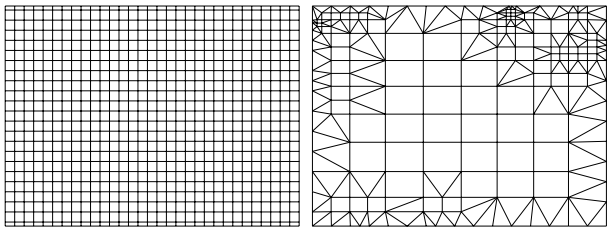
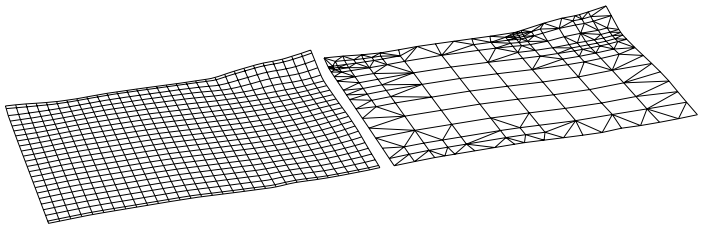
DRAPING AN IMAGE MAP

Objectives:
To produce an aerial view of a landform, with colored or textured features "draped" over it.

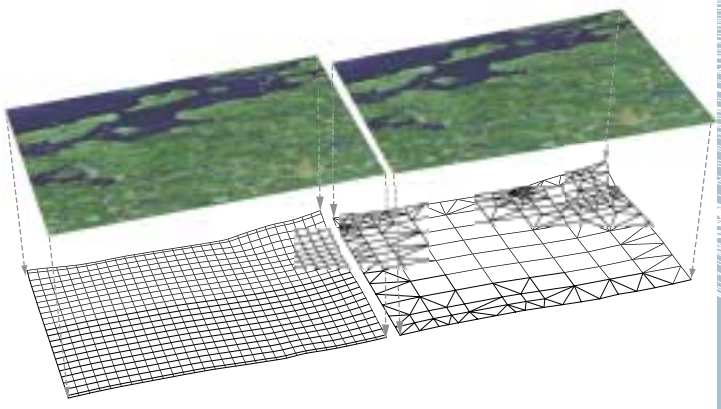
Inputs:
Digital Elevation Model (TIN or Grid, in standard format).
Image (aerial photo, hand sketch, etc., as JPEG, TIFF, or other standard image format).
Coordinates of area of interest, usually a rectangle, in standard geo-referencing system (i.e., known units and projection system).



Step 1.
Determine area of interest, and choose software for the drape operation. Some software may require specific image formats, terrain data formats, or have other limitations or requirements. Determine these beforehand.

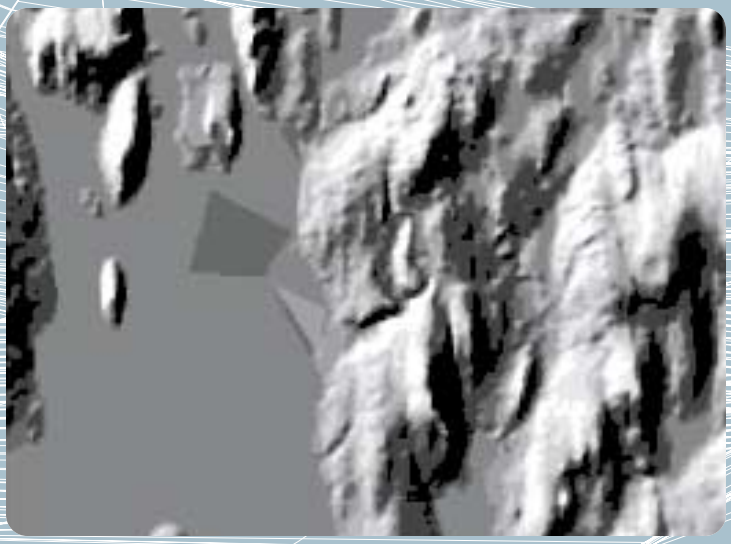


Step 2.
Assemble source material. Terrain and image data must overlap the area of interest.
a. *Acquire or generate DEM in desired geo-referencing system, at desired resolution (grid cell size, for a mesh, or minimum triangle size for TIN). Remember that higher resolution will necessitate larger files, and take longer to render. If only contours are available, then some software must be used to create either a grid or a TIN from the contours.*
b. *Acquire or generate image, at desired resolution. The image can match the resolution of the terrain; if a grid is used, then one pixel will be on one grid cell. Image and terrain resolution need not match, but some interpolation and hence inaccuracy may result if they don't.*

