GEON LiDAR Workflow (GLW) output and ArcMap
Users Guide

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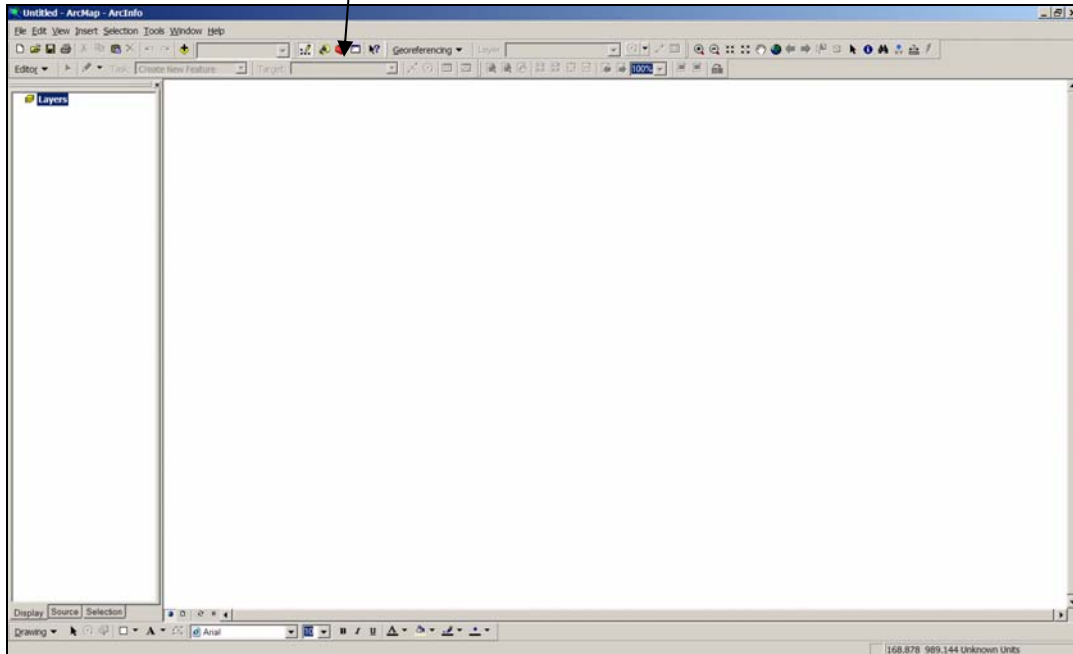Arizona State University

24 October 2007
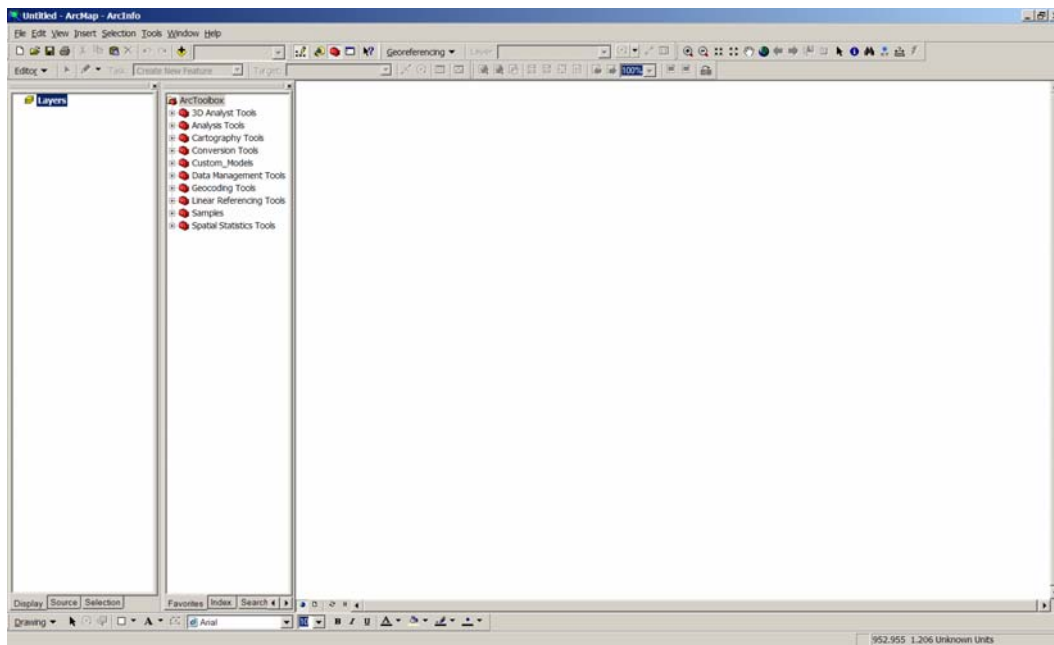
http://lidar.asu.edu

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Importing GLW output into ArcMap
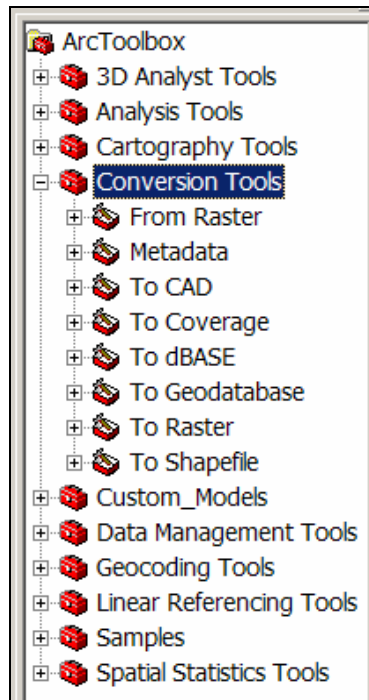
Open ArcMap and click on the toolbox button.

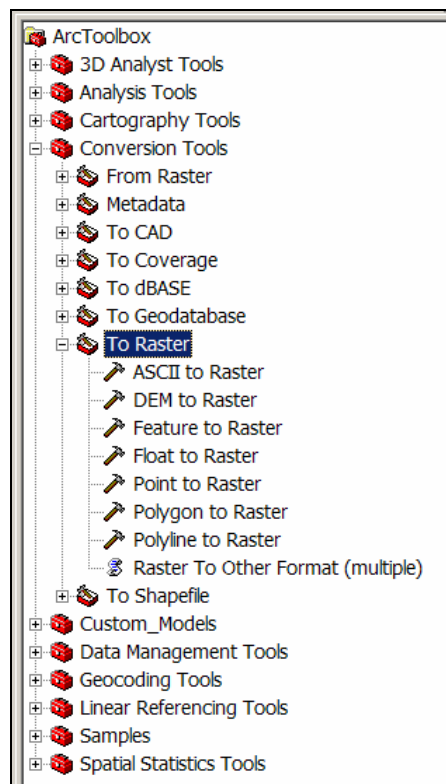Click on the toolbox button to open the toolbox window.

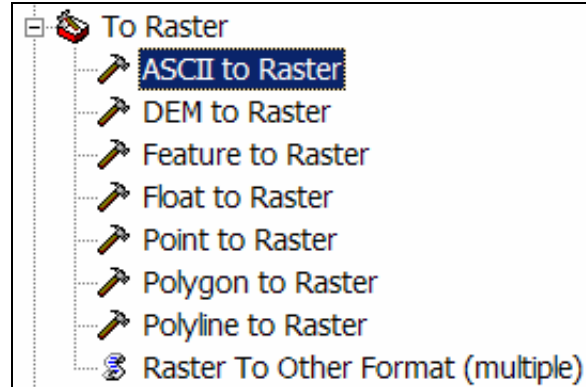The toolbox window will open as a pane as shown below.

Click on the **Conversion Tools** option. This will expand the menu.

Click on the **To Raster** option. This menu will expand further.

