EXPORTING

Getting Started

Exporting Geodata

with

TNTmips® and TNTedit™

Before Getting Started

This booklet introduces the procedures used to export geospatial data from TNTmips to file formats compatible with other software packages. The Export process allow you to export raster, vector, CAD, TIN, and database objects to a variety of geospatial data formats. Attribute data attached to vector or CAD elements can be exported along with the parent object for output formats that support attribute linkage. This booklet leads you through a series of exercises to familiarize you with the basic export procedures for the different types of spatial objects. A complete list of file formats available in the Export process can be found on the inside back cover.

Prerequisite Skills This booklet assumes that you have completed the exercises in *Getting Started: Displaying Geospatial Data* and *Getting Started: Navigating*. Those exercises introduce essential skills and basic techniques that are not covered again here. Please consult those booklets and the TNTmips reference manual for any review you need.

Sample Data The exercises presented in this booklet use sample data that is distributed with the TNT products. If you do not have access to a TNT products CD, you can download the data from MicroImages' web site. In particular, this booklet uses sample files in the CB_DATA, BLACKBRN, BEREA, CROPDATA, DB_MANAG, HAWAII, TERRAIN, and TOPOMAP data collections.

More Documentation This booklet is intended only as an introduction to exporting geodata. Consult the TNTmips reference manual, which contains more than 75 pages on the Export process, for more information.

TNTmips and TNTlite® TNTmips comes in two versions: the professional version and the free TNTlite version. This booklet refers to both versions as "TNTmips." If you did not purchase the professional version (which requires a software license key), TNTmips operates in TNTlite mode, which limits the size of your objects and does not allow export.

The Export process is not available in TNTlite, TNTview, or TNTatlas. All the exercises can be completed in TNTmips using the sample geodata provided.

Randall B. Smith, Ph.D., 11 September 2002

It may be difficult to identify the important points in some illustrations without a color copy of this booklet. You can print or read this booklet in color from MicroImages' web site. The web site is also your source for the newest Getting Started booklets on other topics. You can download an installation guide, sample data, and the latest version of TNTlite.

http://www.microimages.com

Welcome to Exporting Geodata

TNTmips provides a full spectrum of image processing, GIS, and spatial analysis functions. You can work with raster, vector, CAD and TIN data structures, each of which can have associated attribute information in database tables. Once you have developed, processed, and analyzed the geospatial data for your project, you can also export data to file formats compatible with many other software packages.

The TNTmips Export process supports the export of raster, vector, CAD, TIN, and database objects to a variety of external formats. Most of the vector and CAD export processes allow you to select a single attribute table (or one per element type) to be exported with the map elements. For best results, choose a table that is directly linked to the map elements. You can then separately export other relationally linked tables to a database format compatible with the target software package and use that software to import and relink the tables.

The export procedures offer options that allow you to tailor the export process to best accomodate the characteristics of your data and the structure of the target file format. For example, some spatial data formats used by other GIS software packages are based on a CAD data model, and do not maintain the topological structure found in vector objects in TNTmips. When you export a polygonal vector object to one of these formats, you can choose whether a closed shape formed by intersecting lines is treated as a polygon or as separate lines in the output file. You can also choose which type of spatial element is associated with attribute data.

The exercises in this booklet lead you through the export process for a sampling of the supported external file formats. The procedures you learn here should enable you to follow the steps required to export data to other formats.

STEPS

- ☑ launch TNTmips
- ☑ select Import / Export from the Process Menu
- ☑ select Export from the Operation option menu in the Import / Export window

Procedures common to all export operations are introduced on page 4. The exercises on pages 5-14 lead you through the standard procedures for exporting raster objects. Export of vector and CAD objects is introduced on pages 15-20, and pages 21-22 cover database export. Export of objects that model 3D surfaces to VRML format is introduced on page 23. Pages 24-25 cover conversion of map layouts to PDF and SVG files. A list of currently supported export formats can be found on Page 27.

Common Export Procedures

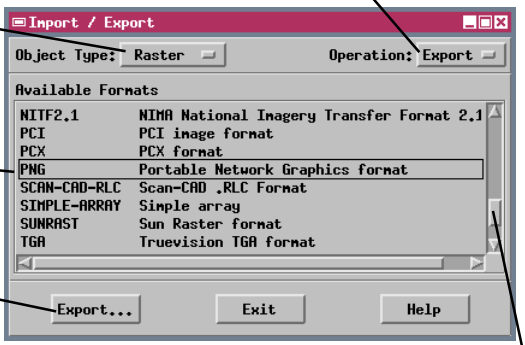
For all Export operations, begin by following the common procedures outlined below:

Make sure Export is selected on the Operation menu.

Select the type of object to be exported to an external file format.

Select the desired external file format from the alphabetical list.

Click [Export...] to open the corresponding export dialog window.



Use the scroll bar to move up or down through the format list.

STEPS

- ☑ on the Import / Export window, select Raster from the Object Type option menu
- ☑ select PNG from the scrolled file format list

If you wish, you can use the standard Display process (Display / Spatial Data) to view any of the objects used in these exercises prior to exporting them.

All export operations are launched from the Import / Export window. Use the Object Type option menu to select the type of object you want to export or select All to view all available formats. The large scrolled list that occupies most of the Import / Export window shows the external file formats that are available for export for the specified object type. The list shows the file format acronym on the left, a brief description on the right, and is ordered alphabetically by file acronym. If you compare the listings for different object types, you will find that you can export to certain file formats from more than one object type (vector or CAD, for example).

When you click the Export button, in most cases a Select Objects window automatically opens to enable you to select the object(s) for export. An Export dialog window then appears, allowing you to set the desired export parameters. The layout of the Export window varies depending on the type of object you are exporting and the specific external file format. The exercises that follow lead you through the export procedures for a number of common types of external file format.

Export a Raster Object to PNG

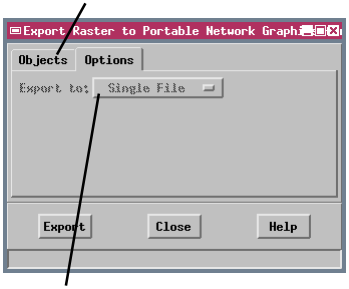
Let's begin by exporting a raster object to the PNG (Portable Network Graphics) format. PNG is a relatively new format designed for the transmission of image data through computer networks. It can accomodate 8-bit or 16-bit grayscale images, true-color images (up to 48 bits per pixel), and indexed color images (with a color palette). The PNG format also incorporates an efficient form of lossless data compression.

The raster you export in this exercise is an 8-bit color composite image. When this raster is displayed, the numerical values stored in the raster are merely used as index values to an associated color palette subobject, allowing a color to be mapped to each cell. When you export a color-mapped raster to an external file format that supports color palettes, such as PNG, BMP, GIF, TIFF, and others, the color palette is transferred to the external file along with the raster to produce an indexed-color image file.

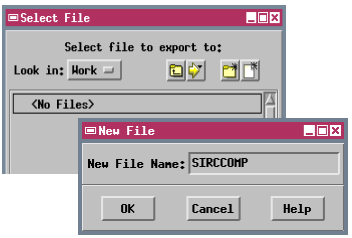
STEPS

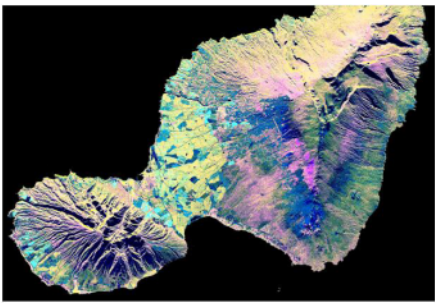
- ☑ click [Export...] on the Import / Export window
- ☑ use the standard Select Objects window to select object SIRCCOMP from the MAUISIRC Project File in the HAWAII data collection
- ☑ click [Export] on the Export Raster window
- ☑ in the Select File window, navigate to the desired destination drive and directory, then click the New File icon button 
- ☑ enter SIRCCOMP in the New File Name box in the New File window and click [OK]
- ☑ when the export process is complete, click [Close] on the Export Raster window

The Export Raster window opens with the Options tabbed panel exposed. Click the Objects tab to see the list of objects selected for export.



