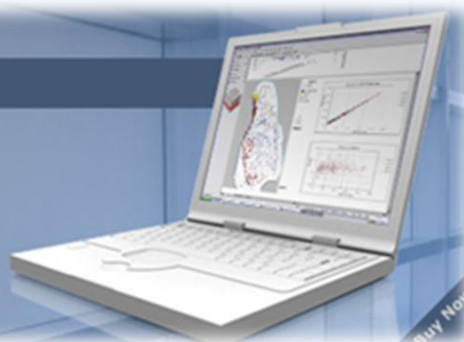


Groundwater Vistas

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Groundwater Vistas is a software package for 3D groundwater flow and contaminant transport modeling, calibration and optimization using the MODFLOW suite of codes.



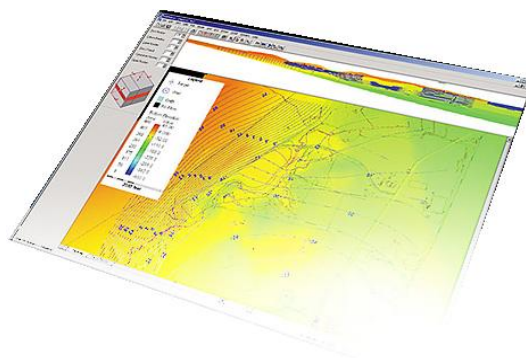
Groundwater Vistas (GV) is a unique groundwater modeling environment for Microsoft Windows that couples a powerful model design system with comprehensive graphical analysis tools. GV is a graphical design system for MODFLOW and other similar models, such as MODPATH and MT3D. GV displays the model design in both plan and cross-sectional views using a split window (both views are visible at the same time). Model results are presented using contours, shaded (color flood) contours, velocity vectors, and detailed mass balance analyses. MODPATH particle traces are also displayed in both plan and cross-sectional views. Another unique aspect of GV is its use of grid independent boundary conditions. Grid-independent boundaries do not change position as the grid is modified. This allows you to make major changes to the mesh without wasting time repairing the location of boundaries.

GV is designed to be a model-independent system. This means that you only need to learn one software program in order to use a wide range of groundwater models. In the current release, GV supports the following models:

MODFLOW, a three-dimensional groundwater flow model published originally by the USGS (MODFLOW88 and a double precision version of MODFLOW96 come with GV),

MODFLOW2000, the second generation of MODFLOW from the USGS incorporating an inverse model for parameter estimation (MODFLOW2000win32 comes with GV),

MODFLOW2005, the latest version of MODFLOW from the USGS incorporating unsaturated flow and grid refinement (MODFLOW2005win32 comes with GV),



MODFLOW-SURFACT, a new version of MODFLOW from HydroGeoLogic, Inc. (www.hgl.com) that includes variably-saturated flow, a sophisticated well-bore model, a radial flow model, an improved recharge package including seepage faces, an improved PCG solver, and a contaminant transport model that incorporates the new TVD solution scheme. TVD allows you to simulate sharp contaminant fronts without the mass-balance problems associated with particle-tracking codes. MODFLOW-SURFACT does not come with Groundwater Vistas but can be purchased separately from ESI. GV supports both MODFLOW-SURFACT version 2.2 and 3.0.

MT3DMS, a three-dimensional contaminant transport model distributed by the Chunmiao Zheng at the University of Alabama (www.mt3d.org). GV supports the latest version of MT3D, called MT3D '99 and the latest public version called MT3DMS.

MODFLOWT, a new version of MODFLOW that includes contaminant transport. MODFLOWT was developed by GeoTrans, Inc. and may be purchased from ESI. GV does not come with MODFLOWT.

MODPATH, a three-dimensional particle-tracking model that works with MODFLOW. MODPATH was developed by the USGS. The initial release of MODPATH supported only steady-state MODFLOW models. The most recent version, however, has been enhanced to include transient simulations. GV supports both versions. ESI has developed a windows interface for MODPATH Version 3.2 (called MODPATHwin32).

PATH3D, a three-dimensional particle-tracking model that works with MODFLOW. PATH3D is sold commercially by S.S. Papadopoulos & Associates and is not included with Groundwater Vistas.

