Chapter 8: Elevation Data

SADA permits user's to bring in elevation data into their analysis. The same types of grid file formats for importing gridded data discussed in the previous chapter apply to elevation grid data. SADA allows users to import Digital Elevation Models or DEMS. Regardless of the type, be advised that SADA DOES NOT perform any type of projection or coordinate conversions. The user is responsible for making sure the elevation information and any sampled or modeled values applied are reconciled before bringing them into SADA.

It may be that you don't have access to local elevation information and may want to construct your elevation contours from elevation point measurements taken across your site. If this is the case, simply import the elevation data through the standard sampled or point data format (see chapter?). You can then contour the elevation measurements and store the model (see chapter ?) . If you do have elevation information from outside SADA the following formats are permissible.

Standard SADA Grid, Float Grid, and ASCII Grid

Just like in the import model case, SADA recognizes three types of gridded data formats for elevation: SADA grid (*.csv), float grid (*.hdr), and ascii grid (*.txt). The float grid and ascii grid formats are industry standard formats that most GIS or contouring packages typically export too. You can also bring in elevation in a SADA file format but this isn't really necessary since that format is usually associated with 3d data.

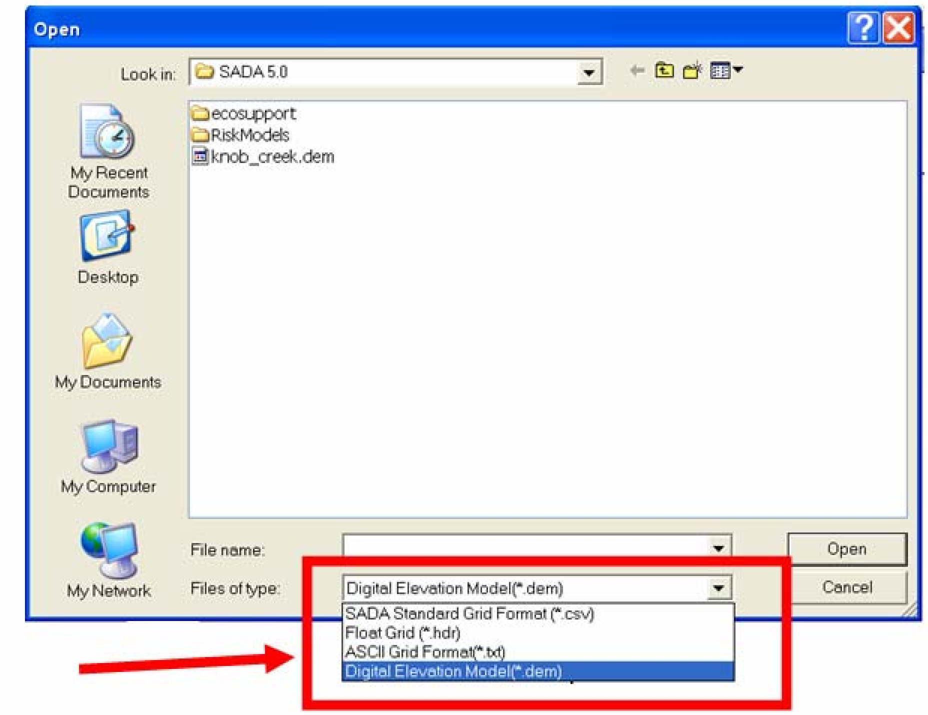
Digital Elevation Model (DEMS)

A digital elevation model (DEM) is a standard GIS format for storing often very dense elevation data. The USGS provides a great deal of elevation data as DEMS, typically very dense and often in UTMs. SADA does not convert UTMS and unless your data set is in UTMs or you have made the conversion outside of SADA you should not use DEMS.

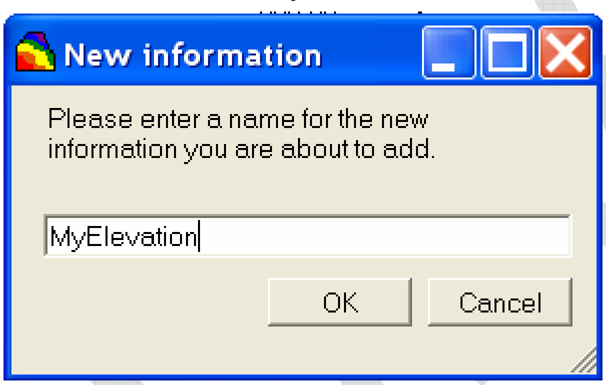
Importing Elevation Data

We'll use a quick example to show how import some elevation data into SADA. First, open SADA and open the SADA file MyEmptyFile.sda. This is an empty file so SADA will ask us questions about adjusting site boundaries and so forth when we bring the elevation data in.

