

# Field Calibration Report

## Geometric Field Calibration



**Camera:** UltraCam XpWa, S/N UC-SXp-wa-32618416

**Manufacturer:** Vexcel Imaging GmbH, A-8010 Graz,  
Austria

**Date of Calibration Flight:** February-23-2014

**Date of Report:** April-09-2014

**Camera Revision:** 5.0

**Revision of Report:** 2.0

# Calibration Procedure

The purpose of the Field Calibration is a verification of the camera status and calibration and consists of three major steps:

1. Test flight performed by customer
2. Processing of images and aerotriangulation (AT) by customer or Vexcel Imaging GmbH
3. Analysis of AT results by Vexcel Imaging GmbH

## Available Data

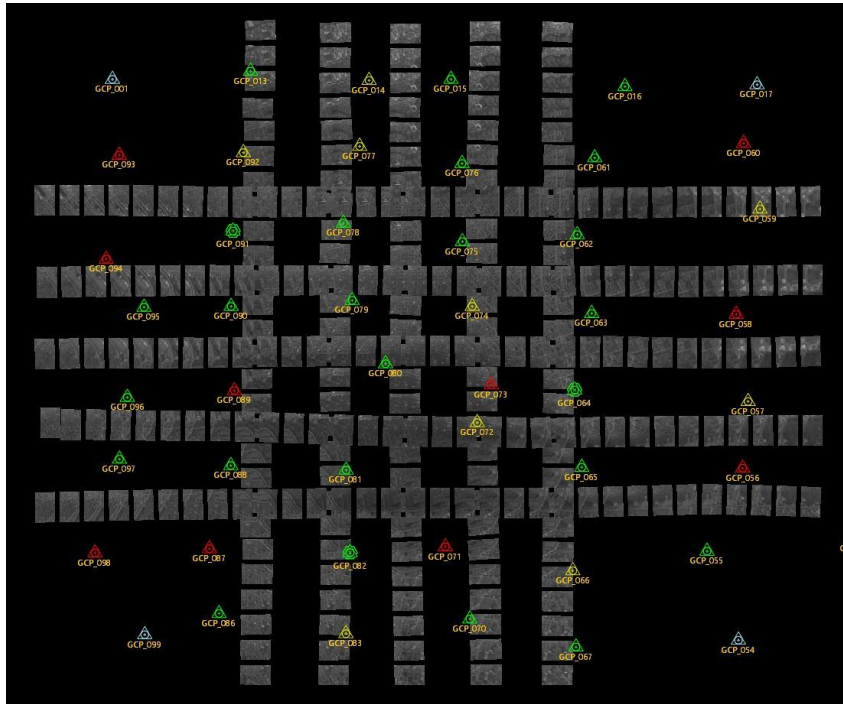
Test flight at customer's test site:

- Date of flight: 23/02/2014
- Number of images: 391 (total)
- Flying heights: 700m (GSD 6cm)  
1400m (GSD 12cm)
- Number of images: 295 (GSD 6cm)  
96 (GSD 12 cm)
- Ground Control Points: 33 (3 were used as check points)
- Postprocessed GPS/IMU: available

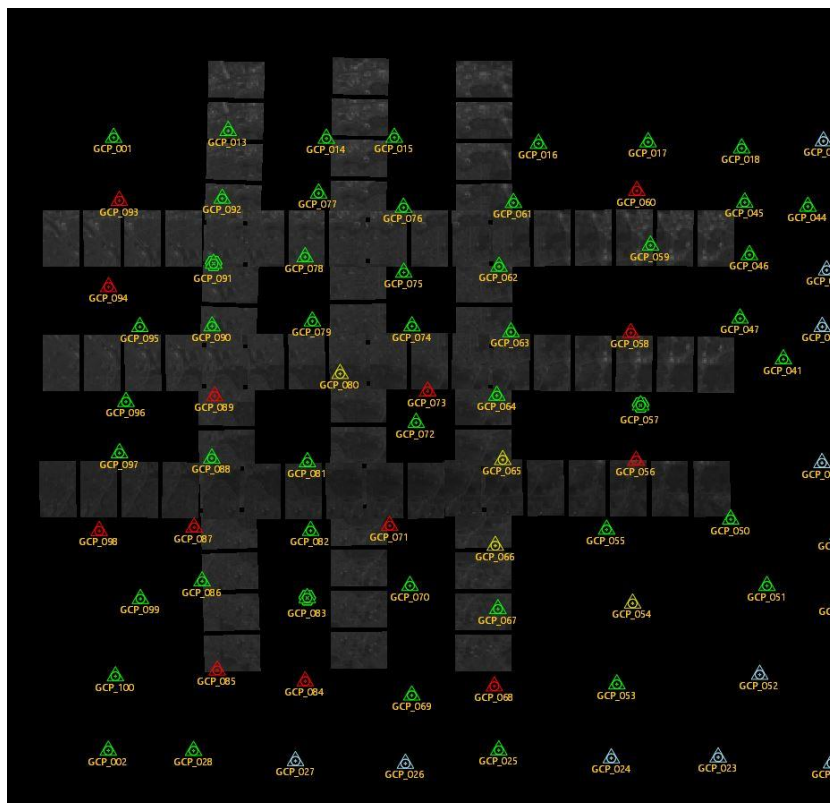
Flight lines look very well done and show good overlap and image quality.

