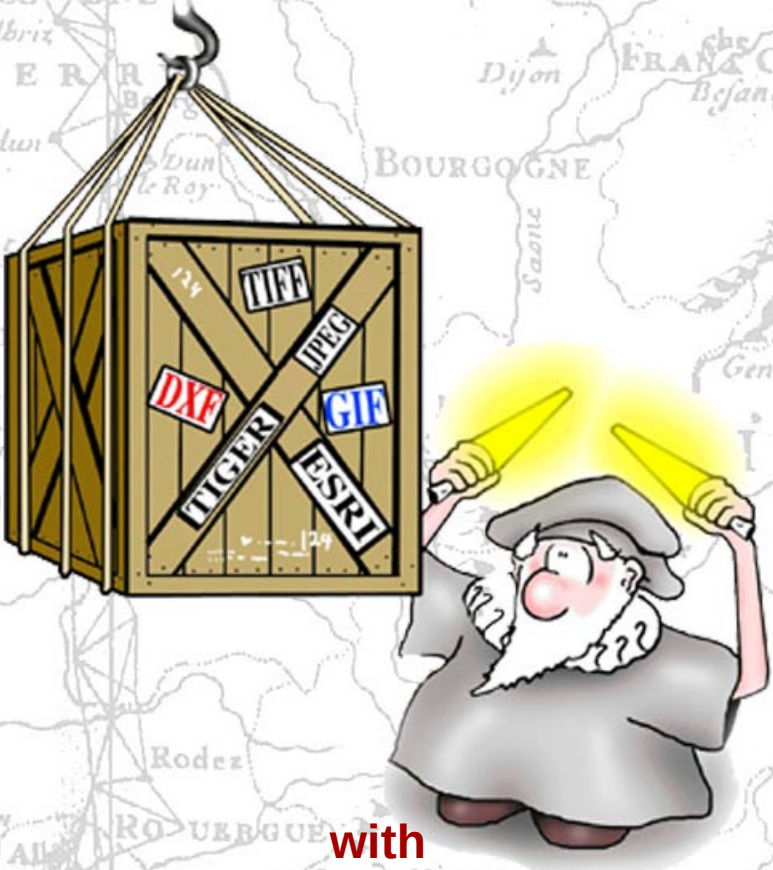
IMPORTING

Getting Started

Importing Geodata



with

TNTmips®

TNTedit™

TNTview®

Before Getting Started

This booklet introduces procedures for importing geospatial data for use with TNTmips®, TNTedit™, and TNTview®. The Import process allows you to import geospatial data from a wide array of file formats, including many common raster, vector, CAD, and database formats. Import of attached attribute data is supported for many of the vector and CAD file formats. This booklet leads you through a series of exercises to familiarize you with basic import procedures for raster, vector, CAD, and database files. A complete list of file formats that can be imported is 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 IMPORT data collection.

More Documentation This booklet is intended to be only an introduction to importing geodata. Consult the TNTmips reference manual, which contains more than 110 pages on the Import 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 hardware key), TNTmips operates in TNTlite mode, which limits the size of your objects and does not allow export.

The Import process is not available in TNTatlas. All the exercises can be completed in TNTlite using the sample geodata provided.

Randall B. Smith, Ph.D., 12 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 Importing Geodata

Geospatial data can come in several different forms. TNTmips allows you to work with raster, vector, CAD, and TIN data structures, and to store all of them as objects within a single Project File format. You can use the sample data distributed with TNTmips to explore various processes and object types. Once you are familiar with TNTmips, you will probably want to start working with geospatial data that you have obtained from other sources.

TNTmips supports the import of geospatial data from many different types of raster, vector, and CAD file formats. You can also use point location data stored in a text or database file to create a vector object. Database subobjects are created automatically for imported vector and CAD objects with attached attributes. You can also import database tables directly from several different types of database file formats or set up a link to the external database file.

The exercises in this booklet use a set of sample files to lead you through the import procedures that are specific to different external file formats. The geodata contained in these external sample files can also be found as objects in Project Files elsewhere in the sample data collections. The objects you import in these exercises can thus be placed in a temporary Project File which can be deleted once you have completed the exercises. For your convenience, each exercise provides you with the object name, Project File, and data collection name for the corresponding sample object. Although only a sampling of the supported import formats are covered in these exercises, the common procedures you learn here should enable you to follow the steps required to import other file formats.

You can use the standard Display process (Display / Spatial Data) to view any of the objects you import in these exercises or the corresponding objects in the sample data collections.

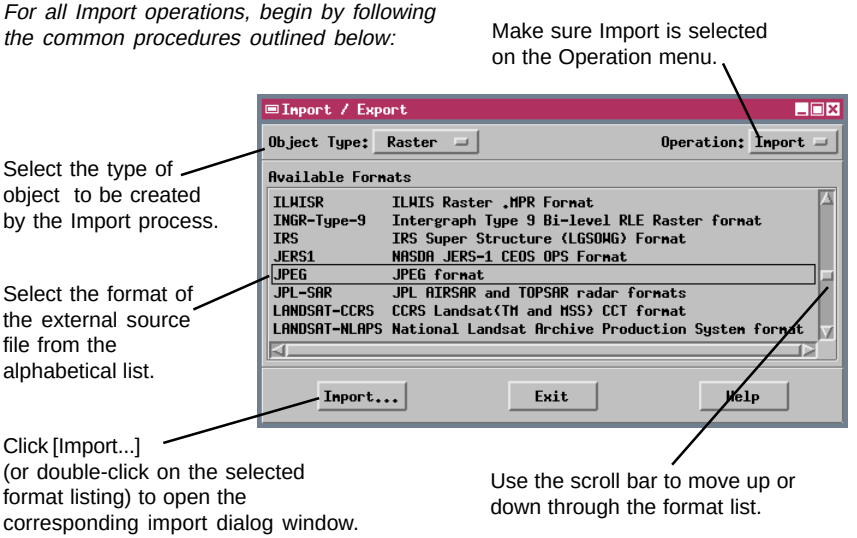
STEPS

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

Procedures common to all import operations are introduced on page 4. The exercises on pages 5-9 cover standard procedures for importing raster objects. Import of vector and CAD objects is introduced on pages 10-16, and database import is covered on pages 17-19. Procedures for sizing imported objects for TNTlite are summarized on pages 20-21. Page 22 discusses how you can incorporate metadata in your Project File for any imported object. A list of currently supported import formats can be found on Page 23.

Common Import Procedures

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



STEPS

- ☑ in the Import / Export window, select Raster from the Object Type option menu
- ☑ select JPEG from the scrolled file format list
- ☑ click [Import...]

The spatial object illustrations included with each exercise use display settings created for the object in the existing sample Project Files. Your newly-imported objects will not include these settings. For information on setting display parameters for raster objects, see *Getting Started: Getting Good Color*. For instructions on setting up display styles for vector and CAD objects, see *Getting Started: Creating and Using Styles*.

All import operations are launched from the Import / Export window. Use the Object Type option menu to select the type of object you want to import 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 import 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 some external file formats can be imported to more than one type of object.

