Mala\_Near\_Surface\_Slice\1.png. Examples of processing this are shown above and below. With your own data, you may have several images at different depths that show different features. You can use the Image Threshold tool to convert the information at each depth into different coloured threshold images and then overlay them in the Animation tool for presentation, possibly along with resistance and gradiometer data.





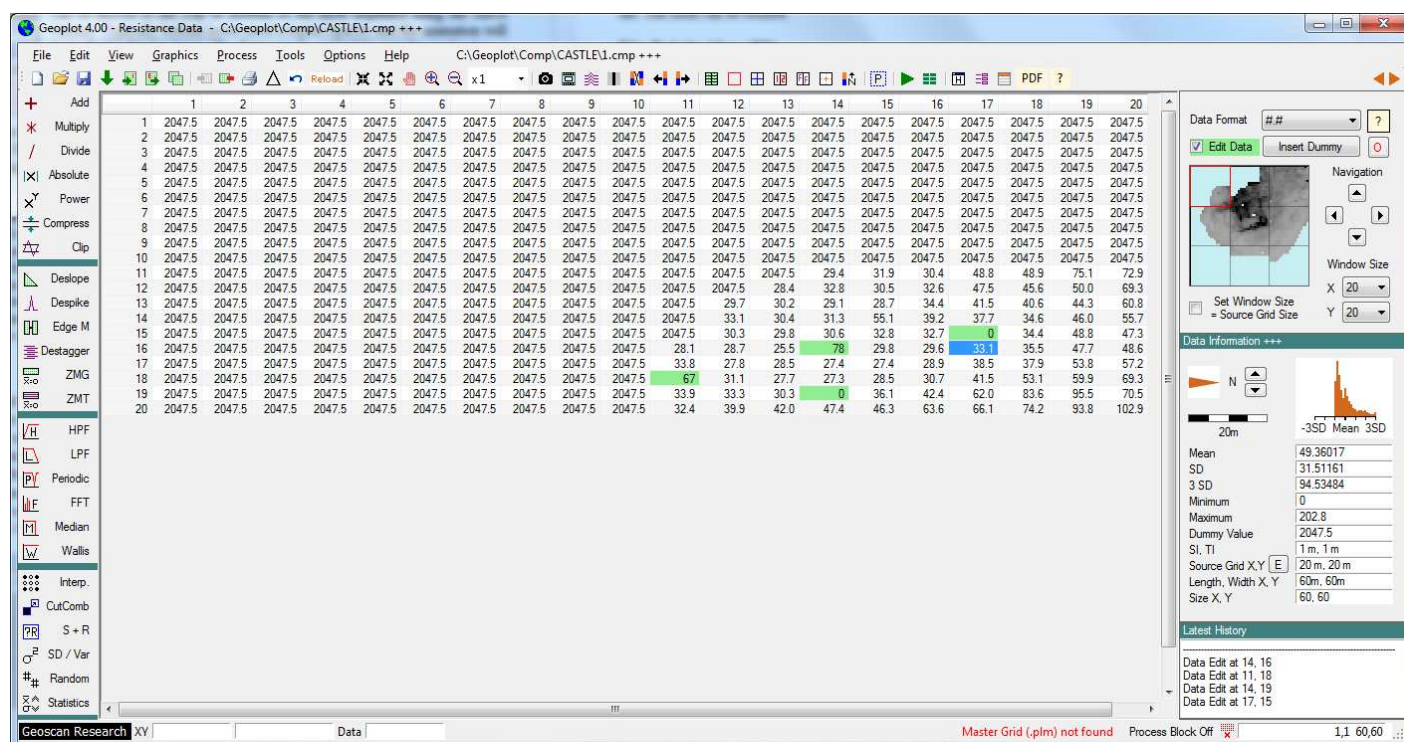
## 5 Data View (F6)

## 5-1 Overview

The Data View has a small image of the data plus red rectangle which moves over the plot to show what area of data you are looking at. The view window size is adjustable: it can be set manually using the X and Y combo boxes or set to the source grid size if the data set is a composite by clicking on the checkbox. These preferences can be set in Options. Click on the four arrow buttons in the Control Panel to move the window over the data set. To enable editing tick the Edit Data check box – the text will turn green to signify editing is on – see image below. Highlight a data point to edit and either press Delete or Back-step to clear the existing data, or simply append new values. When you move away from the cell it will turn green to indicate it has been edited and the Latest History will update as well. If you leave a cell empty, it will be filled with a zero. An ‘Insert Dummy’ button is provided in the Right-Hand panel to ease dummy value entry where the cursor is, though you must move the cursor away from the cell to activate the entry.

Any edits applied will not show in the panel image until data is saved and reloaded. If you apply a process function, then this will be reflected in the data values you see in Data View - the red navigation rectangle will be reset to the top left-hand corner after a process if applied whilst in Data View and the panel image will be updated. The data view cannot be printed. If you wish to have a printout of the data then please export as a spreadsheet, open in Excel and then print the spreadsheet.

The data view cannot be printed. If you wish to have a print-out of the data then we suggest you export in spreadsheet format, open in Excel and then print from there.



# 6 History View (F7)


## 6-1 Overview

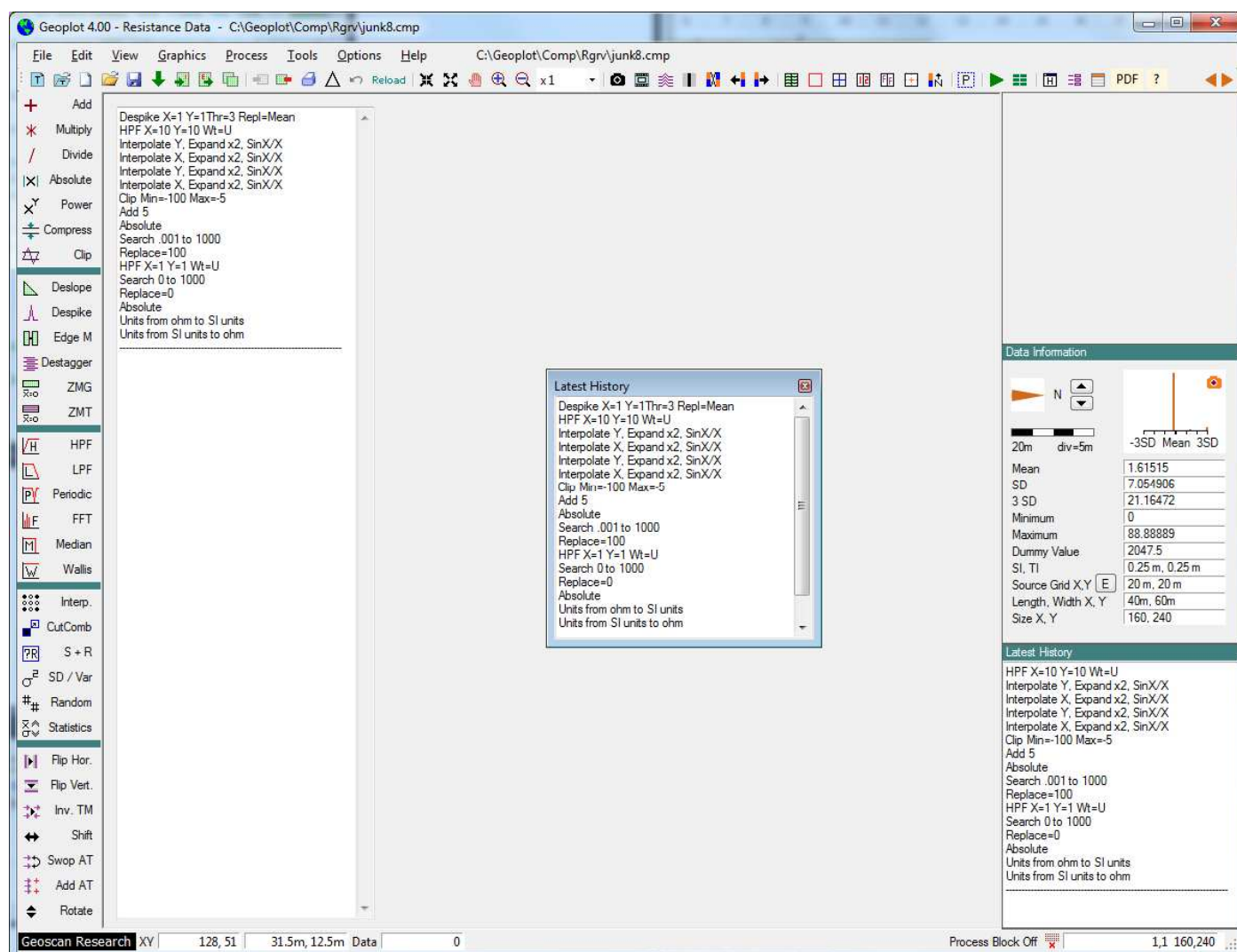
The history view is updated whenever a function from Edit, Process, Tools or Macros is applied. There is a separator line that indicates which are saved and unsaved function applications – anything below the line is unsaved. The separator line is moved down once the new data is saved. A shorter version of this information is shown in the right-hand panel in Graphics view and also the floating Latest History form if activated. If you have Calculator displayed, then this may limit the amount of history that can be viewed on smaller screens; in that case use the floating form. Please note there is currently a bug with the RH panel history report – the text disappears off the bottom when the history list is very long; again use the floating History form if this happens.

### 1 Latest History – Floating

The ‘Latest History – Floating’ form is normally only visible in the Graphics view when activated; you can turn it on in other views if required. If you want it to always appear at start-up check the box in Options, Environment, General tab. The form can be resized to fit conveniently in your working area.

### 2 Print

The full history can be printed using the print button  also found on the File menu. This can be either to a real printer or PDFCreator (or similar) to obtain a PDF document.



# 7 File Details View (F8)

## 7-1 Overview

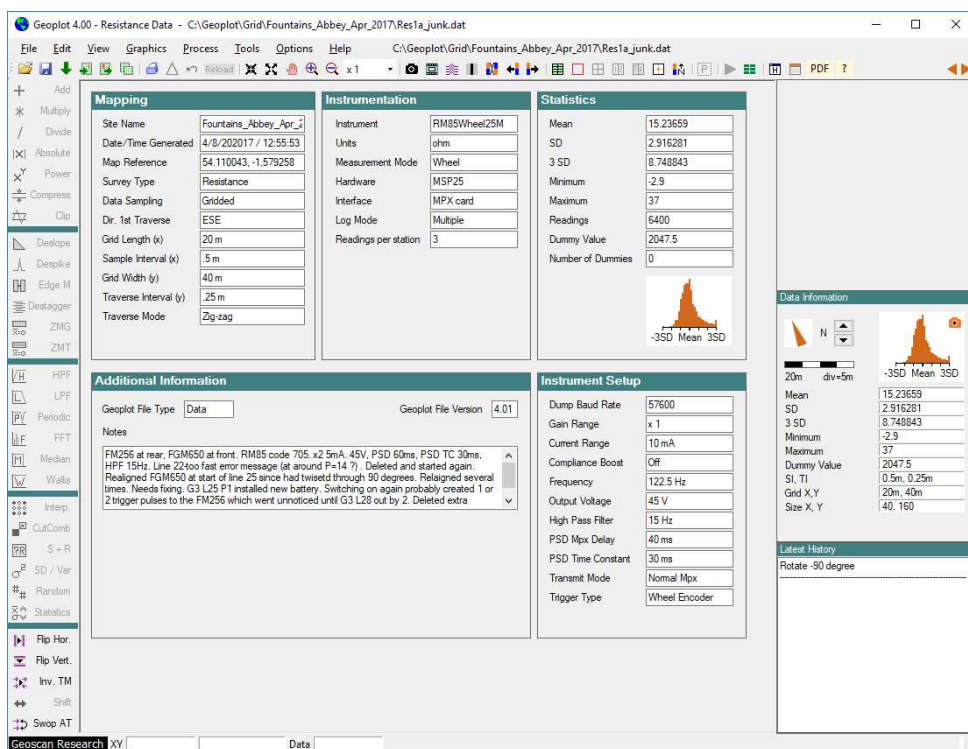
The File Details view for grids gives comprehensive information about mapping parameters, instrument setup and statistics. The File Details view for composites likewise shows mapping parameters, instrumentation, statistics plus MasterGrid information. If a MasterGrid exists then details will be shown in this view, otherwise just a red label will advise it is missing.

The File Details View also enables notes to be stored as a text file with each composite – click the ‘Edit Notes’ button to make entries in Composite Notes. These can be used to explain details and logic of data processing, site peculiarities, unusual aspects of the survey or background information etc. Scratchpad notes (see below) can also be added here. Geoplot 3.0 will simply ignore this file. The text file can also be edited or created in Notepad – note that there are no graphics allowed. It is stored with the .cms, .cms, .cmp files as .txt.

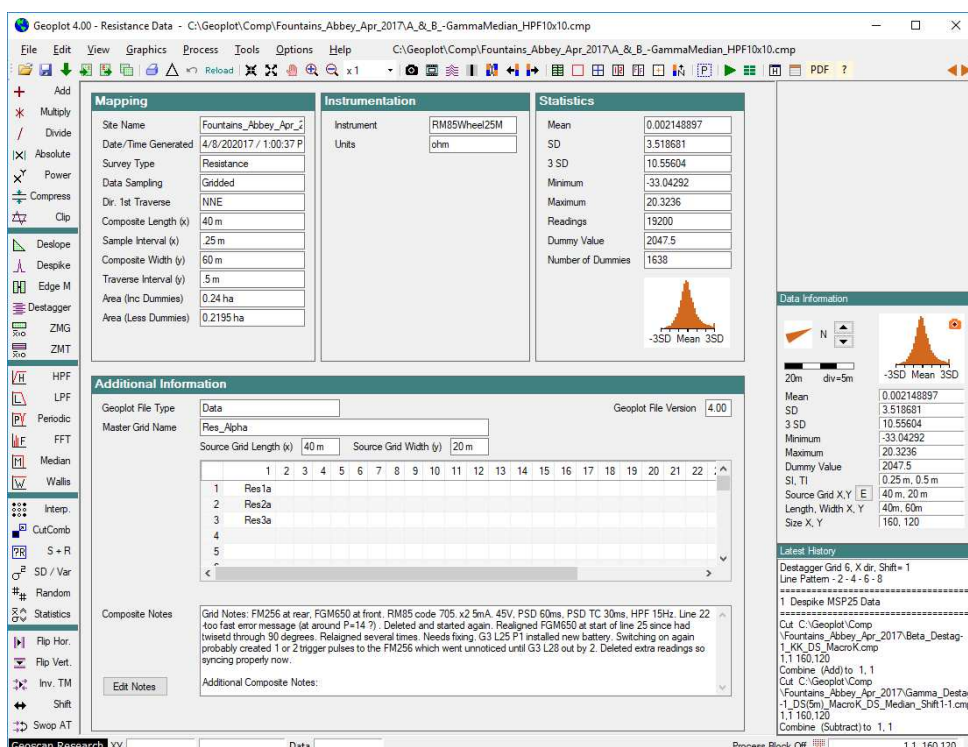
The Edit Source Grid Size button which was formerly only available in this view is now moved to the Edit menu and there is also a button on the Control Panel, next to the report of Source Grid Size. Please see Edit Menu for further information.

### 1 Print

Summaries of grid or composite file details can be printed using the print button. This can be either to a real printer or PDFCreator (or similar) to obtain a PDF document. Optionally, history can be printed out at the same time.



## Grid File Details



## Composite File Details

# 8 File Menu

## 8-1 Overview

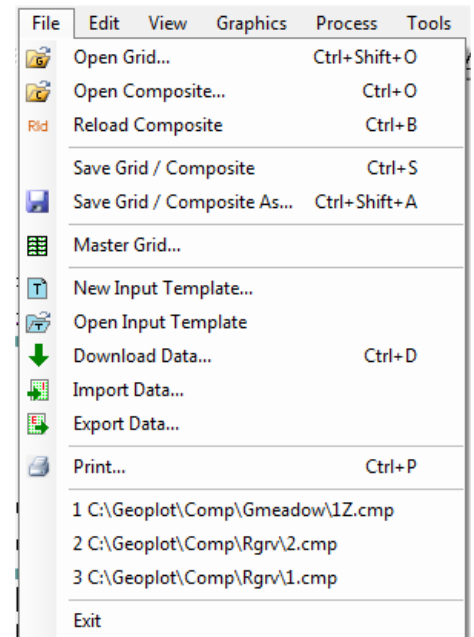
The File menu provides access to opening and saving data, creation of MasterGrids and composites, download and import of data supported by use of Input Templates, export of data and printing of the current view. Please note that Keyboard Input (present in Geoplot 3.0) has been removed and instead we suggest that if you wish to enter data manually you enter these into a spreadsheet and then import that data into Geoplot 4.0.

## 8-2 Details

### 1 Open Grid and Open Composite

Separate 'Open Grid' and 'Open Composite' menu items are located on the File menu, including keyboard short cuts Ctrl+Shift+O and Ctrl+O respectively, that allow Open to immediately show contents of either the last grid or composite directory used, making for faster file selection. The Open button on the top General Toolbar will default to the last file type opened but can be changed in the bottom RH corner.

Files recently opened are recorded on the MRU list at the end of the File menu. This provides a quick way of loading recent data.



Note that if a Master Grid is not located when you load new composite data then a message to this effect appears in red on the status bar and it means original grid file names cannot be displayed on the graphics if desired.

### 2 Maximum File Size

Maximum file size is about 200 Mb on a Windows 7 64 bit with 4 Gb memory. Feedback on file size limitations welcome on PC's with different memory sizes or operating systems. The limit will be found by repeated Interpolation – once the limit is reached you will see an error message: "Insufficient memory for expansion". Any feedback from your experience on this point would be welcome.

### 3 Reload Composite

'Reload Composite' discards any unsaved edit, process, tools or macro functions applied and restores the previous composite loaded to its unchanged state. A warning is given if there are any unsaved changes to the data before doing so. Unsaved changes are indicated by '+ + +' appended after the file name at the top of Geoplot. A 'Reload Composite' button is also provided on the General Toolbar. [Reload](#)

### 4 Save and Save As

Use Save to immediately save any changes, use Save As to generate a warning that a data file is about to be over-written. This gives you a chance to change the file name. The button on the General Toolbar is 'Save As' only.

### 5 MasterGrid

A MasterGrid is a template that specifies how individual grids fit relative to one another – the grids are still separate files. The individual grid files can be combined into one file called a composite for further data manipulation. Grid names may be added to the MasterGrid by typing in (Manual Entry) or by Drag and Drop from a list-box. Use the 'Browse' button to select files for the list-box. A check box determines whether grid names are removed from the list as they are dragged to the MasterGrid. You must save the MasterGrid before creating a composite. Click on 'Create Composite' to create the composite file. A checkbox determines whether the notes from Grid 1 are added to the composite notes when it is created. After you have saved a MasterGrid and created a composite, then if you click on Close rather than Cancel, a new plot will be created automatically without having to open the file. Any composite created can be read by Geoplot 3.0 and 4.0.

If you wish you can click on 'Export' to create a spreadsheet text file, with MasterGrid names separated by either tabs, commas or spaces.





8-4 Download ↓

To download data, click on the Download button on the top general toolbar or select it from the File menu. This will show an initial Input Template selection form which will show the default template ODEFAULT.GIP and a list of any other templates that may have been defined. Select the template you want and then click on the Next button - use the default template if none exist.

If you selected ODEFAULT then you will see a Survey Type and Instrument selection form. Select a survey type and then instrument from the list on the right-hand side. Click Next to show the appropriate default Input Template form – see example below. Template details include Mapping, Instrumentation, Instrument Setup and Notes and the actual details shown will depend on the instrument selected. If you selected a pre-defined template then this will be shown immediately with entries already made, though these can be changed to suit.

Grid Input Template -

Mapping

Site Name

Map Reference

Survey Type

Resistance

Data Sampling

Gridded

Dir. 1st Traverse

E

Grid Length (x)

20 m

Sample Interval (x)

1 m

Grid Width (y)

20 m

Traverse Interval (y)

1 m

Traverse Mode

Zig-zag

GPS Data Logged

No

Instrumentation

Instrument

RM85

Units

ohm

Measurement Mode

Probe

Hardware

PA20

Interface

No adapter

Log Mode

Single

Configuration

Twin

Probe Spacing

0.5 m

Instrument Setup

Dump Baud Rate

38400

Gain Range

AUTO

Current Range

AUTO

Compliance Boost

Off

Frequency

122.5 Hz

Output Voltage

45 V

High Pass Filter

13 Hz

Auto-Log Delay

300 ms

Insertion Delay

50 ms

Speed Boost

Off

Notes

Dump Content

Data

Back

Next...

Cancel

Download Data

Grid Names

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

Quick Entry

Clear Table

Grid name <=8 characters for best Geoplot 3 compatibility

Buffer 32768

COM Port COM1

USB-RS232 Adapter Help

Back

Cancel

Next

?

Typical grid name form

The next steps, in summary, are (a) ensure the template settings match the survey details then click Next, (b) in the following form enter the grid names, check the COMM port is correct and click on the 'Make Ready for Download', then (c) when the message 'Waiting for data ... press 'Dump' on the instrument' appears follow this instruction. Data will then be downloaded, and a progress bar will update. Note that on the Grid Names form there is a Help button giving advice on USB-RS232 adapters.

When you select the Download process, the Help buttons on the 'Input Template' form and 'Survey Type + Instrument' forms will display the most recent PDF Help file for the download procedure.

In addition, full details of the download procedure are given at the end of the Manual Summary in section 15 'Download Instructions' – this includes COM port preparation. A short example of an MSP25 download sequence is also given later. The PDF Manual button on the General Toolbar (see later) will display a form that will allow you to view a pdf file called "Download Instructions for a Single Twin" which is an RM85 example. Please refer to individual instrument manuals for advice on Input Template settings. For example, more complete instructions can be found in Chapter 7 of the RM85 manual, 'Data Handling' which also gives advice on the template settings for different probe configurations.

Downloaded grid files will be readable also in Geoplot 3.0. If you keep the file names <= 8 characters, then they will be directly readable by Geoplot 3.0 but if longer they appear in truncated form when displayed in Geoplot 3.0.

Download now provides support for the RM85 / FAB1 / FGM650 handheld combination and also when an RM85 / FAB1 / FGM650 combination is used with an MSP25 system. Download of GPS data is not supported and will be introduced in a later version. **Note that for the FM256 data format is Fast ASC, ASC and ASC+SPCS only, NOT the FM256 default of Hex D – please change the FM256 instrument Data Format setting accordingly. When the memory battery is changed, it will revert to Hex D.**

## 8-5 Import

Geoplot is able to import a variety of data types: gridded data, non-uniform data (NOT GPS referenced), GPS referenced data and LiDAR data. This may be from a range of Instruments including: Geoscan Instruments, Bartington gradiometers, Frobisher instruments, Foerster Ferex multi-sensor arrays, SENSYS MXPDA multi-sensor arrays, Geometrics G-864, Scintrex magnetometer.

To import data, click on the Import button on the top general toolbar or select it from the File menu. This will show an Import Data form where you can choose to import in either Grid or Composite form via radio buttons at the bottom of the form. When you select either of these, the Input Template box will show a list of templates including the default ones of ODEFAULT.GIP for grids and ODEFAULT.CIP for composites. Please refer to Help on Input Templates for further information if you are unfamiliar with this term.

Select the template you want and then click on the Next button - use the default template if none exist. If you selected ODEFAULT then you will see a Survey Type and Instrument selection form. Select a survey type and then instrument from the list on the right-hand side. Click Next to show the appropriate default Input Template form.

Normally you will use a **Grid Input Template** if all the data sets are gridded (see below) and of the same size and sampling intervals, and data is later going to be joined together as a composite using MasterGrid. You may wish to use a **Composite Input Template** if there is only one data set (typically large) and you wish to start applying processing straightaway after importing.

When you Import in grid format, this will use the same system of templates used for downloading data allowing you to enter Mapping, Instrumentation and Instrument Setup. When you import in composite format then the template form shows a cut-down set of information which always includes at least Mapping and a shortened version of Instrumentation.

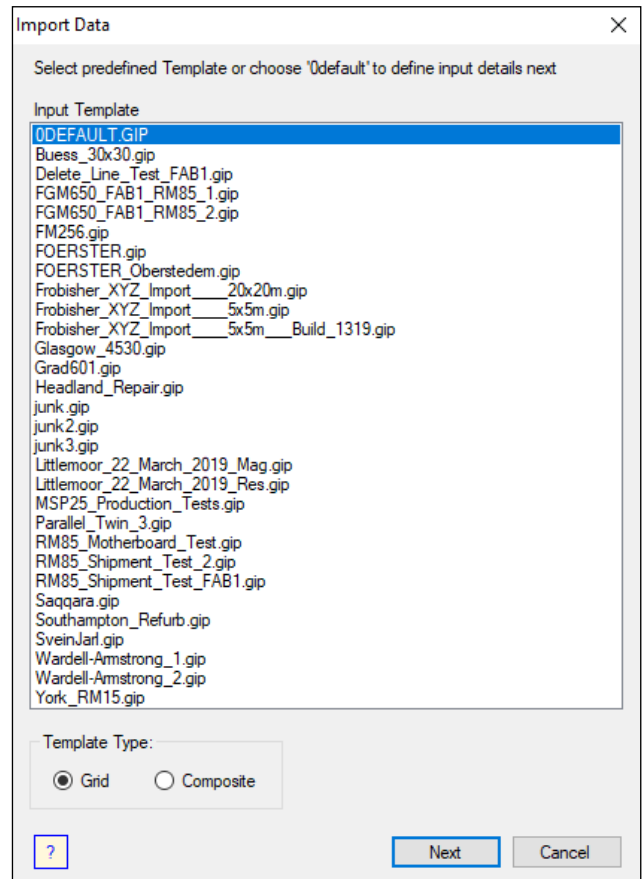
There are three styles of composite template as shown below: Gridded, Non-Uniform and LiDAR.

The **Gridded Composite Input Template** is used for data that matches Geoplot 4.0 data sampling values e.g. 2m, 1m, 0.5m, 0.25m, 0.125m, 0.0625m etc. (multiples of 2) and which is collected on a regular grid – this is typically used in Geoscan and other instruments.

You must ensure the Source Grid dimensions can be divided evenly into the composite lengths and widths entered. In cases where this is not possible, the Source Grid dimensions can be set to 1m x 1m to allow import to take place, but with some restrictions on grid dependent processing functions and the area they act upon. It is possible to subsequently edit the source grid size, using the Edit menu or the button in the Data Information panel on the right.

Therefore, with some geometries, for example if one dimension (usually horizontal) is exactly divisible by 4, 5, 10, 15 etc, and can be set to such a value, this may enable some sensible grid dependent large area processing to be done. Or, even if not exactly divisible, it might be useful for some localised Destagger or ZMT processing of a small area, for example.

If you select a User Defined Grid Input Template for import then only the Mapping part will have any entries. The Instrumentation details can be entered as you wish for record purposes.



