

**Geographic Information Systems and Remote Sensing for Natural Resource
Management
School of Forest Resources and Environmental Science
Michigan Technological University
Spring Semester 2009**

**Laboratory Exercise 7
Working with 3D Analyst**

Introduction

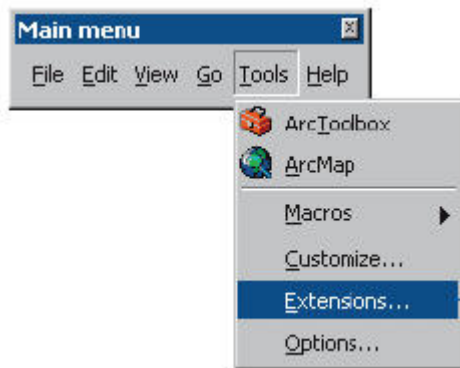
ArcGIS 3D Analyst, the three dimensional (3D) visualization and analysis extension adds a specialized 3D viewing application, ArcScene, to the GIS suite of programs. ArcScene lets you make perspective views in which you can navigate and interact with displayed thematic layers.

You can drape raster and vector data over surfaces and extrude features. You can also use 3D analyst tools in ArcScene to create and analyze surfaces. Viewing a remotely sensed image draped over a terrain surface can often lead to a greater understand of the patterns in the image and how they relate to the shape of the earth's surface.

Create a lab 7 folder in your home directory.

Turning on the 3D Analyst Externison

Enable the 3D analyst extension by clicking Tools, followed by Extensions.



Check **3D Analyst** and close the Extensions window. If the 3D Analyst button does not automatically appear, click **View** in the top menu bar and click **Toolbars** and check **3D Analyst**.

Start **ArcScene**. Note that many of the tools on the Arc Scene Standard tool bar are the same as the tools you see