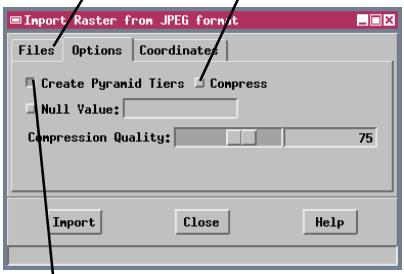
When you click the Import button, in most cases a Select File window automatically opens to enable you to select the file for import. An Import dialog window then appears, allowing you to set the desired import parameters. The layout of this window varies depending on the type of object you are importing and the specific format of the source file.

Import a Raster Object from JPEG

Let's begin by working through import procedures for several common raster file formats, starting with JPEG files. The JPEG File Interchange Format can store 8-bit grayscale or 24-bit color images and incorporates JPEG (Joint Photographic Experts Group) image compression. This is a lossy compression scheme that can achieve compression ratios of 20:1 without noticeable degradation in image quality. JPEG is a common interchange format for large, "true-color" raster images. Color JPEG images are imported into TNTmips as 24-bit color composite raster objects.

Click the Files tab to see the list of files selected for import.

Turn on the Compress toggle button to apply JPEG compression to the new raster object, then use the slider to set the desired compression quality (lower values result in greater compression and lower image quality).



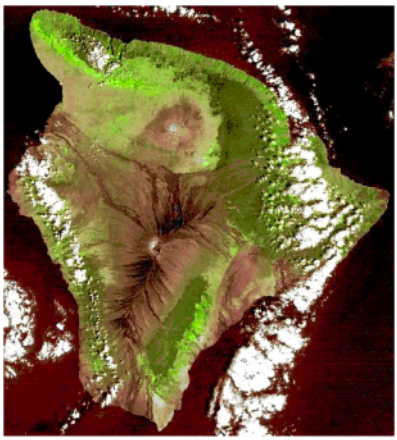
The Create Pyramid Tiers button is toggled on by default, ensuring that imported raster images are automatically pyramided.

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

STEPS

- ☑ use the Select Files window to select file HAWMSSCM.JPG from the IMPORT data collection
- ☑ click the Coordinates tab in the Import Raster window and make sure that None is selected on the Georeference option button
- ☑ click [Import] and use the standard Select Object window to create a new TEMP_IMP Project File and a new object for the imported raster
- ☑ when the import process is complete, click [OK] on the Process Status window and [Close] on the Import Raster window

The sample JPEG file is a Landsat image of the island of Hawaii acquired with the Multispectral Scanner (MSS). The ground resolution of the image has been reduced to 276 meters. The image is a color composite created using red and near infrared bands to simulate approximately "natural" colors. Vegetated areas appear in shades of green and areas of bare lava and ash in shades of brown. This color composite image can be found as object COMPOSITE in the HAW_MSS Project File in the HAWAII data collection, along with the full set of Landsat MSS bands.

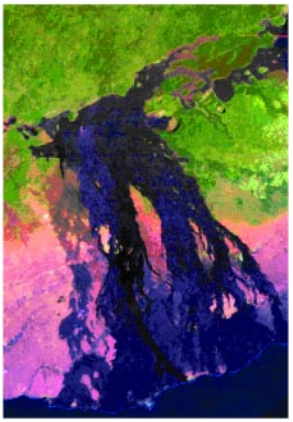


Import a Raster Object from TIFF

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.

STEPS

- ☑ select the TIFF format in the Import / Export window
- ☑ click [Import...]
- ☑ click the Files tab in the Import Raster window, then click [Select...]
- ☑ select file M_ULU_TM.TIF
- ☑ click the Options tab on the Import Raster window
- ☑ choose Single Composite from the Import As option menu
- ☑ click [Import] and direct the link object to the TEMP_IMP Project File

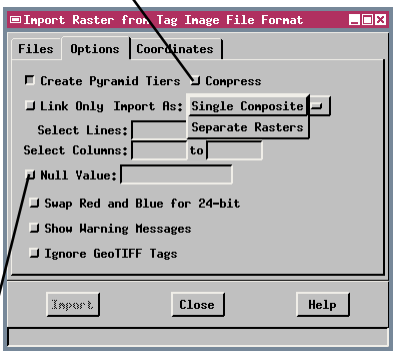


Keep the Import Raster window open for the next exercise

The TIFF format is one of the most diverse and widely supported raster file formats. TIFF (Tag Image File Format) files can store a binary or grayscale image, an 8-bit color image with a color map, or a 24-bit color image. TIFF images can also be compressed using either lossless or lossy compression.

When the TIFF file contains a 24-bit color image, the Import As menu choices allow you to import the file as either a single 24-bit color composite raster or as a set of separate 8-bit grayscale rasters (one for each RGB color component). Import the image as an RBG raster set if you wish to modify its contrast and color balance later.

When you turn on the Compress toggle button for file formats other than JPEG, a standard lossless compression is applied to the new raster object.



For any raster import you can designate a single raster value to be the null value (representing no image data). Enter the desired value in the text field and turn on the toggle button.

The sample TIFF file is a 24-bit color image of part of the East Rift Zone of Kilauea volcano on the island of Hawaii, derived from Landsat Thematic Mapper imagery. The dark blue to black areas are lava flows erupted since 1969. Forested areas appear green, and grassy areas appear in shades of orange, pink, and magenta. This image can be found as object COMPOSITE in the KIL_IMG Project File (MAUNAULU_TM folder) in the HAWAII data collection.

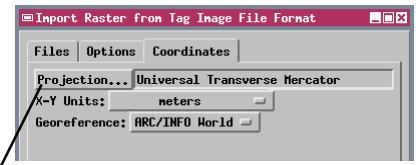
Import a Georeferenced TIFF Raster

TIFF image files may be georeferenced in several ways. Georeference information may be incorporateed within the file (GeoTIFF format) and/or be found in an accompanying file with the same name but different file extension. The import process reads GeoTIFF georeference information automatically (unless you turn on the Ignore GeoTIFF Tags toggle button). For information in accompanying files, you must use the Georeference menu on the Coordinates panel to select the file type: the available options are Arc/Info World (*.tfw) and MapInfo (*.tab).

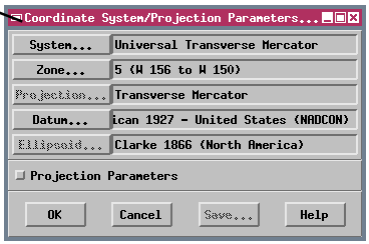
Arc/Info World files include coordinates and scale parameters but do not specify the coordinate system. You must set the Coordinate System / Projection Parameters for the image in order for the TIFF import process to use the information in the .tfw file to create a Georeference subobject for the imported raster. This information may be found in a metadata or descriptive text file (.txg file extension) accompanying the TIFF file.

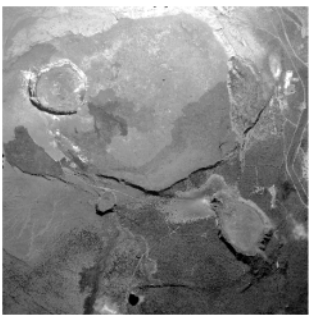
STEPS

- ☑ on the Files tabbed panel in the Import Raster window, click [Clear], then [Select...]
- ☑ select file KIL12A01.TIF
- ☑ on the Coordinates tabbed panel, select ARC/INFO World from the Georeference option button menu
- ☑ click [Projection...]
- ☑ in the Coordinate System / Projection Parameters window, click [System...] and select Universal Transverse Mercator
- ☑ click [Zone...] and choose 5 (W 156 to W 150)
- ☑ click [Datum...] and select North American 1927
- ☑ click [OK] to close the Coordinate System / Projection Parameters window
- ☑ click [Import] and direct the new raster object to the TEMP_IMP Project File
- ☑ close the Import Raster window



Click the Projection button to reveal the Coordinate System / Projection Parameters window so that you can set the relevant parameters.





