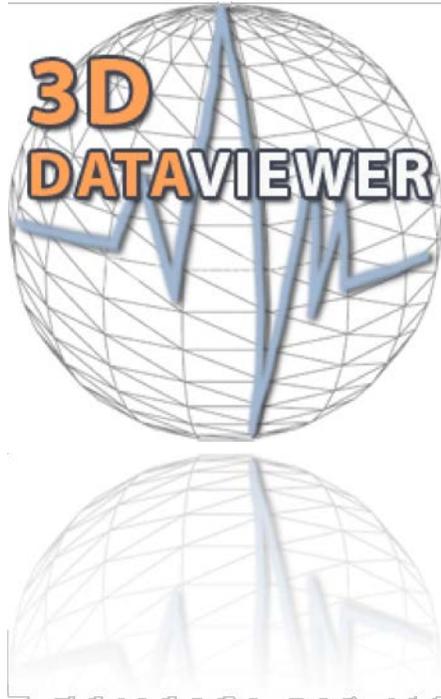


User's Guide

Last Modified March 8, 2013



Introduction

The 3D Data Viewer (3DDV) is a tool that helps researchers to visualize 3D models and to view data plots that reflect data collected during experimentation. Although the tool can be fitted to meet other needs, it was developed to provide researchers who are developing physical models with a way to organize and understand the data that they have collected from embedded sensors. Users typically interact with the viewer by visualizing the 3D virtual model (rotating, zooming in/out, etc) and clicking on the sensors of interest within the model to plot the data acquired, overlaying plots as needed for comparison purposes.

Using 3DDV

In earlier versions of 3DDV, a user would describe her objects within her model and their spatial relationships in an XML file. This may still be done, but nearly all users prefer the relative ease of drawing their model in [Trimble Sketchup](#). 3DDV can read output generated by SketchUp. For those who prefer the file input method, Appendix A covers the topic in some detail.

Starting with Sketchup

Sketchup, a 3D modeling tool, is a free download from Trimble that runs on both Windows and Mac OS X. As of this writing SketchUp is at version 8 and exports Collada 1.5. Collada is the interchange format between Sketchup and 3DDV. More on that later...

While instruction on how to draw models in Sketchup is outside the scope of this document, tips on how to use Sketchup to get the most of 3DDV will be covered. If you are new to Sketchup, Google [provides a series of excellent training videos](#).

The Standard Recipe

Before you start, locate your data file and make sure that it is ready to go with column headers that name your sensors and numerical data (by time) trailing down the column. Also, make sure that you know the location of your site's component library. In the best case, you'll be able to load (rather than draw) most of what you need from your site's component library.

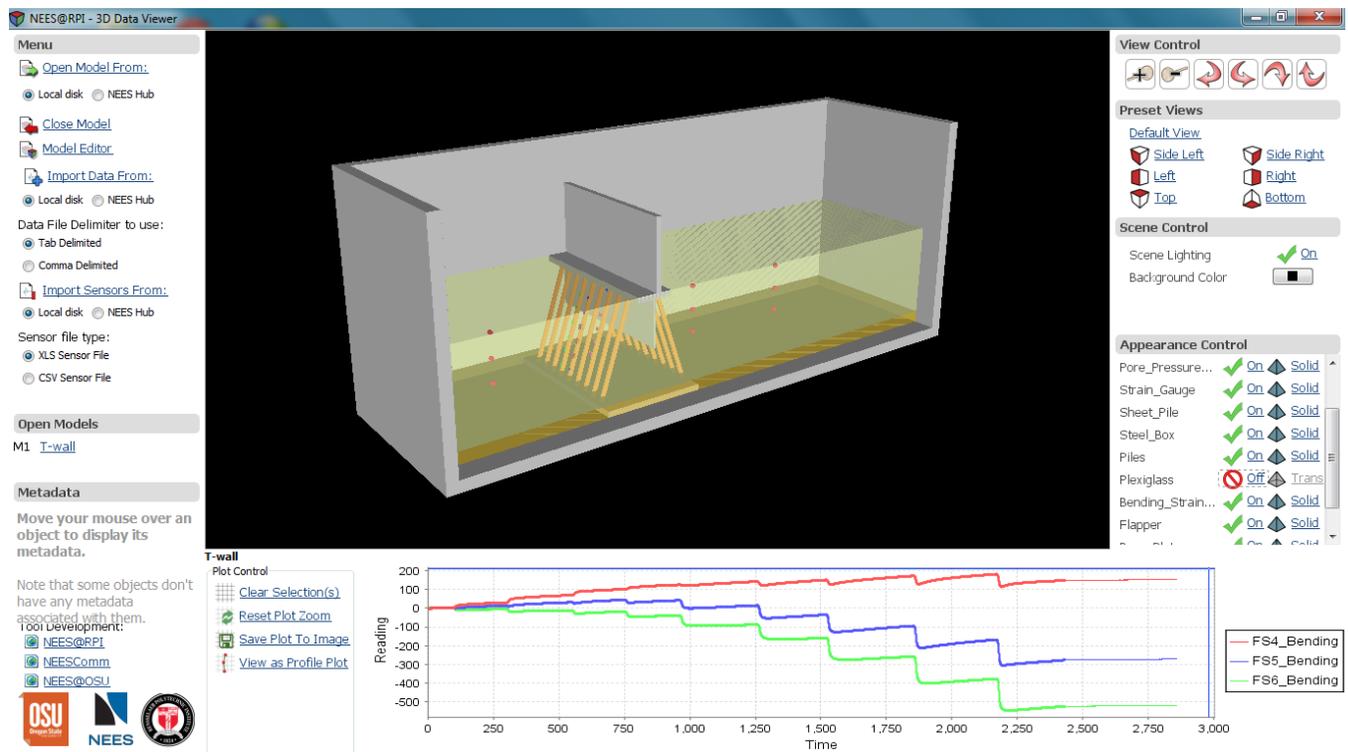
As you go through these steps, you'll notice that much care is taken to make sure that your sensors end up being Sketchup components and that the other objects that make up your model do not. In 3DDV, all components are selectable and components that "wrap" other components -- such as a box that contains sensors -- makes selecting what's inside very difficult.

