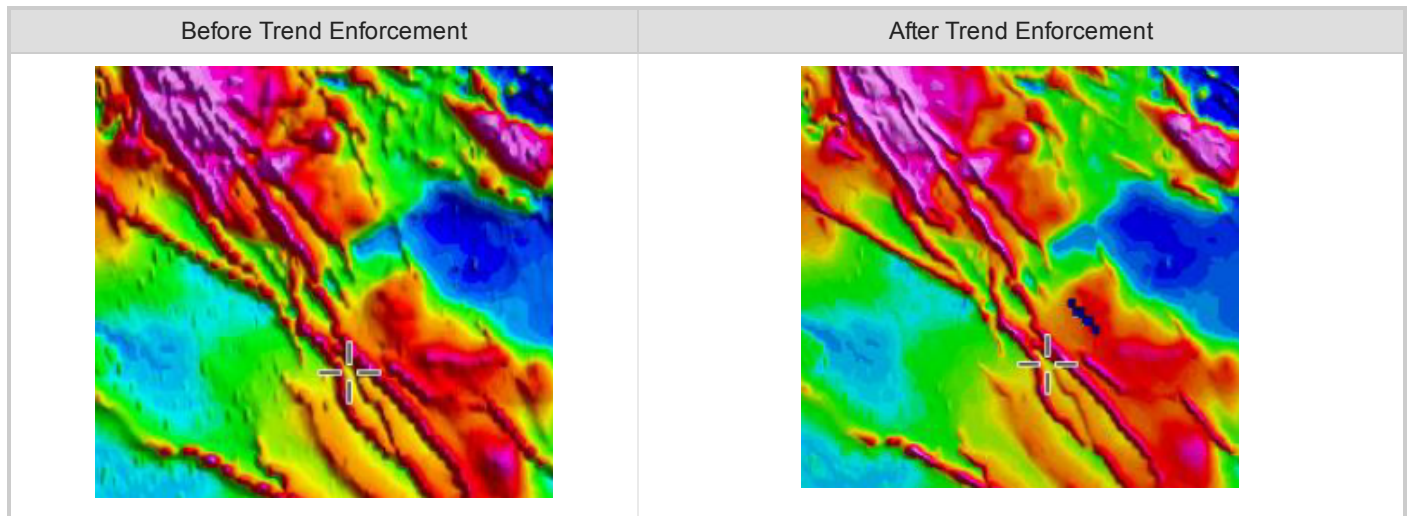# Oasis montaj Trend Enforcement Gridding

This How-To Guide demonstrates how you can use the **Trend Enforcement Gridding Tool** to alleviate a traditional problem in gridding geophysical data, that is, the aliasing problem that occurs due to the presence of more samples "along the lines" than across lines. This problem leads to obvious effects including ellipsoids or ellipsoidal "beads" between lines in gridded data. There are various solutions to these types of effects including filtering and gridding along trend directions. However, these techniques may reduce geologic signal or obscure local trends.

A traditional solution is to add a trend line. This method works as long as you match high values and low values. The Trend Enforcement algorithm is designed to perform this process automatically – smoothly joining highs to highs, and lows to lows. The algorithm also makes sure that the highs and lows do not cross (i.e. backtrack).

Before Trend Enforcement	After Trend Enforcement

The **Trend Enforcement Gridding Tool** algorithm is designed to provide a solution that preserves the character of local trends while eliminating aliasing effects. This guide describes how to:

- Access the Trend enforcement menus
- Grid your data using Bi-Directional Line gridding
- Display colour-shaded grid
- Find trends with the Trend Enforcement Tool
- Access trend line channels in the database
- Plot trends
- Add your own trends
- Grid trend enforced data
- Deselect/select trend lines

Accessing the Trend Enforcement Menus

The *Trend Enforcement* menu can be accessed from the *Grid and Image|Gridding* menu on the Oasis montaj main menu bar.

