New Features In TerraPhoto

What's New in Terrasolid v011?

Webinar

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Darrick Wagg
GeoCue Group
9668 Madison Blvd., Suite 202
Madison, AL 35758
+1 (256) 461-8289
support@geocue.com
support.geocue.com

Various Improvements

- **Tools / Solve parameters** can now solve calibration values for multiple cameras as one operation
- Tools for converting time stamps between GPS seconds-of-week and GPS standard time
- Support for **Netherlands RD/NAP**
  - Produces orthometric heights
  - Requires x2c.grd, y2c.grd and nlgeo04.grd which we do not have permission to deliver

Various Improvements

- Lever arm and height above ground values are now always treated as meters regardless of active design file unit
- **Derive** command in **Define Color Corrections** does a better job with images with mostly very dark or very bright pixels
- Conversion for bringing in Matlab Camera Calibration Toolkit calibration
- **Convert raster files** can rotate 180 degrees

Various Improvements

- Support for using Point Grey raw images
  - Mitsubishi
- Support for Portable Gray Map raw images
  - Riegl
- **Derive** reports RMS and average magnitude values of residuals when deriving a coordinate transformation between two sets of coordinate points
- Support for group hole elements in **Rectify mosaic** and **Retile images**

Color Point Improvements

- Option to update views automatically after changes to color points or seamlines

Tie Point Improvements

- **Only inside polygons** setting in automatic tie point search for finding tie points only inside polygons on a given level
- **Exclude polygons** setting in automatic tie point search to exclude polygons on a given level
- More compact data format using less RAM
  - Makes it possible to use a larger number of tie points on a large project
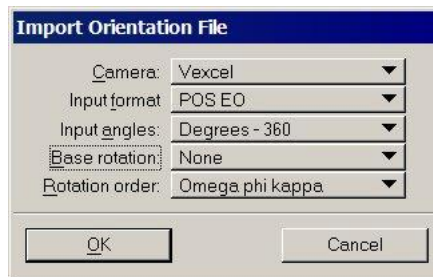
ECW Sub Tile Caching

- TerraPhoto now caches 256*256 tiles of ECW raw images
- Improves speed when using ECW as raw image format

64 bit Image Numbers

- Raw image numbers are now 64 bit
  - Max signed 32 bit value is 2147483647
  - Max signed 64 bit value is 9223372036854775807
- Flexibility in extracting a number from file name
- Can use longer sequence without overflow
- Tie points, color points and selection shapes reference images by image number
- If numbering changes as a result of update, you need to renumber tie points and color points

Import Exterior Orientation Files

- Load list can now read in user defined file formats containing orientation as omega-phi-kappa angles
- Makes it possible to import exterior orientation information from various photogrammetric packages

Import Orientation File

Camera:	Vexcel
Input format	POS EO
Input angles:	Degrees - 360
Base rotation:	None
Rotation order:	Omega phi kappa

OK   Cancel

OPK   vs   HRP

Rotation from image to world coordinates	Rotation from aircraft to local tangent plane
Usually OPK order	Usually HPR order
Misalignment angles usually incorporated	Need camera orientation and misalignment angles to derive complete rotation

Omega ≈ Pitch
Phi ≈ Roll
Kappa ≈ Heading

Example 1 : POS EO

```
**********************************************************************************
  POS Exterior Orientation Computation Utility       Version  4.3
  Copyright (C) 1997-2005 by Applanix Corporation    [July 12, 2005]
  All rights reserved.
**********************************************************************************
 .
 .
 .
Sequence of the rotation from mapping to image frame:
   First rotation is about the 'x' axis by the 'omega' angle.
   Second rotation is about the 'y' axis by the 'phi' angle.
   Third rotation is about the 'z' axis by the 'kappa' angle.
Kappa cardinal rotation:  180.000 deg.
Boresight values: tx =       1.4086 arc min, ty =        3.5144 arc min, tz =      20.4483 arc min.
Lever arm values: lx =       0.0000 m, ly =       0.0000 m, lz =       0.0000 m.
Shift values: X = 0.000000 meter, Y = 0.000000 meter, Z = 0.000000 meter
 .
 .
 .
Record Format:
ID, # EVENT, TIME (s), EASTING, NORTHING, ELLIPSOID HEIGHT, OMEGA, PHI, KAPPA, LAT, LONG
(position in Meters, orientation in Degrees, lat, long in Deg)

2001   51 540744.103509  525383.573 6959904.061 1314.218   -0.06677    0.03049   88.99007 62.76858564
27.49720314
2002   52 540747.482386  525390.245 6960202.916 1315.158   -0.09838    0.03107   89.08774 62.77126747
27.49737900
2003   53 540750.899258  525395.395 6960503.852 1318.364    0.07857    0.24443   89.82573 62.77396809
27.49752540
2004   54 540754.311156  525396.668 6960803.615 1319.839   -0.04925   -0.17208   90.02862 62.77665844
27.49759569
2005   55 540757.733011  525398.621 6961104.048 1320.371   -0.14799   -4.63096   90.27644 62.77935476
27.49767941
2006   56 540761.140881  525391.407 6961403.962 1319.197    0.05526   -0.40228   91.72058 62.78204705
27.49758344
```


