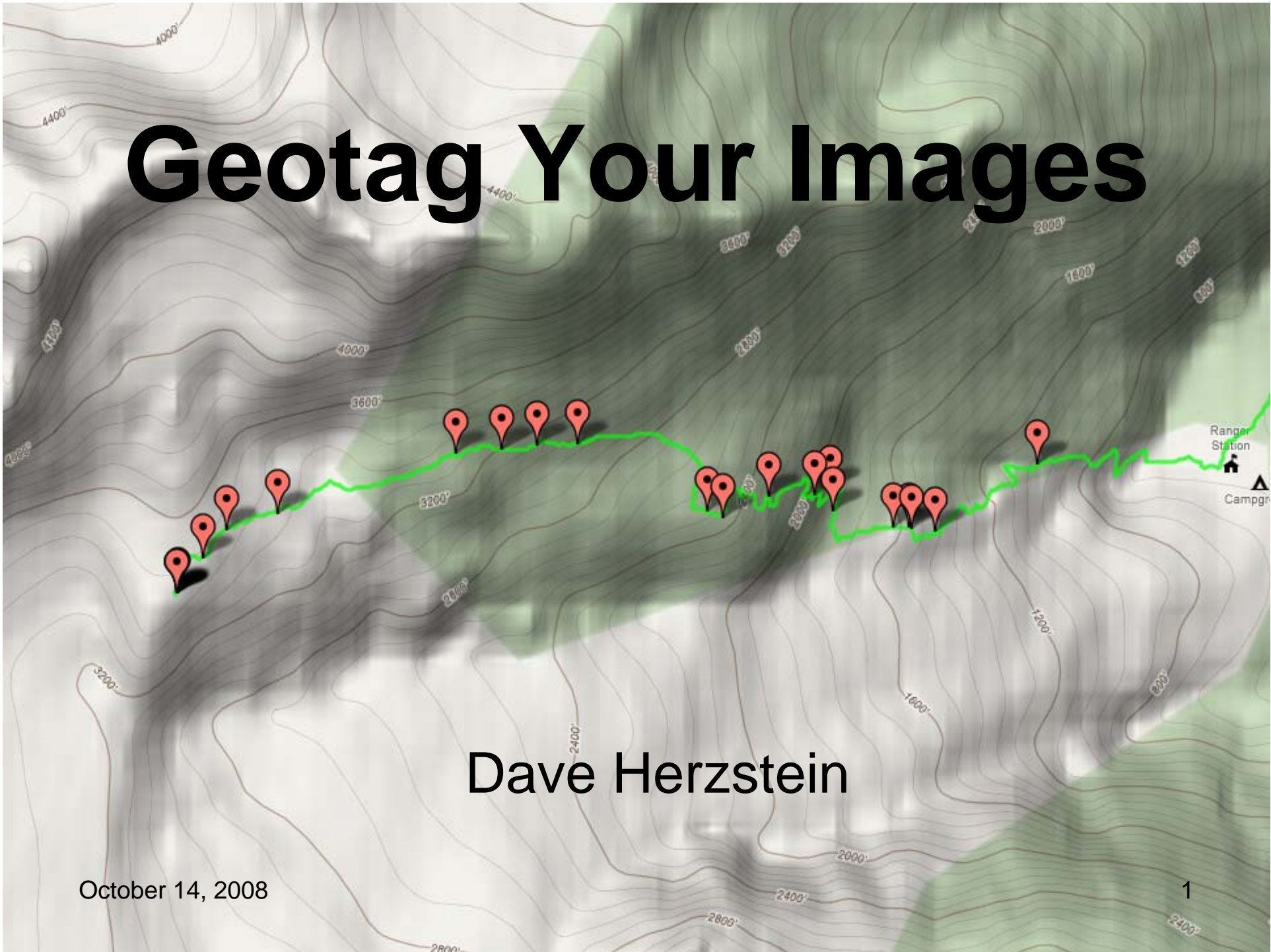


Geotag Your Images

Dave Herzstein

October 14, 2008



Why geotag your images?