To Access the Trend Enforcement Menu

1. On the *Grid and Image* menu, select *Gridding* and then select **Trend Enforcement**.
   The *Trend Enforcement* menu appears

Find Trends...	(trenddb.gx)
Plot Trends...	(trndpath.gx)
Add Trend Line...	(trnddigi.gx)

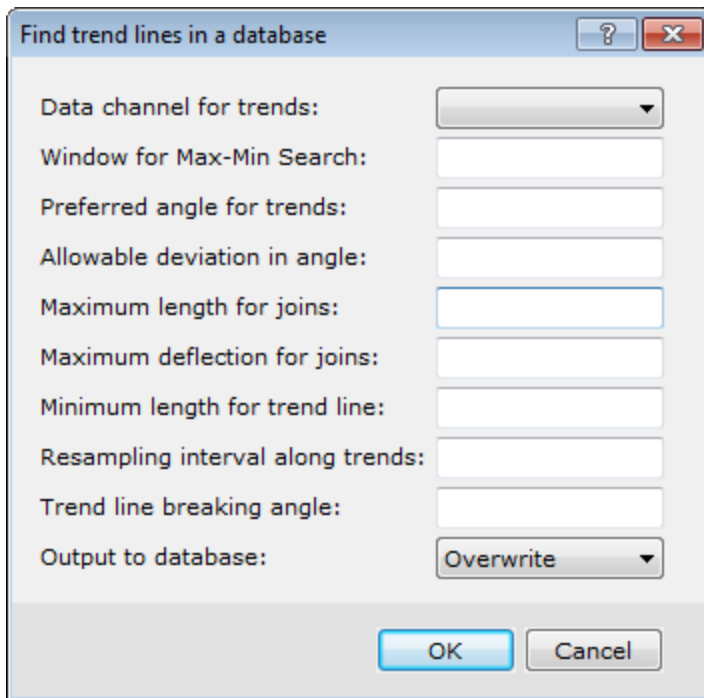These menu items (GXs) enable you to eliminate aliasing effects while preserving the character of local trends.

Finding Trends

A traditional problem in gridding geophysical data is the aliasing problem that occurs due to the presence of more samples "along the lines" than "across lines". This leads to obvious effects including ellipsoids or ellipsoidal "beads" between lines in gridded data.

To Find Trends

1. Open the database in which you want to find the trends.

2. On the *Grid and Image* menu, select *Gridding*, and then select *Trend Enforcement*, and then select **Find Trends**.
   The *Find trend lines in a database* dialog appears.

Find trend lines in a database

Data channel for trends:

Window for Max-Min Search:

Preferred angle for trends:

Allowable deviation in angle:

Maximum length for joins:

Maximum deflection for joins:

Minimum length for trend line:

Resampling interval along trends:

Trend line breaking angle:

Output to database: Overwrite

OK   Cancel

3. Use the *Data channel for trends* dropdown list, to locate the channel in which to locate the trends.

4. In the *Window for Max-Min Search* field select the max-min value on either side of the selected point. The default is 100.

5. Specify the *Preferred angle for trends*, measured counter-clockwise from the horizontal (X-axis) in degrees. The default is 30.

6. Set the *Maximum length for joins*. This controls the length of the joins. The default is 500.

7. Set the *Maximum deflection for joins*. This controls the local straightness of the joins. If the field is blank, no check will be made for this condition.

8. Enter a value for *Minimum length of trend line* if you wish to ignore all trend lines shorter than the specified value. This test is applied after any resampling and before breaking of lines at the breaking angle. If the field is blank, this test is not performed.

9. Set the *Resampling interval along trends* field. The line may be splined at a fixed interval. For maximum effectiveness set this value to a fraction of the average line spacing. If the field is blank, this test is not performed.

10. Set the *Trend line breaking angle*, if appropriate. If the field is left blank, this test is not performed.

11. Select to *Overwrite* or *Append* the *Output to database*.

    💡 *For more information on each of the fields in the "Find trend lines in a database" dialog, click the Help button.*

12. When ready to continue, click **OK**. The system calculates the *Trend lines* and places this information in your database.