Import Data

Select predefined Template or choose 'Odefault' to define input details next

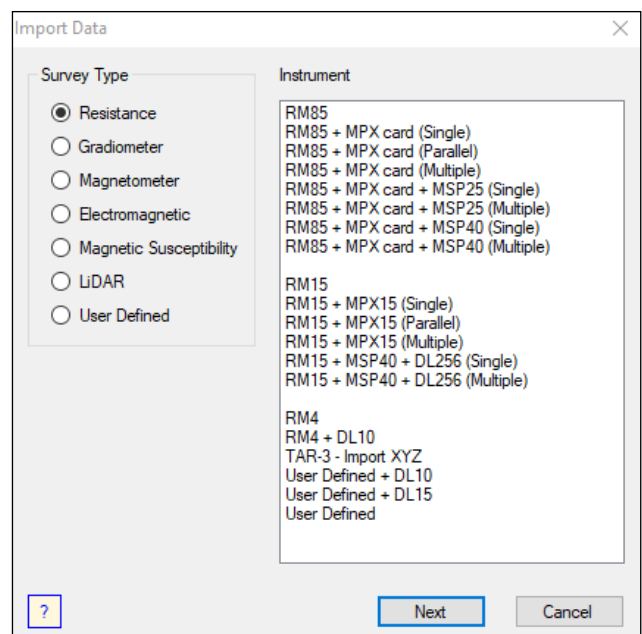
Input Template

- ODEFAULT.GIP
- Buess\_30x30.gip
- Delete\_Line\_Test\_FAB1.gip
- FGM650\_FAB1\_RM85\_1.gip
- FGM650\_FAB1\_RM85\_2.gip
- FM256.gip
- FOERSTER.gip
- FOERSTER\_Oberstedem.gip
- Frobisher\_XYZ\_Import\_20x20m.gip
- Frobisher\_XYZ\_Import\_5x5m.gip
- Frobisher\_XYZ\_Import\_5x5m\_Build\_1319.gip
- Glasgow\_4530.gip
- Grad601.gip
- Headland\_Repair.gip
- junk.gip
- junk2.gip
- junk3.gip
- Littlemoor\_22\_March\_2019\_Mag.gip
- Littlemoor\_22\_March\_2019\_Res.gip
- MSP25\_Production\_Tests.gip
- Parallel\_Twin\_3.gip
- RM85\_Motherboard\_Test.gip
- RM85\_Shipment\_Test\_2.gip
- RM85\_Shipment\_Test\_FAB1.gip
- Saqqara.gip
- Southampton\_Refurb.gip
- SveinJarl.gip
- Wardell-Armstrong\_1.gip
- Wardell-Armstrong\_2.gip
- York\_RM15.gip

Template Type:

☒ Grid ☐ Composite

? Next Cancel



Import Data

Survey Type

☒ Resistance

☐ Gradiometer

☐ Magnetometer

☐ Electromagnetic

☐ Magnetic Susceptibility

☐ LiDAR

☐ User Defined

Instrument

- RM85
- RM85 + MPX card (Single)
- RM85 + MPX card (Parallel)
- RM85 + MPX card (Multiple)
- RM85 + MPX card + MSP25 (Single)
- RM85 + MPX card + MSP25 (Multiple)
- RM85 + MPX card + MSP40 (Single)
- RM85 + MPX card + MSP40 (Multiple)
- RM15
- RM15 + MPX15 (Single)
- RM15 + MPX15 (Parallel)
- RM15 + MPX15 (Multiple)
- RM15 + MSP40 + DL256 (Single)
- RM15 + MSP40 + DL256 (Multiple)
- RM4
- RM4 + DL10
- TAR-3 - Import XYZ
- User Defined + DL10
- User Defined + DL15
- User Defined

? Next Cancel

Composite Input Template -

Mapping

Site Name

Survey Type

Data Sampling

Dir. 1st Traverse

Composite Length (x)

Sample Interval (x)

Composite Width (y)

Traverse Interval (y)

Length and Width units = metres, not readings.  
Multiples of Source Grid size. Do not add 'm'.

Instrumentation

Instrument

Units

Source Grid

Grid Length (x)

Grid Width (y)

Next...

Cancel

Notes

Enter your notes here

User Defined Grid Input Template (right)

Grid Input Template -

Mapping

Site Name

Map Reference

Survey Type

Data Sampling  ▾

Dir. 1st Traverse  ▾

Grid Length (x)  ▾

Sample Interval (y)  ▾

Grid Width (y)  ▾

Traverse Interval (y)  ▾

Traverse Mode  ▾

Instrumentation

Instrument

Units

Instrument Setup

Notes

Imported Non-Uniform gridded data cannot be joined together using MasterGrid – normally such data will be imported using a composite template.

Non-Uniform Composite Input Template (right)

Composite Input Template - ✕

Mapping

Site Name

Survey Type

Data Sampling  ▼

Dir. 1st Traverse  ▼

Instrumentation

Instrument

Units

Notes

Enter your notes here

The **LiDAR Composite Input Template** is used for importing gridded DSM or DTM OS style LiDAR data, 500m or 1000m in size, with sampling of 0.25m, 0.5m 1m or 2m.

### LiDAR Composite Input Template

**Composite Input Template -**

Mapping		Instrumentation			
Site Name	<input type="text"/>	Instrument	<input type="text" value="DTM"/>	<input type="button" value="Next..."/>	<input type="button" value="Cancel"/>
Survey Type	<input type="text" value="LiDAR"/>	Units	<input type="text" value="m"/>		
Data Sampling	<input type="text" value="Gridded"/>				
Composite Length (x)	<input type="text" value="1000 m"/>				
Sample Interval (x)	<input type="text" value="1 m"/>				
Composite Width (y)	<input type="text" value="1000 m"/>				
Traverse Interval (y)	<input type="text" value="1 m"/>				
Notes					
<div></div>					

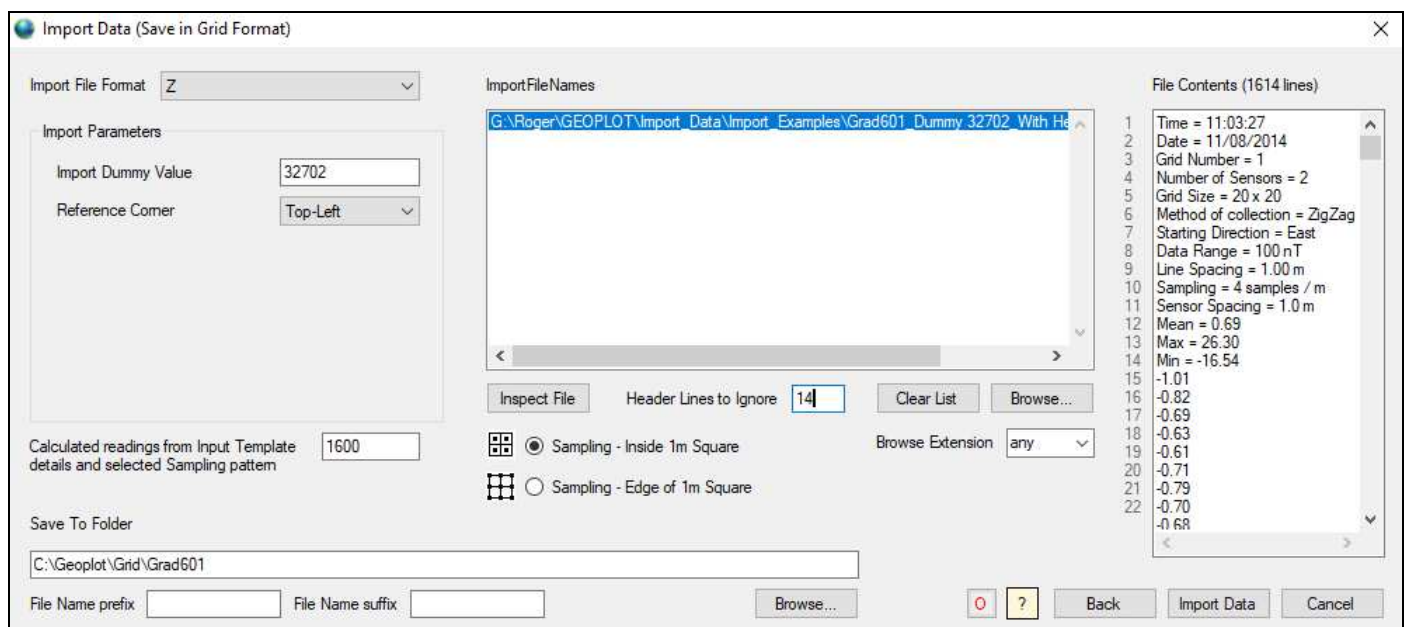
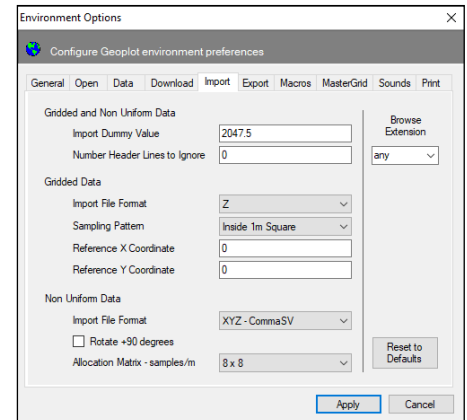
After entering the import details on an **Input Template** click on the Next button to display the import form. Once you click the Next button on the template form you will be presented with the appropriate Import. Four types of import are discussed below: Gridded Data, Non-Uniform Data (NOT GPS referenced), Non-Uniform Data (GPS referenced) and LiDAR data.

## 8-6 Import of Gridded Data

Import of a batch of gridded data into Geoplot 4.0 can be made from Z and XYZ files (comma, tab or space separated), Spreadsheet (comma and tab separated) and Excel (.xls and .xlsx). **Note that Excel import requires Excel to be installed on the PC.**

A typical grid import form is shown below for importing Bartington Grad-601 data. The layout may change slightly, depending on the instrument chosen.

Select the appropriate file format using the Import File Format drop-down box and ensure any required details that appear in the Import Parameters group box are correct – the defaults are normally appropriate. The default import dummy value in the group box can be specified in Environment Options, Import Tab, for routine import operations for all the import types.



Next use the 'Browse' button below Import File Names to select the files you wish to import - files may be imported singly or in a batch. Note that you can set a 'Browse Extension' filter to display only those file types you are interested in. The contents of a file can be inspected and displayed in an information panel on the right by highlighting it and clicking on Inspect File. From this, if there are header lines that should be ignored during an import specify these in the 'Header Lines to Ignore' text box; this number can be set as a default in Options. Compare the 'File Contents' reported at the top of the information panel with the calculated readings from the Input Template which is found just below the Import Parameters Group box. Taking into account the header lines to ignore entry, the two numbers should match. If they do not, then you can use the Back button to amend the Input Template mapping details.

Import can cater for import of data collected at grid edges, i.e. starting at 0, 0, rather than the standard Geoplot 1, 1. This collection procedure, typical of Ferex, CMD and other EM data, results in, for the example of a 40m grid with sampling of 1m, a resultant data width of 41 readings not the normal Geoplot 4.0 width of 40 readings. A radio button lets you specify the sampling pattern, 'Inside 1m Square' or 'Edge of 1m Square'. As the radio button selection changes so does the number of calculated readings displayed, and this can be checked against the 'File Contents' total to ensure Import parameters are correct. **See also Import of Non-Uniform data, below, which may be more appropriate.**

Next define where the imported data is to be saved using the 'Browse' button below the 'Save To Folder' field. Note that Prefix and Suffix fields are provided to modify file names if you wish.

Assuming the calculated and inspection panel numbers compare, highlight one or more files to import and click on OK. Imported files will be saved in the Save To folder.



Use of predefined templates, Options and suitable defaults make routine data imports from instruments such as the Grad-601 easy to achieve. The example above shows Bartington Grad-601 data about to be imported as a Z file – the Header Lines to Ignore (=14) and Import Dummy value (=32702) are set in Import Options for convenience.

### Import of Frobisher Instrument Data

In the case of Frobisher instrument data (Resistance: TAR-3 and Gradiometer: DFG-1), these are catered for when specifying the Import Type and Instrument. Only the XYZ comma separated variable files are catered for. The Input Template takes into account the fact that these instruments have X and Y swopped relative to the directions normally expected in Geoplot 4, so, providing you enter the Mapping details, as specified on the form, then this is taken account of and the data is automatically rotated 90 degrees internally so that the first traverse is horizontal, in keeping with the Geoplot approach. Grids can subsequently be assembled into composites using a mesh definition with this orientation. The Input Templates also take into account the different dummy values used in the resistance (2047.5) and gradiometer (999.9999) instrument. You must ensure you enter Mapping details according to the instructions given on the form, in red – see below.

Grid Input Template -

Mapping

Site Name: Frobisher\_TAR3

Map Reference:

Survey Type: Resistance

Data Sampling: Gridded

Dir. 1st Traverse: E

Grid Length (x): 20 m

Sample Interval (x): 1 m

Grid Width (y): 20 m

Traverse Interval (y): 1 m

Traverse Mode: Zig-zag

Instrumentation

Instrument: TAR-3

Units: ohm

In Mapping set Grid Length (m) as the length of the first traverse and Sample Interval (m) as the distance between each reading along the traverse. Set Grid Width (m) as the distance that encompasses all the traverses and Traverse Interval (m) as the separation between traverses.

The TAR-3 and DFG-1 XYZ files both have the first traverse direction in the Y direction. This is accounted for during import, when data is rotated through 90 degrees to make the first traverse horizontal for Geoplot use.

Instrument Setup

Notes

Back Next... Cancel

Import Data (Save in Grid Format)

Import File Format: XYZ - CommaSV

Import Parameters

Import Dummy Value: 2047.5

Calculated lines from Template: 400

Save To Folder: C:\Geoplot\Grid\Frobisher\_TAR3

File Name prefix: File Name suffix: Browse...

ImportFileNames

C:\Geoplot\Import\_Data\Frobisher\_TXT & XYZ\TAR3\_G5 XYZ

Inspect File

Clear List Browse...

Browse Extension: xyz

File Contents (400 lines)

1	0.00,0.00,2047.5
2	0.00,1.00,2047.5
3	0.00,2.00,2047.5
4	0.00,3.00,195.93
5	0.00,4.00,196.00
6	0.00,5.00,195.95
7	0.00,6.00,196.01
8	0.00,7.00,196.00
9	0.00,8.00,196.02
10	0.00,9.00,195.99
11	0.00,10.00,196.14
12	0.00,11.00,195.97
13	0.00,12.00,196.09
14	0.00,13.00,196.10
15	0.00,14.00,196.10
16	0.00,15.00,196.16
17	0.00,16.00,196.16
18	0.00,17.00,196.00
19	0.00,18.00,195.85
20	0.00,19.00,195.96
21	1.00,19.00,195.88
22	1.00,18.00,195.99
1 00	17 00 196 07

Back Import Data Cancel

## 8-7 Import of Non-Uniform Data (NOT GPS referenced)

Import of a batch of non-uniform data into Geoplot 4.0 can be made from XYZ files (comma, tab or space separated), 3 columns of data. The procedure for importing is very similar to that for gridded data with the following differences: (a) there is no calculation made of the file contents, (b) there is no grid edge definition, (c) there is an option to rotate the imported data through +90 degrees and (d) an Allocation Matrix size, typical setting 8x8 samples/m, can be set and controls how finely or coarsely the data will be re-sampled into Geoplot format – see form below.

Non-uniform import allows data to be imported from non-Geoscan instruments such as Foerster Ferex multi-sensor arrays which have different sampling intervals to those used in Geoscan instruments.

A typical Import Form is shown below for importing Foerster Ferex data shown above where the data sampling is every 10cm that does not match Geoplot sampling. Use the 'Browse' button below 'Import File Names' to select the files you wish to import - files may be imported singly or in a batch. Note that you can set a 'Browse Extension' filter to display only those file types you are interested in. The contents of a file can be inspected and displayed in an information panel on the right by highlighting it and clicking on Inspect File. From this, if there are header lines that should be ignored during an import specify these in the 'Header Lines to Ignore' text box; this number can be set as a default in Options.

Here there are 8 grids to import, and the first 15 lines of header information are to be ignored. Allocation Matrix can be set to 1x1, 2x2, 4x4, 8x8 or 16x16, with 8x8 being a typical setting. It is better to set the sampling too high and interpolate down, rather than sample too coarsely.

Import Data (Save in Grid Format)

Import File Format: XYZ - TabSV

Import Parameters

Import Dummy Value: 2047.5

☒ Rotate +90 degrees

Allocation Matrix - samples/m: 8 x 8

ImportFileNames

C:\Geoplot\Import\_Data\JF\_Foerster\_Ferex\AY01JF.txt  
C:\Geoplot\Import\_Data\JF\_Foerster\_Ferex\AY02JF.txt  
C:\Geoplot\Import\_Data\JF\_Foerster\_Ferex\AY03FB.txt  
C:\Geoplot\Import\_Data\JF\_Foerster\_Ferex\AY04FB.txt  
C:\Geoplot\Import\_Data\JF\_Foerster\_Ferex\AY05PC.txt  
C:\Geoplot\Import\_Data\JF\_Foerster\_Ferex\AY07PC.txt  
C:\Geoplot\Import\_Data\JF\_Foerster\_Ferex\AY08CL.txt  
C:\Geoplot\Import\_Data\JF\_Foerster\_Ferex\AY10CL.txt

Inspect File Header Lines to Ignore: 15 Clear List Browse...

Browse Extension: any

Save To Folder

C:\Geoplot\Grid\Ferex\_NU

File Name prefix: File Name suffix: Browse...

File Contents (32496 lines)

	X [m]	Y [m]	Val [nT]
15	0.00	0.00	0.13
16	0.00	0.10	0.00
17	0.00	0.20	-0.26
18	0.00	0.30	-0.77
19	0.00	0.40	-0.64
20	0.00	0.50	-1.66
21	0.00	0.60	-1.02
22	0.00	0.70	-1.28

As in the example above for gridded data, set the Save To Folder and any prefixes or suffixes and highlight all the grids to be imported. Example Ferex data is provided in the directory Import\_Data\JF\_Foerster\_Ferex in the form of 8 grids which can then be combined into the composite shown right.

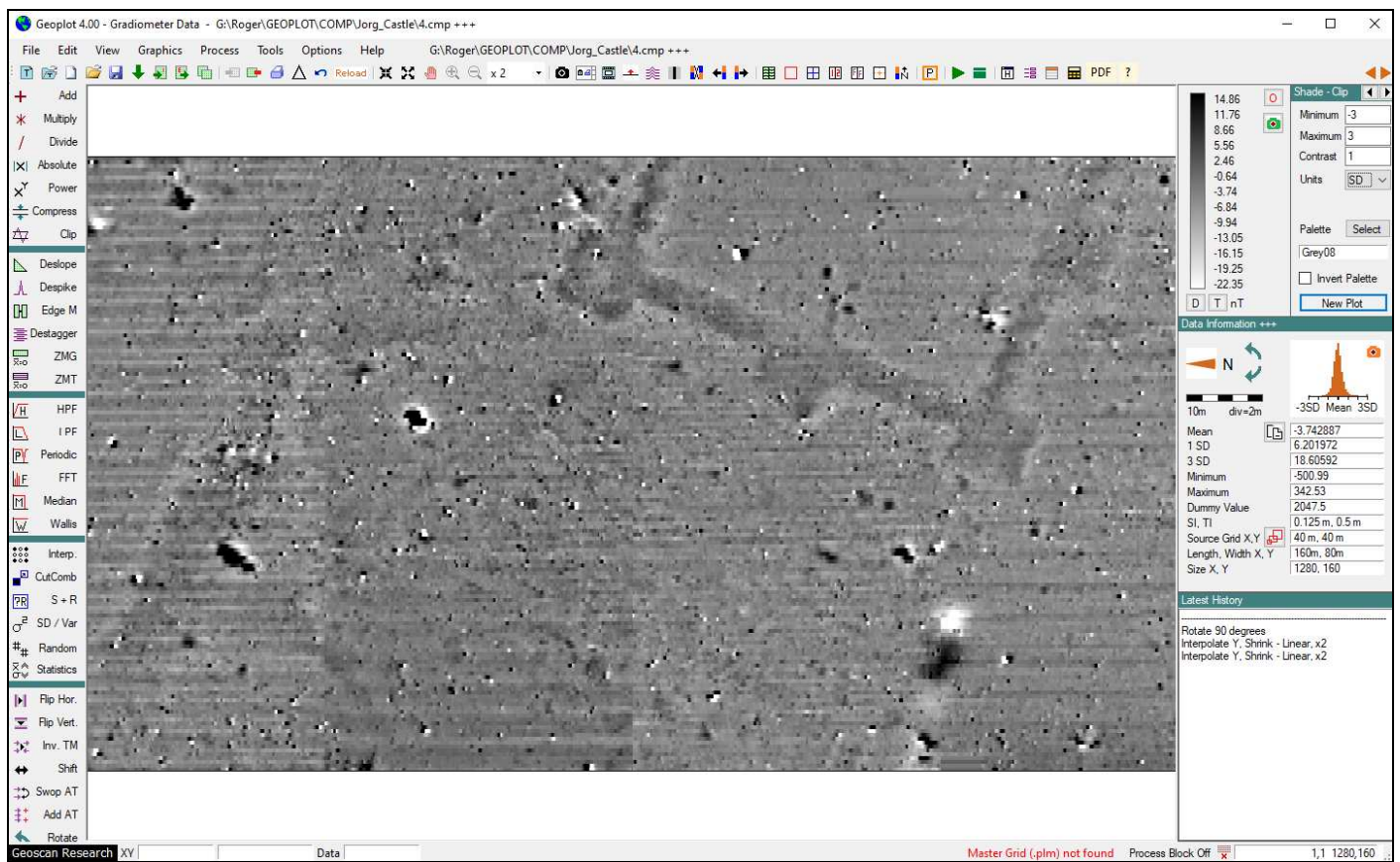
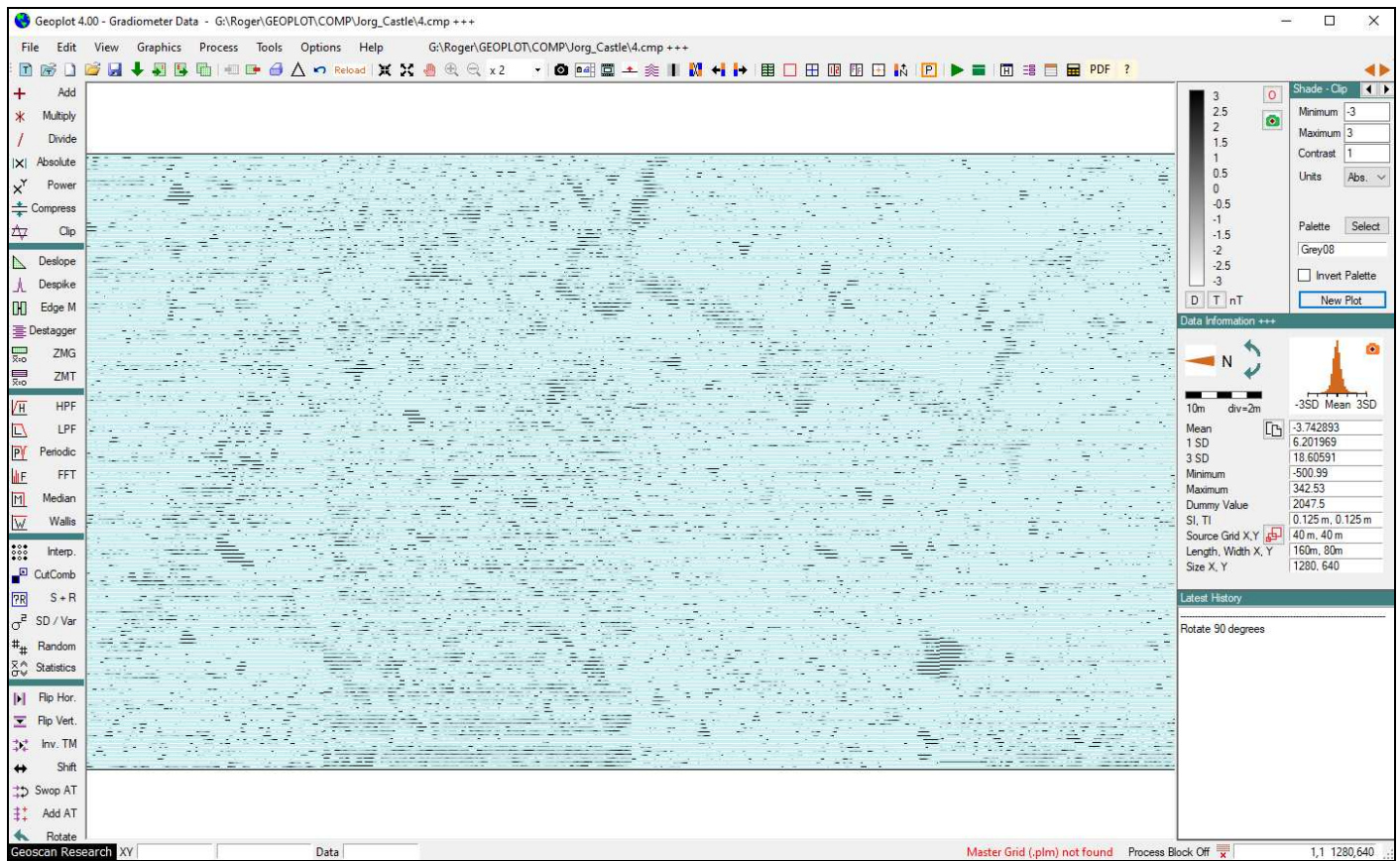
A MasterGrid is provided in Mesh\JF\_Foerster\_Ferex that indicates how the grids would fit together once imported. Note that grids 1, 2, 5, and 7 require rotating through 180 degrees after import before assembling in the MasterGrid – they have been given the suffix '\_Rot' to signify rotation.

After data has been imported and assembled into a composite, this will consist of parallel lines of true data separated by one or more lines of dummy data. Depending on the traverse interval, you may need to increase magnification to seem them initially – see the image below. In this case the data has also been rotated through 90 degrees to orientate traverses horizontally.

Then use the Interpolate-**Shrink Linear** process function one or more times in the Y direction (not the traverse direction) to remove the dummy readings and build up the required image. You can use the reported traverse interval in the RH control panel as a guide as to how far you should shrink the data compared to the original data collection resolution.

The result is shown below and has a resulting sample interval of 0.125m (compared to 10cm initially), and a traverse interval of 0.5m. The data requires application of Zero M Traverse to remove the banding.





## 8-8 Import of GPS Referenced Data as a Composite

The Non-Uniform import data format can also be used to import GPS referenced data and then process it. Excel will typically be used to prepare a file that it is supplied as an XYZ comma separated file with either UTM or northing and easting coordinates plus data. GPS data should be imported as a composite since Interpolate-Shrink Linear will need to be used. This means you should use or create a composite input template first.