This grayscale airphoto of Kilauea Crater can be found as object KIL12A01 in the KIL_IMG Project File in the HAWAII data collection.

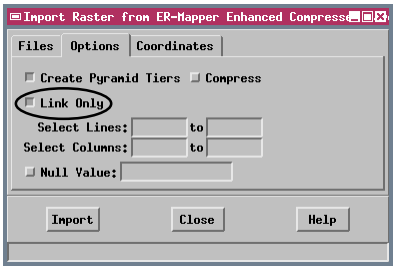
Link to ECW, JP2, MrSID, or TIFF

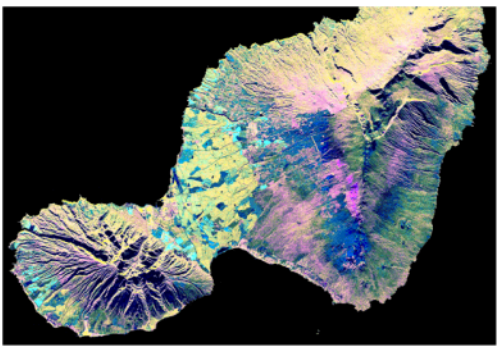
STEPS

- ☑ select the ECW format in the Import / Export window
- ☑ click [Import...]
- ☑ select file MAUISIRC.ECW
- ☑ note that the Link Only toggle button on the Options tabbed panel is turned on by default
- ☑ click [Import] and direct the link object to the TEMP_IMP Project File

For some file formats TNTmips offers you the option of **linking** to the external file rather than performing a full import of the data. This option is available for raster data in the ECW (Enhanced Compressed Wavelet), JP2 (JPEG 2000), MrSID (Multiresolution Seamless Image Database), and TIFF formats.

When you choose the link option the image is not copied into the destination Project File. Instead, a link object is created that contains the information needed to direct TNT processes to the external file. You can thus maintain one copy of the image for use with many application programs, including TNTmips. This is especially advantageous when you are working with large images, in which case storing duplicate versions would require a large amount of hard drive space.





The sample ECW file is a composite radar image of the island of Maui (in the Hawaiian Islands) acquired by the Spaceborne Imaging Radar-C (SIR-C) sensor from the Space Shuttle Endeavour on 16 April 1994. Light blue and yellow areas in the lowlands are sugar cane fields, rain forests appear in yellow, and grasslands are dark green, pink, and blue. This color composite image can be found as object SIRCCOMP in the MAUISIRC Project File in the HAWAII data collection.

NOTE: TNTmips will automatically link to raster files in the above formats in any process that uses the standard File/Object Selection window. Files in these formats appear in the window along with TNT Project Files, and you can navigate into the files and see their contained raster "objects". When you select any of these objects in any process, a link file with same name as the external file and the extension .rlk is automatically created in same directory. (If the external file is on read-only media, the link file is automatically placed in a special link-cache directory).

Import a Raster Object from Simple Array

Use the Simple Array option to import a raster image that is encoded as a generic stream of byte data. To import such a file, you must know the size of the image (in Lines and Columns) and the data type (8-bit unsigned, for example). You might find this information in an accompanying readme, label, or header file.

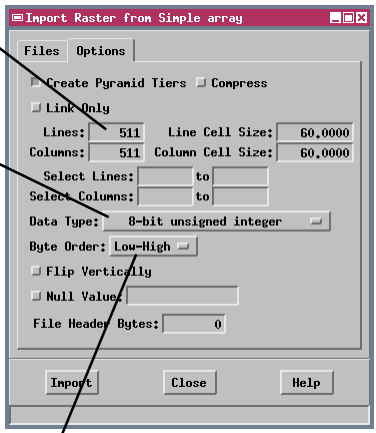
The sample file in Simple Array format is a shaded relief image produced from a digital elevation model (DEM) of Kilauea volcano on the island of Hawaii. The illumination is from the south. The relief shading highlights the large summit crater, subsidiary craters along the Southeast Rift Zone, and the steep escarpments marking fault zones near the coast.

STEPS

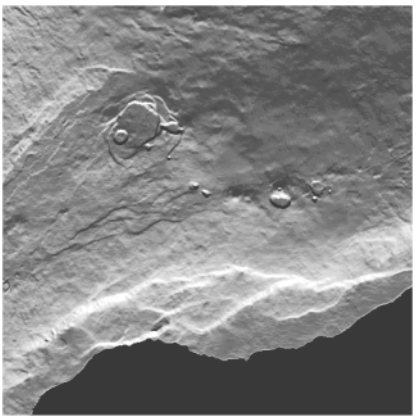
- ☑ select the SIMPLE ARRAY format in the Import / Export window
- ☑ click [Import...]
- ☑ select file KILSHADE.ARR
- ☑ enter 511 in the Lines and Columns text fields
- ☑ enter 60 in the Line Cell Size and Column Cell Size text fields
- ☑ select 8-bit unsigned integer from the Data type option menu
- ☑ click [Import] and direct the new raster object to the TEMP_IMP Project File
- ☑ close the Import Raster window

Set the dimensions of the image in Lines and Columns.

Set the Data type for the raster values.



The Byte Order setting applies if the file contains 16-bit values (each value consisting of two bytes). Some computer operating systems structure such data with the least significant byte first (Low-High), and others in the reverse order. The byte order should be included with the header information for the file.



This shaded relief image can be found as object SHADING in the KIL_DEM Project File in the HAWAII data collection.

Import a Vector Object from SDTS

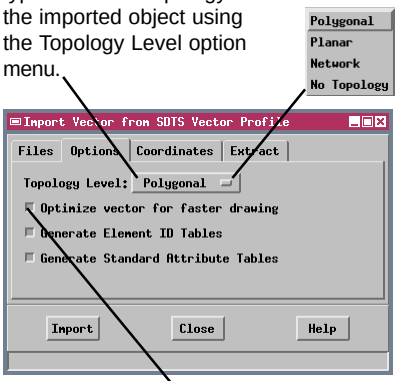
STEPS

- ☑ select Vector from the Object Type option menu in the Import / Export window
- ☑ select SDTS from the scrolled format list
- ☑ click [Import...]
- ☑ select file HP01AHDR.DDF from the SDTS directory
- ☑ click [Import] and direct the new vector object to the TEMP_IMP Project File
- ☑ close the Import Vector window

The Spatial Data Transfer Standard, or SDTS, is a format standard adopted by the United States government for the transfer of digital geographic information. The SDTS format includes geographic vector data with full topology, georeferencing, and attributes. SDTS vector data can include point, line, polygon, and composite features. Much of the Digital Line Graph (DLG) vector map data produced by the U.S. Geological Survey has been converted to SDTS format.

A vector dataset in SDTS format consists of a suite of files in a common directory. In the case of DLG data, a global set of Data Dictionary files must be obtained separately and copied into the data directory before import.

