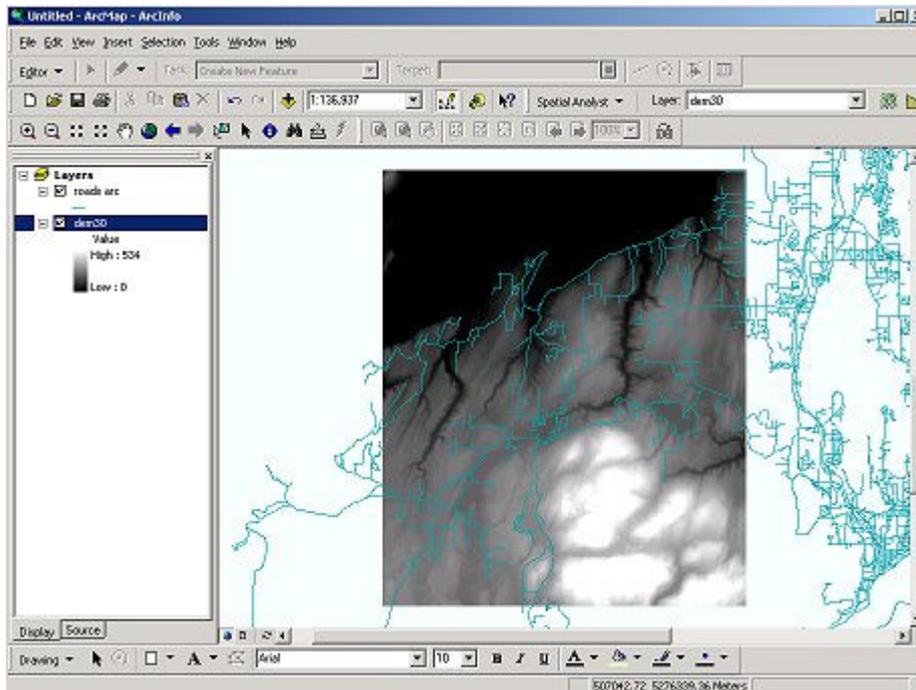
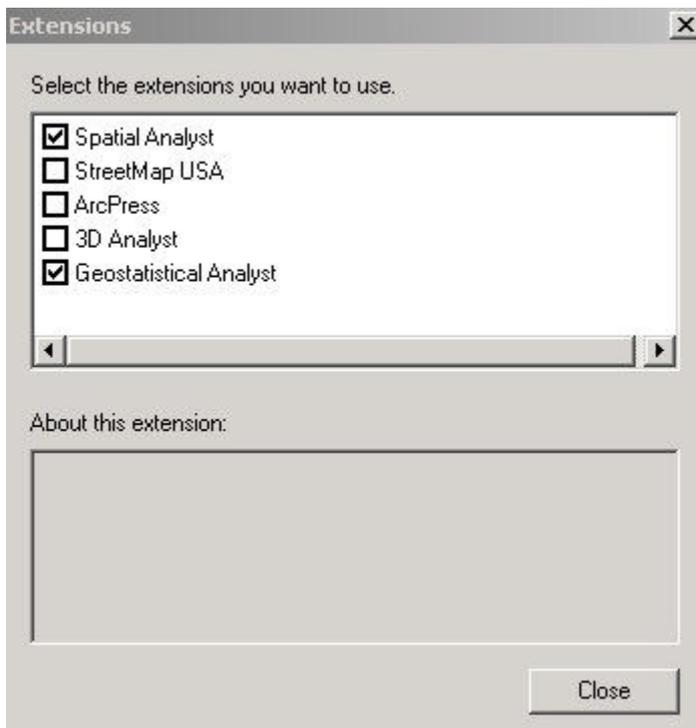


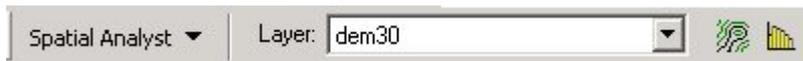
1. Open ArcCatalog and ArcMap and load the geospatial datasets named ROADS as arcs and DEM30 of our class bbcGIS workspace to the data view of ArcMap. Set the "map extent" to the full extent of the DEM30 raster dataset. (RIGHT click on the DEM30 name in the table of contents and select ZOOM to layer)