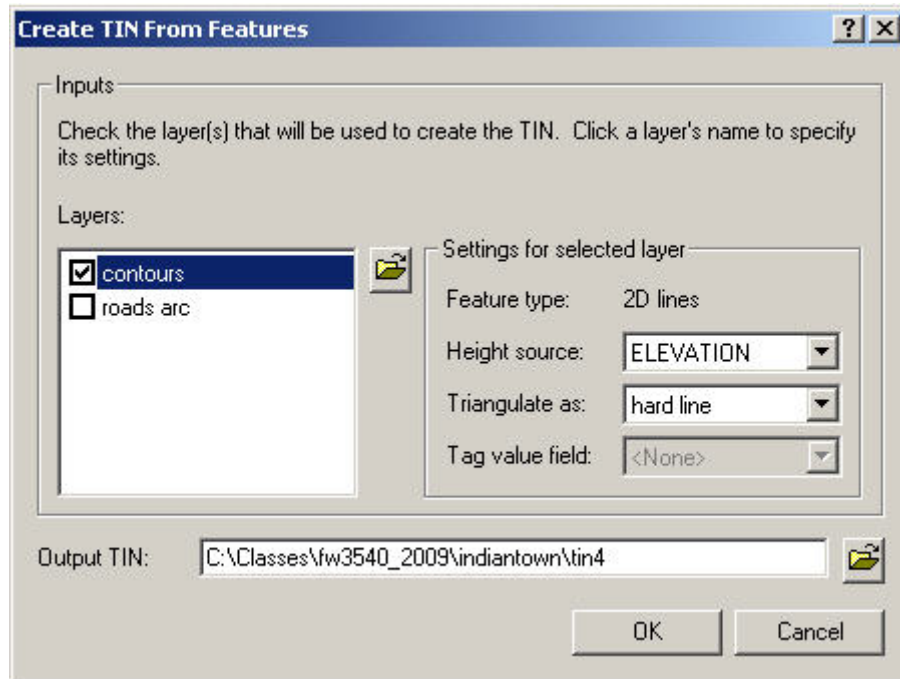
in ArcMap

Creating 3D Data

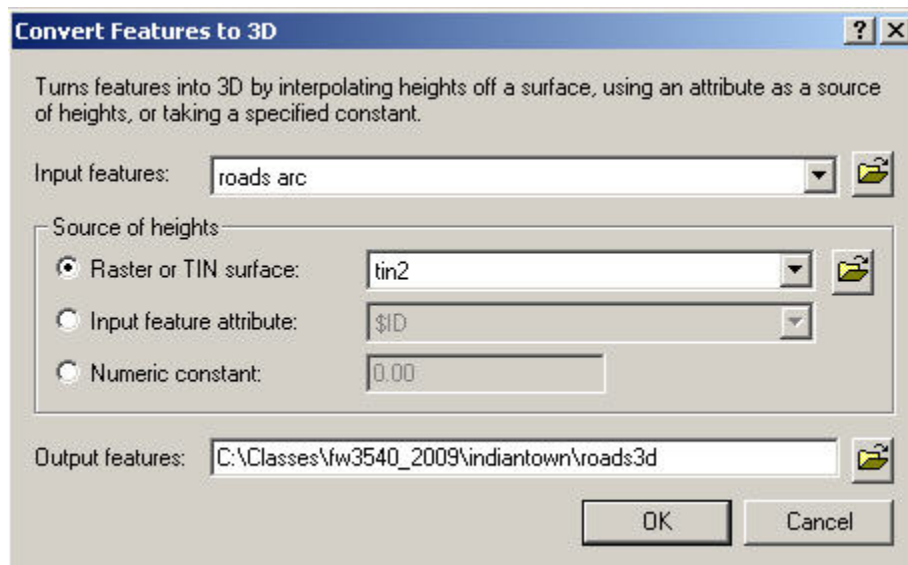
To drape thematic information and create a 3D representation you must have a TIN representing the elevation values. There are several ways to create a TIN. For this exercise you are going to use the DLG hysography contours (arcs). Remember you joined the elevation values to the contour lines before exporting the hysography coverage to the contours shapefile.

Click the **3D Analyst** button, click **Create/Modify Tin**, click **Create TIN From Features**. The CreateTIN From Features window will open. See illustration on next page. Check the box in front of contours and be sure to choose the correct attribute field for the **height source-**

ELEVATION. Be sure the TIN is placed in your Lab 7 folder. The newly created TIN will display automatically.



