

Geotagging Digital Photos

The Create Geotagged Image Table process in TNTmips (accessed from the Database menu) allows you to select a set of geotagged digital photo files and creates a database table with a record for each of the photos. Each record stores the digital image (or a link to the image file), its geographic position, and other information, allowing the photo locations to be pinned along with your other geospatial data. However, you may have digital photos that were not geotagged when the photos were taken. The Create Geotagged Image Table process also can assign geographic coordinates for digital photos that are not yet geotagged, either automatically from GPS logs, or manually. See the Technical Guide entitled *Create Geotagged Image Table* for an overview of the process and the output options.

Geotagging from GPS Logs

The automated procedure for geotagging digital photos uses Global Positioning System (GPS) logs that were acquired concurrently with the photos. This procedure determines map coordinates for each photo in the Image List using the date and time recorded in the EXIF (Exchangeable Image File) header of the photo's JPEG file and the times and positions recorded in one or more GPS log files. The logs can contain continuous track data or discrete waypoints coinciding with each photo acquisition.

To select GPS log files, press the Add Logs icon button in the Log List box. The process can directly read log files in NMEA



0183, GPS Exchange (GPX), and Microimages formats. You can also import logs from any formatted text file by pressing the *Import log file from formatted text* icon button. The window opened by this action allows you to specify the structure of the file (number of header lines, columnar or delimited text) and the fields containing the required information.

The Log List has an entry for each selected log file with columns showing the starting and ending date and time for each log. You can open a window that shows the records for any of the selected logs by left-clicking on its list entry to highlight it and pressing the Log Records icon button. The Log Records window shows the date, time, and 3D position values for each waypoint or trackpoint in the log.

Date	Time	Latitude	Longitude	Elevation
2006/10/13	22:54:26	40.82958	-96.74066	354.9
2006/10/13	22:54:41	40.82954	-96.74070	345.4
2006/10/13	22:54:56	40.82952	-96.74069	345.5
2006/10/13	22:55:11	40.82952	-96.74070	343.6
2006/10/13	22:55:26	40.82949	-96.74071	352
2006/10/13	22:55:41	40.82934	-96.74064	355.4
2006/10/13	22:55:56	40.82929	-96.74060	357.7
2006/10/13	22:56:11	40.82934	-96.74060	359.8
2006/10/13	22:56:26	40.82956	-96.74071	361.3
2006/10/13	22:56:41	40.82952	-96.74072	361.6
2006/10/13	22:56:56	40.82953	-96.74072	362.3
2006/10/13	22:57:11	40.82966	-96.74076	360.8
2006/10/13	22:57:26	40.82950	-96.74077	359.7

You can remove any log from the list by selecting it and pressing the Remove Log icon button. Press the Remove All Logs icon button to clear the list.

Log Processing Options

GPS logs record times in Coordinated Universal Time (UTC), whereas EXIF header times for your digital photos depend on the current clock setting of your camera. The Log Processing Options section of the Create Geotagged Image Table window provides fields in which you specify the offset of the photo times (hours, minutes, and seconds) relative to UTC time.

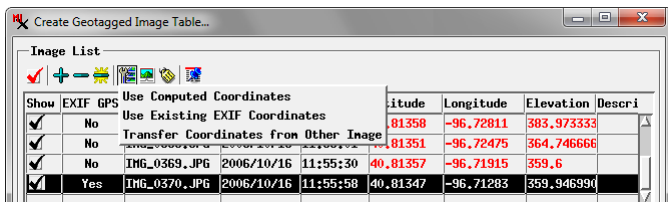
A pair of radio buttons allow you to set the Geotag process to either interpolate photo coordinates between the pair of GPS positions with the closest bracketing times, or to simply assign the coordinates from the closest GPS position. You can also set the maximum allowed difference in time between photos and GPS records for computing coordinates.

Latitude and longitude coordinates are automatically computed and shown in the image list after you select the desired images, GPS logs, and time offset, and are automatically recomputed when you change any of the geotagging options. Each entry in the Log List is shown in a different text color; these colors are also used in the coordinate field entries in the Image List to indicate which log was the source for the coordinates shown for each photo. The Coordinate Format menu above the Log Processing

(continued)

Options box allows you to choose the format in which to list the latitude and longitude values for the images in the Image List.

Photos that already have geotags in their EXIF headers are indicated in the image list by the entry “Yes” in the EXIF GPS field, and those stored coordinates are automatically shown in the Latitude and Longitude fields in black text. These existing values are not automatically replaced in the image list when coordinates are computed or recomputed from the selected logs. You can choose how the coordinates are set for a photo you have selected in the Image List by pressing the Image Options icon button. The resulting menu lets you choose to Use Computed Coordinates, Use Existing EXIF Coordinates, or to Transfer Coordinates from Other Image. If you choose the latter option, a separate Image List window opens, allowing you to select an image and press [OK] to transfer the coordinates.



Manual Geotagging

Two methods for manually geotagging photos are provided. If you have already obtained map coordinates for the photos from another source, you can directly enter latitude and longitude values in the respective fields in the Image List. (You can also press the Reference System pushbutton to choose a different coordinate reference system in which to enter coordinates; your coordinates and their latitude/longitude equivalents are all automatically included in the output table.)

Alternatively, you can derive geographic coordinates for each photo by locating their positions in a Database Pinmap view that includes a georeferenced raster object such as an orthoimage, satellite image, or scanned map. This procedure can also be used to adjust the positions of previously-geotagged photos.

The procedure for manually geotagging photos from a reference raster is illustrated below. Press the Database Pinmap icon button on the Create Geotagged Image Table window, then press the Input Raster button on the Database Pinmap view window to choose the reference raster. Selecting an image file in the Image List automatically activates the Point tool in the Database Pinmap window. Drag the tool’s cross-in-circle symbol to the desired location, then right-click to set the position. The corresponding map coordinates are automatically determined from the raster object’s georeference (and converted to the WGS84 / Geographic coordinate reference system, if necessary) and transferred to the Latitude and Longitude fields in the Image List for that photo. The photo position is also marked in the view using the selected pinmap symbol.

Setting the position for the selected photo also automatically activates the view’s selection tool with which you can select any photo pin in the view for repositioning; selecting the pin symbol (or selecting its photo record in the Image List) reactivates the point tool, which you can use to reposition the photo pin in the view as described above. Once you have geotagged all of the selected photos, press the Run button to save the image database table.

Write EXIF

You can select the EXIF option from the Output menu to write the computed or assigned photo position information to the EXIF tags in the input digital photo files. These files can then be used with other geotag-aware software or web applications.

You can change the pin symbol used to mark geotagged photo locations in the View by choosing Controls from the right mouse-button menu on the Geotagged Images entry in the sidebar legend. In the Pinmap Layer Controls window, press the Style button on the Symbol tabbed panel to open the Point Style Editor to set the desired style.

To manually geotag digital photos using a georeferenced image:

- Use the Add Images icon button to select the photo files to geotag.
- Press the Database Pinmap icon button to open the Database Pinmap view window.
- Press the Input Raster button and choose the georeferenced raster object to provide the map coordinates.
- Left-click on a photo in the Image List to select it.
- Drag the point tool’s crosshairs symbol to the desired location in the view and right-click to accept the position.
- Repeat the last two steps for the remaining photos.
- Press [Run] in the Geotag process window to save the image table.