The Export to: menu becomes active if you select exactly three raster objects for export. Choose Single File to save an RGB color raster set as a color image in a single file. Choose Separate files to save each input raster as a separate output file.





Input raster SIRCCOMP, an 8-bit raster with a color palette.

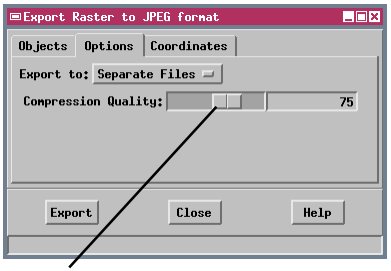
Export a Raster Object to JPEG

STEPS

- ☑ select the JPG format
- ☑ click [Export...] on the Import / Export window
- ☑ use the standard Select Objects window to select object _24BIT_RGB from the CB_COMP Project File in the CB_DATA data collection
- ☑ click [Export] on the Export Raster window and name the output file CBCOMP
- ☑ when the export process is complete, click [Close] on the Export Raster window

The JPEG File Interchange Format is commonly used for the transfer of large, "true-color" raster images. You can export RGB raster sets, color-composite rasters (8-bit or 24-bit), or grayscale rasters to this format. In this exercise you export a single, 24-bit color composite raster.

The JPEG file format incorporates JPEG (Joint Photographic Experts Group) image compression. This is a lossy compression scheme that can achieve compression ratios of 20:1 for photographic-quality images without a noticeable degradation in quality. The fidelity of the compressed output file is governed by the Compression Quality parameter, which varies from 25 to 100 with a default value of 75. Maximum image quality (and minimum compression) is achieved with a Compression Quality value of 100. Reducing this value results in a smaller, more compressed output file.



Use the slider to adjust the Compression Quality parameter to the desired value.

Lossy compression schemes achieve high compression ratios by adjusting raster values during compression, which results in some loss of the original data.

Lossless compression schemes do not discard any cell values during compression. When an image is compressed and then decompressed, the original data in the image is completely preserved.

Raster object _24bit_RGB, a 24-bit color composite image.

JPEG files can only store color images as 24-bit rasters with separate red, green, and blue color values for each image pixel. They cannot store indexed-color images. If you export an 8-bit or 16-bit color composite raster to JPEG, the image is automatically converted to 24-bit color during export.

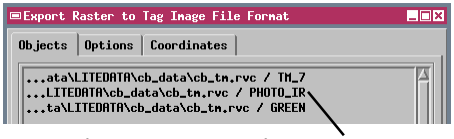
Export an RGB Raster Set to TIFF

TIFF (Tag Image File Format) is one of the most flexible and widely supported raster file formats. TIFF files can store color or grayscale images at various bit-depths as well as bilevel (binary) images. For full-color TIFF images, you can export either an RGB composite raster or select three grayscale rasters (8- or 16-bit) for assignment to Red, Green, and Blue components. TIFF files can also store color-mapped data, so you can export an 8-bit composite color raster with its color palette.

When you export grayscale rasters or RGB raster sets to TIFF, PNG, or JPEG, the output file automatically includes contrast enhancements that you have created and saved in the TNTmips Spatial Data Display process. If a raster object in the selected set has a contrast table subobject, the contrast-adjusted values are written to the output file rather than the raw raster values. If there is more than one contrast subobject for an input raster object, the last one used is applied during export.

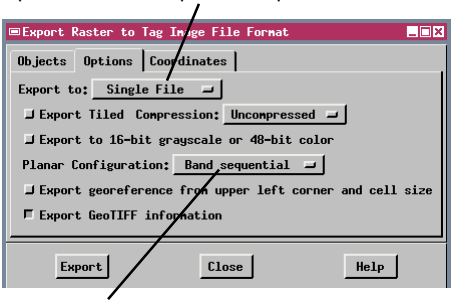
STEPS

- ☑ select the TIFF format
- ☑ click [Export...] on the Import / Export window
- ☑ select objects TM_7, PHOTO_IR, and GREEN (in that order) from the CB_TM Project File in the CB_DATA data collection
- ☑ on the Options panel of the Export Raster window, select Single File from the Export to: option menu
- ☑ click [Export] and name the output file CBTM742
- ☑ when the export process is complete, click [Close] on the Export Raster window

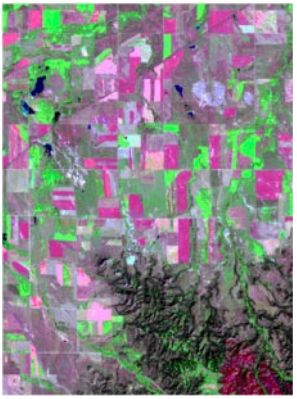


When you export a three-raster set to a single color image file, the first raster you select is assigned to Red, the second to Green, and the third to Blue.

Select Separate Files from the Export to: option menu when you want to export each input raster to a separate output TIFF file.



The Planar Configuration menu determines how the TIFF file stores a full-color image. The Pixel interleaved option defines a single raster with three values (Red, Green, and Blue) per cell. The Band Sequential option creates a separate grayscale raster for each of the Red, Green, and Blue values. Most modern software should read either format.



TM_7, PHOTO_IR, and GREEN displayed as Red, Green, and Blue (respectively).

Export a Georeferenced Raster to TIFF

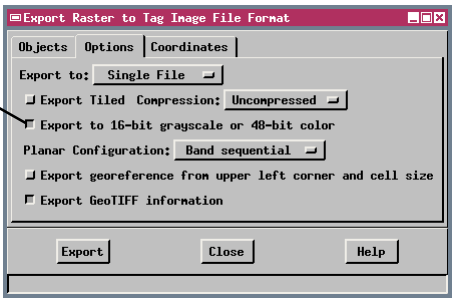
STEPS

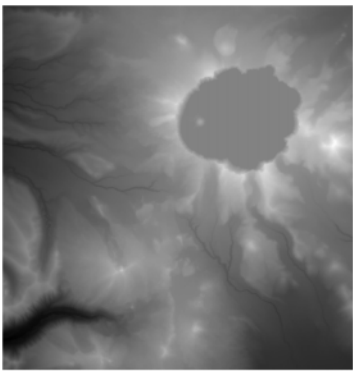
- ☑ click [Export...] on the Import / Export window
- ☑ select object CLKDEM from the SHADE Project File in the TERRAIN data collection
- ☑ turn on the toggle for Export to 16-bit grayscale or 48-bit color
- ☑ click the Coordinates tab
- ☑ select ArcInfo World from the Georeference option menu
- ☑ click [Export] and name the output file CLKDEM
- ☑ when the export process is complete, click [Close] on the Export Raster window

When you export a georeferenced raster object to TIFF or JPEG format, the Georeference tabbed panel allows you to save georeference information in an accompanying file. The georeference file has the same name as the TIFF or JPEG file but has a distinctive file extension that varies depending on the output type you select: ArcInfo World (.tfw), Map Info (.tab), or Descriptive Text (.txg). You can also choose to create both ArcInfo World and Text files. If the raster has more than one Georeference subobject, georeference information from the last one you used is exported to the georeference file.

The Map Info and Text georeference files identify the map coordinate system and store map coordinates for the four image corners. The Arc Info World file contains the map coordinates for the upper left corner of the image along with x- and y-scale parameters used to compute map coordinates for the remaining cell locations. However, it does not identify the coordinate system.

To preserve the full range of values when you export a single 16-bit grayscale raster or the three 16-bit color components of a 48-bit color image, turn on this toggle button. Otherwise each component is rescaled to the 8-bit data range.





Signed 16-bit elevation raster CLKDEM.

Select a file format option for georeference information from the Georeference option button.

Choose distance units for the georeference coordinates from the X-Y Units option menu.

