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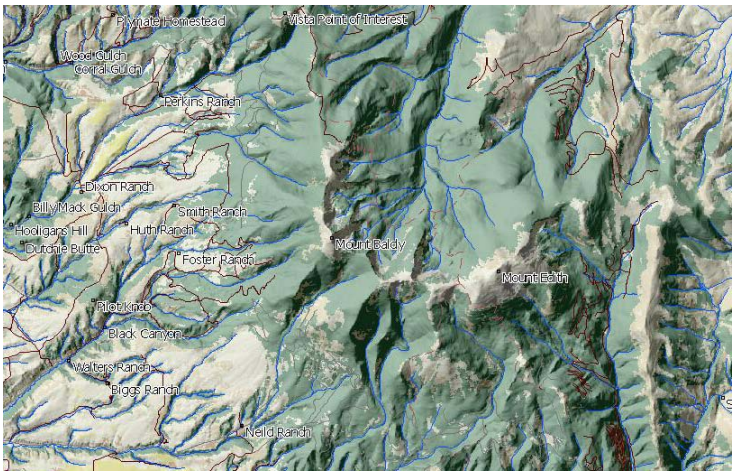
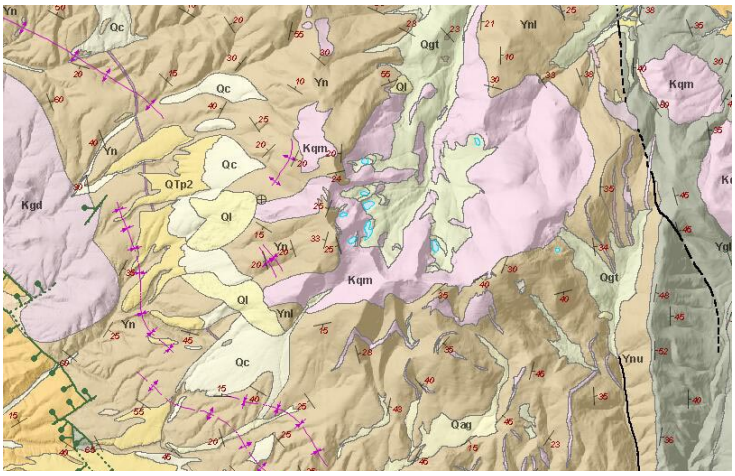
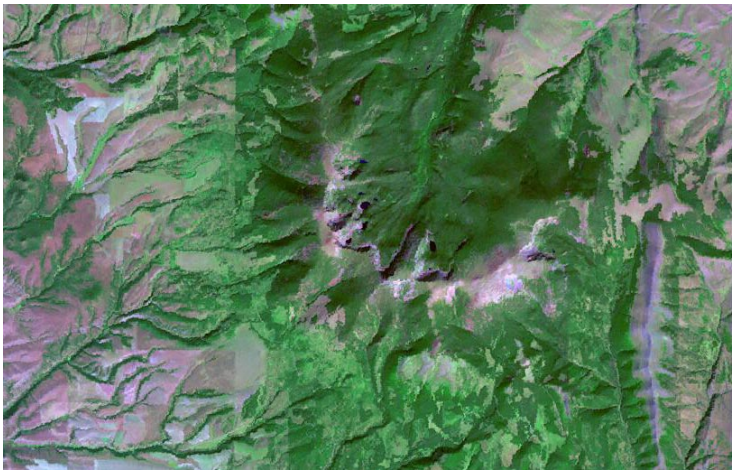
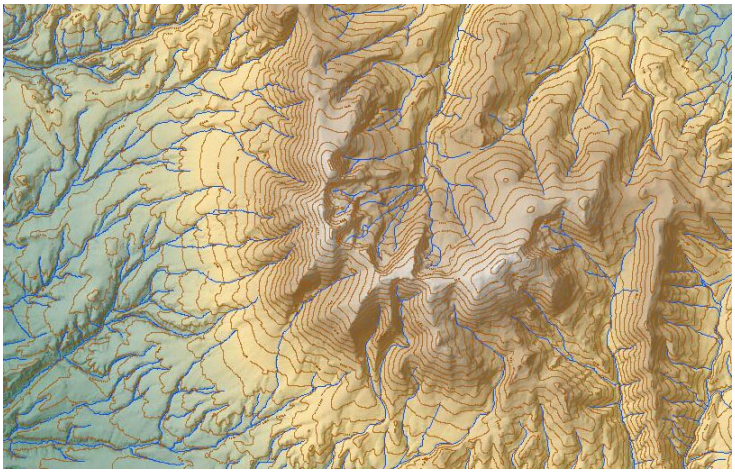
# TNTmips®

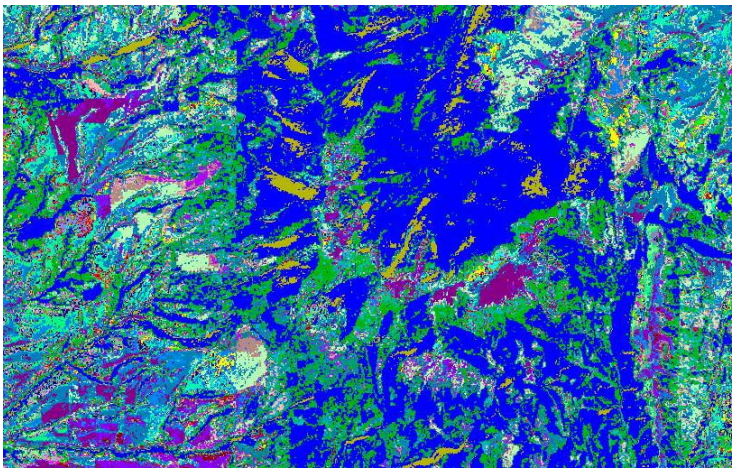
## The complete geospatial software solution

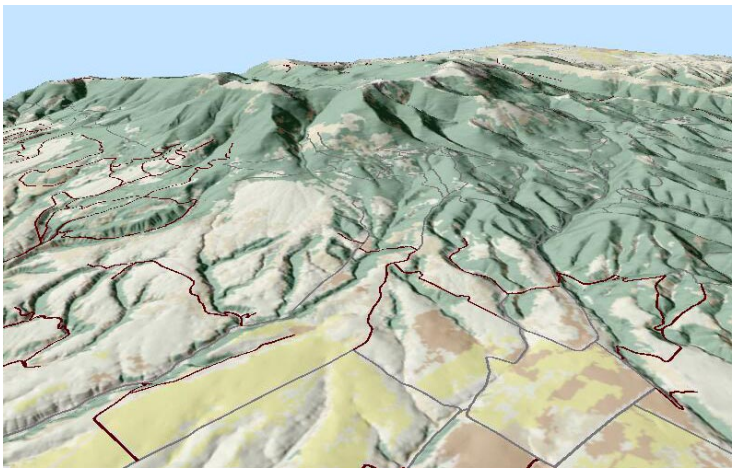




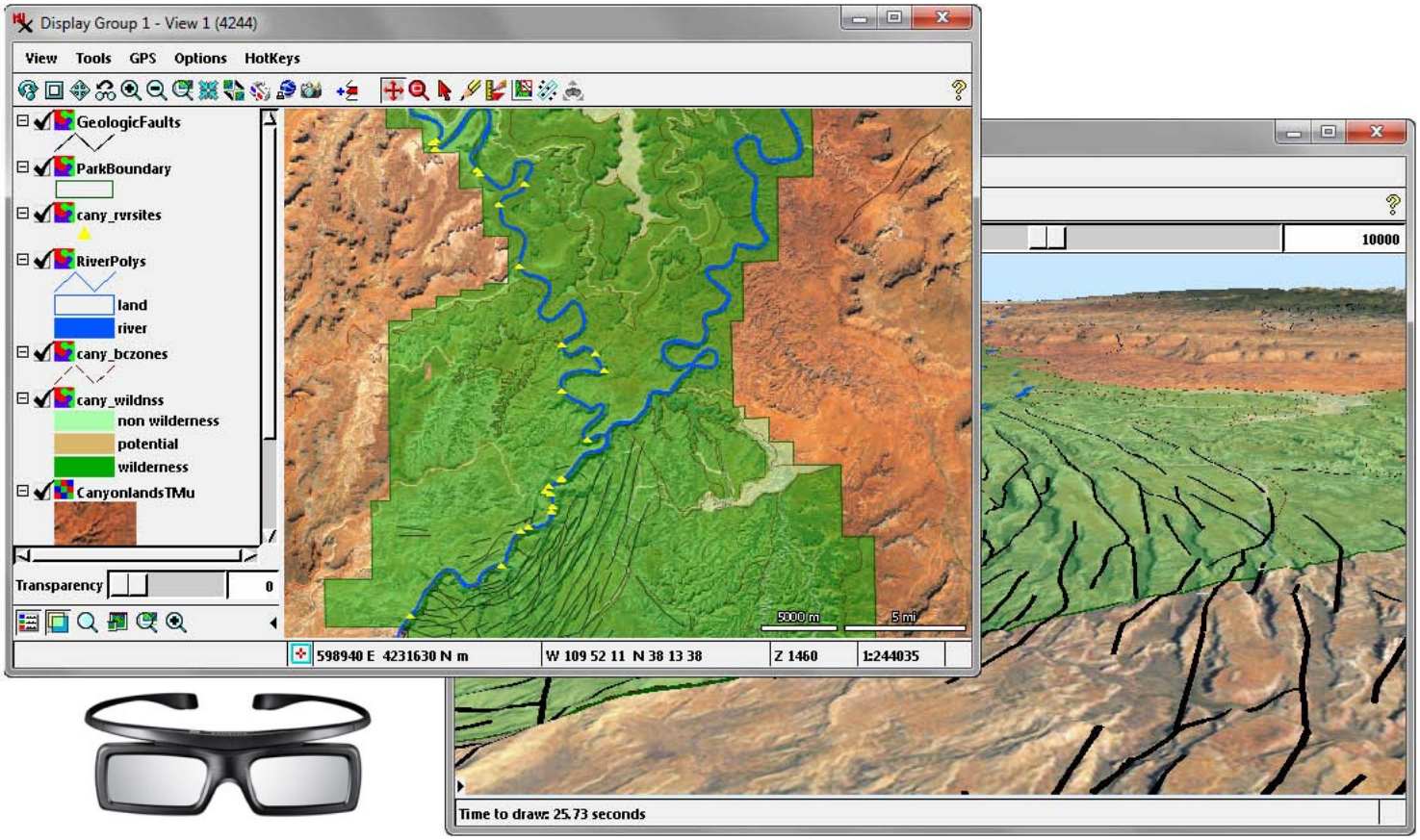




TNTmips is a complete Geographic Information System that lets you work with virtually any type of geospatial data including imagery, terrain surfaces, and map data with associated tabular attributes. It provides all the tools you need to view, create, edit, georeference, interpret, and publish any type of geospatial data. TNTmips provides professional geospatial tools in a single package at an affordable price without costly add-ons.