- Web display
- Recording the image location
 - Travel
 - Documentation

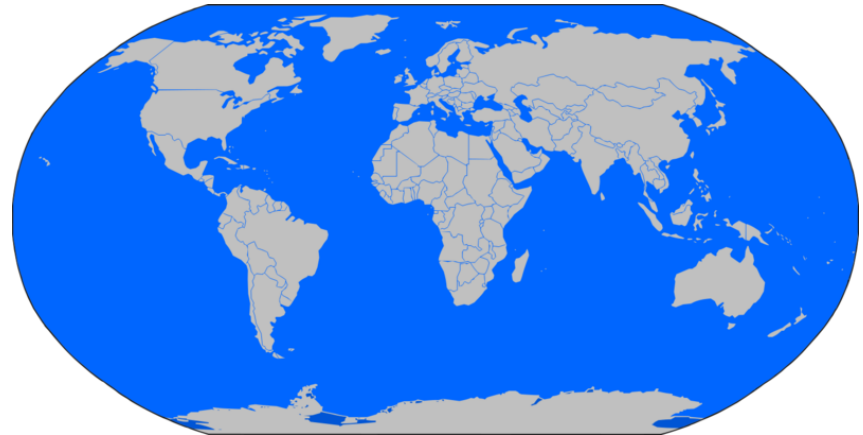


Image Metadata

- EXIF
Exchangeable Image File Format
 - Generated by the camera:
 - Shutter speed, aperture, ISO
 - Date and time
 - **Location data** (if a GPS receiver is connected to the camera)
- ITPC
International Press Telecommunications Council
 - Added in post-processing
 - Copyright
 - Title
 - Category tags
- XMP
Extensible Metadata Platform
 - Developed by Adobe
 - Separate “Side car” file
 - RAW conversion parameters
 - **Location data**
 - Leaves the original RAW file untouched
- ...caution...
 - EXIF and ITPC data can be changed or eliminated by some image editors



NAVSTAR GPS



- U.S. Department of Defense
 - Russian GLONASS (incomplete)
 - European Galileo (upcoming)
 - Chinese COMPASS (proposed)
 - Indian IRNSS (proposed)
- 24 to 32 satellites in “medium earth orbit”
 - Civilian and high-accuracy military signals
 - All have synchronized atomic clocks
- Accuracy:
 - Varies with the number and position of satellites
 - Wide Area Augmentation System (WAAS)
- Horizontal position and altitude
 - GPS alone cannot determine direction
- More information:
 - http://en.wikipedia.org/wiki/Global_Positioning_System

GPS receiver...

- Types of GPS receivers:
 - Multi-purpose handheld
 - Largest capacity
 - Most accurate
 - Mapping units are available
 - Auto routing units are available
 - Dedicated for track log
 - Small and lightweight
 - Dedicated for camera
 - Easiest to use
 - Single purpose
 - Car
 - No computer-interface
 - Not battery powered



...GPS receiver...

- **Must-have features:**

- Computer interface

- USB
- Bluetooth
- Serial cable
- Flash card

- Long battery life

- Rechargeables
- AA / AAA cells

- **Desirable features:**

- Customizable
- LCD display
- 12VDC power source
- Small, lightweight



...GPS Receivers...