TIFF and GeoTIFF

The TIFF file format uses internal data structures called tags to convey information about the image in the file. GeoTIFF is an extension of the TIFF file format that uses a specialized set of tags to embed geographic information directly within the TIFF file structure, removing the need for additional supporting georeference files. The geographic tag structure in GeoTIFF is open and non-proprietary, so the GeoTIFF format is widely supported by software packages designed to work with geographic data. You can export an image to GeoTIFF using either the GeoTIFF or TIFF format options. The Options panel on the Export Raster to TIFF window includes an "Export GeoTIFF information" toggle button that is turned on by default.

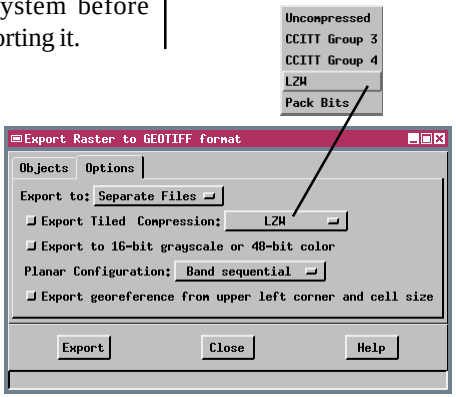
An image that you have georeferenced in TNTmips using control points may not have its lines and columns parallel to the referenced map grid, so the transformation from image coordinates to map coordinates may involve rotation and shear. TNTmips handles these conversions transparently, and the GeoTIFF and ArcWorld formats also can accomodate them, but some other software packages may compute incorrect map coordinates from rotated TIFF or GeoTIFF images. For best results you can use the Automatic Resampling process to reproject the image to its map coordinate system before exporting it.

STEPS

- ☑ select the GeoTIFF format from the scrolled list
- ☑ click [Export...] on the Import / Export window
- ☑ select object SPOT_PAN_LITE from the CB_SPOT Project File in the CB_DATA data collection
- ☑ Choose LZW from the Compression menu
- ☑ click [Export] and name the output file CLKDEM
- ☑ when the export process is complete, click [Close] on the Export Raster window

The TIFF format incorporates several types of image compression that you can choose from the Compression option button. The CCITT compression options are designed for binary (black and white) images. The LZW and Pack Bits (a type of Run Length Encoding) can be used for higher bit-depth images.

Raster object SPOT_PAN_LITE



Export Raster Objects to ECW

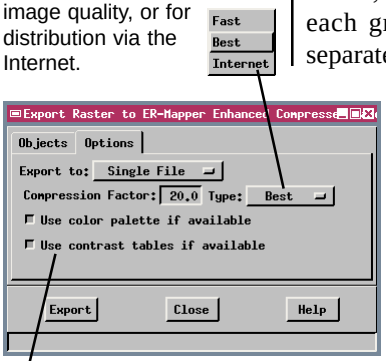
STEPS

- ☑ select the ECW format
- ☑ click [Export...] on the Import / Export window
- ☑ select objects RED, GREEN, and BLUE (in that order) from the RGBCROP Project File in the CROPDATA data collection
- ☑ on the Options panel of the Export Raster window, select Single File from the Export to: option menu
- ☑ change the Compression Factor value to 20
- ☑ turn on the toggle button *Use contrast tables if available*
- ☑ click [Export] and name the output file
- ☑ when the export process is complete, click [Close] on the Export Raster window

The Enhanced Compressed Wavelength format uses wavelet compression techniques to achieve high compression ratios for large images and image mosaics (10:1 to 20:1 for grayscale images and 20:1 to 50:1 for color images). The Compression Factor field specifies your target compression ratio. The actual amount of compression achieved is dependent on the image and may be greater or less than your target value. Georeference information is automatically stored internally within the ECW file. There is a maximum size limit of 500 MB on ECW files that you export from TNTmips.

When you select more than one input raster, the result depends on your selection on the Export To menu and the number of rasters you have selected. Choosing Single File on the Export To menu writes the output to a single ECW file. If you select three input rasters, the raster set is treated as an RGB image. The ECW compression engine converts the RGB cell values to a color space that separates intensity from chromatic or color changes in order to achieve high compression while preserving detail. If you select fewer than or less than three input rasters, then a multiband ECW file is created in which each grayscale band is compressed and stored separately.

Use the Type: menu to optimize the compression for decompression speed, image quality, or for distribution via the Internet.



Toggle buttons give you the option of applying saved contrast enhancements and applying a saved color palette during export.

RGB display of the input raster set, a natural-color aerial photo.

Export Raster Objects to JP2

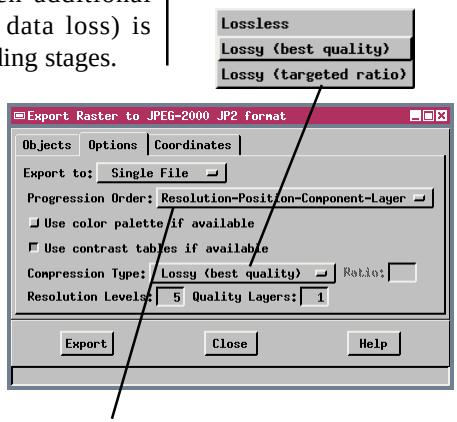
The new JPEG2000 format (.JP2) is designed to store large images while overcoming many of the limitations of the original JPEG image format. JP2 allows either lossless or lossy compression and provides better image quality at high levels of compression. You can export color (single composite or RGB raster set), integer grayscale (1- to 32-bit), or binary images to JP2. The exported files can be any size up to the limit imposed by your operating system.

Like the ECW format, JP2 uses a wavelet transform to provide the initial image compression (following color conversion for RGB images). Different versions of the wavelet transform are used to produce lossless or lossy compression. If you choose *Lossless* or *Lossy (best quality)* from the Compression Type menu, the appropriate wavelet transform is applied with no further compression. Either choice provides modest compression with no or essentially no visible impact on the image. For greater compression, choose *Lossy (targeted ratio)* and specify the numerator of the ratio (e.g., 50 for 50:1). The lossy wavelet transform is applied, then additional compression (and accompanying data loss) is achieved in the quantization and coding stages.

The wavelet transform also produces a series of reduced-resolution versions of the image that are similar to the raster pyramids used internally in TNTmips to speed display at different zoom levels. You may want to increase the Resolution Levels setting (the default value is 5) for very large images to provide an adequate number of pyramid levels.

STEPS

- ☑ select the JP2 format
- ☑ click [Export...] on the Import / Export window
- ☑ reselect objects RED, GREEN, and BLUE (in that order) from the RGBCROP Project File in the CROPDATA data collection
- ☑ on the Options panel of the Export Raster window, select Single File from the Export to: option menu
- ☑ turn on the toggle button *Use contrast tables if available*
- ☑ click the Coordinates tab
- ☑ select Descripive Text from the Georeference option menu
- ☑ click [Export] and name the output file
- ☑ when the export process is complete, click [Close] on the Export Raster window



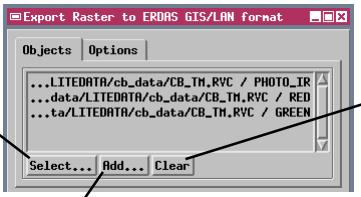
The data in a JP2 file can be organized in different ways that affect the order in which the compressed image is "rebuilt" during decompression and display. The default Progression Order menu setting orders the data so that a complete low-resolution (blurry) image is initially displayed and its spatial resolution (sharpness) increases as more data is read. This setting should be adequate for most display applications.

Export Raster Objects to ERDAS GIS/LAN

STEPS

- ☑ select the ERDAS GIS / LAN format
- ☑ click [Export...] on the Import / Export window
- ☑ select objects PHOTO_IR, RED, and GREEN from the CB_TM Project File in the CB_DATA data collection
- ☑ on the Options panel of the Export Raster window, select Single File from the Export to: option menu
- ☑ choose Hectares from the Pixel area units: option button
- ☑ click [Export] and name the output file
- ☑ when the export process is complete, click [Close] on the Export Raster window

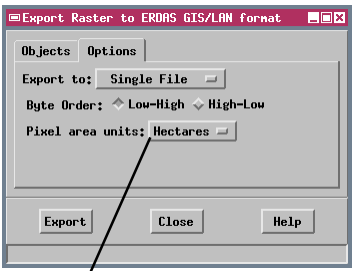
You can export raster objects to formats specific to a number of image processing software packages, including ERDAS (Earth Resources Data Analysis System). The ERDAS GIS/LAN export process creates output raster files in one of two formats: GIS format (for single raster objects) or LAN format (for export of multiple raster bands to a single output file). Each file type has the corresponding file extension. When the Single File export option is selected, the appropriate file type is created based on the number of input rasters. The image files are created using raw raster cell values from the input objects; accompanying contrast tables are not saved with the output. Georeference information from the last-used georeference subobject (if any) is automatically incorporated in these files.



