



# Importing Geodata



with  
**TNTmips<sup>®</sup>**  
**TNTedit<sup>™</sup>**  
**TNTview<sup>®</sup>**

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## 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, shape, 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 the tutorial booklets *Displaying Geospatial Data* and *Navigating*. Those exercises introduce essential skills and basic techniques that are not covered again here. Please consult those booklets 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. Details of the processes described here can be found in a variety of tutorial booklets, color plates, and Quick Guides, which are all available from MicroImages' web site.

**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 preparation of linked atlases.

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., 3 November 2006*  
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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 tutorial booklets on other topics. You can download an installation guide, sample data, and the latest version of TNTlite.

<http://www.microimages.com>

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# Welcome to Importing Geodata

The Import process in the TNT products allows you to import geospatial data from many different types of raster, vector, CAD, shape, and text file formats. When you import geospatial data with attached attributes, the process automatically creates and populates database subobjects for the imported objects. You can also import database tables directly from several different types of database format.

The Import process also gives you the option to establish a link to externally-maintained database information and to external spatial data in selected formats. Linking allows you to work with the spatial and/or attribute data in the TNT products while maintaining it in its original format for use in other products. For certain spatial data formats you don't even need to use the Import process to set up the link; you can simply select the file in any TNT process and use it directly.

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. 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. Linking and direct use procedures are also discussed.

The geodata contained in the 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 that 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. You can use the standard Display process in TNTmips (Main / Display) to view any of the objects you import in these exercises.



## STEPS

- launch TNTmips
- select Main / Import from the TNTmips menu



Procedures common to all import operations are introduced on pages 4-5. Page 6 discusses direct use, linking, and import. The exercises on pages 7-11 cover standard procedures for importing raster objects in various formats. Import of CAD and vector objects is introduced on pages 12-16, 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.

# Choosing the Format First

**STEPS**

- ☑ press the Vector filter button in the Import window
- ☑ click on the MIF entry in the format list to select it
- ☑ press the Select Files button in the Import window
- ☑ use the Select Files window to select NECOUNTY.MIF from the IMPORT data collection and press [OK]
- ☑ click [Next]
- ☑ in the Import Parameters window, note the Object Type menu is set to Vector

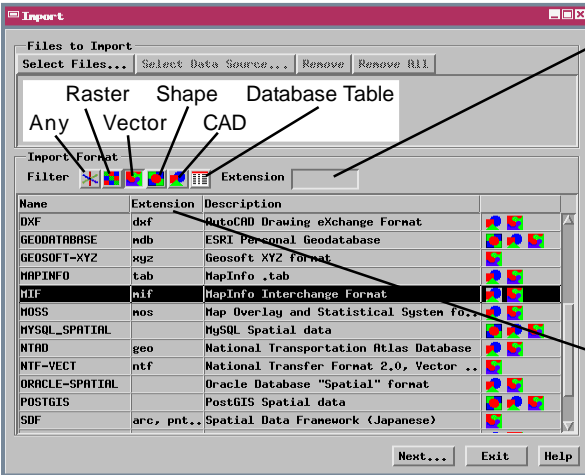


When the Import window initially opens, it presents a scrolled list of all file formats that can be imported. You can either choose the file to import first or choose the format first. The first two exercises familiarize you with these two alternative workflows.

When you are going to select the format first, as in this exercise, it is best to first use the Import Format Filter buttons to specify the object type (raster, vector, shape, CAD, or database) to which you want to import the external file. This approach has several benefits. First, the filter prunes the list of available formats to those consistent with your choice of object type, so scrolling down to find the desired format in the list is faster. Second, some file formats can be imported to different TNT object types; in this example, MIF data can be imported to either a vector or CAD object. Pressing a filter button automatically sets the desired object type in the subsequent Import Parameters window.

- ☑ press [Cancel] in the Import Parameters window
- ☑ press [Remove All] on the Import window to clear the file list for the next exercise

Once you have selected a format, only files matching that format are shown in the Select Files window that opens when you press the Select Files button (or Next button with no file currently selected).



You can also choose a format by typing its three-letter file extension in the field provided. Each letter you type prunes the format list to those whose extensions begin with the entered letters.

Click on any field heading (such as Extension) to sort the format list alphabetically by that field. (The list is initially sorted by format name.)

## Choosing the File First

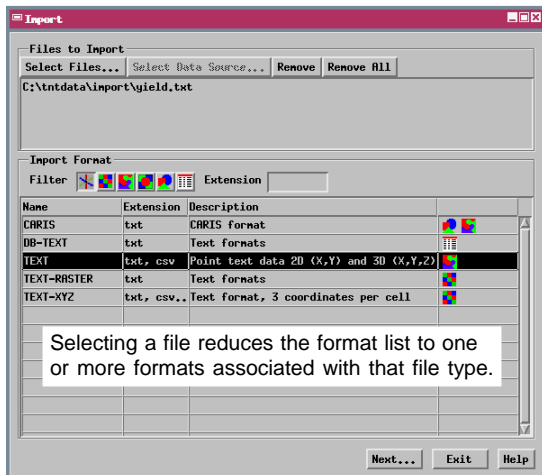
Pressing the Remove All button on the Import window clears the input file list and resets the object type filter to Any, but retains your previous format selection. With the Any entry in the format list selected and the Any filter button turned on (the default state when the Import window opens), you can use the Select Files button to select a file in any format. This option is particularly useful when you are working with data that you are not familiar with. You can select multiple files for import as long as they are the same file type. Once you have selected the file or files, the format list is reduced to show only the formats that are associated with that file type. If the resulting list shows only a single format, you can immediately press the Next button to open the Import Parameters window for that format.

In some cases the extension of the file you have selected may be associated with several different formats, some of which may even be different data types. In the example in this exercise, a text file with the TXT file extension is associated with five different formats. As a group, these formats can import to CAD, vector, or raster objects or can contain database information. In such cases you must choose the desired format from the pruned list before pressing the Next button. Also, when you choose the file first for a format that can import to different object types, (such as the MIF file in the previous exercise), remember to set the desired object type on the Import Parameters window.