Select the **ASCII to Raster** option.
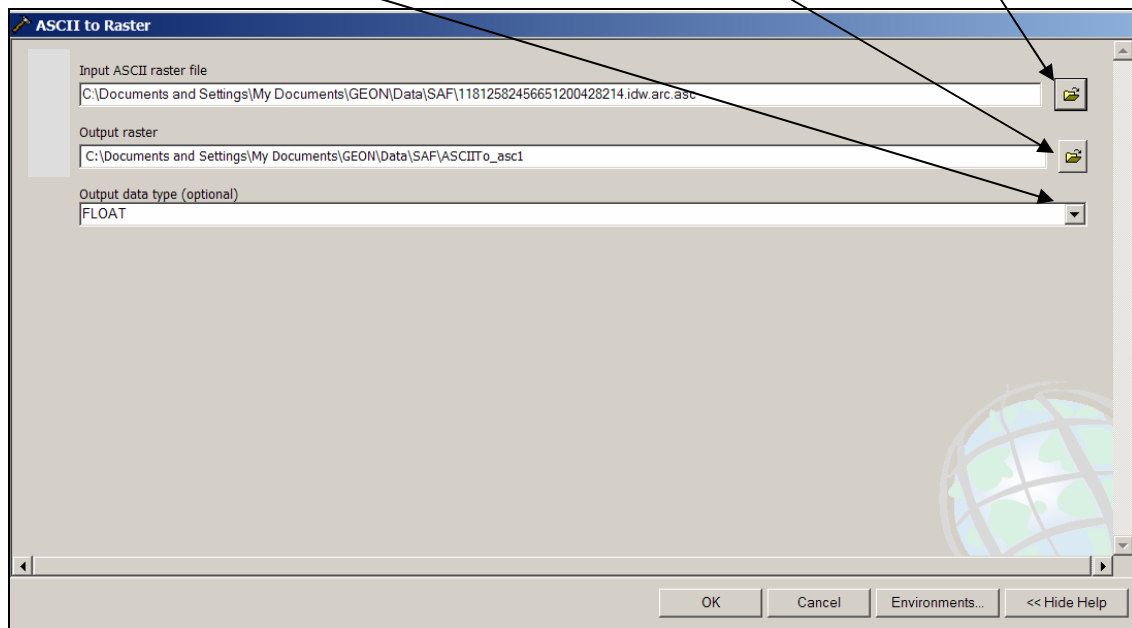

This opens a new window. Specify the file you would like to import, the name and location for the output and finally under **Output Data Type (optional)** select Float.
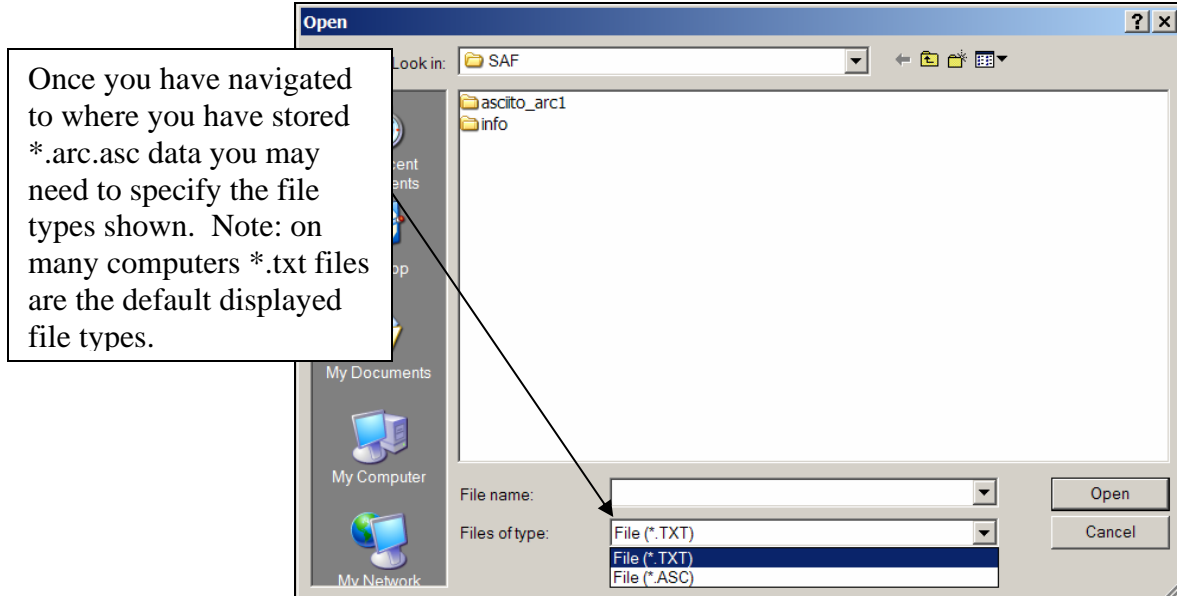
Click here and select FLOAT for the Output data type.	Click here to navigate to where you would like to save the output raster.	Click here to navigate to where you have saved *.arc.asc file types.

Note: based on your default settings, you may need to specify the file type listed.

Once you have navigated to where you have stored *.arc.asc data you may need to specify the file types shown. Note: on many computers *.txt files are the default displayed file types.

Based on the size of your data set, it may take a moment for the calculation to complete. Once it has completed, the window will give you a notice that says the job has completed click **Close**.

This window summarizes the calculation of ASCII to Raster. When the status is Complete, click **Close**.
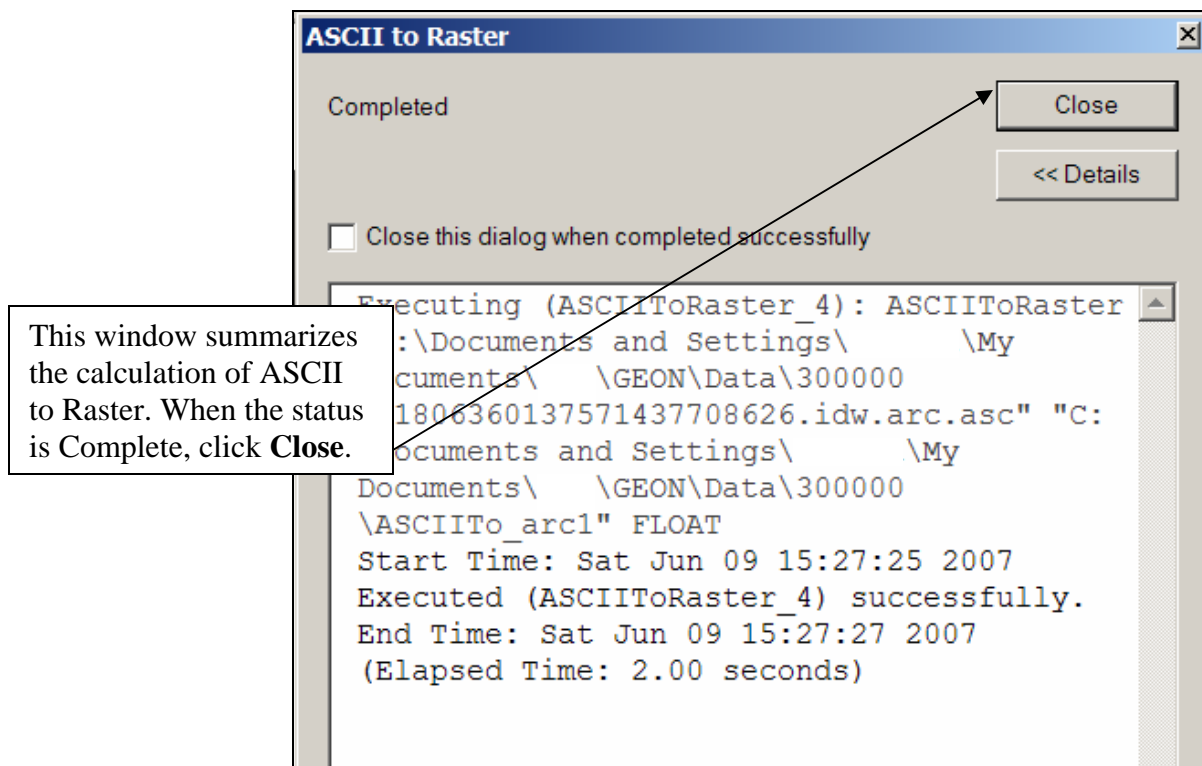
Now on the left windowpane, under the layer you just added, right click on the layer and click **Zoom to layer**.

Right click on the Layer you just imported and then click **Zoom to Layer**.
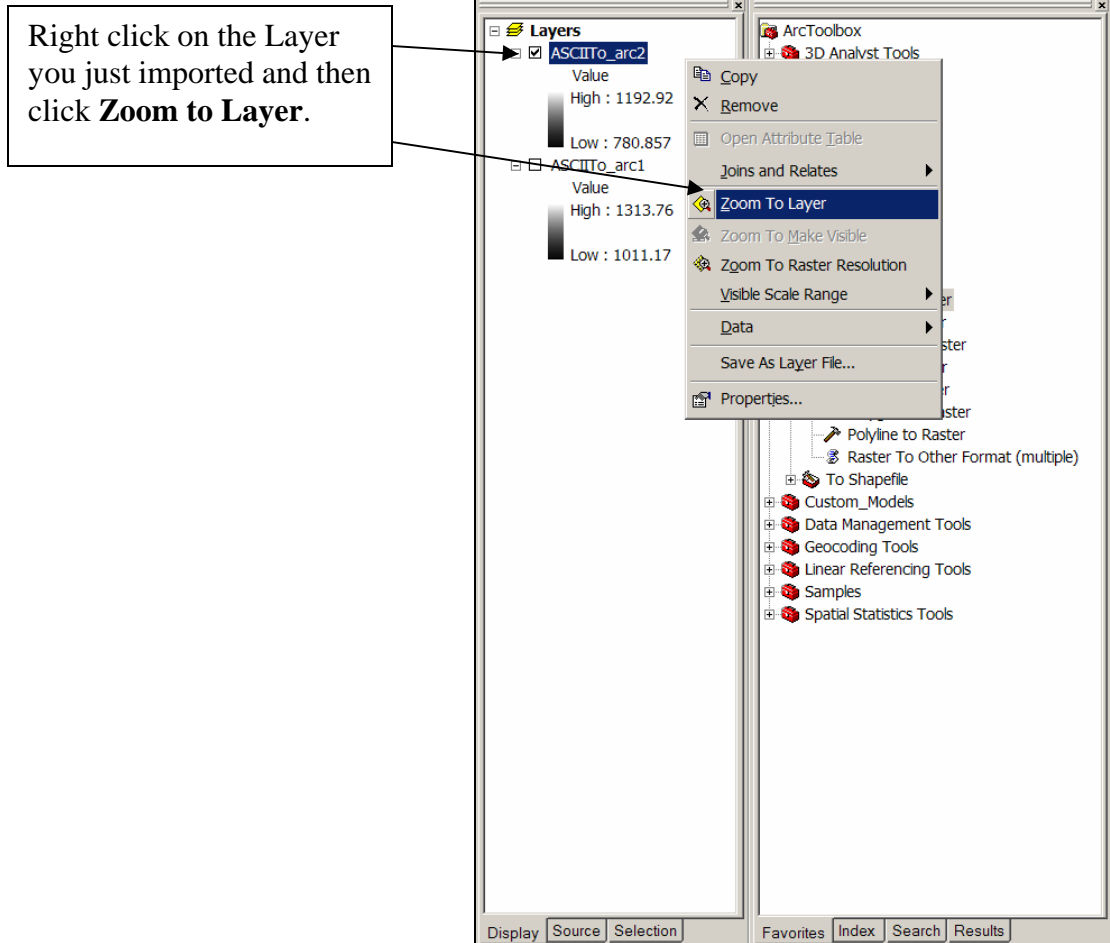
Defining the projection

You may need to define the projection of the dataset before projecting (change the datum or projection) the DEM to match other data.

The DEM products delivered from the GLW do not have their projection explicitly defined but the coordinates of the grid are consistent with the dataset's native coordinate system and thus the DEMs will align with other data in the same projection. You can work with GLW DEMs without defining the projection, but if you want to project them to match other data you will need to first define the coordinate system.

