

2.5D & 3D Map Visualization

Introduction

In this Workshop, we will be working some 3D data and display. Keep in mind that working with 3D data is inherently more computationally intensive; and operations may take longer to complete, and the software may be more unstable than normal. **Save your project often.**

Data: smithers from L: Drive

- Create a new project in ArcGIS Pro and save it as relief in your local folder.
- We'll start by creating a Digital Elevation Model (DEM) from a contour layer.
- This is rarely necessary anymore as high-quality DEM layers are widely available, but it is worth noting that it is possible to do so using the “**Topo to Raster**” tool using a contour layer as your input.

Creating a DEM

Open the Tools (Geoprocessing) pane from the Analysis tab

- Search for the “Topo to Raster” tool and set:
 - Feature Layer: contour_100ft
 - Field: ELEVATION
 - Type: Contour
 - Output surface raster: dem30
 - Output cell size: 30

Leave all other settings as default and press run.

- Next, in your drawing order, turn off your contour layer.
- Select the new DEM layer you created and set the symbology to stretch (Raster Layer > Symbology > Stretch).

The pixels of this image represent the elevation, where white pixels are the highest values and therefore the highest elevation.

It is more common to receive elevation data as a DEM than as contours.

Hillshade

Digital elevation models are not the most visually appealing on their own, so to add some visual style we will create a hillshade

Create hillshade

Select your DEM layers.

- Open Imagery > Raster Functions
- At the very bottom you will find Surface > Hillshade

We will start by making a Traditional Hillshade:

- Select your DEM created in previous step from the drop down, and leave type as traditional.

Azimuth is the compass direction the ‘sun’ will be coming from to cast shadows. 315 degrees represents North West. If you want your shadows on the other side of the mountain, this can be changed.

Altitude is how high on the horizon the ‘sun’ is in degrees with 0 being at the horizon (very strong shadows cast), and 90 being directly above (very few shadows, with no discernible direction).

If you want to avoid shadows all being on one side of the terrain, instead of setting the Altitude to 90 degrees, use multidirectional as opposed to traditional hillshade.

- Next, turn off the DEM layer, and all but one of the hillshade layers you just made. Ensure World Topographic Map and World Hillshade are turned off.

Move the hillshade layer to the very top of the Drawing Order.

- In the top ribbon, under Raster Layer, set Transparency to 60%, and Layer Blend to Luminosity.
- If you turn your **vegetation layer back on**, your map should now have a nice 2.5D effect. Go ahead and **save your project**.

Creating 3D Scenes

- Create a new Local Scene by clicking Insert -> New Local Scene

Now let’s examine the drawing order for the Scene. In the map we had only a single category, and now we have three categories.

3D Layers: this is for layers that have elevation information attached (i.e. contours). We will not be using any of these right now, these layers will be displayed at an altitude based on the contained data.

2D Layers: these are the layers you have been working with to date, and function exactly the same as they did in the map, except they will be draped over an Elevation Surface.

Elevation Surfaces: this is the 3D data that 2D layers will be displayed against.

REMEMBER THIS: On 3D Layers, the elevation can either be above ground level or absolute. When elevation is absolute, errors in alignment between 3D Layers and the Elevation Surface could cause the layers to end up below the ground and thus not visible.

- We will start by turning off all 3 of the default layers, giving us a clean canvas to work with.
- Add layers dem30. Usually it will be added in to 2D layers
- Add roads, trails and waterbody
- Copy dem30 and paste it under Ground by right-click Ground-> Paste.

This will allow the system to use this DEM as ground height.

- Turn off WorldElevation3D/Terrain3D.

Hypsometric tints

Note that the process for creating hypsometric tints is identical on the regular 2D Maps. We can change the symbolize to view the hypsometric tints

- Right-click dem30 in 2D layers -> Symbology
- Click Primary symbology -> Shaded Relief. You can play round different color scheme to see how the appearance changes. Note that different terrains will look better with different colour ramps.

Note if your terrain looks too flat (or not flat enough) you can change the **vertical exaggeration**. Select Ground in the drawing order.

- Then go into the Elevation Surface Layer tab and you will be able to set the Vertical Exaggeration.

Map Presentation

- Create a new layout. Scenes can be added to layouts as **Map Frame**.
 - Add your name and title. For the 3D scene, a legend is optional. Scale Bars and North Arrows should NOT be used as they will be incorrect due to **perspective**.
 - Export your map
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Create Movie/Animation

- Go to top ribbon>select View>Animation: ADD frame at different perspective
- Export > Movie > .tif
- Open with Internet Explorer