With TNTmips you can work with geospatial data consisting of raster, vector, CAD, and TIN objects with their associated relational databases. All of these forms of geodata can be stored in MicroImages' unique Project File structure. You can also work directly with geodata in dozens of other file formats, such as shapefiles and LAS LIDAR files, as well as spatial and attribute data in enterprise databases such as MySQL, Postgres/PostGIS, and Oracle.

TNTmips is used in government, industry, and academic institutions in more than 120 nations. It is available for Windows and Macintosh computers in more than 20 languages.



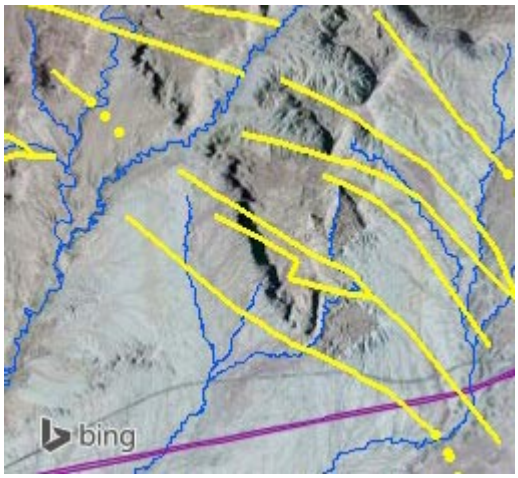

# Dynamic Visualization

The powerful and flexible display capabilities in TNTmips give you a multitude of ways to explore and visualize your geospatial data. You can overlay any number and type of geospatial data layers including web layers (web tilesets, WMS, and ArcIMS) along with public web imagery and base maps from Bing Maps and MapQuest. You can include image and map layers in a wide variety of native file formats, such as JP2, GeoTIFF, shapefile, geodatabase, and DGN, without importing. Geodata layers with different coordinate reference systems are automatically reprojected to register with the target reference system.

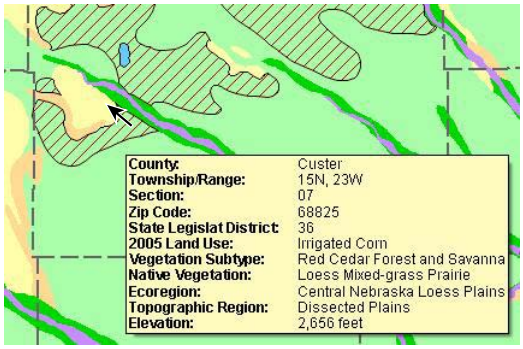
Add terrain data to a view to create oblique perspective renderings and stereoscopic 3D views of any imagery and map data using your 3D monitor or analglyph glasses to see the 3D relationships between map elements. Open multiple views geolocked by scale and/or position to show different combinations of layers, and set adjustable transparency for any layer.

TNTmips uses image pyramids and a pipeline processing architecture for fast display of imagery at any scale. You can easily enhance image contrast and color and apply on-the-fly filtering to sharpen or smooth the image rendering.

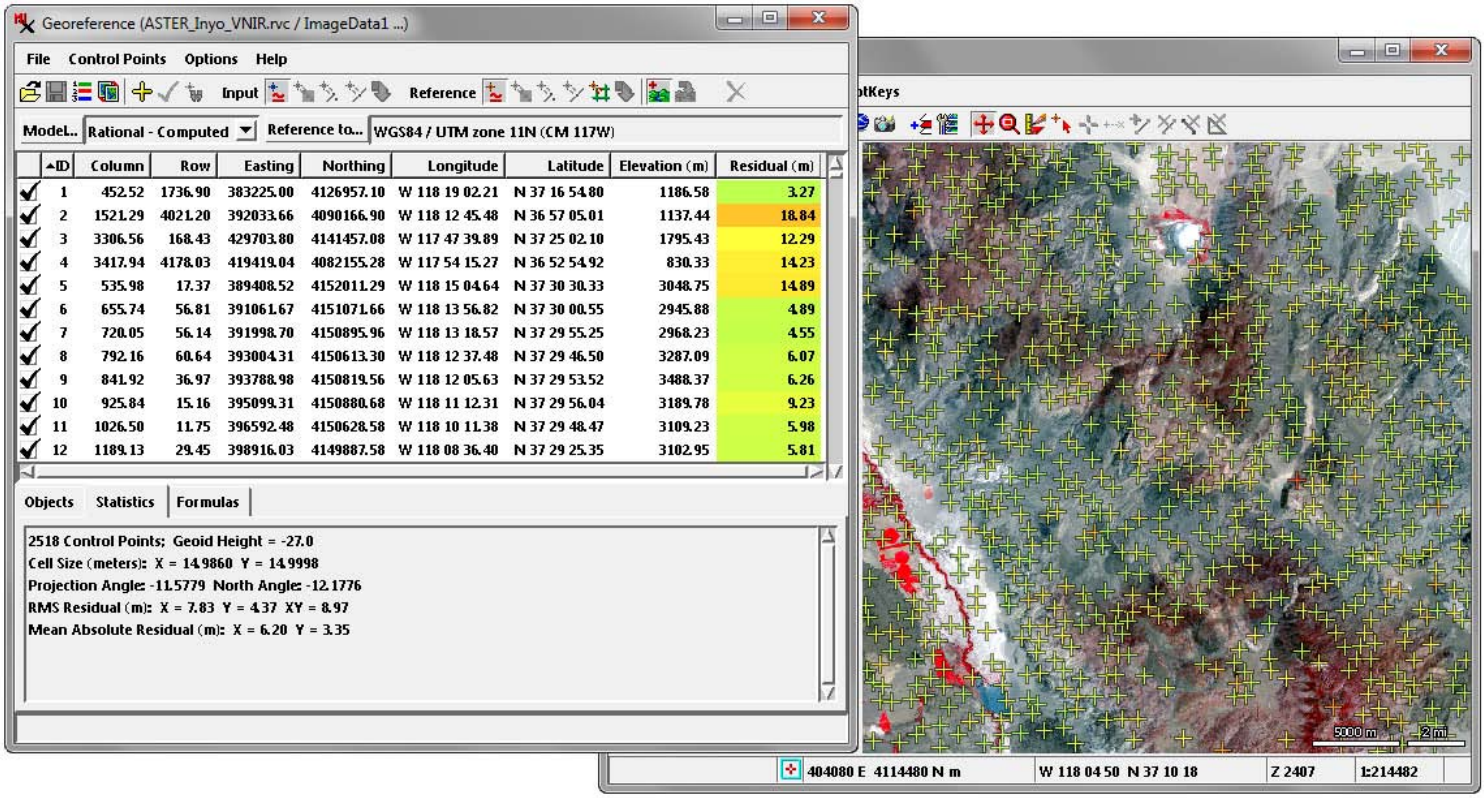
You can automatically generate display styles for map element classes, design individual styles, or create custom styles using scripts. Map element classes can have visibility set by scale to present detail appropriate for the current view scale.




Overlay your geodata on public web imagery and base maps from Bing Maps and MapQuest.



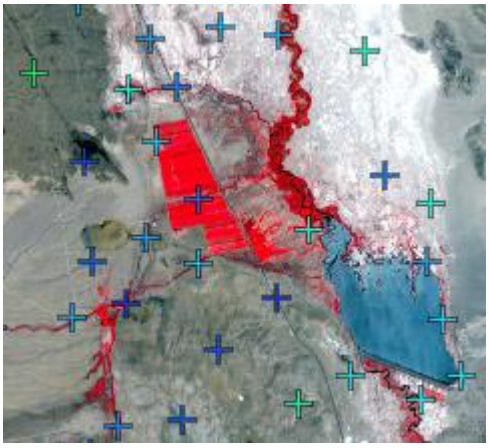

View location-specific attribute information for multiple layers in pop-in DataTips.



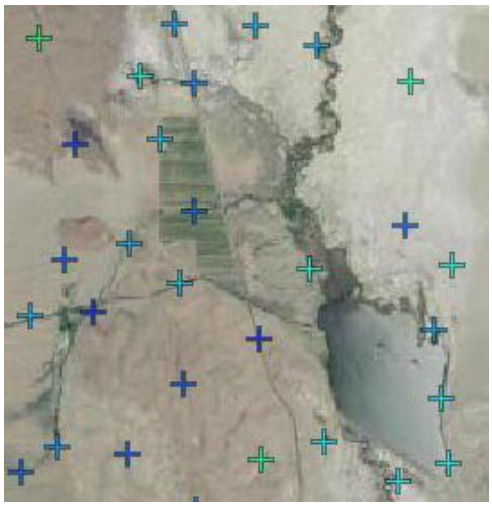

# Georeference and Rectify

Geospatial data that you obtain for your projects may have georeference information that is not accurate enough for your objectives and may contain spatial distortions that require rectification. TNTmips lets you create, import, or edit georeference information quickly and easily for any type of geospatial data (image or geometric) including external files in many formats. Thousands of predefined coordinate reference systems are supported. The Auto-Register procedure in the Georeference process can automatically generate hundreds of control points for an image using a local reference image or an online web tileset. Control points can be colored by residual value to easily identify poorly-fitting points.

Images and geometric objects with different coordinate reference systems can be displayed together in TNTmips or you can permanently reproject them to a common reference system. The image resampling operation can also orthorectify images that are provided with Rational Polynomial Coefficients. The Georeference process can compute a Rational Polynomial model for any image with sufficient 3D control points, which you can add manually or compute using the Auto-Register procedure.



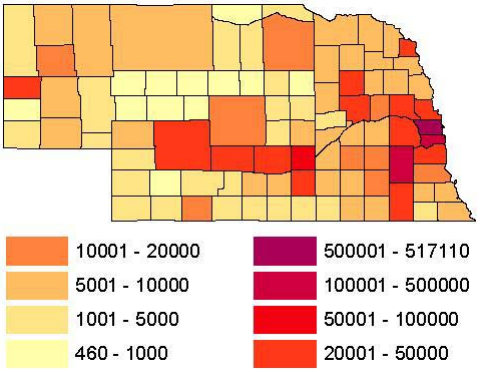
The Georeference Auto-Register procedure automatically finds control points for the input image (above) using a reference image (below).