Click [Select...] to clear the object list and open the Select Objects window to select a new set of objects for export.

Click [Clear...] to delete the current object list.

Click [Add...] to add objects to the existing list.



You can specify an area measurement unit for the ERDAS file from the Pixel area units option button. The choices are None, Acres, Hectares, and Other.

Raster objects PHOTO_IR, RED, and GREEN displayed as Red, Green, and Blue (respectively). This raster set was exported to the multiband LAN format.

Export a Raster Object to ASCII

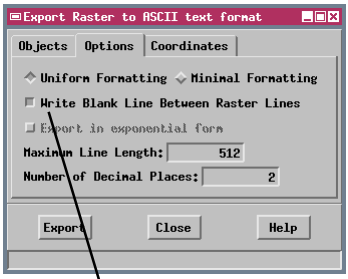
Choose the ASCII option to export a raster object to an ASCII text file that can be viewed, reformatted, or edited using a text editor or word processing program. The raster values are written line by line into the text file, which is assigned a .txt file extension.

The default Minimal Formatting option places a single space between values, or you can choose the Uniform Formatting option to align the cell values in columns. The Maximum Line Length parameter has a default value of 512 characters; you can adjust this value to accomodate the constraints of your text editing program. If the number of characters required for a single raster line exceeds the Maximum Line Length value, then each raster line will be written to a sequence of contiguous text lines. A new text line is created for the start of each raster line.

You can use the controls on the Coordinates panel to create a georeference file to accompany the ASCII raster file (see page 8).

STEPS

- ☑ select the ASCII format
- ☑ click [Export...] on the Import / Export window
- ☑ select object AERIAL from the BLACKBRN Project File in the BLACKBRN data collection
- ☑ on the Options panel of the Export Raster window, click the Uniform Formatting radio button
- ☑ turn on the Write Blank Line Between Raster Lines toggle button
- ☑ on the Coordinates panel, select None from the Georeference option button
- ☑ click [Export] and name the output file
- ☑ when the export process is complete, click [Close] on the Export Raster window



To provide a clear separation between raster lines in the text file, turn on the Write Blank Line Between Raster Lines toggle button. See the accompanying illustration of the sample output text file.

```
 5  5  5  6
 5 10  9  8
 9  9  9  8

 5  5  5  5
 7  9  9 10
10  9  9  8

 4  4  4  5
 5  6  9  9
 7  5  5  5
```

Sample of output text file with Uniform Formatting, multiple text lines for each raster line, and a blank line between each pair of raster lines.

Raster object AERIAL.

Raster Export Tips

Know Your Raster Data Type

TNTmips allows you to work with a very wide range of raster data types, including binary, signed and unsigned integer, floating point, complex, and color-composite. The bit-depth of grayscale rasters can range from 4 to 32 bits per pixel and you can work with 8-bit, 16-bit, and 24-bit color composites. Many of the external raster formats allow only a limited range of data types. Be sure that your selected export format accommodates the type of raster you are trying export. If not you can convert the raster to an allowed data type before export. The bit-depth of grayscale rasters can be converted using the Raster Extract process (Process / Raster / Extract). Select all cells for extraction and use the Output Type menu on the Values tab to select the appropriate bit-depth. To create color composite rasters, or to create separate RGB rasters from a composite, use the Raster Color Conversion process (Process / Raster / Combine / Convert Color).

Contrast Enhancement

The TNTmips display process allows you to enhance the contrast and brightness of grayscale rasters as they are displayed without modifying the numerical values stored in the raster itself. You can enhance contrast using an automatic contrast method or by creating a contrast table that is stored with the raster. When you export a raster object, contrast-enhanced values are transferred to the output file **only** if the object has a saved contrast table and only for certain formats. When you export to one of the generic, general-purpose image formats (BMP, JPEG, TIFF/GEOTIFF, PCX, PNG, and TGA), the last-used saved contrast table is applied during export. When you export to most application-specific formats, only raw raster values are transferred to the output file.

Orientation to Projection

Some image processing / GIS software products assume that a georeferenced raster is aligned to its map coordinate system. This means that the raster lines and columns are parallel to the axes of the map coordinate system, enabling the map coordinates for each cell to be computed by the software from the cell size and the position of a single cell (such as the upper left corner cell). TNTmips does not impose this restriction on raster georeferencing. If a raster has been georeferenced in TNTmips using control points, in most cases its lines and columns will not be oriented parallel to the map coordinate system. If a raster you export is not aligned to its coordinate system, external software using this system will compute incorrect coordinates. Check each raster before export and if necessary reproject the raster into its map coordinate system using the Automatic Raster Resampling process (Process / Raster / Resample / Automatic).

Export a CAD Object to DXF

The Export process allows you to export CAD objects to several file formats. The AutoCAD DXF (Drawing eXchange File) format is a standard means of exchanging drawing data between CAD programs. DXF files are ASCII text files containing the information needed to describe each element in a CAD drawing. The elements in a DXF file can include points, lines, polygons, and regular geometric shapes such as circles and ellipses. Drawing elements can be grouped into blocks and can reside on different layers. Unlike vector files, the elements in a CAD file (or CAD object) can overlap each other yet remain as distinct elements. Because they are ASCII files, DXF files can be examined and edited (if necessary) using a text editor.

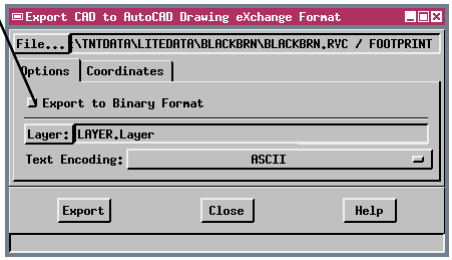
The DXF export process can assign drawing elements to different layers on the basis of attribute values. You must specify a single field in a database table to provide the layer assignments. All of the elements with the same attribute value for this field will be assigned to a single unique layer in the DXF file.

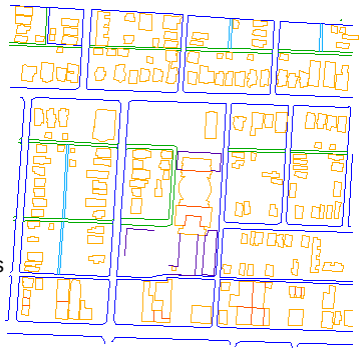
STEPS

- ☑ select CAD from the Object Type option menu in the Import / Export window
- ☑ select the DXF format
- ☑ click [Export...]
- ☑ select object FOOTPRINT from the BLACKBRN Project File
- ☑ click [Layer:] on the Options panel in the Export CAD window
- ☑ in the Select Table / Field window select LAYER from the Table list

- ☑ select LAYER from the Field list and click [OK]
- ☑ click [Export] and name the output file
- ☑ when the export process is complete, click [Close] on the Export CAD window

You can turn on the Export to Binary Format toggle button to produce a binary version of the DXF file. The binary form (which has the same file extension) is smaller and can be read by AutoCAD more quickly than the normal ASCII file, but cannot be edited as easily.





The FOOTPRINT CAD object displayed with line colors set By Attribute. The lines represent curb lines for different street classes, and footprints of buildings and houses. In this example, each line class is written to a separate layer in the DXF file.