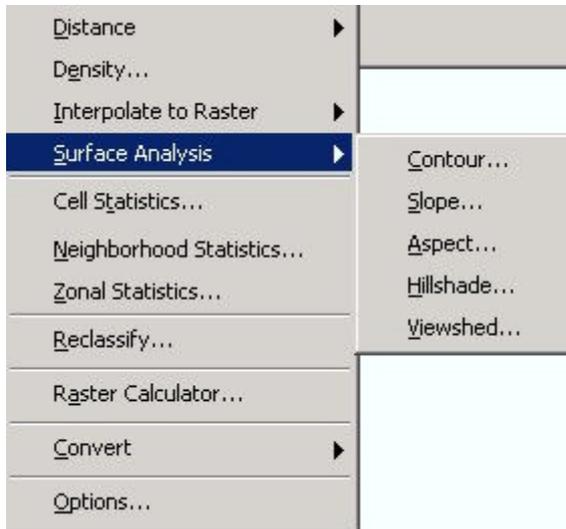
2: Now we need to "extend" the functions of ArcMap by loading the SPATIAL ANALYST "extension". Select TOOLS > Extensions and click on the checkbox for the Spatial Analyst extension if it isn't already set.



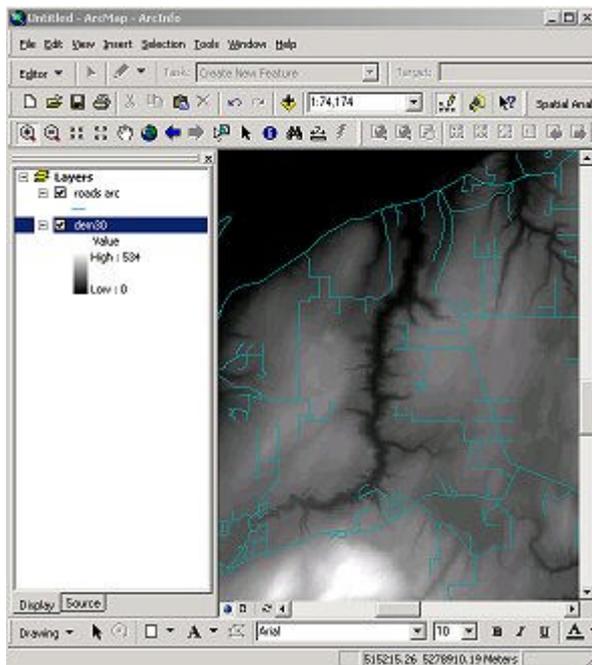
3. Now load the TOOLBAR for that extension. VIEW > Toolbars > Spatial Analyst.



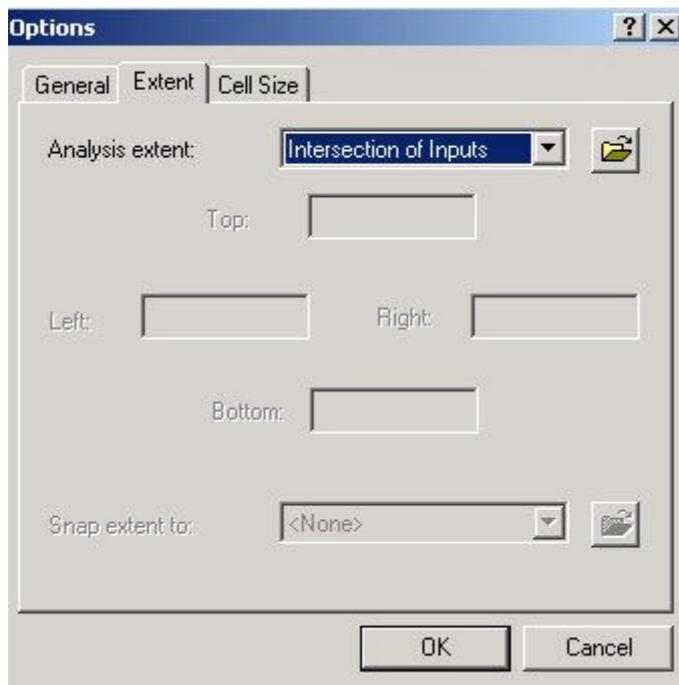
4. Take a moment to look at the various option available from the drop down menu under the Spatial Analyst button.



