Analysis tools

This section describes the Source processing tools that are installed by default, accessible via the *Tools* menu and sub-menus.

Data calculator

The Data calculator (accessed via **Tools » Data Calculator Tool**) can be used to analyse spatial raster data and time series through the use of simple arithmetic operators, or to compare data sets.

> **Note**: Use can also drag and drop data to and from the Charting tool. First, choose **Draggable** from the contextual menu (as shown in Figure 1). Then, drag and drop the raster data or time series to the Charting tool.

You can use rasters, time series or numbers as operands as follows:

- Drag and drop the raster data or time series into either of the two view controls (raster or time series are displayed in a small window called a **View Control** (Figure 1), or use a combination of a raster/time series and a number.
- Use the radio buttons to select either the view control or numeric values as left and right operands;
- Click one of the basic operations buttons (addition, subtraction, square root etc). The data calculator displays the operand you selected; and
- Click **=**, and the result, either raster/time series or numeric, appears in the results area on the right.

> **Note:** Time series and raster data need to be in a format compatible with Source. Refer to Data file formats.

The memory feature of the data calculator allows you to save previous results, either numeric or raster/time-series.

Click **Memory** to open the memory area. To save a result raster/time series into the memory, click on the 1st or 2nd operand, or result, view control, then drag and drop the contents into your desired memory view control. The label above each view control resides shows the mathematical operation leading to the result stored there. Figure 3 shows the memory area with several stored results.

> **Note:** When you close the data calculator, the stored results are not saved. If you want to keep any of the rasters, right-click the raster, and choose **Save** from the contextual menu.

Figure 1. Data Calculator with data stored in memory
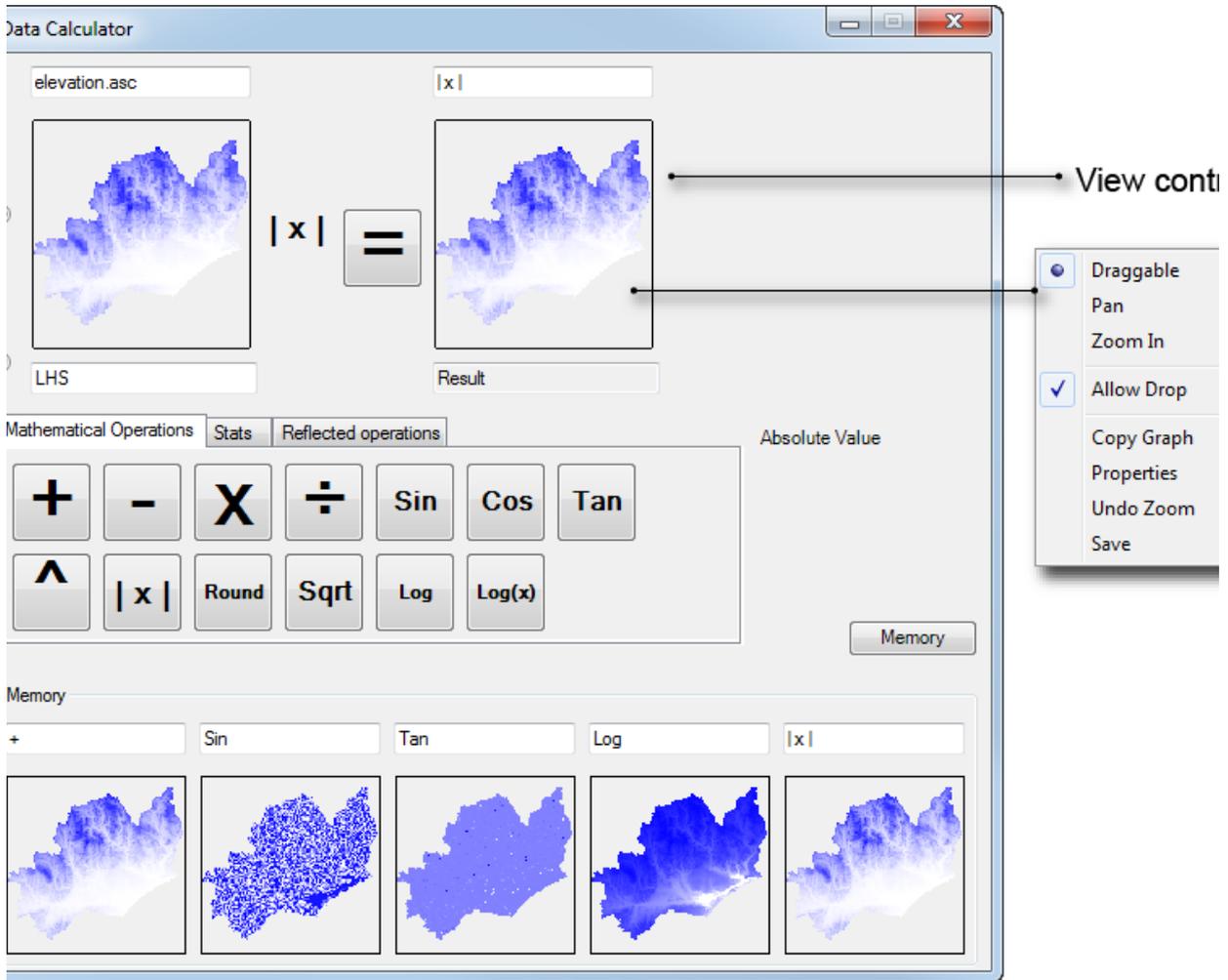
To save any of the results, right-click any of the view controls, and choose **Save** from the pop-up menu. You can also drag the contents of any view control into any other view control or graph form anywhere else in Source.

