



VEXCEL
IMAGING

ULTRACAM

Field Calibration Report



Camera: UltraCam Eagle Mark II
Serial: UC-Ep-1-70013023-f100
Manufacturer: Vexcel Imaging GmbH, A-8010 Graz, Austria

Date of Calibration Flight: Dec-14-2017
Date of Report: Feb-09-2018
Camera Revision: Rev02.00
Version of Report: V01

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Bahia, Brasil 2013

Photo on page 1 courtesy of Hiparc Geotecnologia, Brasil

www.hiparc.com

UltraCam Lp, GSD25 cm, RGB



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 Vexcel Imaging GmbH
3. Analysis of AT results by Vexcel Imaging GmbH

Available Data

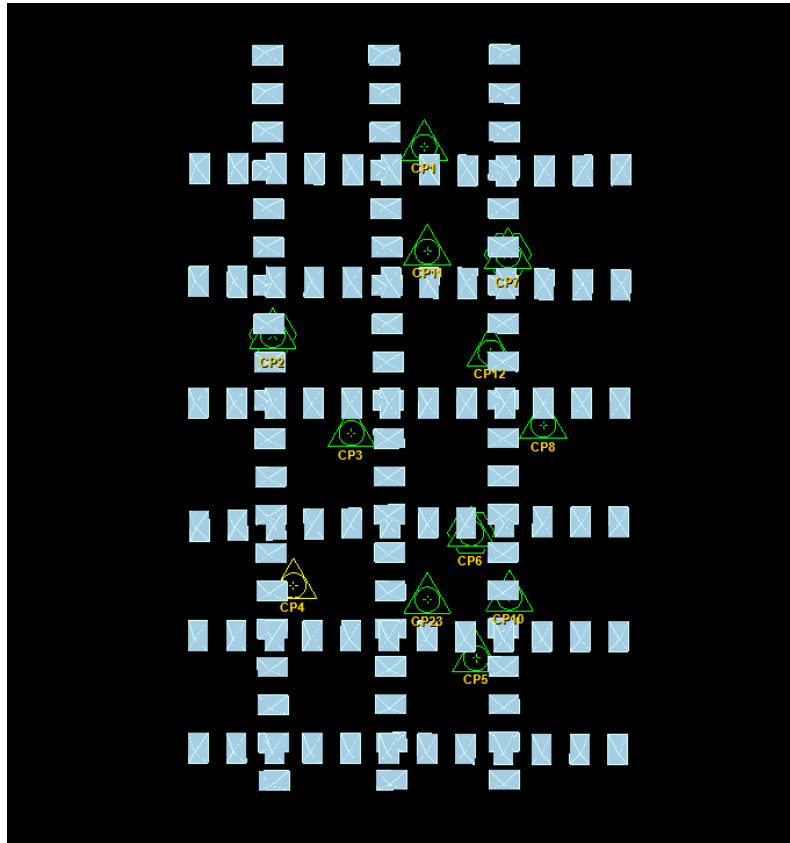
Test flight at customer's test site:

- Date of flight: 14/12/2017
- Number of images: 195 (total)
- Flying heights: 2300m (GSD 10cm)
4420m (GSD 20cm)
- Number of images: 132 (GSD 10cm)
63 (GSD 20cm)
- Ground Control Points: 17 (3 were used as check points)
- Postprocessed GPS/IMU: available

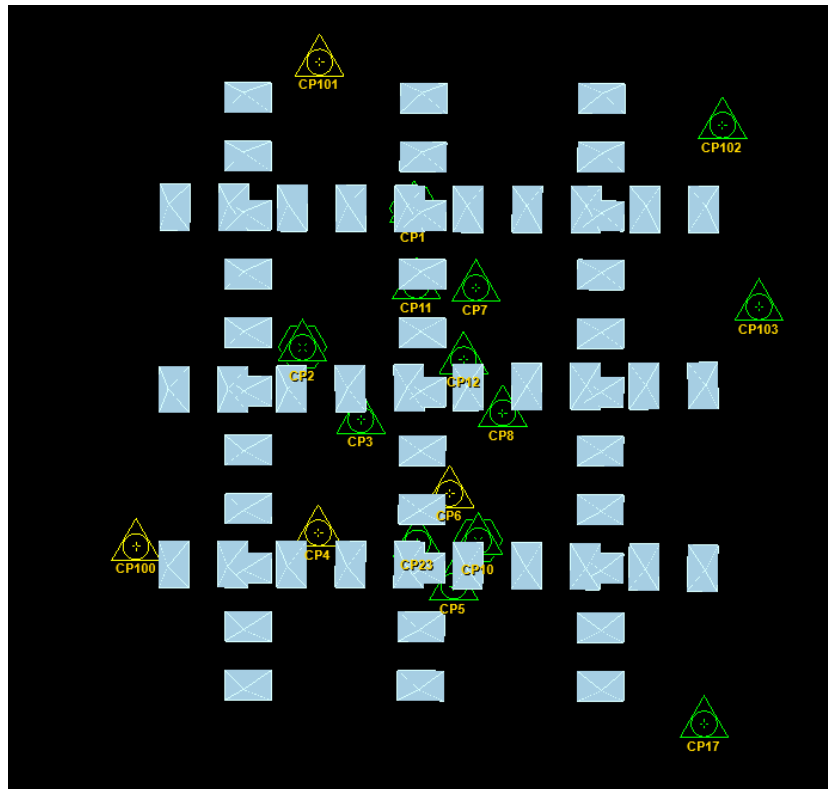
Flight lines look very well done and show good overlap and image quality.



