

Web Structures Summarized

TNTmips Pro can convert aerial or satellite imagery; scanned maps; styled vector, CAD or shape data; and elevation rasters (DEMs) to *web tilesets*. These tilesets are specially structured for efficient viewing over the web in a browser-based geoviewer (such as Google Maps, Bing Maps and Open Layers) or in a standalone web geoviewer (Google Earth and NASA Worldwind) along with their aerial and map content. These web tilesets can also be packaged together with Open Layers libraries for off-line viewing in a browser, and can be viewed in TNTmips from local or internet sources for use as reference images for editing, georeferencing, and other visual tasks.

MicroImages developed web tilesets to provide the capability to view image, terrain, or geometric map data:

- for any size area
- over any range of map scales
- for any data size (up to terabytes)
- on the web or locally
- publicly or privately
- with no specialized server software.

Web tilesets contain image or map data that has been subdivided into uniformly-sized tiles created at a series of discrete map scales and stored in a predefined directory structure. This standardized structure makes web tilesets a convenient means to efficiently store and present spatial data of any detail and area, from local to global, over any range of scales (zoom levels). Web tilesets can be viewed locally, copied to a website for anyone to view over the web in a browser, or limited to designated users over a private network. They can be viewed using current versions of all popular web browsers (Chrome, Firefox, Safari, Internet Explorer, and Opera). Custom web tilesets created in TNTmips can be used in geomashups with other custom web tileset overlays and designated base maps provided by the geobrowser or other web sites. Because MicroImages' web tilesets are designed for use with popular geoviewers, no specialized software is required on your web server to present and view these tilesets on the web.

You can create different varieties of web tilesets in TNTmips using various TNT processes. This spectrum of web tilesets accommodates different forms of geospatial data and different options for viewing and using the result. The types and uses of web tilesets you can create in TNTmips are described briefly below. More detailed discussions can be found in numerous Technical Guides at <http://www.microimages.com/documentation/html/Categories/Tilesets.htm> and examples viewed at <http://www.microimages.com/gallery/local/maps.htm>.

Standard Web Tilesets (Export Raster Tilesets, Auto Mosaic, or Render to Tileset)

Standard web tilesets are raster tilesets that can be exported from single large raster images, mosaicked from sets of contiguous images, or rendered into raster form from a view containing one or more geospatial data layers, including styled map data (i.e., vector, CAD, or shape objects). TNTmips can create specific types of standard web tilesets that conform to the structure and specifications required for viewing in Google Maps and Bing Maps, Google Earth, or NASA Worldwind. In addition to the uses noted below, Google/Bing Maps and Google Earth standard web tilesets can also be displayed in TNTmips Pro or Basic along with any other supported type of geospatial data, used as reference layers for georeferencing and editing, and viewed in stereo. MicroImages hosts a number of standard web tilesets created from satellite or aerial imagery with global, national, statewide, or local coverage that can be used over the web in TNTmips or in a geobrowser.

A standard web tileset prepared for Google/Bing Maps can be copied to any web site for immediate public 2D viewing in these web browser geoviewers. Alternatively, you can store a Google/Bing Maps tileset on a local computer with Internet access for private viewing. These tilesets can also be packaged with the Open Layers geobrowser library for viewing in a web browser at locations lacking Internet access.

Google Earth standard web tilesets can be viewed in 3D in the Google Earth desktop application from a local drive (on a computer with Internet access) or from a web location. A Google Earth tileset that has been copied to a web site can also be viewed in 3D perspective in a web browser using the Google Earth browser plug-in. The NASA Worldwind desktop application provides 3D perspective viewing but requires that all custom tilesets reside in a specific local directory structure in order to be viewed along with their web-based terrain and imagery.

Geometric Web Tilesets (Export Geometric Tileset)

Geometric web tilesets contain tiled map data in vector graphic form rendered from styled TNT vector objects (including objects converted to vector objects from CAD or shape objects). They are especially informative in web applications because they can also store attribute information for the map elements; these attributes are transferred from the element DataTip in the TNT vector object used to create the tileset. Mousing over the map feature in the geoviewer reveals the feature's name attribute, and left-clicking reveals the list of additional attributes in the Google info window. Geomashups of geometric web tilesets can also include interactive legends that provide a visual key to different map feature classes and allow all elements in any classes to be highlighted or turned on or off. Geometric web tilesets can be viewed in the current version of all popular web browsers.



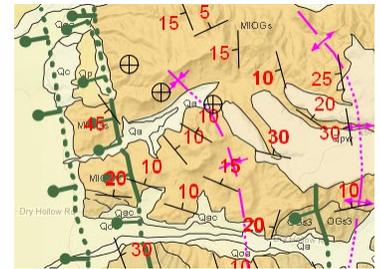
Attributes for geometric tileset polygons shown in the Google info window.

TNTmips can create two types of geometric web tileset: KML and SVG geometric tilesets. Both forms can be used to present map data with styled polygon, line, and point features with attributes for viewing on the web with other custom overlays and geobrowser base maps.

(over)

KML geometric web tilesets use a vector form of Google's KML Super-Overlay structure. The tiled KML files can store polygons with transparent color fills, lines with a limited range of simple styles, and points with symbols of any complexity (which are rendered to very small PNG image files linked to the KML structure). When copied to a website, KML geometric tilesets can be viewed in 2D in Google Maps and in 3D in the Google Earth browser plug-in or in the Google Earth desktop application. A KML tileset also can be stored on a local drive for private viewing in the Google Earth desktop application.