- Nikon dedicated:
 - Wolverine GPS Geo (\$170)
 - attaches to D200, D300, D2Hs, D2Xs, D3
- Track loggers:
 - Holux M-241 (\$70)
 - GlobalSat DG100 (\$70)
 - GiSTEQ Photo Trackr (\$100)
 - Sony GPS-CS1 (\$120)
 - Jobo Photo GPS (\$149)
 - General reviews:
 - <http://scilib.typepad.com/techreviews/2008/01/gps-logger-comp.html>
 - http://spreadsheets.google.com/pub?key=pDyuTM9yMly7oD_4K1o-7DA&gid=0



...GPS Receiver

- Garmin
 - GPSMAP 76CSx
 - Great general-use GPS
 - Can store up to 2 GB of track log (removeable micro SD card)
 - Road routing for North America and Europe
 - External antenna or built-in
 - External power or AA cells
 - *Same as GPSMAP 76Cx, 60Cx, 60CSx*
 - Many other models
- Other brands:
 - Magellan
 - Reviews:
 - <http://gpsinformation.net/>
 - <http://www.gpsinformation.org/dale/>



Synchronize camera to GPS

- Synchronize camera to GPS
 - Local time or Universal Time (UT)
 - Be consistent!
- Synchronize PC to GPS
 - NTP server
 - Or use camera time offset
- GPS time is always accurate



Generate a Track log

- GPS receiver must “see” at least 4 satellites
 - GPS receivers require a wide view of the sky
 - GPS signals do not penetrate some objects:
 - Dense foliage, metal, earth, buildings, people
 - GPS signals reflect off some objects:
 - Metal, rock
 - An external antenna can be useful
- GPS receivers require a “warm-up” period
 - 1 second (“hot”)
 - up to several minutes (“cold”)
- Choose a reasonable track point interval
 - Time, distance, direction change
 - Depends on how you’re traveling
- Don’t run out of power



Track log Properties

- Should be NMEA or GPX

- NMEA

- National Marine Electronics Association
 - Designed for RS-232 serial communications

- GPX

- GPS eXchange Format
 - XML based
 - Designed for “batch” data exchange

- Datum

- WGS84

- World Geodetic System of 1984 (WGS84)

- Convert from other formats:

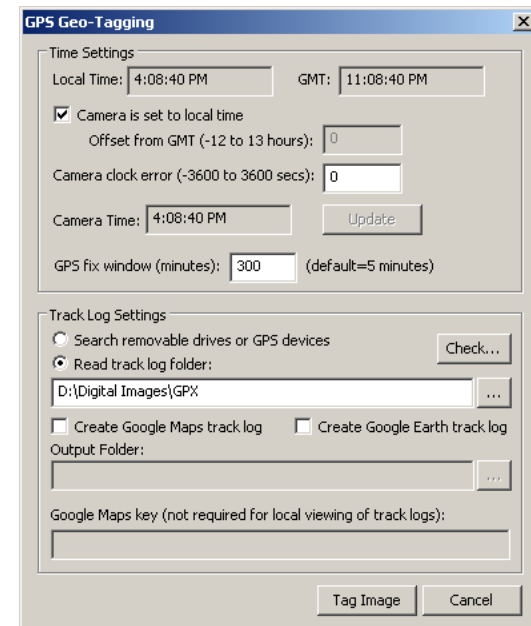
- GPSTabel

- Free, Windows only
 - <http://www.gpsbabel.org/>

```
<trkpt lat="60.175997" lon="-149.529885">
  <ele>81.686</ele>
  <time>2008-08-31T02:16:59Z</time>
</trkpt>
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  <time>2008-08-31T02:17:00Z</time>
</trkpt>
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</trkpt>
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</trkpt>
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</trkpt>
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  <time>2008-08-31T02:17:08Z</time>
</trkpt>
```