### STEPS

- scroll up to the top of the format list and click on the Any format entry
- press the Select Files button
- use the Select Files window to select YIELD.TXT from the IMPORT data collection and press [OK]
- click on the TEXT entry in the format list
- click [Next]
- press [Cancel] in the Import Parameters window
- press [Remove All] on the Import window to clear the file list for the next exercise

When you are importing a series of files in different formats, as we will in this tutorial, choosing the format first usually requires fewer steps, so subsequent exercises follow that sequence.

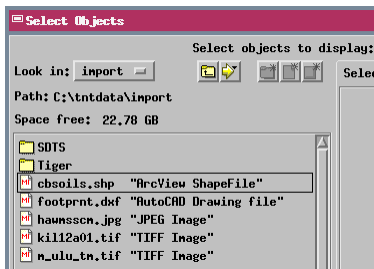


# Import, Direct Use, and Linking

Importing an external file or other data source converts all of its data and stores it in a MicroImages Project File. The resulting object is completely self-contained and independent of the external source. You do not need to retain the external source in order to be able to work with the imported object in the TNT products.

Direct-Use Formats	
<b>Raster</b>	<b>Shape</b>
JPG	ARC-Shapefile
PNG	<b>CAD</b>
TIFF / GeoTIFF	MapInfo TAB
JP2 / GeoJP2	MicroStation DGN
MrSID	AutoCAD DXF
ECW (Windows only)	AutoCAD DWG

Import is not the only option for external data. For the data formats listed in the box to the left, you can directly use the external file in any TNT process without any prior processing. Files in these formats appear in the standard Select Objects window's list of available files along with TNT



Project Files. The external files are shown with the MI icon but with their own file extension, as shown in the illustration. TNTmips automatically establishes a link to such a file when you highlight it in the Select Objects list in any process. This auto-linking procedure creates in the same directory a link file whose name includes the name and extension of the external file

and which has the extension RLK. This RLK file is used to automatically store display parameters, raster pyramid tiers, style information, and so on, and must remain in the same directory with the external file in order to preserve this ancillary data. (If the external file is on read-only media, the link file is automatically placed in a special link-cache directory on your computer's hard drive). Unlike a Project File, where you must select an object from within the file for display or processing, you can simply select the auto-linked file itself for use in any process.

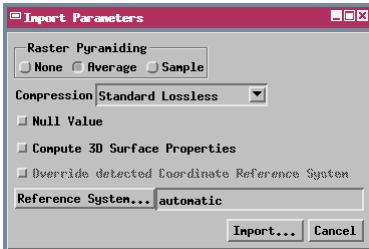
Some external formats that cannot be directly used in the TNT products nevertheless allow you to use the Import process to manually set up a link to the external file. A toggle button is provided on the Import Parameters window to choose the link option for these formats. (For any format that stores geometric elements as shapes, choose Shape from the Object Type menu on the Import Parameters window to enable the link option.) When you save the object at the end of the "import", you actually save a link object in a standard MicroImages Project File; this link object serves the same function as the RLK file described above. It is best to create the link in a Project File in the same directory as the external file so that it is easier to keep the files in the proper relative directory location if they need to be copied or moved.

## Basic Raster Import Parameters

When you import raster images, certain basic import parameters are common to all formats. As an introduction to these basic settings we import a color image from a Windows Bitmap (BMP) file.

As a rule you should allow the Import process to create pyramid tiers for imported images. These reduced-resolution (larger cell size) versions of a raster provide fast display of images of any size at any zoom level. Omitting pyramids could result in long display times for large images. The Raster Pyramiding control allow you to choose how the cell values in the pyramid tiers are produced from the source raster cells: by averaging the corresponding source cells or by sampling single cell values.


Rasters you import can be compressed to reduce the stored size of the objects in your Project Files. Use the Compression menu to choose a compression method. (Compression can only be applied to rasters with integer cell values.)



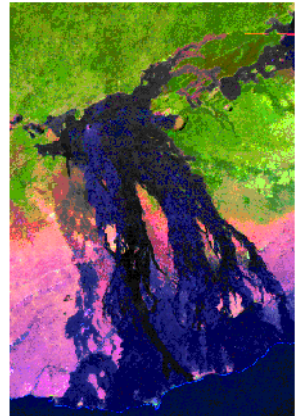
and enter the “blank cell” value in the numeric field that is activated by the toggle. When the raster is displayed the null areas can then be rendered transparent if you choose. If you are importing a digital elevation model for use in a 3D display, turn on the toggle to Compute 3D Surface Properties so these properties can be computed and stored during import rather than the first time you render the 3D display.

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.

### STEPS


- press the Raster filter button in the Import window 
- choose BMP from the format list
- press Select Files and select LAVA.BMP from the IMPORT data collection
- click [Next]
- in the Import Parameters window, turn on the Average radio button for Raster Pyramiding
- choose Standard Lossless from the Compression menu
- 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

If the image file includes blank areas with a known value, you can turn on the Null Value toggle



# Import a Raster Object from GeoTIFF

## STEPS

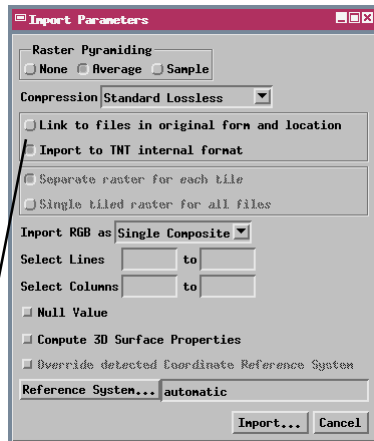
- press [Remove All] to clear the file list
- press the Raster filter button 
- choose GeoTIFF from the format list
- press Select Files and select RIVER.TIF from the IMPORT data collection
- click [Next]
- in the Import Parameters window, turn on the *Import to TNT internal format* toggle
- choose Single Composite from the *Import RGB as* menu
- click [Import] and direct the new raster object to the TEMP\_IMP Project File
- when the import process is complete, click [OK] on the Process Status window

Although you can directly use GeoTIFF files in the TNT products, there may be occasions when you want to do a full import instead. (Perhaps you want to streamline your dataset by storing all of the data in a single Project File.) TIFF/GeoTIFF files can store images in a variety of data types: binary, one or more 8-bit or 16-bit grayscale rasters, or 24-bit composite color. When the TIFF file you have selected contains a 24-bit color image, the *Import RGB as* menu allows 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 RGB raster set if you wish to modify its contrast and color balance later in TNTmips.