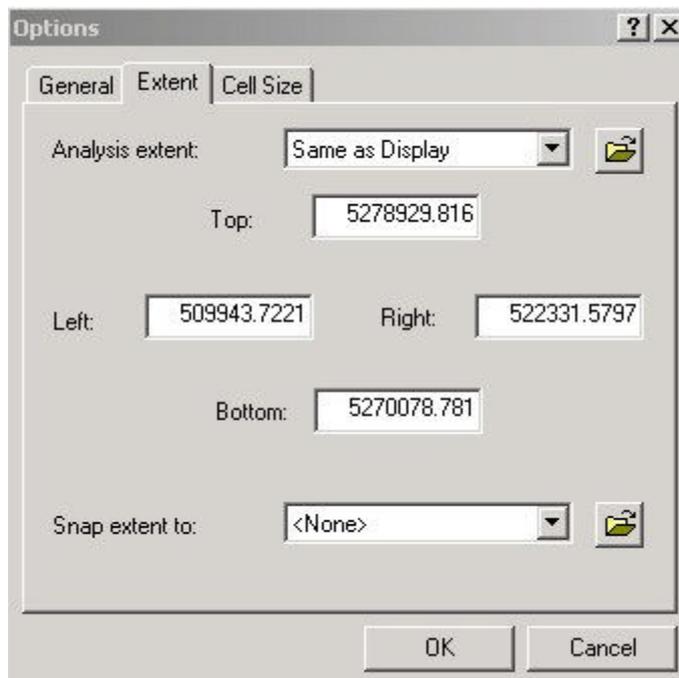
5. Now us the "zoom-in" tool to just a small area of the DEM30 dataset. I would suggest you zoom into the Big Beef Creek area. Remember that you can "re-size" the ArcMap window to make the display take on different sizes and shapes



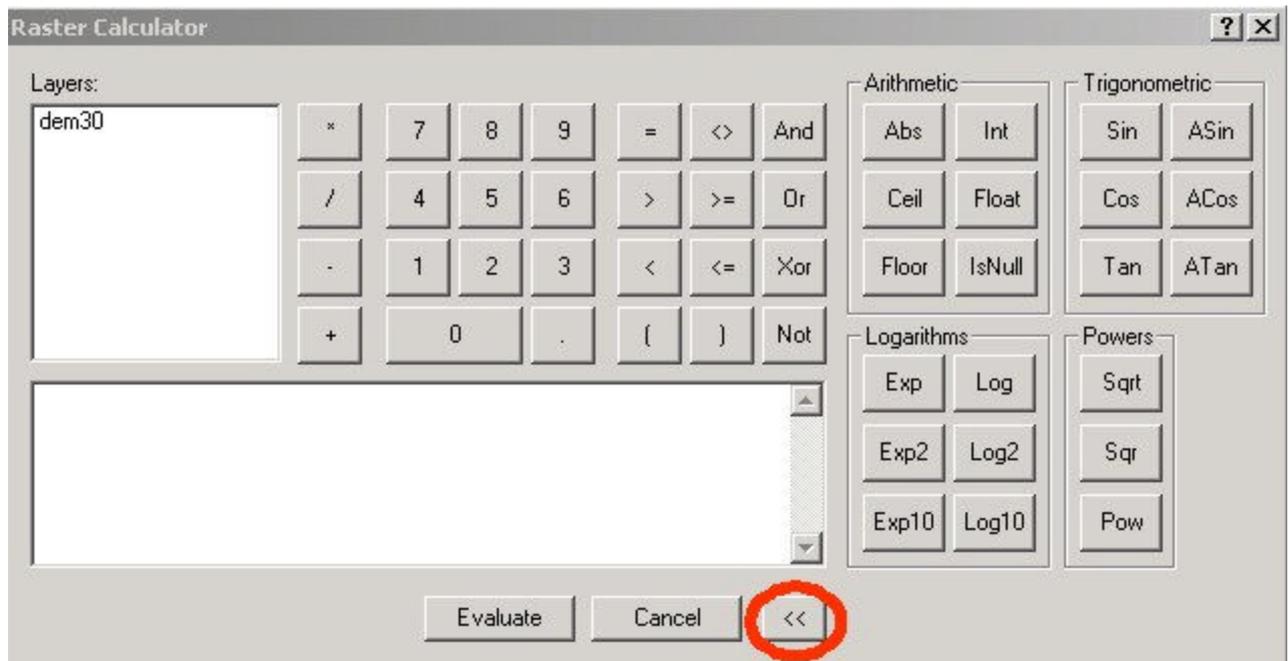
6. Return to the Spatial Analyst drop down menu and select OPTIONS. The following dialog box will allow you to set the properties of the analysis environment. Select each of the "tabs" and explore your options. We'll work primarily with the "EXTENT" tab. So end up with that tab opened.