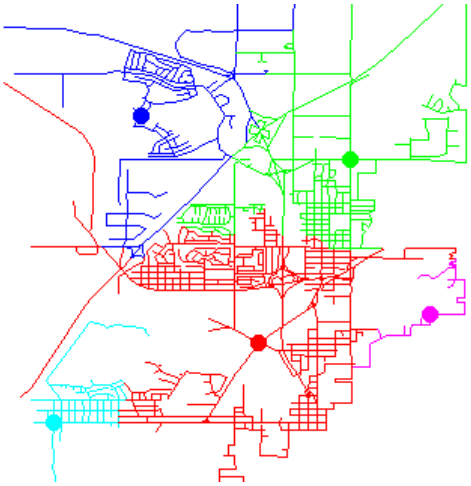
# GIS and Geospatial Analysis

TNTmips provides full support for relational databases containing information associated with your map data. Database tables can include dynamic fields whose values are the result of numeric or string expressions so the results update automatically when the underlying values change.

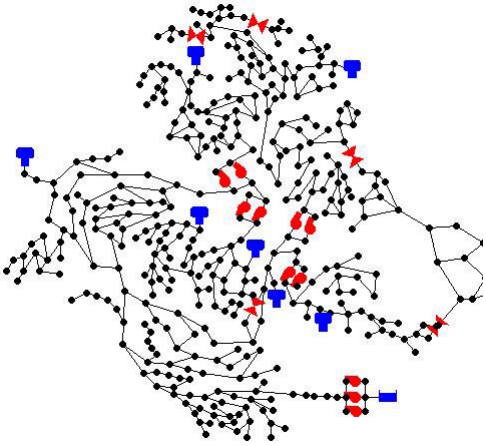
Your exploration of this rich information starts in the Display process, where you can easily create map feature styles based on these attributes, including theme maps that categorize features based on designated ranges of numeric values. You can also perform simple or complex database queries easily using the interactive Query Builder, which provides menu-based selection of tables, fields, comparison operators, and values. The GeoToolbox, available from any View window, provides multi-purpose drawing tools for measuring, sketching, and annotations. You can also use the GeoToolbox to create region objects from drawn shapes, selected map polygons, or view extents for subsequent data processing.



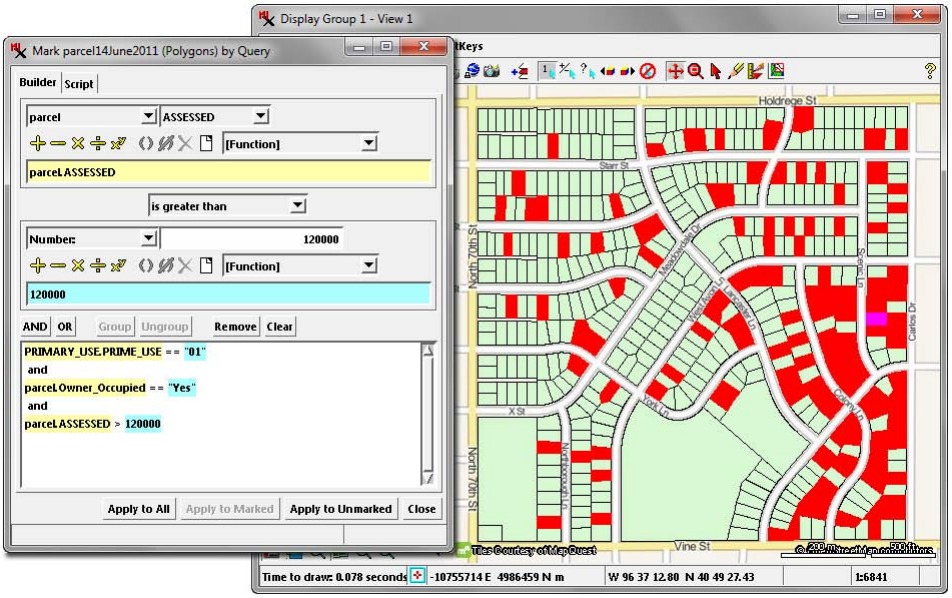

Thematic Mapping using numeric attributes



Network Analysis and route allocation



EPANET Pipe Network Simulations



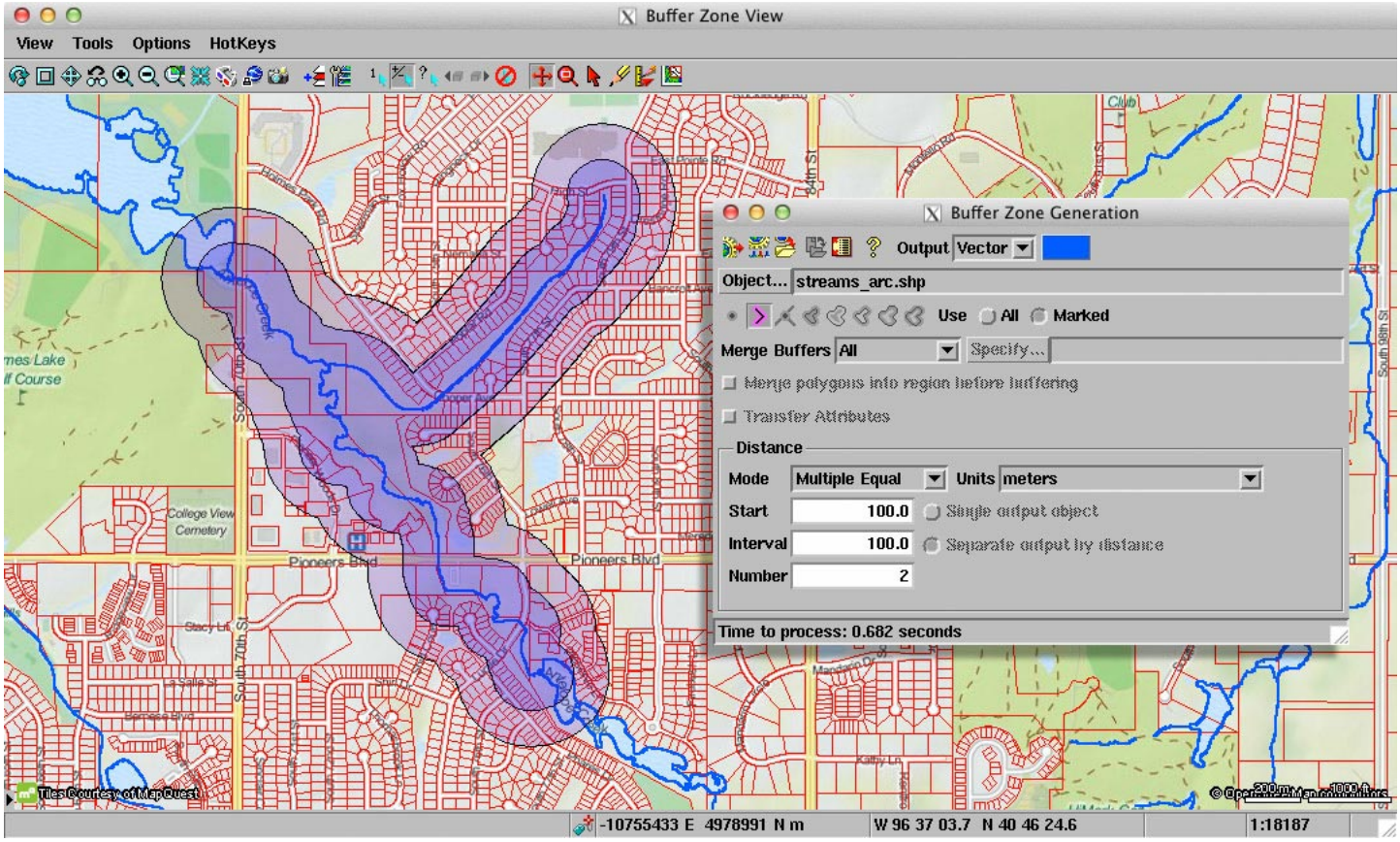

Use the intuitive, interactive Query Builder to construct compound attribute queries that can access data in multiple tables, including attributes that are dynamically calculated using numeric or string expressions. Here a compound query highlights (in red) property parcels based on three criteria in two tables: residential properties that are owner-occupied and have assessed values exceeding a specified numeric threshold.

parcel \ Polygon \ parcel14June2011

Table Edit Record Field Help

| Style | GIS_CPO_PA | PERIMETER | PRECINCT | SECTION_ | BLOCK | PARCEL | SUBPARCEL | PID | PROP_ID | PROPOWN_ID | OWNER | CO_OWNER | OWN_ST_NUM | OWN_ST_DIR | OWN_ST_NAM | OWN_ST | OWN_APT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 9751.76864302 | 430.04901262 | 17 | 22 | 100 | 012 | 000 | 1722100012000 | 93665 | 432854 | BERNADT, GRETCHEN K & MELANIE L | | 7116 | | STARR | ST | |
| | 7950.88792395 | 383.51214569 | 17 | 22 | 101 | 014 | 000 | 1722101014000 | 93687 | 304363 | ELAM, JOHN THOMAS | | 7330 | | STARR | ST | |
| | 8006.29850641 | 382.09001880 | 17 | 22 | 101 | 015 | 000 | 1722101015000 | 93688 | 421209 | TUMBLESON, THERESA L | | 7340 | | STARR | ST | |
| | 7214.66253144 | 365.53382179 | 17 | 22 | 101 | 017 | 000 | 1722101017000 | 93690 | 304372 | CHAPIN, MARGUERITE | | 7400 | | STARR | ST | |
| | 8233.24223198 | 374.79032803 | 17 | 22 | 101 | 022 | 000 | 1722101022000 | 93695 | 434468 | WHITNEY, SPENCER R & HILPERT-WHITNE | | 1401 | | URBANA | LN | |
| | 7428.20462425 | 349.81567270 | 17 | 22 | 101 | 023 | 000 | 1722101023000 | 93696 | 490330 | RADER, WILLIAM T | | 1421 | | URBANA | LN | |
| | 9620.85065810 | 400.13495251 | 17 | 22 | 102 | 010 | 000 | 1722102010000 | 93706 | 463919 | STEWART, DEREK & TERAH | | 7501 | | HOLDREGE | ST | |
| | 7940.00219971 | 366.75751275 | 17 | 22 | 102 | 011 | 000 | 1722102011000 | 93707 | 431207 | BRODD, MICHELLE M | | 1420 | | URBANA | LN | |
| | 7628.94658218 | 372.12891089 | 17 | 22 | 102 | 019 | 000 | 1722102019000 | 93715 | 304447 | SVOBODA, BERNARD & CAROL TRUST | | 7610 | | STARR | ST | |
| | 7629.24668676 | 372.13877379 | 17 | 22 | 102 | 020 | 000 | 1722102020000 | 93716 | 304450 | MEYER, JAMES J | | 7620 | | STARR | ST | |
| | 9378.84558391 | 400.10662365 | 17 | 22 | 102 | 022 | 000 | 1722102022000 | 93718 | 304456 | HEEDUM, ROLAND H & JEANNINE A | | 7640 | | STARR | ST | |
| | 9738.45114543 | 429.63471647 | 17 | 22 | 103 | 010 | 000 | 1722103010000 | 93728 | 304486 | FULLERTON, DANIEL E & BROOKLYN | | 7100 | | DUDLEY | ST | |