From the main menu select Data→Import Elevation Data. SADA presents the standard open windows form. As in the case of importing gridded data click on the File Type to choose the type of file you wish to import.

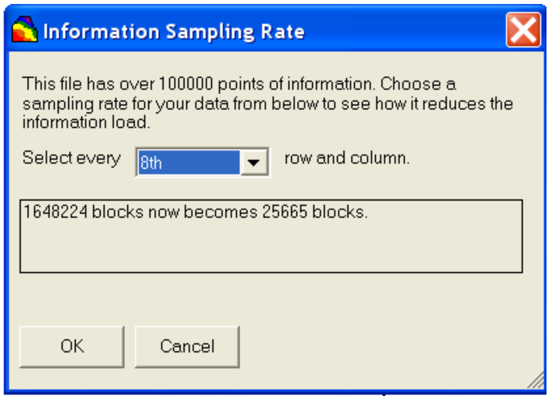


Next select the file knob_creek.dem and press Open. This is elevation data in the east Tennessee area. In the next window provide the name you wish to call your elevation set. In this case we'll call it MyElevation. Press Ok.



Thinning The Data

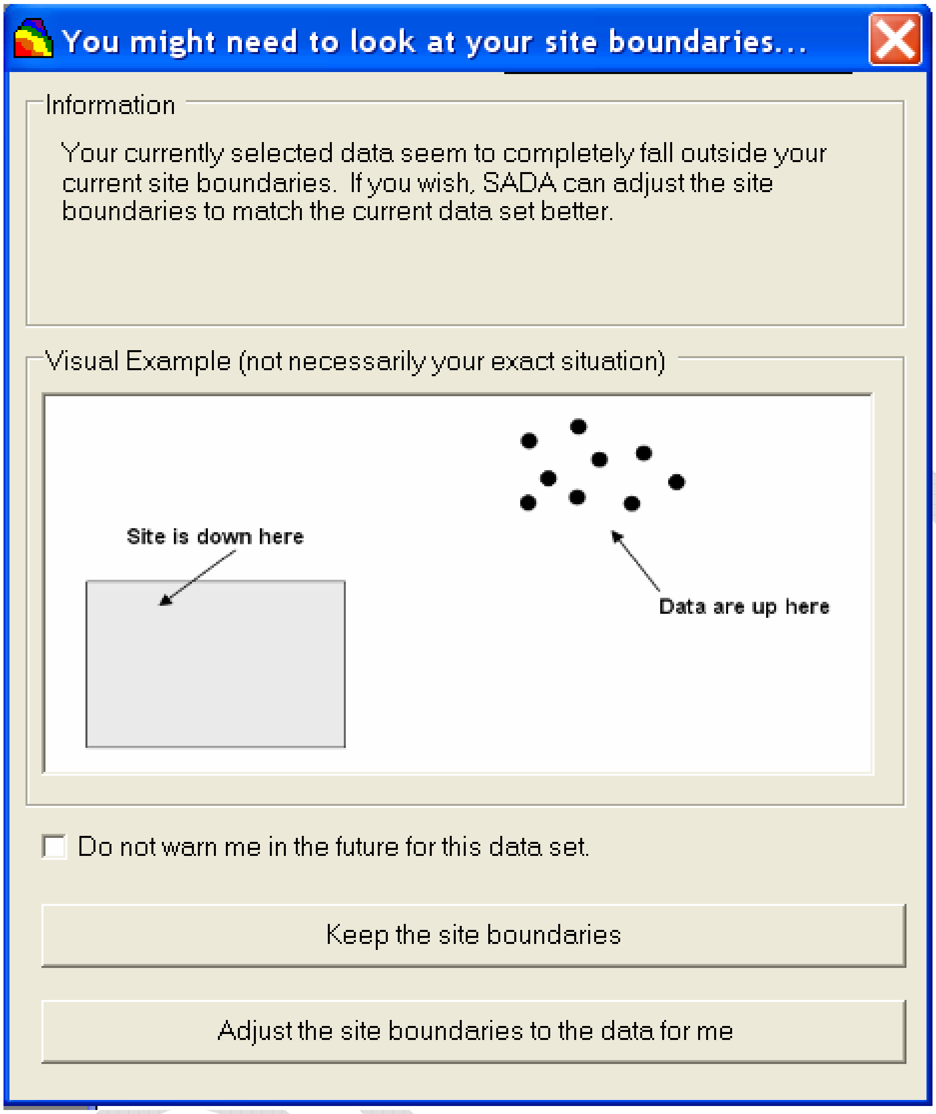
If your information set has a very large number of data it may be practical and even desirable to thin the data set some so that it does not consume an inordinate amount of resources. This is likely to be the case when importing geophysical data, elevation data, and so forth. If this is the case, SADA will present you with a window for selecting a subset of the data.