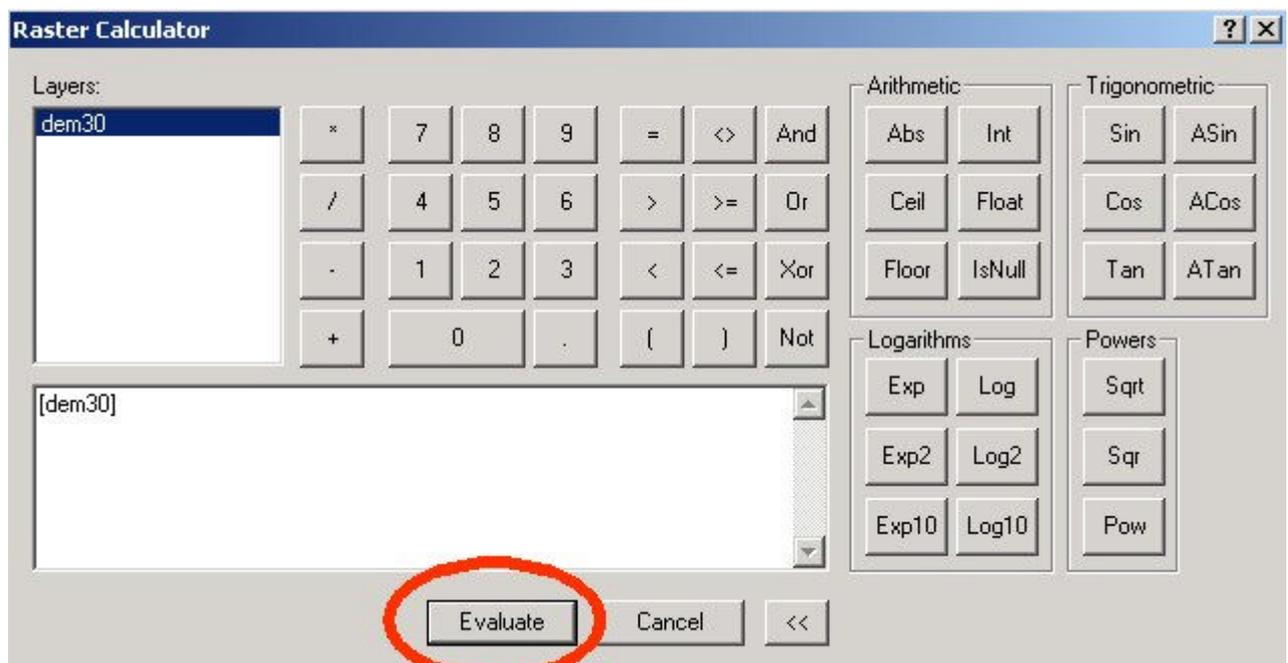
7. This tab allows you to set the geographic extent for all the functions you are about to ask ArcMap to perform. The Analysis extent may be set to various coordinates. The geographic coordinates may be determined by referring to existing raster datasets loaded into ArcMap or by the coordinates shared between existing datasets, or by referring to the display window. Look at the option available from the drop down menu and select "SAME AS DISPLAY". Then select OK.