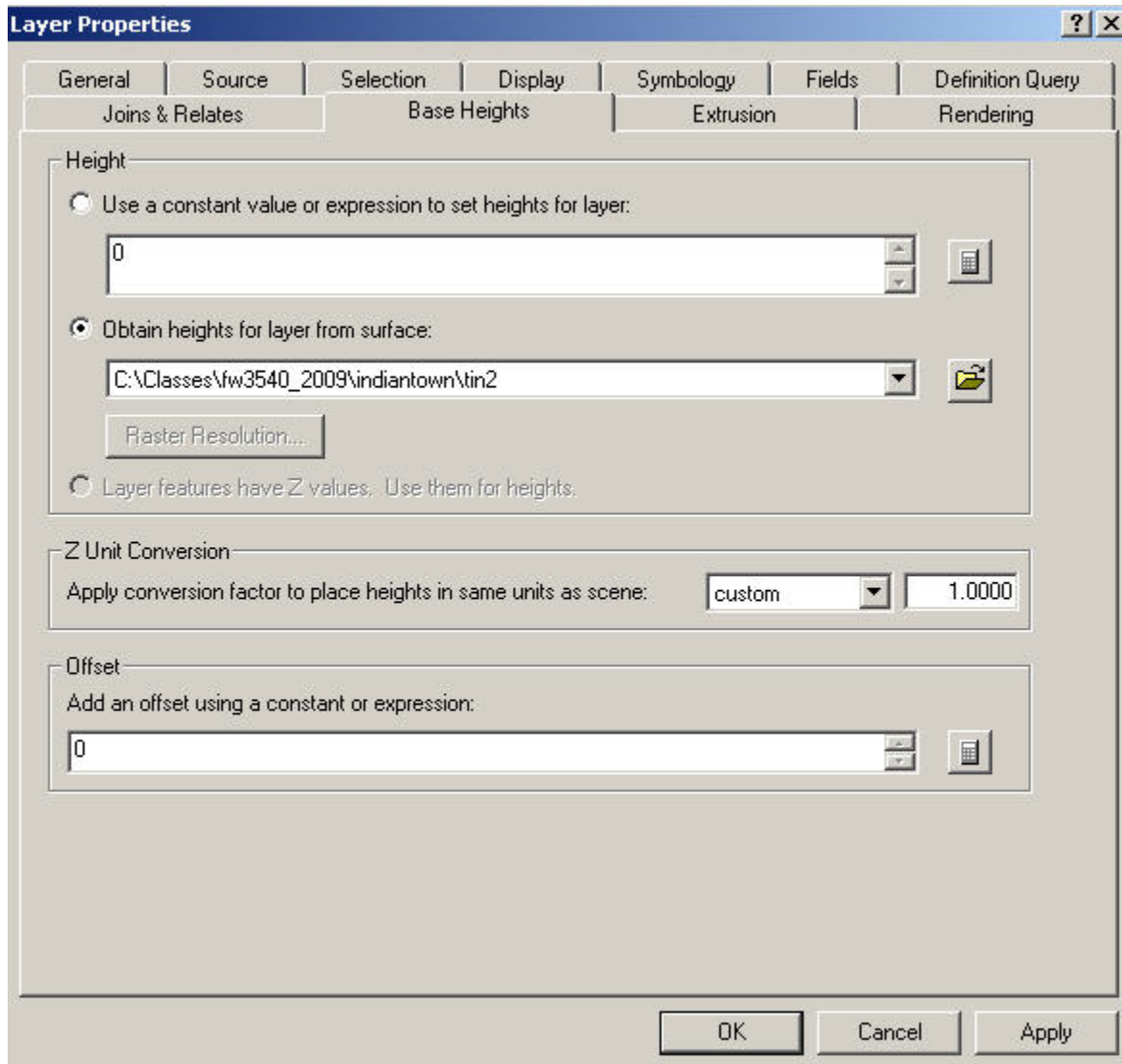
Data which you want to drape over the TIN needs to be converted to 3D. Click the **3D Analyst** button, click **Convert**, click **Features to 3D**. The Convert Features to 3D window will open.



Convert the DLG derived roads, hypopoly and hypsoarc shapefiles to 3D structured files. Be sure to place these files in your lab 7 directory. *Note: I like to place "3d" at the end of the output file name to help me remember which files are in 3D format vs. 2D format.*

Draping the Data

Before the 3D converted data can be draped over the TIN, it must be tied to a source from which to derive the elevations. This is accomplished by opening the 3D thematic layers **Properties** window. Click on the **Base Heights** Tab, and check **Obtain heights for layer from surface** and using the newly created TIN. Do this for the 3D roads, hypso poly and hypsoarc shapefiles.



Once the files are tied to the TIN they will appear to lie on the TIN. Up until this point they were below the TIN at “0 elevation”.

