CONVERTING DIGITAL ELEVATION MODELS INTO GRIDS AND TINS FOR USE IN ARCVIEW AND ARCGIS

The following documentation outlines conversion steps for the following DEM and DTM formats for use in ArcView and ArcGIS:

1. Digital Terrain Model (DTM) data from NRVIS
2. Digital Elevation Model (DEM) data from NRVIS
3. DEM data from DMTI
4. Canadian Digital Elevation Data (CDED) from NRCan

The data from these sources come in point format. The amount of detail in a GRID or TIN is a direct function of the number of sample points used in the original data source. Thus, the more points used to create the GRID or TIN, the more detailed the image will be. Furthermore, the more points used, the longer the processing time required to construct each GRID and TIN.

Instructions for importing each of the above DEMs into ArcView and ArcGIS are discussed by data type. Note: DEMs and DTMs are synonymous.

Note: Each of the images used in this document to illustrated the resulting GRID's and TIN's from the above sources are taken from the same area (Waterloo Area)

CONVERTING DIGITAL TERRAIN MODEL (DTM) DATA FROM NRVIS

File Format: *.shp

Convert to GRID in ArcView:

1. Start a new view and turn on the **Spatial Analyst** and **3d Analyst** extensions.
2. Open the *.shp file of the area you want to view.
3. In the **Theme** menu – Click **Convert to GRID.**
4. Select the name and location of the new grid to be constructed.
5. Select 'SPOT' as the attribute from which to derive the grid (**Note:** Alternate synonyms for 'SPOT' include 'ELEV,' 'Z-Factor,' 'Height' etc).

The conversion can take up to 15 minutes depending on the number of points in the shapefile.

When the conversion is complete, you will be asked to join the attribute table. If you just want to view the GRID click no. If you need the attribute for further analysis, click yes. Note: Joining the attribute table can take longer than the construction of the GRID itself.
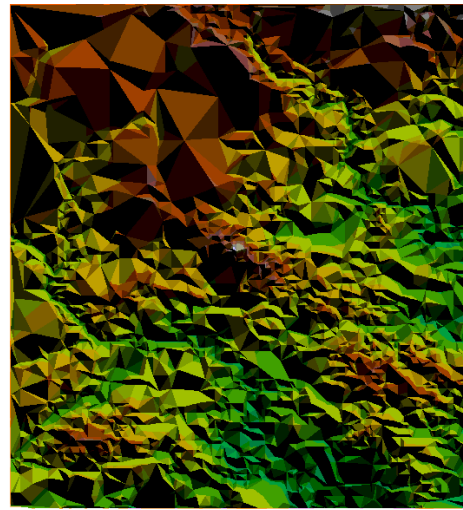
Convert to TIN in ArcView

Note: You must have constructed a GRID before proceeding and you must have the **Spatial Analyst** and **3d Analyst** extensions turned on.

1. Click on the GRID in the viewer that you want to convert.
2. Click on **Convert to GRID** from the **Theme menu.**
3. Specify a filename for our new TIN and click **OK.**
4. You will be prompted to specify a z-value tolerance. This value represents the max plus/minus height that the output TIN can differ in relation to the center value of each cell from the input GRID (ArcView Help). The default value is typically ok to use unless you are doing advanced analyses.
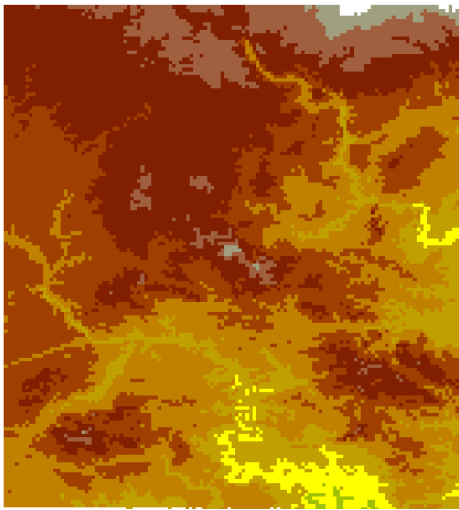
NRVIS DTM GRID using ArcView   **NRVIS DTM TIN using ArcView**
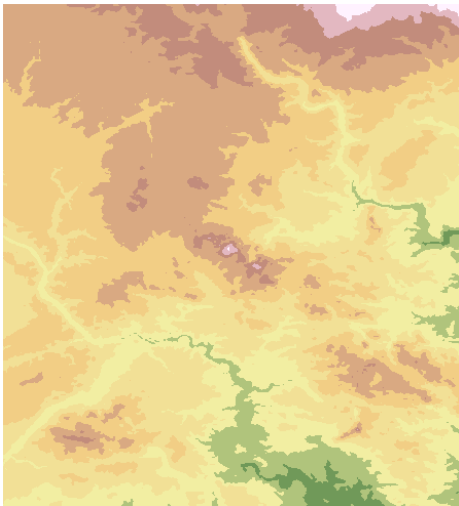
Converting to GRID in ArcGIS:

1. Start ArcMap and turn on the **Spatial Analyst** menu that is located under the **toolbar** menu in the **View** pull down menu.
2. Using the **Spatial Analyst** menu, go to **Inverse Distance Weighted** under the **Interpolate to Raster** menu. (Note: There are a few choices for GRID conversion. If you are unfamiliar with the workings of each, use Inverse Distance Weighted as it is a good all around choice).
3. In the box that opens up—click on the folder to select the *.shp that you want to convert to a DEM. On the right, your **Height** source is 'SPOT' and your **Triangulate as:** is 'Mass Points.' Leave the **Tag Value Field** as default. Indicate the destination and name of the output GRID at the bottom and click **Ok**.

Converting to TIN in ArcGIS:

Note: You must have constructed a GRID before proceeding and you must have the **Spatial Analyst** and **3d Analyst** extensions turned on.

1. Click on the GRID in the viewer that you want to convert.
2. Click on **Convert to GRID** from the **Theme menu.**
3. Specify a filename for our new TIN and click **OK.**
4. You will be prompted to specify a z-value tolerance. This value represents the max plus/minus height that the output TIN can differ in relation to the center value of each cell from the input GRID (ArcView Help). The default value is typically ok to use unless you are doing advanced analyses.

Note: Both of these conversions can take up to 30 minutes or longer depending on the number of input points. Furthermore, draw time for the TIN can be upwards of 10 minutes.

NRVIS DTM GRID using ArcMap
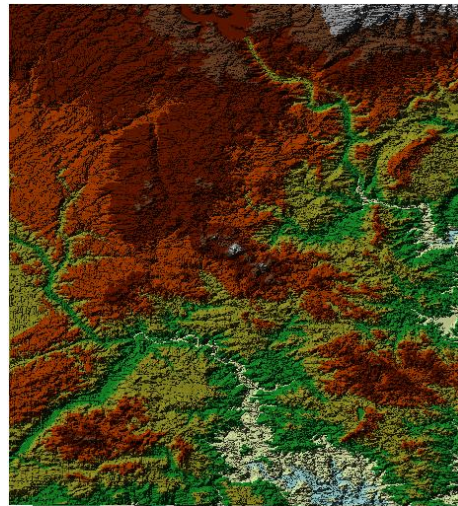
NRVIS DTM TIN using ArcMap

CONVERTING DIGITAL ELEVATION MODEL (DEM) DATA FROM NRVIS

File Formats: *.dem ; *.hdr – Header File ; *.htm – Metadata File

Converting to GRID in ArcView:

1. Start a new view and turn on the **Spatial Analyst** and **3d Analyst** extensions.
2. Click **Import Data Source** under the **File** menu.
3. Under the **Select Import File Type** menu that appears, select **Binary Raster** from the pull down menu.
4. A new box will appear for the selection of the input DEM. In the **List of File Types** on the bottom left**,** change to **All file types.** In the window on the right, click the path where your DEM is located then click on the file with the *.dem extension and click **Ok**.
5. Select a name and location for your new grid in the next window that appears and click **Ok.**

Converting to TIN in ArcView

Note: You must have constructed a GRID before proceeding and you must have the **Spatial Analyst** and **3d Analyst** extensions turned on.

