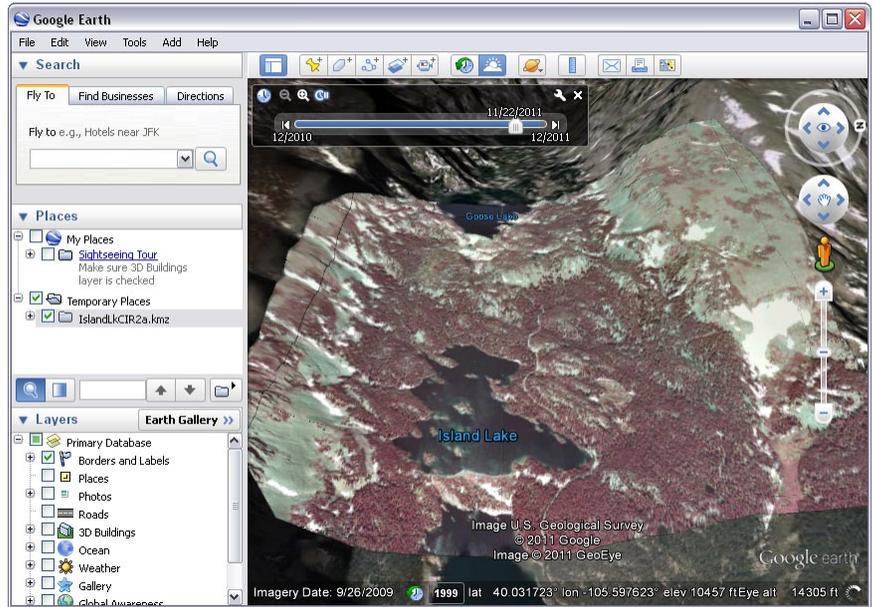


# Overlay Geodata Using a Custom Terrain

The Export Google Earth 3D Tileset process in TNTmips (Tileset / Collada / Build) allows you to process your custom elevation data and imagery into a tileset for viewing in 3D in Google Earth. The inputs for the process are an elevation raster (Digital Elevation Model) and one or more raster images (orthoimage, shaded-relief image of the DEM, or any other desired single-raster image) covering all or part of the same area. A Google Earth 3D tileset allows you to view your custom imagery draped over your custom terrain in 3D from any viewpoint in Google Earth.

A Google Earth 3D tileset consists of a tiled and pyramided set of 3D models created over a range of Google Earth zoom levels that you specify. For each tile area and zoom level the process creates an image file for each of your selected drape rasters and a COLLADA file that stores the corresponding patch of your terrain data. Image tiles that contain transparent cells are stored in PNG format, otherwise JPG format is used. A KML file is also produced for each drape image tile to relate the image tile to the corresponding COLLADA terrain file and to specify to Google Earth the location, orientation, and scale of each model.

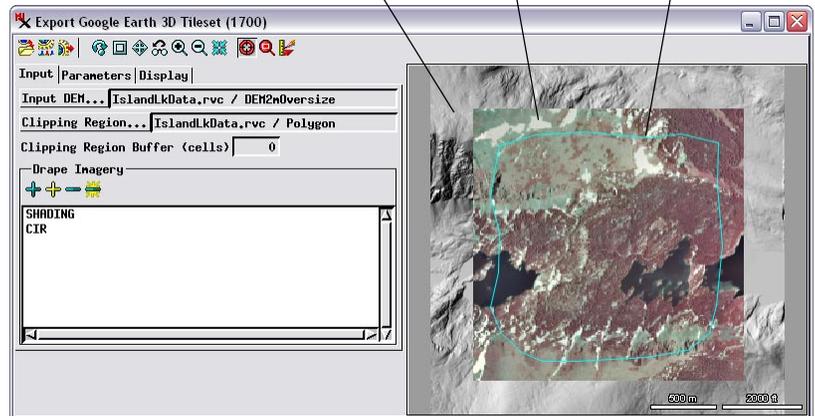
During export the tiles at the maximum zoom level are created first, then reduced-resolution versions of each drape image are used to create the tiles at successive zoom levels. The KML files for the reduced-resolution tiles contain network links to the tiles covering the same area at the next higher-resolution zoom level to allow Google Earth to switch tiles as you zoom. After the Export process creates all of the zoom levels, a single master KML file is created for each drape image to describe the entire tiled structure. When you load this KML file in Google Earth, Google Earth loads the COLLADA models and drape images that cover the current viewing area and that match the current view scale, enabling you to view your imagery draped over your custom terrain surface. (over)



View in Google Earth of a Google Earth 3D tileset that includes color-infrared orthoimagery and a custom DEM derived from Lidar and stereo imagery.

**COLLADA** (COLLABorative Design Activity) is an XML-based format designed for the exchange of digital 3D models. A COLLADA file can define one or more surfaces (such as ground terrain or the sides of a building) and the mapping of colors or image textures to these surfaces. Google Earth supports the display of 3D COLLADA models referenced by KML/KMZ files.