Note that grid specific (e.g. ZMT) or line specific (e.g. Destagger) process functions will not yet work directly with GPS referenced data. A work around for GPS referenced data that has also been collected on a gridded basis can have these functions applied first, as gridded data, then exported and re-imported as GPS referenced data. Instrumentation which is able to offer the data with sensor offsets already removed, e.g. SENSYS MXPDA helps remove the need for ZMT etc.

The procedure for importing is very similar to that for gridded data with the following differences: (a) there is no calculation made of the file contents, (b) there is no grid edge definition, (c) there is an option to rotate the imported data through +90 degrees and (d) an Allocation Matrix size, typical setting 8x8 samples/m, can be set and controls how finely or coarsely the data will be re-sampled into Geoplot format. A typical import form for importing SENSYS MXPDA data is shown below. Note that the maximum file size that can be imported is about 200 Mb so you may need to reduce the file size using MXPDA. The file shown below is 105 Mb in size.

Import Data (Save in Composite Format)

Import File Format: XYZ - CommaSV

Import Parameters:

- Import Dummy Value: 2047.5
- ☐ Rotate +90 degrees
- Allocation Matrix - samples/m: 8 x 8

ImportFileNames:

G:\Roger\GEOPLOT\Import\_Data\Pisz\_Magneto\_Import\_Small\_Large\20210902\_Dzi...

File Contents (4057900 lines):

1 749374.856,720292.172,3.5  
2 749374.834,720291.923,1.6  
3 749374.811,720291.674,-0.2  
4 749374.788,720291.425,-1.2  
5 749374.766,720291.176,-0.1  
6 749374.743,720290.927,-2.2  
7 749374.72,720290.678,-1.8  
8 749374.697,720290.429,0.9  
9 749374.675,720290.18,1.5  
10 749374.652,720289.931,-0.2  
11 749374.629,720289.682,-1.3  
12 749374.606,720289.433,-2.4  
13 749374.583,720289.184,-1.5  
14 749374.56,720288.935,-0.6  
15 749374.537,720288.686,-1.7  
16 749374.514,720288.437,-2.8  
17 749374.491,720288.188,-1.9  
18 749374.468,720287.939,-3.0  
19 749374.445,720287.690,-2.1  
20 749374.422,720287.441,-3.2  
21 749374.399,720287.192,-2.3  
22 749374.376,720286.943,-3.4

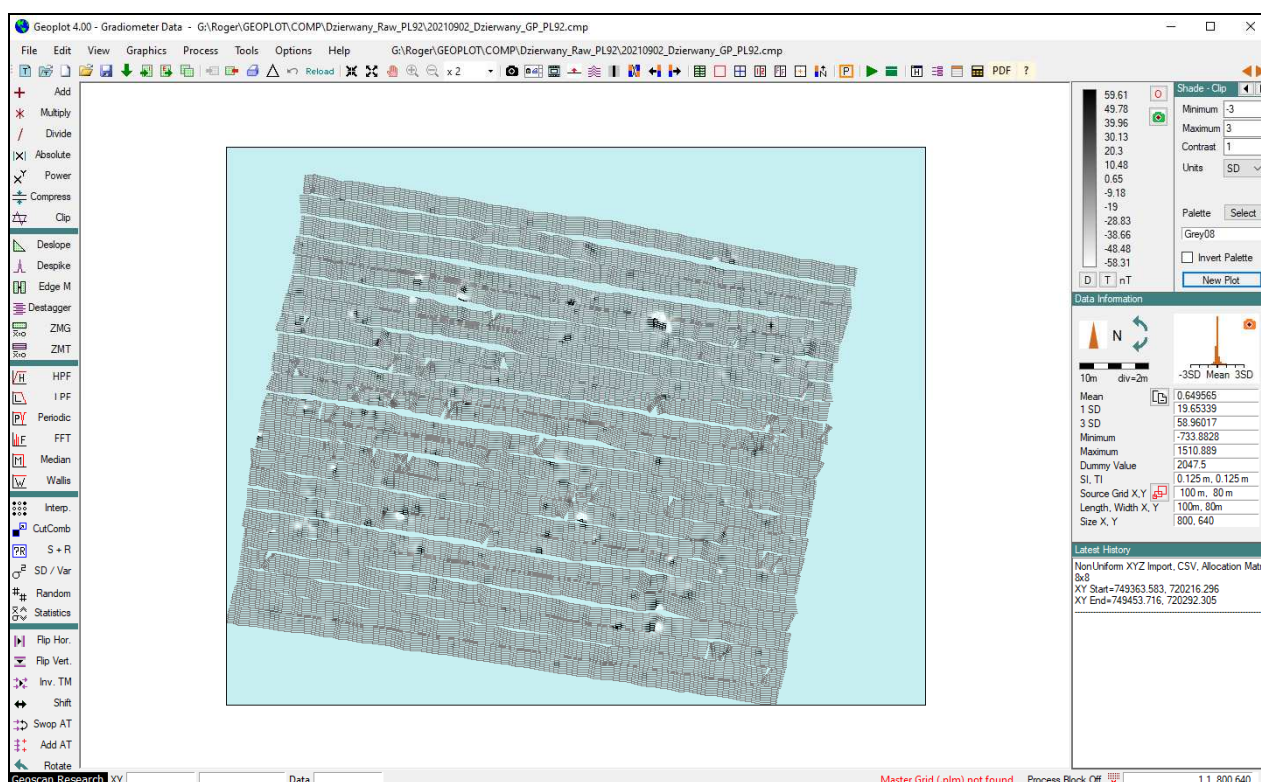
Inspect File Header Lines to Ignore: 0 Clear List Browse...

Browse Extension: any

Save To Folder: c:\Geoplot\Comp\Dzierwany\_Raw\_PL92

File Name prefix: File Name suffix: Browse...

Import Data Cancel





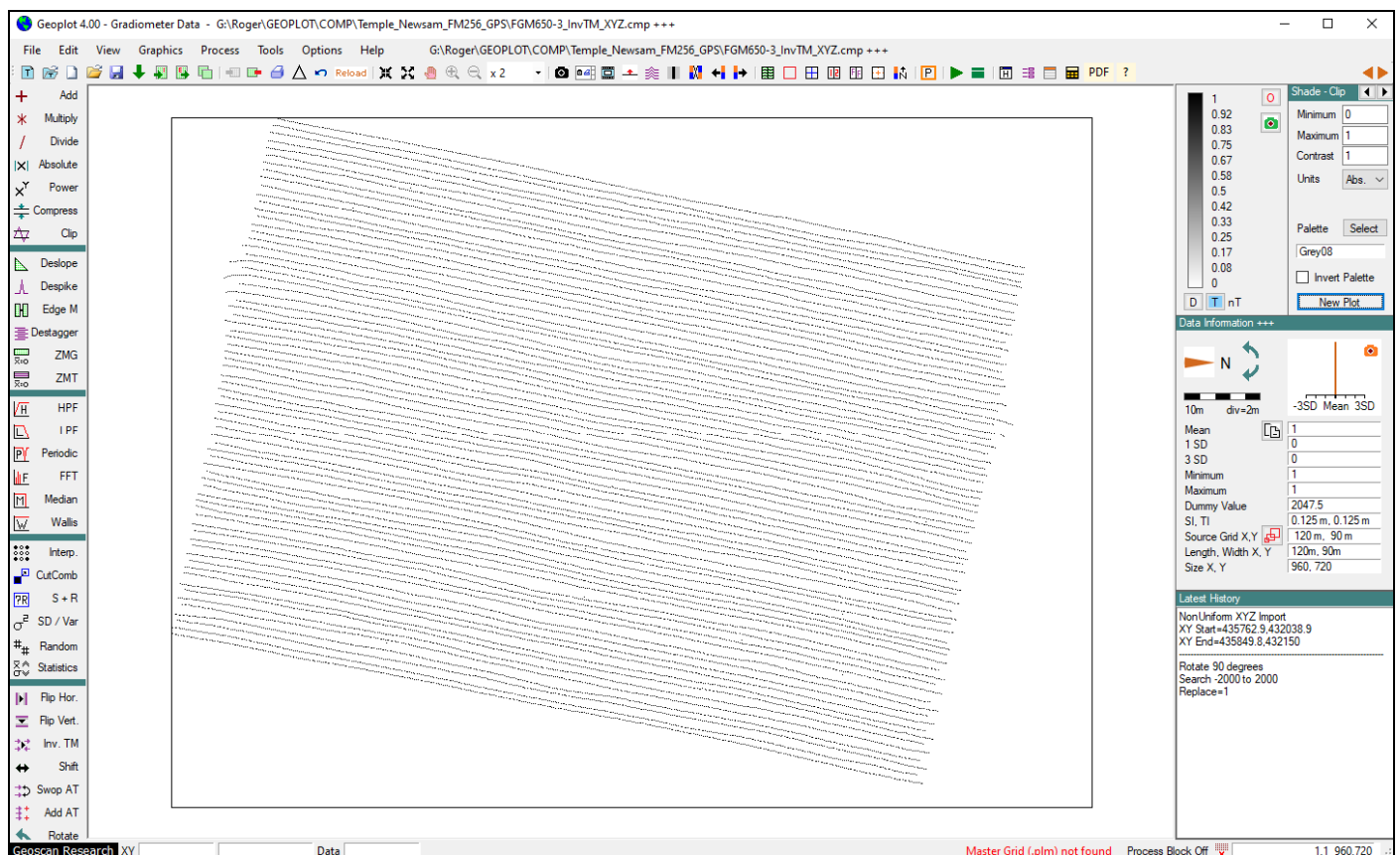
Use the 'Browse' button below 'Import File Names' to select the files you wish to import - files may be imported singly or in a batch. Note that you can set a 'Browse Extension' filter to display only those file types you are interested in. The contents of a file can be inspected and displayed in an information panel on the right by highlighting it and clicking on Inspect File. If the file is too big you will get a memory error message and if so you should restart Geoplot and try with a smaller import file size.. The Allocation Matrix can be set to 1x1, 2x2, 4x4, 8x8 or 16x16, with 8x8 being a typical setting. It is better to set the sampling too high and interpolate down, rather than sample too coarsely.

Also define where the imported data is to be saved using the 'Browse' button below the 'Save To Folder' field. Note that Prefix and Suffix fields are provided to modify file names if you wish.

After data has been imported the composite will consist of a cloud of points positioned on an allocation matrix of typically 8x8 points/m (resolution of 0.125m) – you may need to increase magnification to seem them initially.

Next use the Interpolate-**Shrink Linear** process function multiple times to remove the dummy readings in the point cloud and build up the required image. You can use the reported sample and traverse interval in the RH control panel as a guide as to how far you should shrink the data compared to the original data collection resolution – you should be aiming for the same sampling in X and Y as used for the original data collection. If you import GPS data in a routine situation then a macro could be defined to automate this process. Once you have shrunk the data as far as is appropriate you can use the GPS Gap Fill tool to fill in dummy areas that may have arisen due to poor-quality GPS positioning. Typically, the data will then be low pass filtered and interpolated as for standard gridded data. Please see Help for GPS Gap Fill to see the above data set processed.

Before shrinking the data, you can use Search and Replace to temporarily change all the readings to a single-value, typically 1, and then, with appropriate plotting parameters minimum=0, maximum=1, Absolute, and after clicking the 'T' button (below the palette on the right hand side) to make dummy readings transparent, you can see an image of the GPS tracks and points. For large data sets there may not be enough magnification to see the full detail though, as with the data set above. An example from a smaller and simpler data is shown below.

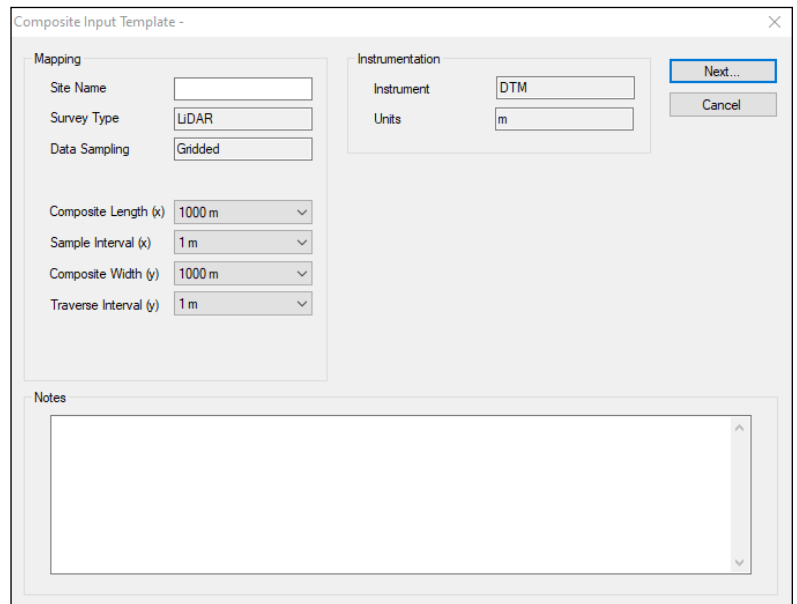


## 8-9 Import of LiDAR as a Composite

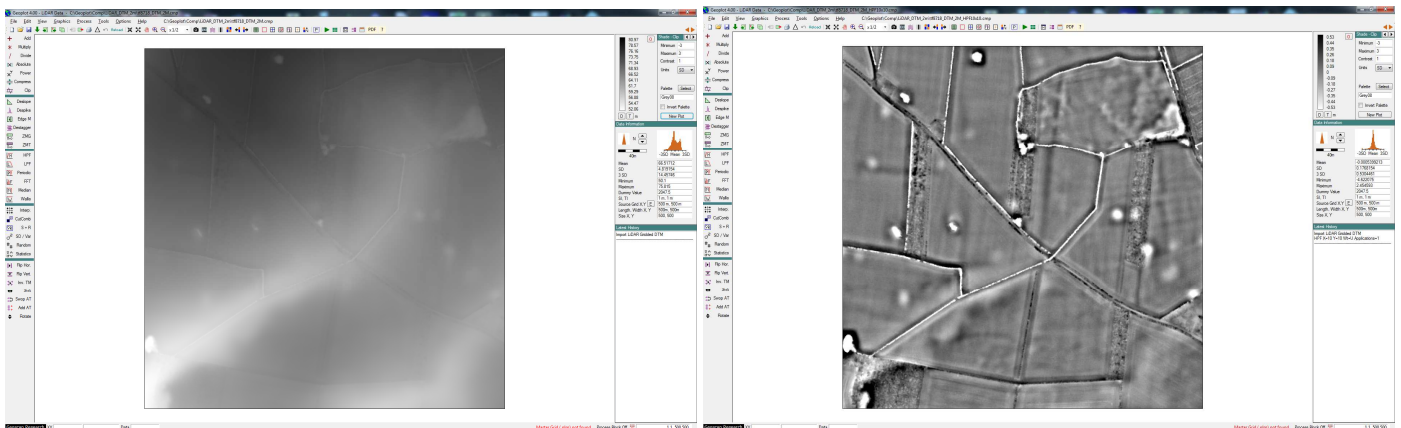
Import includes import of DSM and DTM LiDAR data from sources such as the Environment Agency Geomatics Survey Open Data.

The files can be either 500m or 1000m in size with sample intervals of 0.25, 0.5, 1, 2m. An example file for import can be found in the Import\_Data\LiDAR\_DTM\_2m directory. It has dimensions of 500m x 500m and a sample interval of 2m. Select LiDAR from the instrument choice to bring up the Input Template form designed for LiDAR data – see right where it is configured for the sample data: 1000m x 1000m and 2m sample and traverse interval. Clicking next will display the Import form.

Geoplot 4.0 automatically takes into account the header information and import dummy value for LiDAR data though you should compare the file contents above the inspection box with the calculated number of lines and use the Back button if required to change the Input template parameters. When you first open up the data the default x1 graphics plot size of x1 will be too large so you should reduce the size to typically x1/4 or less, depending on your screen size. Application of HPF (10 x 10) should reveal much more detail in the image than is first apparent. Shade - Relief plots can also reveal fine detail.



The 'Composite Input Template' dialog box is used to configure import parameters. It is divided into two main sections: 'Mapping' and 'Instrumentation'. The 'Mapping' section includes fields for 'Site Name', 'Survey Type' (set to 'LiDAR'), 'Data Sampling' (set to 'Gridded'), 'Composite Length (x)' (set to '1000 m'), 'Sample Interval (x)' (set to '1 m'), 'Composite Width (y)' (set to '1000 m'), and 'Traverse Interval (y)' (set to '1 m'). The 'Instrumentation' section includes 'Instrument' (set to 'DTM') and 'Units' (set to 'm'). There are 'Next...' and 'Cancel' buttons at the top right. A 'Notes' section with a text area is at the bottom.



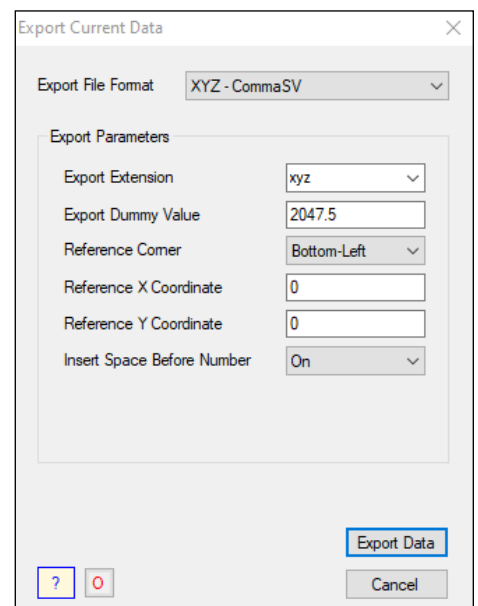
Imported example LiDAR data

Imported example LiDAR data after HPF 10x10

## 8-10 Export

At present files can only be exported one at a time. Export provides formats: Z, XYZ (comma, tab, and space), Spreadsheet (comma, tab), Geosoft, Surfer (ASCII) and Grass for GIS. A setting for export of XYZ-CommaSV data allows insertion of a space before numbers to allow ArcGIS to import the data correctly – see right. The preferred setting can be set in Export Options.

Exporting in Surfer (ASCII) format provides a rapid and convenient way of getting data into Surfer as a Surfer grid file, minimising preparation required.

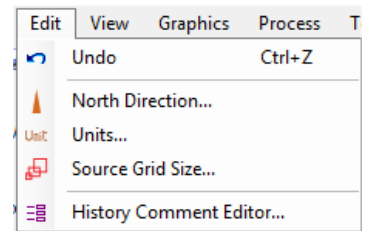


The 'Export Current Data' dialog box allows users to configure export settings. The 'Export File Format' is set to 'XYZ - CommaSV'. Under 'Export Parameters', the following settings are shown: 'Export Extension' is 'xyz', 'Export Dummy Value' is '2047.5', 'Reference Corner' is 'Bottom-Left', 'Reference X Coordinate' is '0', 'Reference Y Coordinate' is '0', and 'Insert Space Before Number' is 'On'. There are 'Export Data' and 'Cancel' buttons at the bottom right, along with a help icon (?) and a reset icon (O).

# 9 Edit Menu

## 9-1 Overview

The Edit menu comprises: 'Undo', 'North Direction', 'Units', 'Source Grid Size' and 'History Comment Editor'. Please note that Edit data has been removed from here and is now found in the Data View form.



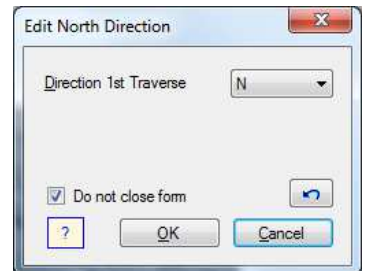
## 9-2 Details

### 1 Undo

'Undo' reverses the last Edit, Process, Tools and macro function applied to a grid or composite. It is only single level so if you wish to remove the effect of a chain of any of these functions then use 'Reload Data' (composites only). An Undo button is provided on applicable forms, as well as on the General Toolbar. The key combination Ctrl-Z can also be used.

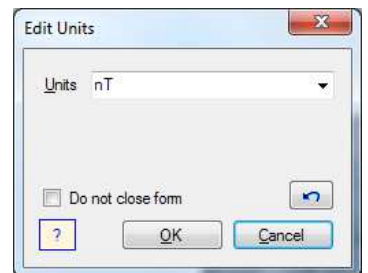
### 2 Edit North Direction

Edit North Direction changes the direction of the north symbol displayed in the right-hand panel only, and leaves the data set unchanged. Use this function to modify an incorrect setting for 'Dir. 1st Traverse' when downloading data - if the Grid File Details view is being displayed then the entry for 'Dir. 1st Traverse' will change accordingly.



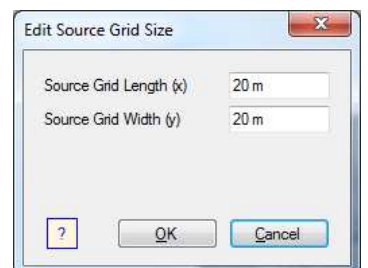
### 3 Edit Units

Edit Units changes the units displayed in the right hand panel. Use this function to modify an incorrect setting for 'Units' when downloading or importing data. There are many predefined choices from the drop down list or you may define your own. If the File Details view is being displayed then the entry for 'Units' will change accordingly.



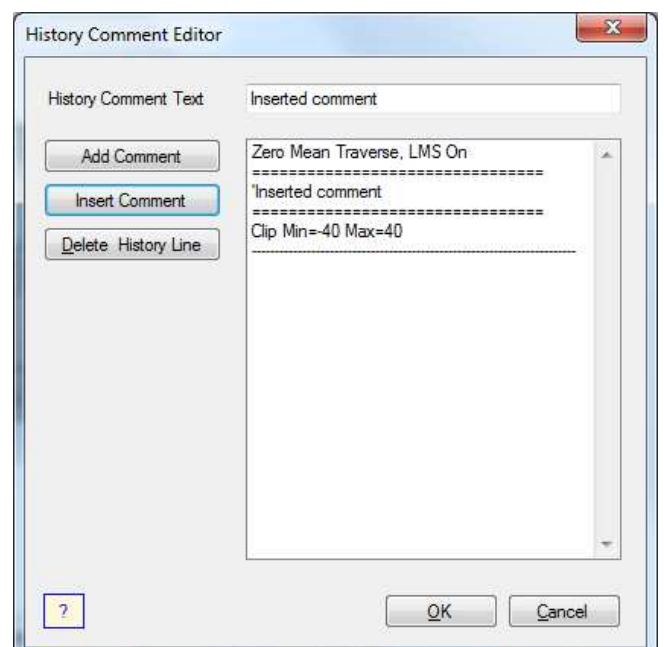
### 4 Edit Source Grid Size

Edit Source Grid Size can be applied to composites only and allows you to effectively change the size of the displayed grid lines overlaying a composite – the number of grids displayed will change along with their numbering. Temporarily changing the grid source size can be used to isolate and home in on, for example, the top half or quarter of an original grid for Destagger or ZMT application where you do not want to apply it to the whole of the grid. Once a process function has been applied, edit the source grid size back to its original size again. Each change of source grid size will be reported in the History. As well as appearing on the Edit menu, it is also accessible via a button on the Control Panel, Data Information, next to the report of Source Grid Size. The edit function Source Grid Size was formerly available only in the File Details view, F8 but is now moved to the Edit menu.



### 5 History Comment Editor

History Comment Editor allows you to add a comment at the end of the History report or insert a comment part way through. This can be a useful reminder of why specific process steps were taken. Make an entry in the 'History Comment Text' box and click 'Add Comment' to position it at the end. Click on one of the History lines and then 'Insert Comment' to position it just before the highlighted line. Any comment created will be enclosed within two '=====' lines of text. Comments and the '=====' lines can be removed by highlighting a line and clicking 'Delete History Line' - be sure to remove the '=====' lines as well as the comment. You cannot delete actual lines of history, only comments.

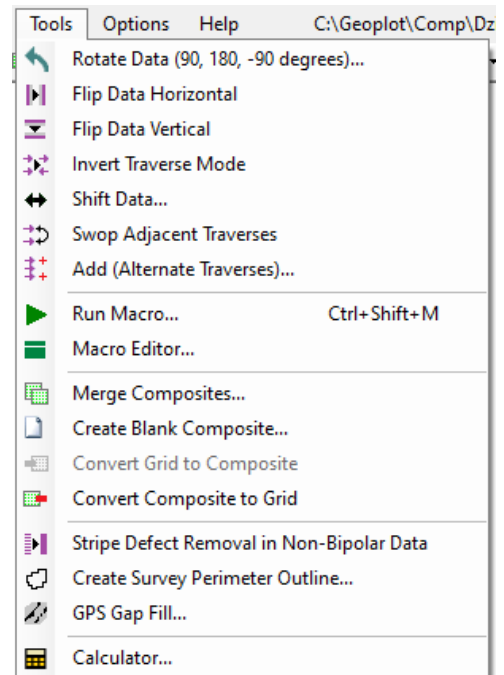


# 10 Tools Menu (including Macros)

## 10-1 Overview

The first six menu items, 'Rotate Data', 'Flip Data Vertical', 'Flip Data Horizontal', 'Invert Traverse Mode', 'Shift Data', 'Swop Adjacent Traverses' and 'Add Alternate Traverses' can all be applied to composites. However, 'Shift' and 'Add Alternate Traverses' cannot be applied to grids and will be greyed out when grid data is loaded. All these functions can also be accessed from the vertical or horizontal toolbars.

Please note that Create Pseudo-Section has been removed from the Tools menu and will now be implemented in the next version of Geoplot.



## 10-2 Details

### 1 Rotate Data

'Rotate Data' rotates the underlying data set through 90, 180 or -90 degrees. The graphics and north symbol will rotate by the same angle to reflect this. Rotation through 90 degrees can be used to effectively apply direction dependent functions such as Zero Mean Traverse at right angles to the traverse direction. Data can then be rotated back through 90 degrees. 'Rotate Data' can also be accessed from the vertical toolbar and the two buttons to the right of the north symbol on the right-hand panel (Rotate Data 90 degrees clockwise and Rotate Data 90 degrees anti-clockwise) and will be quicker to use for +/- 90 degrees rotation.

### 2 Flip Data Horizontal and Flip Vertical

These functions create mirror images of the data in the horizontal and vertical directions, useful for situations where grid data was accidentally or deliberately collected with the starting traverse direction opposite to that recommended.

### 3 Invert Traverse Mode

'Invert Traverse Mode' is used to correct for data being incorrectly specified as Zig-Zag or Parallel during download. It changes alternate lines of the data set.

### 4 Shift

'Shift' can be used to move the data set in either the X or Y directions, by a specified number of readings, plus or minus in value. The blank strip, left as a result of a shift, will be filled with dummy readings. Shift can be used to re-align different data sets, such as resistance and gradiometer data collected on an MSP25 cart, since the gradiometer data will be displaced from centre by 0.75m; with a sample interval of 0.25, a correction of +/-3 readings can be applied, depending on whether the gradiometer is at the leading or trailing edge. The Y shift can also be used to compensate for the slight shift that happens when you Interpolate data. This is an interim measure, and we hope to stop Interpolate shifting data in the future.

### 5 Swop Adjacent Traverses

'Swop Adjacent Traverses' is a legacy function used to correct for incorrect wiring by the users of the PA5 / PA20.