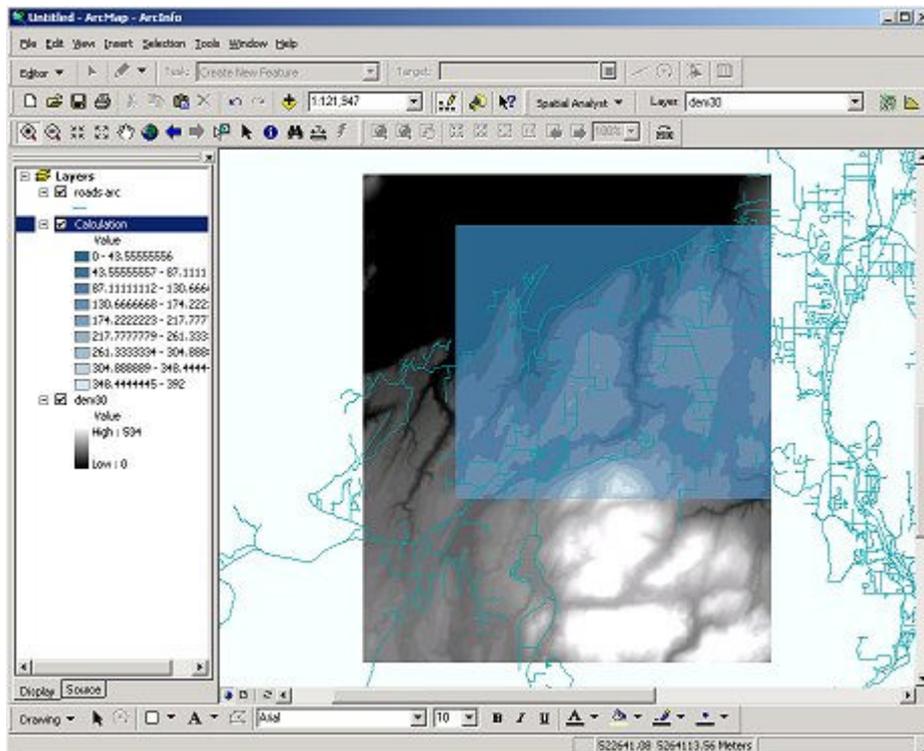
8. Now return to the Spatial Analyst drop down menu and select the RASTER CALCULATOR. Expand or contract the options of the calculator by clicking on the ">>" or "<<" buttons.



9. It is helpful to think of this calculator as a means of constructing the "right" side of an equation. By that I mean that you can begin your thinking as if you said to yourself, "the new raster grid is equal to" now paste in the terms that complete you thought. In this case because we've set the analysis extent to be equal to the display coordinates, if we say "the new raster grid is equal to DEM30", then the values of DEM30 for only those cells within the display extent will be written (or calculated) for the new raster dataset. Double click on the name dem30 to paste it into the dialog box and click on Evaluate

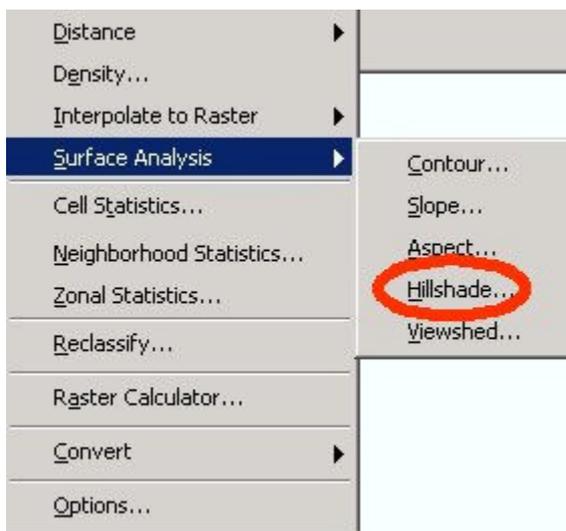


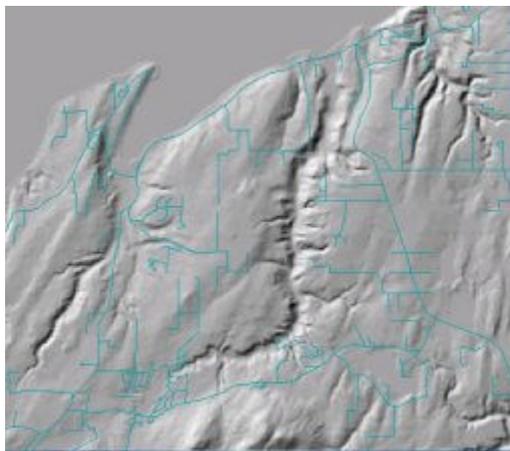
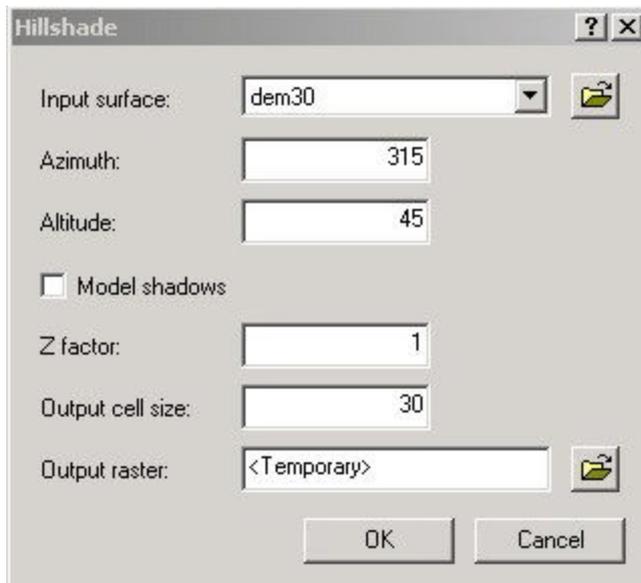
10. The new raster dataset will be named "Calculation" and it will be added to your data view and display with default settings. You can prove to yourself that the extent of the data has changed by setting the data view extent back to the extent of the DEM30 and displaying all of your data coverages. When through return you display extent to that of the "Calculation".