Raster image files such as GeoTIFF and GeoJP2 include georeference information embedded within the image file. When you select such a file, the coordinate information and reference system are read from the file automatically during import without further action on your part. You can import GeoTIFF images using either the TIFF or GeoTIFF format entries in the Import window.



The sample GeoTIFF file is a 24-bit color composite image of the Green River in Utah, USA. This natural-color image is an extract of a pan-sharpened Landsat 7 ETM image.

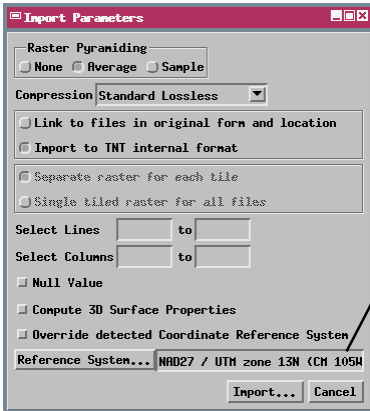


Use these radio buttons to choose between importing or manually linking to the file.

# Import a Raster with an Arc World File


Image files that do not contain embedded georeference information may be accompanied by an auxiliary georeference file. This file should share the root name of the selected image file and be in the same directory. MapInfo \*.tab and ArcGIS \*.prj files identify the coordinate reference system as well as providing coordinate information. These files are read automatically when the Import Parameters window opens, and the detected coordinate reference system is then shown in the Reference System field at the bottom of the window.

An Arc World file (\*.jfw with a JPEG image or .tfw for other image types) includes coordinate information but does not identify the reference system. To produce complete georeference information on import you must use the Coordinate Reference System window (opened by the Reference System button on the Import Parameters window) to select the appropriate datum and coordinate system using information provided in the metadata accompanying the image.



Coordinate Reference System field

## STEPS


- press [Remove All] to clear the file list
- press the Raster filter button 
- choose JPEG from the format list
- press Select Files and select LAKE.JPG
- click [Next]
- in the Import Parameters window, turn on the *Import to TNT internal format* toggle
- press the Reference System button
- on the Predefined panel in the Coordinate Reference System window, choose Global and Regional / Universal Transverse Mercator (UTM) / UTM zone 13N
- choose North American 1927 (NAD27) from the Datum menu on the Datum panel
- press [OK] on the Coordinate Reference System window
- click [Import] and direct the new raster object to the TEMP\_IMP Project File
- when the import process is complete, click [OK] on the Process Status window

The sample JPEG image is a false-color composite from 3 Landsat TM bands showing a lake (dark blue) in northern Wyoming, USA. Vegetation is bright green.



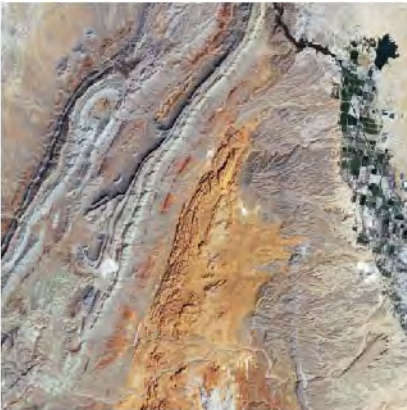
# Create a Multifile Raster Object

## STEPS

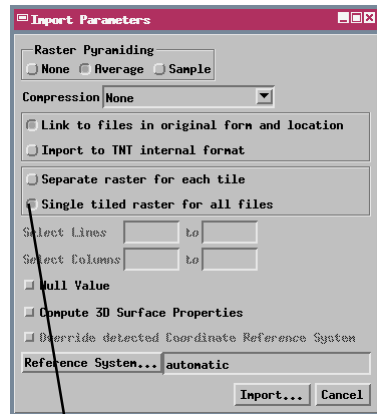
- ☑ press [Remove All] to clear the file list
- ☑ press the Raster filter button 
- ☑ choose GeoJP2 from the format list
- ☑ press Select Files and select VOF\_11.JP2, VOF\_12.JP2, VOF\_21.JP2, and VOF\_22.JP2 from the IMPORT data collection
- ☑ click [Next]
- ☑ in the Import Parameters window, turn on the *Link to files in original form and location* toggle
- ☑ turn on the *Single tiled raster for all files* toggle
- ☑ click [Import] and direct the link raster object to the TEMP\_IMP Project File
- ☑ when the import process is complete, click [OK] on the Process Status window

Large image datasets may be distributed in pieces, or tiles. The Import process allows you to set up a link that creates a single, multifile raster object that links simultaneously to a collection of image tile files that you select. A linked multifile raster object appears in TNT dialogs and processes as a single raster object. Meanwhile, the original data files remain available for individual use in the TNT products or other software. A multifile raster object can be created in just a few minutes even for very large tiled raster datasets representing gigabytes of image data.

Multifile linking is available for the following raster file formats: JP2/GeoJP2, MrSID, SRTM, and TIFF/GeoTIFF. The component image files must be georeferenced, have uniform line and column dimensions, and be arranged in a regular rectangular grid. The edges of the tiles must abut or have a uniform width of overlap for all tiles. These restrictions enable rapid display of very large multifile raster images.



Multifile raster object linked to the four tiled JP2 files, each of which is 256 cells square. The image is natural-color composite of Landsat TM bands of an area in southern Nevada, USA.



Choose the *Single tiled raster for all files* option to create a single linked multifile raster object.

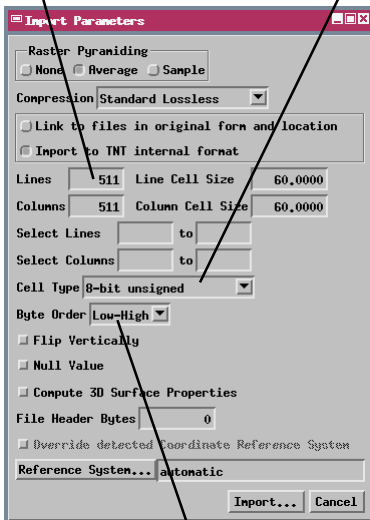
# Import a Raster Object from Simple Array

The dialogs for most standard raster file formats are very similar to those you have already seen. But in some cases you may need to import a single raster image that is encoded as a generic stream of binary byte data. To import such a file you can use the Simple Array format option. You must know the size of the image (in Lines and Columns) and the numeric data type (8-bit unsigned, for example), which you might find in an accompanying readme, label, or header file.