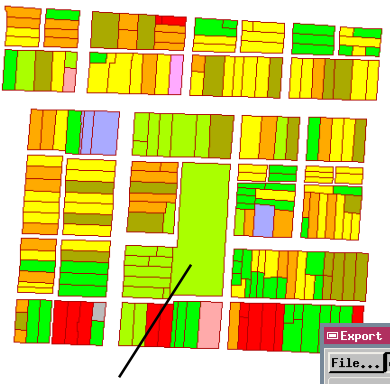
Export a Vector Object to DXF

STEPS

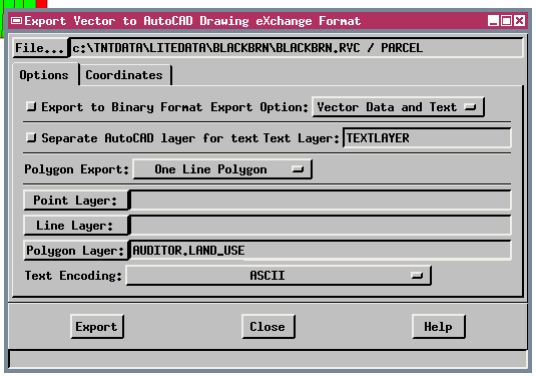
- ☑ select Vector from the Object Type option menu in the Import / Export window
- ☑ select the DXF format
- ☑ click [Export...]
- ☑ select object PARCEL from the BLACKBRN Project File
- ☑ click [Polygon Layer:]
- ☑ in the Select Table / Field window select AUDITOR from the Table list
- ☑ select LAND_USE from the Field list and click [OK]
- ☑ click [Export] and name the output file
- ☑ when the export process is complete, close the Export Vector window

You can export vector objects to both vector and CAD file formats, including DXF. The DXF export dialog window for vector objects has several options in addition to those for input CAD objects. Because vector objects can contain distinct types of elements, there are separate layer assignment controls for points, lines, and polygons. Each of these works in the same way as the single Layer assignment button used for CAD export.

The selections on the Polygon Export option menu control the way in which polygons formed by networks of intersecting lines are written to the DXF file. If you choose the One Line Polygon option (the default), all of the vector lines making up a polygon become segments of a closed polygon in the output. A line shared by two adjacent polygons is incorporated into both. Use this option if you want adjoining polygons treated as separate drawing elements by a CAD-format application program. The Multiple Line Polygon option does not create closed polygon elements from a network of intersecting lines, but instead maintains separate line elements in the output DXF file. Use this option if the lines are the primary drawing element, or if you are using the DXF file to transfer map data to an application program using a vector file format.



The PARCELS vector object displayed with polygon fill colors set By Attribute, depicting different land use categories. In this exercise parcel polygons in different land use classes are written to separate layers in the DXF file.



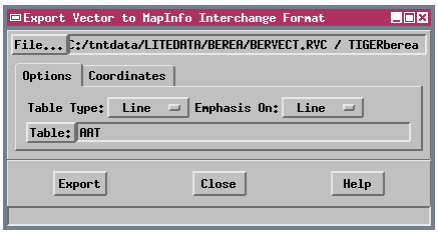
Export a Vector Object to MIF

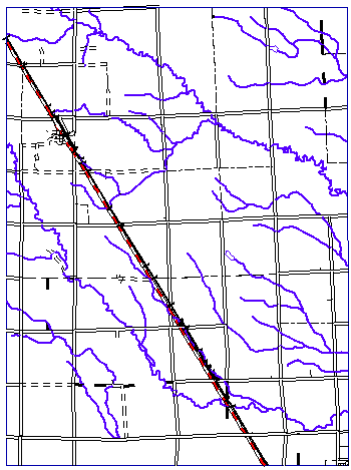
You can export either vector or CAD objects to the MapInfo Interchange Format (MIF). Map elements are output to a file with a .MIF file extension, which stores them in a nontopological (CAD) format. Attribute information from a single table in an accompanying database can be written to a separate file with a .MID file extension. The attribute file is an ASCII text file with fields separated by semicolons.

The output format of polygons formed by intersecting line elements is controlled by the selections on the Emphasis On option menu. The lines in the vector object used in this exercise (derived from the U.S. Census Bureau's TIGER / Line files) have attribute links that differentiate roads, highways, streams, and other line types. The polygons created by intersections of these different line types have no significance. In this instance, choose the Line option to maintain the integrity of the line types in the output file. If attributed polygons are the intended output drawing element (as in the next exercise), choose the Polygon option. Use the options on the Table Type option menu to select the database (Polygon, Line, or Point) from which to choose a table for export.

STEPS

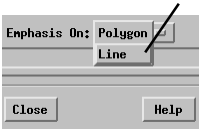
- ☑ select the MIF format
- ☑ click [Export...]
- ☑ select object TIGERBEREA from the BERVECT Project File in the BEREA data collection
- ☑ select Line from the Table Type option menu
- ☑ select Line from the Emphasis On option menu
- ☑ click [Table:]
- ☑ choose AAT from the list in the Select Table window that appears and click [OK]
- ☑ click [Export] and name the output file
- ☑ when the export process is complete, close the Export Vector window

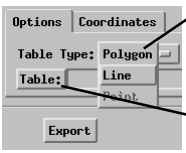




The TIGERBEREA vector object displayed with line styles determined By Attribute.

Use the Emphasis On option menu to determine whether networks of intersecting lines are assembled into polygons in the output file.





Choose the type of attribute table to be exported using the Table Type option menu, then press [Table:] to select the specific table.

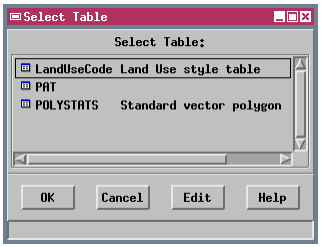
Export a Vector Object to Arc Shapefile

STEPS

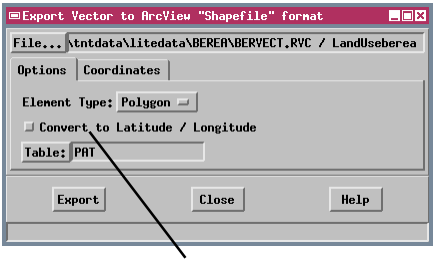
- ☑ select the ARC-SHAPEFILE format
- ☑ click [Export...]
- ☑ select object LANDUSEBEREA from the BERVECT Project File
- ☑ select Polygon from the Element Type option menu
- ☑ click [Table:]
- ☑ choose PAT from the list in the Select Table window that appears and click [OK]

Shapefiles used in ArcView also store map data in a nontopological (CAD) form, and a single shapefile can contain only one type of element (point, line, or polygon). You can export either vector or CAD objects to the shapefile format. Attribute information from a single table in an accompanying database can be exported to a dBASE file (.dbf) with the same name as the main shapefile (.shp).

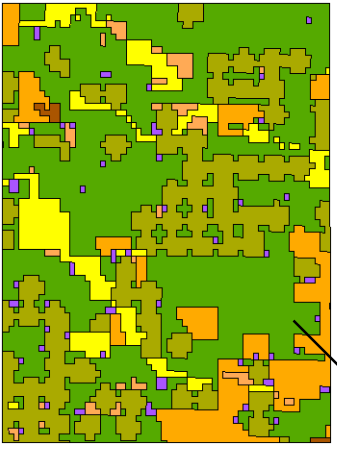
Use the Element Type option button to choose which type of element is written to the shapefile. The vector object used in this exercise has attributed polygons representing areas of differing land use type. In this case, choose the Polygon element type option. This option assembles the lines making up each polygon into a single polygon element in the output file. If the input vector object has line-oriented data (as in the previous exercise), choose Line from the Element Type option menu. Use the Table button to select a database table for export.



- ☑ click [Export] and name the output file
- ☑ when the export process is complete, close the Export Vector window



When the Convert to Latitude / Longitude toggle button is turned on, vector map coordinates are automatically converted to latitude and longitude during export (if necessary) for use in ArcView. Turn this toggle off if you want to preserve the input object's coordinate system. However, keep in mind that the shapefile does not store information about the coordinate system. You should create an accomanying metadata text file to convey this information.



The LANDUSEBEREA vector object displayed with polygon styles determined By Attribute, depicting different land use categories.