### 6 Add (Alternate Traverses)

'Add (Alternate Traverses)' can be used with gradiometer data to add (or subtract) a number from alternate traverses or pairs of alternate traverses. This acts as an alternative to using Zero Mean Traverse and will alter the data much less, thus reducing the chance of losing features running parallel with the traverse direction. It can be used with single or dual gradiometers. In the latter case, two independent Add values can be entered, one for each of the pair of traverses.

### 7 Merge Composites

'Merge Composites' allows two composites to be merged into one, useful for dual gradiometer data and multiple and parallel resistance data sets. Set the survey type you want to merge: 'Dual Gradiometer - FM256', 'Multiple Resistance' or 'Dual Gradiometer - Grad601'. The Merge Parameters and graphic below will change according to the Survey Type. In addition, if you change the Rotation Angle, the graphic will also change as a visual reminder of the setting. Use Browse to display a list of file names, select a pair then click on Merge. You will then be prompted for the name to save the merged data set with. Note that data is extracted in the order defined by the 1<sup>st</sup> and 2<sup>nd</sup> filename suffixes specified. Therefore, you may need to add or edit and save any suffixes that require their suffix to be created or changed, for example if the pair have the same ending.

After merging, if you click on Close rather than Cancel, a new plot will be created automatically without having to open the file. Tools and Edit Options allows you to preset Survey Type, Rotation Angle and the 1<sup>st</sup> and 2<sup>nd</sup> Suffix.

## 8 Create Blank Composite

‘Create Blank Composite’ allows one to define a blank composite canvas on which to paste data from grids or composites using the Cut and Combine process function.

## 9 Convert Grid to Composite

‘Convert Grid to Composite’ tool is useful for bypassing the MasterGrid approach to creating a composite if only a single grid has been downloaded. It is useful also when you wish to apply some processing functions e.g. FFT to a specific grid (and then use Convert Composite to grid – see next). It appears in the menu or on the horizontal toolbar.

## 10 Convert Composite to Grid

‘Convert Composite to Grid’ complements ‘Convert Grid to Composite’, allowing you to apply some processing functions and then change it back to a grid, perhaps for inclusion in a MasterGrid. It appears in the menu or on the horizontal toolbar.

## 11 Stripe Defect Removal in Non-Bipolar data

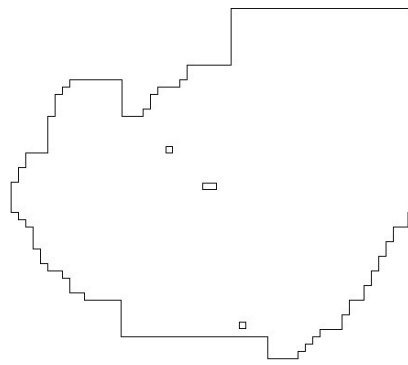
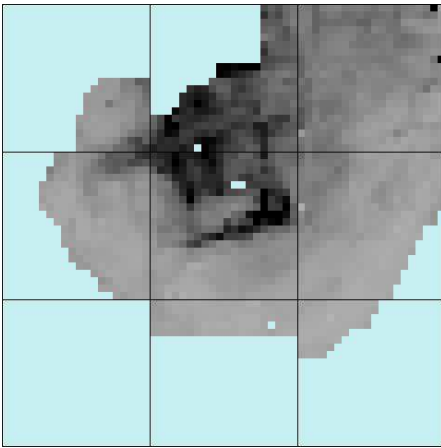
The ‘Stripe Defect Removal in Non-Bipolar data’ tool (see also the macro section below) is designed to remove stripe effects in resistance data.

## 12 Create Survey Perimeter Outline

The ‘Create Survey Perimeter Outline’ tool generates an outline of the survey area (transparent by default) which is useful for generating interpretations and reports. Any dummy regions within the survey will also have an outline drawn round them. Note that during the generation of the outline Geoplot 4.0 may change the magnification to ensure the outline is visible. If it does this ensure that you save the image at this magnification. The Save Image form will be launched automatically providing the checkbox for this is ticked. The example composite data provided in the Castle directory can be used to try this tool out – see images below.

There is a reminder on the ‘Create Survey Perimeter Outline’ form to say that the data must use 2047.5 as a dummy reading for correct operation.





### 13 GPS Gap Fill

A 'GPS Gap Fill' tool can be used for completing imported non-uniform GPS referenced data, filling in any dummy areas left after the interpolation process – see Import of GPS Referenced Data. Selecting the tool displays the GPS Gap Fill form. Two GPS Gap Fill methods are available: (a) the original method provided in Build 1322 and earlier, and (b) an improved version provided in builds later than 1322. The improved method preserves the original data and merges this with a new form of generated gap fill data. The original method could lead to excessive blurring of data, especially when required to be used more than once.

### 14 Calculator

The Calculator tool provides a convenient way of making simple calculations during processing and capitalises on special one-click copy and paste operations possible in various parts of Geoplot. It can save several keyboard clicks and mouse highlight movements, compared to using the Windows calculator.

The calculator is in the bottom right-hand corner and can be hidden or shown by using the Tools Menu or clicking on the Calculator icon on the General Toolbar. Environment Options controls whether it is shown at start-up or not.

You can enter values for variables A and B and then perform Addition, Subtraction, Multiply, Divide, raise A to the power of B or calculate the square root of A. Use the result in various process functions such as Add, Divide or Multiply, either entering the result manually in these functions, by single clicking on the field or by copy and pasting from the result text box into the function form.

Values for A and B can be entered manually, or you can instead use a drop-down list of existing map statistics for speedy parameter entry, including current value of +/- Mean, +/- Dummy, +/- SD levels. See the example opposite. **Remember that if you use the drop-down list, the value set in A or B will change dynamically as processing proceeds.**

If you have used the Statistics function to display the statistics of a block of data, then you can single click on any statistics value to place it on the Windows clipboard (the field will briefly turn green to indicate it has been placed on the clipboard) – see image at the end of the Example section. Then on the Calculator form simply single click on either A or B to enter the value (or paste conventionally). Similarly, you can click on any value in the Data Information panel, which will temporarily turn green to place it on the clipboard – again see image at the end of the Example section. You can also copy and paste a value from the Process History or from the Scratchpad.



Once you have values set for A and B then click on the appropriate mathematical function and the result will be displayed in the text box above. You can change the sign of this result if appropriate using the +/- button. The result value can be copied and pasted normally, or you can single click once on the field to copy it direct to the Windows clipboard – when you do this it will briefly turn green. The value can then be used elsewhere.

Calculator

+/- 0.3690505

A 1.860018 B 5.04001

A + B A - B A ^ B Clear A

A x B A / B Sqrt A Clear B ?

Add, Divide and Multiply have special provision to allow you to single click paste the result into their Value fields, or you can right click and paste as normal. If you find single click paste into Add, Divide and Multiply is not what you want, then you can click on the Add, Divide or Multiply forms Option button to take you to the Process Options form where you can disable this operation.

You can use the Clear A and Clear B buttons to clear those fields, along with the result.

The scratchpad can be very useful for building up a sequence of values to copy and paste from when doing a batch process.

### Example

An example of Calculator use is normalisation of all the grids in a composite using SD as a measure. The SD of the grids you want to normalise would be entered in A whilst the SD of the reference grid to normalise to would be entered in B. Note that in this case, you should enter a fixed value here - if you have entered the B value using +1.0SD from the combo box then the value will change dynamically as the data is processed. You would select each grid in turn using Process Block with snap to grid set to on, then use the Statistics tool to measure the SD of a grid, single click on the 1 SD field in the Statistics report to copy the value to clipboard, then single click to paste the value into the A field. Click on the A/B button to evaluate and then single click on the result text box to place it on the Windows clipboard. Leave the Calculator form and then select the Divide process function. Either single click on the Value field to insert the clipboard value, or right click on Value field and paste as normal and then click OK to normalise the grid (the same process block will be used).

Next move the process block to the next grid and repeat, just entering a new value in the A field each time. The sequence above saves keyboard clicks compared to using the Windows calculator.

You can see below examples of single clicking on a field to place a value on the Windows clip board - Statistics form on the right and the Data Information panel on the left.

Data Information

N

20m div=5m

-3SD Mean 3SD

Mean 10.84349

SD 5.04001

3 SD 15.12003

Minimum -5.75

Maximum 204.7

Dummy Value 2047.5

SI, TI 0.25 m, 1 m

Source Grid X,Y 20 m, 20 m

Length, Width X, Y 60m, 80m

Size X, Y 240, 80

Statistics Report

Mean 8.191348

1 SD 1.860018

2 SD 3.720037

3 SD 5.580055

Minimum 0.65

Maximum 30.75

Copy Summary to Clipboard

Inclusive Block

Top Left X Y 81, 21

Bottom Right X Y 160, 40

? Cancel

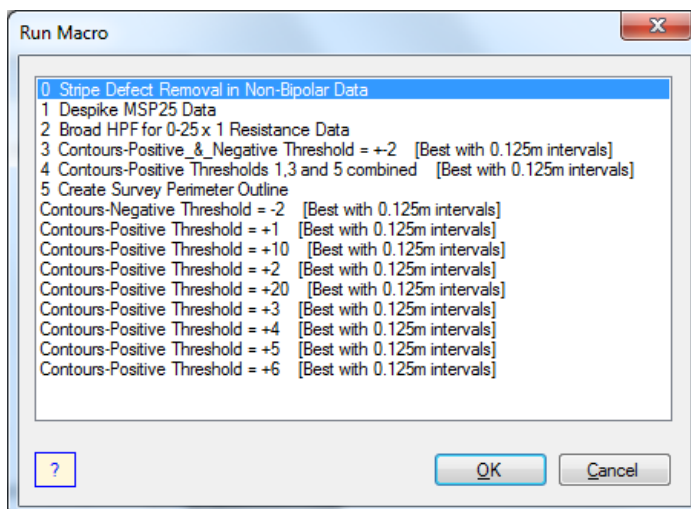
## 10-3 Macros

### 1 Macros

Macros allow users to define and save a sequence of data processing steps with specified parameters - the macro can then be run with a couple of mouse clicks to greatly speed up data analysis. A Macro Editor is provided to let you define your own macros. Some Tool functions, such as Stripe Defect Removal in Non-Bipolar Data, Create Survey Outline and GPS Gap Fill, are based on a macro sequence.

### 2 Run Macro

Once a macro is created in the Editor and saved with a user defined name, the macro can be accessed from Run Macro form which shows a list of existing macros. Select a macro and click OK or double click a macro to run it immediately.

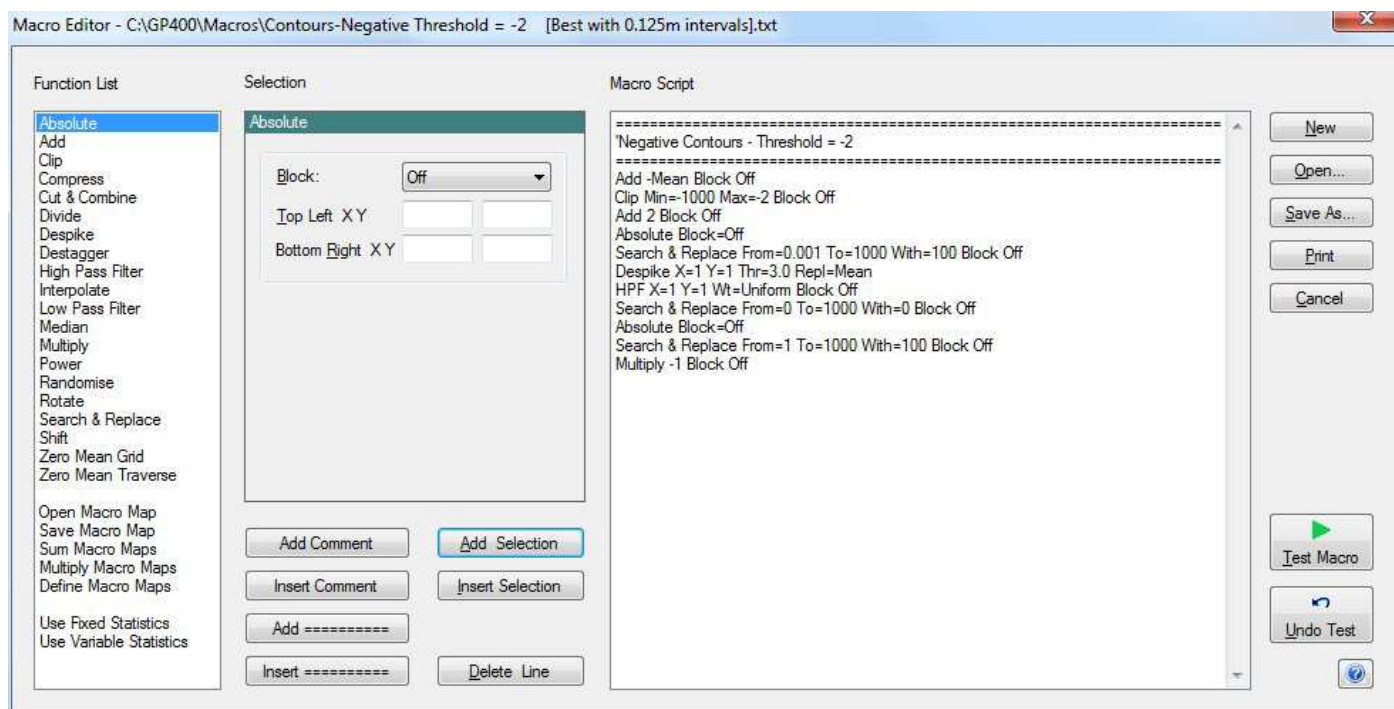


When a macro is run its name is shown in the History list. Undo removes all functions associated with the macro from the list in one go. Options allows you to include just the macro name in History or the full sequence of instructions. Use the Macro Editor, described later, to define your own macros.

### 3 Macro Editor

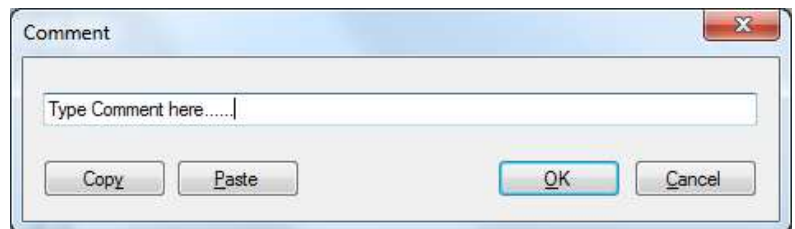
The macro editor allows users to define and save a sequence of data processing steps with specified parameters; this macro can then be run using Run Macro (see above) to greatly speed up data analysis. Comments can be added to the macro and the definition can include temporary files for saving intermediate results. If required a macro can also allow you to enter up to 8 initial filenames and you can use fixed or variable statistics for intermediate calculations. Several macros are already provided including ones for (a) 'Stripe Defect Removal in Non-Bipolar data' i.e. equivalent of Zero Mean Traverse but applied to resistance data, (b) generate a range of contour plots which can be overlaid on other data sets, and (c) another to provide a broad HPF for data sets with higher sampling intervals. During development, macros can be created and evaluated using the Test Macro and Undo Macro buttons.

To create a macro, highlight a function from the Function List and as soon as you do this the appropriate function will appear in the Selection box. Make your entries in the function form, just as you would when using a normal process function. Usually, you will click Add Selection to add it to the list that will appear in the Macro Script list box on the right-hand side. If, during creation of a macro, or editing of a macro, you want to insert a function then highlight the point where you want to insert it just before, then click on Insert Selection. If you add or insert an incorrect function, then highlight it and click on Delete Line to remove it.



#### 4 Add or Insert a Macro Comment

If you want to add or insert a comment then you can use the Add Comment and Insert Comment buttons in the same way, and optionally also include '=====' demarcation lines for clarity.



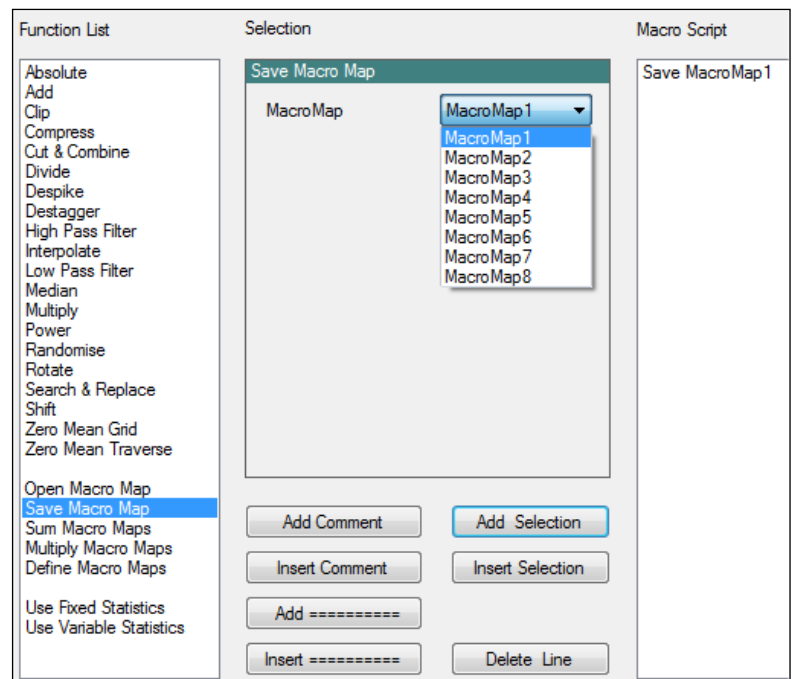
#### 5 Work with Temporary Maps of Intermediate Results

The top three quarters of the Function List replicate the normal process functions to be found on the Process menu or toolbars. The next block of functions, Open Macro Map, Save Macro Map, Sum Macro Maps, Multiply Macro Maps and Define Macro Maps allow you to define temporary files for saving intermediate results as you work within a macro.

Often you may wish to save the starting data set for later use during a macro so you can use the Save Macro Map function to save it as one of 8 maps for later recall using Open Macro Map – see illustration to the right.

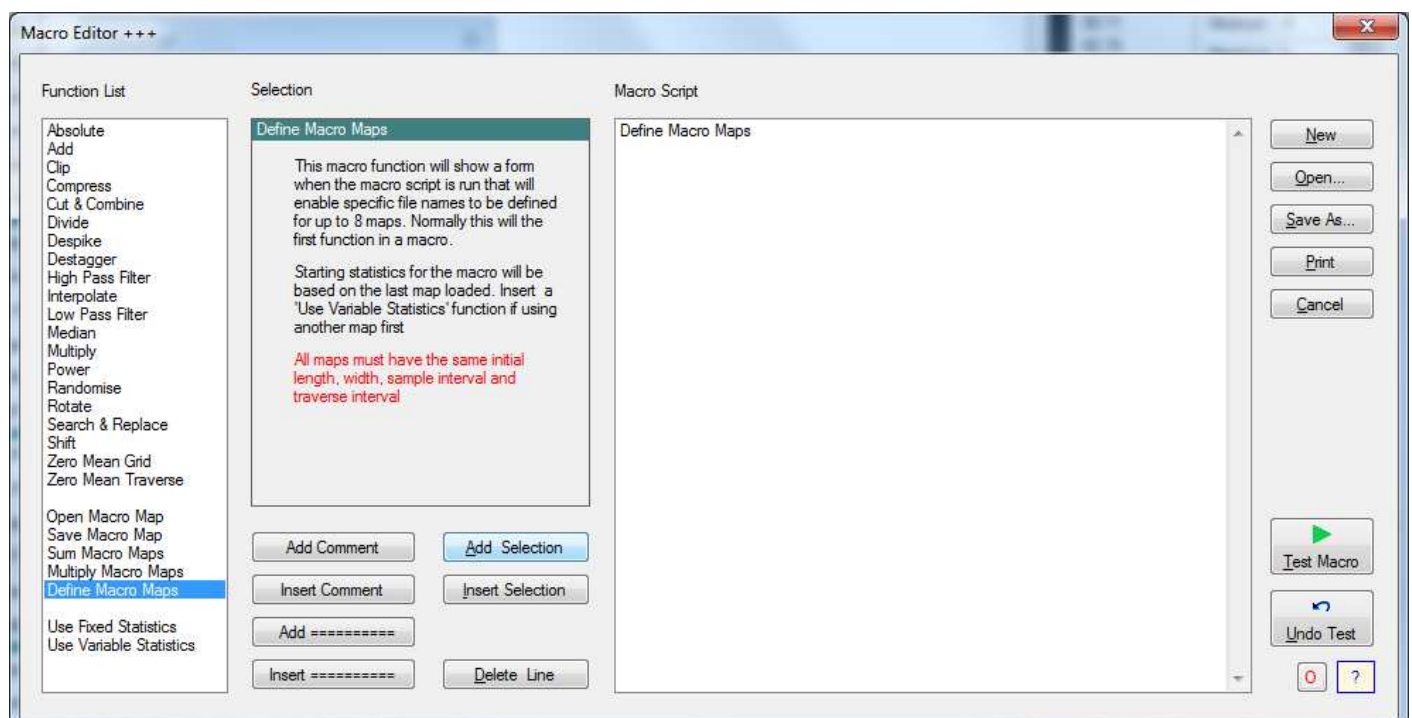
#### 6 Addition and Multiplication of Macro Maps

If you want to add (or sum) an intermediate macro map to the one currently being worked with during a macro, then use the Sum Macro Maps function to define which map should be added. You can do the same if you wish to multiply maps together using the Multiply Macro Maps function.



#### 7 Define Multiple Source Data Sets

The function Define Macro Maps allows you to define a group of initial source data sets to work with. This should always be the first macro command, if used. Note that the data sets must all have the same size and sampling. When you run the macro, a form will appear (see below) that allows you to browse to the file definitions of MacroMap1, MacroMap2 etc.



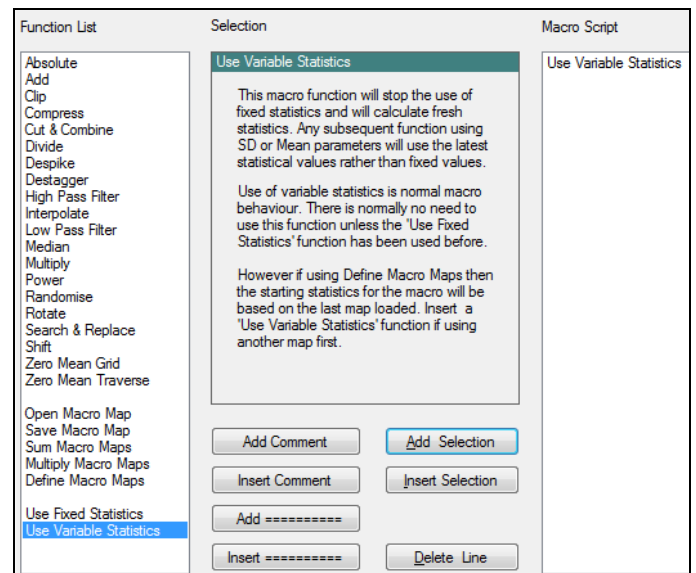
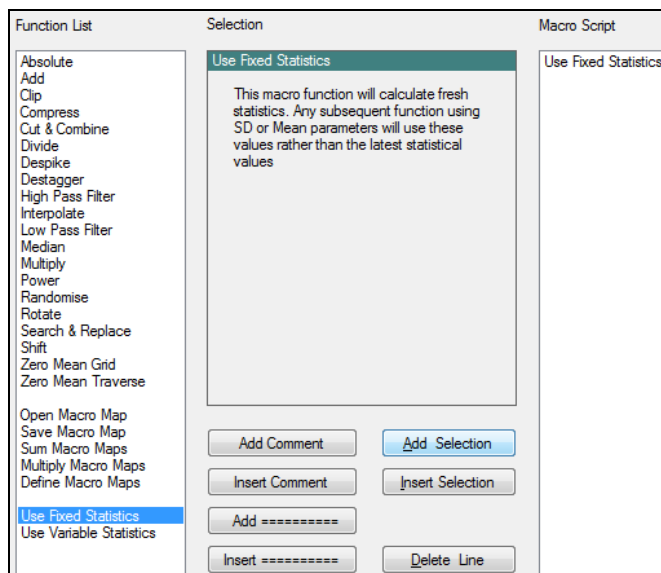
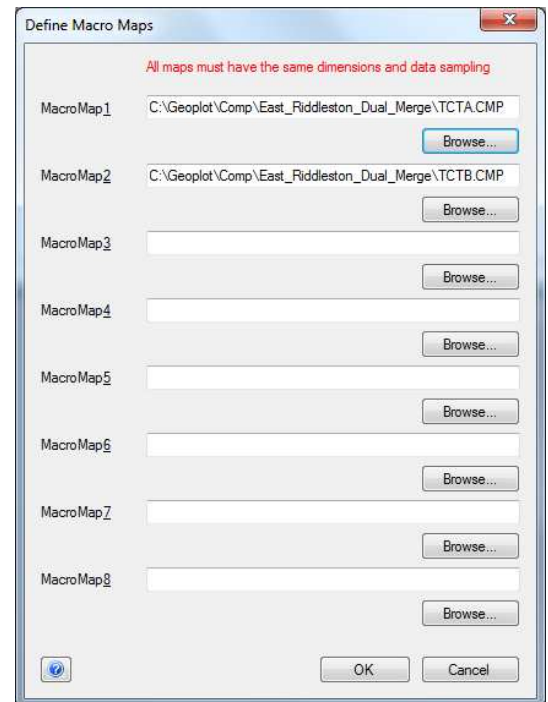
## 8 Fixed and Variable Statistics

Macros can use map statistics such as mean and standard deviation and normally you will be using the current values, whatever they may be. However, in some situations you may need to define whether the statistics are those of the original data set or whether fresh calculations need to be made. The bottom two items in the Function List, Use Fixed Statistics and Use Variable Statistics, allow you to do this.

The 'Use Fixed Statistics' function will calculate fresh statistics. Any subsequent function using SD or mean will use these fixed values rather than the latest statistical values.

The 'Use Variable Statistics' function will stop the use of fixed statistics and will calculate fresh statistics and any subsequent function using SD or Mean will use the latest statistical values rather than fixed values.

Use of variable statistics is normal macro behaviour and there is normally no need to insert the Use Variable Statistics function unless the Use Fixed Statistics function has been used before. Note that if using the 'Define Macro Maps' function then the starting statistics for the macro will be based on the last map loaded. Insert a 'Use Variable Statistics' function if using another map first.

