

INSTALLATION GUIDE

INSTALLING VENSIM SOFTWARE


Vensim comes in several different versions. Vensim PLE will be sufficient to follow the course. Vensim PLE can be downloaded from the Vensim website at <http://vensim.com/download/>.

VENSIM FEATURES

Exhibit 1 presents an annotated illustration of the Vensim window through which the user accesses the model creation interface. This exhibit serves as a guide that will be referred to throughout this document as different features of the model and Vensim software are described. Specific features of the Vensim window are labeled with green circles, including a number of the controls available on the vertical and horizontal toolbars across the top and left side of the window. These features and controls include:

- 1) Menu for navigating across modules
- 2) An example of an Auxiliary/Constant variable
- 3) Causes Tree and Uses Tree tools
- 4) Equation tool
- 5) Where to name and run a simulation
- 6) Graphing tool
- 7) Table tool
- 8) Subscript Control
- 9) Runs Compare tool
- 10) Control Panel

NAVIGATING THROUGH THE MODEL

Vensim has the capability of separating a large model into individual sketches or modules, making it easier to organize and view a complex model. To navigate through the model by selecting a module, use the menu at the bottom left of the Vensim window identified as  in Exhibit 1.

VARIABLES AND RELATIONSHIPS


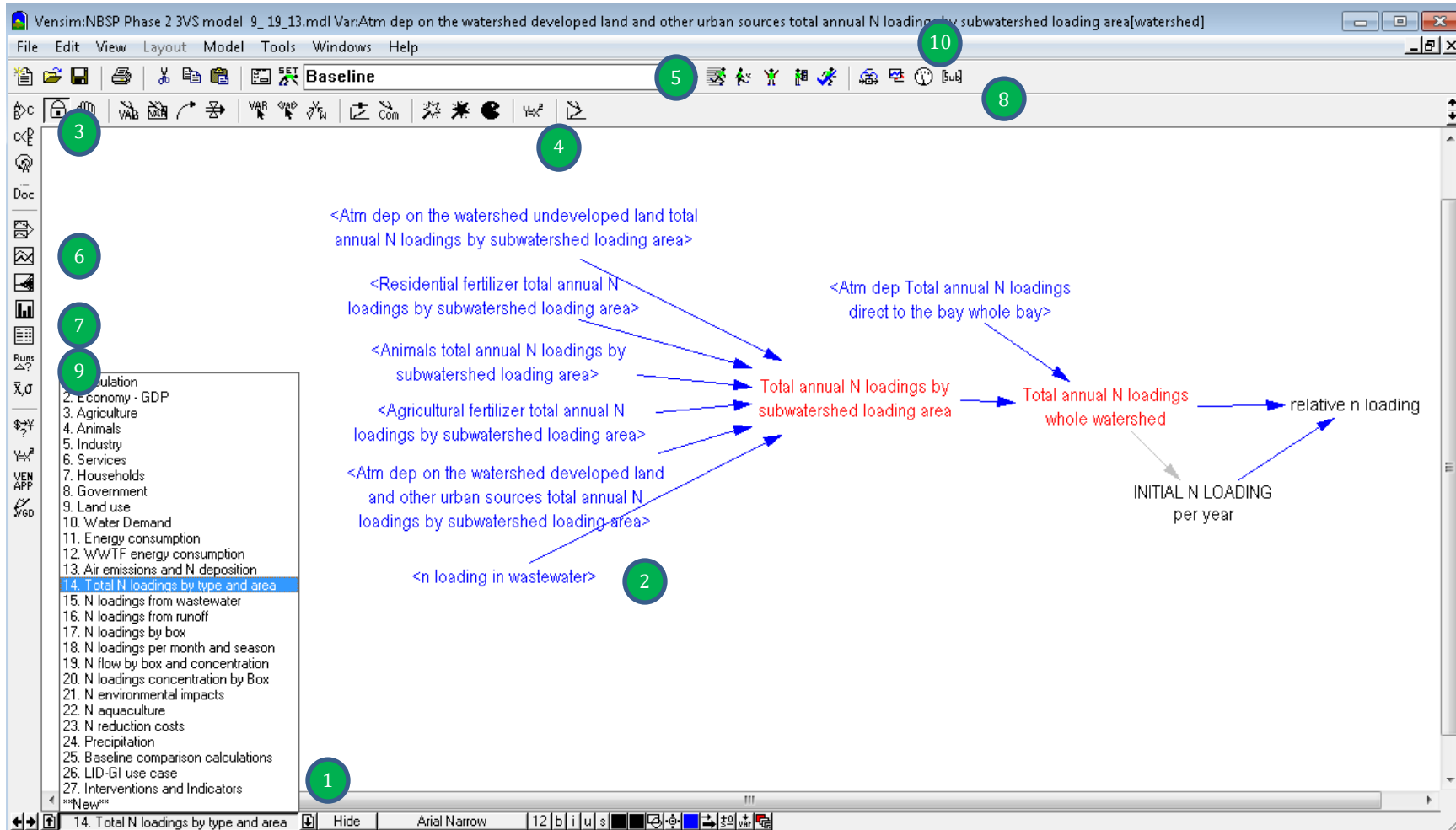
There are three different types of variables in Vensim: box variables, flow variables, and auxiliary/constant variables (labeled as  in Exhibit 1). A box variable represents an accumulating quantity (i.e. a stock) and has associated inflows and outflows. Auxiliary/constant variables are constants or calculated values that can affect inflows and outflows or other auxiliary/constant variables. The arrows represent relationships between variables; a given auxiliary/constant variable can be affected by all other variables with arrows pointing to it.