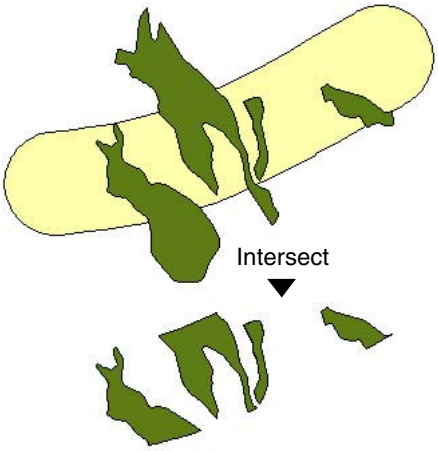
133 of 501 records shown - 133 related to selected elements



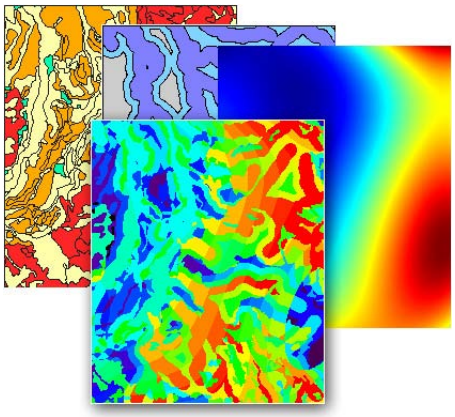

TNTmips provides versatile Buffer Zone analysis for points, nodes, lines, and polygons in vector, CAD, or shape objects.

TNTmips provides a rich suite of processes and tools for extracting information from your geospatial data and finding relationships between different sets of data.

- Generate single or multiple buffer zones for polygons, lines, points, and nodes with automatic style generation.
- Generate polygon grids (rectangle, hexagon, or triangle) with specified orientation to cover an entire geospatial layer or a particular polygon or region.
- Fit polygons to the distribution of point observations with separate polygons for points with different attributes.
- Map the density of distributed points.
- Use Network Analysis to find optimal routes and define service/distribution areas for facility locations.
- Perform EPANET hydraulic and water quality simulations of pipe networks.
- Use polygons in a geometric object to compile statistical properties from elements in another selected object (points, polygons, or raster cells) and attach these attributes to the polygons.
- Perform logical map overlay operations (intersect, union, exclusive union, add, subtract) using pairs of map layers.
- Perform Multi-Criteria Decision Analysis using different spatially-varying conditions defined by any number of spatial layers to identify areas of differing cost/benefit.




Map Overlay Logical Operations



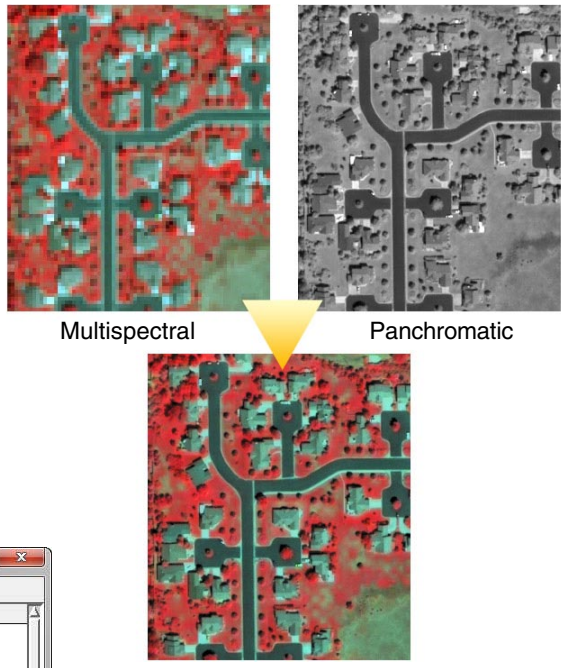
Multi-Criteria Decision Analysis

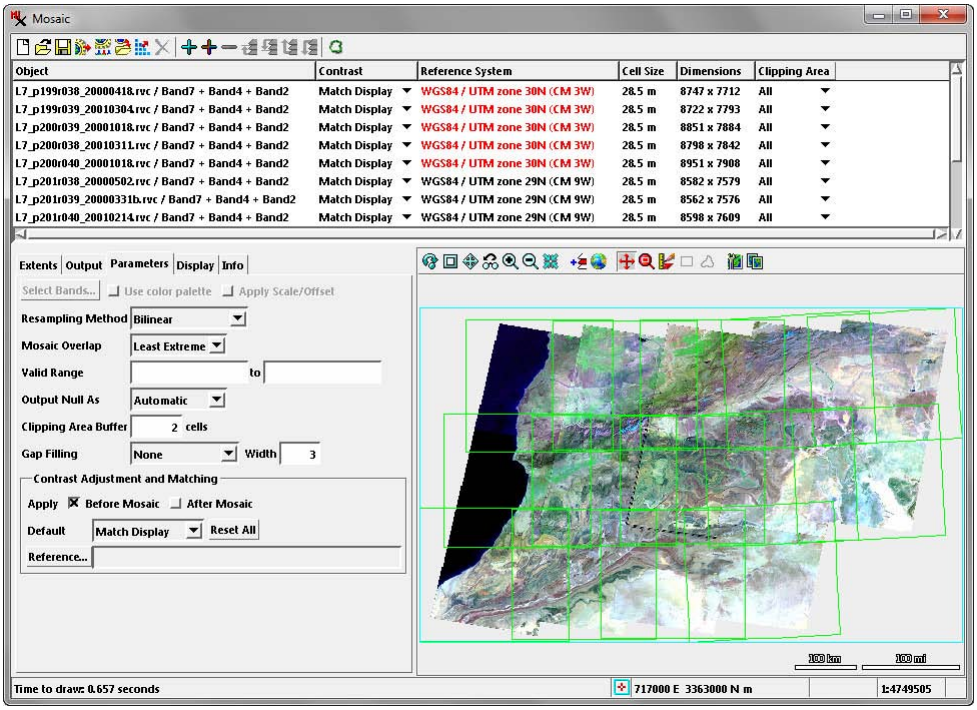
# Image Processing

TNTmips allows you to display, create, and process images of any type, including multispectral and hyperspectral optical images and radar. The efficient image processing pipeline architecture in TNTmips is optimized to handle images up to terabytes in size. You can enhance, combine, rectify, reproject, mosaic, and classify your geospatial images to optimize information extraction and data presentation.

The Display process provides contrast and color adjustments and inline spatial filtering so you can design the best views of your grayscale and color images. TNTmips provides a variety of additional image enhancement operations including spatial and frequency filtering, contrast matching, pan-sharpening of multispectral images, trend removal, and decorrelation stretching.

**Pan-Sharpening**



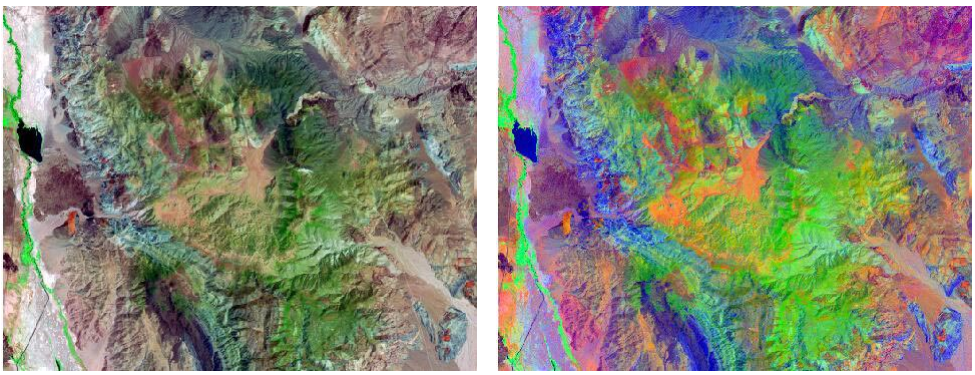

You can mosaic any number of grayscale, multiband, or color images with mixed georeference to any map coordinate system with optional contrast adjustment/matching and flexible options for handling overlap areas.

**Contrast Matching**

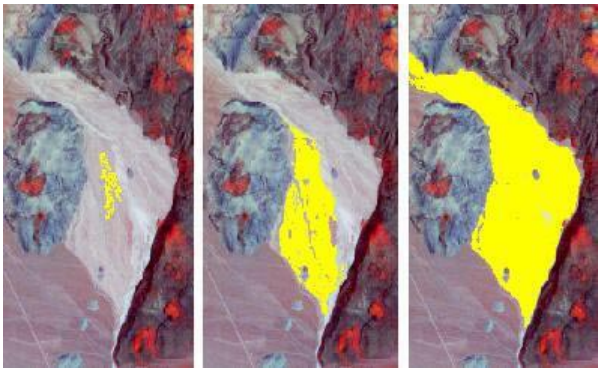
Reference: 2004

Raw 2006 Matched

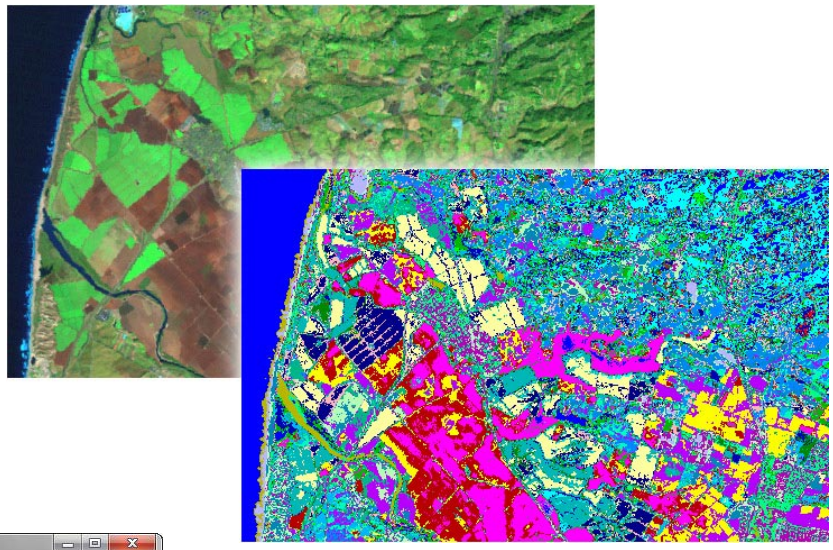
Raw 2009 Matched



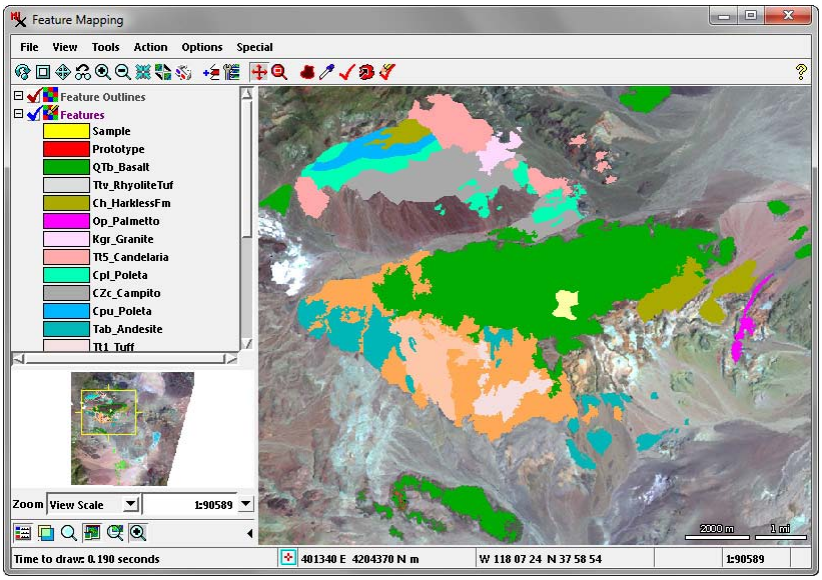
Decorrelation Stretch of Landsat false-color image to better distinguish different surface materials.

