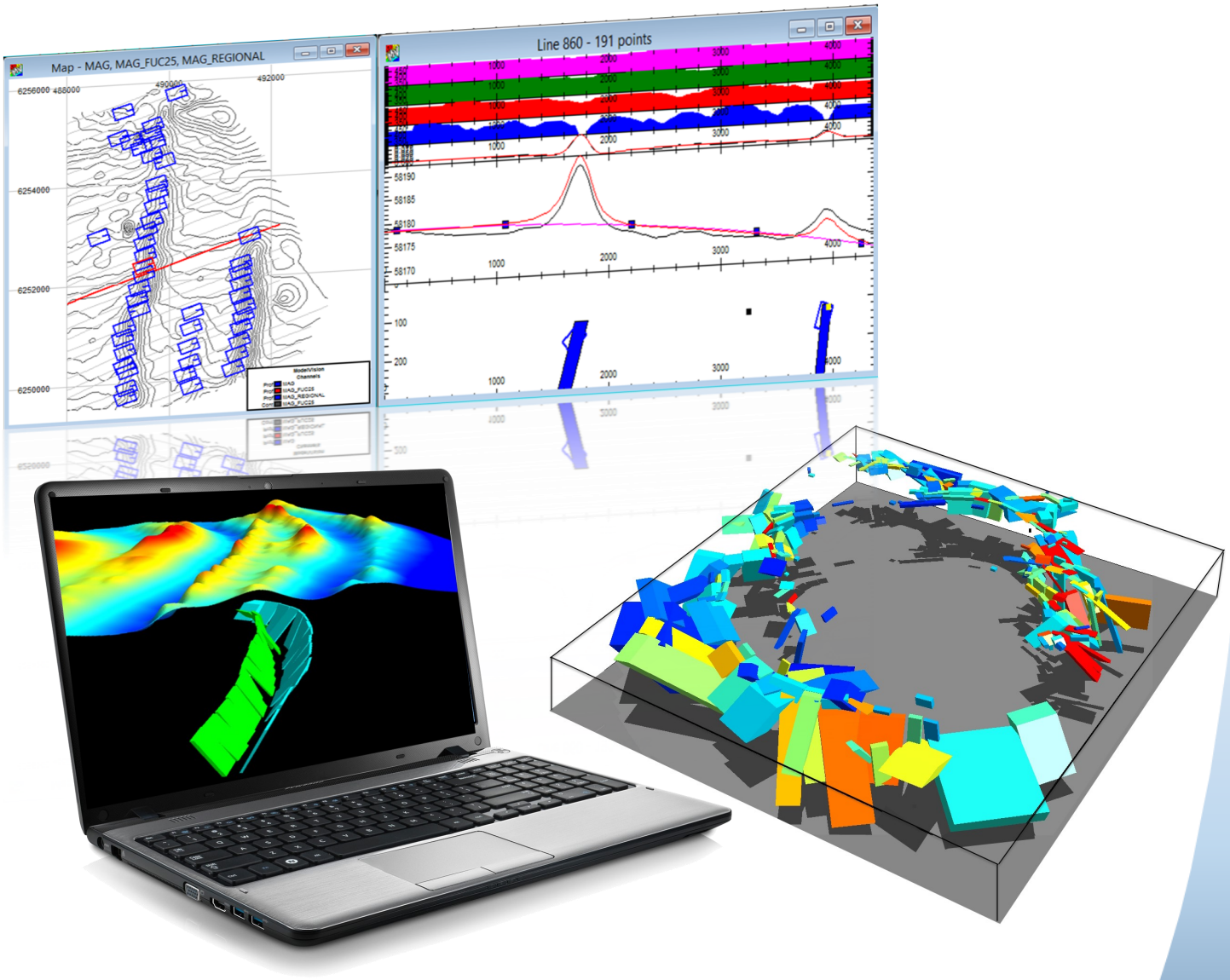
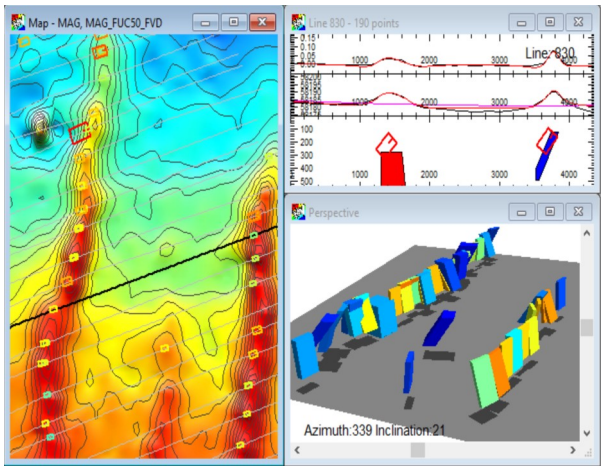
Tensor Research