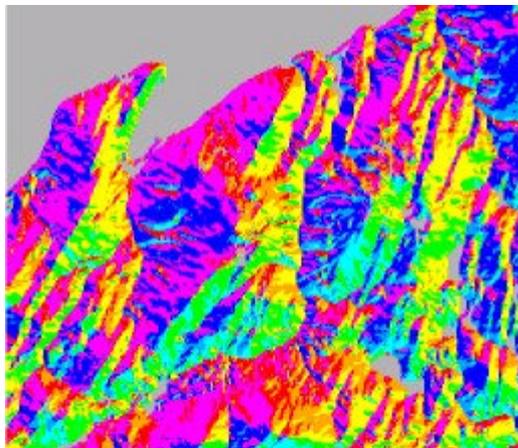
11. Now return to the Spatial Analyst drop down menu and select the OPTIONS and set the EXTENT to Same as layer "CALCULATION". Now we'll only be working within the extent of our new dataset.

12. Use the drop down menu of Spatial Analyst to produce an HILLSHADE map of the Calculation dataset. Look over the settings for the function but accept the defaults. The result will be added to your display.



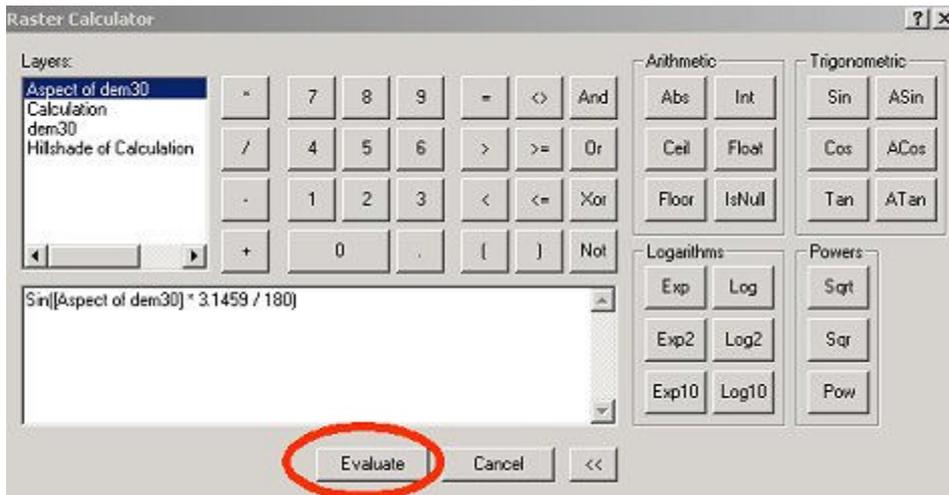


13. Let's once again use the Spatial Analyst drop down menu, this time to create an ASPECT raster dataset. SPATIAL ANALYST > SURFACE ANALYSIS > ASPECT. Once again accept the default settings. Remember the INPUT is the DEM30, the extent of the analysis is still set to the coordinates of the smaller "calculation". The result will be loaded. Check the legend to understand the results.