EXHIBIT 1. VENSIM WINDOW



Note that the views of Vensim included in this guide were created with version 5.11A. The icons in the controls in the toolbars across the top and along the side of the Vensim window have changed in the most recent version of Vensim (6.1); however, the names and the locations of these controls have remained the same.

SHADOW VARIABLES AND CAUSES/USES TREES

Variables that are colored blue in a module are called shadow variables. These variables are included in a specific module because they interact with other variables in the module, but they are calculated in another module; therefore, it is not immediately apparent what variables affect them. Similarly, it can be difficult to discern whether a variable in a given module influences variables in other modules.

Vensim provides tools to isolate a variable and identify which upstream variables affect it or which downstream variables are affected by it. These tools are the Causes Tree and the Uses Tree. To use these tools, click on the variable and then click on the Causes Tree or Uses Tree button, labeled as 3 in Exhibit 1. Exhibit 2A shows how these tools can be used to trace causes or uses two steps away from the variable. This is especially useful for looking at shadow variables, which can have relationships that span multiple modules.

EQUATIONS AND CONSTANTS

Each variable is defined by either an equation or a predetermined value, which may vary with time. To see how a variable is defined, first right-click on the variable name to open the variable options window, shown in Exhibit 1 (or selected the “equation editor tool” in the top menu). Clicking the equation button will open the equations window which will show either a single value, a lookup range which varies with time, or an equation based on other variables. Examples of each of these types of variable definitions are provided in Exhibits 4, 5A, and 6. The equations window can also be opened by clicking the equations tool, labeled as 4 in Exhibit 1, and then clicking on a variable.