The SVG geometric tilesets created by TNTmips use files in the Scaleable Vector Graphics (SVG) format to store styled map elements in vector form. (The compressed SVGZ format can also be used to reduce stored file size and reduce download times on the web.) SVG geometric tilesets conform to the tiling scheme and directory structure of Google Maps standard web tilesets containing raster data, though the two structures use different file formats. SVG geometric tilesets can include polygons, lines, points, and text labels and can reproduce simple to complex display styles set for the source vector elements in TNTmips, including custom point and line symbols created dynamically from individual element attributes by TNT CartoScripts. SVG geometric tilesets can be viewed in 2D in Google Maps from a local drive or from a web location.



Geomashup of several SVG geometric tilesets with complex line and point symbols rendered from TNT CartoScripts.

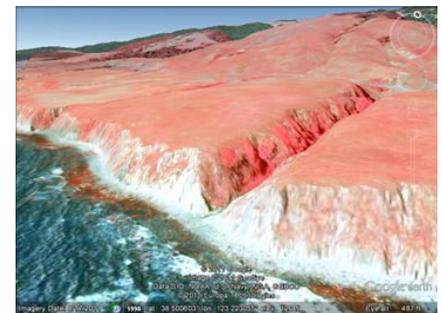
Web Terrain Tileset (Export Web Terrain Tileset)

New Feature in 2013 DV

Web terrain tilesets contain tiled elevation data stored in PNG files and provide internet or local access to actual elevation values. Web terrain tilesets can be used in TNTmips Pro or Basic as terrain surfaces for visualizing satellite and aerial images in stereo. MicroImages has created and published a number of sample web terrain tilesets with global, national, and statewide coverage that can be used over the web for this purpose. Because they store actual elevation data, web terrain tilesets can also form the basis of web applications using the HTML5 canvas element and JavaScript that process the elevation data in the web browser and create dynamic, adjustable shaded relief presentations, stereo rendering, and other elevation-based renderings.

Google Earth 3D Tileset (Export Google Earth 3D Tileset)

A Google Earth 3D tileset frees you from the constraints of the native terrain surface in Google Earth. This type of tileset combines your detailed, high-resolution elevation data with one or more of your custom images (orthoimage, shaded-relief image of the DEM, ...), and allows you to view your custom imagery draped over your custom terrain in 3D from any viewpoint in Google Earth.



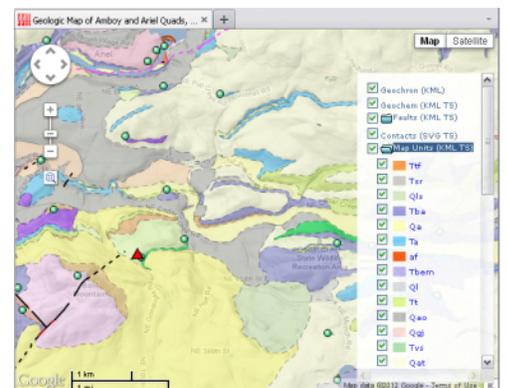
Google Earth view of a Google Earth 3D tileset created in TNTmips presenting custom color-infrared imagery and a detailed custom terrain surface of coastal terraces and seacliffs.

A Google Earth 3D tileset consists of a tiled and pyramided set of 3D models created over a selected range of Google Earth zoom levels. Each tile area includes an image tile for each of the drape layers and a COLLADA 3D model file that stores the corresponding patch of the terrain data. The image tiles and terrain models are linked via KML files in a KML Super Overlay structure, with a master KML file for each drape layer. When you load a master KML file, Google Earth loads the 3D models and drape images that cover the current viewing area and that match the current viewing scale. With this tiled and pyramided structure you can load and view custom 3D data of any size area in Google Earth. A Google Earth 3D Tileset can also be copied to your website for anyone to view in a web browser using the Google Earth browser plugin.

Geomashups (Assemble Geomashup)

A *geomashup* is a web page that presents multiple predefined layers of geospatial data in an interactive map display using one of the browser-based geoviewers (Google Maps, Bing Maps, Open Layers, and the Google Earth browser plug-in). The custom data in the geomashup is typically overlaid on a global base map (map, terrain, or satellite/aerial imagery) native to the geobrowser. The geobrowser provides familiar zooming and panning controls, and the mashup provides layer controls that allow overlays to be turned on and off and other custom controls. Geomashups thus provide a convenient interactive web viewer that allows anyone to view at any scale any number of thematic map or image layers covering any size area.

TNTmips can create standard web (raster) tilesets suitable for use in geomashups designed for any popular geobrowser (Google Maps, Google Earth, Bing Maps, and Open Layers). In addition, Google Maps and Google Earth geomashups can also include simple KML files and KML geometric tilesets, and Google Maps geomashups can include SVG geometric tilesets. The Assemble Geomashup process is used to choose the custom overlays to use, the geobrowser base map(s), range of zoom levels, legend parameters, custom tools and controls, and other settings.



Geomashup of geologic map data layers that includes an SVG geometric tileset, three KML geometric tilesets, and a KML file.