Generic binary files might also contain multiple image bands, file header information, band header information, and so on. For these more complex files you can use the User-Defined raster format, which allows you to create and save a format file that completely describes the file format.


Set the dimensions of the image in Lines and Columns.

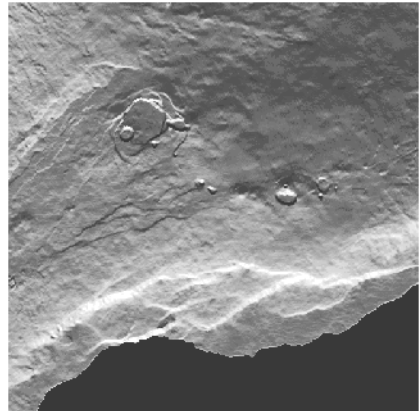
Set the data type for the raster cell values.



The Byte Order setting applies if the file contains 16-bit values (each value consisting of two bytes) or 32-bit values (four bytes).

## STEPS


- press [Remove All] to clear the file list
- press the Raster filter button 
- choose SIMPLE-ARRAY from the format list
- press Select Files and select file KILSHADE.ARR
- click [Next]
- in the Import Parameters window, 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 Cell Type option menu
- click [Import] and direct the new raster object to the TEMP\_IMP Project File
- when the import process is complete, click [OK] on the Process Status window



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.

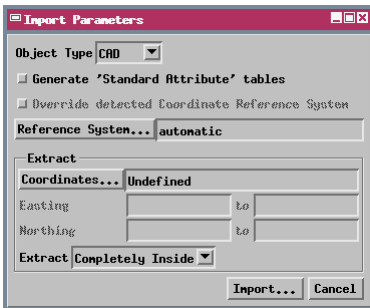
# Import a CAD Object from MIF

**STEPS**

- press [Remove All] to clear the file list
- press the CAD filter button 
- choose MIF from the format list
- press Select Files and select NECOUNTY.MIF
- click [Next]
- turn on the *Generate 'Standard Attribute' tables* toggle
- click [Import] and direct the new CAD object to the TEMP\_IMP Project File
- when the import process is complete, click [OK] on the Process Status window

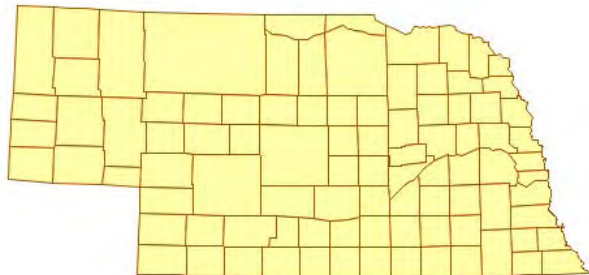
Files in the MapInfo Interchange Format (MIF) store coordinate lists for polygon, line, and point elements, as well as information about the map projection, in an ASCII text format. An accompanying file with the “mid” file extension stores attribute values for a single database table; this file is read automatically when you import the MIF file. You can choose to import MIF data to either a CAD or Vector object using the Object Type menu at the top of the Import Parameters window.

Import to CAD or vector objects from most formats provides the option to compute Standard Attribute tables for the new object during the import. For CAD imports a single CADSTATS table is produced; for vector imports, one table is produced for each type of geometric element (point, line, polygon) in the object. These tables contain basic statistical attributes of each geometric element, such as length, area, centroid coordinates, and so on, that can be used in selection queries, shown in DataTips, or used to construct more complex computed field attributes in other tables.



The illustrations on this and subsequent pages show imported objects that have had display styles set after import. See the tutorial entitled *Creating and Using Styles* for information on setting up display styles for vector, CAD, and shape objects.

The sample MIF file is a map of Nebraska counties.

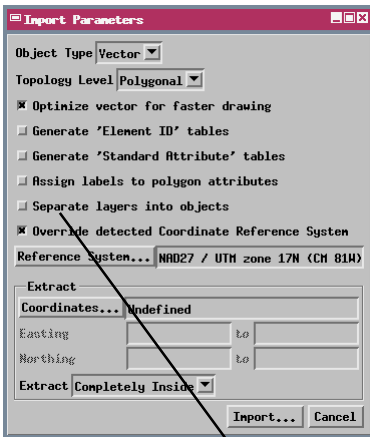


**NOTE:** The TNT products can directly use MapInfo TAB files as described on page 6. These linked objects are treated and styled as CAD objects.

# Import a Vector Object from DXF


The AutoCAD DXF format has become one of the standard means of exchanging drawing data between CAD programs. You can directly use DXF files, manually link them as CAD objects, or import them to CAD or vector objects.

When you import a vector object, use the Topology Level menu to set the type of vector topology that is most appropriate for the data. Use Polygonal topology if the data includes polygons with attributes, Planar topology if only lines or points require attributes, and Network topology if lines should be allowed to cross without intersecting at a node (for road, pipeline, or other network applications). You should also routinely turn on the toggle to optimize the vector for faster drawing. Optimization assigns element numbers based on spatial location to speed rendering when you are zoomed in to local areas of the object.



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

## STEPS


- press [Remove All] to clear the file list
- press the Vector filter button 
- choose DXF from the format list
- press Select Files and select FOOTPRINT.DXF
- click [Next]
- choose Polygonal from the Topology Level menu
- turn on the *Optimize vector for faster drawing* toggle
- press the Reference System button
- use the Coordinate Reference System window to set the CRS to NAD27 / UTM zone 17N and press [OK]
- click [Import] and direct the new vector object to the TEMP\_IMP Project File
- when the import process is complete, click [OK] on the Process Status window



The sample DXF file contains lines that depict street curbs and polygons that represent house and building outlines.