Selected SHADING Image Drape      Selected CIR Image Drape      Optional clipping region



Use the Input tabbed panel on the Export Google Earth 3D Tileset window to select the input DEM and the image or images to be draped over it; all are automatically shown in the view pane on the right side of the window. If a drape image does not cover exactly the same area as the DEM, only the area in common between them is processed. You also have the option to choose a region object to further limit the area to process. When you use a clipping region, you can expand the clipping area by specifying a buffer distance (in image cells) around the region boundary.

### Google Earth Tileset vs Google Earth 3D Tileset

A Google Earth tileset (KML Super-Overlay) created in TNTmips contains tiled custom images that Google Earth drapes over its native terrain surface. In contrast, a Google Earth 3D tileset (COLLADA tileset) created in TNTmips includes its own tiled terrain data in addition to one or more tiled images. A Google Earth 3D tileset is thus a full 3D representation of your terrain and image data, and it can be displayed in Google Earth in 3D independent of the Google Earth terrain surface.

## Input Data

The raster object you choose for the Input DEM can be any grayscale raster datatype (8-bit or 16-bit integer or floating-point). An input image you choose to drape over the DEM can be a composite-color raster or a grayscale raster with or without color palette. The input DEM and image are displayed in the view pane in the right side of the Export Google Earth 3D Tileset window. The DEM and image are not required to have the same cell size, extents, or georeference. The area of overlap between the DEM and an image (excluding any null areas) is the default area that is processed to the 3D tileset. You have the option to select a clipping region object to outline a specific subarea to be processed. If you haven't yet created the desired region object, you can open the GeoToolbox from the Export window, draw the desired outline in the view pane, add it as a region, save the region object to a Project File, and then select it for use in the process.

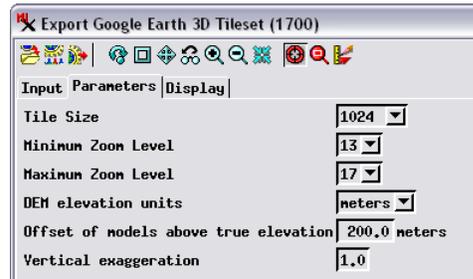
### Tile Size and Zoom Levels

To produce the Google Earth 3D tileset, the input DEM and images are each subdivided into tiles covering the designated area, with the corresponding DEM and image tiles covering the same ground area. The tile areas are computed to overlap by one DEM cell to insure that the elevations at the edges of adjacent 3D models match and form a seamless surface. The Tile Size combobox on the Parameters tabbed panel lets you choose the size of the image tiles in pixels. The available sizes are powers of 2 beginning with 512 cells.

The image tile size, the size and complexity of the terrain data in the Google Earth 3D tileset, and the number of 3D models in the tileset all affect the speed with which Google Earth loads the data. An image tile size of 1024 is optimal for most cases. If the DEM you are using is highly detailed and includes a large elevation range, you may want to decrease the image tile size to 512 to reduce the load time per tile of the surface data.

The elevation surface in a COLLADA 3D model is represented by a triangular mesh. Google Earth allows a maximum of 65,536 vertices in any model's surface mesh; tiles with more vertices are not loaded. When the Export Google Earth 3D Tileset process creates the surface mesh for a particular tile area, it detects if the number of elevation vertices produced exceeds the Google Earth limit and automatically retiles the area at the next smaller tile size. The process thus produces tiles at the requested size for areas with simple to moderately complex terrain, but may reduce the tile size for areas of more complex terrain in order to maximize efficiency of loading of the tileset in Google Earth.

When you select the DEM for the export,



Use the Parameters tabbed panel to set the parameter values for creating the Collada tileset.

the process sets a default Maximum Zoom Level and Minimum Zoom Level based on the spatial resolution (cell size) of the DEM and its spatial extents. You can modify these default settings manually using the zoom level menus provided on the Parameters tabbed panel.

### Elevation Units, Offset, and Vertical Exaggeration

DEM rasters typically have elevation values expressed in meters, decimeters, or feet. In order for proper elevation scaling to be set in the models in the Google Earth 3D tileset, you must specify which elevation units are used by your input DEM.

Google Earth does not allow its native imagery to be turned off, and thus it does not display any custom data that extends below its own terrain surface (unless you navigate below that surface). Any Google Earth 3D tileset placed at its true elevation would therefore likely intersect the Google terrain in a complex way, with some patches above Google's terrain (and visible) and some patches below (and obscured by Google Earth's own imagery). You can set an elevation offset value to raise the 3D models in the Google Earth 3D tileset above their true elevation and insure that all parts of your custom terrain data are above the Google terrain surface and fully visible. You may need to experiment with your data to determine an appropriate vertical offset value on a case by case basis.

### Job Processing

You can run the Google 3D Tileset export as a single process using the Run icon button or under TNT job processing via the Queue Jobs or Save Jobs icon button. Because each tile area is processed independently, you can use your 2, 4, or 8 processor cores to simultaneously process multiple tiles, greatly speeding completion of the tileset compared to the equivalent single process. See [microimages.com](http://microimages.com) for a suite of Technical Guides describing the TNT Job Processing system.