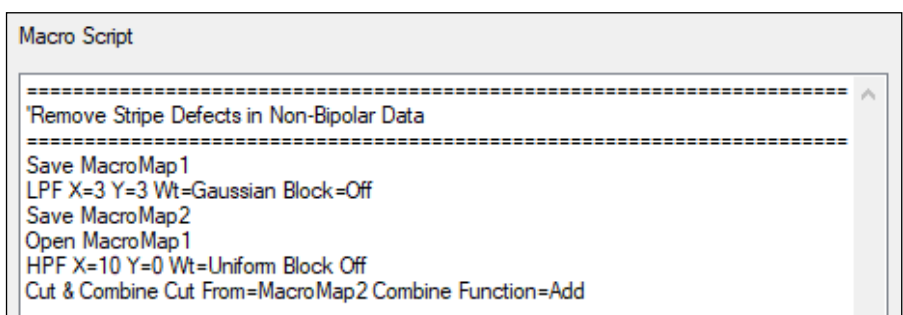


## 9 Example Macros

Several example macros, of varying complexity, have been provided in the Geoplot 4.0 installation. The most straightforward one is 'Despike MSP25 Data' which is simply a sequence of repeated Despike steps with varying parameters. You can open this macro from within the Macro Editor form to see the steps involved and the number of operations saved by using a macro instead of individual process applications.

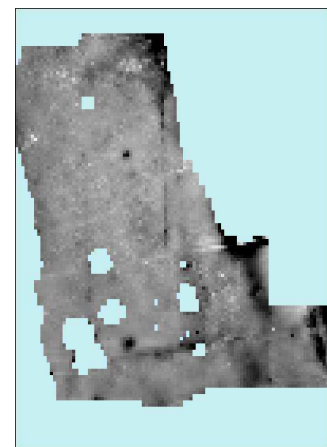
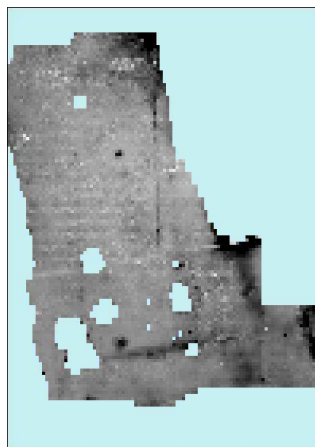
A more complex example is provided by the 'Remove Stripe Defects in Non-Bipolar Data' macro. Open this up in the Editor so you can see the steps involved which include Save MacroMap, OpenMacroMap, LPF, HPF and Cut and Combine.

Try applying this macro to the sample composite data found in Restripes. The results are shown below. You can see that there has been no need to specify the statistics type here since they are not fundamentally involved. To become familiar with creating your own macros you can try recreating this example. As well as being in the macro Run list this particular macro can also be found on the Tools menu.





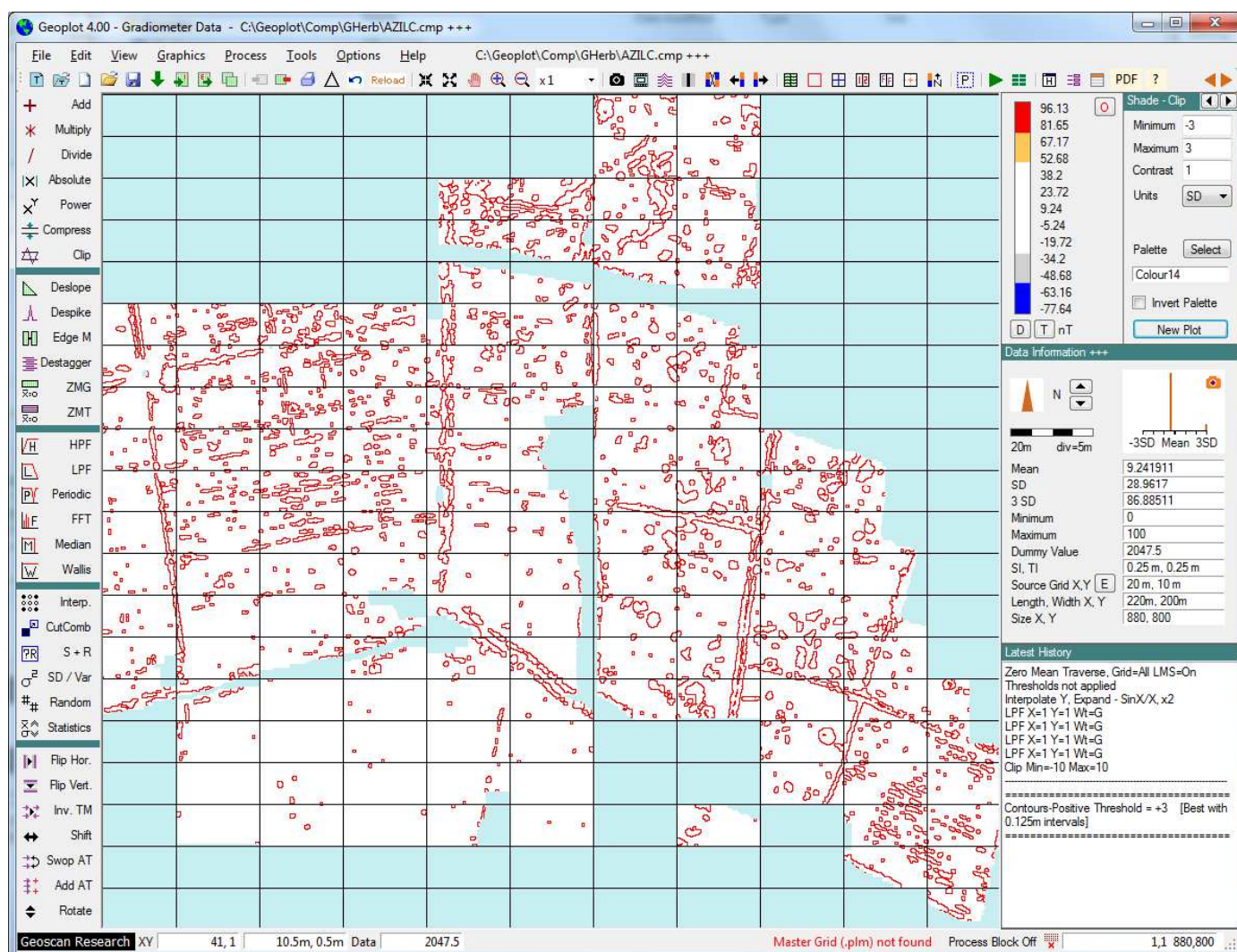
You can also open the Create Survey Perimeter Outline to see how this operates. Try it with the example composite '1' in the Castle directory. Whilst this is also present on the Tools menu (see Tools Menu (including Macros) section), operation has been extended there to also change the plot size, hide the border, hide grid lines, set appropriate plotting parameters and launch Save Image. When developing your own macros then you may also find you have to modify the Geoplot environment to get the best result.



In the case of the contour macros, the choice of best palette can help present the result you require. Try using the Contours macros with the example composite AZILC provided in the Gherb directory. Plot the data using the 'Colour 14' palette and +/- 3nT SD clip parameters then run the macro 'Contours-Positive Threshold = +3 [Best with 0.125m intervals]'. After a short while the contour plot shown below should appear. Although you should get better data using 0.125m sampling intervals, as advised by the macro, 0.25m sampling is still acceptable.

Note that this macro does make use of the Mean statistics but again there is no need to specify fixed or variable statistics.

```
=====
'Positive Contours - Threshold = +3
=====
Add -Mean Block Off
Clip Min=3 Max=1000 Block Off
Add -3 Block Off
Search & Replace From=0.001 To=1000 With=100 Block Off
Despike X=1 Y=1 Thr=3.0 Repl=Mean
HPF X=1 Y=1 Wt=Uniform Block Off
Search & Replace From=0 To=1000 With=0 Block Off
Absolute Block=Off
Search & Replace From=1 To=1000 With=100 Block Off
=====
```



# 11 Process Menu

## 11-1 Overview

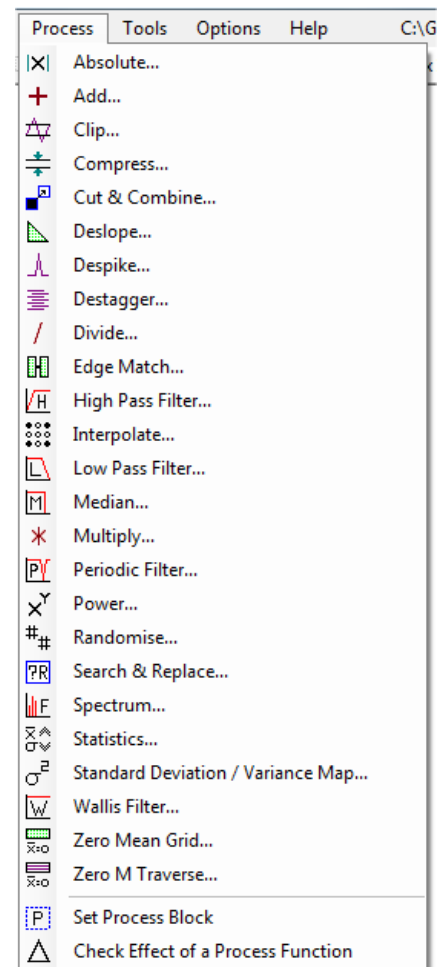
Process functions can be applied to composites, but not grids. The functions can be accessed from the Process Menu or toolbars. A detailed guide to process functions can be found in Geoplot 3.0 documentation – this can be accessed by clicking on 'PDF' on the General Toolbar and then selecting 'Geoplot 3.0 Processing Reference'. Additional comments on some process functions and operations are given below.

The latest process history is shown at the bottom of the right-hand control panel; a floating, re-sizeable history form is also available when working in the Graphics view. Alternatively, a full report is given in the History view. You can change the default process form parameters that are displayed in Process Options.

The functionality of some process functions has been extended, e.g. you can quickly perform a multiple number of Low Pass Filter operations at 1x1 which is useful for smoothing data without losing crispness. Again, the default number of operations can be set in Process Options.

When appropriate, many parameters can be entered as a straightforward numerical value or you can instead use a drop-down list of existing map statistics for speedy parameter entry, including +/- Mean, +/- Dummy, +/- SD levels and +Mean/2, +Mean/5. See the Clip form example below, right. You can set a preference for the drop-down order (positive or negative first) in Process Options for Clip & Search/Replace.

You can use 'Undo' to reverse the effects of the last process function. It is only single level so if you wish to remove the effect of a chain of process functions then use 'Reload Data'. An Undo button is provided on all process forms, as well as on the General Toolbar. The key combination Ctrl-Z can also be used.



## 11-2 Details

### 1 Cut and Combine

Cut and Combine now has a checkbox for determining 'Paste' action for dummy readings. The default action is for any pasted dummy to replace existing data, but this can be turned off to preserve any original data value if desired. Cut and Combine also has a check box for determining 'Add' action for dummy readings. The default action is for dummy readings to be ignored when adding data sets. If the checkbox is ticked, then added dummy reading will replace data. You can use the mouse to look at coordinates of graphics areas whilst the Cut and Combine form is active.

### 2 Destagger

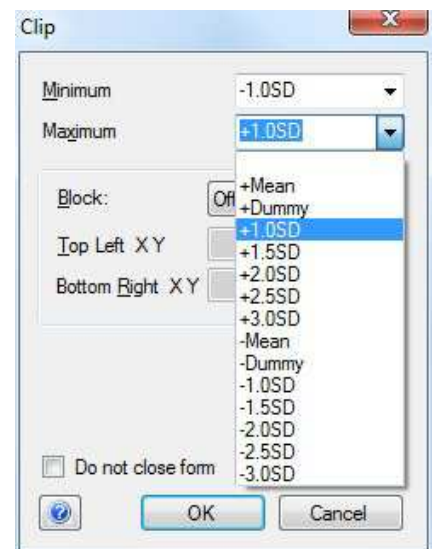
The Destagger process function has been extended so that 2-5 lines can shifted at a time, useful for multi-sensor magnetic arrays such as Ferex data. Destagger has also been extended so it can be applied to individual grids, all grids individually or the whole composite. The latter addition can help prevent edge artefacts.

### 3 Median Filter

Median filter is now working correctly with no shift in the X and Y directions.

### 4 Zero M Traverse

The function of Zero M Traverse has now been extended to work with either Mean or Median as the Zero Measure which is subtracted from the traverse data. Both may be used with or without application of Thresholds. Thresholds are very useful for working in the presence of very strong features (often given by ferrous features) or for preserving weak features running in the traverse direction. Least Means Square Fit can also be used with both measures. Application of the Zero M Traverse process can be restricted to a few lines at the start and end of a grid. This can be useful in preserving data when data is rotated through 90 degrees and Zero M Traverse is applied to reduce just grid start/end discontinuities – the start and end settings limit the regions over which Zero M Traverse is applied.



## 5 Statistics Report

The statistics report form that appears after you select a data block now has an option to save a summary of the statistics to the Windows clipboard. This can be pasted into the ScratchPad, Composite Notes or other locations that accept text. When you click on this button all the statistics fields will briefly turn green to indicate they have been copied and a summary prepared. An example of the report that appears on the clipboard is:

Statistics for file: C:\Geoplot\Comp\Rgrv\2.cmp

Mean = 70.02078

1 SD = 30.32029

2 SD = 60.64058

3 SD = 90.96087

Minimum = 55.15


Maximum = 662.0

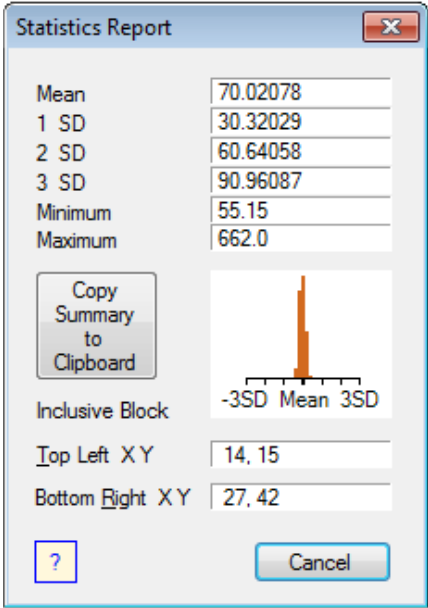
Block = Inclusive Block

Top Left X Y = 14, 15

Bottom Right X Y = 27, 42

You can also click on any statistics or block value which will briefly turn green to indicate it has been placed on the clipboard for pasting elsewhere.

Note that in addition you can copy a summary of all the Data Information from the RH Control Panel, which includes statistics and mapping sizes, using the  button to the right of 'Mean' to place the information on the clipboard and then to the Scratchpad.



Statistics Report

Mean	70.02078
1 SD	30.32029
2 SD	60.64058
3 SD	90.96087
Minimum	55.15
Maximum	662.0

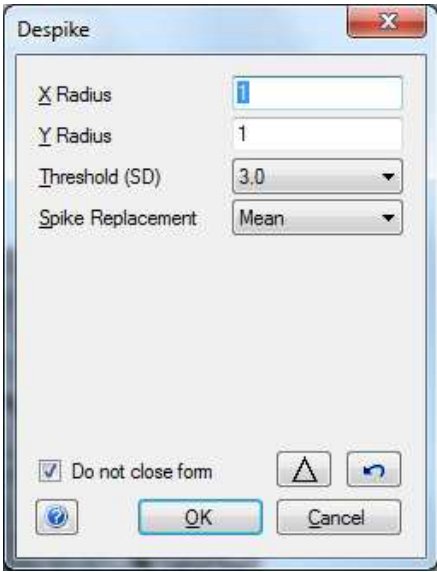
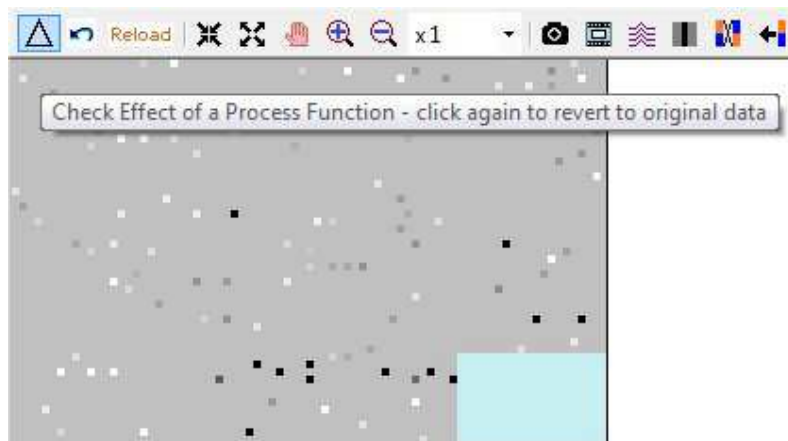
Inclusive Block

Top Left X Y 14, 15

Bottom Right X Y 27, 42

## 6 Check Effect of a Process Function

Once a process has been applied the effect of that last process function can be displayed by clicking on the triangle symbol (general toolbar) and the display will show the difference. In the example below this shows the spikes removed by Despique; click the triangle symbol again to restore the processed data. Checking data in this way is important for avoiding over-processing of the data. The normal Undo state is unaffected.



Despique

X Radius 1

Y Radius 1

Threshold (SD) 3.0

Spike Replacement Mean

☒ Do not close form

This approach has been extended further with provision of Undo and Check Process effect buttons on most process function forms making it easier and quicker to experiment with different parameters directly on the form. See the example of the Despique process form to the right. Remember this is a single level undo.

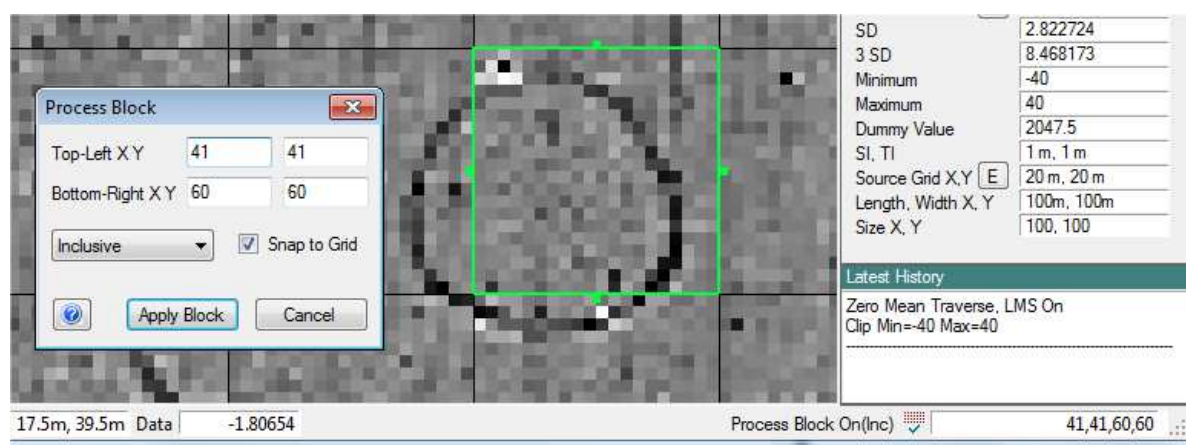
## 7 Process Block Selection

The Process Block selection function is accessed using the P button on the horizontal toolbar. The mouse is used to draw an orange rectangle that turns green once the mouse is released. The rectangle snaps to reading or grid, depending on the check box setting on the selection form – the current status is shown in the bottom RH corner (red dot pattern with either a cross or green tick below). The 'P' has a dark blue background when active. Snapping to grid takes place if you tick the check box and click Apply Block on the selection form (snap to grid mode is indicated by the icon to the right of the process block status text in the bottom right hand corner). If the initial rectangle is drawn outside the data area it will snap to the nearest edge once Apply Block is clicked. To remove the block right click the graphic. If you zoom in or out the block size will now track the size change. Note that the block selection button and menu item is disabled whilst Pan is enabled – disabling Pan re-enables block selection.

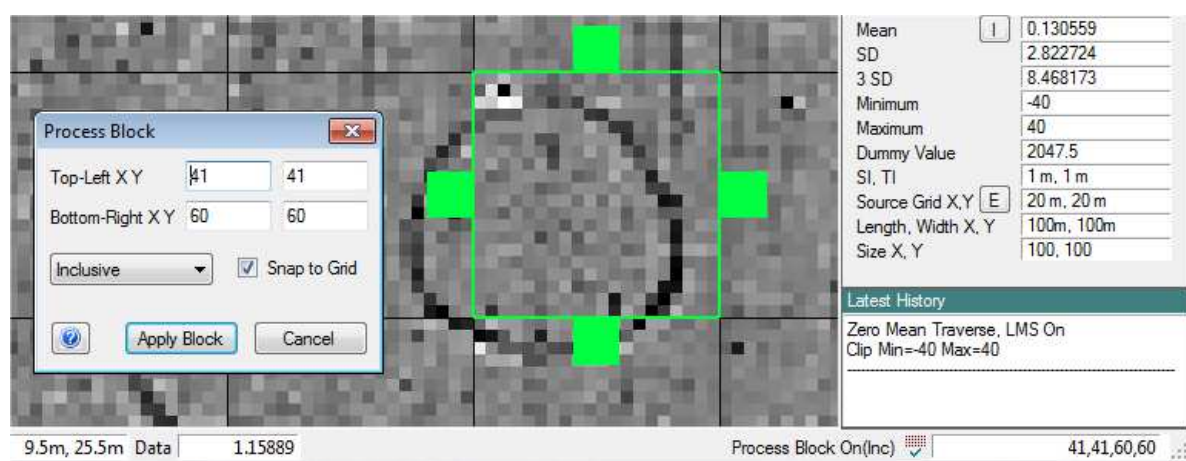


If you want to resize the rectangle place the mouse over one of the small handles (squares) in the centre of an edge, depress the mouse and drag the edge to the new location. As soon as you depress the mouse the Process Block form appears, and the Top-Left and Bottom-Right text boxes will track changes as the mouse is moved. Alternatively, you can change the text values in the form and the green rectangle will resize to match the new text values.

There are three sizes of handles which can be set in Graphics Options. The Normal size is used for routine desktop work. If using a touch screen, then the Large or Very Large handles can be used so a stylus or even a finger can be used to resize the rectangle.



Normal Handle



Very Large Handle

## 8 Do not Close Forms

You can specify if process forms should, by default, remain on screen by modifying the first tab of the Process Options page. When a form first shows the 'Do not close form' will be checked or not checked accordingly. For example, it can often be useful to keep Interpolate showing for several operations or keep Despique on screen whilst trying various parameter combinations. It can be over-ridden locally on each process form.

**Process Options**

Configure Geoplot process form preferences

Form Close Compress Despique HPF Interpol. LPF Median Periodic

Do not close form after process is completed if checkbox is ticked :

<input type="checkbox"/> Absolute	<input checked="" type="checkbox"/> Edge Match	<input type="checkbox"/> Randomise
<input checked="" type="checkbox"/> Add	<input type="checkbox"/> HPF	<input checked="" type="checkbox"/> Search & Replace
<input type="checkbox"/> Clip	<input checked="" type="checkbox"/> Interpolate	<input type="checkbox"/> Spectrum
<input type="checkbox"/> Compress	<input checked="" type="checkbox"/> LPF	<input type="checkbox"/> Statistics
<input type="checkbox"/> Cut & Combine	<input type="checkbox"/> Median	<input type="checkbox"/> SD / Var
<input checked="" type="checkbox"/> Deslope	<input checked="" type="checkbox"/> Multiply	<input type="checkbox"/> Wallis
<input checked="" type="checkbox"/> Despique	<input checked="" type="checkbox"/> Periodic Filter	<input type="checkbox"/> ZMG
<input checked="" type="checkbox"/> Destagger	<input type="checkbox"/> Power	<input checked="" type="checkbox"/> ZMT



# 12 Options Menu

## 12-1 Overview

The Options Menu allows you to determine how Geoplot 4.0 is set up and operates. The most important of these is the COM port settings for download and you should explore and make sure at least this setting is correct. Environment Options let you set default COM ports separately for the RM85 and other instruments – this is found in the Download tab. Environment options also lets you set dummy values for data, import preferences, export preferences and Macro History reporting behaviour. You can now choose to have macros show as just a short summary in process history, rather than a full list of process functions and parameters used. There are also preferences for MasterGrid, and Sounds.

Options	Help	C:\Geoplot\Corr
Environment...	Alt+Shift+E	
File Paths...	Alt+Shift+F	
Graphics...	Alt+Shift+G	
Process...	Alt+Shift+P	
Tools and Edit...	Alt+Shift+T	

The Environment, General tab, allows you to configure form colours and which toolbars are displayed. The default behaviour is to hide the Horizontal Process and Tools toolbar, shown below since the vertical form of this is usually more convenient. But on small displays the horizontal version may be preferable.



General Toolbar (top) and Horizontal Process and Tools Toolbar (bottom)  
Note that not all General Toolbar buttons will be visible on small screens

The Vertical Process and Tools toolbar can be either wide (the default) or narrow.

File path organisation has a very similar structure to that used in Geoplot 3.0 whereby grids, composites, meshes etc. are all sub-directories of a 'Geoplot' directory in the main drive. In Geoplot 4.0 some of the subdirectories have been renamed: for example, in Geoplot 4.0 we use 'Import\_Data', rather than 'impdata' used in Geoplot 3.0 and can do so because file names longer than 8 characters can now be used, and a more descriptive name can thus be adopted. In fact, it is important that Input Template file paths are kept separate for Geoplot 4.0 and Geoplot 3.0 since the file formats are different – hence the different file path names and settings from Geoplot 3.0. Grid, Comp, Mesh / MasterGrid file paths are set to be the same as Geoplot 3.0.

Graphics Options allow you to set colour schemes for border, grid lines etc. and determine start up preferences such as display of the border, palettes etc. There are options for the Animation Editor and Display Parameters such as overlay opacity.

Process Options allow you to specify which process forms stay on screen after use and set your preferred process form parameters. Clip and Search and Replace can have the drop-down combo box information order changed to suit user preference. Tools and Edit Options also allow you to specify which forms stay on screen after use and set your preferred Merge Composites parameters and set your Create Survey Perimeter Outline parameters.

Throughout Geoplot 4.0 you will find buttons with a red 'O' in the centre – these remind you there are Options associated with this part of Geoplot 4.0 and if you click the button it takes you directly to the appropriate Options tab.

Note that with each Geoplot build a new set of Options files will generally be installed, along with the executable and other support files. Old options files will not be compatible with new builds since the information in them will have a different format. Do **not** try to carry forward old settings by trying to use the old options files since this will cause unpredictable and obscure problems.