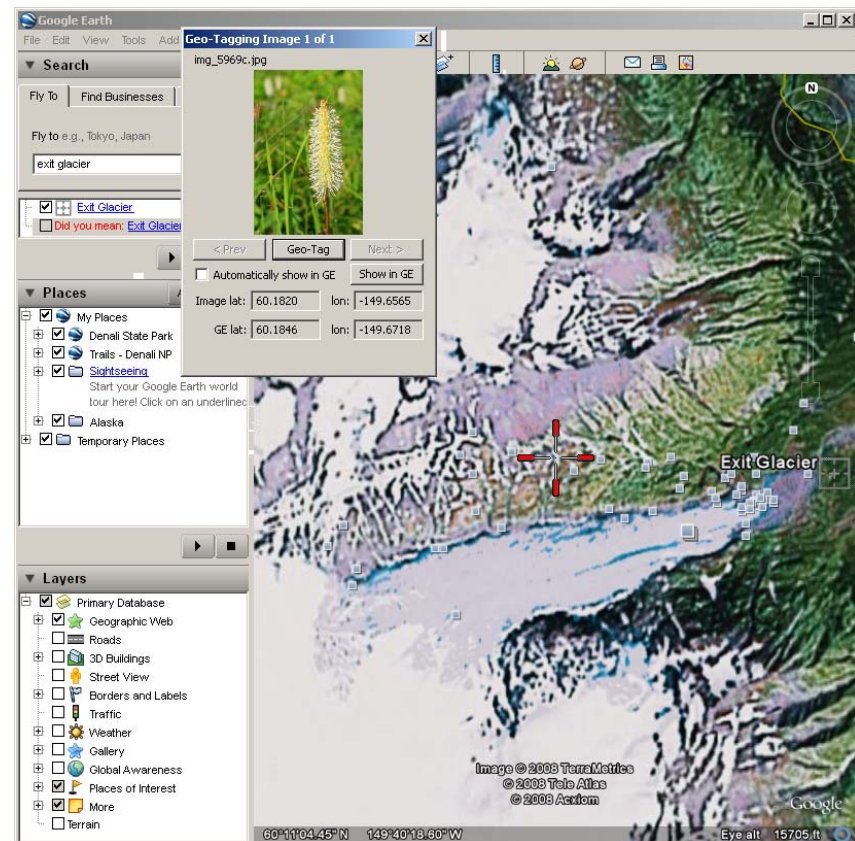
Automatically geotag images

- **DownloaderPro**
 - <http://www.breezesys.com/Downloader/index.htm>
 - \$30 - Windows
- **BreezeBrowserPro**
 - Includes RAW converter and HTML generater
 - <http://www.breezesys.com/BreezeBrowser/index.htm>
 - \$70 - Windows
- **RoboGEO**
 - <http://www.robogeo.com/home/>
 - \$40 - Windows
- **GeoSetter**
 - <http://www.geosetter.de/en/index.html>
 - Free - Windows
- **GPS Photolinker**
 - <http://www.earlyinnovations.com/gpsphotolinker/index.html>
 - Free - Mac OS X 10.5)



Manually geotag images

- Use Google Earth:
 - Breezebrower
 - Picasa
 - Flickr
 - Pbase



Display geotagged images

- Public sites

- PicasaWeb

- <http://picasaweb.google.com/pixseal>
 - Displays reduced image size
 - free - \$20/year

- Flickr

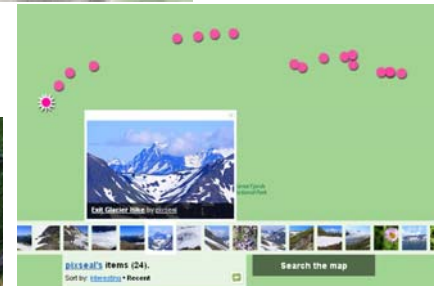
- <http://www.flickr.com/photos/pixseal>
 - Displays reduced image size
 - free - \$25/year

- PBase (trial period)

- <http://www.pbase.com/pixseal>
 - Displays actual image size
 - trial - \$23/year

- Personal domain

- <http://pixseal.com/2008/2008alaska/index2-0830.htm>
 - Complete control
 - \$60+/year



Summary

- Synchronize your camera clock to your GPS
 - Not required with a camera with built-in or attached GPS receiver
- Record your track
 - External GPS receiver
 - Camera with built-in GPS receiver
 - Manually geotag your images
- Geotag your images
 - Inexpensive software
 - Not required with a camera with built-in or attached GPS receiver
- Display your images
 - Photo web site
 - Google Earth

