



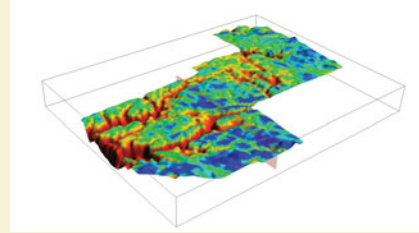
**Mira Geoscience**  
...modelling the earth

# VP Suite for Geophysics

## 3D modelling and inversion programs

### Summary

VP Suite is a group of geophysical modelling programs used for geological investigations, hypothesis testing and validation of geological models. It is designed for 3D modelling and inversion of gravity, gravity gradient, total magnetic field, magnetic gradient, and TEM data. The individual components of VP Suite can be used as stand-alone programs, or integrated within GOCAD® Mining Suite\*.

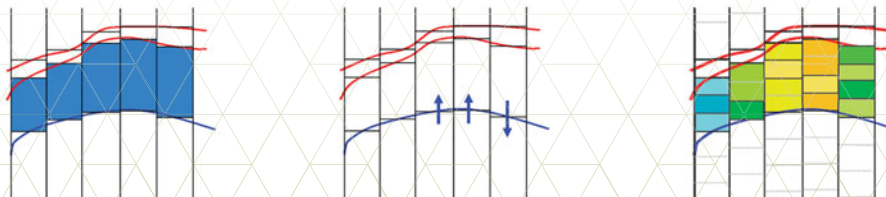


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\*GOCAD Mining Suite is a customized extension of SKUA-GOCAD™–Paradigm®, the world's most sophisticated geological modelling platform, adapted specifically for the mining industry and available exclusively from Mira Geoscience.

**VP Suite models are geologically based—they work directly with geological contact geometries as well as physical property distributions within geological units. This model parameterization lends itself to a variety of model styles and inversion options.**

- » Rapid forward modelling for geological model validation
- » Inversion operates directly on a geological model
- » A wide range of model styles are supported, including discrete bodies in a uniform background, layered stratigraphy on bedrock and complex 3D block models
- » The shape and property of each unit can change during inversion, with its geological identity and sharp geological contacts preserved
- » Constrained or unconstrained inversion
- » Geological contacts can be fixed, bounded, or free to move during inversion
- » Assignment of constraints on geological contacts can be user defined or controlled from geological constraints (e.g., drillhole pierce points)
- » Geological units can be homogeneous or heterogeneous (compact 3D model format)
- » Upper and lower bounds can be imposed on each unit's properties (density, susceptibility or conductivity)
- » Local constraints can be imposed on model density, susceptibility or conductivity based on locations of drill core samples or from downhole logs
- » Three inversion styles are available: homogeneous property, heterogeneous property and contact geometry
- » Users can control units and contacts that are active during inversion
- » Inversion uses a steepest descent inversion algorithm providing faster run times
- » Forward modelling and inversion uses multi-core parallelization
- » Compatible file format for different data types



Vpmg inversion styles: homogeneous unit inversion (left), geometry inversion (centre) and heterogeneous property inversion (right).

## Key Features

### VPmg

VPmg is a gravity, gravity gradient, magnetic, and magnetic gradient 3D modelling and inversion program.

Key features specific to VPmg:

- » Data reduction (e.g., gravity terrain correction, overburden stripping)
- » Depth to basement inversion
- » Rapid, accurate gravity terrain modelling
- » Can embed a local model into a regional model (accounting for regional effects)
- » Model and invert total-magnetic gradient or magnetic amplitude data
- » Direct inversion of remanent magnetization parameters
- » Modelling and inversion with self-demagnetization

### VPem1D

VPem1D is a 1D airborne transient electromagnetic (TEM) inversion program. It is well suited to formation thickness (depth to basement) inversions. Conductivities are bounded by geological contacts.

Key features specific to VPem1D:

- » Designed for inverting moving loop data from airborne central loop and Slingram configurations
- » Horizontal (along-line) or vertical B-field or dB/dt data can be inverted
- » During inversion, each vertical prism is treated as a layered model and the conductivity or geometry of active cells in the model is adjusted to reproduce the observed data
- » Each vertical prism is inverted in 1D within the context of the 3D VP model
- » Multi-moment transmitter systems can be inverted

### VPem3D\*

VPem3D is a fast, approximate, 3D modelling and inversion program for airborne, ground, and down-hole transient electromagnetic (TEM) data.

Key features specific to VPem3D:

- » Inverts airborne, ground and downhole data
- » VPem3D converts dB/dt or B-field TEM decays to resistive limits in order to reduce run times by a factor of 10 or more relative to conventional programs
- » Fast 3D inversion of TEM
- » Inversion can operate on geological models
- » Fast model validation of TEM moment data
- » Conductivities are bounded

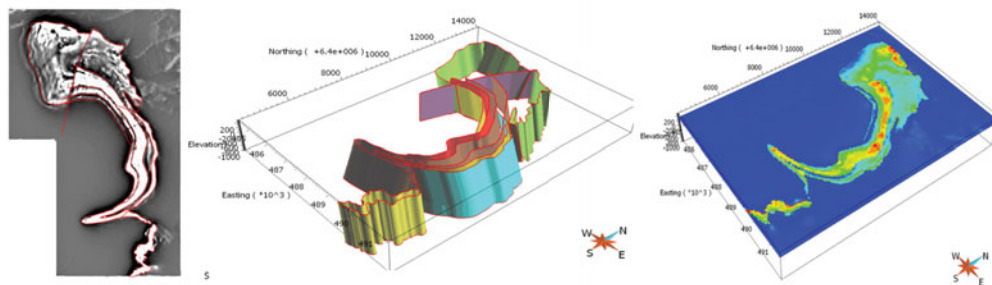
\* VPem3D © Fullagar Geophysics Pty Ltd and University of Tasmania (CODES).

### VPutility

VPutility is a free program to help you create and modify VP 3D models. It is compatible with all VP Suite products.

Key features specific to VPutility:

- » Creates layered-earth VP models
- » Exports VP models to Geoscience ANALYST
- » Constraints include pierce-points on drilled contacts and well-known contacts
- » Layers can be added to build subsurface modelling complexity
- » Creates heterogeneous cell models



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Example of developing a geologically-based model through geophysical modelling, heterogeneous property inversion (right).

  
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