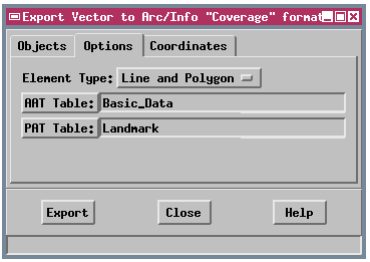
Export a Vector Object to Arc Coverage

Vector objects and associated attribute data can be exported to several topological vector file formats supported by ArcInfo. Vector export to the native Coverage format produces a series of related files with predefined file names and file extensions. The Select Folder dialog allows you to name a coverage directory that is created to contain the vector element files. The associated attribute files are written to an INFO directory at the same level as your named output directory. For use in ArcInfo, the INFO directory and all related coverage directories must be contained in a single workspace directory.

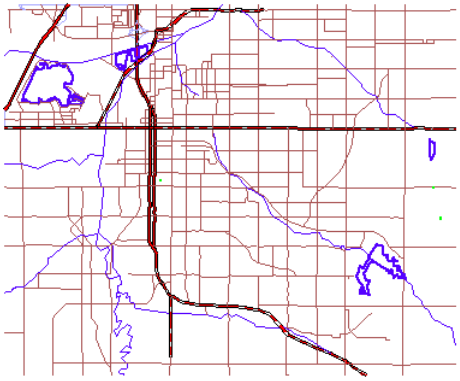
The Coverage export process allows you to export a single attribute table for polygons, lines, or points, or a pair of tables for line and point or line and polygon combinations (a coverage cannot have both point attributes and polygon attributes). Some of these choices may be dimmed on the Element Type option menu if the input vector object does not have the appropriate table types. Use the AAT Table button to choose a line attribute table, and the PAT Table button to choose either a point or polygon attribute table.

STEPS

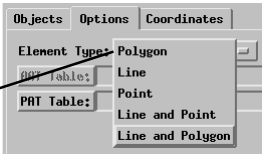
- ☑ select the ARC - COVERAGE format
- ☑ click [Export...]
- ☑ select object TGRCLIPPEDEDIT from the PROPINFO Project File in the DB_MANAG data collection
- ☑ select Line and Polygon from the Element Type option menu
- ☑ click [AAT Table:]
- ☑ choose Basic_Data from the table list in the resulting Select Table window and click [OK]
- ☑ click [PAT Table:]
- ☑ choose LANDMARK from the table list and [OK]



- ☑ click [Export]
- ☑ use the Select Folder window to choose the desired directory level, then click the New Folder icon button 
- ☑ name the output directory, then press [OK] in the NewFolder window
- ☑ click [OK] in the Select Folder windowtest



Vector object TGRCLIPPEDEDIT.



Choose the type(s) of elements that have attributes from the Element Type option menu.

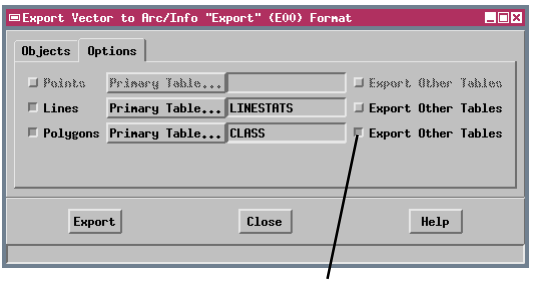
Export a Vector Object to Arc E00

STEPS

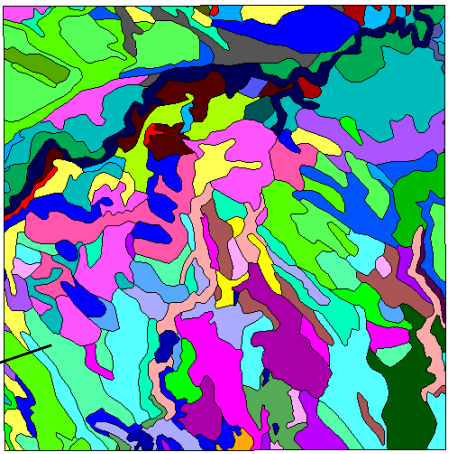
- ☑ select the ARC - E00 format
- ☑ click [Export...]
- ☑ select object CBSOILS_LITE from the CB_SOILS Project File in the CB_DATA data collection
- ☑ check that the Lines toggle button is turned on, and press the adjacent Primary Table button
- ☑ choose LINESTATS from the list in the Object Selection window that appears and click [OK]
- ☑ turn on the Polygons toggle button and press the adjacent Primary Table button
- ☑ choose CLASS from the list in the Object Selection window and click [OK]

- ☑ turn on the Export Other Tables toggle button for Polygons
- ☑ click [Export] and name the output file
- ☑ when the export process is complete, close the Export Vector window

An ArcInfo Export format (e00) file stores both vector map elements and associated attribute data in ASCII-text form. Export to e00 format offers the same options for and restrictions on attribute table export as the Coverage export process. In addition, you have the option to export the entire set of relationally linked tables for each available element type. You first choose a Primary Table; this should be the table that is directly linked to the vector elements, and that contains a field designated as a primary key field. When you turn on the Export Other Tables toggle button for an element type, all tables that have relational links to the Primary Table via the primary key field are also exported to the e00 file.



Turn on the Export Other Tables toggle button to export all tables that have a relational link to the Primary Table.

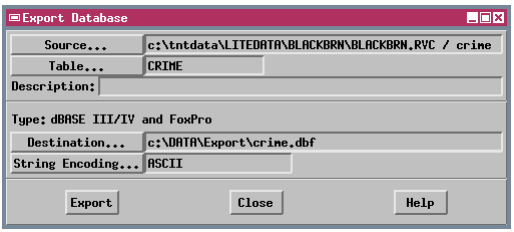


Vector object CBSOILS_LITE displayed with polygons styled By Attribute. Polygon fills are associated with different soil types.

Export a Database Table

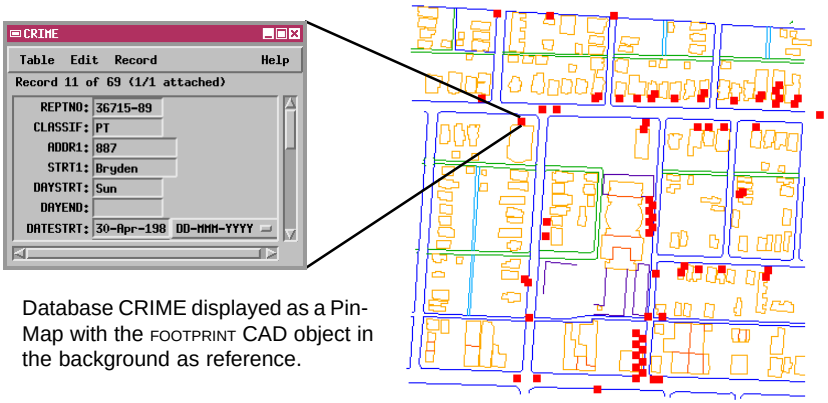
An attribute table in a database object or subobject can be exported to one of several formats compatible with other application programs. If the database object contains more than one table, each table must be exported separately. The Export Database procedure is identical for most of the supported formats and is illustrated in this exercise by export to dBASE format.

To export a database table, you need to select the source object and the desired table, then specify the destination for the exported file. You can also use the steps in this exercise to export attribute information to INFO, ODBC, TYDAC, and TNTmips text file formats.



STEPS

- ☑ select Database from the Object Type option menu in the Import / Export window
- ☑ select DBASE from the scrolling format list
- ☑ click [Export...]
- ☑ click [Source...] on the Export Database window
- ☑ select object CRIME in the BLACKBRN Project File in the BLACKBRN data collection
- ☑ in the Table window that appears, the single available table CRIME is automatically highlighted; click [OK] to accept this selection
- ☑ click [Destination] and name the output file
- ☑ click [Export]
- ☑ when the export process is complete, click [Close] on the Export Database window



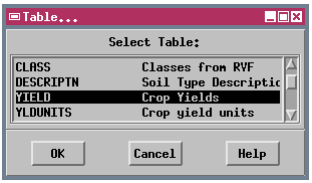
Database CRIME displayed as a Pin-Map with the FOOTPRINT CAD object in the background as reference.