- Flight at 2300m (GSD 10cm):



- Flight at 4420m (GSD 20cm):





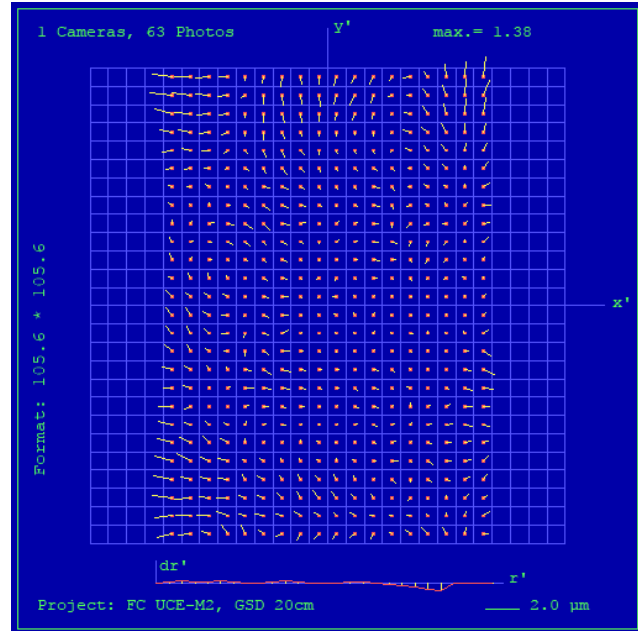
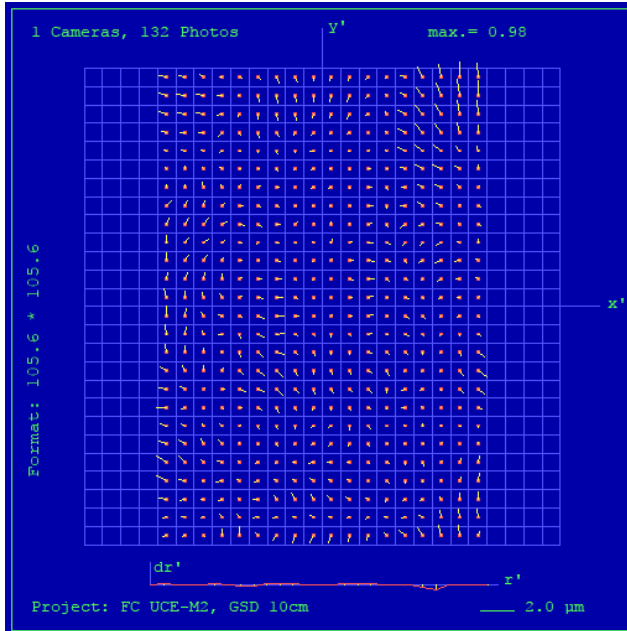
Results

The data was processed in UltraMap v4.3 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 2300m (GSD 10cm)	Flight 4420m (GSD 20cm)
Sigma 0	0.99	1.00
Mean photo scale	1:21785	1:42740
RMS object points X/Y/Z	15/15/50mm	28/28/106mm
RMS check points X/Y/Z	82/97/80mm	92/60/85mm
RMS control points X/Y/Z	60/120/46mm	69/68/45mm

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





ULTRACAM

Geometric Specifications

Camera:	UltraCam Eagle Mark II
Serial:	UC-Ep-1-70013023-f100

Panchromatic Camera:	ck = 100.500 mm
Multispectral Camera:	ck = 100.500 mm

PPA Information:	X: -0.092 mm
	Y: 0.000 mm



Panchromatic Camera

Large Format Panchromatic Output Image

Image Format	long track cross track	68.03mm 105.85mm	14790pixel 23010pixel
Image Extent		(-34.02, -52.93)mm	(34.02, 52.93)mm
Pixel Size		4.600μm*4.600μm	
Focal Length	ck	100.500mm	± 0.002mm
Principal Point (Level 2)	X_ppa	-0.092mm	± 0.002mm
	Y_ppa	0.000mm	± 0.002mm
Lens Distortion	Remaining Distortion less than 0.002mm		

Multispectral Camera

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

Image Format	long track cross track	68.03mm 105.85mm	4930pixel 7670pixel
Image Extent		(-34.02, -52.93)mm	(34.02, 52.93)mm
Pixel Size		13.800μm*13.800μm	
Focal Length	ck	100.500mm	± 0.002mm
Principal Point (Level 2)	X_ppa	-0.092mm	± 0.002mm
	Y_ppa	0.000mm	± 0.002mm
Lens Distortion	Remaining Distortion less than 0.002mm		



Conclusion

The tables and plots above show acceptable results for the processing with the new camera calibration. The calibration was verified with two datasets of the same test area acquired at different altitudes. The remaining distortions in the image are within an acceptable range.

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

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