The **Stats** tab gives a statistical summary of the data sets that have been analysed with the Data Calculator. The **Reflected Operations** tab provides additional data manipulation operations, such as **Merge**, find **Maximum value** or multiply two rasters. It allows you to perform customised operations. You can use a plugin to create these operations, which then appear on the list, and can be performed on various data sets.

Data modification tool

The Data modification tool allows you to edit data inputs depending on conditions that you wish to specify. Choose **Tools » Data Modification Tool** to open the tool, as shown in Figure 2 and carry out the following steps to change the data inputs:

- Click **Open** under **Data loader**, which displays the file name in the box below, along with the file on the right;
- Under **Condition builder**, click **Add** to add a condition. The input data, conditional operator and condition value can be accessed by hovering and clicking on the relevant area in the condition builder. A drop-down menu appears;
- Click **Name** to associate a name with the condition;
- **Clear** can be used to clear the list of conditions if it gets too long and is no longer required;
- Under **Rule Executer**, you can specify the output for specific aspects of the input. For example, if the condition reaches a certain value, the result will be 0; and
- Click **Execute**, and the output will be displayed in **Result**, which can be saved by clicking **Save**.
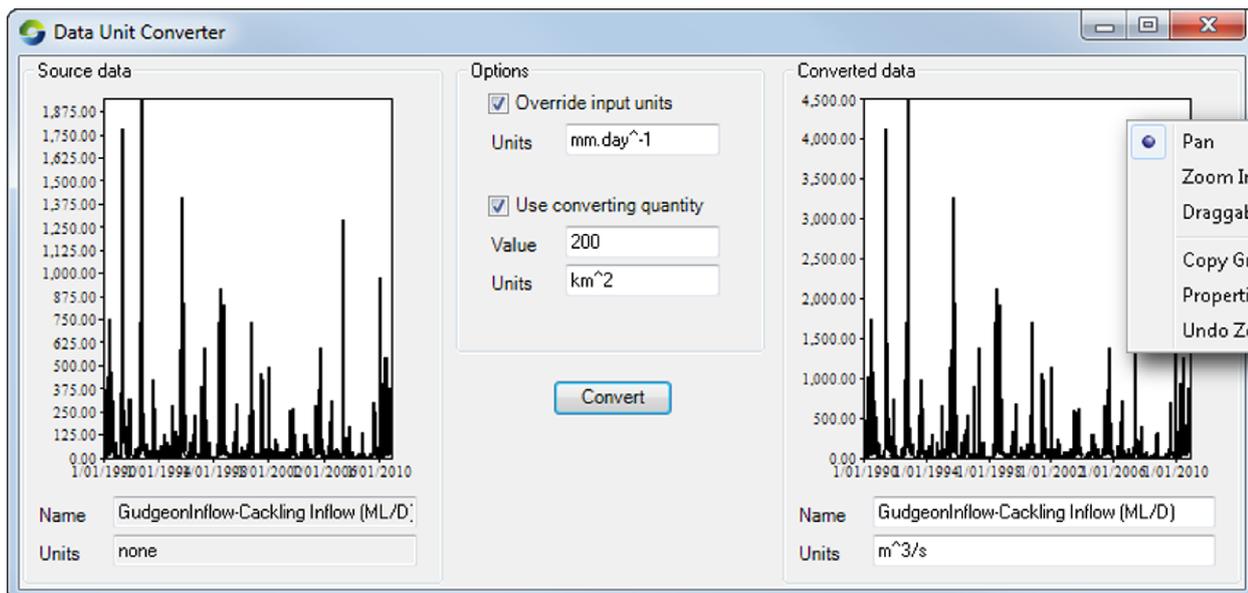
Figure 2. Data modification tool
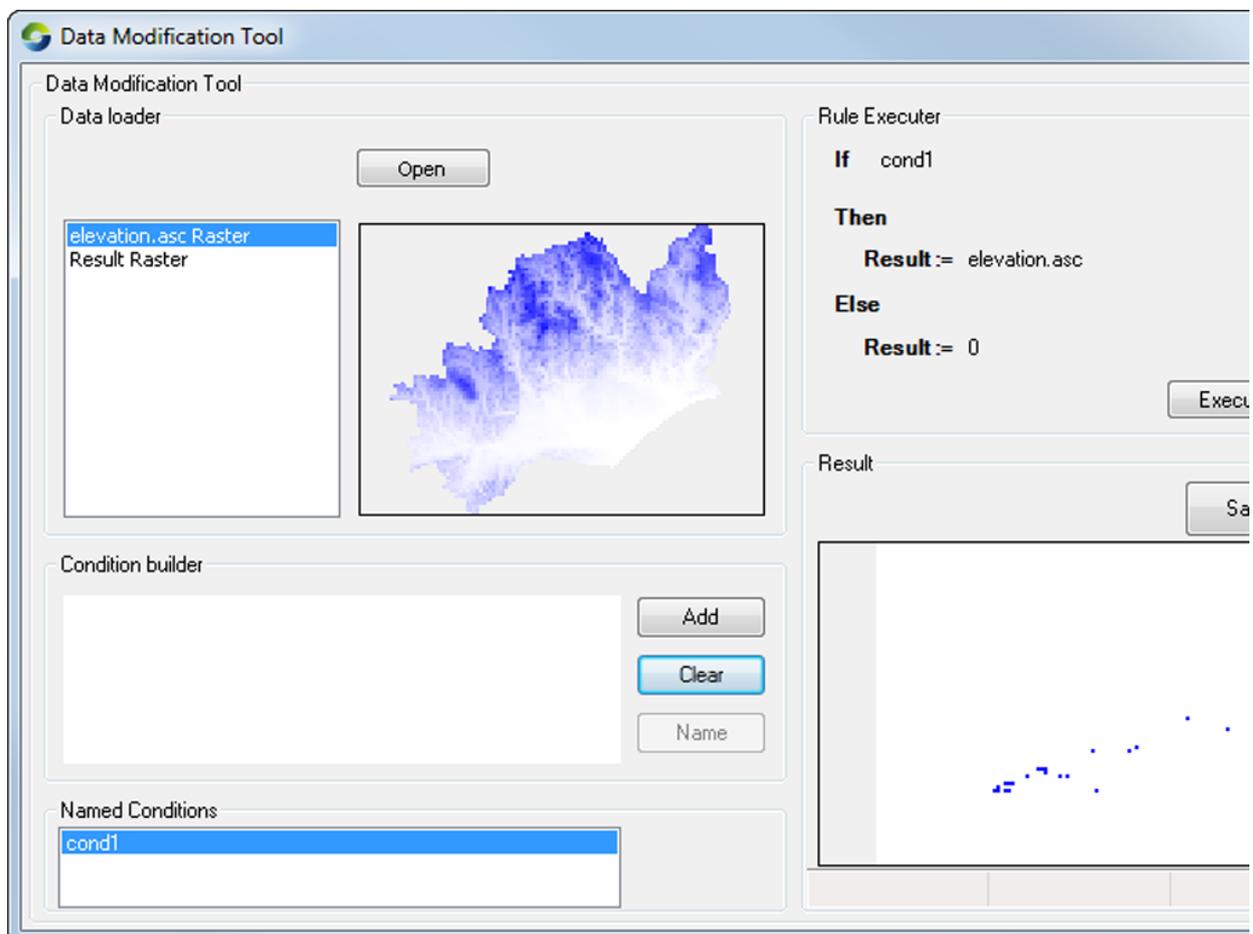
Data unit converter