The example we give here is for the B4 LiDAR data which has this coordinate system description:

> Grid Coordinate System Name: **Universal Transverse Mercator**
> UTM Zone Number: **11 N**
> Transverse Mercator Projection
> Scale Factor at Central Meridian: 0.999600
> Longitude of Central Meridian: -117.000000
> Latitude of Projection Origin: 0.000000
> **False Easting: 500000.000000**
> False Northing: 0.000000
> Planar Coordinate Information:
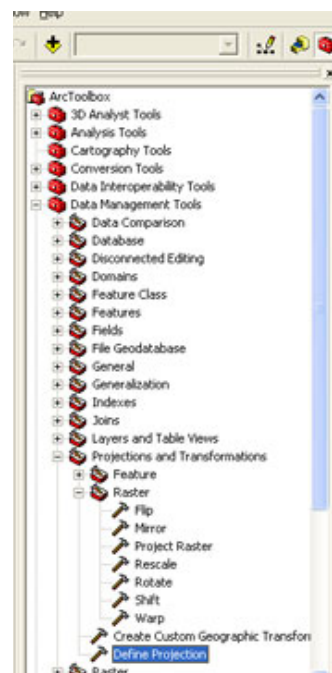> Planar Distance Units: meters
> Geodetic Model
> Horizontal Datum Name: D_WGS_1984
> Ellipsoid Name: WGS_1984

This can be done using the ArcCatalogue tool of ArcGIS, but it is faster to use another ArcToolbox function.

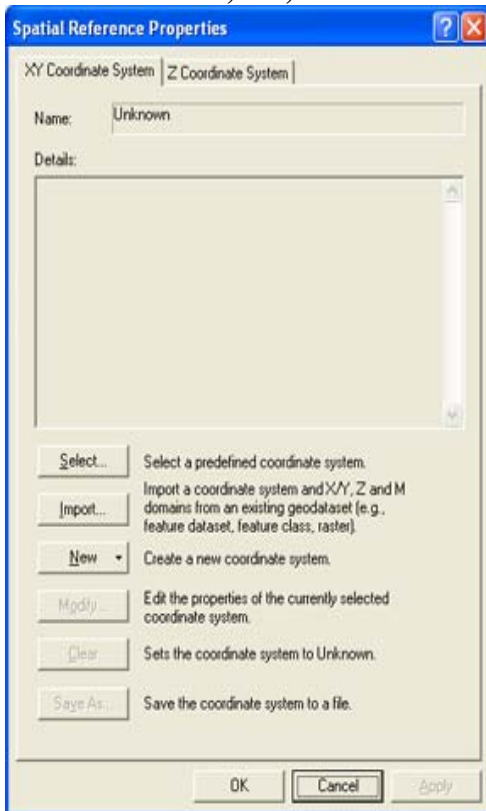1) In ArcMap, click on the ArcToolbox symbol (red toolbox).

2) Identify the Raster file for which you wish to define the projection and then click on the symbol next to the **Coordinate System**.

3) In the you want **Spatial Reference Properties->XY Coordinate System->Select…** Then choose
Projected Coordinate Systems->Utm->Wgs 1984->WGS 1984 UTM Zone 10N.prj
Then affirm **Add, Ok, Ok**

When you have affirmed your choices, a processing box will appear and will run for a few seconds to 10s of seconds and then the projection will be defined.

Note that you will need to quit ArcMap and launch a new session of it and add the Raster with your now defined projection for the ArcMap project to show the proper units. Or you can make this change in the original ArcMap by right clicking **Layers** in the Table of Contents and choosing **Properties->Coordinate System->Predefined->Projected Coordinate Systems->Utm->Wgs 1984->WGS 1984 UTM Zone 10N.prj**

Producing a Hillshade Map

After you have loaded the data and projected it, click on the Spatial Analyst tool. If you do not have the Spatial Analyst tool in your toolbar, select **Toolbars** from the **View** menu. Then click **Spatial Analyst** from the pop up window.

To access the Spatial Analyst tool, click **View**.

Select the **Toolbars** option from the **View** menu.
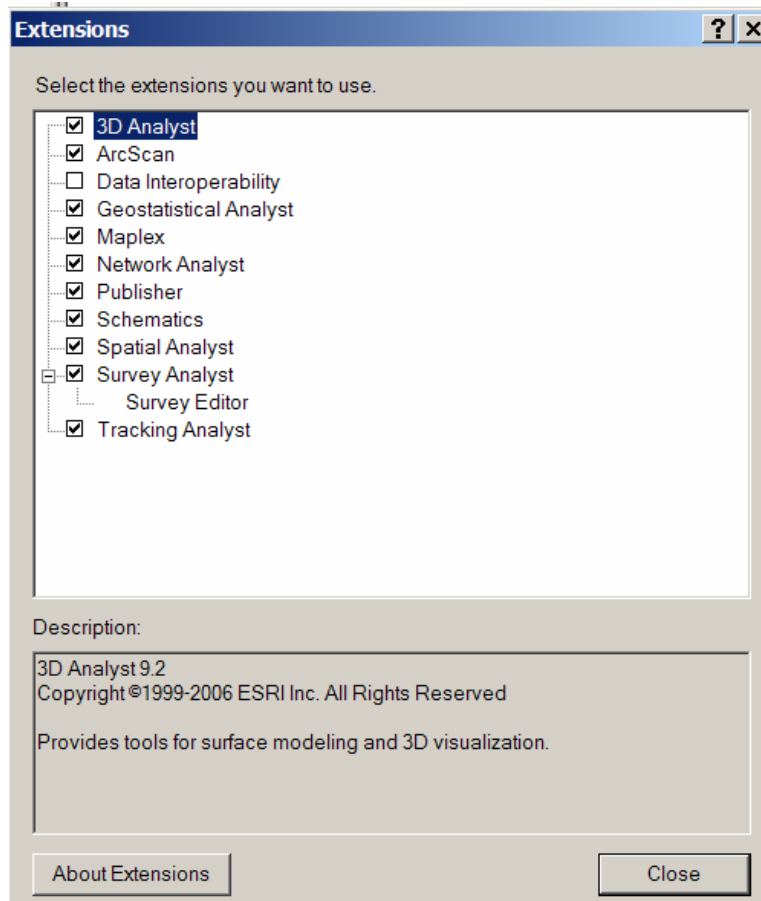
Click on **Spatial Analyst**.
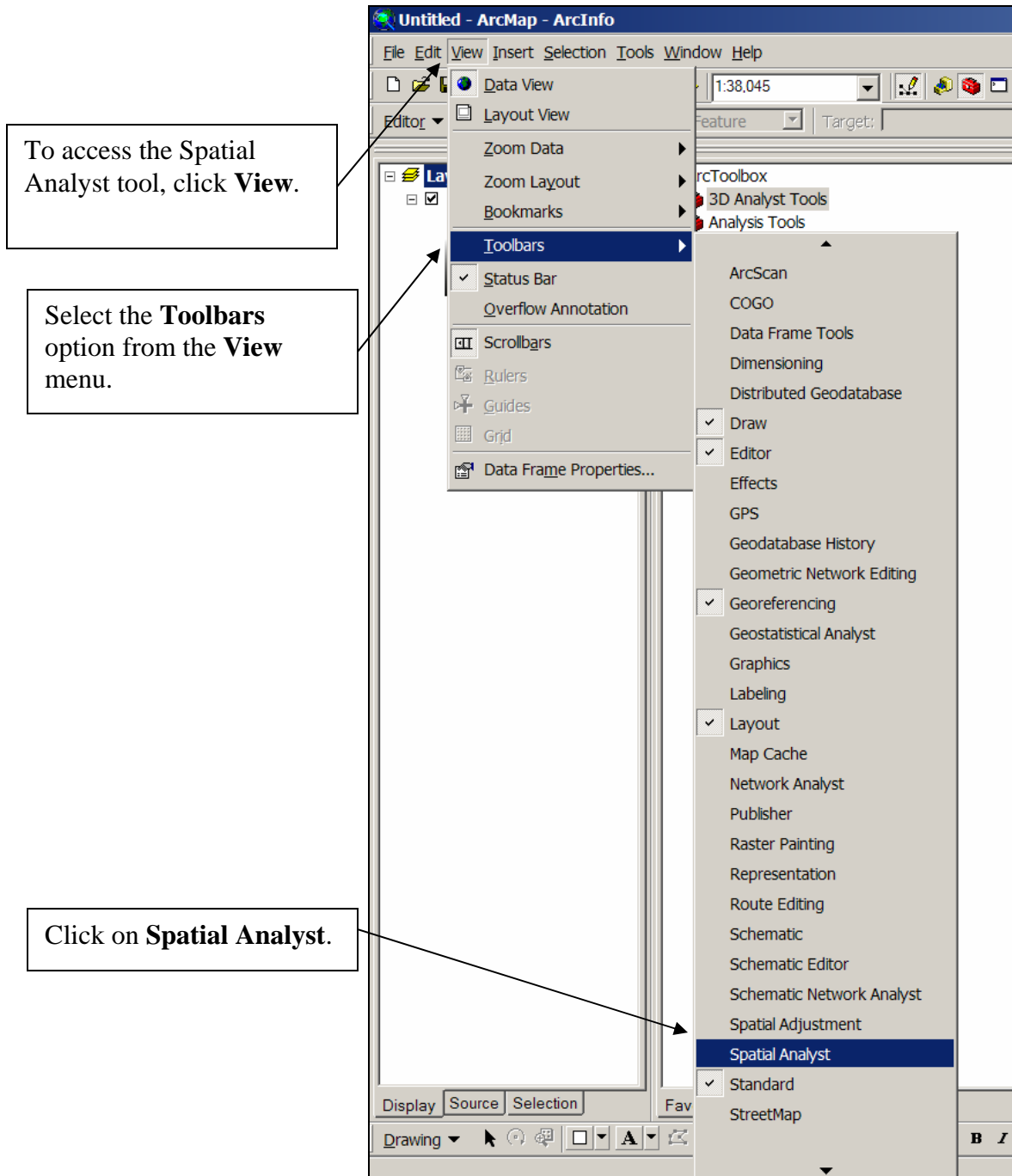
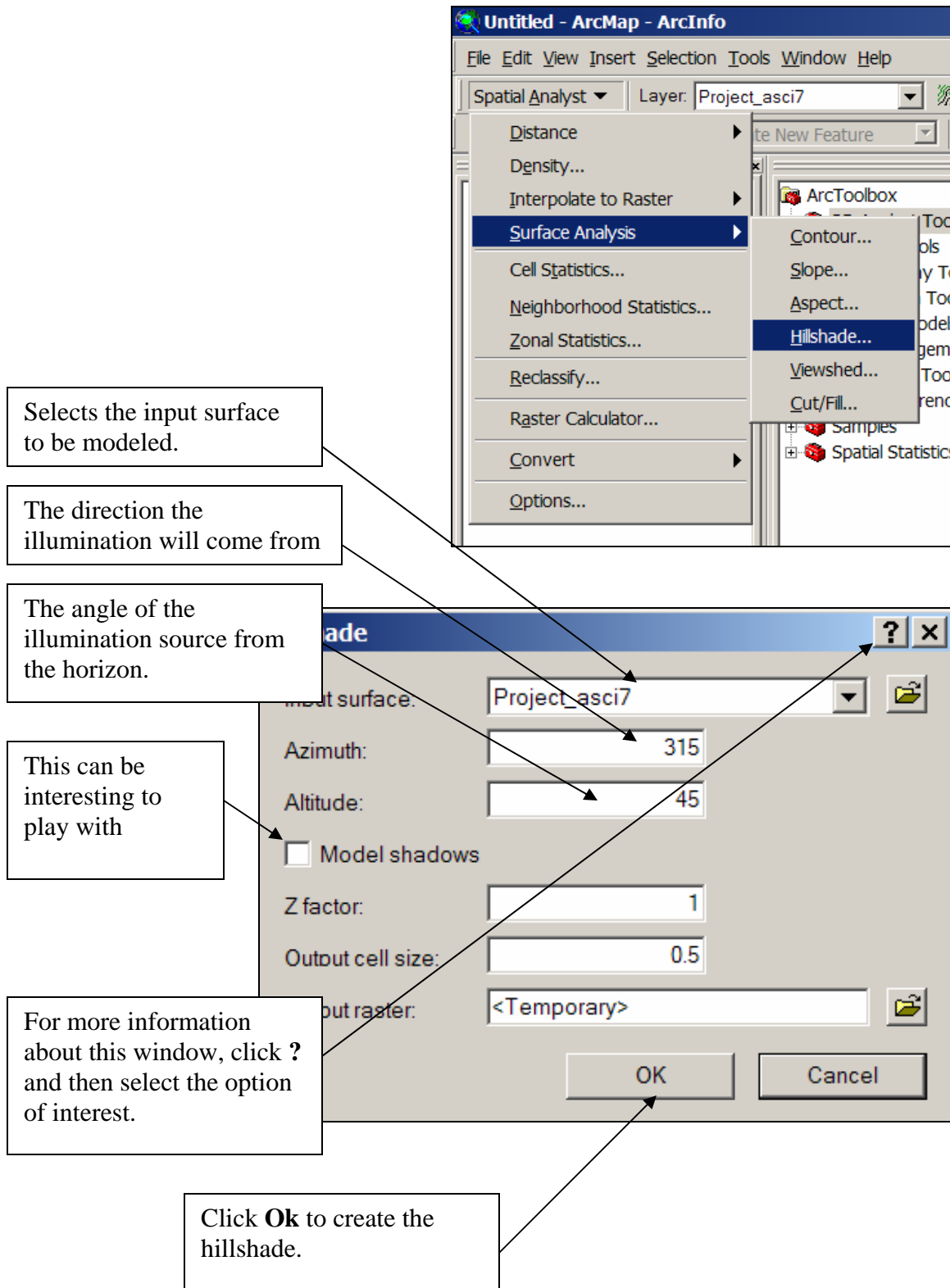Drag the Spatial Analyst toolbar to your toolbar.