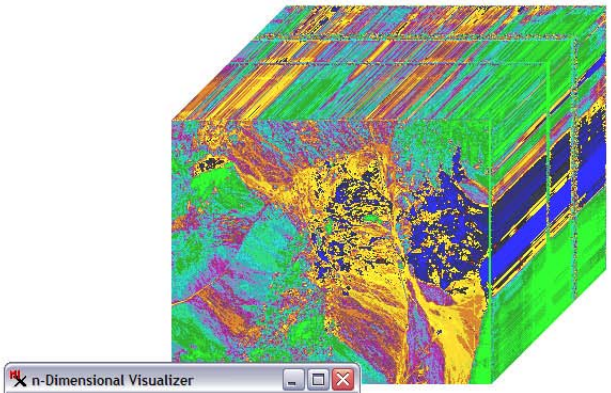


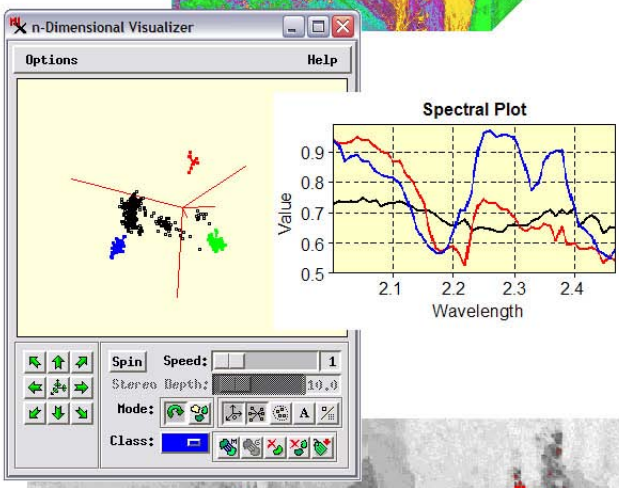
The Feature Mapping process in TNTmips lets you visually identify feature class sample areas to guide an incremental, semi-automated image classification.

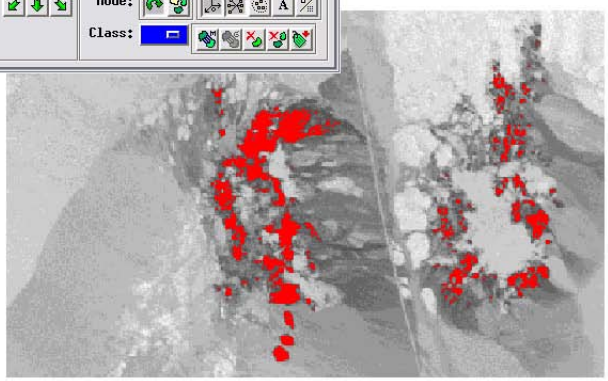


The Automatic Classification process in TNTmips provides a variety of standard supervised and unsupervised classification methods, including Maximum Likelihood, K-Means, and ISODATA.





Analyze and classify hyperspectral images using spectral angle, matched filtering, and linear unmixing.

# Image Classification

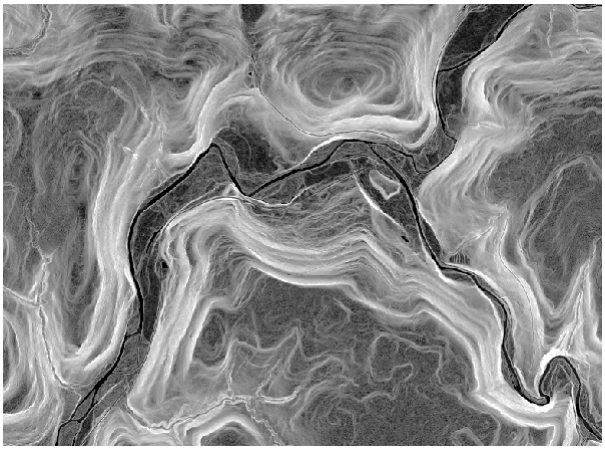
Image classification tools are an important component of image analysis. Traditional supervised and unsupervised classification methods are provided in the Automatic Classification process in TNTmips, which also provides tools for importing or creating training data for supervised classifiers. The unique Feature Mapping process couples your visual interpretive skills with automated image analysis methods. Using Feature Mapping's interactive tools, you can analyze any number of bands to identify, mark, and measure feature classes. You guide the classification procedure by designating a sample area for a prospective class on a reference image, then let Feature Mapping tools find similar image cells throughout the image or in a contiguous patch around the sample. The Hyperspectral Analysis process provides the specialized tools you need to exploit the spectral range and resolution of hyperspectral images, including classification using spectral angle and self-organizing map classifiers and subpixel spectral mapping using linear unmixing or matched filtering.

# Terrain Analysis

Terrain surface data can be represented in TNTmips as 3D points, contour lines, Triangulated Irregular Networks (TINs), raster objects, and web terrain tilesets. Elevation rasters and web terrain tilesets can be displayed as terrain layers with relief shading, color-coded elevations, or a combination of the two. These layers can be used to create stereoscopic 3D displays with any imagery and to create oblique 3D perspective views.

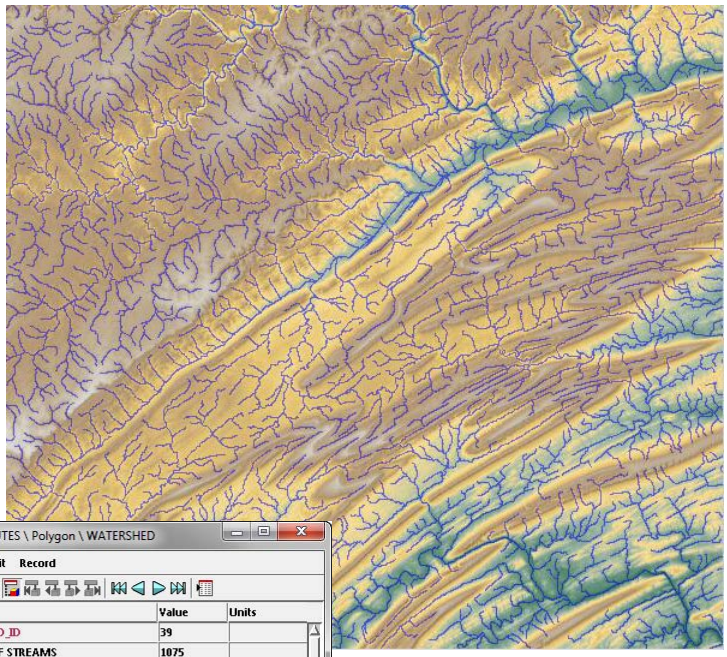
TNTmips provides varied tools for processing and extracting information from terrain data. You can transform terrain data via contouring, surface-fitting, and triangulation operations and extract topographic properties including slope, aspect, and plan and profile curvature. The Viewshed process identifies terrain areas that are visible from input points on or above the surface. Use the Watershed Analysis process to compute watersheds, stream drainage networks pruned to the desired density, and tributary subcatchments along with a variety of hydrologic attributes of the streams and catchments. This process also can compute other hydrologic and geomorphic attributes of the terrain (such as specific catchment area) and allows you to determine watersheds feeding into and flowpaths descending from specific point locations.

Performing contouring, surface fitting, and triangulation operations in the Surface Modeling process.



Compute topographic properties such as slope, aspect, curvature, and relief-shading.

Compute viewsheds from one or more point localities.

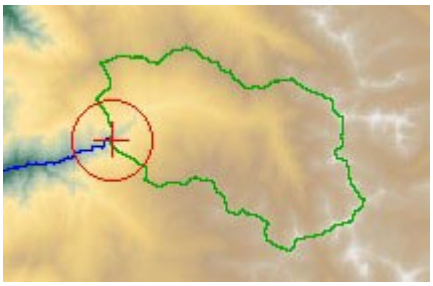


ATTRIBUTES \ Polygon \ WATERSHED

Table Edit Record

| Name | Value | Units |
|---|---|---|
| WATERSHED_ID | 39 | |
| NUMBER OF STREAMS | 1075 | |
| TOTAL STREAM LENGTH | 761763.55 | m |
| AVERAGE LENGTH OF STREAM | 708.62 | m |
| BIFURCATION RATIO | 1.737 | |
| LENGTH RATIO | 2.616 | |
| DRAINAGE DENSITY | 0.003495 | |
| CONSTANT OF CHANNEL MAINTENANCE | 286.09 | |
| LENGTH OF OVERLAND FLOW | 143.05 | |
| STREAM FREQUENCY | 0.00000493 | |
| BASIN LENGTH | 21049.13 | |
| FORM RATIO | 0.4919 | |
| ELONGATION RATIO | 0.79 | |
| BASIN RELIEF | 2910.10 | |
| RELIEF RATIO | 0.14 | |

1 polygon related | 23/88 records in table



Use the Watershed Analysis process to determine watersheds, stream flowpaths, and tributary subcatchments along with other optional hydrologic and geomorphic properties of the terrain. Watersheds and flowpaths can also be determined for individual locations in the terrain (seed points). This process provides fast, efficient processing of very large elevation rasters (gigabytes in size).

