

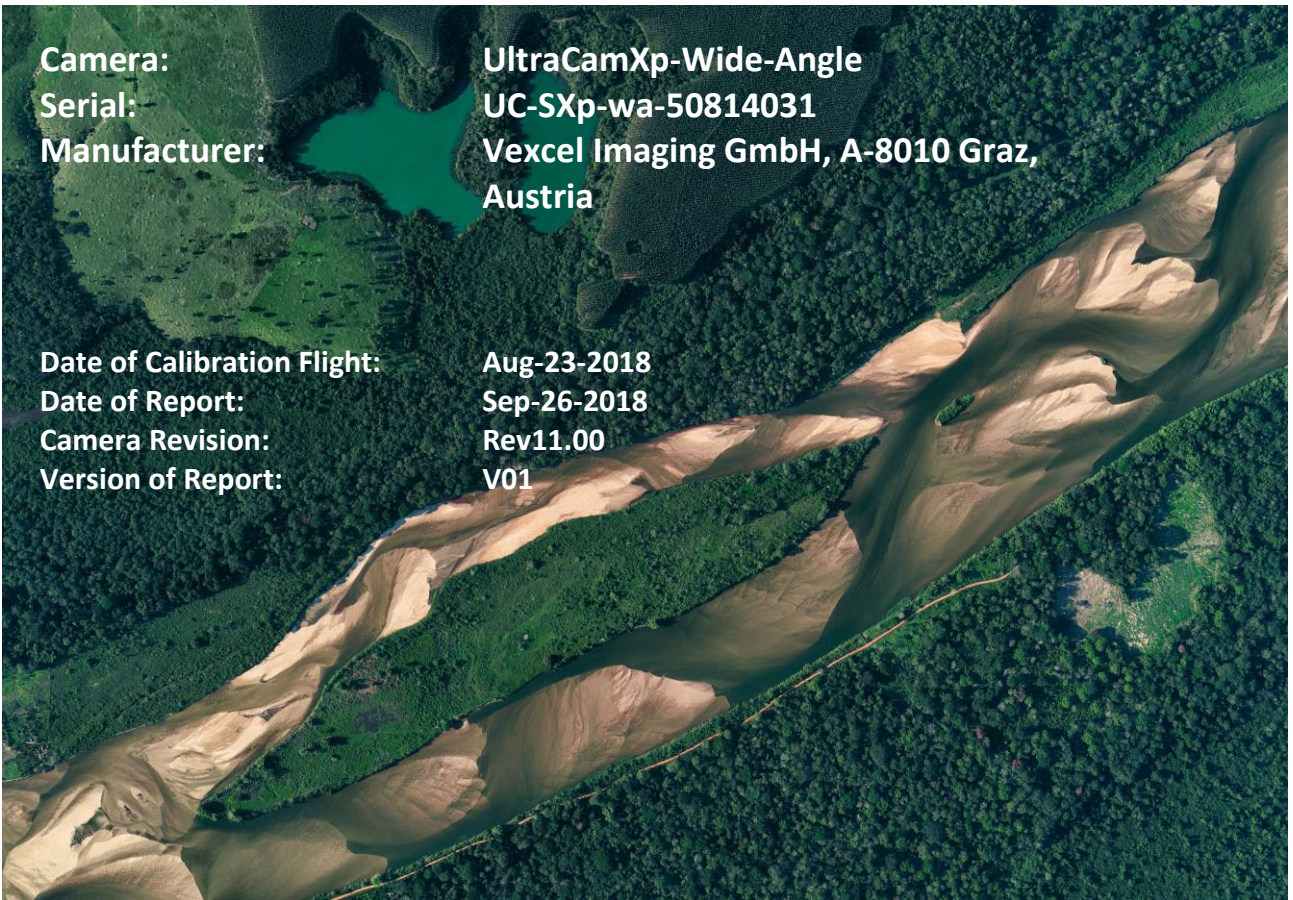


# ULTRACAM

## Field Calibration Report

Camera: UltraCamXp-Wide-Angle  
Serial: UC-SXp-wa-50814031  
Manufacturer: Vexcel Imaging GmbH, A-8010 Graz,  
Austria

Date of Calibration Flight: Aug-23-2018  
Date of Report: Sep-26-2018  
Camera Revision: Rev11.00  
Version of Report: V01



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Bahia, Brasil 2013

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[www.hiparc.com](http://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: 08/23/2018
- Number of images: 274 (total)
- Flying heights: 1200m (GSD 10cm)  
2400m (GSD 20cm)
- Number of images: 205 (GSD 10cm)  
69 (GSD 20cm)
- Ground Control Points: 41 (13 were used as check points)
- Postprocessed GPS/IMU: available