Example 2 : ImageStation Triangulation

```
Exterior Orientation from triangulation: StripID PhotoID Time X Y Z Omega Phi Kappa.
   1    0340 373594.51733055 639892.731 5672915.476 1257.727 -0.382 -0.676   1.905
   1    0341 373597.70329928 640096.415 5672923.597 1257.466  0.142 -0.144   2.702
   1    0342 373600.88143149 640299.554 5672932.903 1256.896  0.150 -0.152   2.841
   1    0343 373604.06639067 640502.931 5672941.688 1257.071 -0.066 -0.116   2.684
   1    0344 373607.26880342 640707.235 5672949.915 1257.038 -0.002 -0.157   2.527
   1    0345 373610.41441827 640907.739 5672957.943 1256.963  0.034 -0.136   2.528
   1    0346 373613.59389641 641110.102 5672966.530 1257.289  0.076 -0.119   2.692
   1    0347 373616.78179184 641312.832 5672975.453 1257.706  0.158 -0.106   2.772
   1    0348 373619.92460887 641512.797 5672983.601 1257.266  0.084 -0.127   2.558
   1    0349 373623.09322745 641714.679 5672990.480 1256.854 -0.008 -0.138   2.302
   1    0350 373626.28240298 641918.174 5672995.755 1256.850 -0.073 -0.163   1.901
   1    0351 373629.45711215 642120.853 5673000.098 1257.205 -0.028 -0.170   1.513
   2    0352 373963.50399463 642138.320 5672548.060 1256.101  0.118  0.156 -179.560
   2    0353 373966.07380641 641934.677 5672549.330 1256.716  0.380  0.632 -179.881
   2    0354 373968.62059738 641733.031 5672549.257 1257.567  0.725  1.208 -179.477
   2    0355 373971.19644110 641529.494 5672547.103 1258.813  0.249  0.920 -178.931
   2    0356 373973.83385405 641321.415 5672543.382 1258.861 -0.217 -0.039 -178.669
   2    0357 373976.31314592 641125.241 5672539.570 1256.296 -0.157  0.155 -178.653
   2    0358 373978.87097734 640921.968 5672536.271 1254.137  0.055  0.197 -178.759
   2    0359 373981.42305754 640718.834 5672533.151 1253.655  0.141  0.182 -178.735
   2    0360 373983.99305001 640514.498 5672528.926 1254.381  0.464  1.014 -178.369
   2    0361 373986.56211242 640310.947 5672522.903 1256.025  0.047  0.957 -177.850
   2    0362 373989.09988151 640110.687 5672515.863 1257.583 -0.284  0.239 -177.598
   2    0363 373991.66763591 639908.173 5672508.459 1257.218 -0.182  0.105 -177.626
   3    0494 374761.24023377 639915.093 5672065.277 1257.979 -0.010 -0.143   1.279
   3    0495 374764.39756698 640121.636 5672069.809 1256.247  0.101 -0.222   1.688
   3    0496 374767.47318911 640322.614 5672075.130 1256.909  0.111 -0.110   1.913
   3    0497 374770.54166524 640522.497 5672080.855 1256.697  0.098 -0.102   1.890
   3    0498 374773.69720535 640727.986 5672086.533 1255.301 -0.034 -0.126   1.783
   3    0499 374776.76971066 640928.063 5672091.775 1254.682 -0.109 -0.234   1.737
   3    0500 374779.91255807 641131.619 5672097.875 1256.713 -0.035 -0.566   1.999
   3    0501 374783.08926415 641335.946 5672105.100 1258.154  0.004 -0.121   2.434
   3    0502 374786.26247842 641539.589 5672113.381 1257.400  0.038 -0.084   2.676
```

Rendering & Linear Elements

• Rendering tools render basic linear elements
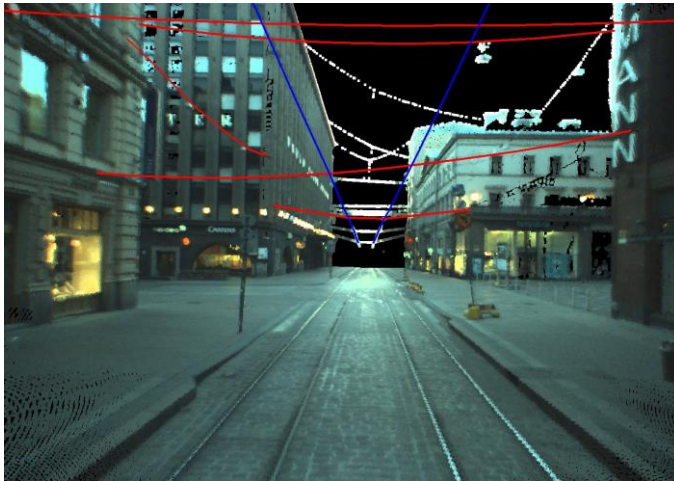
Assign Poor Polygons

