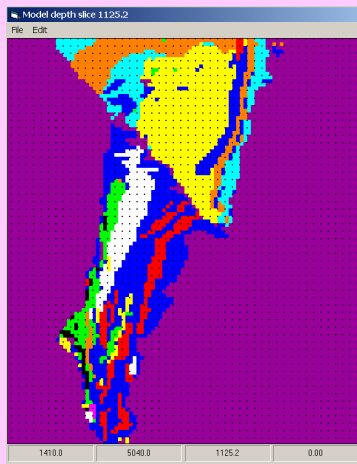


Geologically-constrained 3D gravity & magnetic inversion



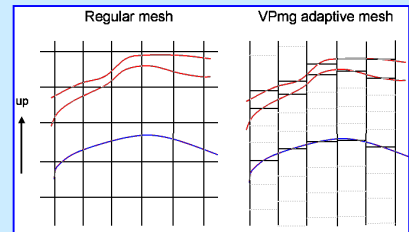
VPmg is a 3D modelling and inversion program for gravity, gravity gradient, TMI and magnetic gradient data. *VPmg* has been designed for geologically-constrained inversion but is also suitable for “unconstrained” inversion.

In *VPmg* models, the sub-surface is discretised into close-packed vertical rectangular prisms. Each prism is divided into cells by a succession of geological contacts. The vertical dimension of each cell is arbitrary. Each cell is assigned to a geological unit; thus the *VPmg* model is truly a geological model, with rock type domains and bounding surfaces defined as well as physical properties.

Geometry of contacts, as well as density or susceptibility of the model cells, can be adjusted via inversion. During geometry inversion, geological contacts can be fixed (where pierced by a drill hole), bounded (if a drill hole passes nearby), or free to move. During property inversion, density or susceptibility is confined between upper & lower bounds. Core or downhole measurements are honoured and *a priori* statistical distributions can be enforced within each geological unit.

VPmg procedure

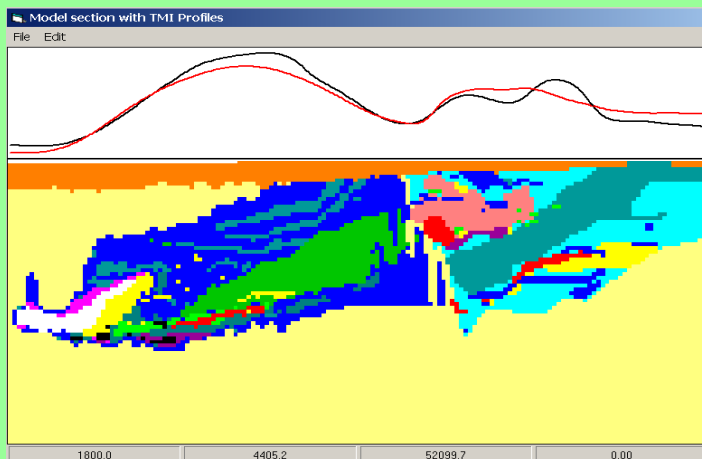
- **Construct geological starting model.** Utilities written by Mira Geoscience can re-format 3D models from all common geological modelling systems into *VPmg* format. If the geology is unknown, use a homogeneous half-space.
- **Impose drilling-based constraints (if any).** Flag model contacts as fixed, bounded, or free. Suppress changes in shape close to pierce points. Hold the property of individual cells fixed if they contain core or DH log values. Control the magnitude of property changes near fixed cells using weights. Utilities written by Mira Geoscience can expedite assignment of geometry and property constraints.
- **Perform modelling & inversion.** Adjust model geometry or physical properties, subject to drilling-based constraints, to optimise data fit.



VPmg mesh adapts to the geology

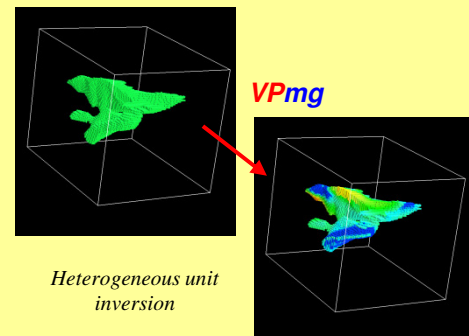
VPview, the VPmg user interface:

- display potential field data
- create simple layered models
- display topography
- cut sections and horizontal fliche plans through the 3D model
- compare observed data and calculated responses
- adjust inversion parameters
- edit model file parameters
- launch inversions



The key features of the program are

- compact 3D model format
- drill pierce points honoured
- sharp geological contacts preserved
- densities or susceptibilities are bounded
- rapid, accurate gravity terrain modelling
- local model embedded in regional model
- remanent magnetisation accounted for
- self-demagnetisation accounted for
- 3 inversion styles: homogeneous property, heterogeneous property, & contact geometry
- fast steepest descent inversion algorithm
- stochastic inversion option
- runs constrained or unconstrained inversion



Further information

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