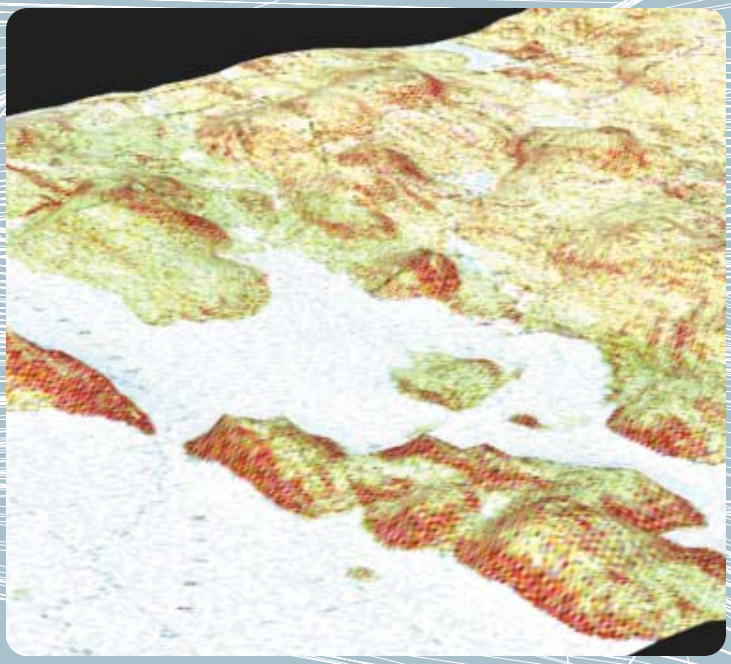


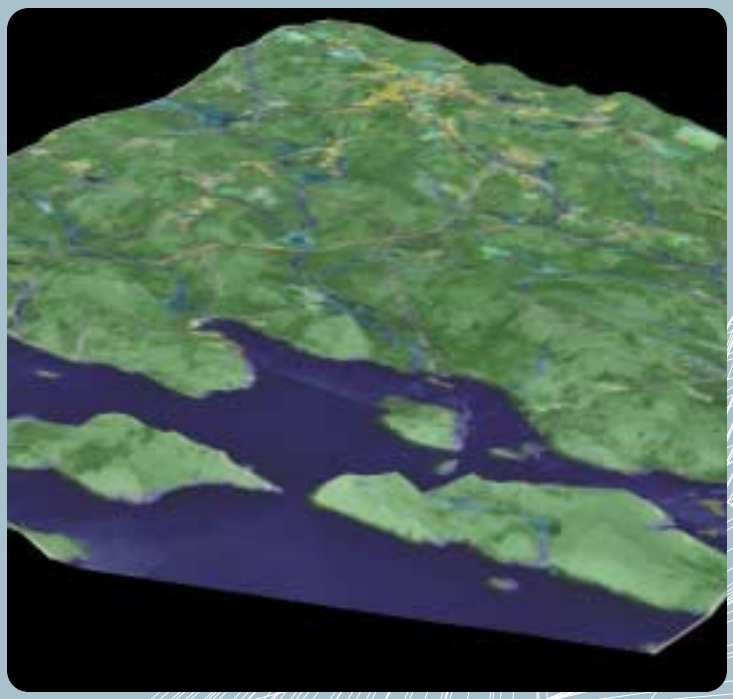
Note:
Image must be geo-referenced. If pre-referenced image is used (Digital Ortho-photo, for example) then just verify that image referencing system is same as terrain, or convert as necessary.
If an unreferenced image is used, then you must go through "rubber-sheeting," or registration and rectification process. Using some other source of known geo-referencing (the DEM, if feasible, or some other vector source) identify known points on the reference map with the same feature on the image. When 3 or more points are established, the image can be rectified, producing a new image in the process. This may often warp or distort the outline rectangular boundary, especially if there is a lot of terrain elevation difference.

Step 3.
Verify geo-referencing. Visual inspection should show similar features in similar places on both the terrain and the image (if they are visible, hydrological features such as rivers or lakes provide good references, as they should be apparent in both image and landform). If there are obvious incongruencies, verify the registration and coordinate systems, including projection system and units, in steps 1 and 2.



Step 4.
Invoke the DRAPE command in your visualization or rendering software. Usually this is as simple as specifying the source file for the terrain and for the image, and picking some eye position. (Sometimes a default eye location may be provided, typically above and to the northeast of the center of the terrain.) A raster image should be produced.
In some systems, draping is just a generic "assign texture to surface" operation. In this case, the image is specified as the diffuse color map for the surface, and adjustments such as tiling and





rotation are made as for any texture.
Usually, the proportions of the image should be the same as the bounding rectangle of the terrain; otherwise, some distortion will appear as the image is stretched or squeezed to fit. Additional texture maps, such as shininess, or opacity, or others, may also be added for special effects.

Step 5.
Adjust eye position (azimuth and altitude) for best visual effect, highlighting desired features, and providing sufficient detail in area of interest.

Step 6.
Adjust terrain vertical exaggeration, if desired. Usually, terrain should not be exaggerated if "'realistic" visualization is required, but if an explanatory, schematic, or other "interpretive" rendering is being produced, increased vertical exaggeration may help emphasize landform relationships, especially in very flat or gentle terrain. You may also realize a need to adjust terrain resolution in this process; if the grid is too coarse, exaggeration may produce undesirable artifacts.

Step 7.
Adjust lighting parameters, if possible (locate direct lights or spotlights, for example, to simulate solar lighting conditions.) Simple draped images will not provide realistic microscale shadows from elements such as buildings, trees or forests, but macroscale shadows and illumination on the terrain – showing light and dark sides of a valley for example, or casting shadows from terrain onto itself in steep or hilly areas – is possible.

Step 8.
Adjust color and texture parameters, if possible. Often colors from the original image will be distorted in the projection and illumination process. You can go back to the original image and make color/hue/value adjustments to improve the final result. If the original image is "'false color" such as a land use map, then you may be free to adjust the colors in any way to create a desired final effect. Also set the background color for the final image (sky-blue, or neutral gray, black or white, etc. depending on the final use.)

Step 9.
Adjust the aspect ratio of the final rendering, accounting for final desired use, and the contents of the image. Choose landscape or portrait format, dimensions, and total number of pixels desired.

Step 10.
Save eye position and other parameters for future reference; save image in desired format (usually JPEG or TIFF) at desired resolution.