

LOCALIZZAZIONE

REGIONE SICILIA  
PROVINCIA DI TRAPANI  
COMUNE DI GIBELLINA



**Acciona Energia Global Italia S.r.l.**

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Capitale sociale: Euro 310.000,00 i.v.

Ufficio Registro Imprese – Roma: C.F. e P. IVA n. 12990031002

R.E.A.– Roma: 1415727

Direzione e coordinamento: Acciona Energía Global S.L.

PEC: accionablobalitalia@legalmail.it

TITOLO BREVE

**AGRIVOLTAICO "GIBELLINA"**

SPAZIO PER ENTI (VISTI, PROTOCOLLI, APPROVAZIONI, ALTRO)

REVISIONI						
	00	12/04/2023	PRIMA EMISSIONE ELABORATO	Vincenzo Ruvolo	Dario D'Angelo	Claudio Rizzo
	REV	DATA	DESCRIZIONE	REDATTO	VERIFICATO	APPROVATO

PROPONENTE



**Acciona Energia Global Italia S.r.l.**

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PROGETTAZIONE E SERVIZI



ENVLAB s.r.l.s. - C.F./P. IVA 02920050842  
Piazza Capelvenere n. 2 - 92016 RIBERA (AG)  
T 0925 096280 - envlab@pec.it - www.envlab.it

CODICE ELABORATO

AC-GIBELLINA-AFV-PD-R-1.1.2.0-r0A-R00

FOGLIO

1/20

FORMATO

A4

SCALA

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IL DIRETTORE TECNICO DI ENVLAB



PROGETTO



**IMPIANTO AGRIVOLTAICO "GIBELLINA"**

PROGETTO PER LA REALIZZAZIONE DI UN IMPIANTO AGRIVOLTAICO DELLA POTENZA DI 29,15 MWp (28,00 MW IN IMMISSIONE) E RELATIVE OPERE DI CONNESSIONE ALLA RTN RICADENTE NEL COMUNE DI GIBELLINA (TP)

OGGETTO ELABORATO

PROGETTO DEFINITIVO

**REPORT RILIEVO E RESTITUZIONE  
AEROFOTOGRAMMETRICA DELLE AREE DI PROGETTO**

Progettazione e Consulenza Ambientale	ELABORATO	PROPONENTE
	<p align="center"><b>REPORT RILIEVO E RESTITUZIONE ORTOFOTOGRAMMETRICA DELLE AREE DI PROGETTO</b></p>	 <p>Acciona Energia Global Italia S.r.l. Via Achille Campanile, 73 – 00144 Roma C.F. e P. IVA n. 12990031002</p>
<p align="center"><i>IMPIANTO AGRIVOLTAICO "GIBELLINA"</i>  PROGETTO PER LA REALIZZAZIONE DI UN IMPIANTO AGRIVOLTAICO DELLA POTENZA DI 29,15 MWp (28,00 MW IN IMMISSIONE) E  RELATIVE OPERE DI CONNESSIONE ALLA RTN RICADENTE NEL COMUNE DI GIBELLINA (TP)</p>		

## 1. PREMESSA

Il presente documento costituisce il Report relativo alle operazioni di rilievo e restituzione ortofotogrammetrica delle aree interessate dal progetto dell'impianto agrivoltaico "GIBELLINA" della potenza di 29,15 MWp (28,00 MW in immissione) e delle relative opere di connessione alla RTN che la società ACCIONA ENERGIA GLOBAL ITALIA S.r.l. intende realizzare nel Comune di Gibellina in provincia di Trapani.

Il soggetto proponente dell'iniziativa è la Società ACCIONA ENERGIA GLOBAL ITALIA S.r.l. avente sede legale ed operativa in ROMA, VIA ACHILLE CAMPANILE n. 73, iscritta nella Sezione Ordinaria della Camera di Commercio Industria Agricoltura ed Artigianato di Roma, C.F. e P.IVA N. 12990031002.

In particolare il rilievo aero-topografico o fotogrammetrico di prossimità è operato mediante Sistemi Aeromobili a Pilotaggio Remoto (SAPR, comunemente denominati "droni") registrati presso ENAC: la finalità è quella di fornire, attraverso l'attività di tecnici qualificati ed abilitati, un modello fotogrammetrico, ovvero un modello tridimensionale misurabile, in scala, dell'area rilevata, che ne riporta tutte le caratteristiche geometriche, cromatiche e materiche e che rappresenta un database sempre interrogabile.