EXHIBIT 2. CAUSES TREE

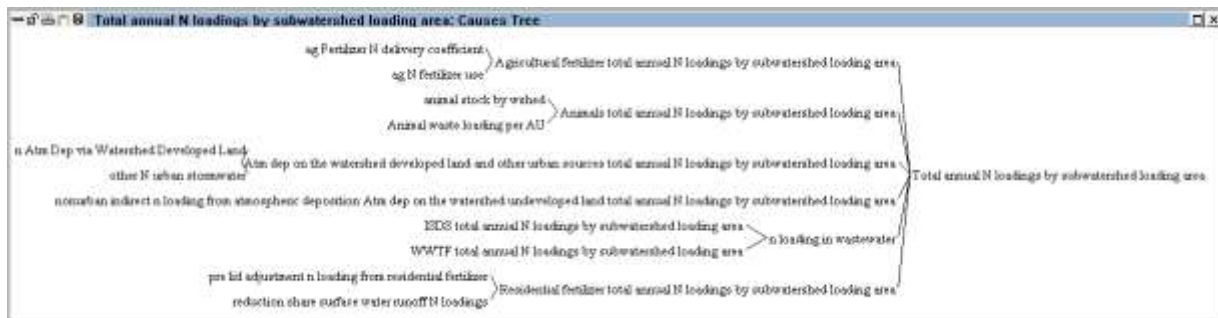


EXHIBIT 3. VARIABLE OPTIONS WINDOW

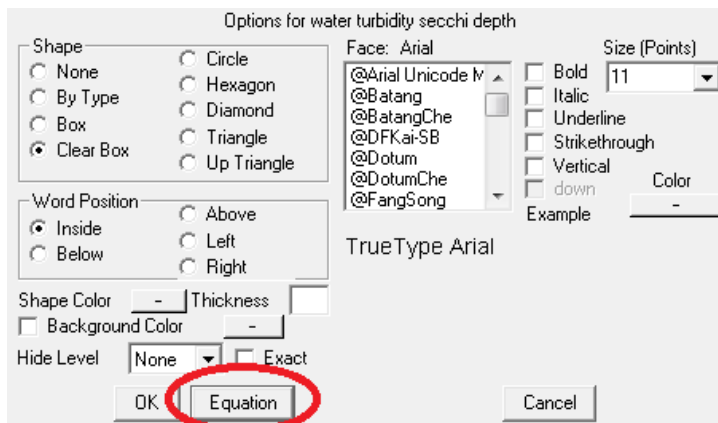


EXHIBIT 4. SINGLE VALUE VARIABLE EXAMPLE

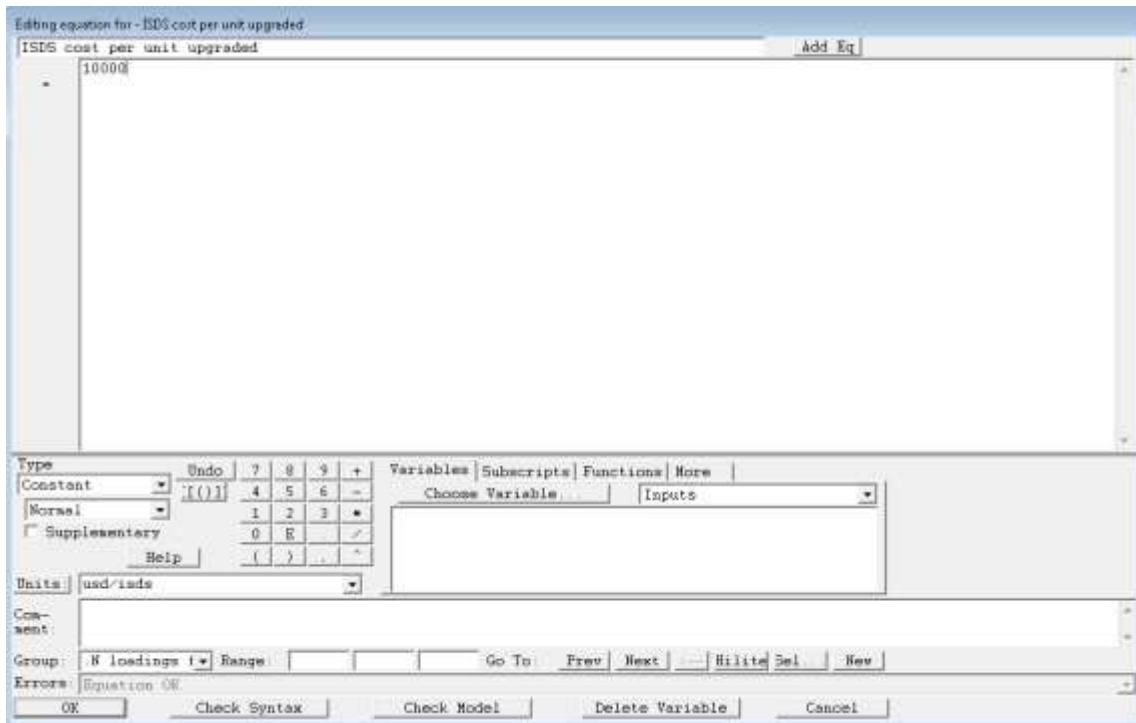


EXHIBIT 5A. TIME-BASED VARIABLE EXAMPLE