1. Open Sketchup
2. Using File/Import, browse to your site's component library and import at least one instance of any component that applies to your model -- a box, sensors, structures. A single instance of each will do once you've learned how to make copies in Sketchup. (Learn how [here](#)).
3. Move all your components into place, making copies as needed. [NOTE: if you group your sensor components, they are not individually selectable within Sketchup.]

4. If you create a sensor (as opposed to import one), make it into a component. Right-click, Make Component.
5. Referring to your data file, attach a name to each of your sensors. Off-click on each sensor and choose *Entity Info* off the menu. *Name* is one of the fields.
6. Because components tend to obscure what's inside, explode, then group, any components that are not sensors. Right click, choose *explode*. Right click, choose *group*.
7. Create any objects that you need that are not represented in the local components library.
8. If you want to have any objects transparent within 3ddv, you need to define transparency within Sketchup. To do so, go to the Edit tab of the Fill (bucket) tool and change the Opacity. The lower the number, the more transparent the object.
9. Once your drawing is ready, export it (*File/Export/3D Model*).
10. Open the 3D Data Viewer and import the Sketchup export.
11. Then, set your separator – comma or tab -- and import the data file.
12. At this point, you should be able to select your individual sensors and view the associated data in the section at the bottom of the viewer. Turn off or make transparent any layers that obscure your view.

Operating 3D Data Viewer

The 3D Data Viewer has a pretty simple interface.



The model is displayed in the top center.

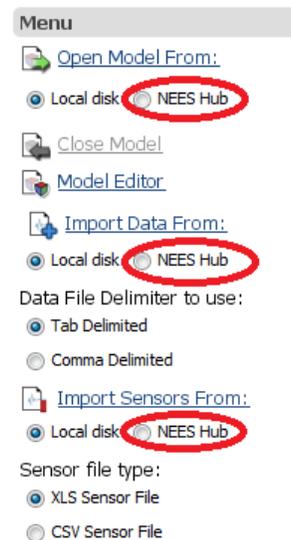
To its left, in the upper left corner are controls for loading and unloading models and loading a data file.

In the upper right corner are controls for zooming and repositioning the model. You may also use your mouse to zoom and reposition.

- To zoom, scroll.
- To pan, click and drag.
- To reposition the model, right-click (on a Mac command-click) and drag the model.

The bottom section is for plotting, controls on the left and plots on the right. If you click View Profile Plot, another window will pop up allowing a plot of highlighted sensors versus time.

New Features:



NEESHub integration:

NEESHub integration requires an account on <http://nees.org>. If you have an account, you can choose “NEES Hub” for any of the “Open From” options. Enter your username and password in the dialog box. You can now browse for your files. All accessible projects are initially shown including public projects. You can use the filters to reduce the number of projects displayed. “Project Name” can be used to look up by project id.

Model Editor:

The model editor allows for alterations to sensor configurations within 3DDV. Sensors can be added, excluded, renamed, and created. Changes can be saved for later use or distribution. Controls in the editor are intuitive and well labeled. The model editor also has the ability to save models and data as a single file. To do so, save the model and use the .3ddv extension on the end of your filename.

Sensor Ingestion:

Sensors can be imported from text files or Excel files. This facilitates making a Sketchup model of the experiment with a base sensor configuration or no sensors. Sensors can then be added via file for different sensor configurations using the same base model. The format of the file and an example follows:

No.: Unique numerical identifier for each sensor in the file

Name: Sensor name, should match the name of the sensor in the data file

Group: Sensors in the same group can be modified in Appearance Control as a group instead of individually

Location X, Y, Z: The X, Y, and Z coordinates of the sensor. The units and magnitudes will be highly dependent on your Sketchup model.

Shape: Possible shapes are sphere, cylinder, cuboid, and cube.

Color: Possible choices are: black, white, red, blue, green, yellow, orange, brown, and gray

Size: Each shape has a specific sizing definition. Cube and Sphere have a single number, the side length and radius respectively. Cuboid takes 3 values, length along the X axis, length along the Y axis, and length along the Z axis. Cylinder takes 4 values, radius, X, Y, Z coordinates of center of base.

Example Sensor File:

No.	Name	Group	Location X	Location Y	Location Z	Shape	Color	Size			
1	Sensor L1	Pore Pressures	5	5	5	sphere	blue	0.2			
2	Sensor L2	Pore Pressures	5.5	5	5	cylinder	orange	0.2	5.5	5.5	5
3	Sensor L3	Group 8	5	5	5.5	cuboid	red	0.2	0.4	0.1	
4	Sensor R1	Axials	5	6	5.5	cube	yellow	0.25			
5	D2_5_Axial	Group 8	5.5	6	5	cube	green	0.25			
6	Sensor R3	Snunu	7.5	6	5	sphere	orange	0.75			
7	Sensor R4	Snunu	5.5	7	5	cube	green	0.25			