# Import a Vector Object from SDTS

**STEPS**

- press [Remove All] to clear the file list
- press the Vector filter button 
- choose SDTS from the format list
- press Select Files
- select file HP01AHDR.DDF from the SDTS directory in the IMPORT directory
- click [Next]
- choose Planar from the Topology Level menu
- turn on the *Generate 'Element ID' tables* toggle
- click [Import] and direct the new vector object to the TEMP\_IMP Project File
- when the import process is complete, click [OK] on the Process Status window

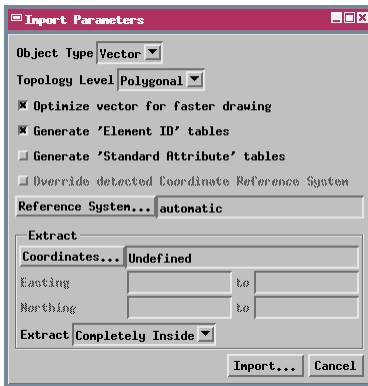
The Spatial Data Transfer Standard, or SDTS, is a format standard adopted by the United States government for the transfer of digital geographic information. The SDTS format includes geographic vector data (point, line, and polygon) with full topology, georeferencing, and attributes. Much of the Digital 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. 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 are read automatically by the import process. In the

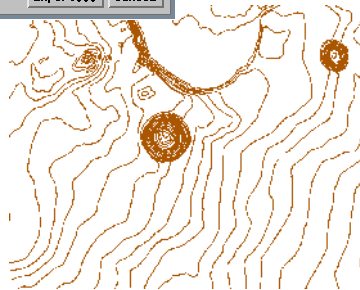
case of SDTS DLG data, be sure to select a data file rather than one of the Data Dictionary files.

Most vector imports provide the option to generate an element ID table for each element type. An element ID table provides a unique ID number for each element that can be used to relate records in other attribute tables to the vector elements. Records in an ID table remain attached to the appropriate elements even if element numbers

change when the vector object is edited. You do not need to generate ID tables if the imported data already includes a table with a categorical attribute for each element, as these records are already directly attached to the vector elements.



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.




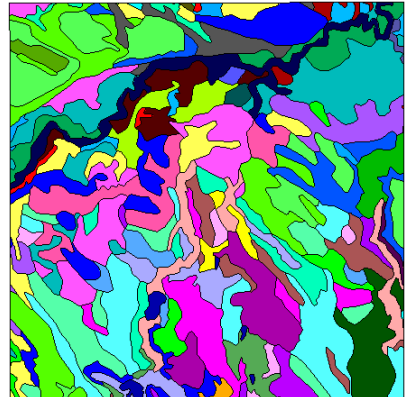
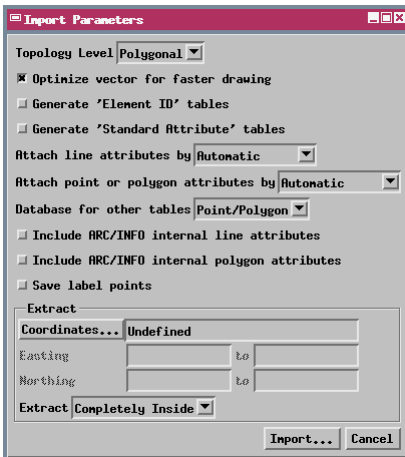
# Import a Vector Object from Arc E00

TNTmips can import vector and attribute data from several file formats produced by ArcInfo, including the “Export” format (e00). The import process provides options to attach any line attributes and point/polygon attributes in the e00 file to their respective vector elements. The default “Automatic” option for attaching attributes should work for most e00 files. If records in the imported table are not attached correctly, try re-importing the file using one of the other options on the attachment menu.

The import writes basic point or polygon attributes to a table named PAT, while line attributes are stored in a table named AAT. The e00 file also stores internal attribute information (such as line length and polygon area); toggle buttons allow you to choose whether or not to include these fields in the imported PAT or AAT table. Some e00 files may also contain additional attribute tables; the *Database for other tables* menu lets you specify which element database these tables should be stored in.

**STEPS**


- press [Remove All] to clear the file list
- press the Vector filter button 
- choose ARC-E00-VECTOR from the format list
- press Select Files and select CBSOILS.E00
- click [Next]
- choose Polygonal from the Topology Level menu
- turn on the *Optimize vector for faster drawing* toggle
- choose Point/Polygon from the *Database for other tables* menu
- click [Import] and direct the new vector object to the TEMP\_IMP Project File
- when the import process is complete, click [OK] on the Process Status window



The sample e00 file is a soil map of part of the Crow Butte quadrangle in northwest Nebraska.

# Import Vector Points from TEXT

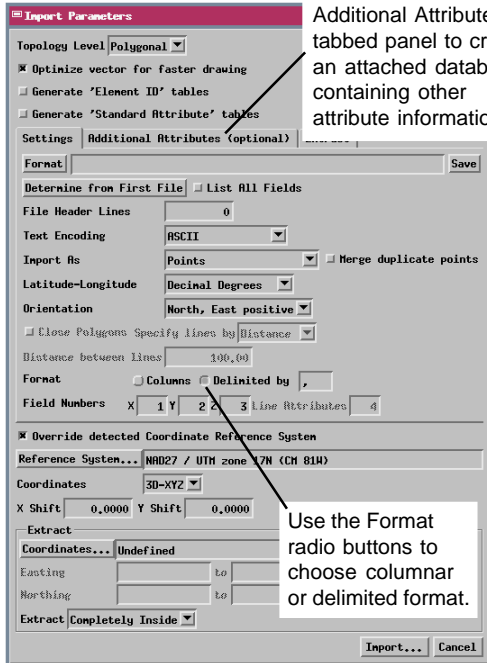
**STEPS**

- press [Remove All] to clear the file list
- press the Vector filter button 
- choose TEXT from the format list
- press Select Files and select ELEVPTS.TXT
- click [Next]
- choose Points from the Import As menu
- choose 3D-XYZ from the Coordinates menu
- turn on the Delimited radio button for Format
- for Field Numbers enter 2 for X, 3 for Y, and 1 for Z
- press the Reference System button
- use the Coordinate Reference System window to set the CRS to NAD27 / UTM zone 17N and press [OK]
- click [Import] and direct the new vector object to the TEMP\_IMP Project File
- when the import process is complete, click [OK] on the Process Status window

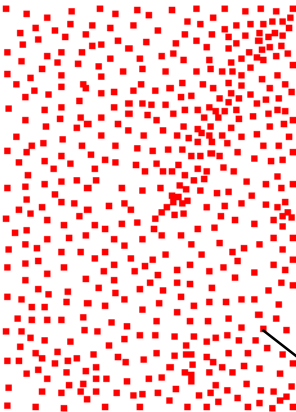
The TEXT format allows you to create a vector point object from sets of 2D or 3D coordinate values in a text or database file. The coordinate values in a text file can be aligned in columns or separated by a delimiter character (the default is comma-delimited). You must specify the coordinate reference system 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.



