

Photo Linking Software Comparison

A Product Comparison
by Electronic Data Solutions

Linking Photos to GPS/GIS Features

Many methods are available for linking digital imagery to GIS features. Some of these are summarized below:

Hotlinking or Hyperlinking – Displays an image when clicking on a GIS feature. Photos are stored somewhere on your PC or network, and each GIS feature stores the photo file path and file name as an attribute or as a dynamic hyperlink. *Advantages:* Hotlinking is built into ESRI ArcGIS Desktop, dynamic hyperlinking can be used to link multiple photos to one feature. *Disadvantages:* Managing the correct entry of the photo file name for the correct GIS feature in the office or in the field can be time-consuming, cumbersome and error-prone.

ArcPad or TerraSync Camera Tool – Takes pictures using attached camera. *Advantages:* Mapping the feature and taking the photo is all managed in one software application, and it is easy to use on handheld with built-in camera. Reduces opportunity for error by linking photos in the field. *Disadvantages:* If the camera is not built-in, it relies on camera device drivers that are compatible with the operating system. Still have to manage hyperlinks in ArcGIS.

Wind Image Transfer – Uses WiFi to transfer photos from WiFi camera to Trimble handheld running TerraSync or ArcPad. *Advantages:* Only costs \$75, and transfers photos more quickly and efficiently than over a Bluetooth connection. Reduces opportunity for error by linking photos in the field. *Disadvantages:* Have to have WiFi camera and Trimble handheld. Still have to manage hyperlinks in ArcGIS.

Wind Image Software - Links GPS data to digital images and outputs to Google Earth KML and KMZ files, ESRI shapefiles and feature classes, and other formats. Designed primarily for cameras that can geocode photos, such as Ricoh 500 SE, an 8 MP 3x optical zoom rugged camera with built-in Bluetooth and optional WiFi. Can be purchased with built-in, WAAS-enabled SiRF GPS or can connect via Bluetooth to external GPS receivers and laser rangefinders for offsets. The Ricoh camera also allows entry of up to 10 attribute memos for a photo, which can be configured as drop-down lists with included software. The camera has the ability to scan barcodes and store them as memos. It features a GPS-lock function which allows the user to take a position, lock GPS, then move back and take a picture. *Advantages:* Automates the linking of photos to features. Can embed images as raster attributes rather than linked images, which improves portability and use across an enterprise. Can imprint text, logos, GPS and memo data on photo. Can output to file and enterprise geodatabases in ArcGIS and ArcSDE. *Disadvantages:* Need camera that can geocode photos.

GPS-Photo Link Software – Similar to Wind Image when working with the Ricoh 500SE. It also has the capability to link photos based on a time stamp, which will work with nearly any digital camera and any GPS. *Advantages:* Works with wide variety of digital cameras and batch processes photo link based on time rather than file name, doesn't require camera and data collector to be connected. *Disadvantages:* When working with Ricoh camera, it has less functionality and higher cost than Wind Image.

		ArcPad or TerraSync Camera Tool	Wind Image		GPS-Photo Link GIS Pro Series
			ArcMap	StandAlone	
Hardware support	Windows Mobile support	Trimble Nomad, Juno SB/SC, Yuma ¹	N/A	N/A	N/A
	Camera Support	Any Attached ¹	Any camera capable of geocoding images		Any ²
	GPS Support	Any Supported by ArcPad or TerraSync	Built-in or Bluetooth ³		Built-in, Bluetooth or Other ⁴
Field Collection Features	Create Photo Link in Field ⁵	Yes	Yes	Yes	Yes
	GPS Lock ⁶	No	Yes	Yes	Yes
	Laser offset ⁷	Yes	Yes	Yes	Yes
	Feature Collection	Yes	Yes	Yes	Yes
	Attribute Collection ⁸	Yes	Yes	Yes	Yes
	Real-time DGPS ⁹	Yes	Yes	Yes	Yes
	Post-processed GPS ¹⁰	Yes	No	No	Yes ¹¹
	Data Quality Filters ¹²	Yes	No	No	Yes ¹¹
	Loss of DGPS Warning	Yes	Yes	Yes	Yes
	Record Barcode as attribute	Yes ¹³	Yes	Yes	Yes ¹³
	Link voice note ¹⁴	Yes ¹⁵	Yes	Yes	Yes
Desktop Features	Output to shapefile ¹⁶	Yes	Yes	Yes	Yes
	Output to personal geodatabase feature class	No	Yes	No	Yes

¹ This tool in other devices is dependent on camera hardware compatibility with Windows Mobile operating system for direct camera control. If camera cannot be controlled directly by ArcPad, the photo can still be linked to a feature if the camera's software places it in My Documents or a sub-folder (or an SD or CF card).

² Must be able to set time and date on digital camera. Time and date does not need to be displayed on the photo.

³ Ricoh camera can be purchased with or without built-in GPS. Built-in GPS is 12-channel WAAS-enabled SiRF receiver, 2-5 meter accuracy. Camera can connect via Bluetooth to any Bluetooth GPS that outputs NMEA protocol.

⁴ Must record GPS hour, minute, second in order to link with photo. Trimble with TerraSync, Garmin, Magellan, etc.

⁵ In ArcPad and TerraSync, the file name of the photo is linked to the feature. On GPS-enabled cameras, GPS coordinates are embedded in the EXIF file header as photos are taken. In Photo-Link, the link can be based on time stamps from the field.