You can set the desired type of vector topology for the imported object using the Topology Level option menu.



The structure of a vector object can be optimized during import to speed up vector display. The optimization procedure uses spatial location to assign element numbers. Nearby elements are assigned similar numbers, speeding the search for the elements when only a portion of the object is in the view. This option is turned on by default.

The sample SDTS-DLG data set shows elevation contour lines and spot elevation points for an area on the island of Hawaii southeast of Kilauea Crater. It includes the area shown in the color TIFF image you imported in an earlier exercise.

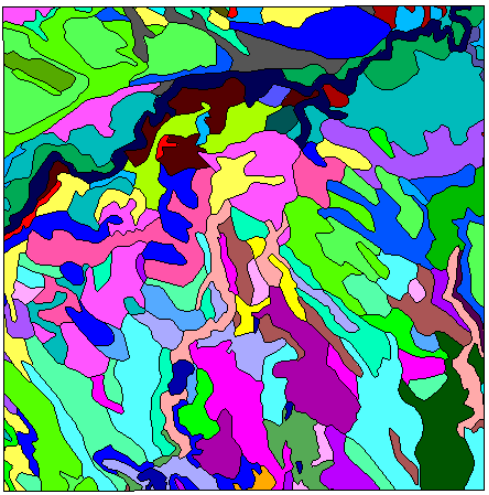
Enlargement of part of the elevation contour object. It can be found as object MAKADLG in the KIL_IMG Project File in the HAWAII data collection.

When you import data from formats with multiple files (such as SDTS, TIGER, and Arc Coverage), select only a single data file from the directory. All associated files in the directory will be read automatically by the import process. In the case of SDTS DLG data, be sure to select a data file rather than one of the Data Dictionary files.

Import a Vector Object from Arc Shapefile

Shapefiles produced in ArcView store map data in a nontopological form, like the file formats used by CAD programs. A single shapefile can include only one type of map element (point, line, or polygon). Attribute information is stored in a dBase file (.dbf) with the same name as the main shapefile (.shp). You can import a shapefile into TNTmips as either a vector object or a CAD object. The import process automatically creates a database subobject with a table linked to the external dBase file.

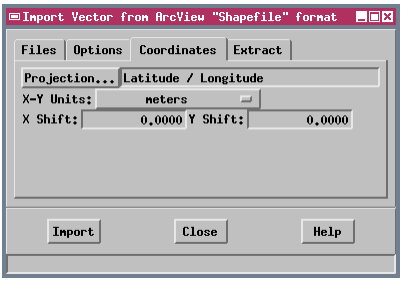
The sample shapefiles contain vector and attribute data for a soil map of part of the Crow Butte area in northwestern Nebraska. The polygons delineate areas with different types of soils, which are identified by a soil class code. The class code can be used to link individual soil polygons with records in other databases that contain additional attribute information for each soil type.



This vector soil map can be found as object CBSOILS_LITE in the CB_SOILS Project File in the CB_DATA data collection.

STEPS

- ☑ select the ARC-SHAPEFILE format in the Import / Export window
- ☑ click [Import...]
- ☑ select file CBSOILS.SHP
- ☑ accept the default selection Polygonal on the Topology Level option button on the Options panel



- ☑ in the Coordinate System / Projection Parameters window, set the System to Latitude / Longitude and the Datum to North American 1927, then click [OK]
- ☑ click [Import] and direct the new vector object to the TEMP_IMP Project File
- ☑ close the Import Vector window

ArcView originally supported only Latitude / Longitude (Geographic) map coordinates, so the Shapefile format has no provision for specifying a coordinate system. But Shapefiles are used to distribute geographic data in a variety of coordinate systems. Consult the metatdata that accompanies a shapefile to determine its coordinate system, then use the Coordinates panel to make the appropriate settings.

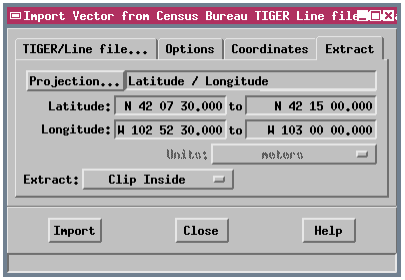
Import a Vector Object from TIGER

STEPS

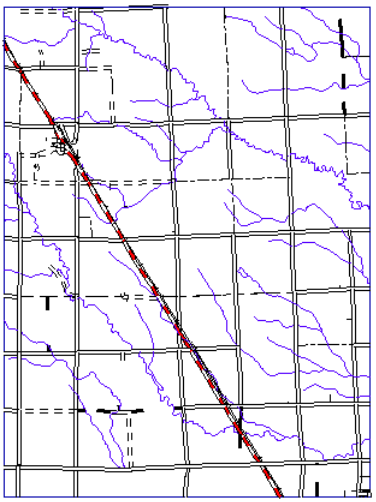
- ☑ select the TIGER format in the Import / Export window
- ☑ click [Import...]
- ☑ select file TGR31013.BW1 from the TIGER directory
- ☑ accept the default selection Polygonal on the Topology Level option button on the Options panel
- ☑ click on the Extract tab
- ☑ click [Projection...], accept the default Latitude / Longitude system, select North American 1927 for the datum, and click [OK]
- ☑ in the Latitude text fields, enter N 42 07 30 (to) N 42 15 00
- ☑ in the Longitude text fields, enter W 102 52 30 (to) W 103 00 00
- ☑ choose Clip Inside from the Region option menu
- ☑ click [Import] and direct the new vector object to the TEMP_IMP Project File
- ☑ close the Import Vector window

TIGER/Line files contain geographic data from the U.S. Census Bureau's TIGER (Topologically Integrated Geographic Encoding and Referencing) database. TIGER files contain line segments that represent natural and man-made physical features such as streams and roads, along with census and governmental boundaries, all integrated into a single topological network. Associated attribute data provide direct links to other 1990 Census data products. TIGER/Line files have been prepared for each county, creating seamless coverage of the entire United States.

Most TIGER/Line files contain too many lines to be usable in TNTlite in their entirety. Use the controls on the Extract panel to specify the extents of a smaller area that will be extracted from the full county during import. If this area still contains too many lines, TNTlite directs you to select a smaller area.



The Clip Inside selection option extracts only the parts of lines within the boundary of the specified area. The other options extract entire lines that are either Partially Inside or Completely Inside the selection area.



This TIGER data can be found as object TIGERBEREA in the BERVECT Project File in the BEREA data collection.

Import Vector Object from Arc E00

TNTmips can import vector and attribute data from several file formats produced by ArcInfo, including the "Export" format (e00). The import process gives you the option to attach any included Line attributes and Point/Polygon attributes to their respective vector elements. The default "Element Number" attachment option should work in most cases; if not, try the "Element ID" option.

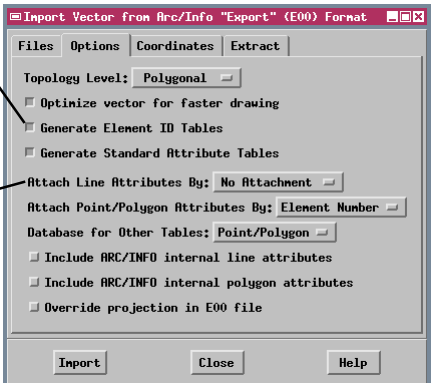
The sample e00 file is an index map of 1-degree quadrangle outlines for the western United States. The polygon attributes include a code number (made up of the latitude and longitude of the southeast corner) used to reference the location of USGS topographic quadrangle maps. The map coordinates are in meters, referenced to the Mercator Projection, with a central meridian at 96 degrees west longitude.

