

Magnetic interpretation (MagMage) (T42)

The Magnetic Interpretation tool was developed as part of a project called the Magmage project, thus the name MagMage. In the following chapter we will refer to the tool as the Magnetic Interpretation tool. It contains two separate interpretation methods.

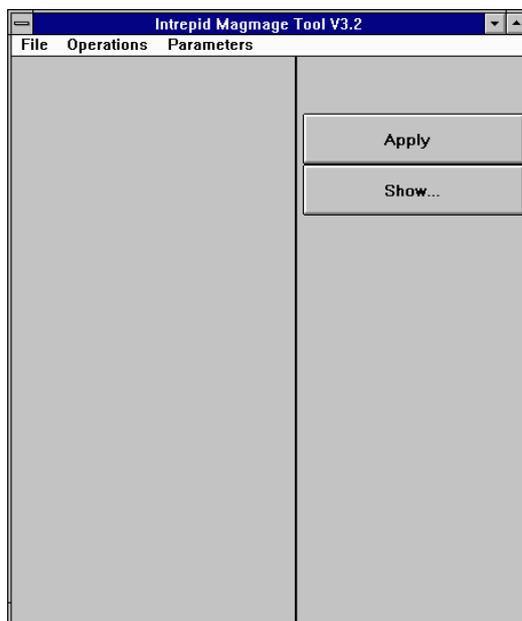
The anomaly points process searches a grid for anomalies and classifies them as anticlines, synclines, hills and holes, assigning a structural index number according to the shape. For each anomaly, INTREPID calculates a variance, which indicates the 'quality' of the anomaly. INTREPID saves the results of the calculation in a point dataset.

The coherence map process detects discontinuities in a grid by comparing values in overlapping blocks of cells (normally 7 x 7 cells in size). By comparing the values calculated for each block, INTREPID can detect areas of similarity and discontinuities in the data.

Using the Magnetic Interpretation tool

>> To use the Magnetic Interpretation tool with the INTREPID graphic user interface

- 1 Choose **Magnetics Utilities** from the **Interpretation** menu in the Project Manager, or use the command `magmage.exe`. INTREPID displays the main window of the tool.



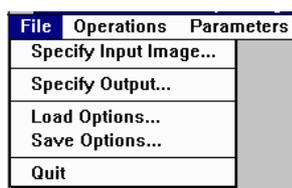
- 2 If you have previously prepared file specifications and parameter settings for Magnetic Interpretation, load the corresponding task specification file using **Load Options** from the **File** menu. (See [Specifying input and output files](#) for detailed instructions.) If all of the specifications are correct in this file, go to step 7. If you wish to modify any settings, carry out the following steps as required.
- 3 Specify the grid dataset to be processed. From the **File** menu choose **Specify Input Image**. (See [Specifying input and output files](#) for detailed instructions.)

- 4 Specify the output point or grid dataset to be created with the results of the process. From the **File** menu choose **Specify Output**. (See [Specifying input and output files](#) for detailed instructions.)
- 5 Specify the process you wish to use on the grid (Anomaly Points, Coherence Map or Minimum Curvature Coherence Map) using options from the **Operations** menu. See [The anomaly points calculation](#) and [The coherence map calculation](#) for details.
- 6 If you wish to specify Minimum Variance (for Anomaly Points) or Window Size (for Coherence Map) choose the corresponding option from the **Parameters** menu, and specify the parameter accordingly. See [The anomaly points calculation](#) and [The coherence map calculation](#) for details.
- 7 When you have made specifications and settings according to your requirements, choose **Apply**. INTREPID will perform the process and save the output data as specified.
- 8 If you wish to record the specifications for this process in a `.job` file in order to repeat a similar task later or for some other reason, use **Save Options** from the **File** menu. (See [Specifying input and output files](#) for detailed instructions.)
- 9 If you wish to repeat the process, repeat steps 2–8, varying the parameters and/or data files as required.
- 10 To exit from Magnetic Interpretation, choose **Quit** from the **File** menu.

You can execute Magnetic Interpretation as a batch task using a task specification (`.job`) file that you have previously prepared. See [Using task specification files](#) for details.

Specifying input and output files

To use Magnetic Interpretation, you will need to specify the grid dataset to be examined and the point or grid dataset for saving the results of the process. Choose the options as required from the **File** menu.



In each case INTREPID displays an **Open** or **Save As** dialog box. Use the directory and file selector to locate the file you require. (See "[Specifying input and output files](#)" in [Introduction to INTREPID \(R02\)](#) for information about specifying files).

Specify Input Image Use this option to specify the grid to be analysed.

Specify Output Use this option to specify the name for the dataset you are creating with this process.

If you are using the Anomaly Points process the output will be a point dataset.

If you are using the Coherence Map process the output will be a grid dataset.

Load Options If you wish to use an existing task specification file to specify the Magnetic Interpretation process, use this option to specify the task specification file required. INTREPID will load the file and use its contents to set all of the parameters for the process. (See [Using task specification files](#) for more information).