**If Geoplot 4 behaves in an unexpected manner at any stage, then it could be the Options files have become corrupted or are not compatible with a later build. To restore correct Options files, exit Geoplot 4.0 and delete the existing Options directory in C:\GP400\Options. On restarting Geoplot 4.0 it will offer to create new default options files – these will be saved when you next exit Geoplot 4.0.**

Environment Options

Configure Geoplot environment preferences

General Open Data Download Import Export Macros MasterGrid Sounds Print

Form Background Colour: Control

Horizontal Toolbar Colour: Control

Side Panel Header / Divider Colour: [Color Picker]

Side Panel Header Text Colour: [Color Picker]

☒ View Process/Tools Toolbar (Vertical - wide)
 ☒ View General Toolbar

☐ View Process/Tools Toolbar (Vertical - narrow)
 ☒ View Graphics, Information, History

☐ View Process/Tools Toolbar (Horizontal)
 ☐ View Latest History - Floating

☐ View Help Panel at Start Up
 ☒ View ScratchPad at Start Up

☒ View Help Processing Basics - Resistance
 ☒ View Calculator at Start Up

☐ View Help Processing Basics - Gradiometer

☐ View Help Processing Basics - Magnetometer

Reset to Defaults

Apply Cancel

File Path Options

Configure Geoplot file path preferences

File Paths

Grid and GPS Data: C:\Geoplot\Grid

Composite Data: c:\Geoplot\Comp

Master Grid: C:\Geoplot\Mesh

Input Template: C:\Geoplot\Input\_Template

Data Import: C:\Geoplot\Import\_Data

Data Export: C:\Geoplot\Export\_Data

Import Graphic Image: C:\Geoplot\Import\_Image

Save Graphic Image: C:\Geoplot\Export\_Image

Animation: C:\Geoplot\Animation

Macros: C:\GP400\Macros

Palette: C:\GP400\Palette

Processing Basics Text: C:\GP400\Processing\_Basics\_Help

Reset to Defaults

Apply Cancel

Graphics Options

Configure Geoplot graphics preferences

General Grid Guides Shade Trace Animation Editor & Display Printing Threshold

Background Colour: [Color Picker]

Selection Rectangle Colour: [Color Picker]

Selection Rectangle Line Width: 2

Selection Rectangle Handle: Normal

Dummy Data Colour: [Color Picker]

Dummy Data Symbol: Solid Box

Initial Plot Size: x 1

Plot Type: Shade

Scalebar Data Format: #.##

Save File Type: jpg

Windows Screen Scaling (%): 100

Desktop Image - Save and/or Print

☒ Save Image
 ☐ Print Image

Save Palette and Scale

☒ Include Units
 ☒ Include North Symbol
 ☒ Include Histogram
 ☒ H. Border H. Colour: Black

☐ Make Dummy Readings Transparent and Trace Background Transparent

☒ Show Border

Reset to Defaults

Apply Cancel

Tools and Edit Options

Configure Geoplot Tools and Edit form preferences

Close Status Merge Composites Create Survey Perimeter Outline

Do not close form after tool operation is completed if checkbox is ticked :

Tools

☒ Rotate
 ☒ Shift
 ☒ Add (Alternate Traverses)

Edit

☒ North Direction
 ☐ Units

Reset to Defaults

Apply Cancel

Process Options

Configure Geoplot process form preferences

Form Close Compress Despike HPF Interpol. LPF Median Periodic Spectrum SD/Var Wallis ZMG ZMT Clip, Search/Replace & Clipboard

Do not close form after process is completed if checkbox is ticked :

☐ Absolute
 ☒ Edge Match
 ☐ Randomise

☒ Add
 ☐ HPF
 ☒ Search & Replace

☐ Clip
 ☒ Interpolate
 ☐ Spectrum

☐ Compress
 ☒ LPF
 ☐ Statistics

☐ Cut & Combine
 ☐ Median
 ☐ SD / Var

☒ Deslope
 ☒ Multiply
 ☐ Wallis

☒ Despike
 ☒ Periodic Filter
 ☐ ZMG

☒ Destagger
 ☐ Power
 ☒ ZMT

Reset to Defaults


Apply Cancel


## The five Options Forms

# 13 Help Menu

## 13-1 Overview


General help is available in the form of a Help Panel, Manual and other PDF Files, plus individual Help PDF's for all Geoplot 4 functions. In addition, floating Help forms are available that introduce the basics of processing Resistance, Gradiometer and Magnetometer data.

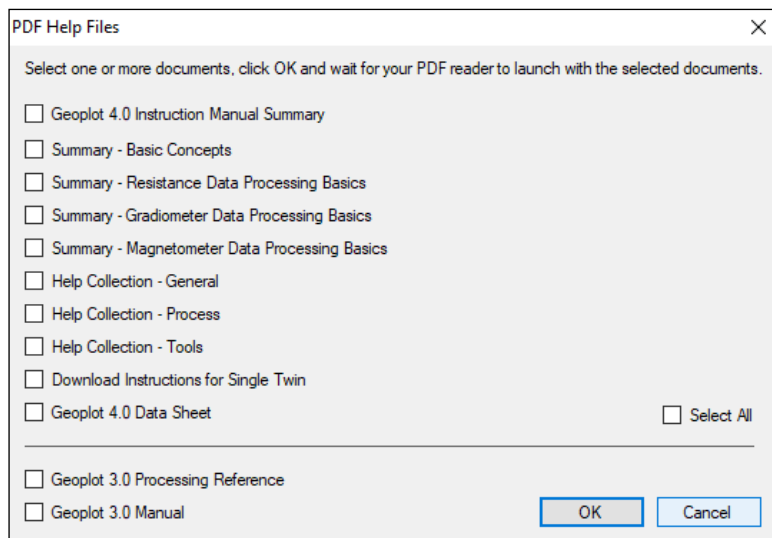
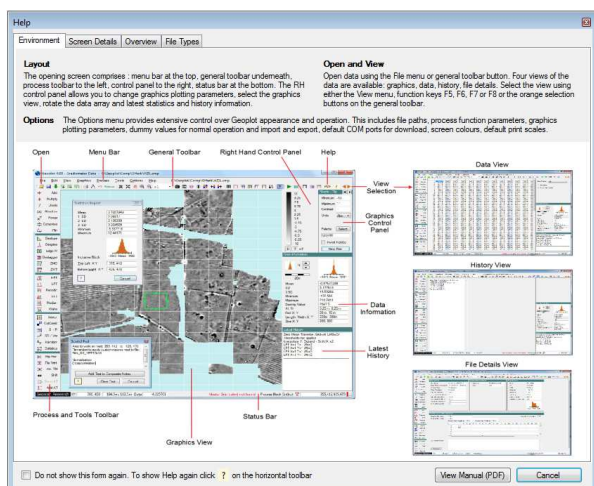
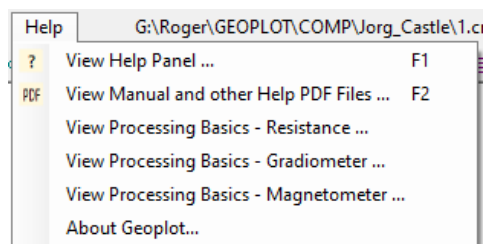
The Help Panel is accessed by clicking on the  button on the horizontal toolbar or by selecting the Help menu and View Help Panel or by pressing F1 and this will display the form shown below, left. It will be of use to new users and can be resized and positioned in the corner of the screen for reference. The panel has four tabs which cover the essentials: Environment, Screen Details, Overview and File Types. It contains the images that follow in the next section. If you want to show the panel again, click on the question mark on the horizontal toolbar. You can stop the form appearing again by ticking the 'Do not show...' checkbox or go to Options, Environment, General.

PDF Help documents can be accessed by clicking on the  button on the horizontal toolbar or by selecting Help menu and 'View Manual and other Help PDF Files' or by pressing F2 and this will display the form shown below. You can select a number of these and then click OK to open them in your PDF reader. If desired, tick Select All on the right-hand side to open them all up at once. It can be convenient to display these on a second screen for reference if possible.

The document "Geoplot 4.0 Instruction Manual Summary" gives the most up to date information. If you would like detailed help on downloading data from our instruments, then select "Download Instructions for Single Twin" as an example or when you start the Download process, click on the Help button. The Basic Concepts document summarises the following topics: Data Collection, Data Download, Master Grid and Composite Files, Associated Files, Statistics / Histogram Files, Information File, Other Geoplot Files and File Extensions and Backups. File extensions are very useful to know when considering what files needs backing up or if you are sending copies of these files to someone else. The three Processing Basics documents summarise guidance on how you should consider processing resistance, gradiometer and magnetometer data.

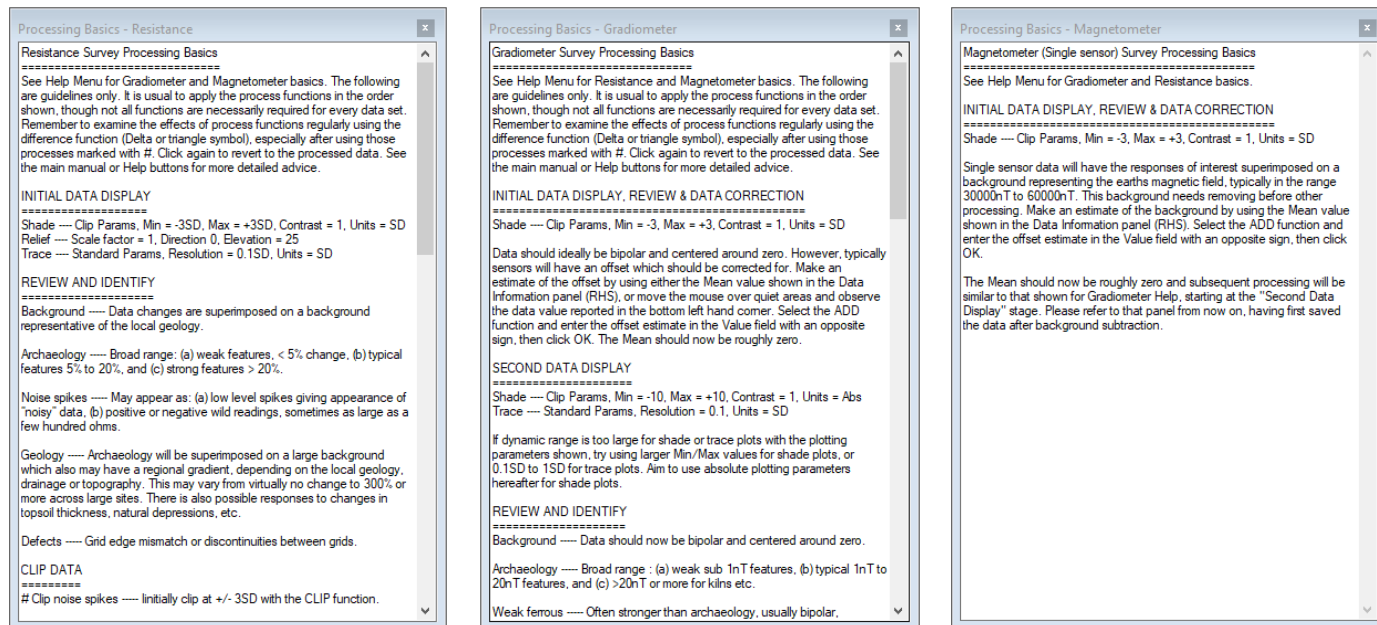
If you are new to using Geoplot 4, then the Geoplot 3.0 Manual and Geoplot 3.0 Processing Reference will act as an interim solution to understanding in depth many of the process functions.

As well as the PDF files accessible from the Help menu, there are individual help buttons  on Geoplot forms which you can click on to show either another descriptive form or launch a PDF document in your PDF reader. Collections of these Help PDFs, grouped as: General Help, Process Help and Tools Help, can also be selected in the PDF Help documents form for viewing.



## Processing Basics Help

The three Processing Basics documents referred to above can also be displayed as floating Help forms for Resistance, Gradiometer and Magnetometer data, in the style of the Scratchpad. These forms can be resized to fit within the screen and used as a reference when processing. The content has been updated and revised, compared to earlier help information. The content can be found in the C:\GP400\Processing\_Basics\_Help folder as simple text files: HelpResistance, HelpGradiometer and HelpMagnetometer. These can be edited by instructors if they wish to provide different information to students. Options, General Tab determines if these are displayed each time at program launch.



## 13-2 About Geoplot

The About Geoplot Help form summarises which version and build of Geoplot you are using. It also reports on installation file paths and version numbers that will be recorded with grids, composites, macros, animation files and input templates.

About Geoplot 4	
Version	4.00
Build	1447
.EXE Installation Path	C:\Program Files\Geoplot 4
Options File Path	C:\GP400\Options
Palettes File Path	C:\GP400\Palette
Macros File Path	C:\GP400\Macros
Processing Basics Text Path	C:\GP400\Processing_Basics_Help
Help Files (PDF) Path	C:\GP400\PDFHelp
Manual Files (PDF) Path	C:\GP400\PDFManual
Version number recorded with each file	
Grid	4.01
Composite	4.01
Macro	4.01
Animation	4.02
Input Template	4.02
Copyright 2025 Geoscan Research. All rights reserved.	
<a href="http://www.geoscan-research.co.uk">www.geoscan-research.co.uk</a>	
<a href="https://twitter.com/GeoscanResearch">@GeoscanResearch</a>	
<input type="button" value="Cancel"/>	



# 14 General Information

## 14-1 Details

### 1 Display of Last Data Set at Start-up

When Geoplot 4.0 starts up it remembers where you were last and will automatically load the last file you used. If you prefer this to not happen you can change the behaviour in Options, Environment. Previous file paths used in a variety of situations, such as Open, are also remembered.

### 2 Form Location

Whenever you use a form and move it away from the centre of the screen, this new position will be remembered and used for its location the next time the form is opened.


### 3 Entry Field Filtering

Filtering to prevent entering a letter in a numeric field has NOT been applied yet to most fields so take care when entering text into fields.

### 4 Distance and North Scales

Several distance scales and a variety of North symbols can be found in the installed Image folder which can be used for publishing purposes.

### 5 New Users

If you are new to Geoplot then you may benefit from following the tutorial in the Geoplot 3.0 manual since this will give you a good idea of the structure of Geoplot 4.0. There will be slight differences, but it should give you a basic grasp of the underlying concepts of grid, composite and master grid and processing. You will not be able to follow all the tutorial since some features such as Publish are not included in Geoplot 4.0. The manual is available from our website but is also installed with Geoplot 4.0, accessible by clicking on the 'View Manual and other Help PDF Files' button  on the general toolbar or go to the Help menu and then select 'View Manual and other Help PDF Files'. The resulting form has the Geoplot 3.0 Manual listed at the bottom. Select the checkbox for it and click OK to open it as a PDF. Go to Chapter 3 for the tutorial.

### 6 Run Simultaneous copies of Geoplot

Note that you can have several copies of Geoplot 4.0 running at the same time. This can be useful if you want to compare different data sets side by side.

### 7 Maximum File Size

The maximum file size is about 200 Mb on a Windows 7 64 bit with 4 Gb memory. Feedback on file size limitations welcome on PC's with different memory sizes or operating systems. The limit will be found by repeated Interpolation – once the limit is reached you will see an error message: "Insufficient memory for expansion". Any feedback from your experience on this point would be welcome.

### 8 Windows Screen Scaling (%)

Some forms require you to set 'Windows Screen Scaling (%)' according to the PC Text Size setting to operate correctly. These are associated with screen saves: 'Save Palette and Scale Image', 'Desktop Image Save / Print' and 'Save Palette and Scale Image'.

# 15 Data Backup

## 15-1 Overview

The extensions used for Geoplot data files are listed below. When backing up data files, ensure that you backup all files associated with grid or composite data, not just data files themselves. Note that Geoplot 4.0 has introduced the additional .txt file associated with a composite where survey notes can be recorded.

Grid :	.DAT Data	.GRD Information File	.GRS Statistics and Histogram	
Composite :	.CMP Data	.CMD Information File	.CMS Statistics and Histogram	.TXT Notes
Master Grid :	.PLM File Names and Biases			
Grid Input Template:	.GIP Grid Input Details			
Composite Input Template:	.CIP Composite Input Details			
Animation List and Overlays:	.GAN			

If you have defined any Macros, then backups of these can be made from the location reported in the 'About Geoplot' form. Backups of Input Templates, Animations, Saved Graphic Images, and Data Exported can be made from the locations defined in Options, File Paths.

# 16 Download Instructions

## 16-1 Download Preparation

Before you can download from an instrument the RS232 or USB communications must first be set up on the PC. This almost always involves installing drivers for an RS232-USB adapter or USB drivers for an RM85, unless you are using RS232 and the PC has a COM1 port already available. Please install required drivers following the instructions for your RS232-USB adapter or, for an RM85, the instructions in section 4-10 of the RM85 manual.

If using RS232, connect the RS232 cable to the RS232-USB adapter when used. If using USB and an RM85 then connect the supplied cable to the PC. **We recommend you only connect the RM85 to a PC via the USB lead once it is powered up.**

Turn on the instrument and select the Comms menu. Select the baud rate you wish to use – the default values in Geoscan Instruments and Geoplot Input Templates should match. If you are using and RM85 then set Data Dump Port to either USB or RS232. For an RM85 you will normally also have Dump Header = Off, Dump Mode = Linear, Data Format = Fast ASC. In the future there will be different settings when downloading GPS data. **Note that for the FM256 the data format should be set to either Fast ASC, ASC or ASC+SPCS only, NOT the FM256 default of Hex D – please change the FM256 instrument Data Format setting accordingly. It will be reset to Hex D if the memory backup battery is changed.**

Next, we need to find out what COM port has been allocated to the instrument. Navigate to Windows Device Manager (Control Panel, System, Device Manager) and expand Ports (COM & LPT). Note the COM number next to the serial adapter name or 'USB Serial Port' for an RM85. Go to the Geoplot Options Menu, Environment, Download tab. For instruments other than the RM85 set the 'General Download COM Port' to the COM number noted above. For the RM85 set the 'RM85 Download COM Port (USB Virtual COM Port)' equal to the number noted above. In the example below, General Instruments will use COM1 and the RM85 COM 6. This will be shown by default in a subsequent form for entry of grid names, discussed below, and once set up in Options, should not need to be changed again, so this Download Preparation section will not be required for future downloads. If the allocated COM number is greater than the range provided by Geoplot 4 (1-10) then you will need to reassign the RM85 Comm number driver setting in the Device Manager view to a number in this range. Once you have the options settings correctly defined click Apply.

## 16-2 Download Sequence and Input Template ↓

To download data, click on the Download button on the top general toolbar or select it from the File menu. This will show an initial Input Template selection form, right, which will show the default template ODEFAULT.GIP and a list of any other templates that may have been defined. Select the template you want and then click on the Next button – use the default template if none exist.

If you selected ODEFAULT then you will see a Survey Type and Instrument selection form. Select a survey type and then instrument from the list on the right-hand side. Click Next to show the appropriate default Input Template form – see

example below. Template details include Mapping, Instrumentation, Instrument Setup and Notes and the actual details shown will depend on the instrument selected. If you selected a pre-defined template then this will be shown immediately with entries already made, though these can be changed to suit. Please refer to individual instrument manuals for advice on Input Template settings. For example, more complete instructions can be found in Chapter 7 of the RM85 manual, 'Data Handling' which also gives advice on the template settings for different probe configurations. The PDF Manual button on the General Toolbar will display a form that will allow you to view a pdf file called "Download Instructions for a Single Twin" which is an RM85 example. Click 'Next' on the Input Template form.

**Grid Input Template -**

**Mapping**

Site Name:

Map Reference:

Survey Type: Resistance

Data Sampling: Gridded

Dir. 1st Traverse: E

Grid Length (x): 20 m

Sample Interval (x): 1 m

Grid Width (y): 20 m

Traverse Interval (y): 1 m

Traverse Mode: Zig-zag

GPS Data Logged: No

**Instrumentation**

Instrument: RM85

Units: ohm

Measurement Mode: Probe

Hardware: PA20

Interface: No adapter

Log Mode: Single

Configuration: Twin

Probe Spacing: 0.5 m

**Instrument Setup**

Dump Baud Rate: 38400

Gain Range: AUTO

Current Range: AUTO

Compliance Boost: Off

Frequency: 122.5 Hz

Output Voltage: 45 V

High Pass Filter: 13 Hz

Auto-Log Delay: 300 ms

Insertion Delay: 50 ms

Speed Boost: Off

**Notes**

**Dump Content**

Data

Buttons:  Back Next... Cancel

## 16-3 Download Grid Names

You will now see a form that allows you to enter grid names and below that a combo box that specifies the COM port – this should match the Options setting for your instrument or RM85. Note there is a Help button giving advice on USB-RS232 adapters.

**Download Data**

	Grid Names
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

Buttons: Quick Entry Clear Table

Grid name <=8 characters for best Geoplot 3 compatibility

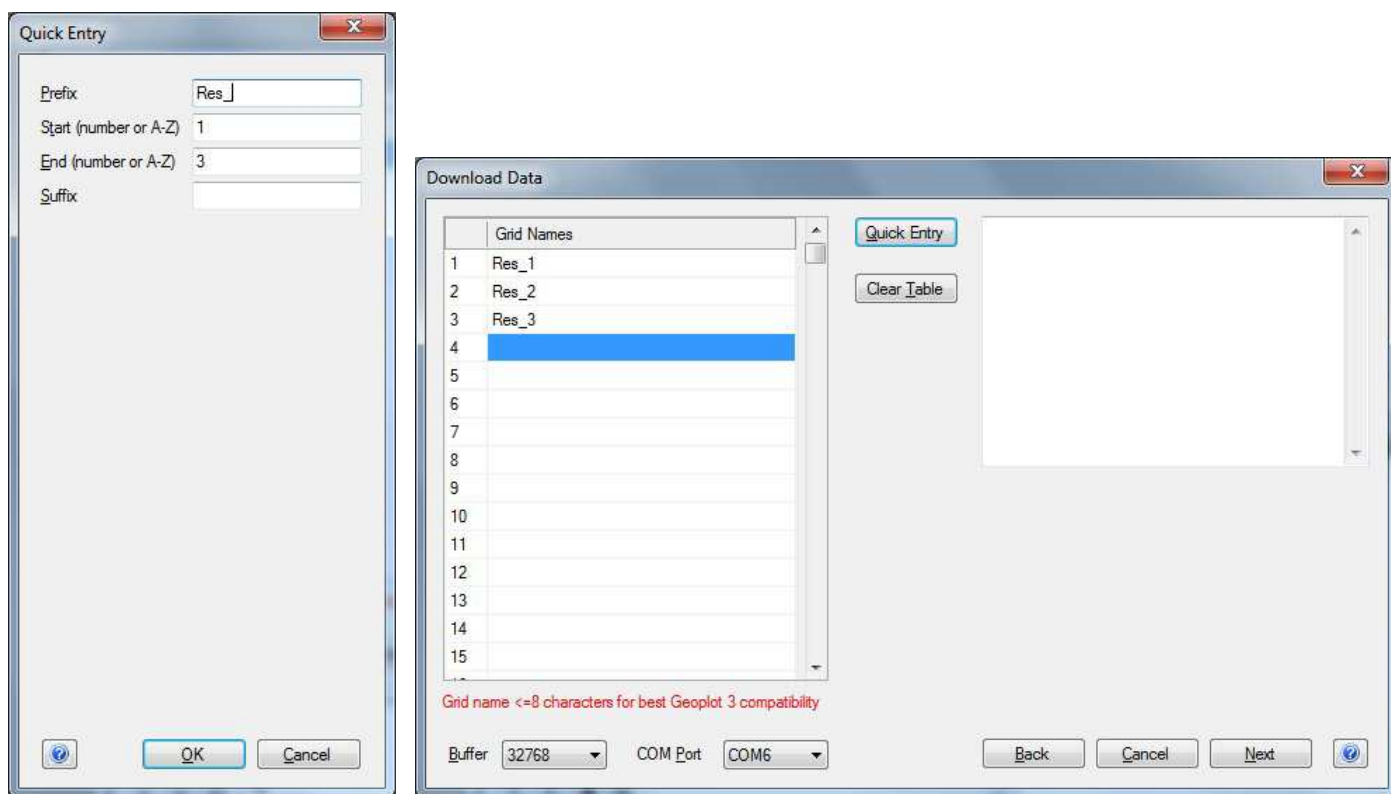
Buffer: 32768 COM Port: COM1

Buttons:  Back Cancel Next ?

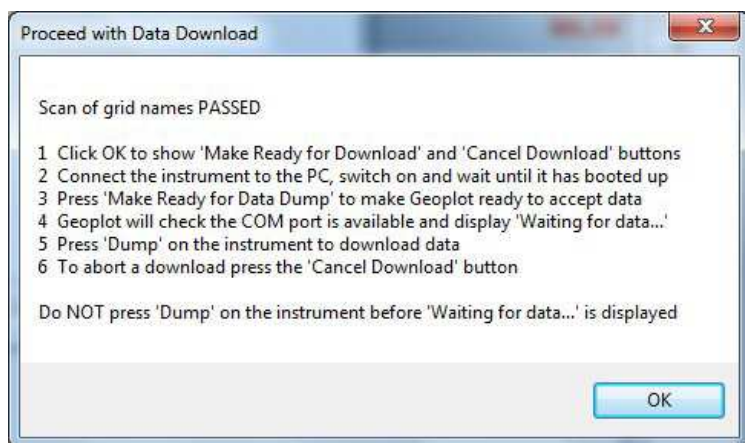
USB-RS232 Adapter Help



You can either enter names manually one by one in the Grid Names list box, but it is better to click on the Quick Entry button. This will display a form that lets you define a Prefix, start and end grid names or numbers and a Suffix. Click OK to populate the Grid Names list box. Downloaded grid files will be readable also in Geoplot 3.0. If you keep the file names <= 8 characters, then they will be directly readable by Geoplot 3.0 but if longer they appear in truncated form when displayed in Geoplot 3.0.

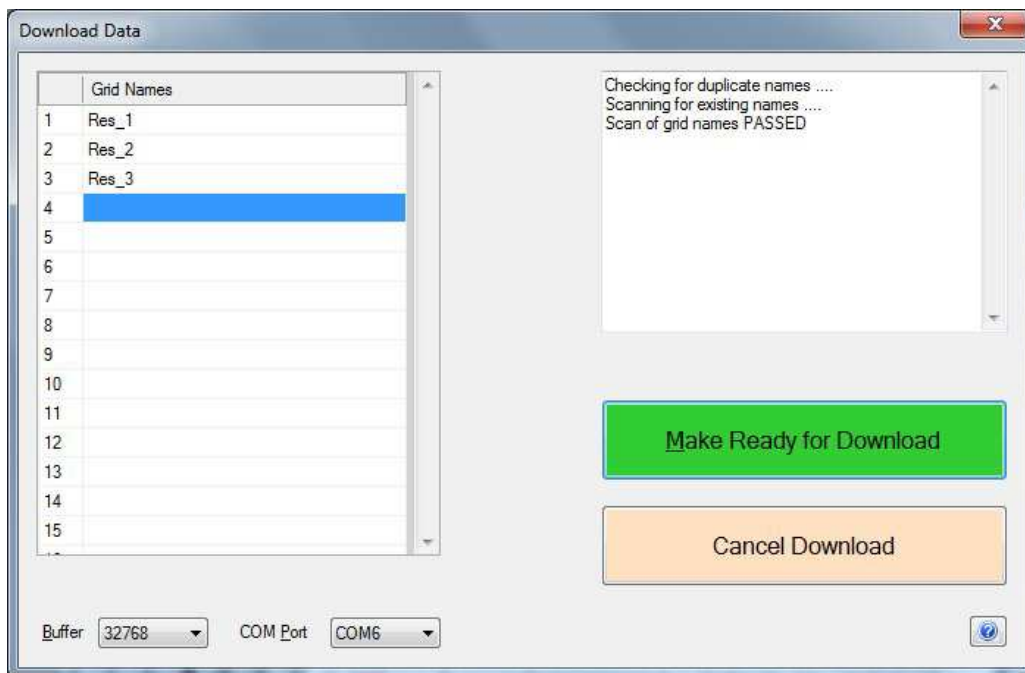


Once the grid names have been entered click Next – Geoplot will then scan to see if you already have any grids with the same names in a directory that will be composed of a combination of the default grid file path and the Site Name entered in the template EG the full path will now be c:\geoplot\grid\siteName (the default grid file paths are set in Options, File Paths and the default is c:\geoplot\grid). If Geoplot finds duplicate names, then it will display a message asking you to enter new names - Geoplot will not allow you to overwrite raw grid files. If all is well then, a message box pops up telling you what to do next. Once you have noted these instructions click OK and you will see a note in a feedback box to the right that the scan of grid names PASSED – in fact all subsequent steps are recorded here.