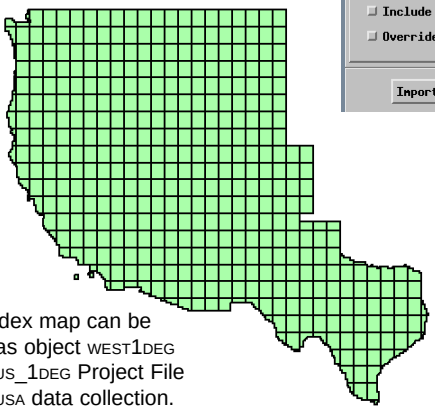
STEPS

- ☑ select the ARC-E00 format in the Import / Export window
- ☑ click [Import...]
- ☑ select file WEST1DEG.E00
- ☑ on the Options tabbed panel, select No Attachment from the Attach Line Attributes By option button menu
- ☑ on the Coordinates panel, click the Projection button
- ☑ in the Coordinate System / Projection Parameters window, click [System] and select User Defined
- ☑ click [Projection] and select Mercator, then click [Datum] and select North American 1927

You can choose whether or not to have Element ID tables and Standard Attribute Tables created during import by using the corresponding toggle buttons. Turning these options off can speed up the import for large files.

This example includes no line attribute data, so set Line attachment to No Attachment; leave Polygon attachment set to Element Number.





This index map can be found as object WEST1DEG in the US_1DEG Project File in the USA data collection.

- ☑ enter W 96 00 00 in the Central Meridian text box, and click [OK] to close the Coordinate System / Projection Parameters window
- ☑ click [Import] and direct the new vector object to the TEMP_IMP Project File
- ☑ close the Import Vector window

Import Vector Points from TEXT

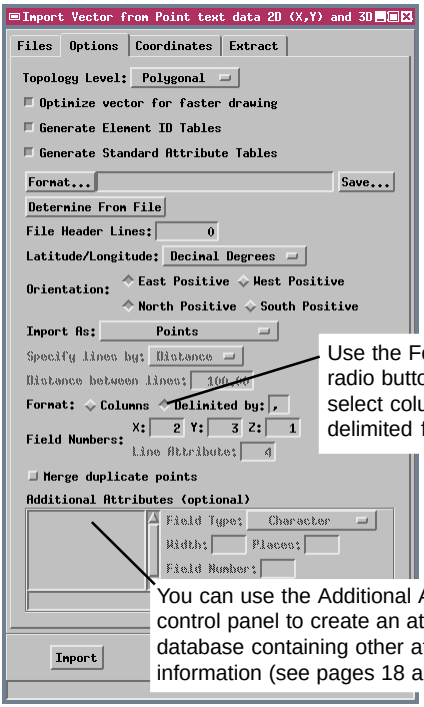
STEPS

- ☑ select the TEXT format in the Import / Export window and click [Import...]
- ☑ select file ELEVPTS.TXT
- ☑ on the Coordinates tabbed panel, select 3D from the Coordinates option menu
- ☑ click [Projection...]
- ☑ in the Coordinate System / Map Projection window, click [System...] and select Universal Transverse Mercator
- ☑ click [Zone...] and select Zone 13
- ☑ click [Datum...] and select North American 1927
- ☑ click [OK] to close the Coordinate System / Map Projection window
- ☑ in the Field Numbers text fields on the Options panel, enter 2 for X, 3 for Y, and 1 for Z
- ☑ click [Import] and direct the new vector object to the TEMP_IMP Project File
- ☑ close the Import Vector window

You can use the Import process to create a vector point object from sets of 2D or 3D coordinate values in a text or database file. The coordinate values in a text file can be aligned in columns or separated by a delimiter character (the default is comma-delimited). You must specify the coordinate system and map projection for the object and identify the text field that contains each of the coordinate values (X, Y, and Z). In this example, Field 1 contains the elevation value (Z), Field 2 the X value, and Field 3 the Y value.

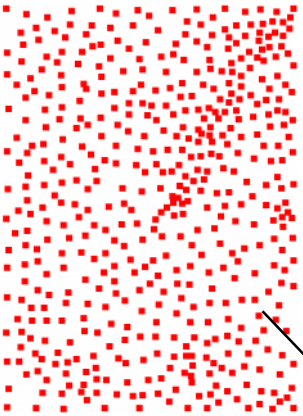
```
Z ,       X ,          Y
2408,517464.88,1410819.55
763,538770.73,1440642.98
98,517406.05,1440642.43
1475,538769.55,1410760.09
```

Sample of input text file with comma-delimited coordinate values.



Use the Format radio buttons to select columnar or delimited format.

You can use the Additional Attributes control panel to create an attached database containing other attribute information (see pages 18 and 19).



This vector point object can be found as object ELEV_PTS in the SURFACE Project File in the SURFMODL data collection.

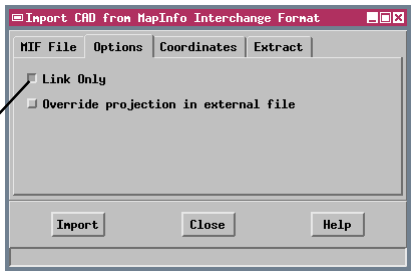
Link to a MapInfo MIF file

TNTmips gives you several options for importing files in the MapInfo Interchange Format (MIF). These ASCII files store coordinate lists for polygon, line, and point elements, as well as information about the map projection and the database table structure. Only one database table can be specified in the file. Attribute data for individual elements are stored in an accompanying ASCII file (with .MID file extension).

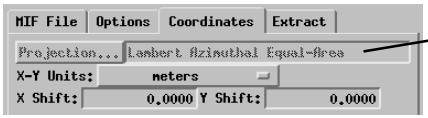
You can import an MIF file using either the Import Vector option (producing a vector object) or the Import CAD option. The latter option gives you a choice of full CAD import or linking to the external MIF file. If the map data contained in the MIF file is geometrically complex, you should import it as a vector object to take advantage of the topological structure provided by vector objects.

STEPS

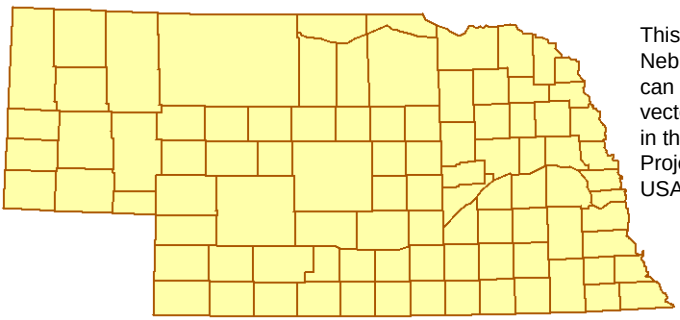
- ☑ select CAD from the Object Type option menu in the Import / Export window
- ☑ select MIF from the scrolled format list
- ☑ click [Import...]
- ☑ select file NEBRASKA.MIF
- ☑ press in the Link Only toggle button on the Options panel
- ☑ click [Import] and direct the link object to the TEMP_IMP Project File
- ☑ close the Import CAD window



Turn on the Link Only toggle button to set up a link to the external MapInfo file.
Turn off the toggle button to import the file as a CAD object.