Save Options If you wish to save the current Magnetic Interpretation file specifications and parameter settings as an task specification file, use this option to specify the filename and save the file. (See [Using task specification files](#) for more information).

Structure of the anomaly points output dataset

The fields of the points dataset are as follows

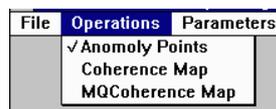
Field	Description
x	Geographic location East–West
y	Geographic location North–South
z	Original grid cell value at the location
StructuralIndex	1 = anticline, 2 = syncline, 3 = hill, 4 = hole
Variance	Used to calculate the Structural Index. This field can indicate the closeness of the correspondence between the anomaly and the structural index.
Direction	Used to calculate the Structural Index
Gradient	Used to calculate the Structural Index

The anomaly points calculation

The anomaly points process searches a grid for anomalies and classifies them as anticlines, synclines, hills and holes, assigning a structural index number according to the shape. For each anomaly, INTREPID calculates a variance, which indicates the ‘quality’ of the anomaly. INTREPID saves the results of the calculation in a point dataset.

>> To specify anomaly points calculation

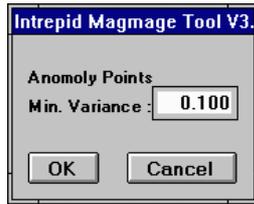
- 1 From the **Operations** menu choose **Anomaly Points**, so that it has a tick against it.



- 2 If you wish to specify the minimum variance for points to be included in the output (the default value is 1) choose **Min Variance** from the **Parameters** menu.



INTREPID displays the Minimum Variance dialog box.



Specify the Minimum Variance in the corresponding text box, then choose **OK**. INTREPID will not save anomaly points with a variance below the value of this parameter.

INTREPID will save a point dataset containing the results of the anomaly points calculation. See [Specifying input and output files](#), particularly section [Structure of the anomaly points output dataset](#) for details.

The coherence map calculation

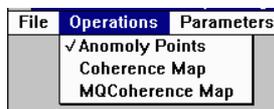
The coherence map process detects discontinuities in a grid. INTREPID examines a window of cells (normally 7 x 7 cells in size) and calculates a value for the window. It moves the window by one cell and calculates the value for the new window. By comparing the values calculated for each overlapping window of cells, INTREPID can detect areas of similarity and discontinuities in the data.

During the development of this tool we have found the coherence map useful for mapping peaks and troughs of magnetic trends. It has been able to identify weak magnetic axes and troughs that otherwise would only show up on vertical gradient images.

The minimum curvature coherence calculation enhances the result by smoothing the grid resulting from the coherence map calculation, then subtracting the smoothed grid from the raw coherence map results. This technique is intended to sharpen the coherence map.

>> To specify coherence map calculation

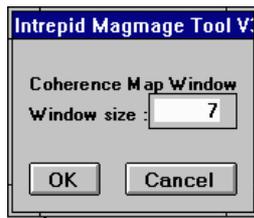
- 1 From the **Operations** menu choose **Coherence Map** (standard coherence map) or **MQCoherence Map** (minimum curvature coherence map) so that it has a tick against it.



- 2 If you wish to specify the size of the coherence window, choose **Coherence Window** from the **Parameters** menu. The default size is 7 x 7.



INTREPID displays the Coherence Map Window dialog box.



Specify the Window Size in the corresponding text box, then choose **OK**.

INTREPID will save a grid dataset containing the results of the coherence map calculation. See [Specifying input and output files](#), for details.

Apply

After you have specified the Magnetic Interpretation task, choose **Apply**. INTREPID will perform the process and save the results.

Exit

To exit from Magnetic Interpretation choose **Quit** from the **File** menu.

Using task specification files

You can store sets of file specifications and parameter settings for Magnetic Interpretation in task specification (**.job**) files.

>> *To create a task specification file with the Magnetic Interpretation tool*

- 1 Specify all files and parameters.
- 2 If possible, execute the task (choose **Apply**) to ensure that it will work.
- 3 From the **File** menu choose **Save Options**. Specify a task specification file (INTREPID will add the extension **.job**) INTREPID will create the file with the current parameters.

For full instructions on creating and editing task specification files see [INTREPID task specification \(.job\) files \(R06\)](#).

>> *To use a task specification file in an interactive Magnetic Interpretation session*

Load the task specification (**.job**) file (**File menu, Load Options**), modify any settings as required, then choose **Apply**.

>> *To use a task specification file for a batch mode Magnetic Interpretation task*

Type the command **magmage.exe** with the switch **-batch** followed by the name of the task specification file.

For example, if you had a task specification file called **surv329.job** in the current directory you would use the command

```
magmage.exe -batch surv329.job
```

Task specification file notes and example

Here is an example of a Magnetic Interpretation specification file.

```
Process Begin
  Name = magmage
  Input = /disk1/surveys/mag_grid
  Output = /disk1/surveys/mag1_grid
  Parameters Begin
    Method = Coherence_map
    Coherence_Window = 7
    Minimum_Variance = 0.1
  Parameters End
Process End
```