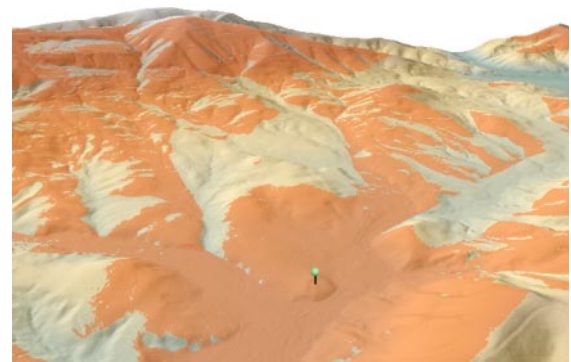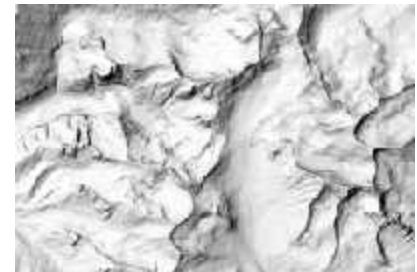# Terrain Operations

TNTmips

TNTmips provides a number of tools for analyzing and processing terrain data. You can view, process, and classify large LIDAR point clouds. The **Topographic Properties** process computes general terrain characteristics such as slope, aspect, shading, and curvature for digital elevation model (DEM) raster objects. The **Viewshed** process identifies terrain areas that are visible from input points on or above the surface. The **Cut and Fill Analysis** process compares two DEMs of the same area and identifies locations where their elevation values differ. The **Watershed Process** models the movement of water over the land surface. The **Surface Modeling** process provides transformations between different elevation representations: DEMs, contours, and triangulated irregular networks (TINs).
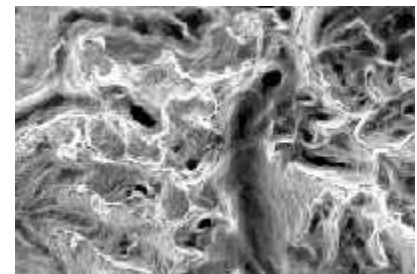

Viewshed (orange) computed for a 50-meter tower for a LIDAR DEM with 2.5-meter resolution.
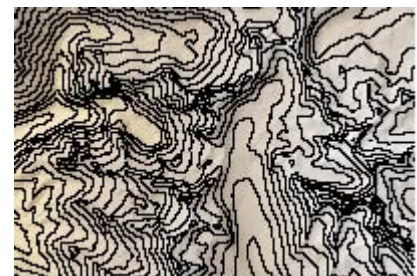
Terrain Operations Highlights:

- Display, classify, and analyze LIDAR point clouds with tens of millions of points in efficient LAS file format

- Work with large-size DEMs at any resolution (detailed local LIDAR DEMs to continent-sized 90-meter SRTM data)

- Compute slope magnitude, aspect (slope direction), and profile (vertical) and plan (horizontal) curvature

- Compute relief shading with with virtual illumination from any direction to aid terrain visualization

- Automatically determine illumination parameters for relief shading to match a particular location, date, and time of day

- Choice of several methods for determining the local surface shape when computing slope, aspect, shading, and curvature

- Determine viewshed from points placed manually or loaded from any geometric object (vector, CAD, or shape)

- Adjust height above surface indepently for each viewpoint

- Adjust field of view independently for each viewpoint by entering values or using on-screen graphics

- Determine changes in elevation through time due to erosion, landsliding, or human activities

- Derive stream networks, watersheds, and subwatersheds along with many geomorphic and hydrographic attributes

- Compute upstream catchment area and downstream flowpath for specific locations by manually placing seed points in a view of the DEM or by loading them from a vector geodata layer

- Compute hydrologic/geomorphic characteristics of the DEM cells: specific catchment area, compound topographic index (CTI), maximum upstream flow distance, and downstream flow distance

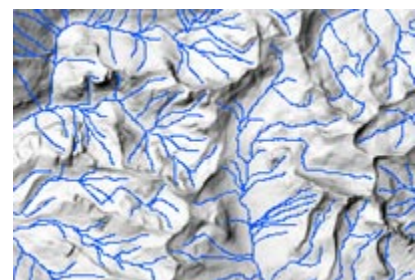- Perform contouring, surface fitting, and triangulation operations

For more information see: Technical Guides on Terrain Operations and Analyzing Terrain and Surfaces tutorial at the MicroImages website.

relief shading from DEM

slope magnitude from DEM

contour lines from DEM

watershed flowpaths