1. Click on the GRID in the viewer that you want to convert.
2. Click on **Convert to GRID** from the **Theme menu.**
3. Specify a filename for our new TIN and click **OK.**
4. You will be prompted to specify a z-value tolerance. This value represents the max plus/minus height that the output TIN can differ in relation to the center value of each cell from the input GRID (ArcView Help). The default value is typically ok to use unless you are doing advanced analyses.
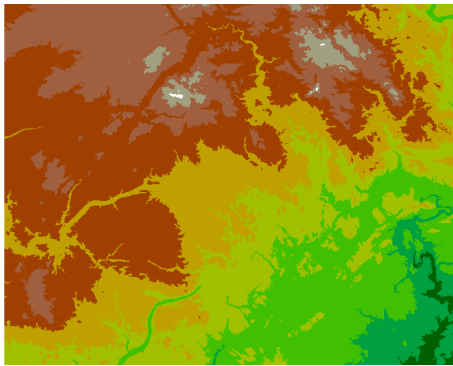
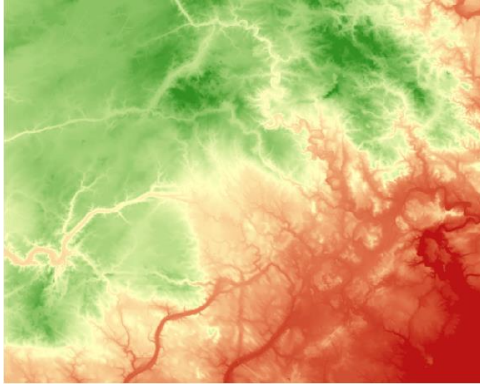

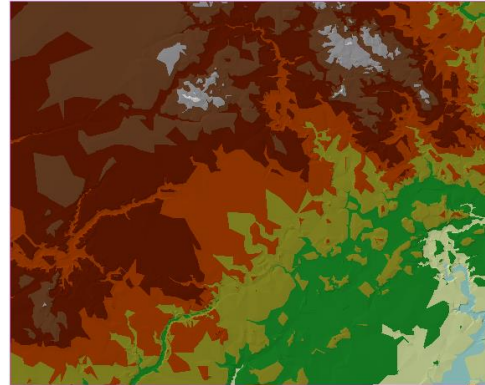| NRVIS DEM GRID using ArcView | NRVIS DEM TIN using ArcView |
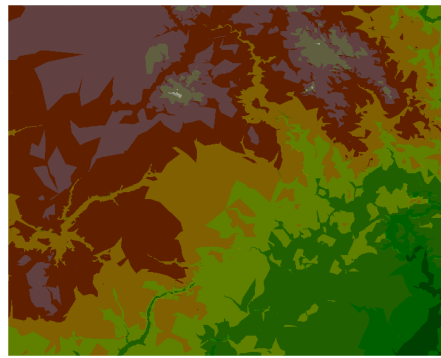
Converting to GRID in ArcGIS:

1. Start **ArcToolBox** (This is a stand alone program that is found under the ArcGIS directory).
2. Click **Floating Point to GRID** under the **Import to Raster** menu.
3. Specify your input DEM and output raster then click **OK.**
4. Start **ArcMap** and open new raster—Note: If prompted to build pyramids, click Y**es.**

Converting to TIN in ArcGIS:

1. Using the **3d Analyst** menu, go to **Raster to TIN** under the **Convert** menu. In the box that opens up, select the input theme to convert. The Z-tolerance can remain as the default. Again, this value represents the max plus/minus height that the output TIN can differ in relation to the center of each cell from the input GRID (ArcView Help). The default value is typically ok to use unless you are doing advanced analyses.
2. The new TIN will automatically be added to the view when complete.

NRVIS DEM GRID using Arc Map   **NRVIS DEM TIN using ArcView**

CONVERTING DEM DATA FROM DMTI

File Formats: *.acs – ASCII File ; *.prj – Projection File

Converting to GRID in ArcView:

1. Start a new view and turn on the **Spatial Analyst** and **3d Analyst** extensions.
2. Click on **Import Data Set** from the **File** menu.
3. In the menu that appears choose **ASCII Raster** in the pull down menu. Click **Ok**.
4. Choose the file that you want to convert and the filename for the output GRID
5. When prompted for **Cell Values as Integers**, click **No.**
6. When the Grid is complete, you will be prompted to add the GRID to the view.

Converting to TIN in ArcView:

Note: You must have constructed a GRID before proceeding and you must have the **Spatial Analyst** and **3d Analyst** extensions turned on.