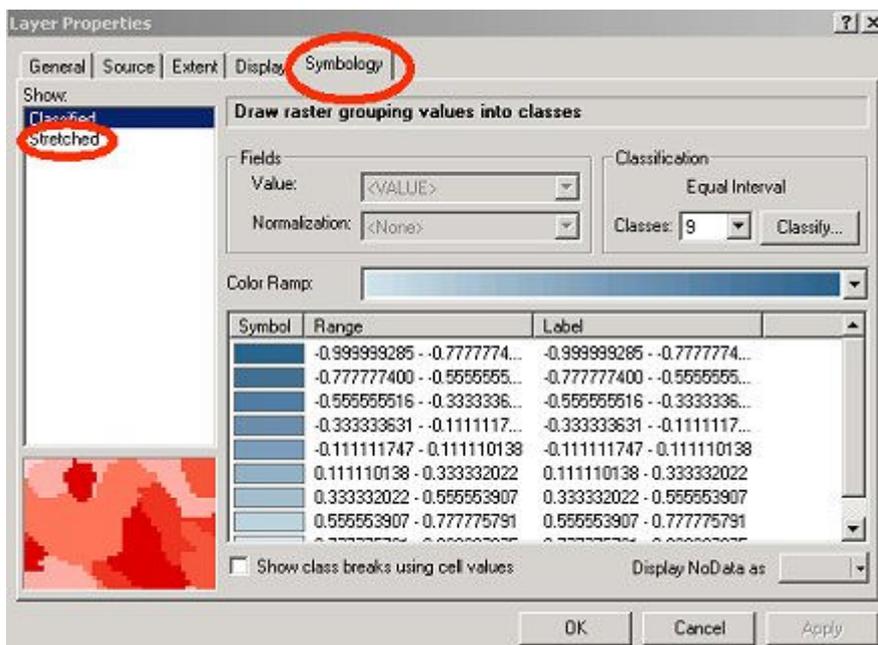


14. Let's now revisit the RASTER CALCULATOR and try something a bit harder. Spatial Analyst > RASTER Calculator. First notice that all of the raster datasets that you've created are available for you to use. Start by clicking on the Trigonometric SIN button. The SIN function is added along with the braces for constraint of the SIN function. In side of the SIN function place the name Aspect of dem30, by double clicking on that name from the available dataset list. Now continue to add the remainder of the equations below. Of course you can just type the whole thing in. When complete click on EVALUATE.

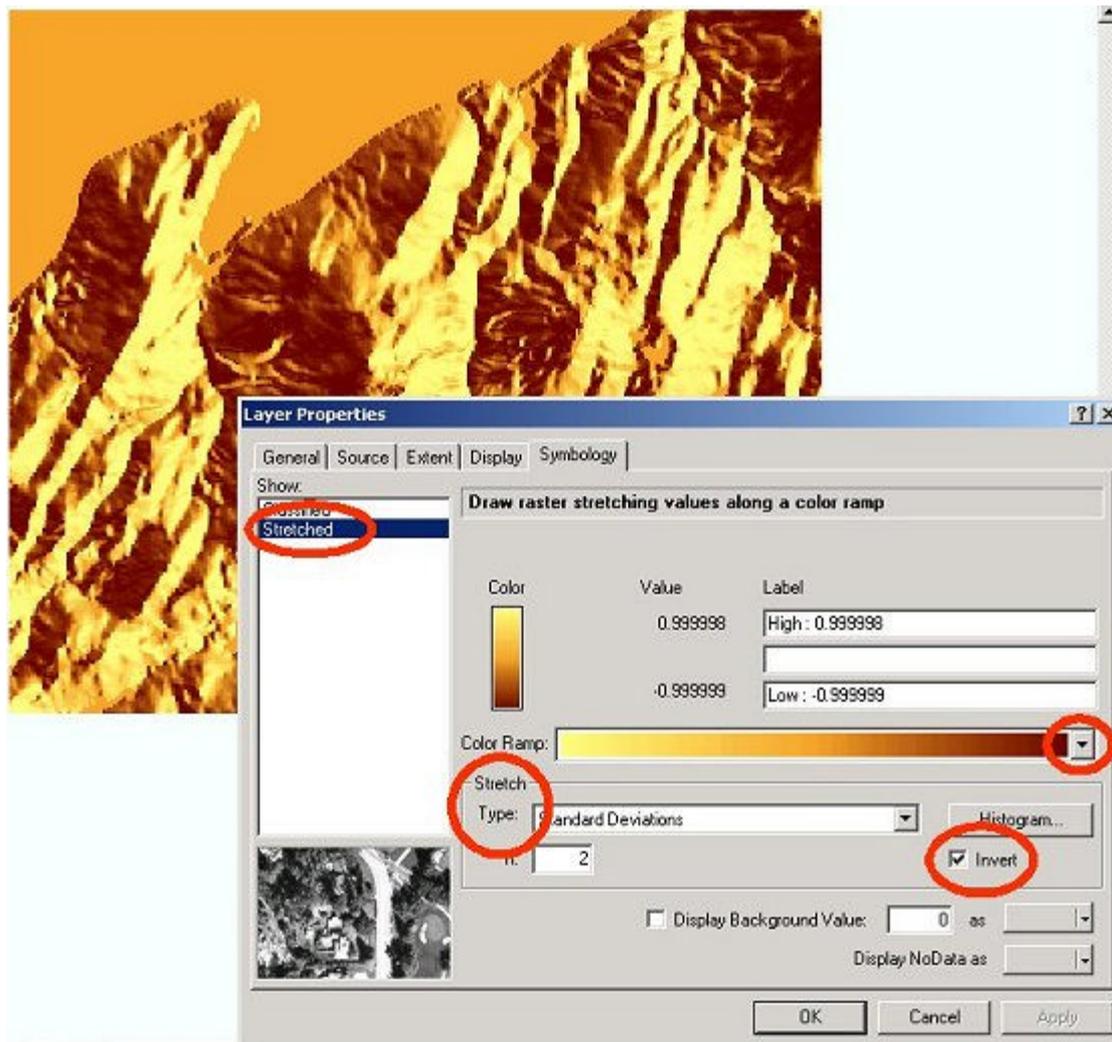
$\text{Sin}([\text{Aspect of dem30}] * 3.1459 / 180)$