# LIDAR Visualization and Classification

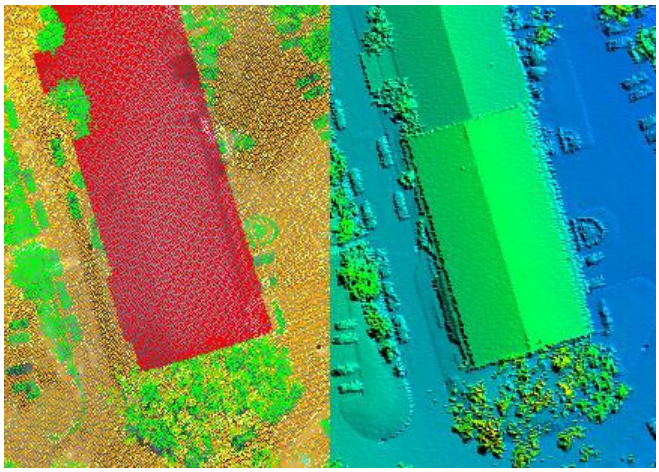
LIDAR point clouds containing millions of elevation points can be viewed, classified, and analyzed in TNTmips directly in their efficient LAS file format.

Use the LIDAR Manager to link, merge, tile, reproject, or extract from LAS point clouds. You can extract points by area and/or by class. Tiled LIDAR files can be defined as a single, seamless LIDAR dataset for ease of display and use.

Use the LIDAR Classification process to detect and flag noise points and to identify points on the ground surface using terrain-following or multiscale curvature methods. Classification operations can be restricted to particular starting classes and can be applied sequentially.

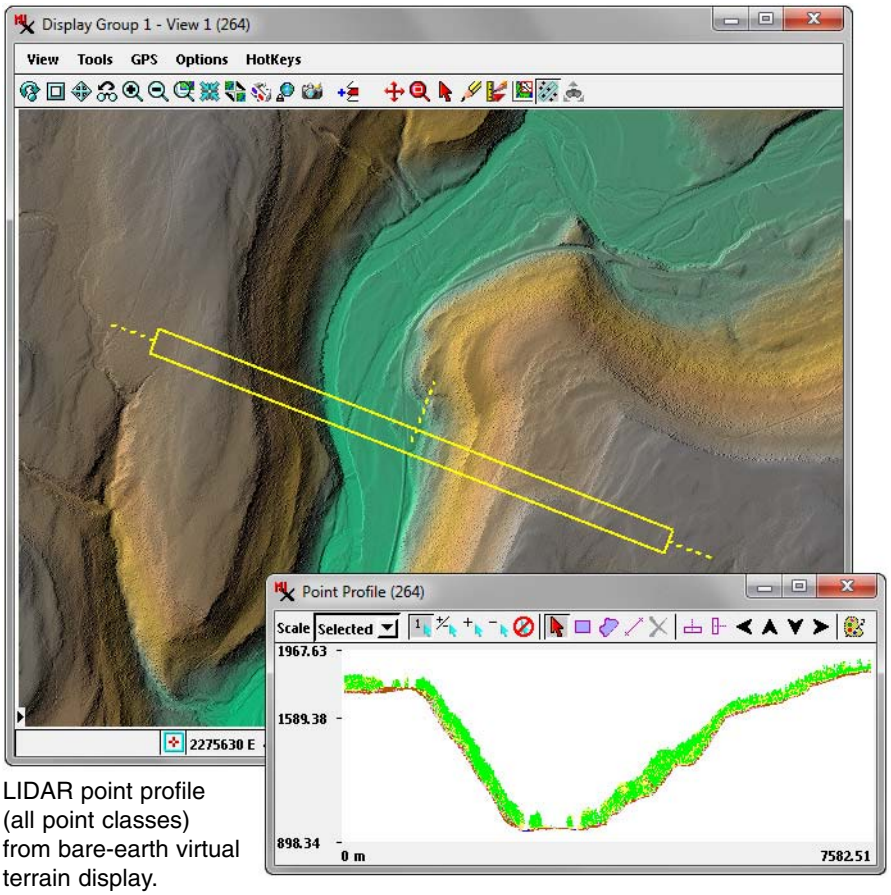
Many flexible options are provided to display LAS point clouds, including selection of points by class or return type and styling of points by class, elevation, return type, or intensity. You can also view a LIDAR point cloud as a virtual terrain surface with relief shading, color-coded by elevation, or both, with full control of point classes used to generate the surface.

The Point Profile tool allows you to view a vertical profile of the 3D LIDAR points within a rectangular area you designate in the View window.

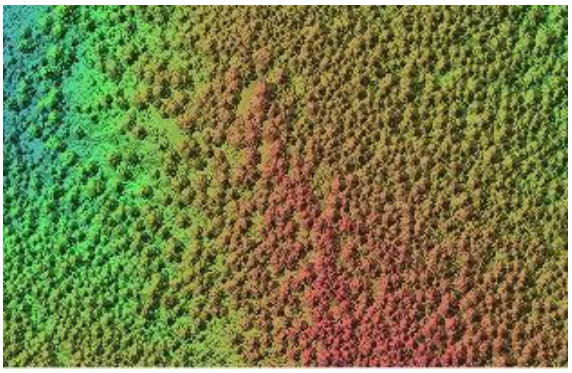


LIDAR point clouds can be displayed as points (styled by class, elevation, or return type) or as a virtual terrain surface with relief shading, color by elevation, or both.

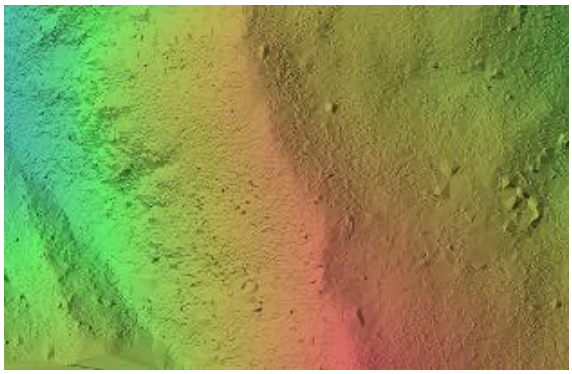
View vertical profiles of LIDAR points.

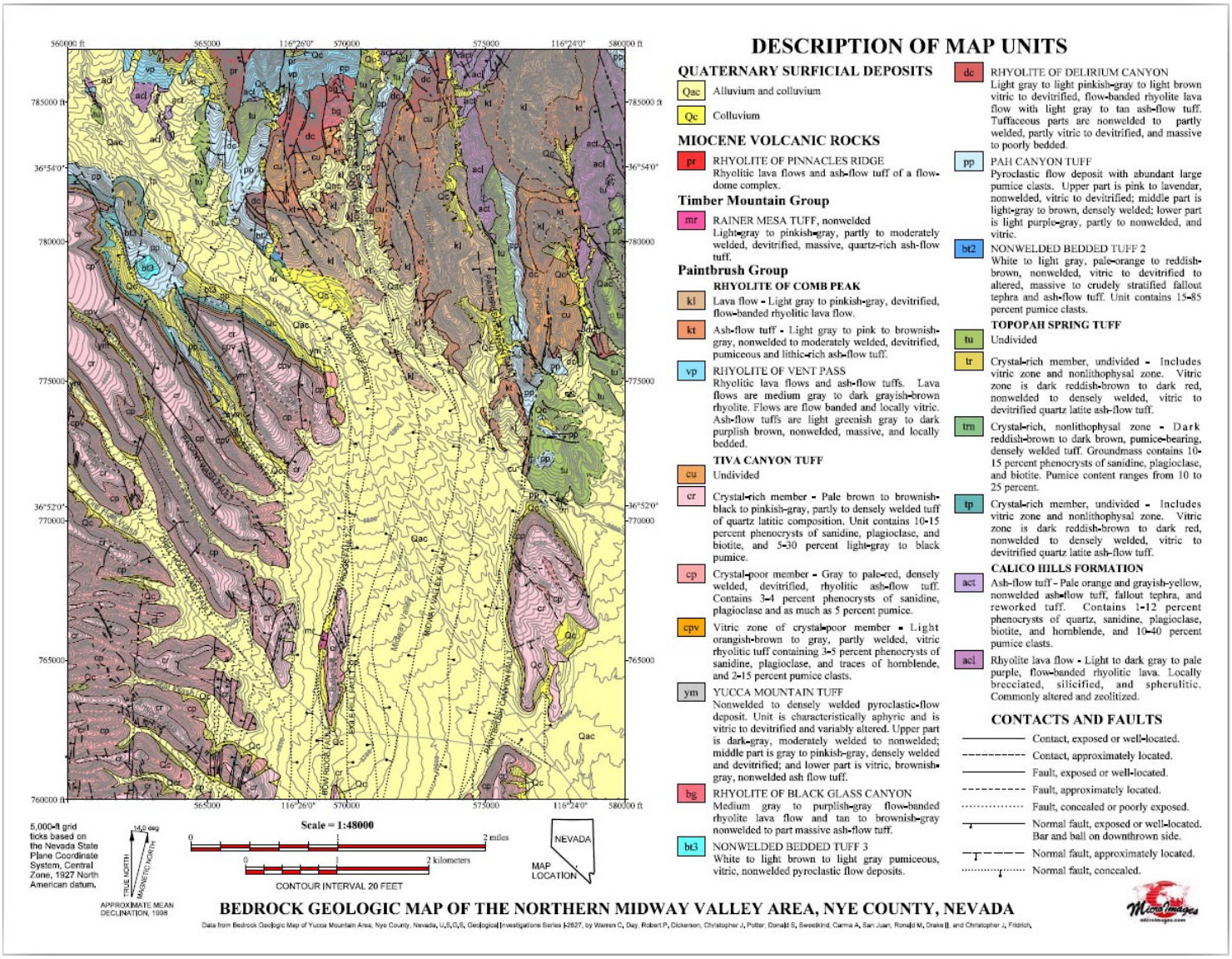



LIDAR point profile (all point classes) from bare-earth virtual terrain display.



LIDAR virtual terrain displays of a forested area using all points (above) and using only ground points classified in TNTmips (below).