1. Click on the GRID in the viewer that you want to convert.
2. Click on **Convert to GRID** from the **Theme menu.**
3. Specify a filename for our new TIN and click **OK.**
4. You will be prompted to specify a z-value tolerance. This value represents the max plus/minus height that the output TIN can differ in relation to the center value of each cell from the input GRID (ArcView Help). The default value is typically ok to use unless you are doing advanced analyses.
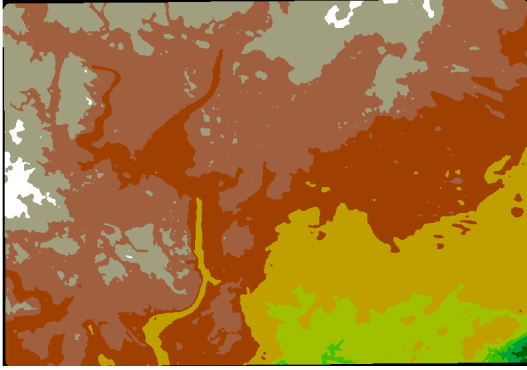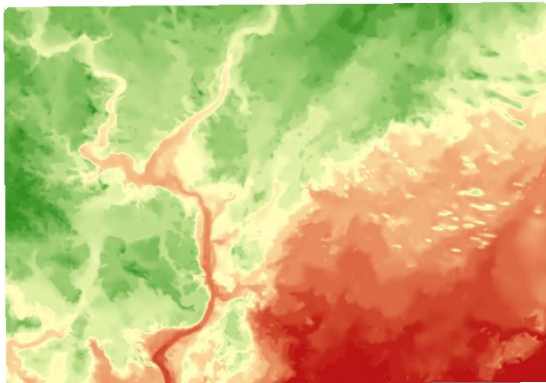
DTMI DEM GRID using ArcView
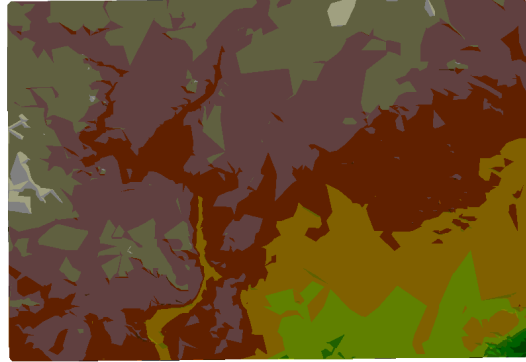
DMTI DEM TIN using ArcView
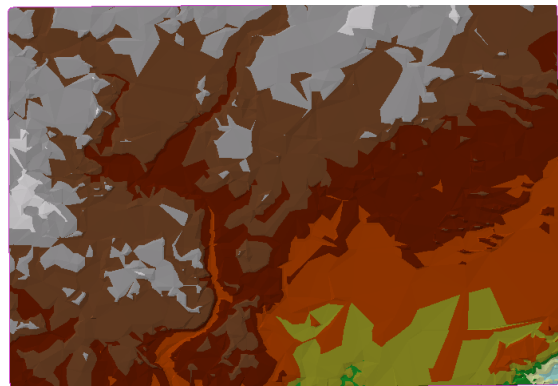
Converting to GRID in ArcGIS:

1. Start **ArcToolBox.**
2. Click **ASCII to GRID** under the **Import to Raster** menu.
3. Specify your input DEM and output raster.
4. Check **Floating** Point and click **OK.**
5. Start **ArcMap** and open new raster.
6. When prompted to **build pyramids**, click **Ok**.

Converting to TIN in ArcGIS:

1. Using the **3d Analyst** menu, go to **Raster to TIN** under the **Convert** menu. In the box that opens up, select the input theme to convert. The Z-tolerance can remain as the default. Again, this value represents the max plus/minus height that the output TIN can differ in relation to the center of each cell from the input GRID (ArcView Help). The default value is typically ok to use unless you are doing advanced analyses.
2. The new TIN will automatically be added to the view when complete.

DMTI DEM GRID using ArcMap

DMTI DEM TIN using ArcMap

File Format: *.dem

Converting to GRID in ArcView:

1. Start a new view and turn on the **Spatial Analyst** and **3d Analyst** extensions.
2. Click on **Import Data Set** from the **File** menu.
3. In the menu that appears choose **USGS DEM** in the pull down menu.
4. When the Grid is complete, you will be prompted to add the GRID to the view.

Note: If the GRID does not appear in your view, click on the GRID on the left then click **Zoom to Themes** in the **View** Menu.

Converting to TIN in ArcView:

Note: You must have constructed a GRID before proceeding and you must have the **Spatial Analyst** and **3d Analyst** extensions turned on.