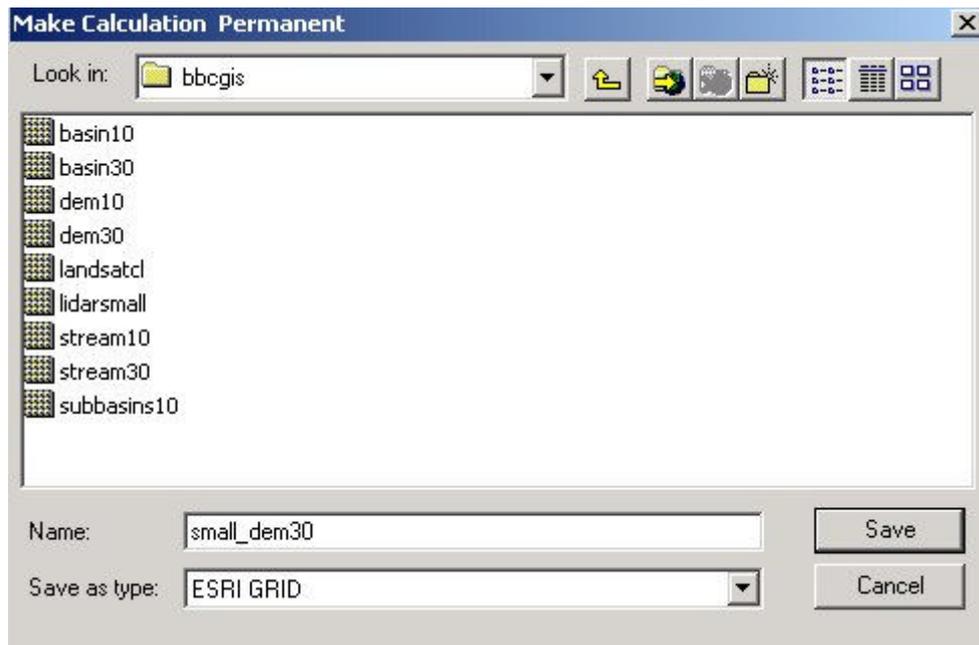
15. The results will look a lot like the hillshade calculation we did before using the default button. Now you can see how basic numeric function can be implemented. Change the display of this new dataset "Calculation 2" by double clicking on the dataset name and use the option available from the SYMBOLOGY tab of the layer Properties



16. Change the display option to Stretched and pick a color ramp you like. Note also the option to invert the stretch and to adjust the type of stretch.



17 The last step is to save the datasets that want from those that you've "calculated". Remember, most of these dataset are only temporary calculations, you have (for the most part) not generated new data. RIGHT click on the "Calculation" dataset and select the MAKE PERMANENT option (this is the first calculation when the extent was set to the display and we "clipped" the raster dataset to a much smaller region). If necessary navigate to your own workspace (or that of you teams) and provide a name that you'll remember.



18. I'm done. Let's go home.