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As an ardent fan of all things Geotagged, I wanted to share with you some observations with one of the consumer digital cameras on the market today with an integrated GPS and compass versus the features and accuracies of a "mapping" grade photo system.

## Ingredients

- Sony DSC-HX5V digital camera
- Garmin Map76CSx set to Tracklog
- Trimble GeoXT 2008 w/ TerraSync 4.1 and DDF with a file name attribute for associating photos
- Trimble TrimPix Professional
- Trimble Pathfinder Office
- Geospatial Experts GPS Photolink Version 5.0 for watermarking and analysis

## Background

I recently purchased a Sony DSC-HX5v digital camera with embedded GPS and compass. It has SDHC memory capacity so TrimPix can be used. This is new for Sony to offer a non-proprietary Sony Memory stick as a storage option (finally). As GPS/GIS professionals, we are being asked to evaluate and recommend GPS-integrated cameras for use in GIS applications. I'm the first to welcome these integrated technologies to expedite the geolocation of photographs however, there are considerations when we think about features (points) being mapped with attributes and the photo subject (the thing you are mapping). For certain jobs (aircraft or scenery overviews or preliminary trail layout), an integrated GPS/Camera may serve really well

as a first look. I've been using the Ricoh 500SE for years, and consider that camera top-drawer for GPS integration and features not found in the consumer line. It's just that many folks complain about cost, size, and why bother when you can get a camera/GPS/compass all in one. I have some comparisons that highlight issues that should be raised and considered with such systems.

### **Overall thoughts on the camera**

I really like the Sony. A price point of about \$350 was right for me. The compass is quite good (after calibration) and responsive. Magnetic only (no declination). Battery life is good. I bought an extra spare, and shot 150 photos over 6 days with plenty of energy to spare. Will not accept AA. The GPS is on top on left side of camera away from your finger over shutter (good idea eh?). The GPS takes from 5 seconds to 3 minutes to "acquire". GPS display is reduced to showing one to three bars (coords not shown). If you had the camera on within 30 minutes, the acquisition is under 1 minute. I always held camera up above head to maximize time to acquire (a photo stance for the future), but even under moderate canopy, acquiring signal takes time. Sometimes turning on/off camera helps. There is nothing to show that you have a fresh GPS position except 3 signal bars. If you don't wait to get a signal bar, the previous position will be used to tag photos. All photos will be tagged in even if you show no signal. You can turn off GPS (stop tagging), but getting to the menu to turn off GPS is about 10 clicks. There is an EASY button setting that makes the GPS from menu accessible to turn off quickly though. There is no feature to "LOCK" GPS onto the photo subject, then step back and take the photo from the photographers position.

### **Accuracy**

A few tests in various Alaskan country shows the Sony works pretty good in the open Slide 4 (range of 2-5 meters), but under canopy error budgets increase dramatically Slide 5 (witnessed 200 meters). The open sky environment is adequate for these systems. That's a picture of Denali - North America's tallest peak from Denali State Park. Wonderful shot!

## **No GPS position is better than a really wrong one**

Since this camera tags all photos regardless if the GPS has a hot fix or not, you can tag a photo miles from it's position. A habit of mine is to turn on the camera, shoot the photo and turn off camera to conserve battery life. Unless you give these camera's time to fix, you can embed extreme inaccuracies, harming a mapping project more than it helps. I would much rather not have any gps position than a really wrong position.

## **Inability to Offset from a Photographers Position**

Again, no big deal if you in an aircraft shooting photos where you don't mind having the position of the camera coordinates embedded, but a bigger deal when on the ground and tying the photo to a feature. Tying the photo of the subject (the feature) to the feature is important to reduce map confusion and matching photo management.

Slides 6, 7 and 8 show a scenario where offsets come into play. The Sony (Slide 6) cannot determine an offset, plus it has inherent accuracies that place the photographers position in errors of 10 - 30 meters away from true photographer position. While the Trimble (Slide 7) has the ability to offset and "bind" one or more photos to a particular point feature. In this case, I took 2 photos (1 and 2) of a building, and associated those photos using TrimPix to a building primary entrance point feature. I took another photo of a sign along the west side of a road and associated that photo with a Sign point feature. In the first mapping scenario I want all photos assigned to one coordinate - the primary entrance. Turn to Slide 8. Hence, i will stand off from the building, offset the GPS antenna position to the front door and fire my photo. This way I conserve energy, and maximize efficiency by mapping and shooting from the same spot. I then Paused the Feature, walked around to back of building and took my Photo 2. TrimPix sent both photos to my datalogger and i selected both photos and closed feature. I then opened my Sign Point feature, offset the point to the sign, fired my photo, wirelessly transmit my photo via TrimPix, and close feature. In Slide 6, you can see the result of all photos. Watermarking from GPS PhotoLink stamps the photos with the Postprocessed Exported true position of the GPS. Coordinates are blocked to protect the innocent (:><).

## **Having GPS PhotoLink to handle all the final photo processing is still valuable**

for seeding true Differential positions from an export back into the photo, watermarking and file management of the photo batch

## **Can You Have a GPS Camera and TrimPix?**

Sure! Any camera with a GPS most likely is SDHC compliant. Hence, TrimPix and a GPS embedded camera serves as a backup to a workflow. TerraSync overwrites the in-camera GPS positions on photo association to the feature, but having the raw gps photo can serve as a backup in case things go really wrong in the field.

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