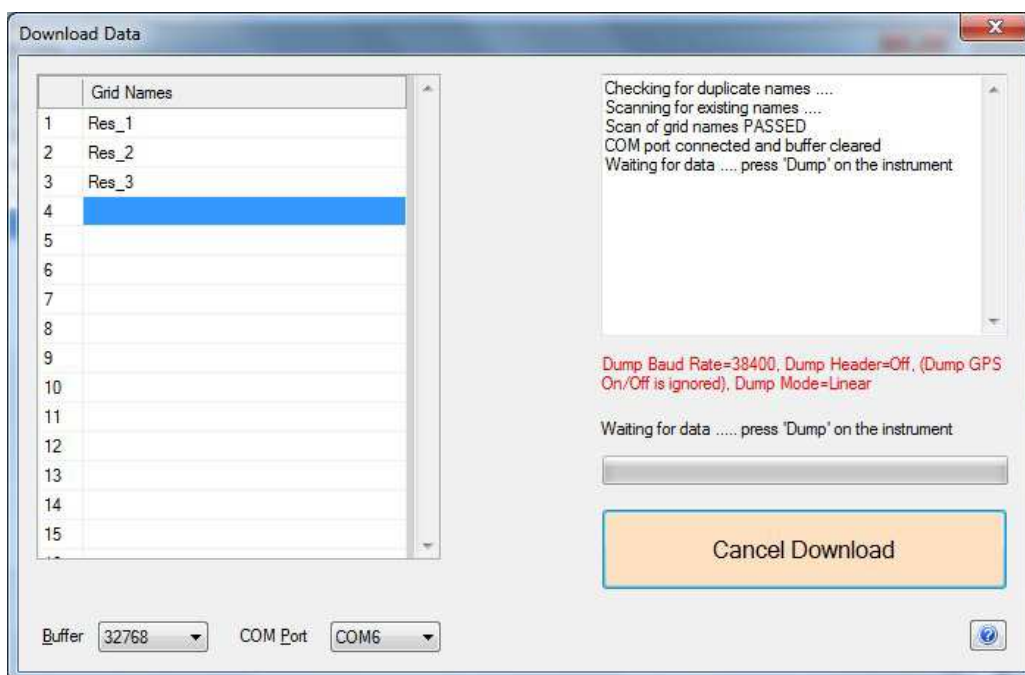


## 16-4 Make Ready for Download

If you have not already done so then at this point connect an RS232-USB adapter and download cable and power up the instrument. In the case of an RM85 and USB cable, power up the instrument and then connect it to the PC via the USB cable. Once an adapter or the RM85 has registered with the PC click Make Ready for Download.



The green button will be replaced by a grey progress bar and above that in red text a reminder of what settings should be made in the instrument (the example below is for an RM8) – ensure that the baud rate and Dump Mode match. If you had not connected an RS232-USB adapter or powered up your RM85 at this point an error message would appear saying the COM port specified in Options does not exist in which case, you would need to rectify this and try clicking on the green button again.



## 16-5 Dump

Assuming all is well, press dump on the instrument (do **NOT** press it before this stage). As data is downloaded the progress bar updates and you will see a final message reporting download successful.

**Download Data**

	Grid Names
1	Res_1
2	Res_2
3	Res_3
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

Checking for duplicate names .....  
 Scanning for existing names .....  
 Scan of grid names PASSED  
 COM port connected and buffer cleared  
 Waiting for data ..... press 'Dump' on the instrument  
 Receiving data .....

Dump Baud Rate=38400, Dump Header=Off, (Dump GPS On/Off is ignored), Dump Mode=Linear

Downloaded : 860 of 1200

Cancel Download

Buffer: 32768 COM Port: COM6

Download successfully completed. Switch Instrument Off

OK

Switch off the instrument and click OK. Geoplot will then assemble all the data stream into individual grids.

**Download Data**

	Grid Names
1	Res_1
2	Res_2
3	Res_3
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

Quick Entry  
Clear Table

Checking for duplicate names .....  
 Scanning for existing names .....  
 Scan of grid names PASSED  
 COM port connected and buffer cleared  
 Waiting for data ..... press 'Dump' on the instrument  
 Receiving data .....  
 Download complete  
 Assembling data .....  
 Assembly complete  
 Reconstructing and saving grids .....  
 Reconstruction and save complete

Grid name <=8 characters for best Geoplot 3 compatibility

Press Cancel to exit this form or Next to download again.

Buffer: 32768 COM Port: COM6

Back Cancel Next

When you see the message 'Reconstruction and save complete' you can click Cancel to exit the form or Next to try downloading again if something went wrong at this point (e.g. mismatch of settings); note that pressing cancel. When you press cancel, you will get a warning about losing the grid names entered on the form – this is all you will lose and any data downloaded will have been saved, providing you have seen the "Reconstruction and Save Complete" message. You can now return to the main menu and open data to look at graphics of the individual grids. In future you may want to define a personal generic template for your most used instrument settings, and this will be listed alongside ODEFAULT. When working on a specific project you could modify and save the personal generic template with a project name.

# 17 Example Download Sequence - RM85 with MSP25

- 1 You should first visit Geoplot File Path Options to specify where data will be saved; by default this will be in c:\geoplot\grid. Ensure you have already installed RM85 drivers and know the COM port that the RM85 occupies. Go to Options, Environment, Download tab and set the RM85 Download COM port to equal this. Whilst you are there, then if you use, for example, an RS232 – USB converter for other instrumentation then set the General Download COM port as well. In future when you go down the download route below you will be specifying an instrument and these settings will be used to setup the appropriate COM port (though you can also change them on the fly during the download process if you need to for any reason).
- 2 Go to the File menu and select Download or click on the large down green arrow, 3<sup>rd</sup> from the left on the horizontal toolbar.
- 3 A form appears that lets you choose a download template. Since you have not defined any specific ones yet select ODEFAULT.GIP
- 4 The next form lets you specify Survey Type and Instrument. Select Resistance and RM85 + MPX card + MSP25 (Multiple) and click Next.
- 5 The following form lets you enter Input Template details – you must specify a Site Name and for measuring alpha and beta enter 2 in the Readings per station section. You'll need to change the Mapping details accordingly. It's useful to change the Instrument Setup details as a record of what you did. Add any extra comments in the Notes section such as problems with the survey. Click Next.
- 6 You will now see a form that allows you to enter grid names and below that a combo box that specifies the COM port – this should match the Options setting for your RM85.
- 7 You can either enter names manually one by one, but it is better to use the Quick Entry button. This lets you define a Prefix, start and end grid names or numbers and a Suffix. More importantly, providing the "Apply auto Multiple Log Mode suffix" checkbox is ticked then grid names will be created with 'a' and 'b' suffixes as well. EG if you enter 1 in Start and 2 in End then click OK you will see 1a, 1b, 2a, 2b listed.
- 8 Click Next – Geoplot will then scan to see if you already have any grids with the same names in a directory that will be composed of a combination of your default file path for grids set in Options (typically c:\geoplot\grid) and the Site Name entered in the template EG the full path will now be c:\geoplot\grid\sitename.
- 9 If it finds duplicate names, then it will come up with a message asking you to enter new names - Geoplot will not allow you to overwrite raw grid files. If all is well a message box pops up telling you what to do next. Once you have noted these instructions click OK and you will see a note in a feedback box to the right that the scan of grid names PASSED – in fact all subsequent steps are recorded here.
- 10 At this point power-up your RM85 and plug into a USB port and once it has registered with the computer click Make Ready for Download. The green button will be replaced by a grey progress bar and above that in red text a reminder of what settings should be made in the RM85 – ensure especially baud rate and Dump Mode match. If you had not powered up your RM85 at this point an error message would appear saying the COM port specified in Options does not exist in which case, you need to power up and plug in the RM85 etc. and try clicking on the green button again.
- 11 Assuming all is well, press dump on the RM85. As data is downloaded the progress bar updates and you will see a final message reporting download successful. Click OK and Geoplot will go ahead and assemble all the data stream into individual grids. You can then cancel the form and go to File, Open or use the Open button on the horizontal toolbar to look at graphics of the individual grids.
- 12 In future, you may want to define a personal generic template for your most used MSP25 settings, and this will be listed alongside ODEFAULT. When working on a project for a few days then you could modify and save the personal generic template with a project name.



# 18 Installation Files

The following folders (bold text) and files will be installed on your computer. The Program Files folder is used for the application. The GP400 folder is used for support files for the application and each folder contains various files not all of which are listed below; those text files that are mentioned in installation notes are shown. The Geoplot folder contains example data and is also provided for storing user data. All folders contain files apart from Export\_Data and Export\_Image.

## C:\Program Files

Gp400mx.exe  
Microsoft.VisualBasic.PowerPacks.Vs.dll

## C:\GP400 folder

**Images**  
**Initialise\_&\_Exit**  
GeneralFormPosition.txt  
MRUFiles.txt  
ProcFormPosition.txt  
RecentFilePaths.txt  
Scratchpad  
**Macros**  
**Macros\_Reserved**  
**NET\_Framework\_Web\_Installer**  
**NORTH**  
**Options**  
EnvironmentOptions.txt  
FilePathOptions.txt  
Graphics\_GGST\_Options.txt  
ProcessOptions.txt  
ToolsOptions.txt  
**Palette**  
**PDFHelp**  
**PDFManual**  
**Processing\_Basics\_Help**  
HelpGradiometer.txt  
HelpMagnetometer.txt  
HelpResistance.txt  
**Sounds**  
**USB\_Drivers**  
  
Build\_Version.txt  
Dongle\_Insurance.txt  
Licence\_Terms\_Warranty.txt  
Readme.txt  
unins000.dat (after installation)  
unins00.exe (after installation)

## C:\Geoplot folder

**Animation**  
**Comp**  
**Export\_Data**  
**Export\_Image**  
**Grid**  
**Import\_Data**  
**Import\_Image**  
**Input\_Template**  
**Mesh**

# 19 Revision History

## Build 1447 Notes

### Documentation

- 1 Documentation has been extensively revised.
- 2 Help files completed throughout for all forms. Viewed as a PDF when clicking on the form Help button.
- 3 Collections of these Help PDFs, grouped as: General Help, Process Help and Tools Help, can also be selected in the PDF Help documents form for viewing.
- 4 Revised the Licence Agreement.

### Installation and Folder / File Organisation

- 1 The Geoplot 4.0 installation directories have been changed to ensure compatibility with organisations that do not allow an executable to be installed in its own directory on the C drive. The Geoplot executable and its associated .dll is now installed in Program Files. In addition, the support directory GP400 has been restructured, along with extensive internal code file path changes. The Geoplot folder which contains user data is unchanged. See section 18 above for details.
- 2 Before installing this latest version, any earlier version should be uninstalled. This will remove Scratchpad.txt, along with HelpGradiometer.txt, HelpMagnetometer.txt and HelpResistance.txt. The latter 3 files may have been modified by course tutors for their students and/or Scratchpad.txt may contain notes of work in progress. So, if you wish to preserve any of these files for the latest installation, please make copies and then paste them back over the newly installed versions.
- 3 Do NOT save earlier copies of any of the Options files or Initialise\_&\_Exit files for use with the new version since the information they contain will not be compatible with the latest code. The exception, as noted above, is Scratchpad which can be saved.

### Environment and Options

- 1 Changes made to Graphics Options: General Tab rearranged and adds 'Save Palette and Scale' options – see Graphics Menu below for further information.
- 2 Changes made to Process Options: Compress Tab, HPF Tab and Wallis Tab have new default settings.
- 3 Changes made to Tools Options: added a GPS Gap Fill Tab which includes a 'Gap Fill Magnification' setting for the improved GPS Gap Fill tool – see Tools Menu below for further information.
- 4 File Path Options: file path preferences have been added for the locations of Macros, Palette and Processing Basics Text files. For now, we suggest these settings are left as they are since the changes have been made in anticipation of future development. If these settings are changed, then you need to make sure you have copied the relevant files to the new location.
- 5 Extended the length of top banner to accommodate long file paths.

### Graphics View

- 1 A green camera button has been added to the Shade Clip parameters area that allows you to save an image of the palette and numbered scale, along with optionally: units, north symbol, histogram and histogram colour. A preview of the image to be save appears in the top right before you save. Once saved, the preview disappears. Not that Windows Screen Scaling needs to be set to match the current Windows setting.

### File Menu

- 1 Changed the Import form from Sizeable to Fixed.
- 2 Added a Help button to the download form which offers advice on suitable USB-RS232 Adapters for RS2323 download cables.
- 3 When downloading data, extended the FM256 data format warning message to include Fast ASC, ASC and ASC + SPCS – the FM256 setting could be reset to an incompatible Hex D or Hex D+R setting if the FM256 memory battery is changed.

### Graphics Menu

- 1 'Save Palette and Scale' has been added to the menu as an alternative to the green camera button described above.


### Processing Menu

- 1 Zero M Traverse function has been extended. Application of Zero M Traverse can optionally be restricted to a few lines at the start and/or end of a grid. This can be useful in preserving data when data is rotated through 90 degrees and Zero M Traverse is applied to reduce just grid start/end discontinuities – the start and end settings limit the regions over which Zero M Traverse is applied.
- 2 Changed the default values for Compress and Wallis Filter in Options.
- 3 Changed default HPF Weighting to Gaussian to match manual text.
- 4 Despise can now set a block selection.
- 5 Fixed a bug in the FFT function whereby it did not report a correct Frequency Index or Frequency in Trace plots for use with Periodic Defect. Shade plots reported a correct value, however.
- 6 Fixed a bug in Clip Exclusive Block.

### Tools Menu

- 1 The Add Alternate Traverses tool has been extended from working with just single traverses to also work with pairs of traverses making it suitable for dual gradiometer data. In the latter case, individual Add values can be entered, one for each of the pair of traverses to allow for different characteristics.
- 2 The GPS Gap Fill tool has been greatly improved. Two GPS Gap Fill methods are now available on the form: (a) the original method provided in Build 1322 and earlier, and (b) an improved version provided in builds later than 1322. The improved method preserves the original data and merges this with a new form of generated gap fill data. The original method could lead to excessive blurring of data, especially when required to be used more than once and often could not fill in all the gaps.
- 3 Edited several older macros that recorded version as '1.00', when it should have been '4.00'. New macros in this build are recorded as '4.01'.
- 4 Enabled Cut and Combine in the Macro Editor to utilise the 'Pasted Dummy replaces data' check box setting when the 'Combine Function' is set to 'Paste'. This allows you to Paste without dummies replacing data.
- 5 Updated Zero M Traverse in the Macro Editor to include the new facility described above in Processing Menu that allows you to apply start and end settings that limit the regions over which Zero M Traverse is applied.
- 6 Fixed an issue with Zero M Traverse macros where Thresholds did not work correctly.

#### Help Menu

- 1 New form layout to include new PDF files that can be viewed.
- 2 Help PDF documents for all forms, including Edit, Process and Tools, have now all been completed and revised. They are accessible by clicking on the  button on each form. Collections of these Help PDFs, grouped as: General Help, Process Help and Tools Help, can also be selected in the PDF Help documents form for viewing.

## Build 1322 Notes

#### Documentation

- 1 Documentation has been revised and restructured.

#### Environment and Options

- 1 Changed the design of the rotate data buttons to the right of the north symbol. The clockwise and anticlockwise curled arrows make their function clearer.
- 2 Changes to Environment Options: General Tab adds View Help Processing Basics for Resistance, Gradiometer and Magnetometer data options along with View Calculator option, Download Tab adds Grid Names Table Line Colour options, MasterGrid Tab adds Grid Line Colour options.
- 3 Changes to Graphics Options: General Tab adds Desktop Image Save and/or Print options with an associated Windows Text Scaling option.
- 4 Changes to Process Options: Clip. Search/Replace & Clipboard Tab adds options to provide single click paste from the clipboard to the Add, Divide and Multiply processing form value fields – this allows you to tailor operation with the in-built Calculator.
- 5 Changed SD in the Data Information panel form to 1 SD.
- 6 Changed the source location of the Spanish Mission .gan files from Export to Import and the manual updated to reflect this.

#### Graphics View

- 1 The palette selection has been expanded with the addition of 8 new palettes and renaming of one. This includes a special "Climate Temperature 1850-2019" palette which, although it has been added mainly as a reminder of the climate crisis, actually does produce some interesting and possibly informative contour like results, especially for resistance data. Two palettes, one with two shades of grey and a red top, the other with one shade of grey and a red top can, when used with appropriate plotting parameters, display data at 1SD, 2SD and 3SD significance compared to the SD of noise measured in a quiet area.
- 2 Opacity is now saved and reloaded correctly in v 4.02 of animation files.
- 3 A button has been added to the Animation control panel to allow you to hide the Animation control panel and restore it by pressing the Space Bar, giving more room for the image.

#### File Details View

- 1 Fixed a problem whereby a MasterGrid would not always be found for display in File Details View.

#### Graphics Menu

- 1 An image of the desktop can be either saved and/or printed by clicking on the 'Save and/or Print Desktop Image' button on the general toolbar or from the Graphics Menu. Images can be saved as jpg, bmp, png, tif and gif. A form appears that allows you to choose to save and/or print. In your Windows settings, if you are using a size of text etc. other than normal 100% (see Windows Settings, "Scale and layout"), then you should set a matching size on the form so that the desktop image is correctly saved or printed. You can save this setting in Options for the next time you come to use this facility.

#### File Menu

- 1 Changes made to the MasterGrid and InputNames grid line colours – different shades can be set in Options.

- 2 Added a trap for invalid data when composites are loaded which also reports the number of invalid data points.
- 3 Added a trap for bad data when using import in Z format, which also gives the position of bad data.
- 4 Added specialised import to handle Frobisher XYZ comma separated variable files, which are stored on an SD card. This allows import of resistance (TAR-3) data and gradiometer (DFG-1) data. The Input Template takes into account the fact that these instruments have X and Y swopped relative to the directions normally expected in Geoplot 4, so, providing you enter the Mapping details, as specified on the form, then this taken account of, and the data is automatically rotated 90 degrees internally so that the first traverse is horizontal, in keeping with the Geoplot approach. Grids can subsequently be assembled into composites using a mesh definition with this orientation. The Input Templates also take into account the different dummy values used in the resistance (2047.5) and gradiometer (999.9999) instruments. You must ensure you enter Mapping details according to the instructions given on the form, in red
- 5 Extra Source Grid sizes of 1m have been added to the Composite Input Template, for both Grid Length and Grid Width. This allows the import any data set size as composite, but one where the source grid size will be 1m x 1m. Note that having a 1m x 1m grid would limit some process functions that are grid dependant in the area they act upon. However, it is possible to subsequently edit the source grid size, either using the Edit menu or by using the button in the Data Information panel on the right of the screen. Therefore, with some geometries, for example if one dimension is exactly divisible by 4, 5, 10, 15 etc, this may enable some sensible grid dependent large area processing to be done. Or, even if not exactly divisible, it might be useful for some localised Destagger or ZMT processing of a small area, for example.

### **Edit Menu**

- 1 Fixed a problem when the number of data edits exceeded 45.
- 2 Changed the Edit Source Grid Size button symbol on the Control Panel, Data Information section to match the "3 grid" symbol used on the Edit menu.

### **Processing Menu**

- 1 Added a message to the Despike function form to aid removal of spikes in the data at the edges: "To remove spikes at the edge of a grid or composite use Radius values of X=2, Y=2".
- 2 Fixed a bug with the Clip process function. If Clip Minimum and Maximum values were set using SD parameters for resistance data, then the mean of the data set was not taken into account, resulting in incorrect clipping.
- 3 Fixed a bug in the Statistic form where the information text box colours did not always change back from green to white after clicking on the field to copy data to the clipboard.

### **Tools Menu**

- 1 A Calculator tool has been added that provides a convenient way of making simple calculations during processing and capitalises on special one-click copy and paste operations possible in various parts of Geoplot. It can save several keyboard clicks and mouse highlight movements, compared to using the Windows calculator. The calculator is in the bottom right-hand corner and can be hidden or shown by using the Tools Menu or clicking on the Calculator icon on the General Toolbar. Environment Options controls whether it is shown at start-up or not. You can enter values for variables A and B and then perform Addition, Subtraction, Multiply, Divide, raise A to the power of B or calculate the square root of A. Use the result in various process functions such as Add, Divide or Multiply, either entering the result manually in these functions, by single clicking on the field or by copy and pasting from the result text box into the function form
- 2 Added a reminder to the 'Create Survey Perimeter Outline' form that the data must use 2047.5 as a dummy reading.

### **Help Menu**

- 1 On the Help menu, the items shown in the View Manual (PDF) form have been simplified, pending addition of future documents. Three Processing Basics PDF's have been added for Resistance, Gradiometer and Magnetometer data, which summarise guidance on how you should consider processing such data. The Help menu has also been extended so you can also click on it to view the same information as floating Help forms in the style of the Scratchpad. These forms can be resized to fit within the screen and used as a reference when processing. The content has been updated and revised, compared to earlier help information. The content can be found in the c:\gp400\Help folder as simple text files: HelpResistance, HelpGradiometer and HelpMagnetometer. These can be edited by instructors if they wish to provide different information to students. Options, General Tab determines if these are displayed each time at program launch.

## **Build 1205 Notes**

### **Environment**

- 1 Created new button icons for the Edit menu, Process Selection Block and Macro Editor to give greater clarity.
- 2 Fixed bugs associated with User Defined Import Input Templates.
- 3 A file extension filter has been added to the Import form, allowing you to easier browse and select specific file types.
- 4 The message associated with the Cancel button on the Grid Names form, used for downloads, has been expanded to avoid user confusion and concerns when leaving this form.
- 5 Download of GPS data is not supported in this version so the Input Template setting 'GPS Data Logged', where you could previously (and erroneously) previously change the setting from No to Yes, has been disabled, pending code changes.



- 6 A button is provided on the Data Information panel that places a summary on the clipboard. This can be copied to the Scratchpad for example.
- 7 Several new options have been provided so the format of most of the Options files has changed, requiring new ones to be automatically installed with this code.
- 8 Extensive revision of the Instruction manual which is now referred to as 'Geoplot 4 Instruction Manual Summary' and comprises this document. It has been expanded to 63 pages and now has a contents page and much more complete information on such topics as Download, Import and Macros. This summary can be shown as a PDF document in your PDF reader when selected from the Help menu. Provision is made for launching a full manual, in separate chapters, also from the Help menu. At present these chapters are incomplete but will be released in due course and sent to registered users as they become available. The PDF chapters will be:  
Contents, Chapter 1 – Introduction, Chapter 2 – Installation, Chapter 3 – Tutorial, Chapter 4 – Data Input, Chapter 5 – Additional Information, Chapter 6 – Processing Reference, Chapter 7 – Processing Examples, Chapter 8 – Trouble-Shooting, Chapter 9 – Data Sheet, Chapter 10 – Installation Files.
- 9 All form Help buttons have been activated. These now either show a second form, with brief help, or trigger a context sensitive PDF Help document to be shown in your PDF reader. Not all the process PDF Help documents are complete so for now these will just launch a standard template document. These will be released in due course and sent to registered users as they become available. In the mean-time please refer to the Geoplot 3 Processing Reference for further help. The PDF Help documents for completion are:  
Compress, Cut & Combine, Deslope, Despique, Destagger, Divide, Edge Match, High Pass Filter, Interpolate, Low Pass Filter, Median Filter, Multiply, Periodic Filter, Power, Randomise, Search & Replace, Spectrum Analysis, Standard Deviation & Variance Map, Statistics, Wallis Filter, Zero M Traverse

### Graphics View

- 1 Extensive rework of the Process Block selection system on a graphics. This now gives much more precise and accurate control; it also constrains any selection made outside of the image area.
- 2 There are now three sizes of handles on the Process Block selection rectangle which can be set in Graphics Options. The Normal size is used for routine desktop work. If using a touch-screen then the Large or Very Large handles can be used so a stylus or even a finger can be used to resize the rectangle
- 3 The palette selection has been greatly expanded. There are an extra 11 new single colour palettes, and 13 new three shades of colour palettes. There is also a new grey/colour palette (grey23) with a compressed central grey section. The new single colour and 3 band palettes are designed for creating simplified plots that can be used as layers in Animations, aiding survey result interpretation when different survey results are overlain one another.
- 4 Zoom-In To a Point and Zoom-Out From a Point are not properly working yet – for now they are disabled; instead use the normal zoom in / out to the level you require and then Pan.
- 5 Fixed bugs with Trace and Relief Default buttons present in the RH Control panel.
- 6 Improved operation of Trace X-Displacement and Y Expansion. However, please note that at present, when you set a non-zero X Displacement value and set Hidden Line to on, then the shadow cast by any spikes will not be correctly placed.

### Graphics Menu

- 1 Shade and Trace Plot menu forms are now working and synchronised with the RH Panel, and vice-versa.
- 2 A new Image Threshold Tool allows you to extract more information from an image, usually a grey scale, by setting a threshold level above which image information is displayed using a chosen palette colour, whilst below that level that part of the image will be typically white. This tool is useful for applying to radar images and the thresholded image can be subsequently used in the Animation as an interpretation layer. It can be used to give false colour to grey images as well.

### Process Menu

- 1 The function of Zero M Traverse has now been extended to work with either Mean or Median as the Zero Measure which is subtracted from the traverse data. Both may be used with or without application of Thresholds. Thresholds are very useful for working in the presence of very strong features (often given by ferrous features) or for preserving weak features running in the traverse direction. Least Means Square Fit can also be used with both measures.
- 2 Added an 'X Direction Traverses Only' reminder to ZMT, FFT, Periodic, Destagger, Add (Alternate Traverses) forms. This is intended to act as a reminder to observe correct data set orientation when applying these functions.
- 3 The Median filter bug, present in the previous build, has now been fixed so there is now no X or Y shift.
- 4 The Statistics function form that appears after you select a data block now has an option to save a summary of the statistics to the Windows clipboard. This can be pasted into the ScratchPad, Composite Notes or other locations that accept text. When you click on this button all the statistics fields will briefly turn green to indicate they have been copied.

### Tools Menu

- 1 Fixed bug with GPS Gap Fill that shifted data by 1 in the X and Y direction. Also changed the algorithm so it now copes with a much wider range of data sets that have a mean of between +10000 and -10000.
- 2 The Run Macro form is now adjustable in size and any new size is remembered.