1. Click on the GRID in the viewer that you want to convert.
2. Click on **Convert to GRID** from the **Theme menu.**
3. Specify a filename for our new TIN and click **OK.**
4. You will be prompted to specify a z-value tolerance. This value represents the max plus/minus height that the output TIN can differ in relation to the center value of each cell from the input GRID (ArcView Help). The default value is typically ok to use unless you are doing advanced analyses.
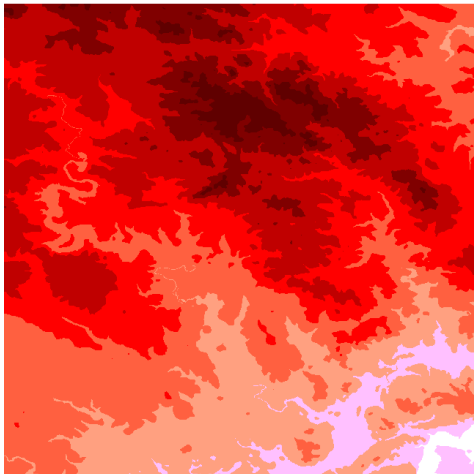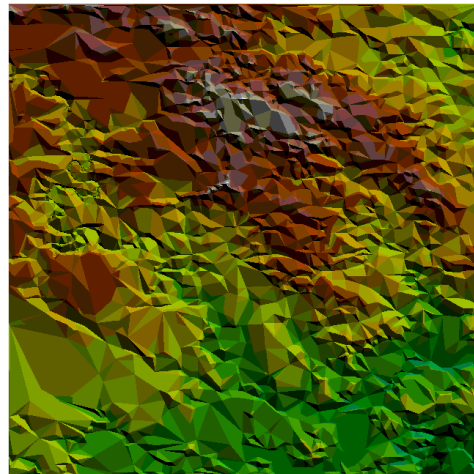
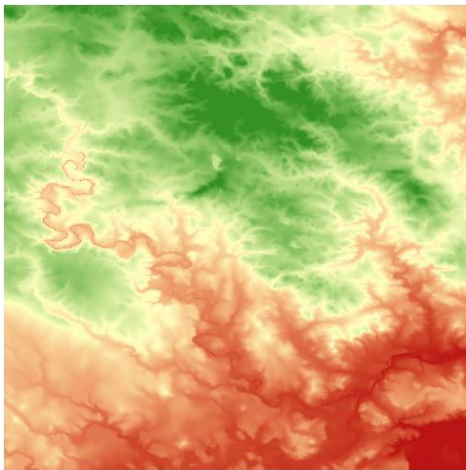**CDED DEM GRID using ArcView**   **CDED DEM TIN using ArcMap**

Converting to GRID in ArcGIS:

1. Start **ArcToolBox.**
2. Click **DEM to GRID** under the **Import to Raster** menu.
3. Specify your input DEM and output raster.

4. Check **Floating** Point and click **OK.**
5. Start **ArcMap** and open new raster.

Converting to TIN in ArcGIS:

1. Using the **3d Analyst** menu, go to **Raster to TIN** under the **Convert** menu. In the box that opens up, select the input theme to convert. The Z-tolerance can remain as the default. Again, this value represents the max plus/minus height that the output TIN can differ in relation to the center of each cell from the input GRID (ArcView Help). The default value is typically ok to use unless you are doing advanced analyses.
2. The new TIN will automatically be added to the view when complete.

CDED DEM GRID using ArcMap
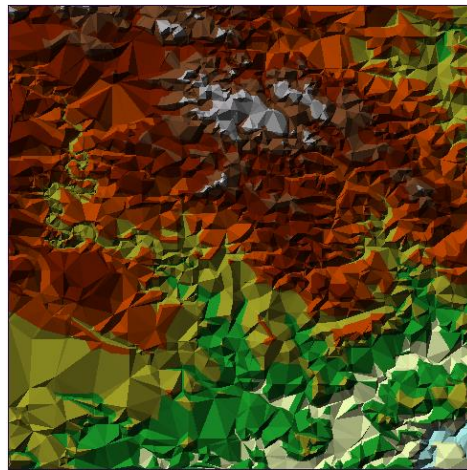
CDED DEM TIN using ArcMap

Complied by: Christopher Close, June 26, 2003