You can use the Additional Attributes tabbed panel to create an attached database containing other attribute information.



The sample text file includes map coordinates and elevation values for a set of locations.


# Link to Access Database

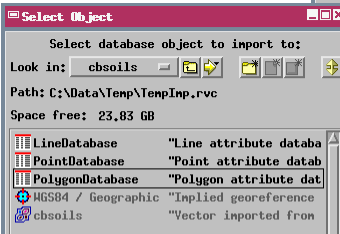
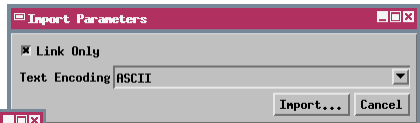
TNTmips can import or link to Microsoft Access or SQL Server databases and create tables from sheets in an Excel spreadsheet. These procedures use specially-tailored Windows OLE DB connections to the database or spreadsheet, providing faster and more robust connection than the older ODBC methods. In addition, all table relationships previously set up in the Access or SQL Server database are automatically maintained by the link or import. In this exercise you link to an Access database that includes five related tables with soil type attributes for the Crow Butte soils vector object you imported in a previous exercise.


Linked tables can be edited by Access while they are in use in the TNT products. An open TNT tabular view of the table can be updated manually to show saved changes made in Access, or the table's Preferences can be set to automatically refresh at a specified time interval.

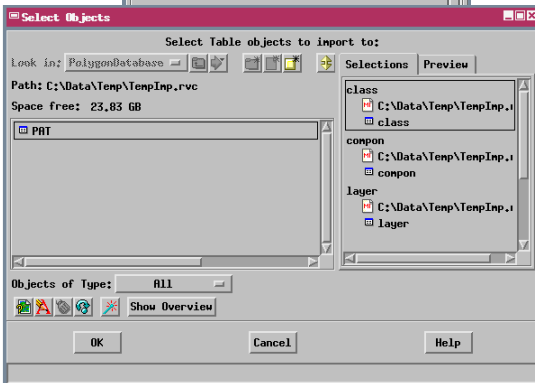
NOTE: To complete this exercise your computer must be running a Windows operating system (98/2000/XP).

**STEPS**

- press [Remove All] to clear the file list
- press the Database Table filter button 
- choose ACCESS from the format list
- press Select Files and select CBSOILS.MDB
- click [Next]
- turn on the Link Only toggle button in the Import Parameters window



- press [Import]
- in the Select Object window, navigate into the CBSOILS vector object (double-click on the object name) that you previously imported into your TempImp Project File
- click on the PolygonDatabase subobject and press [OK]
- in the Select Objects window that appears, press the Auto-Name icon button  to accept the names of the 5 tables in the Access file
- press [OK] on the Select Objects window
- when the import process is complete, click [OK] on the Process Status window




# Import a Database Table from DB-TEXT

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

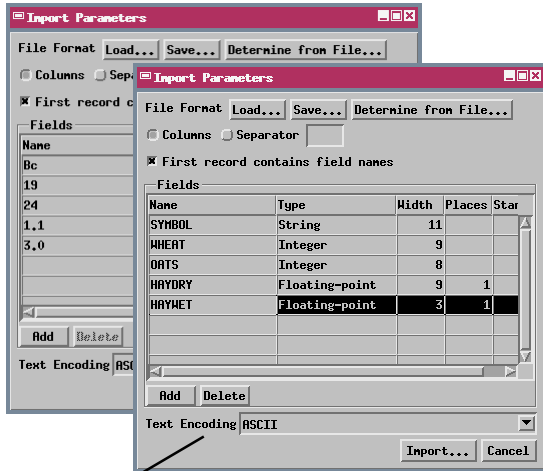
You can also import an attribute table from an ASCII text file. The attribute information for each record must be on a separate line in the text file. The fields can be aligned in columns, as in the sample file for this exercise, or they can

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 are shown in the box above left.

**STEPS**

- ☑ press [Remove All] to clear the file list
- ☑ press the Database Table filter button 
- ☑ choose DB-TEXT from the format list
- ☑ press Select Files and select YIELD.TXT
- ☑ click [Next]
- ☑ in the Fields listing in the Import Parameters window, drag the mouse to highlight the default name for the first field (Bc) and rename it SYMBOL
- ☑ rename the other fields WHEAT, OATS, HAYDRY, and HAYWET, in that order
- ☑ press [Import]
- ☑ in the Select Object window, navigate into the CBSOILS vector object that you previously imported
- ☑ click on the PolygonDatabase subobject and press [OK]
- ☑ press the New Object icon button and accept the default table name YIELD
- ☑ press [OK] on the Select Object window
- ☑ when the import process is complete, click [OK] on the Process Status window

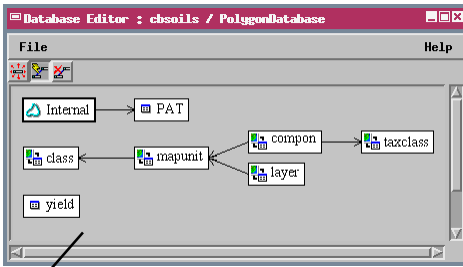
The text file is automatically scanned to determine its format, field types and widths, and default field names (from the first record in the text file), and the resulting information is shown in the Import Parameters window. In this example, there is no header record with field names, so you must manually enter the correct field names in the Name column in the Fields list.



If the default Text Encoding is not correct, the file format may not be interpreted correctly. Use the Text Encoding menu to choose the proper encoding and press [Determine from File] to rescan the file.