## Build 1124 Notes

### Environment

- 5 Print has now been completed for Graphics, History and File Details Views. See following sections for details.
- 6 Options added for printing in both Environment Options (applies to History and File Details only) and Graphics Options (applies to graphics only).
- 7 The statistics report form that appears after you select a data block now has an option to save a summary of the statistics to the Windows clipboard. This can be pasted into the ScratchPad, Composite Notes or other locations that accept text. When you click on this button all the statistics fields will briefly turn green to indicate they have been copied and a summary prepared.
- 8 Bug fix – changed keyboard short cuts for Options to Alt+Shift+letter to avoid conflict with Alt-F and Alt-P menu access.
- 9 Changed the action of clicking on the text box (on the right of the menu bar that shows the full file path of the current file loaded) so that this operation copies just the filename to the clipboard, discarding the other parts.
- 10 Added MasterGrid, Animation and Edit Source Grid Size Help information.
- 11 Added a setting for Export of XYZ-CommaSV data to allow insertion of a space before numbers to allow ArcGIS to correctly import the data. The preferred setting can be set in Export Options.

### Graphics View

- 1 Shade and Trace plots can be printed either as scaled plots (e.g. 1:1000) or as sized plots (e.g. x2); scale can be selected from a drop down list or set to any specific value. Optionally File Information, Statistics and History can be printed out with the plot. Trace plots additionally have a Quality setting, Coarse, Medium and Fine, corresponding to the view seen at x1, x2 and x4 respectively. Apply caution when printing scaled Trace plots since, depending on the data set, chosen scale and dpi, some small horizontal sections of the image may be missing; when printed using sized plots Trace plots are always complete. If PDFCreator is used as the printer then the graphics can be saved as PDF files or as graphics files such as png where very high resolutions can be set, e.g. 2400dpi.
- 2 Trace Save is no longer limited to just saving the LCD screen area - improvements to the Trace plot system allows saving of any off-screen areas, so the image can be saved at high magnification / resolution. Only the area of the trace plot is saved and images may generally be saved as jpg, bmp, png, tif and gif for use in publications. When transparency is turned on using the 'T' button, trace lines will be saved on a transparent background; when turned off the background will be white. Transparent images can only be saved as png or tif files since these support transparency whereas jpg, bmp and gif do not.
- 3 Trace plots can now be panned as well as shade plots.
- 4 A bug fix stops trace plot disappearing when clicking on the screen.

### File Details View

- 1 A summary of both grid and composite file details can be printed. This can be either to a real printer or PDFCreator (or similar) to obtain a PDF document. Optionally, history can be printed out at the same time.

### History View

- 1 The full history can be printed. This can be either to a real printer or PDFCreator (or similar) to obtain a PDF document.

### MasterGrid

- 1 You can now click on an Export button to create a spreadsheet text file, with MasterGrid names separated by either tabs, commas or spaces. This can be opened in Notepad or Excel for further manipulation or use.

## Build 1072 Notes

### Environment

- 1 New Splash screen at start-up.
- 2 General bug fixes including restoration of Ctrl-C and Ctrl-V to compliment right click Copy and Paste operation.
- 3 You can now single click on the text box (on the right of the menu bar) that shows the full file path of the current file loaded and this operation saves just the filename to the clipboard, discarding other parts; the text box will have a green background for half a second to indicate this has happened. This can be very useful for Save Image and Save Histogram when the file name is complex and you wish to incorporate that in the image name, e.g. "R\_HPF10x10\_ZMT\_LPF1x1x6". Normal Copy and Paste can also be used but this method extracts the filename more easily.
- 4 Added buttons on the left-hand side of the General Toolbar for New Input Template and Open Input Template. These may not be displayed on narrow screen widths.
- 5 The About form reports on additional installation file paths and file version numbers are introduced for grids, composites and input templates – these are no longer tied to the Geoplot version number.
- 6 The distance scale bar now changes format dynamically with the number of divisions being appropriate for the scale and magnification. A report of the division size is given below the scale bar. Fixed reported scale bar distance at x5 magnification.

### Data View

- 7 Editing of data in Data View is now working. Instructions are added to the Help button.
- 8 Bug fixes to Data View and improvements to functionality, especially with regard to updating after process applications etc.
- 9 In Environment Options the Data tab has the addition of a threshold setting above which the Data View graphic does not update after processing to avoid delays with large data sets.

### File Details View

- 10 Bug fixes in the File Details View so that the information for grids and composites displays correctly.

### Graphics Menu

- 11 Animation overlays now supports proper support for transparency for png and tif images, allowing improved quality of data set comparison.
- 12 The palette number has increased from 28 to 33 – the additions include palettes designed for Animation overlays, plus a black top palette. The palette selection order is changed slightly to provide better grouping; this involved some name changes.
- 13 Histograms can now be saved, either using the Graphics Menu or by clicking on a small camera button just to the right of the histogram in the RH panel.

### File Menu

- 14 Bug fixes to the Input Template system so you can now save templates for Non-Uniform Import as well as Gridded. User Defined templates have provision for entering more instrumentation details using blank text box for user definition. Templates are now recorded as version 4.02.
- 15 Added download facilities for an FGM650 / FAB1 combination mounted on an MSP25 cart (non GPS for the moment). The handheld FGM650 / FAB1 combination is renamed.
- 16 Expanded the Non-Uniform Import allocation matrix choices to 1x1, 2x2, 4x4, 8x8, and 16x16. The allocation matrix size controls how finely or coarsely the data will be re-sampled into Geoplot format. In Environment Options the Import tab allows you to set the default allocation matrix size.

## Build 1004 Notes

### Documentation

- 1 The Build documentation has been extensively revised and restructured, not only with more detail on new features but also as a guide to new users.

### Environment and Options

- 2 When you first launch this build of Geoplot a yellow background reminder form appears to set the decimal separator correctly on a computer – especially important for European users and import of data.
- 3 Although it is past Easter Time an Easter Egg can be found somewhere in Geoplot 4.0 (Hint – you'll need sounds to be on!).
- 4 Changes to Environment Options: Data Tab adds Data View Window options, Import Tab adds Gridded and Non-Uniform options, MasterGrid Tab adds Drag and Drop options, Sounds Tab sets whether a Quindar tone is made after a process function.
- 5 Changes to Graphics Options: Animation Editor & Display Tab options extended.
- 6 Changes to Process Options: Cut and Combine Tab adds an option for the Add Combine function behaviour for dummy readings, Clip & Search/Replace Tab added to set combo box dropdown order preference.
- 7 Changes to Tools and Edit Options: Create Survey Perimeter Outline Tab added which determines how the outline is created and saved as an image.
- 8 A red 'O' in a button on a form or the main screen reminds you there are Options associated with this element and if you click the button it takes you directly to the appropriate Options tab.
- 9 A Rotate icon has been added to bottom of LH toolbar and the Horizontal Toolbar.
- 10 Added example data sets for LiDAR import, Ferex import, Create Survey Outline Tool – see notes below.
- 11 Added documentation for downloading RM85 Single Twin data as a download example.

### Data View

- 12 The Data View has a small image of the data plus red rectangle which moves over the plot to show what area of data you are looking at (the view window size is adjustable). Editing of data is not yet implemented. Note that, at present, when a process function is applied this is not reflected in the data values you see.

### File Menu

- 13 The MasterGrid form has been enlarged in size and is improved by the addition of drag and drop assembly of file names from a list. A check box determines whether grid names are removed from the list as they are dragged to the MasterGrid. You can alternatively add names manually as well as in earlier versions. A checkbox determines whether the notes from Grid 1 are added to the composite notes when it is created.

- 14 Download has been extended to provide support for the RM85 / FAB1 / FGM650 handheld system.
- 15 Imported data can be either gridded or non-uniform. Non-uniform import allows data to be imported from non-Geoscan instruments such as Foerster Ferex multi-sensor arrays, Sensys MXPDA multi-sensor arrays (ASCII XYZ files) which have different sampling intervals to those used in Geoscan instruments - see example Ferex data below, left where the data sampling is every 10cm, and traverse interval 1m. Example non-GPS referenced Ferex data is provided in the directory Import\_Data\JF\_Foerster\_Ferex.
- 16 GPS referenced data can also be imported and processed as non-uniform data if it is supplied as an XYZ file with either UTM or northing and easting coordinates. Note that grid specific (e.g. ZMT) or line specific (e.g. Destagger) process functions will not yet work directly with GPS referenced data, though GPS referenced data that has also been collected on a gridded basis can have these functions applied first, as gridded data, then exported and re-imported as GPS referenced data.
- 17 Import has been extended to include import of DSM and DTM LiDAR data from sources such as the Environment Agency Geomatics Survey Open Data. This can be further processed e.g. using HPF. An example file for import can be found in the Import\_Data\LiDAR\_DTM\_2m directory.
- 18 Fixed an error in Import which could occur if there was a mismatch between the version of Excel installed and expected or if Excel was not installed at all.

## **Edit Menu**

- 19 The function Edit Source Grid Size was formerly available only in the File Details view, F8. This is now moved to the Edit menu and there is also a button on the Control Panel, next to the report of Source Grid Size. Can only be used when a composite is loaded. This can be used to isolate, for example, the top half of a grid for Destagger or ZMT application but did not want to apply it to the bottom half. Once done edit the source grid size back again.

## **Graphics Menu**

- 20 Animation has been given a major overhaul. The animation can be paused at any convenient point, run forwards or backwards either continuously or in single steps. The opacity of any selected overlay image can be interactively adjusted to help in understanding data sets, their spatial relationship, complementary nature and to develop an interpretation from a variety of sources - including resistance, magnetics, GPR, LiDAR, topography, EM etc. Images can be .jpg, .bmp, .png, .gif, or .tif in any combination. Now up to 9 images can be selected for overlay on the animation and each image can be turned on or off and its ordering position relative to other layers changed.

## **Processing**

- 21 Destagger has been extended so it can be applied to individual grids, all grids individually or the whole composite. The latter addition can help prevent edge artefacts.
- 22 Cut and Combine Add now has a check box for determining action for dummy readings. The default action is for dummy readings to be ignored when adding data sets. If the checkbox is ticked then an added dummy reading will replace data.
- 23 Search and Replace has additional drop down values of '+Mean/2' and '+Mean/5' in the 'From' and 'To' fields.
- 24 Fixed bug in process area selection snap to grid.

## **Tools Menu**

- 25 Added Convert Grid to Composite tool – useful for bypassing the MasterGrid approach to creating a composite if only a single grid has been downloaded. Useful also to apply some processing functions e.g. FFT to a specific grid (and then use Convert Composite to grid – see next). It appears in the menu or on the top toolbar.
- 26 Added Convert Composite to Grid – useful if you have previously used Convert Grid to Composite to apply some processing functions and then want to change it back to a grid, perhaps for inclusion in a MasterGrid. It appears in the menu or on the top toolbar.
- 27 Added Create Survey Perimeter Outline tool – this generates an outline of the survey area (transparent if required) which is useful for generating interpretations and reports. The example composite data provided in the Castle directory can be used to try this tool out.
- 28 Added GPS Gap Fill tool which can be used for completing imported non-uniform GPS referenced data.
- 29 Changed the Macro Editor Icon.
- 30 Extended Swap Adjacent Traverses to composites as well as grids.
- 31 Fixed bug in Swap Alternate Traverses for grids.

## **Build 844 Notes**

- 1 Fixed a bug when downloading Parallel Twin data. The bug could occur if Sample and Traverse Interval were different or the grid width and length were different. For example, with a 20m x 20m grid if Sample Interval = 1m and Traverse Interval = 0.5m then this equated to 20 readings in the x direction and 40 in the y direction, resulting in banding in the second half of the downloaded grid (if Sample interval was also 0.5m then no such problem would occur since this would equate to 40 x 40 readings).



- 2 Fixed a bug which occurred when trying to use the Open button on the horizontal toolbar when no data is loaded. The button now works.

## Build 834 Notes

- 1 Spectrum and Periodic Filter have been added.
- 2 Export has been added which provides formats: Z, XYZ (comma, tab, and space), Spreadsheet (comma, tab), Geosoft, Surfer (ASCII) and Grass for GIS.
- 3 Import has been extended to include Spreadsheet (comma, tab and Excel). Files may be imported singly or in a batch. Prefix and Suffix fields are provided to modify file names. Excel import requires Excel to be installed on the PC.
- 4 Animation has been added, along with the addition of image overlay tools that support archaeological feature analysis and interpretation based on multi-method geophysical survey. Block selection of images in ascending or descending order speeds up the creation of animations. In addition up to 4 images can be selected which can be superimposed over the animation - each image can be turned on or off and has adjustable opacity (the number of images will be extended to 10 shortly). The animation can be paused at any convenient point, or left running, and overlay images can be interactively adjusted to help in understanding data sets, their registration, complimentary nature and interpretation from a variety of sources - these can include resistance, magnetics, radar, LiDAR, topography, EM etc. Images can be .jpg, .bmp, .png, .gif, or .tif; Geoplot 4.0 can be used to prepare the data and generate suitable images using its Save Image As capability. To create an Animation first use the Browse button to add files to the image list on the left. An image preview can be made by clicking on a file name. Files from this list can be added, inserted or deleted from an animation list on the right, either singly or in blocks of ascending or descending names. If you intend to add file names in blocks only add names to the left-hand list at first that will be part of the block. It can be useful to use both the ascending and descending buttons to create an animation list. Further images can be added to the Image list and can be individually selected for addition to the Overlay Image list. Click Start Animation to commence viewing all the image files. If desired, an animation does not have to be created and just the Overlay Images can be used in the next view. The animation display form allows you to control the speed of the animation, which files are used as overlays and their opacity adjusted. Default speed and opacities can be set in Graphics Options. See the latest Geoplot 4.0 data sheet for examples of animation use. Example images from radar, resistance and gradiometer for the Spanish Mission Settlement survey are provided with the Geoplot 4.0 installation for you to experiment with. Note that animation and overlay images must all be in the same directory.
- 5 A ScratchPad form has been added that can be used to make notes during a Geoplot session - the form can be resized and repositioned. Any text is saved when Geoplot is exited and is then reloaded when the program restarts to act as a reminder. Tab and Enter may be used. Closing or cancelling the form does not lose any information - use the Clear button to delete all the text. You can use the 'Add Text to Comp Notes' button to save the text with composite file notes. Examples of use include noting block statistics (click on Statistics Form value to place in Clipboard then paste into the Scratchpad) or noting block coordinates ready for entering into Cut and Combine - values can be copied and pasted. The name of the current file loaded can be copied and pasted here from the menu bar. Reminders for present or future processing steps can be recorded. Process History can be copied here. Any ScratchPad text can be pasted in to the Composite Notes area if enabled - for example recording the logic behind specific steps taken to correct unusual survey defects. Whether it shows at start-up can be controlled in Environment Options.
- 6 A facility has been added to Trace plot which allows you to show any existing Shade Clip plot in the background, underneath the traces. This is activated by clicking on the 'S' button in the graphics control panel. To change the shade plot navigate back to Shade plot, change the plotting parameters and then return to Trace plot.
- 7 Trace line colour can be set directly by clicking on the 'L' button in the graphics control panel; the button changes colour to reflect Trace line colour.
- 8 Trace plot quality has been improved, though at the slight expense of speed.
- 9 Separate 'Open Grid' and 'Open Composite' menu items have been added to the File menu, including short cuts Ctrl+Shift+O and Ctrl+O respectively, that allow Open to immediately show contents of the last grid or composite directory used, making for faster file selection.
- 10 Ctrl-Z (Undo) action has been added to all process forms.
- 11 Grid sizes 60m and 80m have been added to the download system which may prove useful for MSP25 surveys.
- 12 A button to allow editing of Grid Source dimensions has been added to File View. This can be useful if you wish to use, for example, Destagger over a smaller section (e.g. 5m) than source grid width would normally dictate. Once you have applied the process function you can reinstate the Grid Source dimension.
- 13 A report of survey area in hectares has been added to the File View for composites – this has values for area including dummy readings and area without dummy readings. These values can be used for survey reports.
- 14 The tool 'Invert Traverse Mode' has been extended to Composites as well as grids.
- 15 Cut and Combine now has a checkbox for determining Paste action for dummy readings. The default action is for any pasted dummy to replace existing data but this can be turned off to preserve any original data value if desired. In addition you can now use the mouse to look at coordinates of graphics areas whilst the Cut and Combine form is active.
- 16 The macro 'Stripe Defect Removal in Non-Bipolar Data' has been added as a function to the Tools menu. It remains also present as a Macro.

- 17 The tool Flip Vertical has been added for grids and composites, joining Flip Horizontal.
- 18 Cut and Combine has been restored to the macro Editor now that it is working properly again.
- 19 The Macro Destagger pattern has been extended to match that of the normal process function.
- 20 Environment Options has been extended to allow you to make macros show as just a short summary in process history, rather than a full list of process functions and parameters used.
- 21 Environment Options has been extended to allow default preferences for Import and Export.
- 22 The Merge Composite tool has been completed and includes Tools Options settings.
- 23 Fixed a problem loading Geoplot 2.02 grid data.
- 24 Fixed a problem with the data value reported on the status bar as the mouse pointer is moved over an image – this includes Pan.
- 25 Previous file paths are now remembered properly.
- 26 Have investigated the Parallel Twin dump bug that some users have reported when traverse interval is 0.5m. However tests do not indicate a problem. Further feedback would be appreciated.
- 27 Changes have been made to the Quick Entry form used in download to allow suggested suffixes to be changed.
- 28 The Geoplot 3.0 manual and Geoplot 3.0 Process reference have been added to the PDF Help form – in the absence of a formal GP4.0 manual we hope this guidance will help in the short term since in most cases functionality is the same as in 4.0.

## Build 690 Notes

- 1 When the program first starts a new Help panel appears in the centre of the screen. This behaviour can be turned off in Options, Environment, General, or at the base of the panel. The panel will be of use to new users and can be resized and positioned in the corner of the screen for reference. The panel is incomplete at the moment and some screen shots are now out of date.
- 2 Some help panels have now been added to the process function forms, EG ZMG – the original blue Help button is replaced by a yellow background help button in cases where new information is available. Also Help and PDF buttons have been added to the horizontal toolbar – these have limited functionality at the moment but PDF can be used to display this document and the latest data sheet for now.
- 3 There has been a major update of Environment Options (new tabs include Import, Export and Macro), Graphics Options and Tools Options (which now becomes Tools and Edit options). Because of cumulative effect of these updates and new additional files this new release will require a un-install of the previous code and re-installation of new code.
- 4 When colours in Graphics options are changed, clicking the Apply button immediately updates the display.
- 5 There has been a redesign of several toolbar button icons, including Import, Export, Multiply and Add to make them more streamlined.
- 6 Wallis Filter is now working.
- 7 A Divide process function has been added. As with many other process functions either a number can be specified or the combo box can be used to select statistical values such as 1SD, Mean etc.
- 8 The Destagger process function has been extended so that 2-5 lines can shifted at a time, useful for multi-sensor magnetic arrays such as Ferrex data.
- 9 Undo and Check Process effect buttons have been added to most process function forms making it easier and quicker to experiment with different parameters on form. Remember that this is a single level undo.
- 10 Import has been extended to cater for data collected at grid edges, IE starting at 0, 0, rather than standard Geoplot 1, 1. This collection procedure, typical of Ferrex, CMD and other EM data, results in, for the example of a 40m grid with sampling of 1m, a resultant data width of 41 readings not the normal Geoplot 40 readings. A radio button lets you specify the sampling pattern and allows Ferrex, CMD and other EM data to be imported.
- 11 View change arrows have been added to the top horizontal toolbar to compliment the View menu and functions keys F5, F6, F7 and F8.
- 12 Transparency buttons have been added to the RH control panel so that when an image is saved dummy readings can be saved as transparent areas for Shade plots – however trace plots can only be saved with a transparent background for now.
- 13 Trace plot quality is greatly improved, especially for sparse data sets. Most plotting parameters on the RH panel for the two Trace modes are now working include Resolution, Units, Clip levels and Trace View, along with a button to turn dummy trace lines on and off and a button to set the background to transparent. X Displacement is not yet working. Y Expansion (+/- values) is partly working – at the moment the plot is not central and border, grid lines, numbers and names are not placed correctly. The data set mean is subtracted for trace plots so that non-bipolar data (EG resistance) appears centrally. Trace border colour and Trace dummy line colour can be set in Graphics Options. The background colour of trace plots can only be transparent for the moment (ignore the button to set background to transparent) so images can only be saved as png, tif (transparent background), not jpg, bmp, gif which require a solid background. Transparent images can be overlain on corresponding shade plots in publishing documents.
- 14 Grid Numbers and Grid Filenames can now have a white background, set in Graphics Options. Positioning is now correct. Grid Filenames position can now be offset upwards by one line so it does not overlap Grid Numbers – set in

Graphics Options. A warning that grid names will be misleading is given if data is rotated and grid names are displayed – the message disappears if data is subsequently rotated back or round to the original position.

- 15 We have removed various menu and toolbar items which will now be implemented in version 4.1 after the initial release: Keyboard Input, Data Edit, Create New Palette, Select Graphics Area, Merge MSP Composites, Create Pseudo-Section.
- 16 Work has started on implementing the outstanding items we intend to include in this first release: Merge Composites, Export, Periodic Filter and Spectrum, Animation. Plus of course removing remaining bugs and tidying up functionality.

## Build 614 Notes

- 1 Import is now working, including file scan facility.
- 2 Pan working although Zoom In To Point and Zoom Out From Point still not working correctly.
- 3 Border Display button added to horizontal toolbar.
- 4 Limited print capability added – History view prints OK.
- 5 12 new palettes added (28 in total available) and all palettes renamed for better structuring.
- 6 Relief plots now working including animation.
- 7 Block select now tracks when you zoom in and out.
- 8 Macro system now complete: Define Macro Maps working, added Divide, Sum Macro Maps, Multiply Macro Maps macros but removed Cut and Combine macros.
- 9 More macros developed and added to the installation.
- 10 Trace plot greatly improved – now zooms in and out though still only front view available and ideally requires sampling interval of 0.25m or finer for a good plot. Trace scale bar working and tracks parameter entry.
- 11 Trace Clip graphics now working.
- 12 Compress graphics now working
- 13 Grid lines, User grid lines and selection block all now align with one another.
- 14 Grid filenames can now be displayed though positioning needs to be improved.
- 15 Display of RH panels order changed so that Trace and Shade sit next to one another.
- 16 Replicated title bar file information on a label on the menu strip – easier to read and can also be copied for inclusion elsewhere.
- 17 Added 'Add (Alternate Traverses)' tool to menu.
- 18 Microsoft.VisualBasic.PowerPacks.Vs.dll added to installation.
- 19 Added distance scale and north symbols to the installation image folder for publication use.

## Build 528 Notes

- 1 "Create Blank Composite" is now working.
- 2 Cut and Combine fully working now – the default combine function is now Paste, not Subtract.
- 3 A "Check Effect of a Process Function" button added to the horizontal toolbar and also function to the process menu (identified by a delta symbol). This replaces, and is more direct than, the special mode in Cut and Combine used for looking at the effect of processing – new data is subtracted from original data leaving just the difference. Once you have finished with this graphic click the delta symbol again to restore the pre-check processed data. The normal Undo state is unaffected.
- 4 Removed Map Reference field in composite view – this can be added in notes instead.
- 5 Changed default installation colour and width for final selection box.
- 6 Have made 'Reload' inactive when new data has just been loaded.
- 7 Median history now updates correctly.
- 8 Extensive parameter entry checking in process function forms.
- 9 Grid numbers can now be displayed.
- 10 User grid can now be displayed.
- 11 Added "+Mean/5" option to the Search and Replace process function – this is used in a Despiking/data correction macro for MSP25/40 carts.
- 12 Several new macros have been added including a range of contour macros which aid in overlaying gradiometer data over resistance data when used with Cut and Combine.

## Build 500 Notes

- 1 Changed Macro Run and Macro Editor button image designs on the horizontal toolbar (and menus) so they are easier to locate quickly (green play triangle and stacked rectangles respectively).
- 2 Test Macro and Undo Test buttons have been added to the Macro Editor form so you can now develop macros without leaving the form. The Undo is a single level.
- 3 Fixed a bug with Macro Editor Delete Line.

- 4 Undo now works for grids and composites; it is a single level. If a macro has been used then Undo removes all functions associated with the macro. [A bug has just been spotted in that Reload is still active even if changes have not been made to data. If you select Reload in these circumstances you will see a message saying "The current processed data will be lost if you Reload data. Proceed with Reload ?". Click either OK or Cancel to clear the message. The bug does not cause any problems].
- 5 Changed the name of the floating form "Latest Short History" to Latest History – Floating. This form can be resized by the user and is now fully active.
- 6 Process, Edit and Tools history is synchronised across all views: IE side panel 'Latest History', F7 History view and Latest History – Floating form.
- 7 In Build 480 block selection code was improved. In the notes for that build it was reported that the default colour for the final selection box was bright green. However it is still set to orange so you should go to Options, Graphics, Selection Box Colour and set bright green. Also set the line width to 2 for a more distinct selection box. Or set your own preferences,
- 8 On the Edit menu 'Comment History Editor', 'North Direction' and 'Units' are now working.
- 9 Most recently used files (MRU) on the File menu is now working.
- 10 Fixed resizing bug for the history view.
- 11 Fixed bug whereby raw grid files could be saved with the same name after application of a Tools or Edit function. Now you will be forced to choose a new name as was the case for Geoplot 3.
- 12 Added a second report of the current file open on the main menu strip. This is much easier to read than if Geoplot 4 is used on a PC with a dark desktop background.

### Build 480 Notes

- 1 Improved block selection code which should now clear the block when you load new data (though it is still not perfect). The initial selection box is now orange with the final colour being set by Options, Graphics, Selection Box Colour (by default bright green).
- 2 Also Fixed the block select snap-to-grid icon report on bottom right hand corner.
- 3 Process block now remembered when swapping between processes.
- 4 Progress bar code added to many areas where speed feedback is required – process functions and open/save.
- 5 Shift extended to X and Y – Y can be used to compensate for slight Interpolate shift as an interim measure.
- 6 MasterGrid bug sorted so extra dummy grids are no longer added on accidentally to a created composite. Please let me know if you experience any problems with Mastergrid now (problem details required though !)
- 7 Example Radar images changed from bmp to jpg though no animation code available yet.
- 8 Close Grid/Composite removed from File menu.
- 9 Several process function history reports improved including LPF, Compress.
- 10 Macros now add their name to the history report and macro functions such as OpenMap1, SaveMap1 also appear on the history.
- 11 I have noted that the macro function DefineMacroMaps does not work properly yet so please do not use this at the moment.
- 12 I have noted that Cut and Combine, is not fully working in a way different to that outlined in build 461 instructions. It works OK providing you do not need to enter coordinates for the Combine To area (IE you are working with the same sized maps)
- 13 Dump status improved in the feedback text box.
- 14 Note added above regarding PC text size setting.
- 15 Changed installer header name the desktop icon name from Geoplot to Geoplot 4.
- 16 Updated Installation Preparation regarding XP IE NET 3.5. Changed the NET\_Framework\_Web\_Installer program to dotNetFx35setup for use with XP.

### Build 461 Notes

- 1 First beta release.