⚠️ *When using **Minimum Curvature Gridding** as your gridding technique, you must specify a value in the "Re-sampling interval along trends" parameter. If no value is entered, the **Trend Enforcement Tool** will not calculate the appropriate trend lines.*

Accessing Trend Lines in the Database

You may want to review your trend lines before you plot them on a map or re-grid your data using the trend enforced data.

To Access Trend Lines in a Database

1. From your database, right-click the *Line Header Cell* (upper left cell).

2. From the popup menu select *List*. Another popup menu appears containing a list of the lines in the database.

3. Scroll down the list and select the line which contains the trend lines (usually labelled as R0, R1, etc.). The system displays the trend lines in the database.
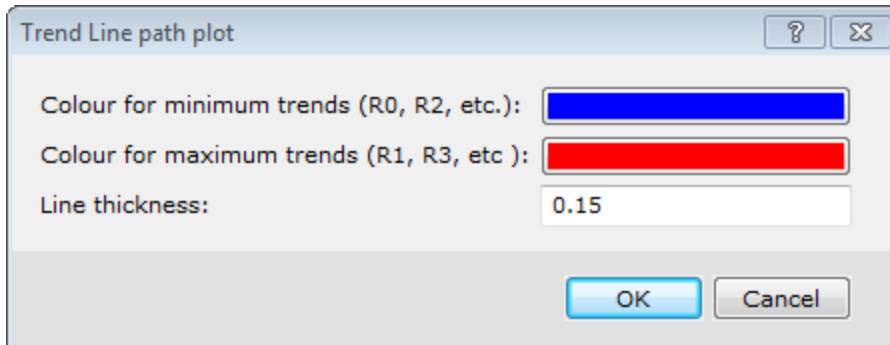
⚠️ *When you click on a data value (X, Y or Z) in the database, you will notice that the linked map cursor moves to the selected location of the trend line on the map.*

Plotting Trend Lines

The **Trend Enforcement Tool** displays the trend lines found in the current database.

To Plot Trend Lines

1. On the *Grid and Image* menu, select *Gridding*, then select *Trend Enforcement*, and then select **Plot Trends**. |The *Trend Line path plot* dialog appears.
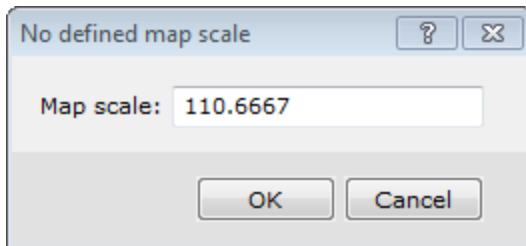

2. Use the **Colour for minimum trends (R0, R2, etc)** and the **Colour for maximum trends (R1, R3, etc)** boxes to select the colours to use to display the trend lines on the map.

   💡 *Red and Blue are the default as these colours are the opposite of the gridding convention and show up clearly on the map*

3. Set the *Line thickness*. The default is 0.15.

4. Click **OK**. The *No defined map scale* dialog appears.

5. Set the *Map scale*. The displayed default scale is chosen to fit the map to an area approximately 30x30 cm when plotted. You can adjust the map scale to a more appropriate value, for example 1:120.

   ⚠️ *This dialog is displayed whenever drawing to a map for which a map scale has not been defined. This situation most commonly occurs when a map has been opened just to display a grid (as applies here). A map scale is required to determine appropriate scaling for drawing text, patterned lines, and other map graphic details.*
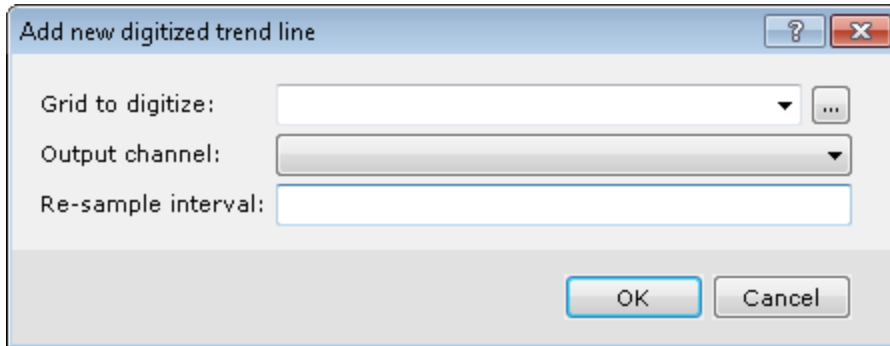
6. Click **OK**. The trend lines are plotted on the current map.