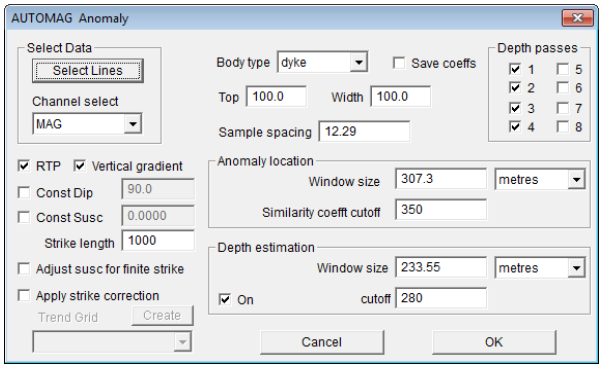
AutoMag

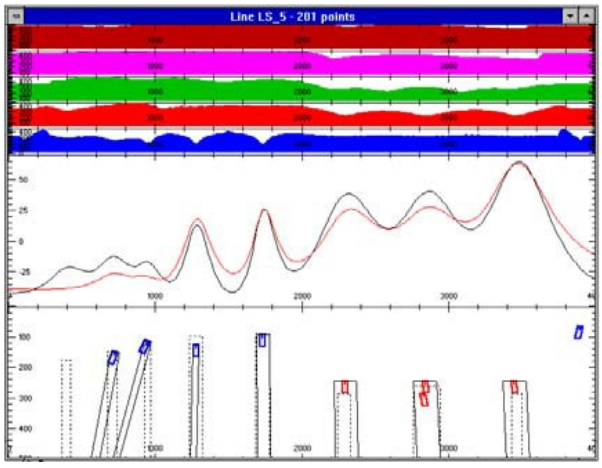
for ModelVision

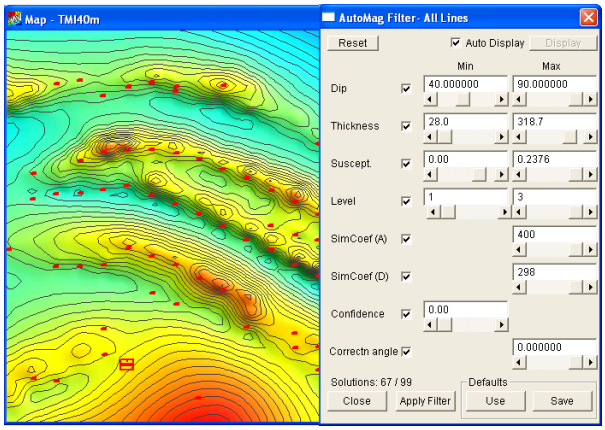


Rapid Depth Estimation for Airborne Magnetic Survey Data









AutoMag is an automated magnetic source depth estimator for airborne data based on the Dipping Tabular Body inversion method (Naudy 1971). AutoMag operates on a profile basis and is tightly integrated into the ModelVision modelling environment. Profiles can be analyzed using original flight line data or traverses selected from gridded data. Large aeromagnetic surveys can be efficiently processed in batch mode with AutoMag.