The map projection is read automatically from the input MIF file.



This map of Nebraska counties can be found as vector object COUNTIES in the NEBRASKA Project File in the USA data collection.

NOTE: TNTmips can auto-link directly to MapInfo TAB files and ArcView shapefiles as described for raster formats on page 8. These linked objects are treated and styled as CAD objects.

Import a CAD Object from DXF

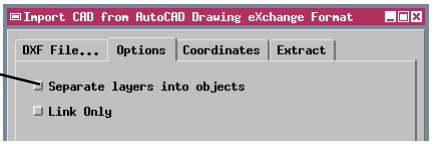
STEPS

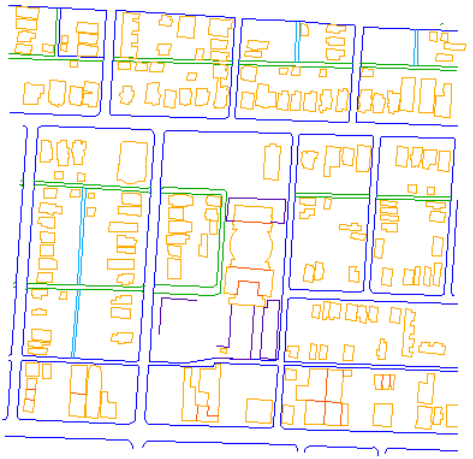
- ☑ select the DXF format in the Import / Export window
- ☑ click [Import...] on the Import CAD window
- ☑ select file FOOTPRNT.DXF
- ☑ on the Coordinates panel, click [Projection]
- ☑ in the Coordinate System / Projection Parameters window, set the System to Universal Transverse Mercator, the Zone to Zone 17, and the Datum to North American 1927
- ☑ click [Import] and direct the new CAD object to the TEMP_IMP Project File
- ☑ close the Import CAD window

The AutoCAD DXF (Drawing eXchange File) format has become one of the standard means of exchanging drawing data between CAD programs. DXF files are ASCII files containing coded text information needed to draw 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. Unlike vector files, the elements in a CAD file (or CAD object) can overlap each other yet remain as distinct elements. Foreground-background relationships of overlapping elements are also stored in the file.

The sample DXF file shows a neighborhood surrounding the Blackburn Recreation Center in Olde Towne, Columbus, Ohio. The drawing contains lines that depict street curbs and polygons that represent building and house footprints.

Elements in a DXF file can be organized into different drawing layers. Each layer might typically hold elements representing a specific type or types of feature. You can choose to create a separate CAD object from each drawing layer in the DXF file during import. If you choose not to separate layers, you can still use the imported DXF Layer table to set up display styles by attribute for elements in the different DXF layers.





This drawing of the Blackburn neighborhood can be found as CAD object FOOTPRINT in the BLACKBRN Project File in the BLACKBRN data collection. Other objects in this Project File include a parcel map, a street map, an airphoto, and a database containing crime reports.

Import a Database from dBASE

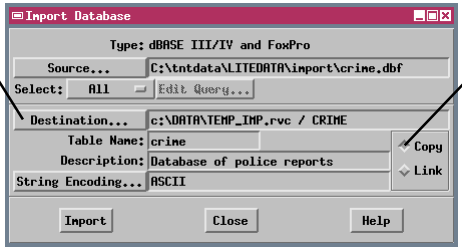
When you have attribute information in dBASE III/IV format that you want to use in TNTmips, you can either import the database information directly into a Project File or set up a link to the external dBASE file. In either case, the database can exist as a main-level object in the Project File or as a subobject of a parent spatial object.

If the database contains fields with spatial coordinates, the attribute information can be displayed directly using the Database Pin-Map option in the Display process. The sample dBASE file is a database of police reports for crime in the Blackburn area. The Pin-Map display below shows the crime locations as red squares, with the FOOTPRINT CAD object from the previous exercise shown in the background for reference.

STEPS

- ☑ select Database from the Object Type option menu in the Import / Export window
- ☑ select the dBASE format and click [Import...]
- ☑ click [Source...] on the Import Database window
- ☑ select file CRIME.DBF
- ☑ click [Destination...] and name an output database object CRIME in the TEMP_IMP Project File
- ☑ in the Description text field, enter “Database of police reports”
- ☑ click [Import]
- ☑ close the Import Database window

Use the Destination button to name the database object or subobject before import.



Choose Copy to do a full import of the database information or Link to set up a link to the dBASE file.

This database can be found as object CRIME in the BLACKBRN Project File.

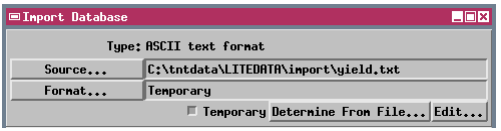
You can also import database files in dBASE and several other formats from the Database Editor (using the File / Import menu path). Consult the booklet *Getting Started: Managing Relational Databases* for more information.

Import a Database from ASCII

STEPS

- ☑ select the ASCII format and click [Import...]
- ☑ click [Source...] on the Import Database window
- ☑ select file YIELD.TXT
- ☑ with the Temporary toggle button turned on, click [Determine from File...]; a Text File Format window then opens with a preliminary list of Field names and associated settings

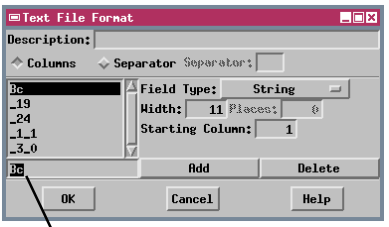
You can also import attribute information from an ASCII text file. The attribute information for each record must be on a separate line in the text file. The fields can be aligned in columns, as in the sample file for this exercise, or they can be delimited by a separator character (the default is a comma). In this exercise you import projected crop yield values for the different soil types in the Crow Butte area. The records in the sample input file include the soil type symbol and yield values for wheat, oats, and dry-farmed and irrigated alfalfa (hay). The first few lines of the sample input file look like this:



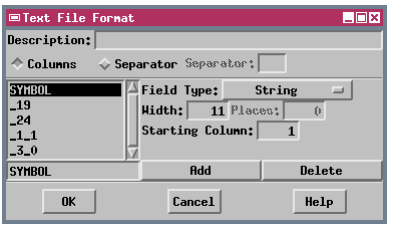

```
Bc   19   24   1.1   3.0
Bd    0    0   1.5   2.8
Bf    0    0   0.0   0.0
Bg   39   46   2.2   5.5
```

- ☑ highlight the default name of the first field (Bc) in the text field below the scrolled list and type SYMBOL; note the other settings in the panel to the right

In order to correctly structure the new database table, the Import process needs information about the format and content of the text file. Each field requires a Field Name and a Field Type setting (String for a nonnumeric field, Integer for whole-number values, or Floating-point for decimal values). For a file in columnar format the width and starting column of each field are also required. You can set most of these specifications automatically by clicking the Determine from File button. The selected file is scanned and the preliminary settings are shown in the Text File Format window.