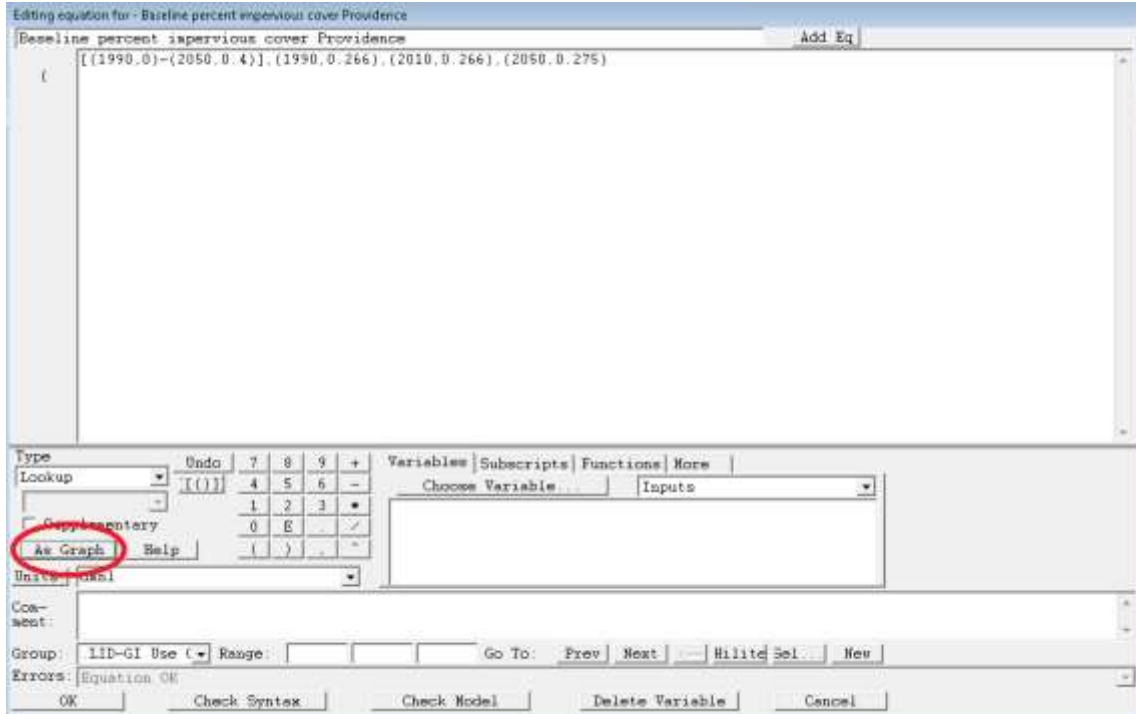


EXHIBIT 5B. TIME-BASED VARIABLE EXAMPLE - VIEWED AS GRAPH

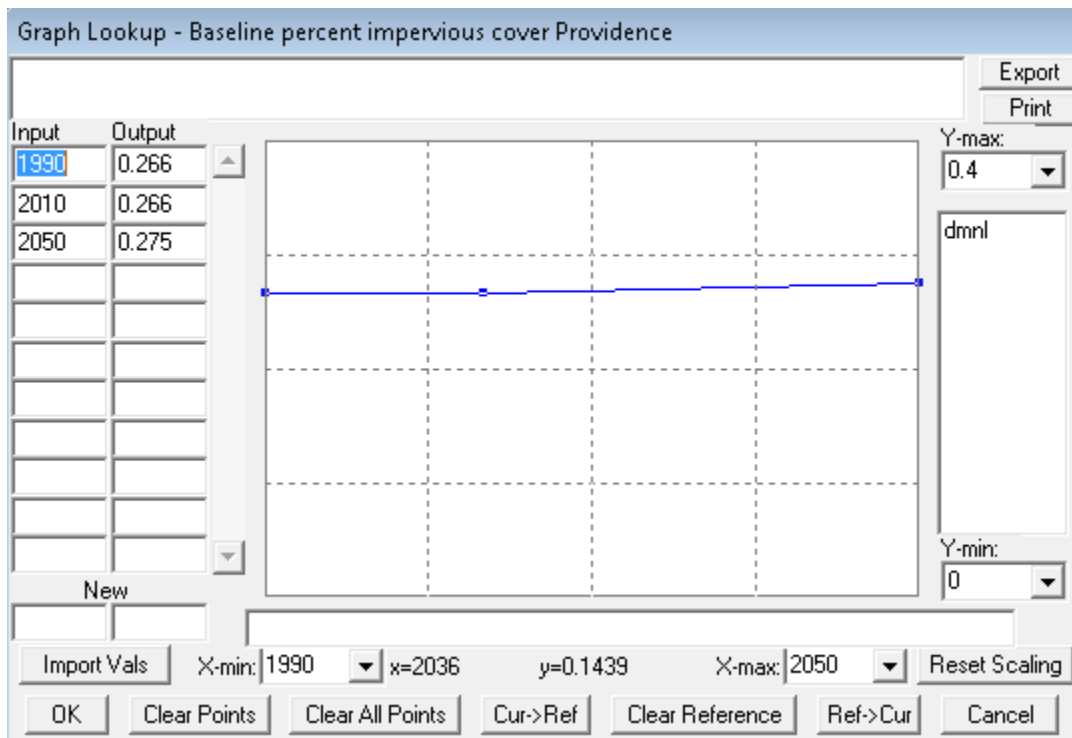


EXHIBIT 5C. TIME-BASED VARIABLE EXAMPLE - WITH SUBSCRIPTS

Editing equation for - WWTF percent reduction in N loading by subwatershed loading area (1/8)