Thinning is done geometrically by selecting every other value, every fourth value and so forth. By changing the sampling rate you can see the impact on the number of samples or grid cells. Select 8th from the drop down options and press OK.

Adjusting Site Boundaries

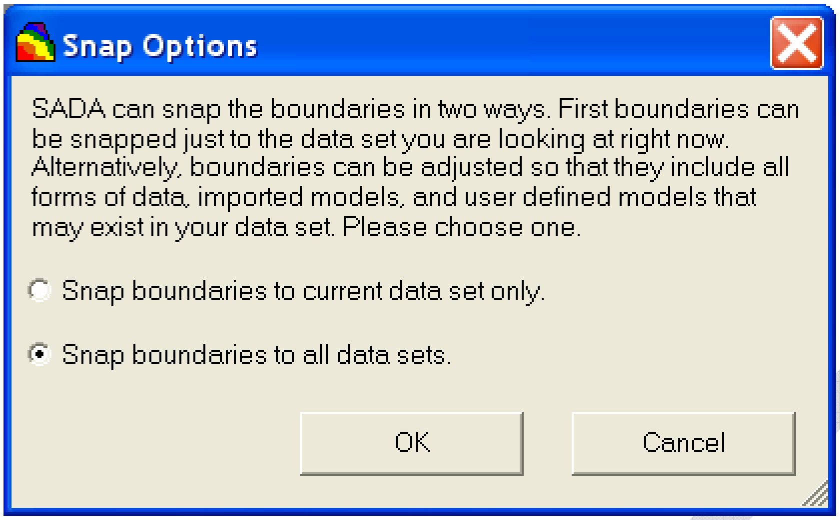
As you know from reading previous chapters, if you import information into your SADA file that has horizontal spatial extents that are beyond the current site boundaries, you will be presented with an opportunity to change the site boundaries to include the current data. This is an action that you may or may not wish to take. For example, certain elevation sets exceed site boundaries, but you do not want to include the entire elevation set. When SADA sees this situation, you may be presented with the following opportunity:



You may either keep the site boundaries or adjust them. For data sets that you regularly visit but do not wish to be warned about select the **Do not warn me in the future for this data set** option. If you regret selecting this you can reverse it by visiting