If this is the first time you have used the Spatial Analyst tool, you may need to turn on the extensions. To turn on the extensions, select the **Extensions** option from the **Tools** menu.
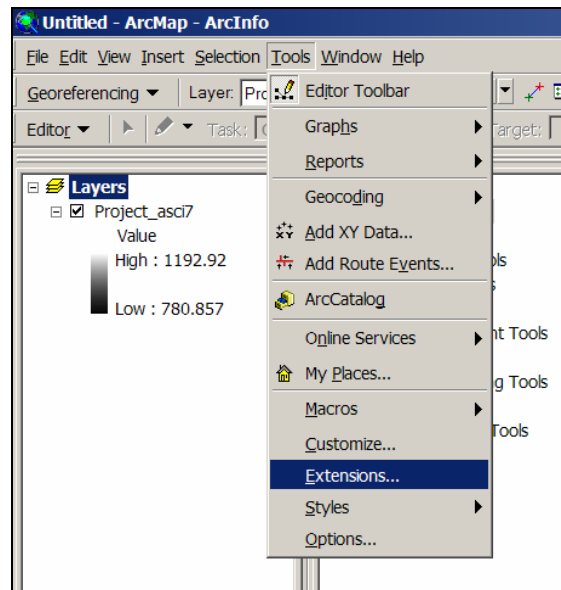
Check the 3D Analyst and the
Spatial Analyst options, click **Close.**

Now to make a hillshade map, select the **Surface Analysis** option under the **Spatial Analyst** pull down menu. Click on **Hillshade**.

Selects the input surface to be modeled.

The direction the illumination will come from

The angle of the illumination source from the horizon.

This can be interesting to play with

For more information about this window, click **?** and then select the option of interest.

Click **Ok** to create the hillshade.

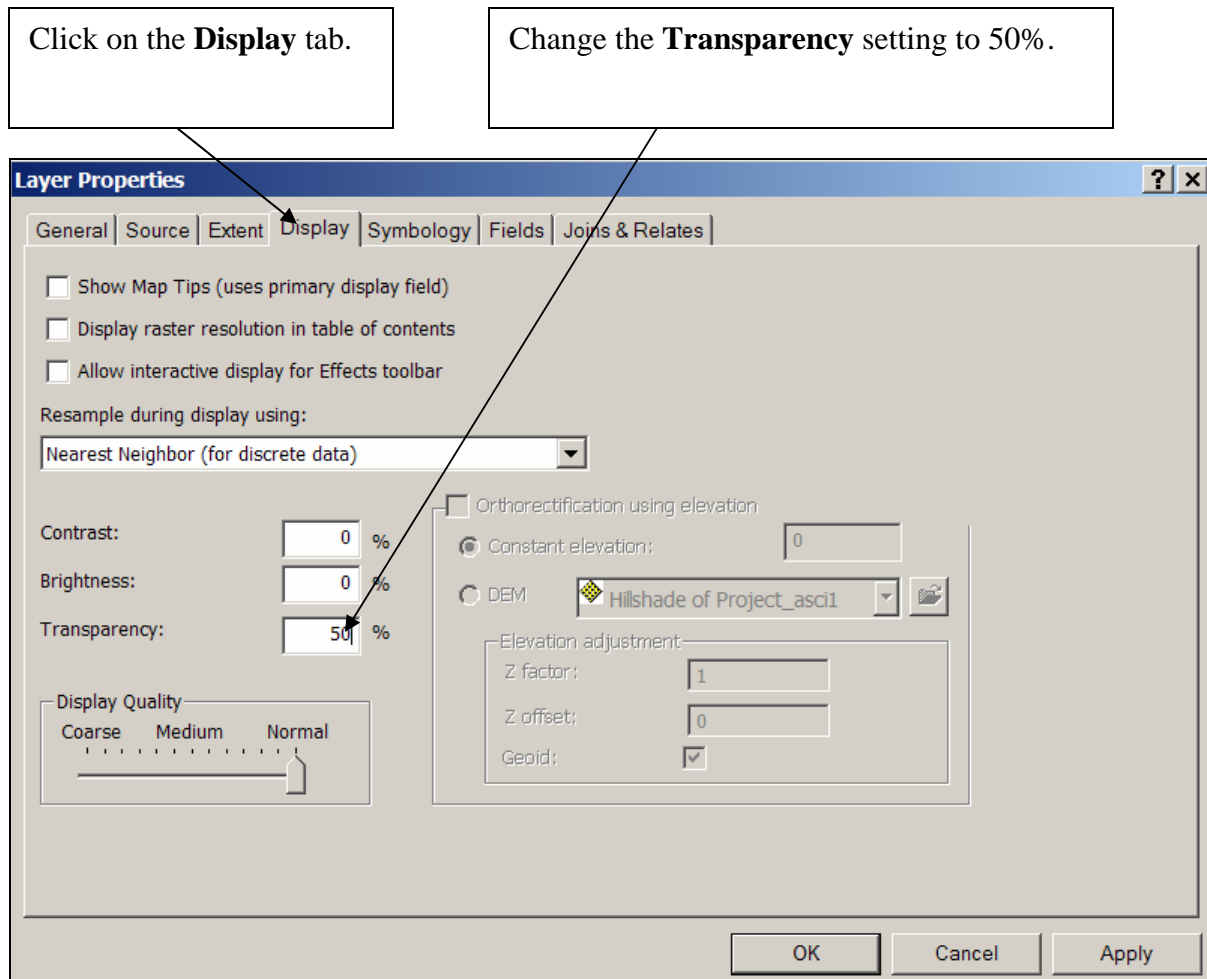Step 4 Combining the Hillshade and DEM, creating a color map

If you have the DEM and hillshade loaded make sure that the DEM is on top in the Layers pane. This can be done by simply clicking on the desired layer and dragging it above the hillshade. To color the DEM, right click on the DEM and select **Properties** then click on the **Symbology** tab.

Click on the **Symbology** tab.

