Release Notes for
SutraSuite

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Summary of release

These Release Notes describe the U.S. Geological Survey (USGS) **SutraSuite** package and give suggestions about how to begin using the software.

SutraSuite contains the **SUTRA** ground-water simulation code and a number of utilities for both pre- and post-processing for simulations in both two spatial dimensions (2D) and three spatial dimensions (3D). All of these codes are briefly mentioned just below (also see table) and are described in more detail in the respective Release Notes that accompany each code.

This version of the **SUTRA** code (*Version 2.1*) adds the ability to use irregular 3D meshes, conveniently incorporate input data from separate files, define schedules to control time stepping and observation output, interpolate observations in time and space, and output observations in an alternative format.

A number of **SUTRA** simulation examples are provided for both 2D and 3D systems together with the **SUTRA** code. A description is provided with each. Also for each example, there are setup files for each of the pre- and post-processing utility codes that may be used for the simulation.

SutraGUI (Winston and Voss, 2003, a revision of Voss and others, 1997) is a pre-processor that is applicable to both 2D and 3D problems. **SutraPrep** (Provost, 2002) is a text-based preprocessor that creates 3D input datasets for **SUTRA** *Version 2.0 (2D3D.1)*, which can also be read by **SUTRA** *Version 2.1*.

There are three post-processors for 2D problems: **SutraPlot** (Souza, 1999); **ModelViewer** (Hsieh and Winston, 2002); and **SutraGUI**. There are two post-processors for 3D problems: **SutraPlot** creates rotatable 3D plots of the mesh, 2D contours of results, and plots of velocity vectors; **ModelViewer** creates rotatable 3D color visualizations of results and plots of velocity vectors.

> **NOTE:** A version of **SutraPlot** that is compatible with **SUTRA** Version 2.1 is currently under development. Please check the web site http://water.usgs.gov/nrp/gwsoftware/sutraplot/sutraplot.html for updates.

Two additional post-processing tools for both 2D and 3D simulations are available. **GW_Chart** can graphically display **SUTRA** fluid, solute and energy budgets, as well as hydrographs for **SUTRA** observation node output, showing pressure, concentration, and temperature as a function of time (Winston, 2000). The utility **CheckMatchBC** aids in setting boundary condition conductances for a **SUTRA** simulation; it checks the match of specified and simulated pressures, concentrations and temperatures and reports the number of matching digits. **GW_Chart** and **CheckMatchBC** are distributed with the installation files for **SutraGUI**.

Examples in 2D and/or 3D for pre-processing and post-processing accompany the utility codes.

All of these codes are available free of charge; however, use of **SutraGUI** requires purchase of a commercial product, ArgusONE™ (http://www.argusint.com).

How to start

After downloading all of the **SutraSuite** files (including **SUTRA** and all utility codes), the user should read both the Release Notes and full documentation provided with each code. Then, try the examples provided with each utility code of interest.

> *Note:*
> For all examples, be careful not to over-write the existing setup, input and output files; it may be best to set up a separate working directories in which to perform experimental runs. Before an example is run, any necessary files should be copied to the corresponding working directory.

Next, the user may try to create and run some of the example simulations provided with the **SUTRA** code. Each example has a complete description given in its '*readme*' file, including example setup, discussion of results, use of pre- and post-processors, and suggestions for further simulations.

In 2D, the easiest examples are *Rocky* (an areal plume simulation) and *Henry* (a variable-density seawater intrusion simulation). Step-by-step instructions for setting up these examples using **SutraGUI** are given the respective *readme* files.

In 3D, the easiest examples are *BF* (a diving plume simulation) and *Pond* (a growing plume intercepted by a water supply well).

The *Rocky*, *Henry*, *Island2D* and *Island3D* examples are also described in the **SUTRA** documentation.

References

Hsieh, P.A., and Winston, R.B., 2002, User's guide to **ModelViewer**, a program for three-dimensional visualization of ground-water model results: U.S. Geological Survey Open-File Report 02-106, 18 p.
http://water.usgs.gov/nrp/gwsoftware/modelviewer/ModelViewer.html

Provost, A.M., 2002, **SutraPrep**, a pre-processor for SUTRA, a model for ground-water flow with solute or energy transport: U.S. Geological Survey Open-File Report 02-376, 43 p. http://water.usgs.gov/nrp/gwsoftware/sutra.html

Souza, W.R., 1999, **SutraPlot**, a graphical post-processor for SUTRA, a model for ground-water flow with solute or energy transport: U.S. Geological Survey Open-File Report 99-220, 30 p. http://water.usgs.gov/nrp/gwsoftware/sutra.html

Voss, C. I., and Provost, A.M., 2002 (Version of June 2, 2008) **SUTRA**, A model for saturated-unsaturated variable-density ground-water flow with solute or energy transport, U.S. Geological Survey Water-Resources Investigations Report 02-4231, 270 p.

Winston, R.B., 2000, Graphical User Interface for MODFLOW, Version 4: U.S. Geological Survey Open-File Report 00-315, 27 p.
http://water.usgs.gov/nrp/gwsoftware/modflow.html

Winston, R.B. and Voss, C.I., 2003, **SutraGUI**, a graphical-user interface for SUTRA, a model for ground-water flow with solute or energy transport: U.S. Geological Survey Open-File Report 03-285, 114 p. http://water.usgs.gov/nrp/gwsoftware/sutra.html

SutraSuite utilities

Utility code	Pre-processor	Post-processor	Description
SutraPrep	*3D*		Generates 3D, regular **SUTRA** meshes and creates input data files for **SUTRA** *Version 2.0 [2D3D.1]*, which can be read by **SUTRA** *Version 2.1. Instructions for using **SutraPrep** can be found in the documentation that accompanies the code.*
SutraGUI	*2D and 3D*	*2D*	Graphical environment for setting up and executing 2D and 3D **SUTRA** runs, and for visualizing results from 2D **SUTRA** runs. *Instructions for using **SutraGUI** can be found in the documentation that accompanies the code.*
SutraPlot		*2D and 3D*	Creates 2D and rotatable 3D plots from 2D and 3D **SUTRA** output data. *Instructions for using **SutraPlot** can be found in the documentation that accompanies the code.* **NOTE:** A version of **SutraPlot** that is compatible with **SUTRA** *Version 2.1* is currently under development. Please check the web site http://water.usgs.gov/nrp/gwsoftware/sutraplot/sutraplot.html for updates.
Model Viewer		*2D (fishnet meshes only) and 3D*	Creates rotatable 3D color visualizations and animations from 2D and 3D **SUTRA** output data. *Instructions for using **Model Viewer** can be displayed by accessing the Help menu.*
GW_Chart		*2D and 3D*	Graphical display of fluid, solute and energy budgets and observation node output, showing pressure, concentration, and temperature as a function of time (hydrographs). *Instructions for using **GW_Chart** can be displayed by accessing the Help menu.*
CheckMatchBC		*2D and 3D*	Checks match of specified and simulated pressures, concentrations and temperatures and reports number of matching digits. This aids in setting boundary condition conductances.