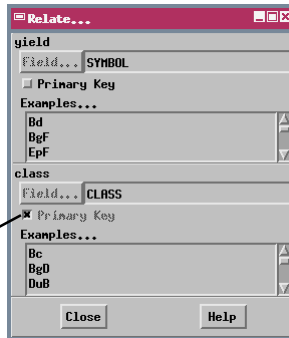
# Relate Imported Tables

The previous two exercises imported tables into the polygon database of the CBSOILS vector object you imported earlier. In this exercise you use the TNTmips Database Editor to establish relationships between the imported tables and the existing PAT table, which contains records that are directly attached to the polygons. These new relationships relate records in the imported tables indirectly to the polygon elements via records in the PAT table.

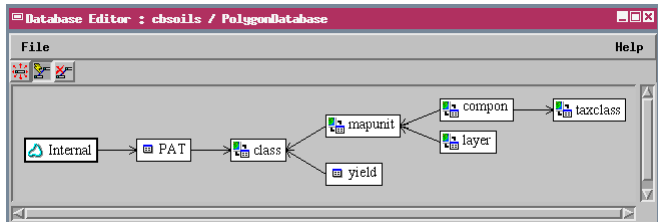


Initial appearance of the Database Editor window. Only the PAT table created by the vector import has records attached to the vector polygons (represented by the Internal table).

Relate window for the yield and class tables after choosing the SYMBOL field from the yield table.



Database Editor after the new table relationships. Records in the imported tables are now indirectly related to the vector polygons.

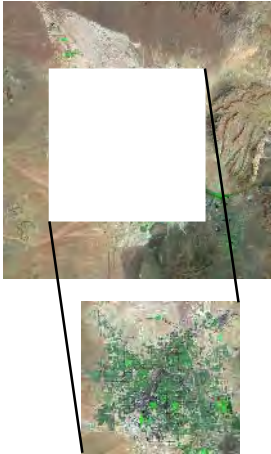


## STEPS

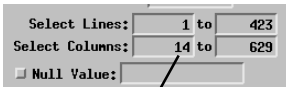
- ✓ choose Tools / Database / Edit from the TNTmips menu
- ✓ in the Select Object window, select the CBSOILS vector object that you previously imported into your TempImp Project File and press [OK]
- ✓ choose Polygon in the Select window and press [OK]
- ✓ press the Relate icon button in the Database Editor window
- ✓ left-click and drag an arrow from the class table to the PAT table
- ✓ in the Relate window that appears, note the CLASS field in the class table will be related to the Class field in the PAT table and press [OK]
- ✓ left-click and drag an arrow from the yield table to the class table
- ✓ in the Relate window that appears, press the Field button for the yield table and select the SYMBOL field
- ✓ press [OK] on the Relate window
- ✓ verify that all tables are now related and then choose Close from the File menu on the Database Editor window

## Meeting TNTlite Object Size Limits

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. The limits discussed below 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.



**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 ensure 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, PNG, and BMP, you can also 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. Vector objects have a separate database subobject for each type of spatial element (vector polygons, for example), and each of these database subobjects can include more than one table. Database tables can also be imported to a database object that is independent of any spatial object in the Project File. TNTlite places no limit on the number of tables in a database object or subobject, but a single table can contain no more than 1500 records.

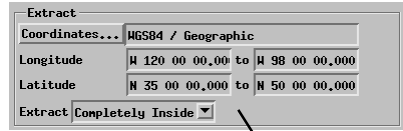
## Meeting TNTlite Object Size Limits

**Vector and CAD Objects** are limited in the number of elements they can contain in TNTlite. The maximum allowed numbers for different elements in a single vector object are: 500 polygons, 1500 lines, 1500 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.

The Import Parameters windows for vector and CAD formats include an Extract panel that you can use to specify the extents of a rectangular selection area (in map coordinates for a georeferenced object). Use the Coordinates button to choose the coordinate reference system you wish to use for specifying the extents of the extracted area. The Extract 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.

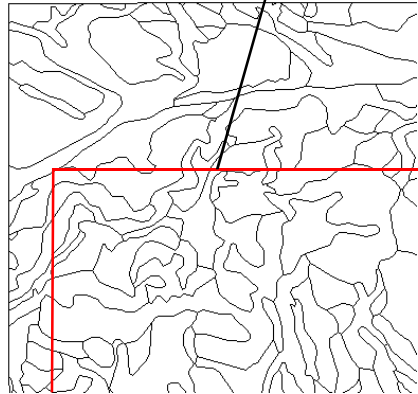
The selection and possible segmentation of elements caused by the extraction procedure create new topological relationships for the extracted elements. TNTlite must compute the new topology during the import procedure before it can determine whether the imported object falls within the TNTlite limits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

**Shape Objects** linked to a shapefile or other external shape data source can be used in TNTlite if they include no more than 1500 shape elements.



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

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




When you import a vector or CAD object with an associated database using the Extract 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.

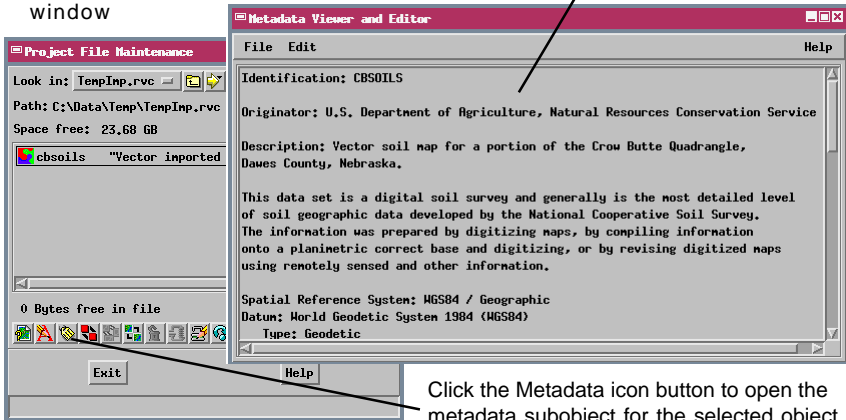
### STEPS

- choose Tools / Manage Project Files from the TNTmips menu
- navigate to your TempImp Project File and highlight the CBSOILS vector object
- press the Metadata icon button 
- choose Insert File from the Edit menu on the Metadata Viewer and Editor window
- select file METADATA.TXT from the IMPORT directory
- choose File / Save on the Metadata Viewer, then File / Close
- press [Exit] on the Project File Maintenance 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 purpose, 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 any spatial 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 geospatial 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.