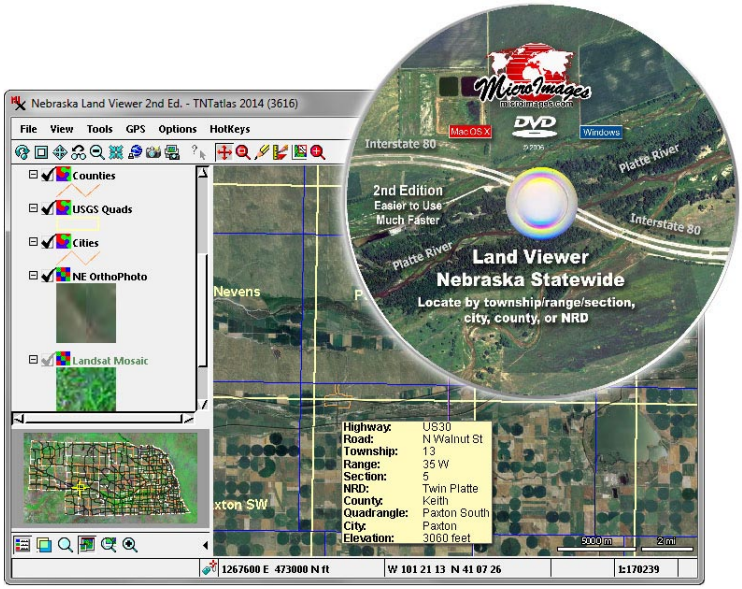





# Map Design and Geomedia Publishing

TNTmips includes interactive map design tools to aid you in styling geodata layers and in setting up map layouts for maps of any type, complexity, and map scale. You can add map grids, automatic scale bars, legends, annotation text, and index maps with fine control over the positioning of each element in the layout. Maps can be designed for hardcopy printing or rendered to PDF for easy electronic distribution on the Web.

You can also assemble any number of map data layers into an electronic atlas that can be distributed on a CD or DVD and viewed by anyone in the free TNTatlas software from MicroImages. TNTatlas displays the atlas layout just as it would appear in a TNTmips display, with access to map attribute information through sidebar legends and pop-in DataTips for map elements.



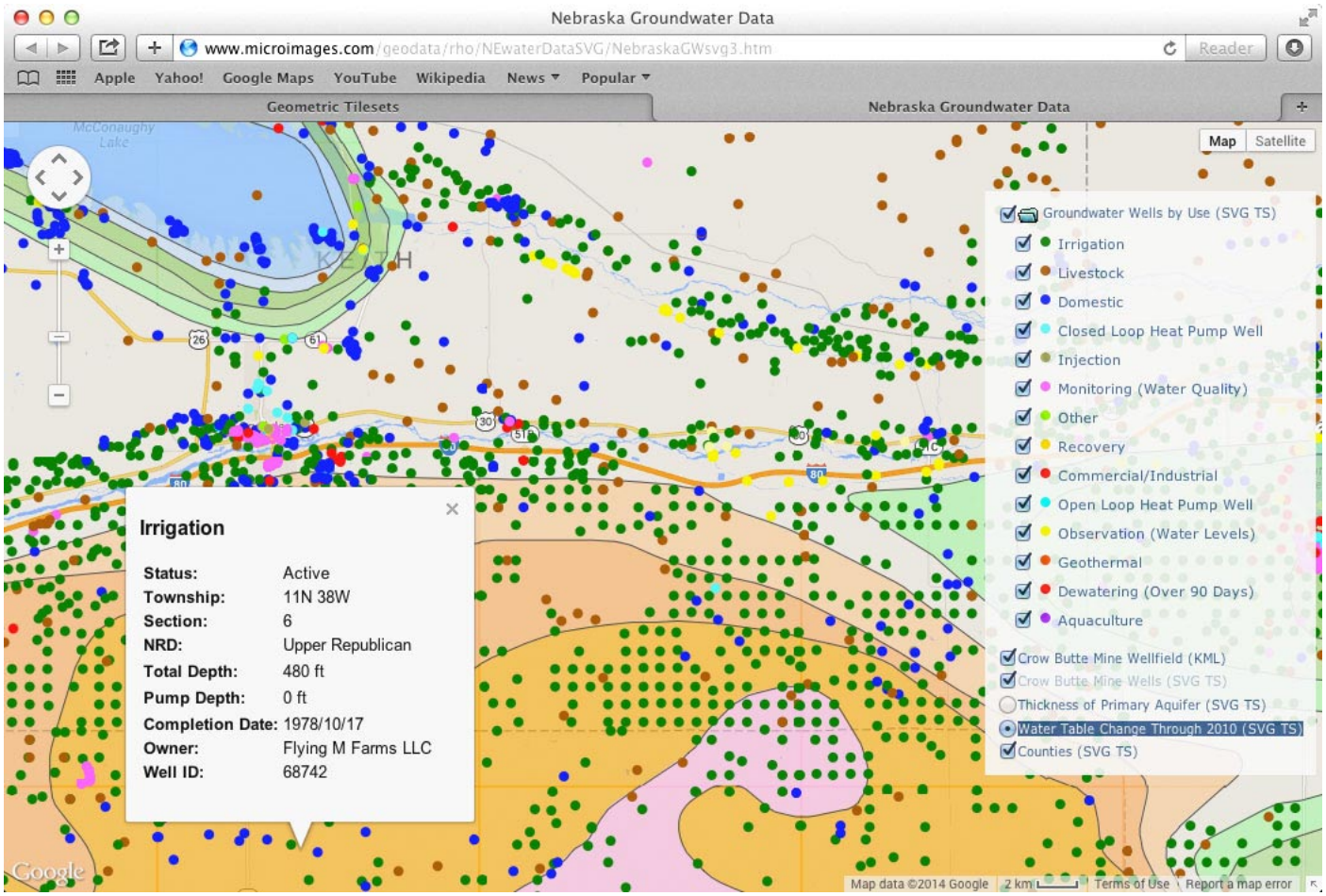

Create electronic atlases in TNTmips to distribute on CD or DVD for anyone to view using the free TNTatlas program.

# Web-Enabled

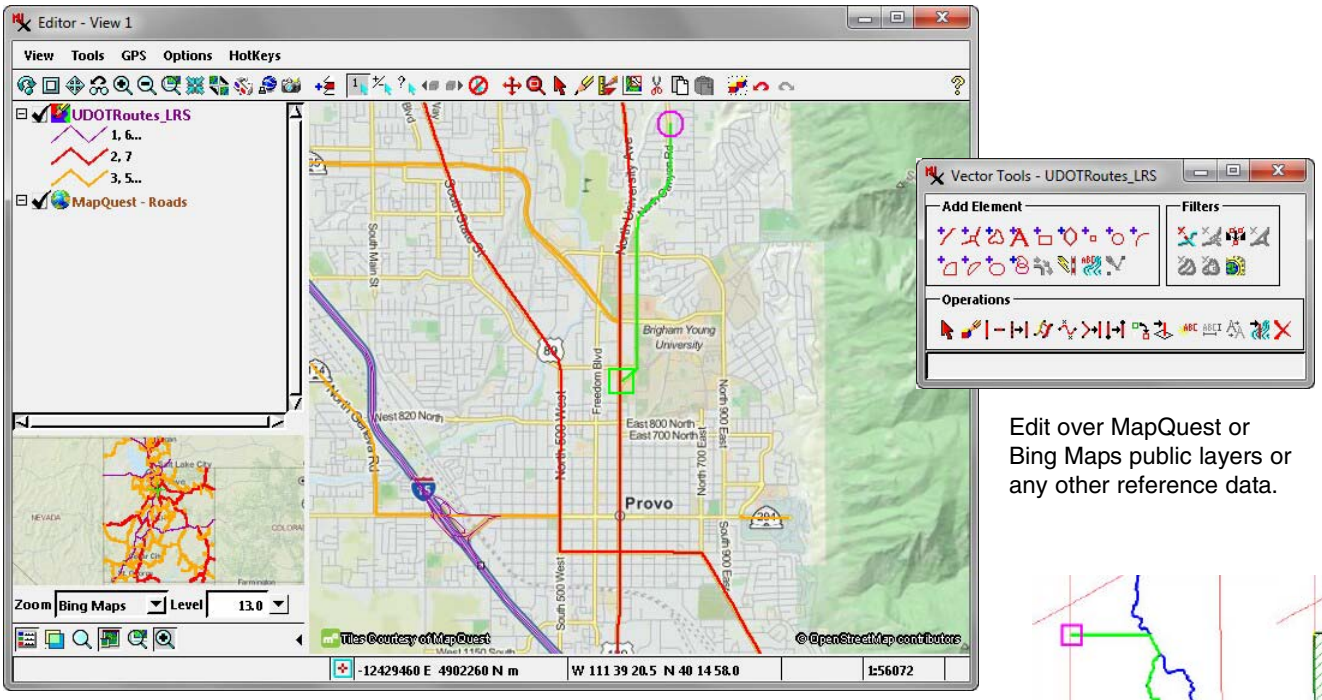
Any display in TNTmips lets you view your local geospatial data in combination with public web data. Global basemaps and imagery from Bing Maps and MapQuest can be added to views of your data with just a few mouse clicks. You can also view web tilesets from microimages.com and other sources showing local and global maps and imagery, as well as any geodata layer available from public Web Map Service (WMS) sources.

Using TNTmips you can also prepare and publish your own data for viewing on the Internet, a private network, or in 3D in Google Earth on your desktop, tablet, or phone. You can convert your imagery or vector maps of any size, scale, and detail to web tilesets that can be used efficiently on the web. You can then use the Assemble Geomashup process in TNTmips to combine these tilesets with the global basemaps and imagery available in popular web mapping platforms (Google Maps, Bing Maps, Open Layers, and Google Earth) to produce web pages that present your geospatial information to your entire organization or to the world on any desktop computer, tablet, or phone.

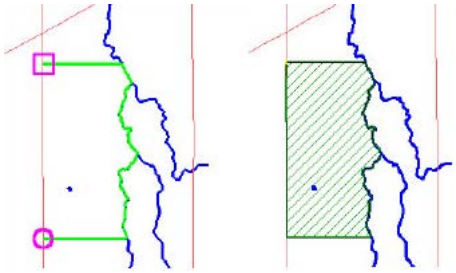
View your geodata with web layers such as these from the Geospatial Information Authority of Japan.




Use TNTmips to convert your imagery and map layers to web tilesets and create geomashups displaying these layers on the Web in Google Maps, Bing Maps, Open Layers, and Google Earth.




Edit over MapQuest or Bing Maps public layers or any other reference data.

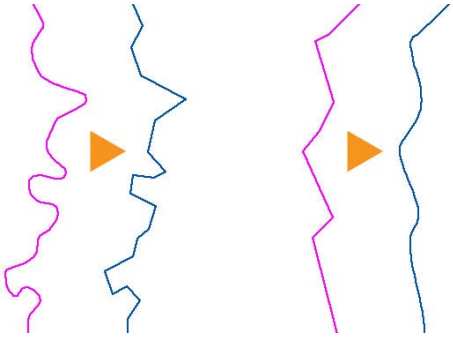


Snap to and auto-trace elements.