NOTE: When you have a database table open in Tabular View, the Save As option on the Table menu allows you to save a copy of the table in one of several forms, including dBASE III, ODBC, or CSV format. This procedure provides a quick alternative to the Export process for these file formats.

Export a Database Table to ASCII

STEPS

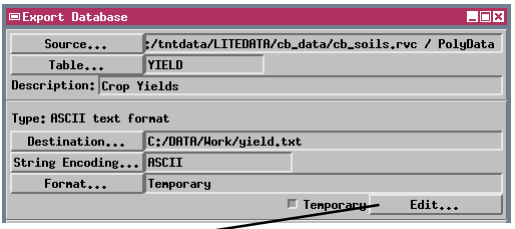
- ☑ select the ASCII format and click [Export...]
- ☑ click [Source] on the Export Database window
- ☑ select database subobject PolyData from the CBSOILS_LITE object in the CB_SOILS Project File in the CB_DATA data collection
- ☑ in the Table window that opens, scroll to and select the YIELD table, then press [OK]



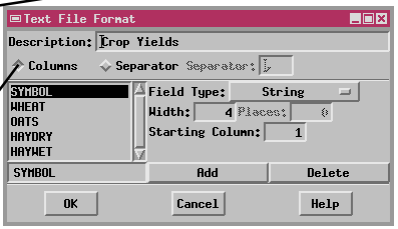
- ☑ press [Destination...] and name the output file
- ☑ press in the Temporary toggle button and click [Edit...]
- ☑ make sure that the Columns toggle button is turned on in the Text File Format window, and click [OK]
- ☑ click [Export]
- ☑ when the export process is complete, click [Close] on the Export Database window

Use the ASCII option to export a database table to a text file. When you name the output file, you have a choice of file extensions: *.txt (the default) or *.csv (Comma Separated Values). Files in CSV format can be opened directly by common spreadsheet programs, which provide a convenient means for viewing and editing the data.

Press the Edit button to create a temporary format file to control the content and format of the output file. All fields in the selected table are automatically selected for export and listed in the Text File Format window. If you don't want a field to appear in the output file, highlight the field name and press [Delete]. Use the toggle buttons below the table description to choose whether to align the values for each field in columns, or to use a character of your choice to separate adjacent field values. The default separator is a comma, and you should choose this option when exporting to CSV format. For columnar output you can accept the default width and starting column that are derived from the current database table or change the width of any or all columns. For fields containing floating-point values you can also modify the number of decimal places in the output file.



Click [Edit] to open the Text File Format window to modify the default Temporary format options.



Press in the Columns toggle button to align the output field values in columns or the Separator button to separate field values with the selected character.

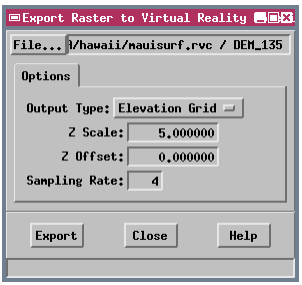
Export Vector, TIN, or Raster to VRML

The Virtual Reality Modeling Language (VRML) is a 3D scene-description language that can be used to create interactive simulations incorporating animation, audio, and multimedia effects. At its heart, VRML is an efficient format for describing simple and complex 3D objects that can be distributed across the World Wide Web and viewed in a web browser (using a plug-in viewer). TNTmips can export 3D objects to VRML format. The 3D objects can then be combined using VRML authoring tools to create complex worlds.

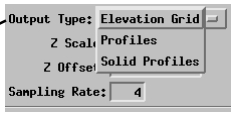
You can export several types of 3D objects from TNTmips to VRML format, including TINs, 3D vector contour objects, and rasters. For each type of object, you can exaggerate the vertical scale for enhanced 3D viewing by specifying a Z Scale factor. When you export a raster object, you can choose to represent the surface as an elevation grid, as a sequence of parallel profiles at the specified sampling rate, or as a sequence of filled profiles. Increase the sampling rate setting if you want to produce a simpler output object that displays more rapidly in your browser.

STEPS

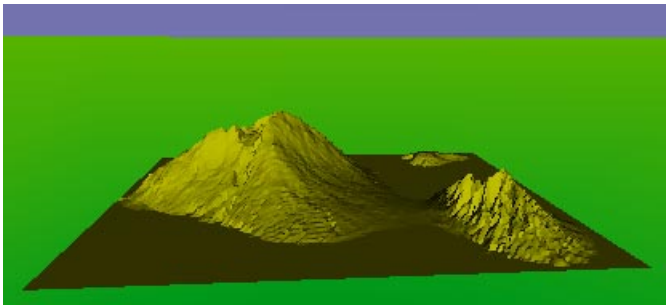
- ☑ select Raster from the Type option menu on the Import / Export window
- ☑ select the VRML format and click [Export...]
- ☑ select object DEM_135 in the MAUISURF Project File in the HAWAII data collection
- ☑ enter 5.0 in the Z Scale text field
- ☑ click [Export] and name the output file
- ☑ when the export process is complete, click [Close] on the Export Raster window



Use the Output Type option button to choose how the raster will be represented in VRML format.



Perspective view of the VRML elevation grid of the island of Maui exported from raster object DEM_135.



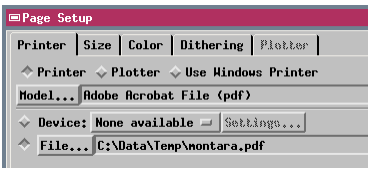
☑ press [Exit] on the Import / Export window when you have completed this exercise

Convert a Map Layout to Acrobat PDF

STEPS

- ☑ choose Display / Spatial Data from the TNTmips main menu
- ☑ click the Open icon button and select Open Layout from the dropdown menu

- ☑ select LAYOUT in the MONTARA Project File in the TOPOMAP data collection
- ☑ choose Print from the Layout menu in the Layout Controls window
- ☑ on the Printer panel of the Page Setup window, turn on the Printer radio button, then press the Model push button
- ☑ from the scrolling list in the Printer Selection window select *Adobe Acrobat File (pdf)*, then click [OK]
- ☑ press the File push button and name the output file
- ☑ press Run



You can view the PDF file using Acrobat, the free Acrobat Reader, or in your browser with the free Acrobat Reader plug-in.

For an introduction to print layouts, see the tutorial booklet *Making Map Layouts*. Support for page sizes up to 11" x 17" is included in the base price of TNTmips. Creating larger layouts requires the purchase of P15 printer support.

The Spatial Data Display process allows you to construct and print professional-quality page-layouts with map and image data, legends, scale bars, and annotations, among other features. You can also use the print procedure to save the layout to one of several file formats: Adobe Acrobat (PDF), Adobe Illustrator, and Scalable Vector Graphics (SVG).

Adobe's Portable Document Format (PDF) is designed to encapsulate formatted documents containing text, vector graphics, and images. Conversion to PDF replicates your complete map layout with all elements correctly positioned and scaled to the selected page size. All TNT vector style characteristics are transferred to the PDF file with the exception of hatch pattern polygon fills (work to support hatch patterns is underway). The PDF conversion does not preserve fonts and text styles directly; text characters in the layout are converted to vector polygons with a coordinate resolution commensurate with the scale of the layout. (Support for embedding fonts during conversion is also underway.)

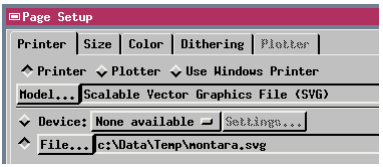
Convert a Map Layout to SVG

The World Wide Web Consortium developed SVG, the Scalable Vector Graphics format, for rapid network transmission of documents with complex vector graphics. SVG files can also include text and raster images, so complex map layouts can be converted readily to SVG. (Rasters in the layout are currently stored in a linked PNG file. Text is stored as text, but fonts are not embedded in the file.)