Adding Your Own Trend Lines

The **Trend Enforcement Tool** may not find all of the trend lines in your database. You can interactively digitise a trend line from a grid and add it to the end of a line in the current database. You also have the ability to resample the trend line to a specified sample interval (necessary when using the random gridding techniques).

To Add Your Own Trend Lines

1. Ensure that the database you want to add the trend lines to, is open in your current project.

2. On the *Grid and Image* menu, select *Gridding*, then select *Trend Enforcement*, and then select **Add Trend Line**. The *Add new digitised trend line* dialog appears.
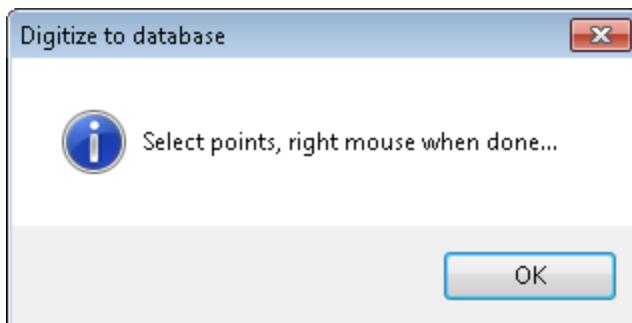

3. Use the *Browse* button to locate the *Grid to digitise*.

4. From the *Output channel* dropdown list, select the channel to place the digitised values from the grid. This should be the same data channel that will be gridded.

5. In the *Re-sample interval* field specify an interval at which to resample the data along the defined trend line.

   ⚠   *It is recommended that the trend line be re-sampled at the same cell size as the grid.*

6. Click **OK** to continue. The *Digitise to database* dialog box appears.
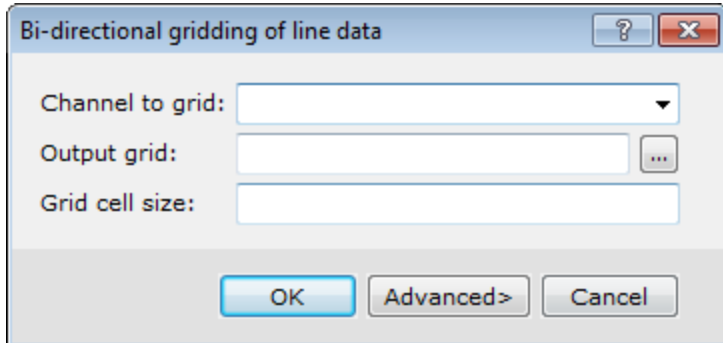

7. Click **OK** to begin digitizing.

8. Draw a *Trend Line* by selecting points (either minimum or maximum point values) on the displayed grid.

9. When you are finished with each line, right-click and select **Done**. The digitised trend line data values, which have been interpolated to the specified re-sample interval, will be added to the trend line(s) in the current database.

Gridding Trend Enforced Data

You can re-grid your data, using the same parameters as the original grid. This can be done to view the two grids side-by-side for comparison.

To Apply Bi-Directional Gridding to Trend Enforced Data

1. On the *Grid and Image* menu, select *Gridding*, and then select **Bi-Directional Line Gridding**. The *Bi-directional gridding of line data* dialog appears.

2. Use the dropdown list to select the *Channel to grid*.

3. Enter the name of the *Output grid*.This name should be different than the original grid.

4. Specify the *Grid cell size*. The cell size is the distance between grid points in the X and Y directions. In most situations the cell size can be selected as 1/4 to 1/8 of the line separation, or the minimum station interval, whichever is greater.