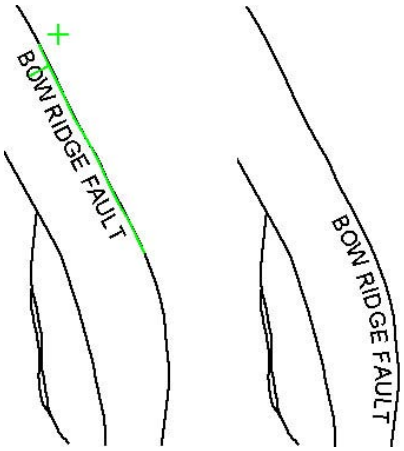
# Powerful Geodata Editor

The Editor in TNTmips lets you create or edit any type of geospatial data (vector, CAD, shape, raster, or TIN) including linked data in many file and geospatial database formats. You can use any type of geospatial data as a visual reference while editing, including Bing Maps and MapQuest base map and imagery layers and any other public web layers. The Editor protects the integrity of your geodata by providing unlimited undo/redo, automatic backups, and timed auto-save while letting you save and restart editing sessions including all reference layers.

- Use context-sensitive graphic editing tools for efficient editing of geometric objects.
- Edit multiple layers, snap to and auto-trace elements in the same or different layers, and convert reference layers to editable layers.
- Edit in stereoscopic 3D with tools that follow the terrain.
- Open auxiliary 3D perspective views to assist in editing.
- Copy, cut, and paste from one geometric or raster object to another.
- Smooth lines automatically while tracing.
- Spline or simplify lines and apply global filters to remove dangling lines, bubble polygons, and sliver polygons.
- Auto-generate labels from attributes for points, lines, and polygons with control of label style, size, position, and leader lines.
- Set up database prompts to automatically create and attach a new record for each new element.
- Designate an existing record to be attached to each new element.
- Specialized tools for setting contour line values and labeling contour lines and roads.
- Create templates from any existing editable object for use in making new objects with same database structure, styles, and georeference.



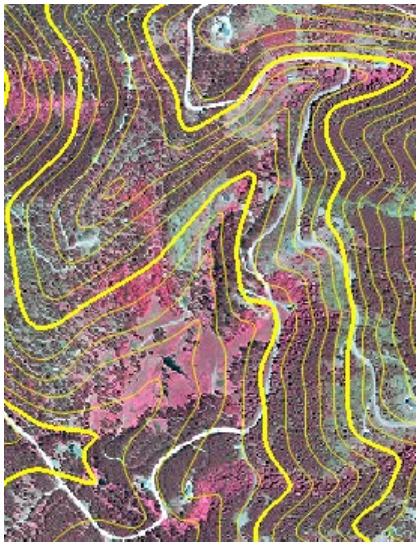
Simplify Lines Spline Lines




Reposition line labels that conform to the shape of the line.

# Flexible Management of Data and Processes

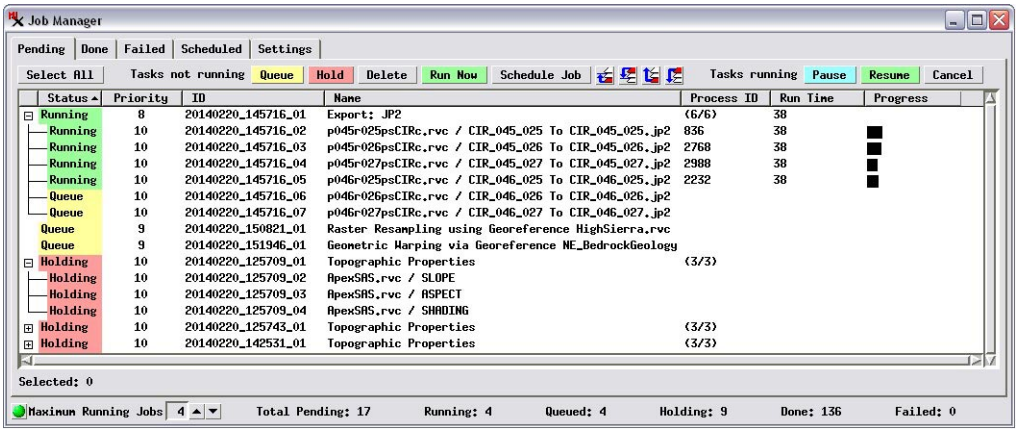
The unique Project File structure used in TNTmips allows you to store one or more geospatial objects with all of their relational databases and supporting information (georeference, display styles and settings, metadata) efficiently in a single file structure. Vector, CAD, raster, TIN, and database objects all can be stored together in the same file or in separate files at your discretion. The data for small to moderately-sized projects can be maintained in a single file for ease of storage, transfer, and management. Geospatial and tabular data in many industry-standard file formats (GeoTIFF, JP2, MrSID, DWG/DXF, shapefile, personal and file geodatabase, and others) can be viewed and used in TNTmips without requiring conversion, and an even wider array can be used in their native format after an initial linking step.



TNTmips display of a color-infrared orthoimage from a 4-band JP2 file and elevation contours from a File Geodatabase.

In TNTmips you can also link to geospatial objects and tabular data hosted in enterprise databases such as Oracle, MySQL, Postgres/PostGIS, and SQL Server, enabling easy sharing of data for projects within an organization.

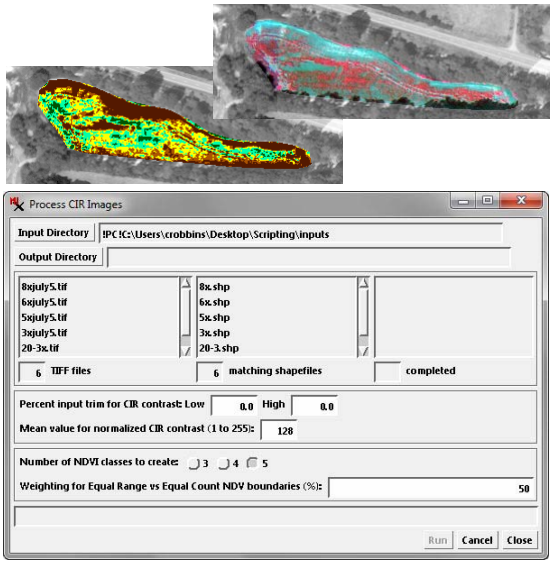
The Job Processing system in TNTmips is a powerful tool for optimizing the use of your computer's capabilities when you are processing large amounts of geospatial data. With job processing you can set up and save the processing parameters for any number of operations. These jobs can be set to run immediately in the background or held in a queue for later release using the Job Manager. Multiple jobs can be run simultaneously to take advantage of multiple processor cores, and you can schedule large jobs to run overnight or over weekends.




The Job Processing System in TNTmips lets you make optimal use of your computer resources and time.

# Custom Processing

TNTmips includes a rich geospatial scripting language that provides a wide range of options for custom processing of your geodata. Scripting can be used in many contexts. Scripts can be used for simple tasks such as creating dynamic computed fields in database tables, defining queries to select map elements based on a combination of database attributes, or designing custom graphic styles for map features. You can also add custom interactive tools to standard view windows and add custom text and graphics to DataTips. The GeoFormula process provides an easy-to-use interactive environment for creating scripts that combine spatial and attribute information from different spatial objects. You can even implement novel new processes with their own dialogs, views, and custom tools, or automate workflows through a chain of processes. Thousands of built-in functions, integrated documentation, and hundreds of sample scripts make it easy to learn how to use these powerful tools.




Create custom processing scripts with their own dialog windows, such as this one for a script to enhance and classify color-infrared aerial images of agricultural fields.

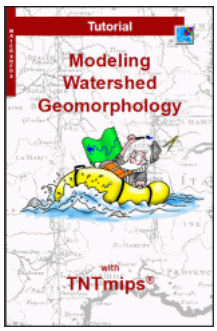
## Free Software Support

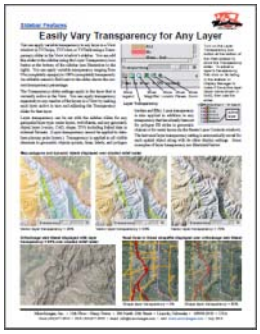
MicroImages provides unlimited free technical support to anyone who is using our software products. You can obtain assistance, report problems, and request new features using the Contact Support Form that is available from the TNTmips Help menu. You may also contact MicroImages by e-mail, phone, or FAX. No per-call charges are assessed. Experienced professional software support specialists will provide you with timely support.

We want to help solve your problems and get your system working for you from the day you unpack it. If a software fix is necessary, we strive to get it done quickly. Weekly editions of TNTmips are made available for you to download — they include all of the latest fixes and updates.

## Documentation

TNTmips includes dozens of tutorial booklets with step-by-step exercises covering major tasks as well as hundreds of Technical Guides and Quick Guides covering a wide variety of features. These documents are provided as PDF files that can be installed along with TNTmips and accessed from the Help menu. TNTmips also includes integrated Quick-Help available throughout the product.




## TNTmips System Requirements

### Windows

32-bit or 64-bit Intel or AMD processor
Windows 8, 7, Vista, XP
1 GB RAM or greater
60 GB hard drive for installation
single or multiple monitors

### Mac

32-bit or 64-bit Intel processor
MacOS X 10.5 or later
1 GB RAM or greater
60 GB hard drive for installation
single or multiple monitors

# The TNT Products from MicroImages

**Advanced Software for Geospatial Analysis Since 1986**

## TNTmips®

### License Levels:

**TNTmips Pro** (professional license)

**TNTmips Basic** (low-cost license)

**TNTmips Free** (freeware)
TNTmips Basic and TNTmips Free provide many of the features available in TNTmips Pro but impose limits on the size of the geodata objects you can work with.

**Academic License**
Significant discounts for purchase or lease of TNTmips are available for eligible academic institutions. Contact MicroImages or any of our Authorized Resellers for eligibility requirements and pricing.

## TNTedit™

**TNTedit** provides professional interactive tools to create and edit the full range of project materials used in TNTmips (vector, raster, CAD, TIN, shape, and relational database). TNTedit includes not only the display and editing capabilities found in TNTmips, but also georeference, import/export, and scripting functions.

## TNTview®

**TNTview** has all of the powerful display features found in TNTmips. TNTview is perfect for those who do not need the technical processing and geodata preparation features found in TNTmips, but who nonetheless need to view and interpret the TNT project materials used in their organization.

## TNTatlas®

**TNTatlas** is a powerful free geodata viewer designed to display electronic atlases and layouts created in TNTmips. TNTatlas can also display single geodata layers of any size in numerous file formats including shapefiles, GeoTIFF, JP2, PNG, MrSID, DXF, and DWG.

## TNTsdk®

**TNTsdk** allows organizations with C++ programming capabilities to create extensions to TNTmips for both internal use and resale. TNTsdk is updated without charge with each release of TNTmips. Access to all TNTsdk documentation is available online.

## Learn more about TNTmips at www.microimages.com

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