⁶ Take coordinate of feature, lock GPS, then step back and take picture. This feature is built in to the Ricoh 500SE camera.

⁷ Offset functionality built into TerraSync or ArcPad software. Ricoh 500SE camera connects directly to Bluetooth laser rangefinders to record distance and direction in EXIF file header. Compass direction can also be created directly from the GPS/Compass module or entered manually as a memo field. Direction and distance can be used to create offset features, or directional symbols using GPS-Photo Link or Wind Image.

⁸ TerraSync and ArcPad support entry of multiple attributes using pick lists and data entry rules. Consumer GPS units usually do not support attribute entry. Ricoh 500SE supports entry of up to 10 attribute Memos, which can be set up with pick-lists using included List Editor software.

⁹ Dependent on GPS receiver capabilities. All Trimble MGIS receivers are real-time capable, as are most consumer GPS receivers. The Ricoh 500SE with GPS is WAAS-enabled.

¹⁰ TerraSync uses Pathfinder Office or GPS Analyst and base station data to post-process GPS and DGPS positions. Post-processing in ArcPad requires Trimble's GPSCorrect for ArcPad extension, using a Trimble Pathfinder receiver and Pathfinder Office or GPS Analyst software. Post-processing is not possible with most consumer GPS receivers, or with the Ricoh 500SE camera with built-in or external GPS.

¹¹ If data is collected in TerraSync.

¹² Data quality filters include position mode, elevation mask, SNR mask, PDOP mask, HDOP Mask, and so on. ArcPad cannot set SNR mask, elevation mask, or HDOP mask. These can be set in GPSCorrect for ArcPad or TerraSync. Consumer GPS receivers generally have no quality filters. The Ricoh 500SE with built-in GPS does not have quality filters, but quality indicators are displayed on the screen.

¹³ Dependent on attached peripheral devices in the case of TerraSync or ArcPad systems. The Ricoh 500SE can scan bar codes and store them in Memo 1. The Trimble Nomad can also scan barcodes and store them as attributes in TerraSync or ArcPad.

¹⁴ The Ricoh 500SE camera can record voice notes with pictures.

¹⁵ TerraSync can link WAV files if the data dictionary has a File Name attribute set up to store the link. ArcPad does not have this capability.

¹⁶ TerraSync data is exported to shapefile through GPS Pathfinder Office, ArcPad works directly with shapefiles, and GPS-Photo Link and Wind Image can output to shapefile.

		ArcPad or TerraSync Camera Tool	Wind Image		GPS-Photo Link GIS Pro Series
			ArcMap	StandAlone	
Desktop Features cont.	Output to file and enterprise geodatabase feature class	No	Yes	No	No
	Embed image as raster attribute in geodatabase	No	Yes	No	No
	Append to existing shapefile or feature class	No	Yes	Yes	No
	Import Tracklog ¹⁷	Yes	Yes	Yes	No
	Output to Google Earth	No	No	Yes	Yes
	Output to HTML Web pages	No	No	Yes	Yes
	Output directional symbols	No	Yes	Yes	Yes
	Imprint GPS Data on Picture ¹⁸	No	Yes	Yes	Yes
	Output renamed photos ¹⁹	No	Yes	Yes	No
	ArcMap Toolbar to process photos	No	Yes	No	Yes
	Photo Editing ²⁰	No	Yes	Yes	No
	EXIF Data Editing	No	Yes	Yes	No
	Rotate map symbols based on direction ²¹	No	Yes	Yes	Yes
Cost		Included in ArcPad and TerraSync	\$199	\$199	\$329
			Can be bundled together for \$299		

¹⁷ TerraSync and ArcPad can record a GPS tracklog. While the Ricoh 500 GPS camera can record a tracklog, only Wind Image provides a way to create shapefiles or feature classes out of it.

¹⁸ If taken by the Ricoh 500SE or the Trimble Yuma, the original photo can be embedded with date, time and GPS information. Three additional memos can also be imprinted on photos taken with the Ricoh 500SE.

¹⁹ Photos can be renamed based on project, date and time. If taken by the Ricoh 500SE, file name can be based on Memo fields.

²⁰ Wind Image for ArcMap has basic photo editing built in. All other systems would depend on 3rd-party software.

²¹ If direction is recorded as an attribute in TerraSync or ArcPad, this could be done in ArcGIS. The Ricoh 500SE camera records the direction the photo was taken by using the GPS Tracklog, by entering the direction as an attribute Memo, or by reading attached compass.

Conclusions

Digital photos are an integral part of data collection for many applications. Managing the large amounts of data generated by GPS receivers and digital cameras can be challenging. Various methods are available to assist with this, and all have their pros and cons.

The ArcPad or TerraSync camera tool is easy to use in the field with a GPS with a built-in camera.

Wind Image Transfer now offers a solution for lower cost WiFi cameras.

The Ricoh 500SE camera is a truly field-worthy, rugged solution that can be used in conjunction with professional Trimble Mapping systems and software, or as a standalone data collection system.

The GPS-Photo Link software automates much of the process and includes many user-friendly features.

Wind Image for ArcMap and Wind Image StandAlone can be bundled together for a complete, user-friendly package with additional functionality at a lower cost.