The Field Name text field allows you to edit the name of the field currently selected from the scrolled list. The field entry in the first line of the text file is selected as the default Field Name.



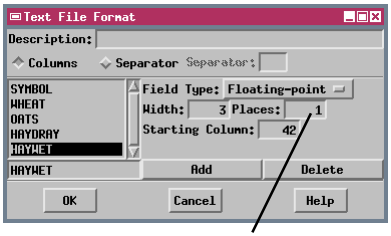
- ☑ rename the remaining fields WHEAT, OATS, HAYDRY, and HAYWET

Keep the Text File Format window open and continue to the next page.

Import a Database from ASCII

When you have renamed all five fields as instructed on the previous page, you should have fields with the characteristics shown in the list to the right. You can then proceed to specify the destination for the new database table.

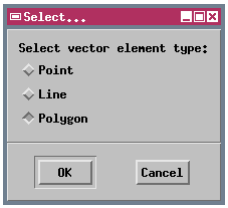
Field Name	Field Type	Places
SYMBOL	String	
WHEAT	Integer	
OATS	Integer	
HAYDRY	Floating-point	1
HAYWET	Floating-point	1



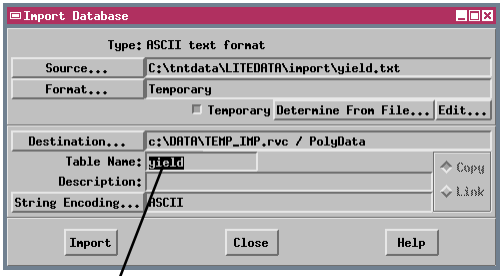
The Places text field specifies the number of decimal places for a floating-point field.

STEPS (continued)

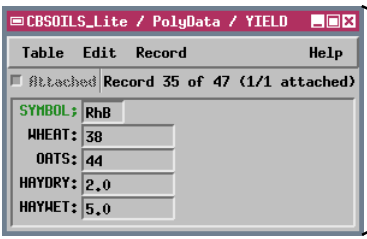
- ☑ click [OK] in the Text File Format window
- ☑ click [Destination...]
- ☑ select the CBSOILS vector object that you imported to the TEMP_IMP Project File on page 11
- ☑ in the Select window, press in the Polygon toggle button, then click [OK]

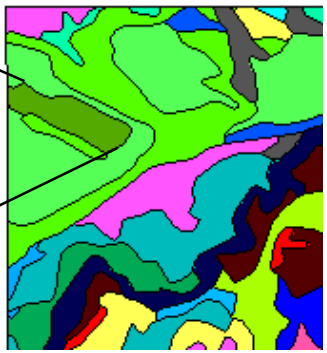


- ☑ click [Import]
- ☑ close the Import Database window



The name of the source text file is automatically used to name the table. You can enter a different name in the Table Name field if you wish, and add a description in the Description text field.





This table can be found as the polygon database table YIELD attached to the CBSOILS_LITE object in the CBSOILS Project File.

Meeting TNTlite Object Size Limits

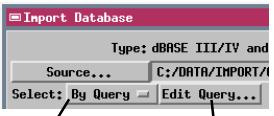
The limits discussed here do not apply to the professional version of TNTmips. However, professional users can still use the techniques described to import specific portions of large geodata files.

Carefully selected limitations have been placed on the size of objects in the free TNTlite version of TNTmips. If you are using TNTlite and attempt to import an object that exceeds these limits, an error message informs you that the object is too large for TNTlite. Most TNT import processes allow you to designate a portion of the spatial object to import. (You have used several of these procedures in the previous exercises.)

Raster Objects in TNTlite cannot exceed 314,368 cells (614 x 512), with a maximum dimension of 1024 cells. You may find the dimensions of the raster file you wish to import in an accompanying metadata or header file. Most of the raster import dialog windows allow you to select a range of lines and columns from the input raster. You can use these settings to insure that the size of the object you are importing fits within the TNTlite raster size limitations. For common raster file formats such as TIFF, GIF, JPEG, and BMP, you can use readily-available shareware utilities to preview a raster before import, and either crop it to the required size or determine a range of lines and columns to select during import.

Specify a range of lines and columns to extract from a large raster during import.

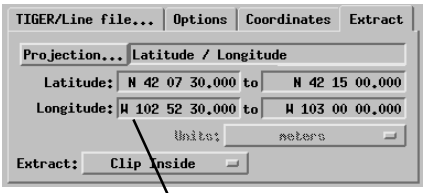
Database Objects containing attribute information can be imported along with a spatial object or independently. A database object contains attribute data for one type of object element (vector polygons, for example), but can contain more than one database table. TNTlite places no limit on the number of tables in a database object, but a single table can contain no more than 1500 records. For a standalone database table, the Import Database process allows you to select records for import By Query. If the external table contains more than 1500 records, you will need to construct a query that selects a smaller subset for import.



Choose the By Query selection option, and press the Edit Query button to create a query to select specific records for import.

Meeting TNTlite Object Size Limits

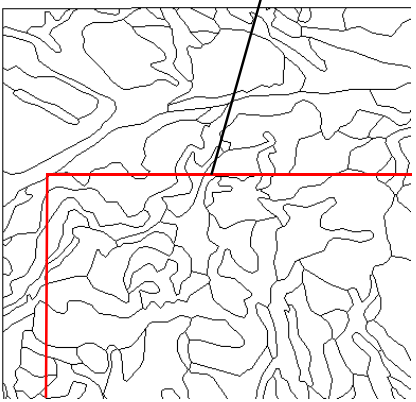
Vector and CAD Objects are limited in the number of elements they can contain in TNTlite. The maximum counts for different elements in a single vector object are: 500 polygons, 1500 lines, 1500 isolated points, and 1500 labels; there is no limit on the number of nodes. The limits for CAD objects are 500 drawing elements (lines or geometric shapes) and 5 blocks.



Specify the extents of a selection area to extract elements from a vector or CAD file.

The Import Vector and Import CAD windows include an Area Selection panel that you can use to specify the extents of a rectangular selection area (in map coordinates for a georeferenced object). The default coordinate system is Latitude / Longitude, but you can use the Projection button to choose an alternate map projection and coordinate system. The Area Element Selection option menu allows you to specify how the selection area is applied. You can choose entire elements that are either Completely Inside or Partially Inside the selection area, or use the Clip Inside option to trim enclosed elements at the boundary of the selection area.

The Clip Inside option used with this selection area boundary will segment several now-continuous lines and polygons.



The selection and possible segmentation of elements caused by the Area Selection procedure create new topological relationships for the extracted elements. TNTlite must compute the new topology during the import procedure before it can determine whether the imported object falls within the TNTlite limits for the specific object type. If it does not, you will need to try again with a smaller selection area.

When you import a vector or CAD object with an associated database using the Area Selection option, only the records attached to the selected elements are copied. This should ensure that a table created to accompany a Lite-sized vector or CAD object will not exceed the TNTlite record limit for a database table.