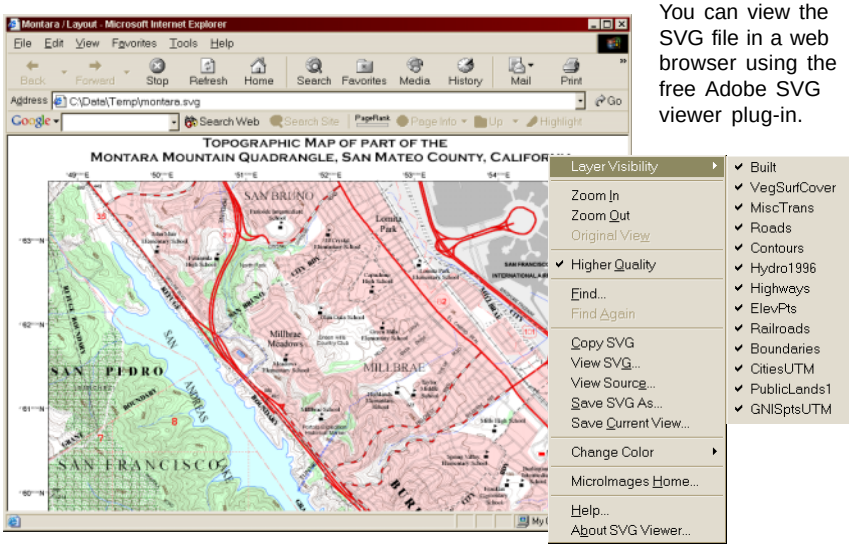
Vector graphics are stored in SVG in a very compact form, so SVG files tend to be much smaller than PDF files made from the same data. Scripts also can be added to SVG files to make the vector graphics interactive. (SVG is written in XML, the Extensible Markup Language, so SVG files can be easily modified in a text editor). For example, the SVG browser plug-in developed by Adobe implements a pop-up right mouse button menu enabling zooming and other functions. The TNT SVG conversion automatically embeds a script that adds a Layer Visibility menu item and submenu that lets the user turn individual layers in the layout on or off.

STEPS

- ☑ choose Print from the Layout menu in the Layout Controls window
- ☑ on the Printer panel of the Page Setup window, check that the Printer radio button is still turned on, then press the Model push button
- ☑ from the scrolling list in the Printer Selection window select Scalable Vector Graphics File (SVG)
- ☑ press the File push button and name the output file
- ☑ press Run



You can view the SVG file in a web browser using the free Adobe SVG viewer plug-in.



General Export Tips

When Good Data Goes Bad

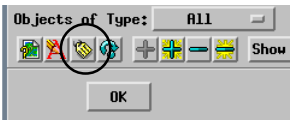
If a series of exported objects show incorrect spatial registration in another software package, check the georeference information for the original objects in your TNTmips Project Files. Make sure that all of the objects use the same coordinate system / map projection, including the geodetic datum. (An easy way to do this is to use the Extents tool in the Spatial Data Display process.) Also check to make sure that none of the objects have more than one georeference subobject (UTM and Lat/Lon, for example).

Since TNTmips can reproject data on-the-fly and overlay objects with different georeferencing, it is easy to forget that some other software packages expect all related objects to use the same coordinate system. If necessary, you can use the Vector Warp process (Process / Vector / Warp) and the Automatic Raster Resampling process (Process / Raster / Resample / Automatic) to reproject all objects into the same coordinate system. When you export vector or CAD objects to ArcView Shapefile format, you can have the objects automatically reprojected to latitude / longitude coordinates (if necessary) by turning on the Export to Decimal Degrees toggle button.

Save Metadata for Exported Files

Digital geospatial data can be copied, edited, and transformed with ease, and it can be displayed at virtually any scale. Without metadata, the end user of geospatial data has no way to know the original scale and accuracy of the data and may be unaware of other potential limitations. When you are conveying exported data to a third party, it is a good idea to create a metadata text file to accompany the data.

If you are maintaining metadata subobjects in TNTmips for spatial objects you plan to export, you can create a metadata text file during the export process. As you are selecting the object for export using the Select Object window, click on the Metadata icon button near the bottom left corner of the window. The Metadata Viewer and Editor window then opens. Select Save as Text File from the File menu to name and save the metadata text file. You can then continue with export of the spatial object.



Send Data When You Contact Software Support

If you send Email to MicroImages Software Support to report a problem with export or import, be sure to include copies of your data that illustrate the problem. By doing so you will make it possible for Software Support to diagnose the problem more quickly and to find problems that may be peculiar to your data.

Supported Export Formats

TNTmips allows you to export objects in Project Files to the following external file formats:

Raster Export Formats

AG LEADER Target
ALDEN Radar
ARC-BIL/BIP: Arc/Info BIL/BIP
ASCII text
BMP: Windows Bitmap
CCRS: Canadian Center for Remote Sensing
DEM: USGS Digital Elevation Model
DOQ: USGS Digital Orthophoto Quad
DTED: Digital Terrain Elevation Data
ECW: Enhanced Compressed Wavelet
EPPL7
ER-MAPPER
ERDAS-GIS/LAN
GEOSOFT-GRD: Grid File
GEOSOFT-GXF: Grid eXchange
GEOTIFF
GGR: Generic Georeferenced Raster
GIF: Graphics Interchange Format
GRASS
IDIMS IDIPS
JP2: JPEG-2000
JPEG
LVT film recorder
MICROBRIAN
NITF2.1: NIMA National Imagery Transfer
PCI: PCI Image Format
PCX
PNG: Portable Network Graphics
SCAN-CAD-RLC
SIMPLE ARRAY
SUNRAST: Sun Raster Format
TGA: Truevision TGA
TIFF: Tag Image File Format
USER DEFINED
VRML: Virtual Reality Modeling Language

TIN Export Formats

VRML: Virtual Reality Modeling Language

Vector Export Formats

ARC-COVERAGE: ArcInfo Coverage
ARC-E00: ArcInfo Export
ARC-GENERATE: ArcInfo Generate
ARC-SHAPEFILE: ArcView Shapefile
DLG-OPT: USGS DLG Optional
DXF: AutoCAD Drawing eXchange
GRASS
GSMAP: USGS GSMAP Format
MIF: MapInfo Interchange
MOSS: Map Overlay and Statistical System
SVG: Scalable Vector Graphics
TYDAC: Tydac SPANS VEH/VEC
VRML: Virtual Reality Modeling Language

CAD Export Formats

ARC-SHAPEFILE: ArcView Shapefile
ATLAS GIS 3.0 AGF/AIF and BNA
DGN: MicroStation/Intergraph
DXF: AutoCAD Drawing eXchange
MIF: MapInfo Interchange
MOSS: Map Overlay and Statistical System

Database Export Formats

ASCII text
dBASE III/IV & FoxPro
INFO database
MIPS-EXTERNAL (DOS MIPS)
ODBC: Microsoft Open Database Connectivity
TNT-TEXT: TNTmips text file
TYDAC-ATTRIB: SPANS Attribute File

The TNTmips Import and Export procedures are also available in TNTedit™. This stand-alone editor allows you to access geodata in all import formats supported by TNTmips, modify the data using the powerful editing functions found in the TNTmips Spatial Data Editor, and export the object to any of the supported export formats.

Import / Export Icon Button

Advanced Software for Geospatial Analysis

MicroImages, Inc. publishes a complete line of professional software for advanced geospatial data visualization, analysis, and publishing. Contact us or visit our web site for detailed product information.

TNTmips TNTmips is a professional system for fully integrated GIS, image analysis, CAD, TIN, desktop cartography, and geospatial database management.

TNTedit TNTedit provides interactive tools to create, georeference, and edit vector, image, CAD, TIN, and relational database project materials in a wide variety of formats.

TNTview TNTview has the same powerful display features as TNTmips and is perfect for those who do not need the technical processing and preparation features of TNTmips.

TNTatlas TNTatlas lets you publish and distribute your spatial project materials on CD-ROM at low cost. TNTatlas CDs can be used on any popular computing platform.

TNTserver TNTserver lets you publish TNTatlases on the Internet or on your intranet. Navigate through geodata atlases with your web browser and the TNTclient Java applet.

TNTlite TNTlite is a free version of TNTmips for students and professionals with small projects. You can download TNTlite from MicroImages' web site, or you can order TNTlite on CD-ROM.

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