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.

The **SUTRA** code (*Version 2D3D.1*) includes both 2D and 3D simulation capability. The 2D code represents the same hydrologic processes as earlier versions, and the 3D code represents the same processes as the 2D code but in three spatial dimensions.

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.

The pre-processor for 2D problems is the **SutraGUI** (Winston and Voss, 2003, a revision of Voss and others, 1997). For 3D problems, there are two preprocessors: **SutraPrep**, a text-based preprocessor (Provost, 2002), and the **SutraGUI** (Winston and Voss, 2003).

There are three post-processors for 2D problems: **SutraPlot** (Souza, 1999), an upgrade of the former 2D version of **SutraPlot** (Souza, 1987); **ModelViewer** (Hsieh and Winston, 2002) currently restricted to plots for 2D fishnet meshes; 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.

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). For the *BF* example, setup files are provided for both preprocessors, **SutraPrep** and **SutraGUI**.

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., **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, 250 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. *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.*
ModelViewer		***2D (fishnet meshes only) and 3D***	Creates rotatable 3D color visualizations and animations from 2D and 3D SUTRA output data. *Instructions for using ModelViewer 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.