

GY461 Applied GIS: Environmental Modeling the 3D Terrain of the Cheaha Mt. Quadrangle

Introduction

In this project you will use ArcScene and 3D Analyst to generate a 3D model of the geologic map of the Cheaha Mt. quadrangle that you have previously completed. Make sure that the elements of this project are available on your workstation and that they load properly into ArcMap before proceeding. In particular, you will need access to the DEM used for this quadrangle.

Step 1: Generate Contours with Spatial Analyst

Load your Cheaha Mt. geologic map into ArcMap and make sure that you still have the DEM attached to the project (not the HillShade). At this time activate the Spatial Analyst toolbar by right-clicking on the gray toolbar area. From the pull down menu select “Surface Analysis > Contour”. Setup the dialog window as displayed in **Figure 1** - be sure to indicate a 25 unit contour interval, and use a “Z factor” of 3.28. This Z factor will convert the elevation values in the DEM from meters to feet. This is useful for comparing the contour lines to the topographic base map contours that are also in feet units. In addition, since the X and Y units are meters (UTM coordinates), this creates a vertical “enhancement” that accentuates the actual topographic relief. After generating the contours the ArcMap project should appear similar to **Figure 2**. Verify that the contours were correctly calculated by zooming in and selecting a contour with the identity tool (“i” icon). The contour elevation value should match nearby base map contours closely- if not get help from your instructor.

Step 2: Generate the TIN from the Contours with 3D Analyst

You will use 3D Analyst in this step to produce a Triangulated Integrated Network (TIN) based on the 25 foot contour line feature generated in the previous step. Make sure the 3D Analyst toolbar is activated, and then select from the drop-down menu “Create/Modify TIN > Create TIN from Features ...”. Setup the resulting dialog window as indicated in **Figure 3**. Note that the only feature used to create the TIN are the contours generated in step 1. Save the output to the Cheaha Mt. project folder as “tin”. The created TIN will allow you to treat the project as a 3D surface.

ArcGIS will automatically choose colors for the TIN- override this by right-clicking on the “tin” feature layer, and selecting “properties > symbology”. Setup the symbology as depicted in **Figure 4**. After setting the symbology the TIN can more or less replace the “hillshade” so turn off the hillshade and arrange the order of the features as depicted in **Figure 5**.

You will want to use the symbology created for “Lithology” and “Contacts” in the ArcScene project file to be created in the next step, therefore, right-click on these layers and then select

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“Export to Layer file”. Accept the default settings and press OK each time. This generates a layer (lyr) file for each feature so that you don’t have to re-create the symbology settings.

Save the ArcMap project and then exit ArcMap at this time.

Step 3: Create ArcScene Project File

Start ArcScene from the desktop or “Start” menu. Using the “Add Data” button at the TIN created in the previous step to this new project. As in ArcMap, change the symbology to use a grey color rather than green. Set the values in the symbology tab of the TIN feature layer to those shown in **Figure 6**. Now add the “Contacts” feature layer and then use the “import” button in the “Symbology” tab to set the contact line symbology to match that of the previous ArcMap project file. Your ArcScene project should now appear similar to **Figure 7**.

The next part of this step is to add the lithologic colors to the 3D scene. Although polygon features cannot be directly “draped” over the TIN, if the lithologic polygon feature class is converted to a raster color map it can be added to this project. To do this, left-click on the ArcToolbox icon on the button bar, and then select “Conversion tools > To Raster > Feature to Raster”. Fill in the dialog window as displayed in **Figure 8**. The new raster will be added automatically to your project. The colors are randomly chosen by ArcScene, and you can’t import a layer file because this is a raster feature so at this point you should take time to write down the RGB values of the lithologies in the ArcMap project, and then set those to the same values in the “LithoGrid” raster layer.

When initially added to the project the “LithoGrid” feature is set to 0 elevation. To change this, right-click on the LithoGrid raster layer, and then select “Properties > Symbology”. Set this layer to use the elevation of the TIN as indicated in **Figure 9**. Add an offset of +10 to ensure that the LithoGrid layer is above the TIN. Make a similar change to the “Contacts” feature layer.

At this point your ArcScene project should appear similar to **Figure 10**.

Step 4: Record the Fly-By Animation

At this point you are ready to record a Fly-By animation. As usual you will by default be starting at the southwest corner of the quadrangle. Practice flying along the west slope of Cheaha Mt. And then back to the starting point along the east slope. This should give the viewer a good look at all of the topography and geology of the quadrangle. Save the animation as “FlyBy” on the project folder.