As its name suggests, this tool converts units (embedded into data files) from one type to another. It is accessible via **Tools » Analysis Windows » Data Unit Converter** (Figure 3).

Figure 3. Data Unit Converter

Use the converter as follows:

- Drag and drop a data file onto the Source data window in the left side panel. If there are units in the data file, they will appear in the units field below the input window;
- Enter the output/target units in the **Units** field on the right side (under **Converted Data**). You can either use the default name (copied from the source data file) or enter a new name; and
- Click **Convert**. To save the converted file, drag it somewhere else in Source that has a **Save as** function. This is because you cannot right-click the converted data graph and save it.

If there are no units in the input file, you must force the data converter to assume that there are input units by ticking the **Override input units** checkbox and entering the "assumed" unit under Units. For example, you have a CSV file containing dates and rainfall, but it does not contain any units. You want an output containing metres per day. Assume the input is in mm/day:

- Drop the input file into the Source data window;
- Tick the **Override units** checkbox;
- Enter mm.day-1 into the **Units** field;
- In the converted data window, enter the name for the converted data set;
- In the converted data window units field, enter m.day^-1 (metres per day); and
- Click **Convert**. The converted data should be scaled down.

You can also scale the converted output to your desired units by ticking the **Use converting quantity** checkbox. Enter a non-zero value into the **Value** field and click **Convert** to scale the output by both the value and the difference in magnitude of the units eg 0.5 mm/h converted to m/h with value 3 ends up being 0.0005 m/h. Note that you must specify both the source value and the target units.

Right clicking in the Converted data dialog will reveal a pop-up menu of options. This enables zooming, panning, dragging, formatting and copying a picture of the output graph to the paste buffer.

Graph Control

Choose **Tools » Graph Control** to open a charting tool window, which can be used to drag data and display it. Refer to Using the Charting Tool for details.