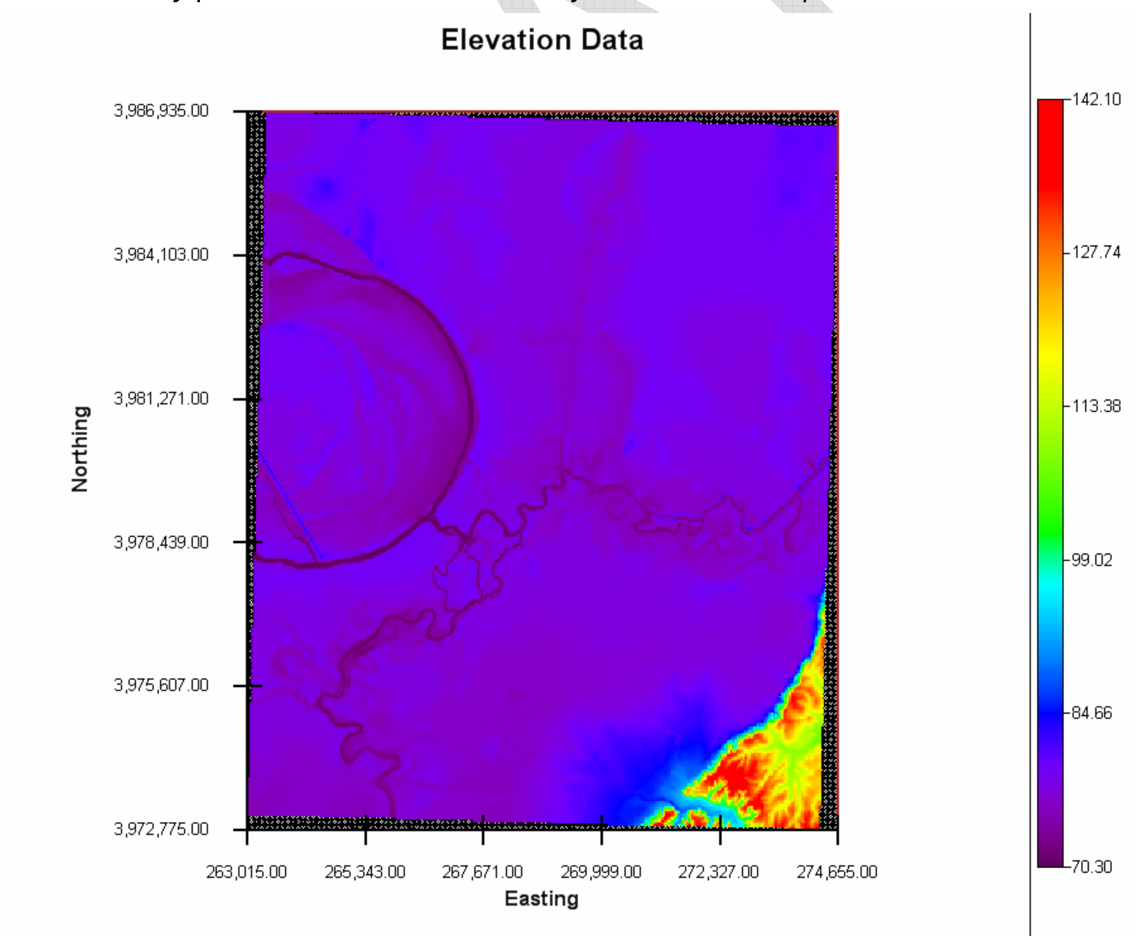
Tools→Warning Options→Site Boundary Problems→Turn Warnings On. (xxx link to the menu topic on this warning options)

If you choose to adjust the site boundaries, you are presented with another option. For this example, indicate that you want to adjust the site boundaries.



Here you can choose to snap the boundaries to the current data set or snap them once and for all to all data sets found in your SADA file. This will automatically update your Site Boundaries information found in your setup the site step. Choose to snap boundary to all data sets (we only have one – MyElevation so selecting either option here is really the same thing).

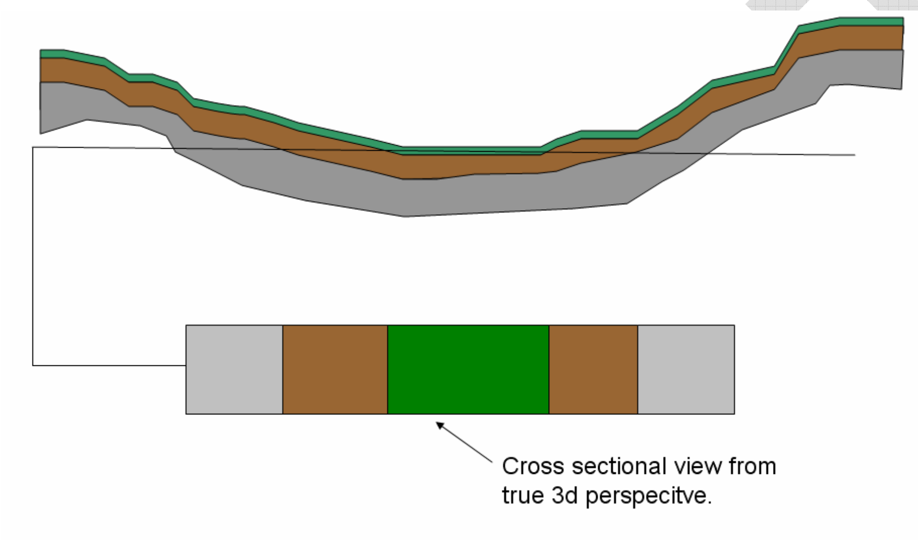
You are finally presented with the results of your elevation map.



Using Elevation Data In Your Work

Elevation in SADA is used primarily in the 3d viewer. There is a chapter on using the 3d viewer that you may want to look at later in your readings. Essentially, this 3d viewer will use elevation to properly position data points and model cell values in correct relation to each other vertically so that land contours are represented in the final outcome.