    ⚠️ *By default, BIGRID will choose a cell size based upon these criteria, but we recommend that you choose the cell size directly.*
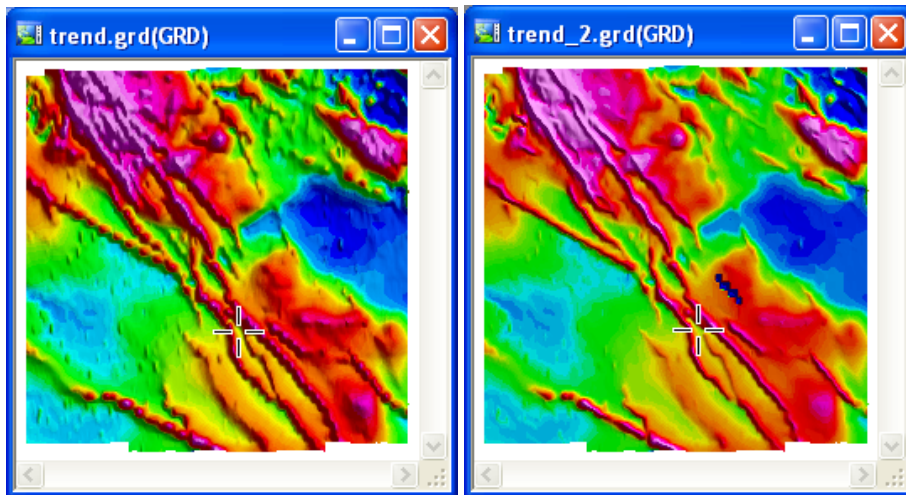
5. Click **OK** to grid the data and display the grid in a temporary map.

    ⚠️ *For information about the Advanced options, click the Help button on the Advanced Gridding options dialog, .*

Comparing the Two Grids

We can display two grids side-by-side to see the difference the trend enforced gridding has on the data. An example is shown below.

The original grid "trend.grd" (left) the Trend Enforcement grid "trend_2.grd" (right).

⚠️ *The grid should be displayed as a colour shaded grid to properly compare the two grids.*

⚠️ *The actual data values and locations are exactly the same in both grids. The **Trend Enforcement Tool** forces the gridding process to honour the trended data. Trend lines must be selected to be included in gridding. You can deselect the trend line(s) when performing additional processing with the database.*
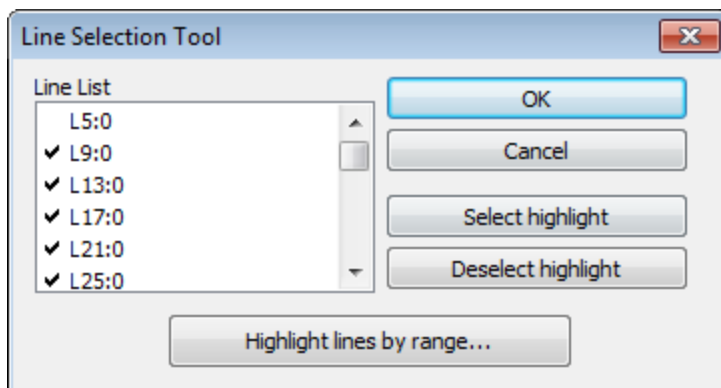
Deselecting/Selecting Trend Lines

You may want to deselect/select your trend lines for other processing applications.

To Deselect/Select Trend Lines in a Database

Before you begin, select your database.

1. Click on the *Line Header Cell* - the upper left cell.

2. Right-click and from the pop-up menu select *Selections*, then select **Selection Tool**.
   The *Line Selection Tool* dialog appears.

3. Scroll down the list and highlight the desired line.

4. Click **Deselect highlight**. The check mark beside the line is removed.

5. Repeat the previous step as needed.

6. Click **OK** to continue.

7. To select lines, repeat above procedure and click the **Select highlight** button. A check mark will be placed beside the line.

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