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



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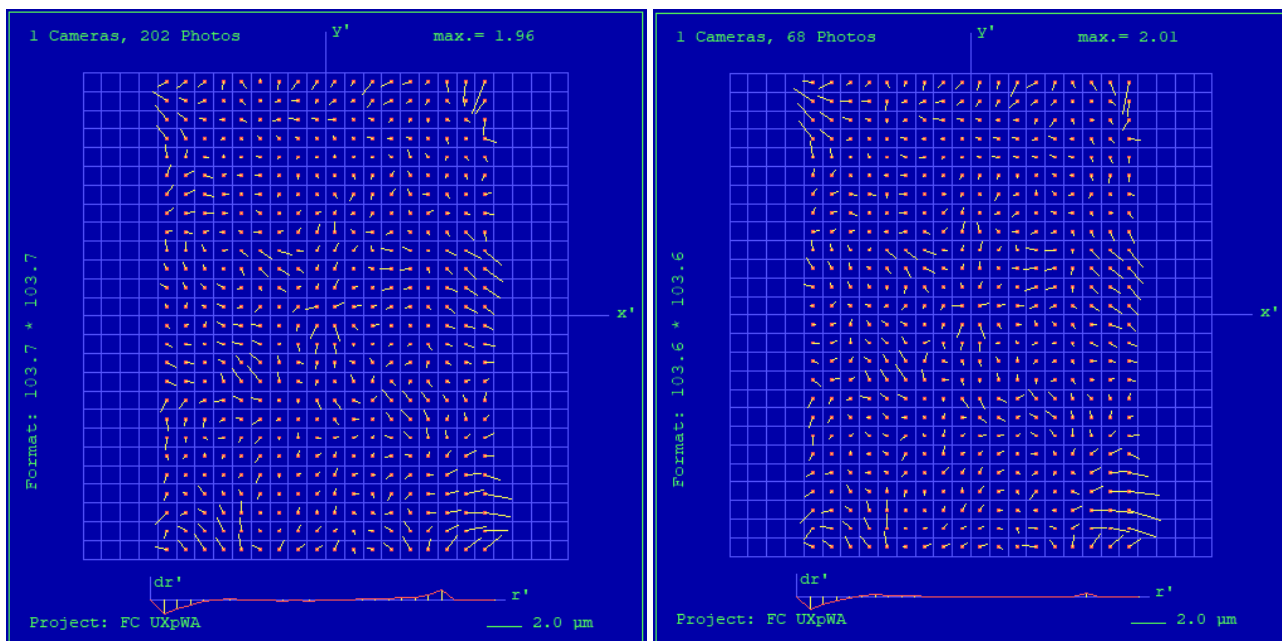
## Results

The data was processed in UltraMap V4.4.3 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 1200m (GSD 10cm)	Flight 2400m (GSD 20cm)
<b>Sigma 0</b>	1.41	1.12
<b>Mean photo scale</b>	1:16 111	1:32 772
<b>RMS object points X/Y/Z</b>	17/18/44mm	34/37/112mm
<b>RMS check points X/Y/Z</b>	45/81/143mm	62/110/250mm
<b>RMS control points X/Y/Z</b>	65/48/156mm	74/59/140mm

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





# ULTRACAM

## Geometric Specifications

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<b>Camera:</b>	<b>UltraCamXp-Wide-Angle</b>
<b>Serial:</b>	<b>UC-SXp-wa-50814031</b>

<b>Panchromatic Camera:</b>	<b>ck = 70.500 mm</b>
<b>Multispectral Camera:</b>	<b>ck = 70.500 mm</b>

<b>PPA Information:</b>	<b>X: 0.000 mm</b>
	<b>Y: 0.120 mm</b>



## Panchromatic Camera

### Large Format Panchromatic Output Image

Image Format	long track cross track	67.860mm 103.860mm	11310pixel 17310pixel
Image Extent		(-33.93, -51.93)mm	(33.93, 51.93)mm
Pixel Size		6.000μm*6.000μm	
Focal Length	ck	70.500mm	± 0.002mm
Principal Point (Level 2)	X_ppa	0.000mm	± 0.002mm
	Y_ppa	0.120mm	± 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	67.860mm 103.860mm	3770pixel 5770pixel
Image Extent		(-33.93, -51.93)mm	(33.93, 51.93)mm
Pixel Size		18.000μm*18.000μm	
Focal Length	ck	70.500mm	± 0.002mm
Principal Point (Level 2)	X_ppa	0.000mm	± 0.002mm
	Y_ppa	0.120mm	± 0.002mm
Lens Distortion	Remaining Distortion less than 0.002mm		



## Conclusion

The tables and plots above show acceptable results for the processing with the 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.

Dr. Michael Gruber  
Chief Scientist, Photogrammetry  
Vexcel Imaging GmbH

Marc Muick MSc.  
Application Specialist  
Vexcel Imaging GmbH