# Supported Import Formats

## Raster Import Formats

ADRG: NIMA ARC Digitized Raster Graphics  
 ARC-BIL/BIP, E00-GRID, GRID, TEXT: Arc/Info formats  
 ASTER-HDF: EOS ASTER in HDF  
 AVIRIS Hyperspectral  
 BMP: Microsoft Windows Bitmap  
 CADRG: NIMA Compressed ADRG  
 CCRS: Canadian Centre for Remote Sensing  
 CDED: Canadian Digital Elevation Data  
 COQ: USGS Compressed Ortho Quad  
 DCR: Kodak Digital Camera Raw  
 DEM: USGS Digital Elevation Model  
 DEM-GTOPO30: GTOPO30 Global DEM  
 DIMAP: Digital Image Map  
 DOQ: USGS Digital Orthophoto Quad  
 DTE: Socet Set Digital Terrain format  
 DTED: Digital Terrain Elevation Data  
 ECW: ER-Mapper Enhanced Compressed Wavelet  
 ENVI Hyperspectral  
 ER-MAPPER  
 ERDAS-GIS/LAN, ERDAS-IMG: ERDAS IMAGINE  
 ERS-SAR: ERS-1 and ERS-2 Synthetic Aperture Radar  
 GeoJP2: JPEG2000 JP2 format with georeference  
 GEOSOFT-GRD: Geosoft Grid format  
 GEOSOFT-GXF: Geosoft eXchange format  
 GeoTIFF  
 GIF: Graphics Interchange Format  
 GOOGLE-LOCAL: Google Local tiled image format  
 GRASS-RASTER  
 HDF4-Generic: Hierarchical Data Format Version 4 Generic  
 IDRISI\_ASCII and IDRISI\_BINARY  
 IDRISI32\_ASCII and IDRISI32\_BINARY  
 ILWIS: ILWIS Raster .MPR format  
 IRS Super Structure (LGSOWG)  
 JERS1: NASDA JERS-1 CEOS OPS radar  
 JP2: JPEG-2000 JP2  
 JPEG  
 LANDSAT-CCRS: CCRS Landsat CCT format  
 LANDSAT-NLAPS  
 LANDSAT7-HDF: LANDSAT7 ETM in HDF  
 MODIS-HDF: EOS MODIS in HDF  
 MRSID: Multiresolution Seamless Image Database  
 NetCDF: Network Common Data Format  
 NITF, NITF2.1: NIMA National Imagery Transfer  
 NTF-DTM: UK National Transfer Format 2.0 DTM  
 PCI: PCI Image Format  
 PCX  
 PNG: Portable Network Graphics  
 RADARSAT: Radarsat CEOS Radar Formats  
 SDTS DEM  
 SIMPLE-ARRAY  
 SPOT: SPOT Image format  
 SPOTView: SPOTView/GeoSPOT Image format  
 SRTM: Shuttle Radar Topography Mission Format  
 SUNRAST: Sun Raster Format  
 SURFER: Surfer ASCII, 6, 7 GRD  
 TEXT-RASTER: ASCII Text format  
 TEST-XYZ: ASCII Text, 3 coordinates per cell  
 TIFF: Tag Image File Format  
 TM-FAST: Eosats Landsat TM Fast  
 TM-FAST-L7A: NASA Landsat 7A Fast  
 USER DEFINED

## Vector Import Formats

ARC-COVERAGE, E00-VECTOR, and GENERATE: Arc/Info  
 ARC-SHAPEFILE: ArcView Shapefile  
 CARIS  
 CGM: Computer Graphics Metafile  
 DGN: MicroStation/Intergraph .DGN  
 DLG-OPT: USGS Digital Line Graph Optional  
 DWG: AutoCAD Drawing (.DWG)  
 DXF: AutoCAD Drawing eXchange  
 GEODATABASE: ESRI Personal Geodatabase  
 GEOSOFT-XYZ  
 MAPINFO: MapInfo .tab  
 MIF: MapInfo Interchange format  
 MOSS: Map Overlay & Statistical System  
 MYSQL-SPATIAL: MySQL Spatial Data  
 NTAD: National Transportation Atlas Database  
 NTF-VECT: UK National Transfer Format 2.0  
 ORACLE-SPATIAL: Oracle Database "Spatial" Format  
 POSTGIS: PostGIS Spatial Data  
 SDF: Spatial Data Framework (Japan)  
 SDTS: Spatial Data Transfer Standard  
 TEXT: Point text data 2D (X,Y) and 3D (X,Y,Z)  
 TIGER: Census Bureau TIGER/Line

## CAD Import Formats

ARC-SHAPEFILE: ArcView Shapefile  
 CARIS  
 CGM: Computer Graphics Metafile  
 DGN: MicroStation/Intergraph DGN  
 DWG: AutoCAD Drawing (.DWG)  
 DXF: AutoCAD Drawing eXchange  
 GEODATABASE: ESRI Personal Geodatabase  
 MAPINFO: MapInfo .tab  
 MIF: MapInfo Interchange Format  
 MOSS: Map Overlay & Statistical System  
 MYSQL-SPATIAL: MySQL Spatial Data  
 NTAD: National Transportation Atlas Database  
 ORACLE-SPATIAL: Oracle Database "Spatial" Format  
 POSTGIS: PostGIS Spatial Data  
 SDTS: Spatial Data Transfer Standard

## Linked Shape Object Formats

ARC-SHAPEFILE: ArcView Shapefile  
 GEODATABASE: ESRI Personal Geodatabase  
 MYSQL-SPATIAL: MySQL Spatial Data  
 POSTGIS: PostGIS (PostgreSQL Spatial Data)

## Database Import Formats

ACCESS: Microsoft Access (OLE DB)  
 CSV: Comma Separated Values  
 DB-TEXT: Text Formats  
 DBASE: dBASE III/IV & FoxPro  
 EXCEL: Microsoft Excel (OLE DB)  
 INFO: ArcInfo Database format  
 MAPINFO-ATTRIB: MapInfo Attribute File  
 MIPS-EXTERNAL (DOS MIPS)  
 MYSQL: MySQL Database  
 ODBC: Microsoft Open Database Connectivity  
 POSTGRESQL: PostgreSQL Database  
 SQLSERVER: Microsoft SQL Server (OLE DB)

# 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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