WWTF percent reduction in N loading by subwatershed loading area[BLACKSTONE ABV MANV: 1 Del

= WITH LOOKUP (

Look up ((1990,0)-(2050,1), (1990,0), (2010,0), (2014,0), (2015,0), (2025,0), (2050,0))

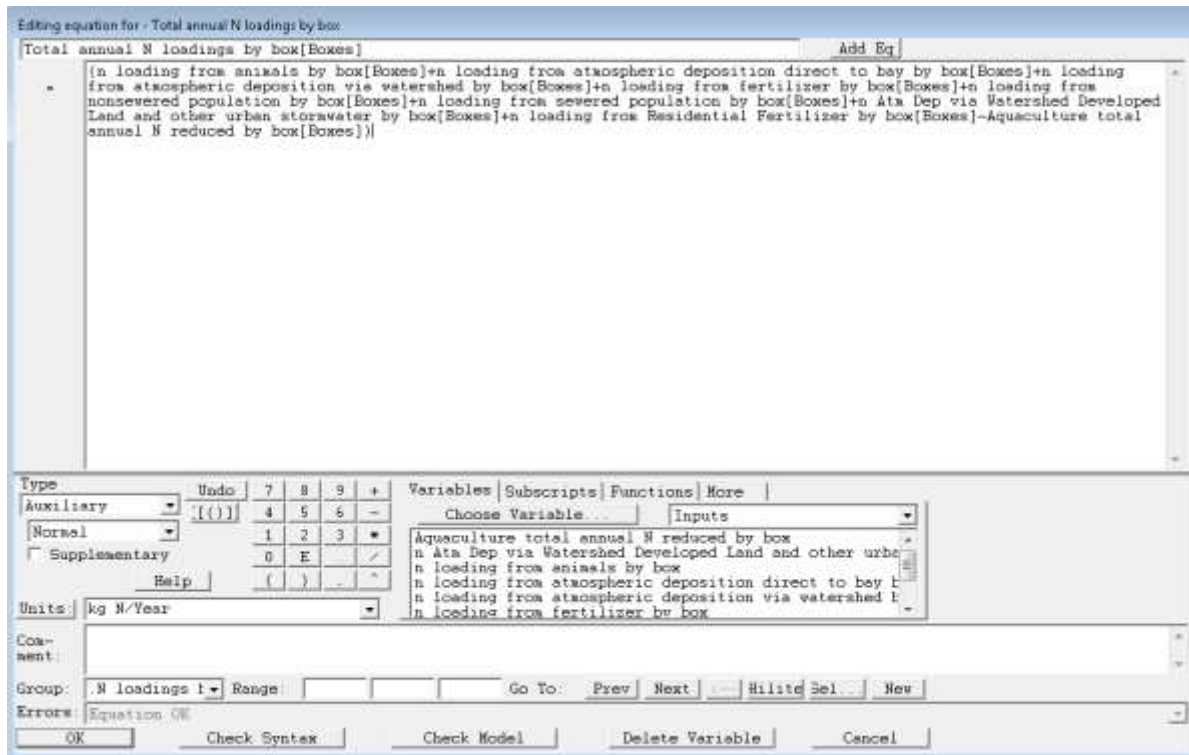
Type: Auxiliary

Units: dmnl

Group: .N loadings f Range: Go To: Prev Next Hilite Sel... New

Errors: Equation OK

EXHIBIT 6. CALCULATED VARIABLE EXAMPLE



RUNNING A SIMULATION

Clicking on the “Simulate” button (to the right of **5** in Exhibit 1) will run this scenario. Once variables in the model are changed to define a new scenario, enter the scenario’s name in the scenario name window (to the left of **5** in Exhibit 1) and click the “Simulate” button. Since multiple scenarios can be stored and viewed at one time, it is useful to use a descriptive name so that they can be easily distinguished.