Click on the color ramp pull down window to select the color scheme of your liking.
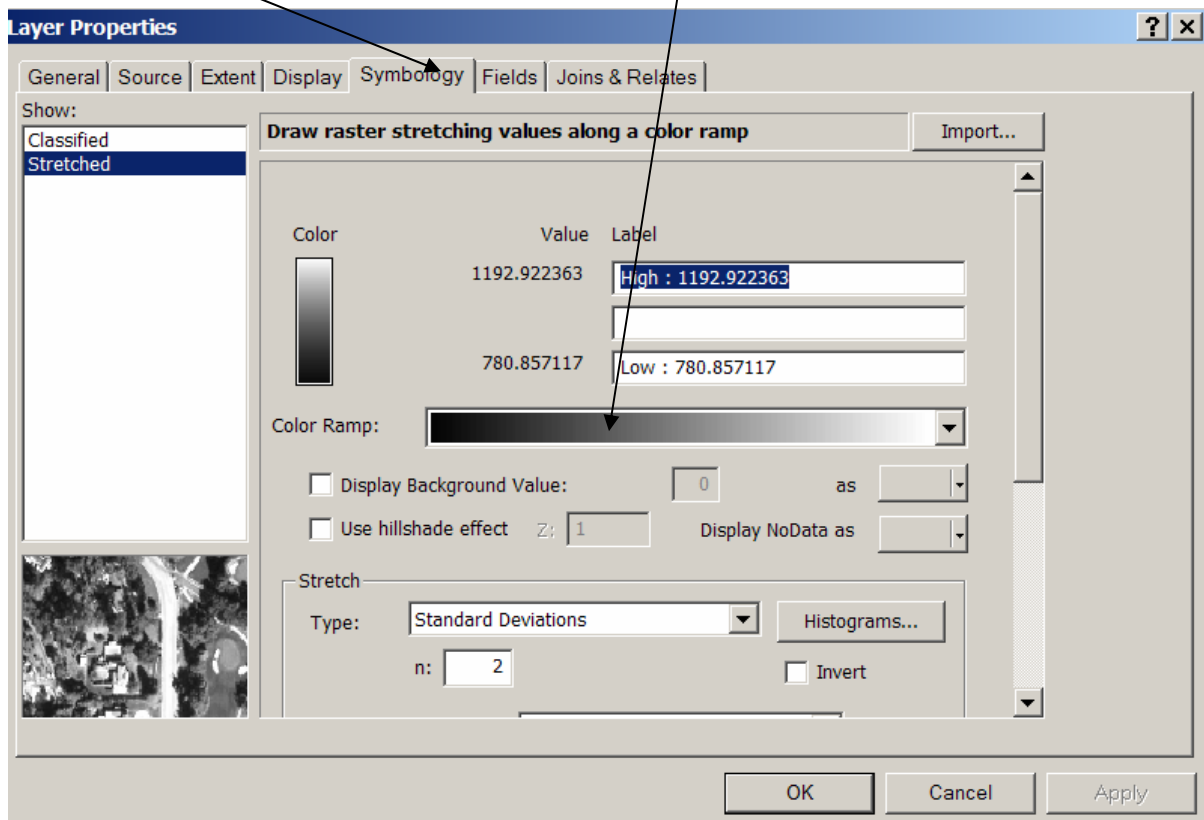
Once you have chosen a color scheme click on the **Display** tab. Change the Transparency setting to 50%. Then click **Ok**.

Click on the **Display** tab.

Change the **Transparency** setting to 50%.

Layer Properties ? ×

General | Source | Extent | Display | Symbology | Fields | Joins & Relates |

☐ Show Map Tips (uses primary display field)
☐ Display raster resolution in table of contents
☐ Allow interactive display for Effects toolbar

Resample during display using:

Nearest Neighbor (for discrete data) ▼

☐ Orthorectification using elevation

Contrast: [0] %   ⦿ Constant elevation: [0]
Brightness: [0] %   ○ DEM ◈ Hillshade of Project_asci1 ▼ 📂
Transparency: [50] %   ┌Elevation adjustment─────────
                                     Z factor: [1]
┌Display Quality────────   Z offset: [0]
  Coarse   Medium   Normal   Geoid: ☑
  · · · · · · · · · · · · · ·
  └──────────────────────┘

OK   Cancel   Apply

The effects can be astonishing. Now you have a colored map.

Printing the map

To print the map, first change from the **Data View** to the **Layout View**.
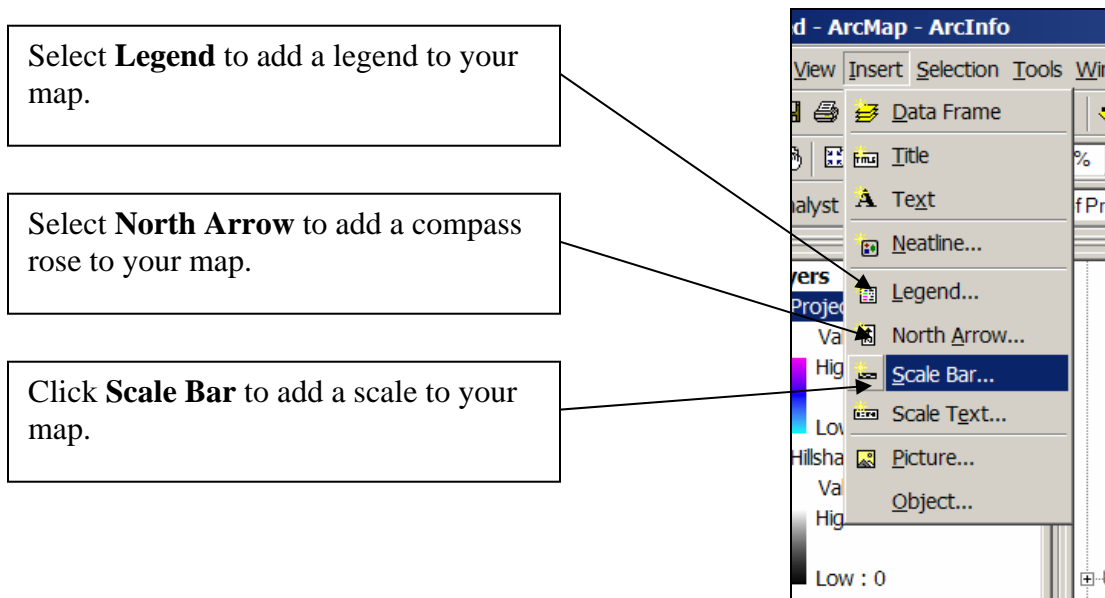
Data View → Layout View
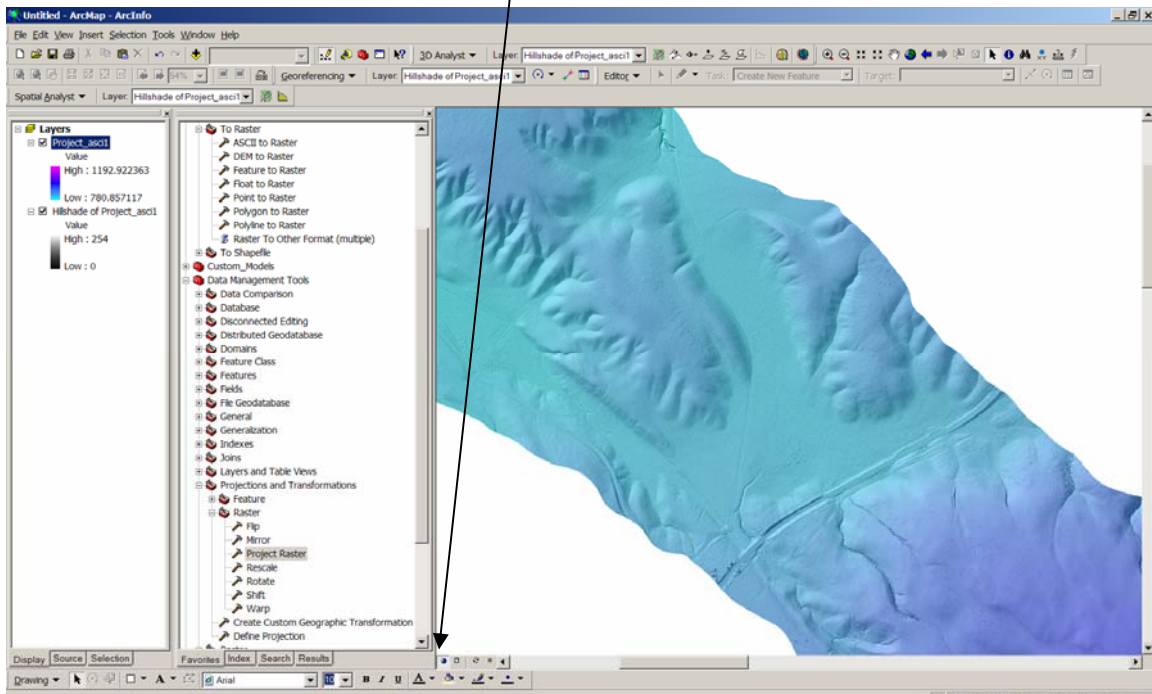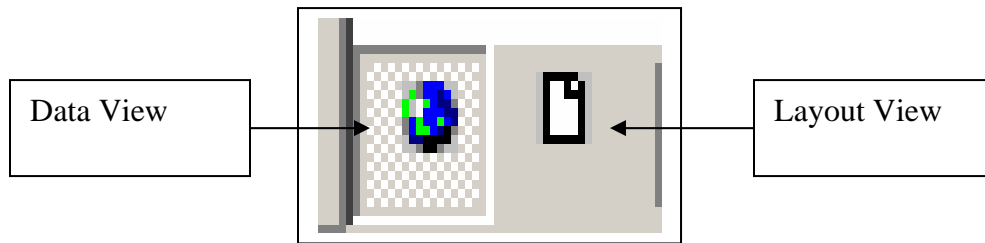
You will now see how the image will look on an 8.5 x 11 sheet of paper.