What can AutoMag do?

- Cut large project times from days to hours
- Match suitable anomalies with high precision
- Select anomalies from sources in a specified depth range of interest
- Use 1st vertical derivative to improve depth estimation precision and anomaly isolation
- Interactively tune parameters on control lines and then process the full survey automatically
- Grid and contour your results at any time for QC analysis
- Pass the solutions to the ModelVision inversion module for refinement
- Link bodies in map view to apply strike adjustment to depth, dip and susceptibility
- Export your solutions to other applications

Batch Operation

You can use the mouse to select regions for analysis and set AutoMag to run in batch mode. Run times for surveys are fast and typically range from 5 to 30 minutes on a Pentium PC for surveys of 10,000 to 100,000 line kilometres.

Visualise Solutions

AutoMag solutions and correlation coefficients are displayed in a model cross-section. Individual solutions have attributes of X, Y, Depth, Susceptibility, Thickness, Dip and Azimuth. You can use the mouse or toolbar to convert selected solutions to a solid model for direct and immediate computation of the magnetic response.

Filtering of Solutions

By choosing loose constraints during the tuning stage, many solutions can be produced which can then be filtered based on reasonable geological criteria to quickly give a subset of realistic solutions. The dynamic solution filtering removes solutions from the display in real time when thresholds are changed on parameters such as dip, thickness, susceptibility, correlation thresholds, upward continuation level and anomaly trend direction and trend confidence. The immediate feedback of the live filtering allows you to quickly converge on realistic solutions for the given parameters and known geology. Further refinement can be performed with direct forward modelling and inversion in the core software, ModelVision.

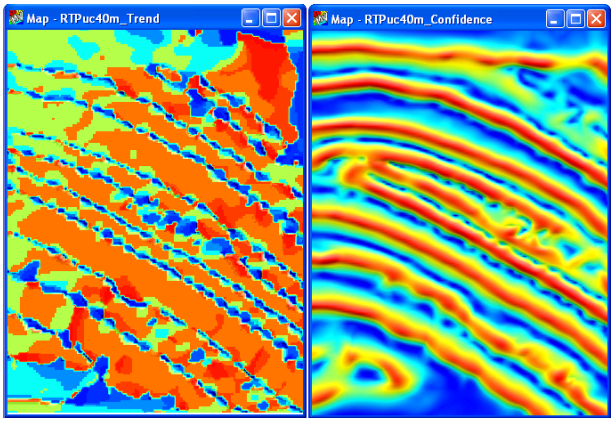
Trend Gridding for Strike Adjustment

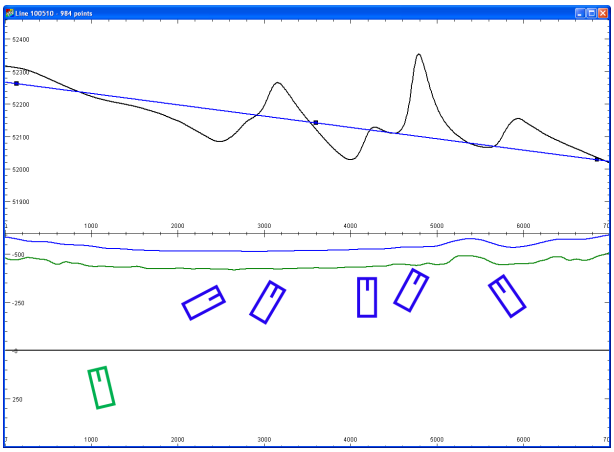
AutoMag solutions are initially created with a strike perpendicular to the line direction. Correction to a more accurate strike direction from the input TMI grid can be made using an automatic trend correction function available in the Grid Utility of ModelVision.