VIEWING RESULTS

Once a simulation has been run, results can be viewed for any variable in the model. Results for all loaded simulations can be viewed as either a table or graph. Though Vensim provides several graphing options, this guide only describes line graphs, which display variables as a time series, and custom graphs, which are available for specific variables only.

Graphs and Tables

To view a graph, first click on the desired variable and then click on the graph button (see **6** in Exhibit 1). Alternatively, a user can right-click on the graph button to launch the Graph Options window (see Exhibit 7). By checking the “Activate on variable selection” box (circled in red) the user can then launch a graph by simply left-clicking on a variable. To deactivate this setting, uncheck the box. To view a table, first click on the desired variable and then click on the table button (see **7** in Exhibit 1).

For graphs, the user can zoom in to see more detail. By holding down the shift key while clicking and dragging to the side a new time range can be set. Similarly, by holding down the control key while clicking and dragging up or down a new vertical range can be set. The selected ranges will appear once

you close and reopen the graph. To refresh just the vertical range of the graph, either click the graph button again (see 6 in Exhibit 1) or close and reopen the graph. The Time Axis tab in the Control Panel window (see Exhibit 8) can be used to alter the time range and to reset both the time and vertical axes of output graphs. The “Reset to Full Range” button, circled in red, will make all graphs display the original full range of values.

EXHIBIT 7. GRAPH OPTIONS WINDOW

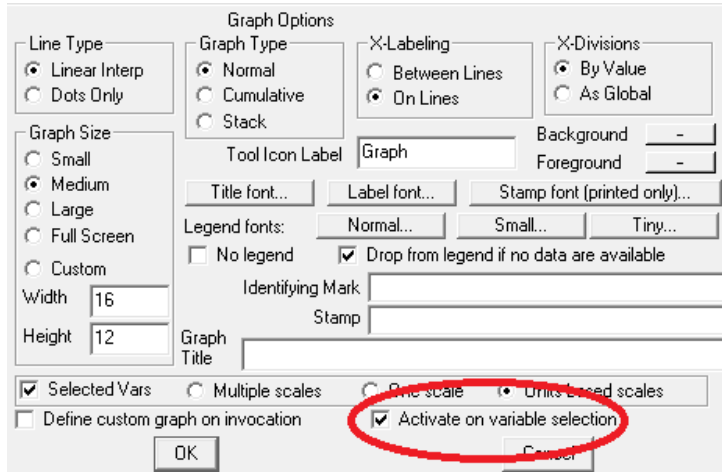
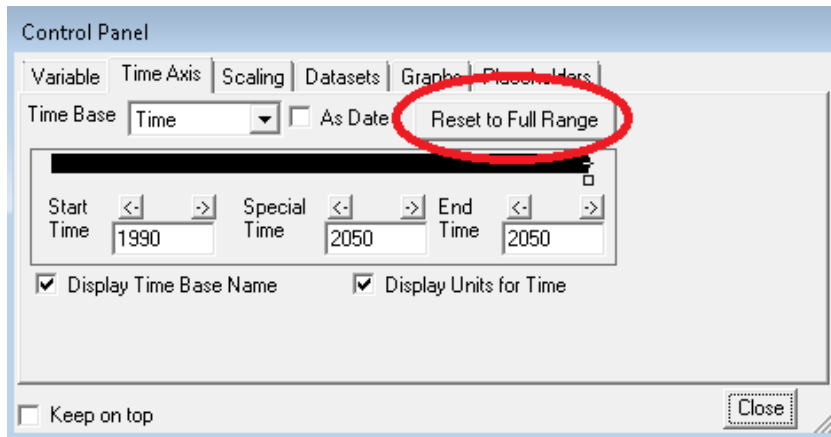


EXHIBIT 8. CONTROL PANEL WINDOW - TIME AXIS TAB



Comparing Multiple Simulations

If a user has run multiple simulations, the Runs Compare tool, can help track how the inputs differ between the simulations (see 9 in Exhibit 1). The tool compares this scenario to the Baseline and shows which inputs were changed from baseline values when the scenario was run.

Users can create and save multiple simulations in Vensim and select which of them will be included in graphs and tables. Clicking on the Control Panel button (see 10 in Exhibit 1) will open the Control Panel window, which has multiple tabs; the Datasets tab will list all loaded simulations, as shown in Exhibit 9. Simulations can be moved between the “Available info and “Loaded info” windows and those in the “Loaded info” window will be displayed in graphs and tables.

EXHIBIT 9. CONTROL PANEL WINDOW - DATASETS TAB