Exploring the Image

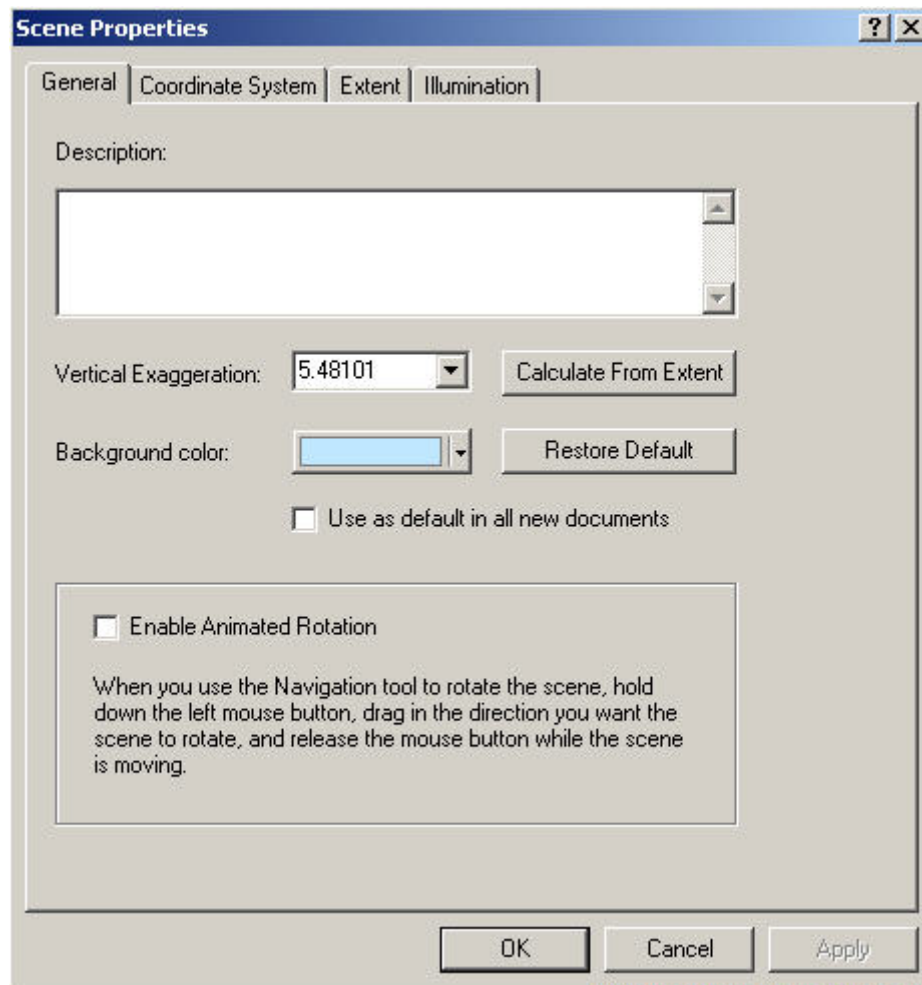
Use the navigation tools in the ArcScene Tools toolbar to explore the draped image.



Click on the Zoom-In icon and zoom into a part of the image. Click the **Navigate** button (far left icon). Click on the scene and slowly drag up and to the left. The scene rotates and view angle lowers. Practice navigating around the scene changing the view and the look angles.

Exaggerating the Terrain

The contrast in heights is fairly limited. You may be able to see more details if the height of the terrain is exaggerated or extruded. Right click **Scene layers** at the very top of the **Table of Contents**. Click **Scene Properties**. This dialog box lets you set properties that are shared by all of the layers in the scene. Set a new vertical exaggeration by clicking on the **Calculate From Extent** button. If this is too much exaggeration use a lower number. Set the background color to the color of your choice. Note you can change the illumination direction and angle. Experiment a little.



Draping the OrthophotoMosaic

Drape the orthophotos over the TIN. Note that raster images do **NOT** need to be converted to 3D. However they must be tied to the TIN in same manner all the vector layers were using the **Base Heights** tab in the **Layer Properties** window.

Since the orthophotos are corrected to a “pseudo” flat surface, you will notice a distortion of the pixels on slopes. Exaggeration of heights will exacerbate this distortion, so you may to adjust the vertical exaggeration once again.

Save your work! The information is saved in a .sxd file (ArcScene) as opposed to a .mxd (ArcMap).

Navigating Through a Scene Using the Fly Tool

In the lab7 folder on the P:drive in the FW3540 folder is a .pdf file of the digital book on using 3D analyst. On page 202 of the book are instructions on using the Fly tool. Read through these instructions and practice flying the coastline of the Indian Town quad. This take some practice so be patient.

The book also provides instructions on creating animations and other features of the 3D Analyst and ArcScene. If this area of GIS interests you- EXPLORE!

Due in lab the week after Spring Break- a flowchart on how to use the Fly Tool for navigating through a scene.