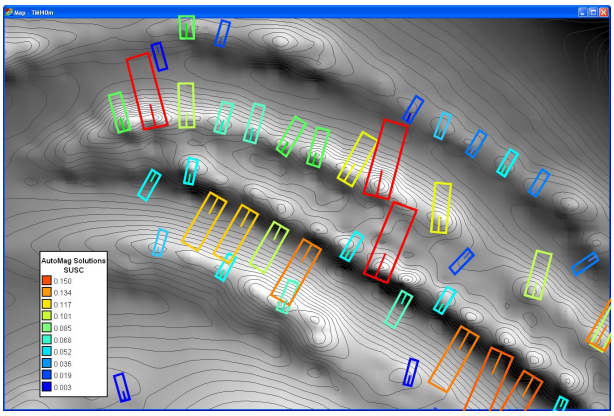
AutoMag uses the azimuth and confidence grids generated by the internal Trend Grid Utility application for strike correction and filtering of the AutoMag solutions.

The Trend Grid Utility analyses trends within the input TMI grid and outputs an azimuth grid (Trend) showing the geological strike (0-180 degrees) for these trends. The trends are binned within 15 degree arcs from zero to 180 degrees. The trend azimuth grid is then used to apply strike corrections to the AutoMag solutions automatically.

The Trend Grid Utility also outputs a Confidence grid which graphically shows the level of confidence between 0 and 1 that is similar to a correlation coefficient in curve fitting. The higher the number the greater confidence that the trend azimuth value has been resolved correctly for that grid point.







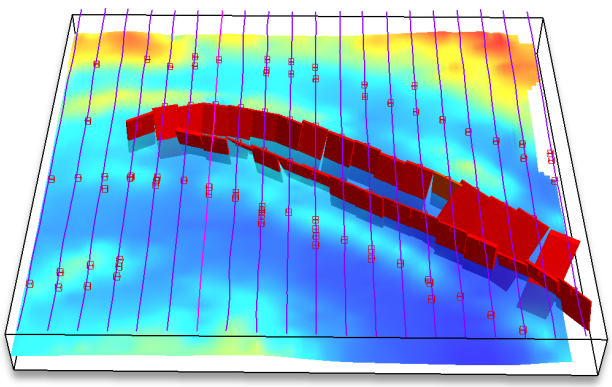
Map Presentation

AutoMag solutions can be displayed in map view along the flight lines, with a choice of stacked profiles, contours or images of any appropriate parameter, such as total magnetic intensity or elevation. Symbols representing the solutions can be modulated in size and colour by properties such as depth, susceptibility and azimuth.

Your final set of AutoMag points can be gridded and displayed as contour maps or images of magnetic source depth together with the annotated solutions. A geological assessment of the solutions can then be used to cull any spurious values. Solutions can be refined through modelling and inversion.

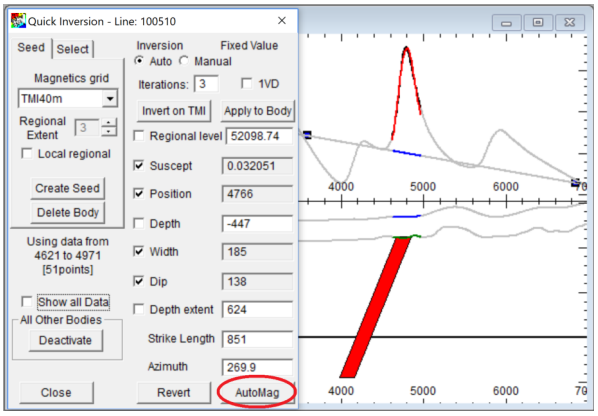
Import/Export Solutions

You can import AutoMag equivalent solutions from another program and refine them in AutoMag. You can import AutoMag equivalent solutions from another program and refine them in AutoMag. Solutions generated by AutoMag can be converted to tabular bodies and exported as a ModelVision .TKM model file or AutoCAD .DXF. The solutions can also be converted to standard points for display in a ModelVision perspective view or exported as an ASCII table (.CSV) for use in other presentation software, such as Datamine's Discover PA and Discover 3D, or for inclusion in written reports.