Incorporating Metadata

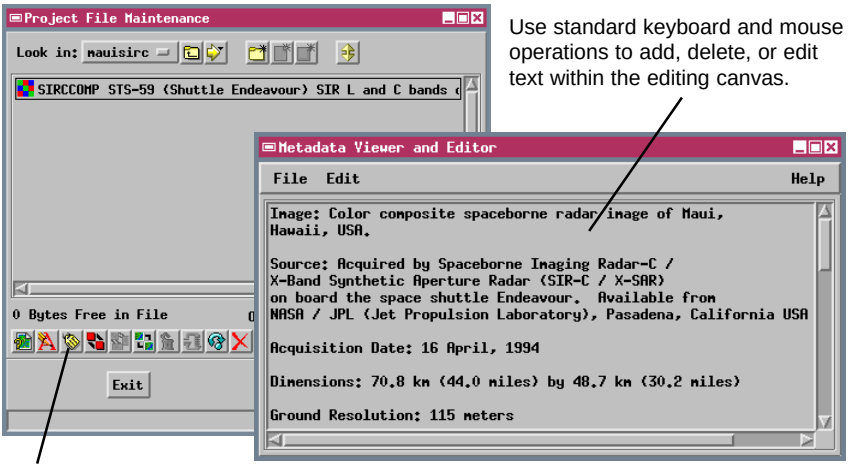
As the use of geospatial data has spread, the concept of **metadata** has become important. Simply put, metadata is "data about data". Metadata is text that describes the content, source, accuracy, georeference control, and other characteristics of digital geographic data and associated attribute data.

STEPS

- ☑ select Support / Maintenance / Project File from the TNTmips main menu
- ☑ select object SIRCCOMP from the MAUISIRC Project File in the HAWAII data collection
- ☑ click the Metadata icon  button
- ☑ after examining the metadata, select File / Close in the Metadata Editor window

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.

In TNTmips, metadata is contained in a special text subobject stored with a raster, vector, CAD, TIN, or database object. A metadata subobject should include any information that would help potential users of the geospatial data to determine whether it is appropriate for their needs, and how best to use it. For example, you can document the source, accuracy, georeference control, and any transformations applied to the geosopatial data. You can use the Metadata Viewer and Editor to create your own metadata text or to copy an internal RVC text object or external text file into a metadata subobject. You access the Metadata Viewer and Editor from the Project File Maintenance window or from the standard Select Objects window in any TNTmips process.



Use standard keyboard and mouse operations to add, delete, or edit text within the editing canvas.

Click the Metadata icon button to open the metadata subobject for the selected object.

Supported Import Formats

Raster Import Formats

ADRG: DMA ARC Digitized Raster Graphics
ADRI: NIMA ARC Digitized Raster Imagery
AG LEADER Target
AISA Hyperspectral
ALDEN Radar
ARC-ASCII, BIL/BIP, E00, GRID: ArcInfo formats
ASCII, ASCII-XYZ: Text, 3 coordinate text
ASTER-HDF: EOS ASTER in HDF
AVHRR-BIWEEK: U.S. Bi-Weekly Composite
AVIRIS Hyperspectral
BMP: Microsoft Windows Bitmap
CADRG: NIMA Compressed ADRG
CCRS: Canadian Centre for Remote Sensing
CDED: Canadian Digital Elevation Data
CIB: NIMA Controlled Image Base
CLEMENTINE Spacecraft Data
COQ: USGS Compressed Ortho Quad
CTG: LULC Composite Theme Grid
DEM: USGS Digital Elevation Model
DEM GTOPO30: GTOPO30 Global DEM
DISIMP
DOQ: USGS Digital Orthophoto Quad
DTED: Digital Terrain Elevation Data
ECW: ER Mapper Enhanced Compressed Wavelet
ENVI Hyperspectral
EPPL7
ER-MAPPER
ERDAS GIS/LAN and IMAGINE
ERS-SAR: ERS-1 and ERS-2 Synthetic Aperture Radar
GAC/LAC: AVHRR Global Area Cov.
GEOSOFT-GRD and GXF
GEOTIFF
GGR: Generic Georeferenced Raster
GIF: Graphics Interchange Format
GRASS
HDF4-Generic: Hierarchical Data Format Version 4 Generic
I2SPS: IIS Photo Science
IDIMS IDIPS
IDRISI, IDRISI 32
ILWISR: ILWIS Raster MPR
INGR-Type-9: Intergraph Type 9 Bi-level RLE
IRS Super Structure (LGSOWG)
JERS1: NASDA JERS-1 CEOS radar
JP2: JPEG-2000 JP2
JPEG
JPL-SAR: JPL AIRSAR and TOPSAR radar
LANDSAT-CCRS: (Can. Centre Rem. Sens.)
LANDSAT-NLAPS
LANDSAT7-HDF: LANDSAT7 ETM in HDF
LASER-SCAN
LVT film recorder
MACPAINT: Macintosh MacPaint
MICROBRIAN
MODIS-HDF: EOS MODIS in HDF
MRLC: Multi-Resolution Land Characteristics
MRSID: Multiresolution Seamless Image Database
NEXRAD Radar
NITF, NITF2.1: NIMA National Imagery Transfer
NTF-DTM: UK National Transfer Format 2.0
PCI: PCI Image Format
PCX
PHOTO-CD: Kodak Photo CD Format
PNG: Portable Network Graphics
RADARSAT: Radarsat CEOS Radar Formats
RESOURCE21
SCAN-CAD IMG and RLC
SDTS DEM
SIMPLE ARRAY
SPANS
SPOT IMAGE and SPOTVIEW
SUNRAST: Sun Raster Format
SURFER: Surfer ASCII, 6, 7 GRD
TERRA-MAR: Terra-Mar .IMG and .BIG
TGA: Truevision TGA
TIFF: Tag Image File Format
TM FAST: Eosat Landsat TM Fast
TM FAST-L7A: NASA Landsat 7A Fast
TM TIPS: Eosat Landsat TM TIPS
USER DEFINED

Vector Import Formats

ARC-COVERAGE, E00, and GENERATE
ARC-SHAPEFILE: ArcView Shapefile
ATLAS-GIS 3.0 AGF/AIF and BNA
DATABASE: Database table records
DCW: Digital Chart of the World
DLG-OPT: USGS Digital Line Graph Optional
DMDF: Digital Map Data Format
DXF: AutoCAD Drawing eXchange
GEOSOFT-XYZ
GRASS
GSMAP: USGS GSMAP Format
MAPINFO Internal, MIF, and MMI
MOSS: Map Overlay & Statistical System
NTAD: National Transportation Atlas Database
NTF-VECT: UK National Transfer Format 2.0
POLAR: Polar coordinate
SDF: Spatial Data Framework (Japan)
SDTS: Spatial Data Transfer Standard
TEXT: 2D (X,Y) and 3D (X,Y,Z) point
TIGER: Census Bureau TIGER/Line
TYDAC: Tydac SPANS VEH/VEC
VPF: Vector Product Format

CAD Import Formats

ARC-SHAPEFILE: ArcView Shapefile
ATLAS-GIS 3.0 AGF/AIF and BNA
CGM: Computer Graphics Metafile
DGN: MicroStation/Intergraph DGN
DMDF: Digital Map Data Format
DXF: AutoCAD Drawing eXchange
GSMAP: USGS GSMAP Format
MAPINFO Internal, MIF, and MMI
MOSS: Map Overlay & Statistical System
SDTS: Spatial Data Transfer Standard
SIF: Standard Interchange Format

Database Import Formats

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

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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