You can now see how the image will be centered and look on an 8.5 x 11 sheet of paper. You can now stretch the image or shrink the image by using the arrow button and clicking on the image. You can use the hand tool and adjust what part of the image is seen. You can also change the paper properties by choosing the **Page and Print Setup** option from the **File** menu.
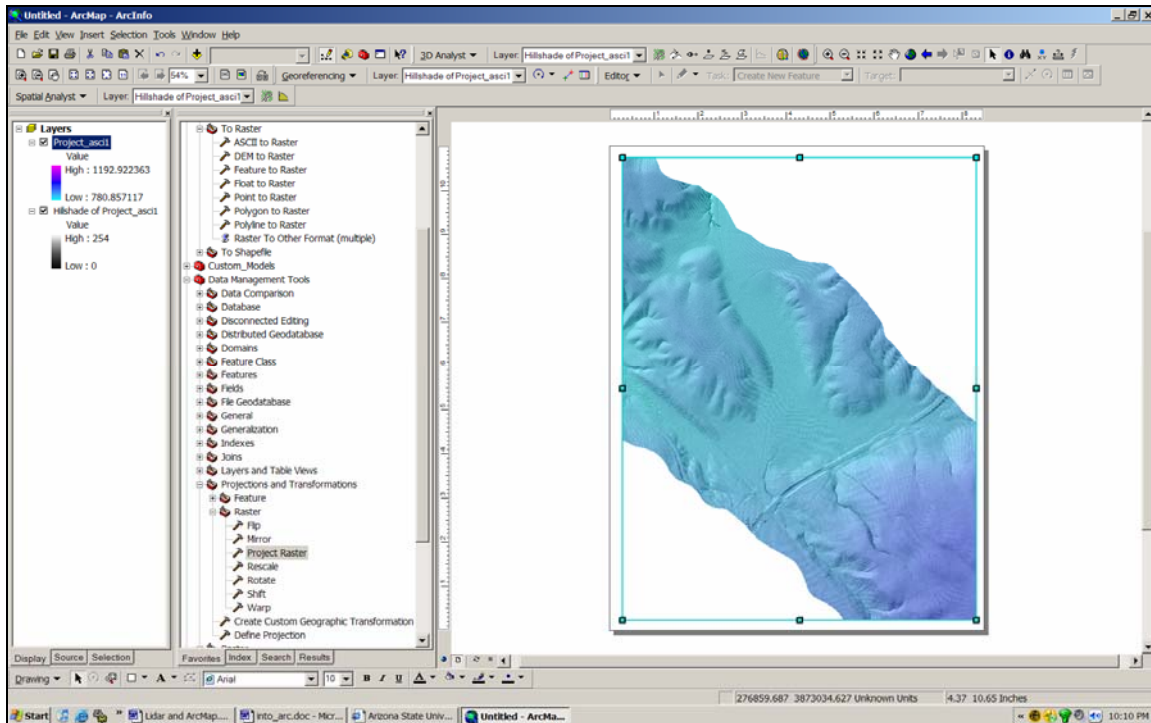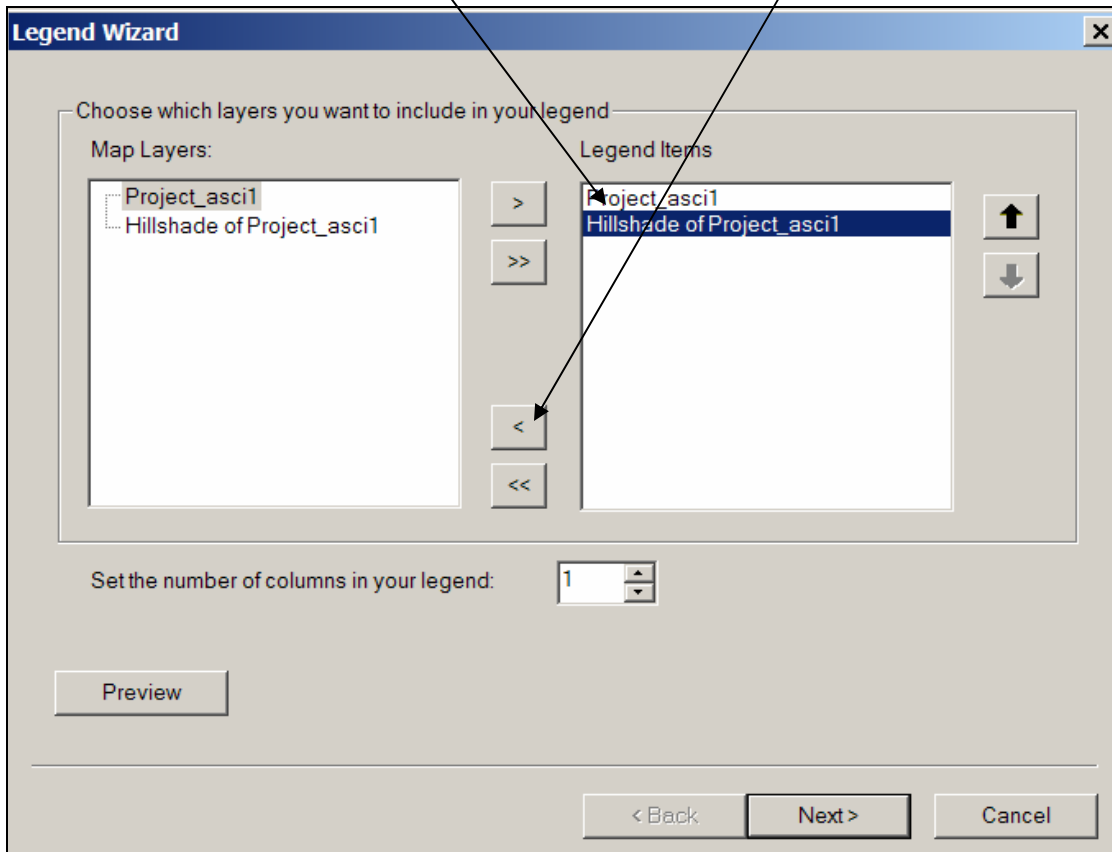

To add a scale bar, legend, and compass rose click on the **Insert** menu at the top of your screen.

Select **Legend** to add a legend to your map.

Select **North Arrow** to add a compass rose to your map.

Click **Scale Bar** to add a scale to your map.

When you choose **Legend**, a new window will open like the one below. Remove the hillshade map and click **Next**.

Click on the Hillshade item

Once you have highlighted the Hillshade item, click the remove link to remove this item.

Legend Wizard

Choose which layers you want to include in your legend

Map Layers:

- Project_asci1
- Hillshade of Project_asci1

Legend Items

Project_asci1
Hillshade of Project_asci1

Set the number of columns in your legend: 1

Preview

< Back   Next >   Cancel

You can then click through the next four windows keeping the default settings or you can specify the options you would like for your legend. For more information about legend options, see the Arc help pages.

The end of this document goes through a tutorial on cleaning up the legend:
http://arrowsmith410-598.asu.edu/Lectures/Lecture9/DEM_data.html.