Quick Inversion

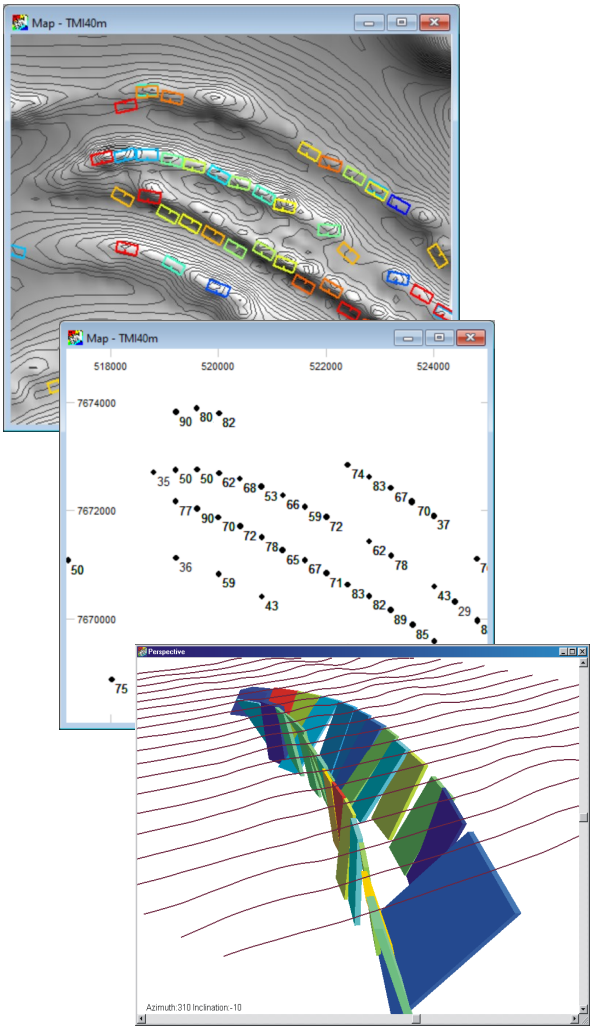
The QuickInvert tool in ModelVision is a great pre-cursor to AutoMag as an alternative to setting up the search parameters manually or by trial-and-error. Run QuickInvert on a typical anomaly in the area and have it generate AutoMag parameters from the Quick Invert solution and initiate the AutoMag interface directly from the QuickInvert dialog.



QuickInvert is a productivity tool that is optimized for inversion of single magnetic anomalies using a tabular body source. It is easy to learn because it automates many of the steps used in Standard Inversion. This includes a single control dialog that automates the use of a 2D regional magnetic field, easy toggling between TMI and first vertical derivative inversion methods and the setting of geological constraints.

AutoMag Applications

- Quick depth estimates on individual anomalies
- Automated depth estimates along profiles
- Overburden thickness studies to select shallow targets
- Alluvial channel mapping for diamond, gold and groundwater
- Regional mapping of basins and grabens
- Cross-section analysis



Elkedra, NT Example

AutoMag was applied to the interpretation of structural dip from modelled airborne magnetic TMI data in the Elkedra area of Northern Territory, Australia. The modelled bodies were derived automatically using AutoMag,

Initial analysis of a single line of the survey using AutoMag addressed the three-dimensional issue of cross-profile variation by tracking the anomaly in map view and applying an automatic strike correction using a Trend grid to each body as it is rotated. Although lacking independent information with which to confirm the dip values, internal consistency suggests that they were correct to within at least 10° to 15°.

AutoMag is available as an optional module of ModelVision.

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