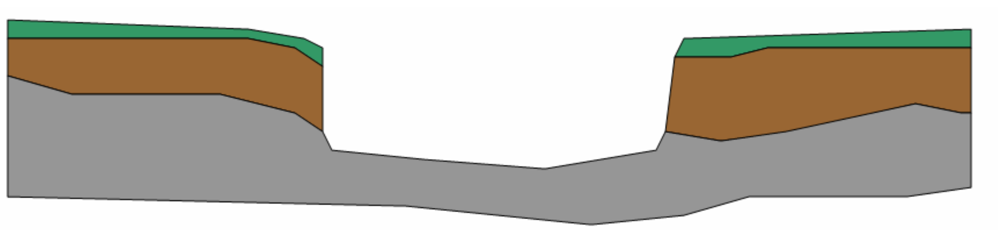
It is important to note that SADA's basis is always "depth below surface". This is how vertical layers are defined and how geospatial modeling is done. Using depth below surface to produce for example geospatial models can be advantageous over using elevation. Consider the following scenario. We have a shallow valley with a subsurface geology that is in a typical pancake formation.



From a geospatial perspective, this would be a difficult way to assess correlation structures, particularly anisotropic conditions. In order to assess the spatial structure, it would need to be broken into subsections in which the lower part of the valley sees fairly horizontal correlation structures,where the left side of the valley sees correlation structure on a downward angle, and the right side of the valley sees structures on an upward angle.

Instead, if you view the modeling from depth below surface, you can see that the really you have fairly consistent layers when measured by the depth so that a single correlation structure (and geospatial model) may suffice to model the entire domain. So you first model the domain and then correct in the visualization for elevation.

A situation where will need a little more attention is seen in the following schematic.



Here we have a ditch, canyon, or perhaps an excavation situation. In this scenario, you can still attack it with the depth below surface approach. You'll just need to use your polygon tools to exclude the enter portion.

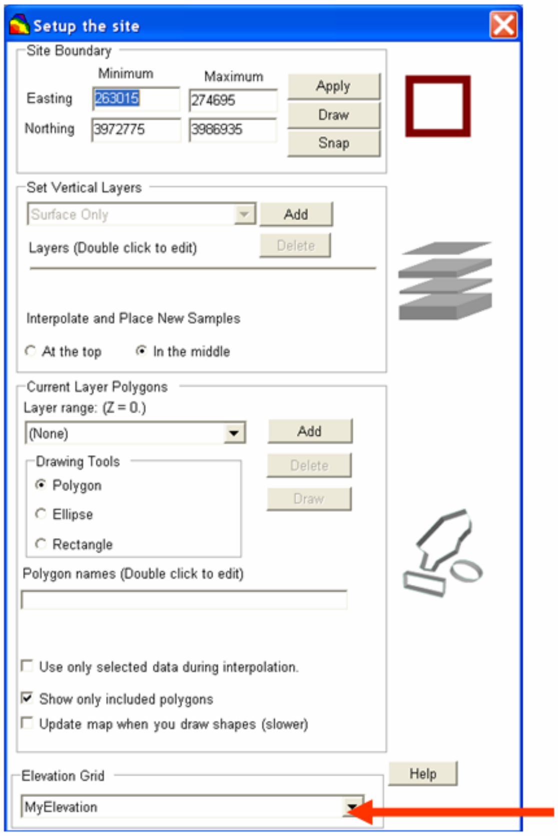
To turn the elevation on in your 3d viewer you need to visit the step “Setup the site”. At the lower portion of the parameter window you'll see a drop down list of your elevation models. You would select MyElevationModel in this case. No change will be apparent until you actually use the 3d viewer.

Generating Elevation Coverage From Scratch

In many cases, users don't have access to elevation data or don't know how to properly project it before bringing it into SADA. This is actually an advanced GIS operation in many cases. However, users may have quite a bit of elevation data stored in their measured samples data set. Sometimes the elevation is recorded with each sample. Users could extract this information into a separate data set using Excel. In this separate data set, the information would be created with the following fields

Easting, Northing, Depth, Elevation Value, Name

Depth is meaningless but should be added to the data set with a value of zero in each record. Name is meaningless but should be added with a value of "elevation" for each record. Both of these fields are included only because SADA requires them in the next step. Now one can import this into SADA as a point file (see above). Once the elevation data is in SADA as a set of point values, use a fine grid and natural neighbor interpolation to contour the elevation values. If the sampling is representative enough of elevation changes the result may be adequate. Once this is created export the model (xxx link to exporting models) as elevation.csv. SADA will automatically export the results as a standard SADA grid. You can now bring this file back in using the methods under the SADA Grid format method described above to create an elevation data set for yourself.



You can now close your file and save it if you like.