• Poor polygons define areas in camera images which should be avoided in rectification

• Use if you have dust in the lens or other small artifacts

• Software fill poor area from another image if possible

• Poor areas will not be used in:
  – Automatic tie point search
  – Automatic color point search
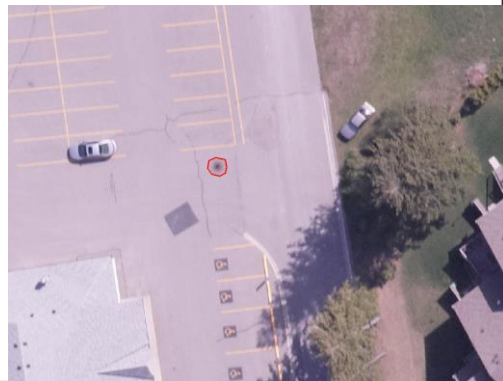
Assign Bad Polygons

- Bad polygons define unusable areas in camera images
- Use this if camera images always see parts of survey car or airplane structures
- Bad areas will not be used in:
  – Rectification
  – Automatic tie point search
  – Automatic color point search
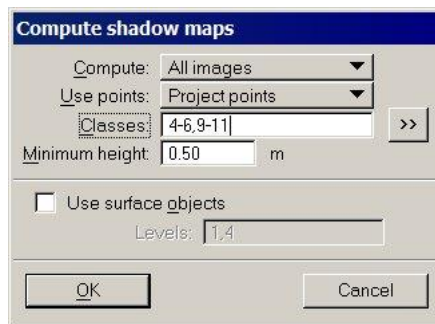 – Extracting RGB colors for laser points

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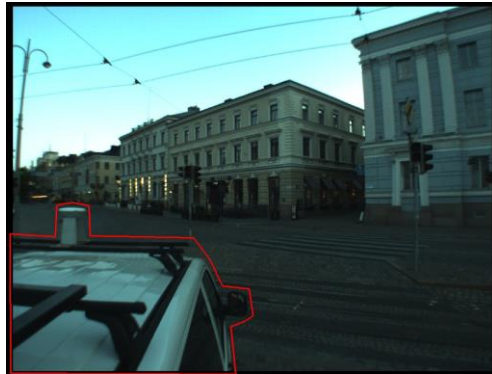
Assign Poor / Bad Polygons

- Attach on raw image as raster reference
- Use **Edit / Modify attachment** to give:
  – Easting origin : 0.00000   Pixel size: 1.00000
  – Northing origin: 0.00000   Pixel size: 1.00000
- Fit a top view to show the image
- Draw polygon(s) around areas
- Start *Define Camera*
- Select polygons and start **Tools / Assign poor polygons** or **Tools / Assign bad polygons**
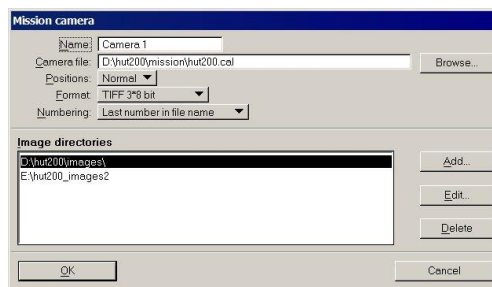- Save camera calibration file

Shadow Map Creation

- Removed from automatic tie point and color point searches
- Dedicated **Utility / Compute shadow maps** menu command

Compute shadow maps

Compute:	All images
Use points:	Project points
Classes:	4-6,9-11
Minimum height:	0.50 m

☐ Use surface objects
Levels: 1,4

OK   Cancel

Multiple Raw Image Directories

- Cameras in mission definition can now have multiple raw image locations
- Makes it possible:
  - Divide large image sets to multiple hard disks
  - To organize images by flight/drive session

Mission camera

Name:	Camera 1
Camera file:	D:\hut200\mission\hut200.cal	Browse...
Positions:	Normal
Format:	TIFF 3*8 bit
Numbering:	Last number in file name

Image directories

D:\hut200\images\
E:\hut200_images2

Add...
Edit..
Delete

OK   Cancel

3*16 Bit Rectification

- **Rectify / Rectify mosaic** can produce 3*16 bit GeoTIFFs
- Most operations in TerraPhoto use 3*8 bit colors:
  - Define color corrections
  - Collecting tie points
  - Collecting color points
  - ...
- Rectification can use 3*16 bit depth in:
  - In applying color corrections from **Define color corrections**
  - In applying color adjustments from color points
  - Rectification