PEST-ASP, a model-independent calibration tool from Watermark Computing. PEST uses nonlinear least-squares techniques to calibrate virtually any type of model. Special software is included with GV to interface PEST with all models supported by GV. The latest version of PEST is called PEST-ASP and is provided at no extra charge with Groundwater Vistas.

RT3D Version 2.5 New! a public version of MT3D that simulates natural attenuation reactions. A command-line version is provided with Groundwater Vistas.

Stochastic MODFLOW/MODPATH/MT3D, monte carlo versions of these popular models. These models are ideal for addressing and evaluating model uncertainty and are available at an extra cost as part of the Advanced Version of Groundwater Vistas.

SWIFT, a 3D flow and transport model incorporating density-dependent flow and heat transport. SWIFT is not provided with GV but is supported by the Advanced Version of GV. Please note, however, that if you have never used SWIFT before, it is not recommended that you start!

All of the supported models may be run from within the GV environment. That means that you simply click a button to create data sets, run the model, and display the results. No other software offers you as seamless an interface to such a wide variety of models!

GV imports a wide variety of files to make model building a quick and painless process! Types of files that may be imported include the following:

MODFLOW data sets. GV can import existing MODFLOW data files that you may already be working on. This allows you to quickly get started with GV.

ArcView shapefiles. GV has the most sophisticated ArcView support of any MODFLOW interface. You can import and export just about any aspect of your model. This allows you to maintain your model in ArcView and then rebuild at any time. You can also make all of your final presentations in ArcView.

Digitized map files. GV imports AutoCAD DXF files, ArcView Shapefiles, and SURFER BLN(blanking) files. These files are automatically converted to the GV mapfile format. No auxiliary software is required.

Calibration target data. Calibration targets are point measurements of head, concentration, drawdown, or water flux that are compared against model-computed values during model calibration. These data may be imported from ASCII files for both steady-state and transient targets.

Boundary condition data. GV imports boundary condition data from delimited ASCII files for any boundary type.

Aquifer property data. GV imports both SURFER gridfiles and delimited ASCII files (X,Y,Z format) to set any aquifer property (e.g., hydraulic conductivity, layer elevations, etc.)

GV offers a wide variety of analysis techniques for viewing the results of model simulations, including the following:

- Head, Drawdown, Concentration, Flux contours
- Head, Drawdown, Concentration, Flux color floods
- Velocity Vectors
- Pathline and travel times from MODPATH and PATH3D
- Mass Balance Bar Charts
- Plot head, drawdown, concentration versus time at monitoring wells
- Parameter Sensitivity Plots
- Head, Drawdown, Concentration, Flux Profiles along a cross-section
- Calibration target scatter plots
- Calibration target hydrographs
- Calibration statistics for head, concentration, flux

A unique and powerful model calibration feature is the new automatic calibration procedure which is part of the GV interface. GV is the only modeling interface to offer a nonlinear least-squares parameter estimation technique right in the interface. This makes calibration a lot easier in many cases. GV also supports three other inverse models, including PEST-ASP, UCODE, and MODFLOW2000. All of these inverse models are provided at no extra charge with GV.

GV offers another unique capability which is a detailed parameter sensitivity analysis. You select the parameter type (e.g., vertical hydraulic conductivity or boundary condition conductance, etc.), the number of simulations, and the parameter value for each simulation. GV then runs the model automatically and extracts both calibration and head-change information.

GV supports Distributed Computing. This allows you to make multiple simultaneous runs on several computers at one time to speed up the monte carlo and auto-sensitivity runs. ESI's Remote Launch software is required to use this feature. Call ESI for details.

GV produces report-quality graphics using any Windows device driver. Output may also be exported to a wide variety of file types, including SURFER, ArcView, EVS, EarthVision, Windows Metafiles, and AutoCAD-compatible DXF files.

GV can now also save figures in a list. Each figure retains all aspects of the display including the size of the view, what is being displayed, model layer, model results, etc. You can quickly scroll through the list of figures and create your own slide show in GV or use it to save final figures for a report.