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When you select **North Arrow** a new window will open like the one below. Select the north arrow you would like and click **Ok**. You can further refine your choices with the **Properties** button or the **More Choices** button.
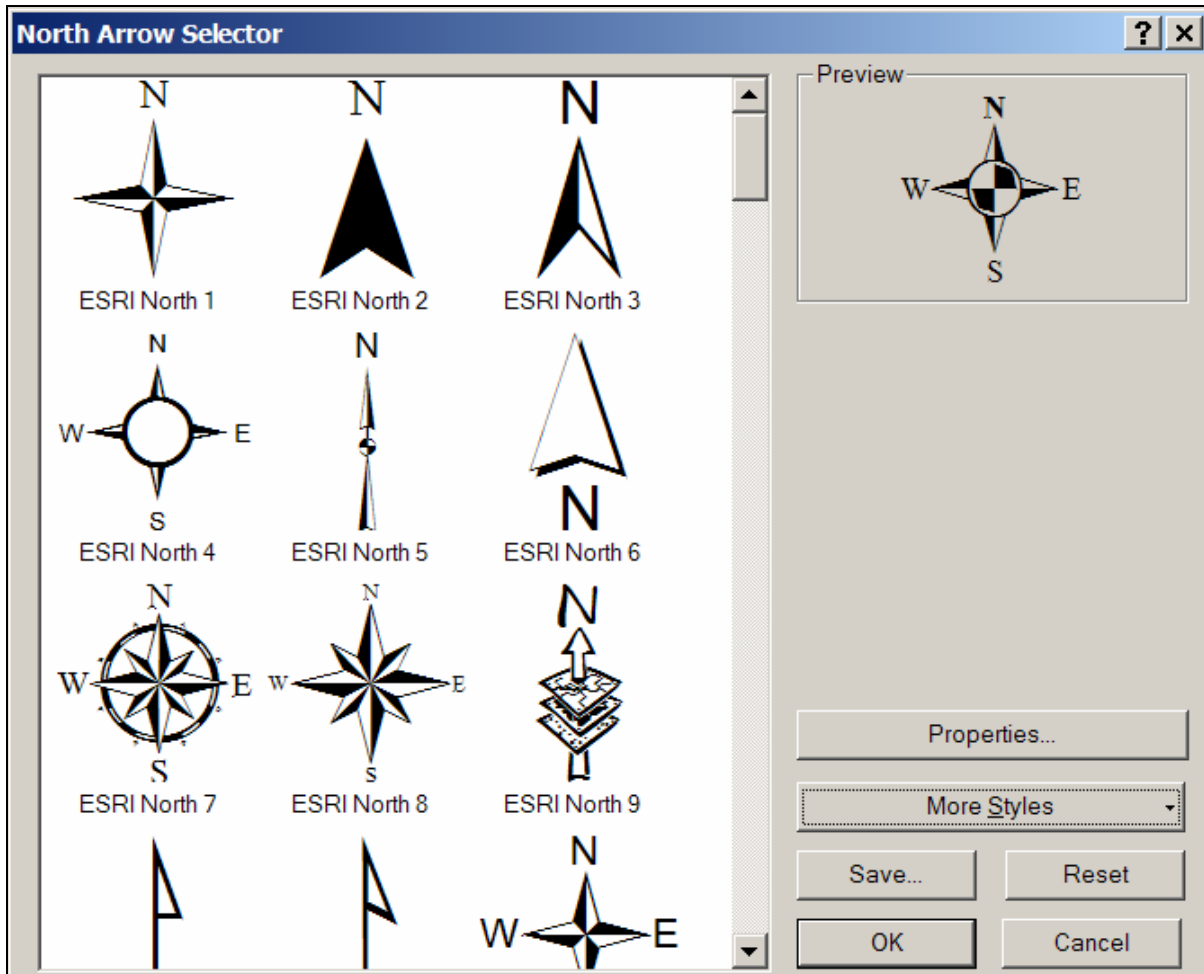
When you select **Scale Bar** a new window will open like the one below. Select the style of scale bar you would like and click **Ok**. You can further refine your choices and you can define the units with the **Properties** button or the **More Choices** button.
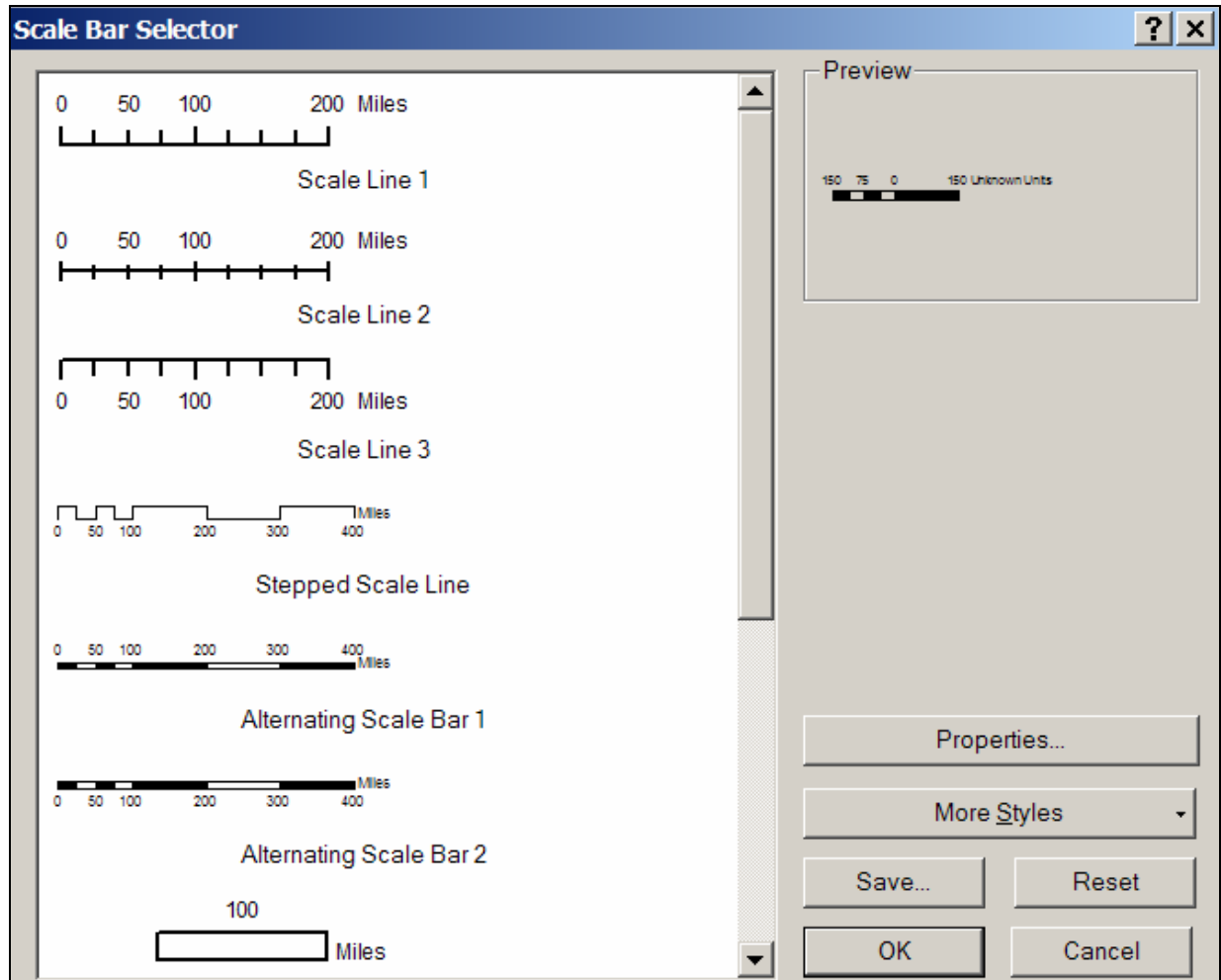
To print the map, select **Print** from the **File** menu. A window will open like the one below. Here you can specify the options you would like. When you are satisfied with your options, click **Ok**.
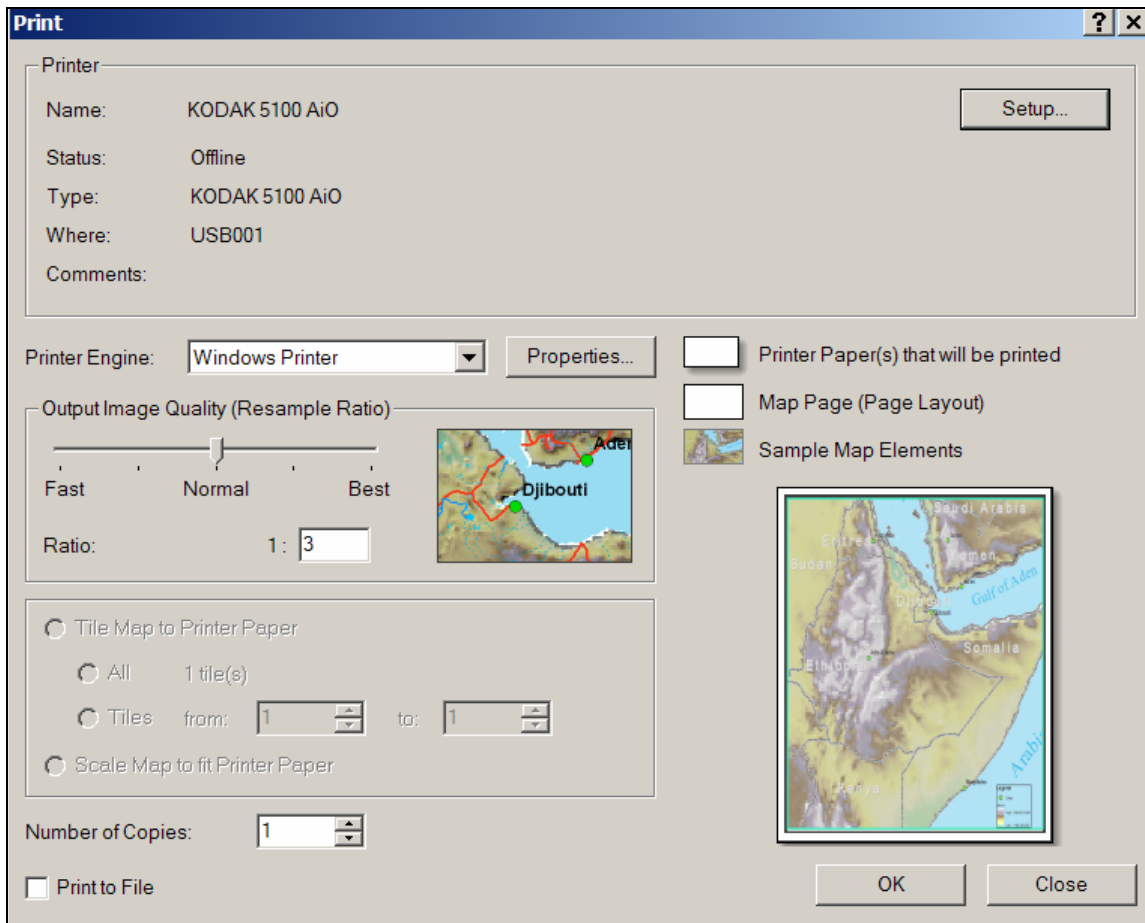
Other activities

Making a contour map

Select the **Surface Analysis** option under the **Spatial Analyst** pull down menu. Click on **Contour**. Make sure that the target layer is your Raster DEM, not the Hillshade!
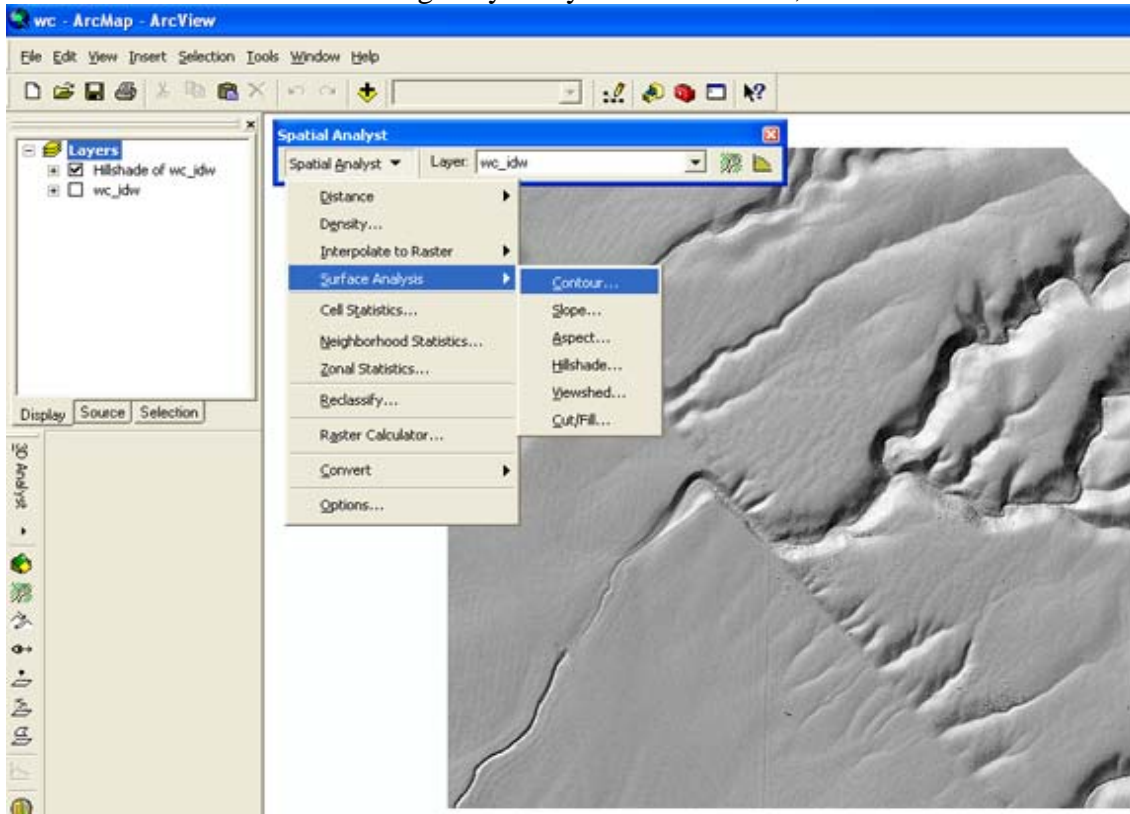
This screen will appear:

Make sure this is the correct file (should be the DEM)

Define the contour interval

Save the contours if you want

To label the contours, right click on the contours layer and choose **Label features**:
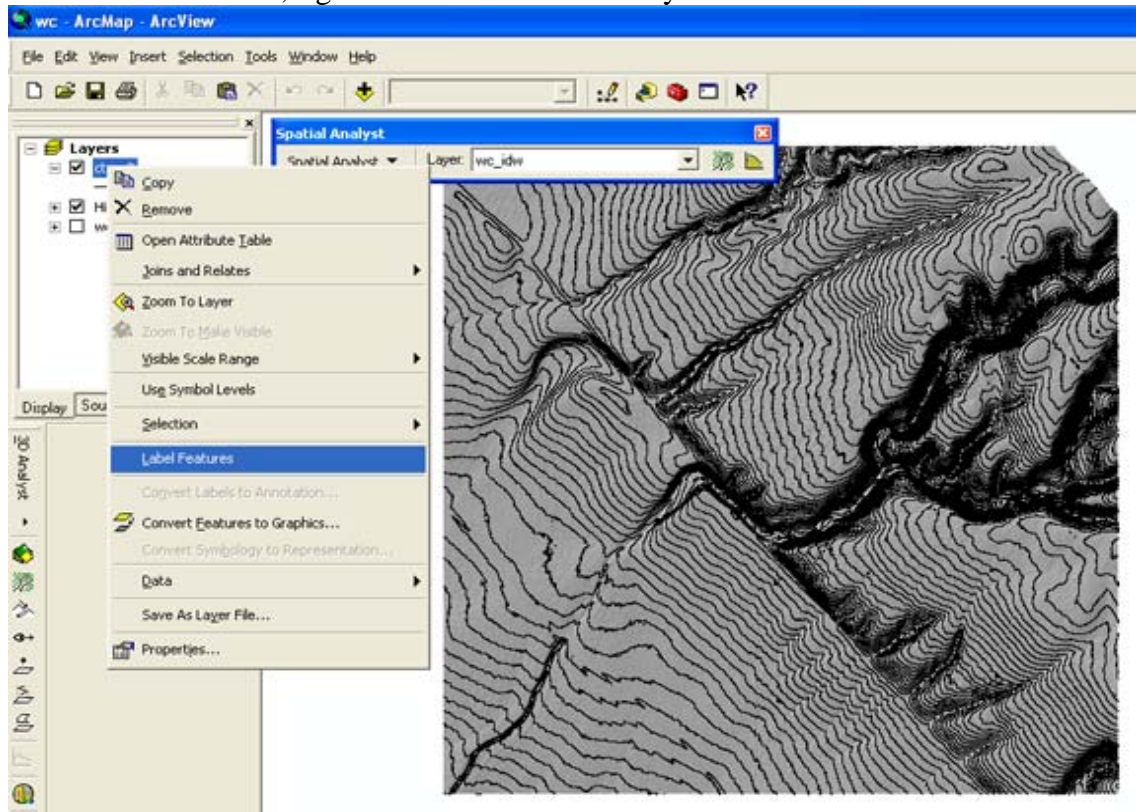
The problem will be that the labels will probably be for the line ID and not the elevation! So, then right click on the layer again, but this time choose **Properties->Label Tab, and make sure that the Label Field is CONTOUR:**
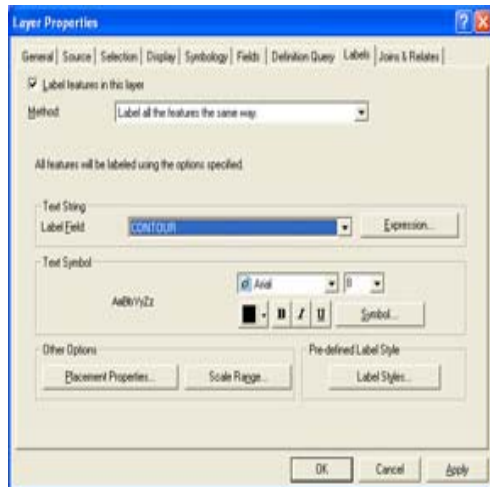
Topographic profiles

To make a topographic profile along a path you define on the DEM, do the following:
You will need the 3D analyst tool, so make sure that under extensions, its check box is checked (as you did above for the Spatial Analyst).
Then under View->Toolbars->3DAnalyst, select that and the toolbar will appear.
Make sure that the target layer is the DEM you have made above, and then click on the little symbol that looks like a squiggle. It is the **Interpolate line** tool.
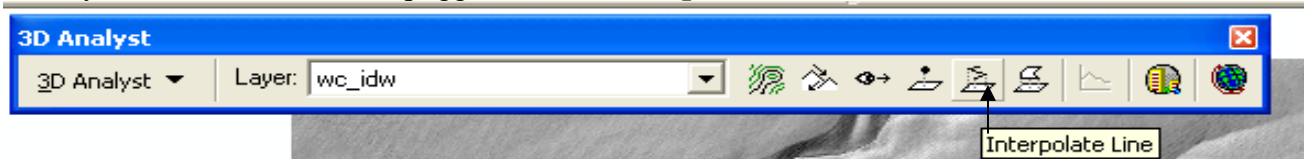

Use that tool to define your profile. Click once to start, and then click for each vertex along your profile (it does not have to be a single straight line profile). Double click at the end. When you double click, it may take quite a while (tens of seconds) at first for anything to happen. The program is going through the DEM and finding your pixels that are nearest to the line you chose.
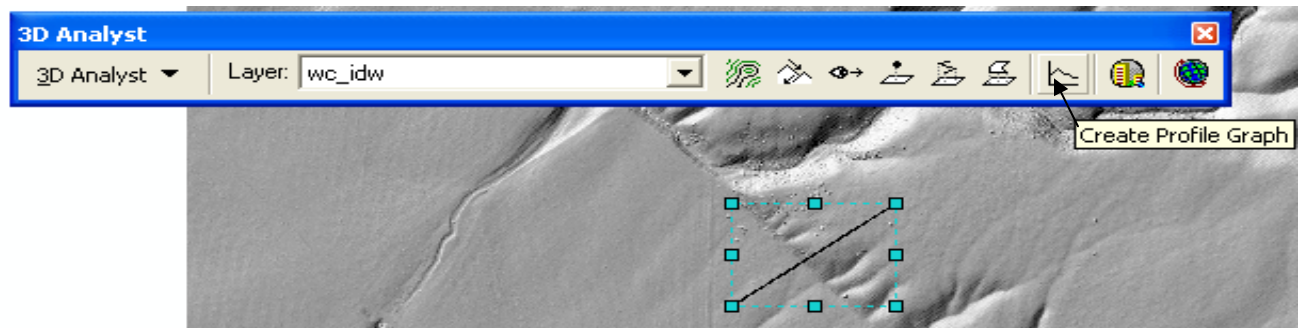
To actually draw the profile, click on the symbol that looks like a profile (**Create Profile Graph** above).

If you right click on the resulting plot, you can set various parameters of the plot (labels, etc.) by choosing the **Properties** and **Advanced Properties**.
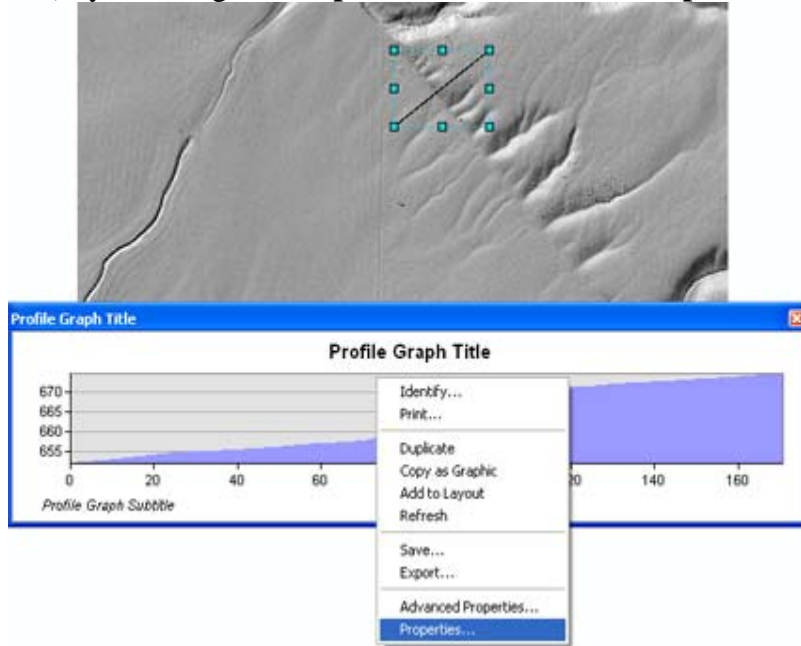
One choice under that menu (the one above that you get when right clicking on the plot), is **Export**. This is a new addition it seems in ArcGIS9.2. You can export the data from your profile to something like Microsoft Excel. Choose the **Data** tab and then the **Excel format.** This will export a two column XY or Distance-Elevation file that one can use for further analysis.