UltraCamXpWa, Serial Number UC-SXp-wa-32618416

### Flight at 700m (GSD 6cm):



### Flight at 1400m (GSD 12cm):



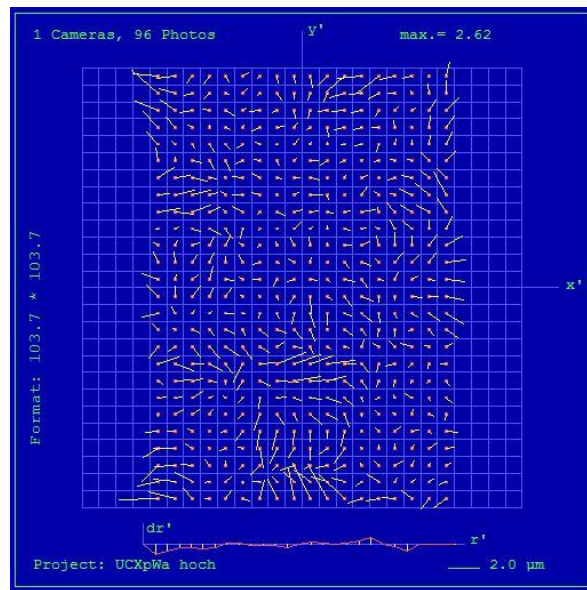
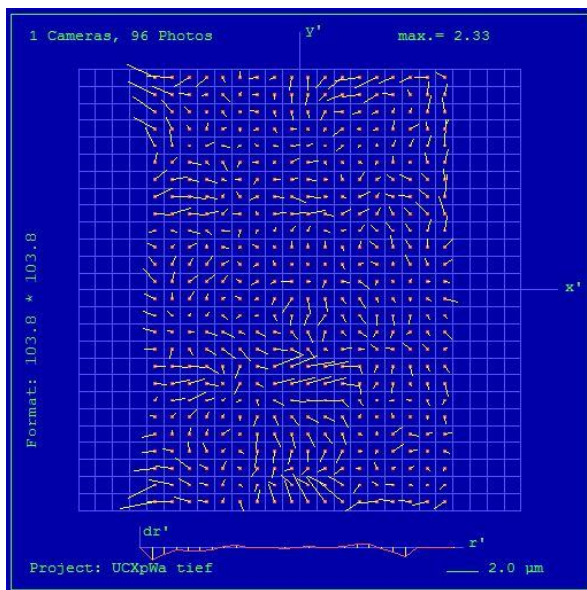
### Results

The data was processed in UltraMap 3.1.4 by Vexcel Imaging GmbH (Process to Lvl02, Automated Tie Point Collection, Bundle Adjustment and Analysis).

The results of the Bundle Adjustment are shown in the table below.

	Flight 700m (GSD 6cm)	Flight 1400m (GSD 12cm)
<b>Sigma 0</b>	1.97	1.68
<b>Mean photo scale</b>	1:9878	1:19822
<b>RMS object points X/Y/Z</b>	11/11/25mm	20/20/45mm
<b>RMS check points X/Y/Z</b>	3/11/21mm	22/13/31mm
<b>RMS control points X/Y/Z</b>	14/16/21mm	11/13/19mm

The remaining residuals in the image of the camera are shown in the plots below.



## Panchromatic Camera

### Large Format Panchromatic Output Image

<b>Image Format</b>	long track	67.860mm	11310pixel
	cross track	103.860mm	17310
<b>Image Extent</b>		(-33.91, -51.95)mm	(33.91, 51.95)mm
<b>Pixel Size</b>		6.000µm*6.000µm	
<b>Focal Length</b>	ck	70.500mm	± 0.002mm
<b>Principal Point (Level 2)</b>	X_ppa	0.000mm	± 0.002mm
	Y_ppa	0.000mm	± 0.002mm
<b>Lens Distortion</b>	Remaining Distortion less than 0.002mm		

## Multispectral Camera

### Medium Format Multispectral Output Image (Upscaled to panchromatic image format)

<b>Image Format</b>	long track	67.860mm	3770pixel
	cross track	103.860mm	5770pixel
<b>Image Extent</b>		(-33.91, -51.95)mm	(33.91, 51.95)mm
<b>Pixel Size</b>		18.000µm*18.000µm	
<b>Focal Length</b>	ck	70.500mm	± 0.002mm
<b>Principal Point (Level 2)</b>	X_ppa	0.000mm	± 0.002mm
	Y_ppa	0.000mm	± 0.002mm
<b>Lens Distortion</b>	Remaining Distortion less than 0.002mm		

## Conclusion

The table above shows acceptable results for the processing with the new camera calibration. The new calibration was verified with two datasets of the same test area acquired at different altitudes. The remaining distortions in the image could be reduced compared to the old calibration and are now in an acceptable range.

This equipment is operating fully within specification as defined by Vexcel Imaging GmbH.



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