La ENVLAB è operatore regolarmente abilitato da ENAC con codice "ITEFZcUeXi" verificabile nell'elenco operatori raggiungibile al seguente link [https://www.d-flight.it/new\\_portal/elenco-operatori/](https://www.d-flight.it/new_portal/elenco-operatori/).

La pianificazione del volo del SAPR consta della definizione dei parametri necessari all'esecuzione del rilievo fotogrammetrico di prossimità da SAPR che sono:

- *Ts tempo di scatto (espresso in secondi);*
- *Fs frequenza di scatto (n° foto al secondo);*
- *Vs velocità di volo del SAPR (metri/secondo);*
- *GSD (Ground Simple Distance).*

Il rilievo dell'area oggetto del progetto è stato eseguito mediante l'ausilio di sistemi aerofotogrammetrici, con apposito aeromobile a pilotaggio remoto o APR, dotato di camera digitale ad alta risoluzione.



L'impianto topografico generale e il rilievo dei relativi Ground Control Point (GCP) posizionati secondo il piano di volo programmato, è stato condotto mediante strumentazione GPS (NRTK-GNSS) e successiva acquisizione, interpretazione, elaborazione e restituzione finale di dati.

I dati risultanti dai rilievi acquisiti con sistemi APR costituiscono il dato di input per le successive analisi di caratterizzazione dell'area indagata.

L'APR è condotto da un pilota in possesso del riconoscimento della competenza (Attestato/Licenza di Pilota di APR), in stato di validità di cui alla Sezione IV del Regolamento ENAC vigente.

Il rilievo si è svolto secondo le seguenti attività:

1. *pianificazione piano di volo in funzione delle condizioni climatiche;*
2. *rilievo aerofotogrammetrico mediante sistema APR;*
3. *elaborazione big data da rilievo;*
4. *restituzione di cartografia di base in scala di dettaglio in proiezione planoaltimetrica;*
5. *realizzazione di un modello tridimensionale in formato mesh;*

Progettazione e Consulenza Ambientale	ELABORATO	PROPONENTE
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<p align="center"><i>IMPIANTO AGRIVOLTAICO "GIBELLINA"</i>            PROGETTO PER LA REALIZZAZIONE DI UN IMPIANTO AGRIVOLTAICO DELLA POTENZA DI 29,15 MWp (28,00 MW IN IMMISSIONE) E            RELATIVE OPERE DI CONNESSIONE ALLA RTN RICADENTE NEL COMUNE DI GIBELLINA (TP)</p>		

6. *produzione di un dettagliato Modello Digitale del Terreno (DTM);*
7. *elaborazione di un ortofotopiano in formato TFF/TFW e sua sovrapposizione alla CTR regionale o alla aerofotogrammetria pubblica esistente;*
8. *estrapolazione di curve di livello del terreno sull'intera area indagata in formato DWG/SHP, UTM dato ERTS 89/WGS84;*
9. *estrapolazione di punti quotati;*
10. *produzione di ortofoto in formato .kml da importare direttamente in Google Earth.*

Le informazioni acquisite con metodo fotogrammetrico sono state integrate da rilievi in campo con strumentazione topografica e/o GNSS per garantire la corretta definizione della geometria del terreno oggetto di studio.

Nel seguito è riportato integralmente il Report generato dal software PIX4D impiegato per l'elaborazione delle immagini georeferenziate acquisite da Drone.

Le migliaia immagini in alta risoluzione, la grande quantità di dati generata e le elaborazioni di modelli 3D, DEM ed ortomosaici sono disponibili presso gli archivi digitali di Envlab per eventuale consultazione su richiesta.

- !** **Important:** Click on the different icons for:
- ?** Help to analyze the results in the Quality Report
  - i** Additional information about the sections

**💡** Click [here](#) for additional tips to analyze the Quality Report

## Summary



Project	gibellina_new
Processed	2022-11-22 11:56:49
Camera Model Name(s)	FC6310_8.8_5472x3648 (RGB)
Average Ground Sampling Distance (GSD)	2.87 cm / 1.13 in
Area Covered	0.922 km <sup>2</sup> / 92.1695 ha / 0.36 sq. mi. / 227.8736 acres
Time for Initial Processing (without report)	01h:16m:54s

## Quality Check



<b>?</b> Images	median of 66132 keypoints per image	✓
<b>?</b> Dataset	983 out of 983 images calibrated (100%), all images enabled	✓
<b>?</b> Camera Optimization	2.89% relative difference between initial and optimized internal camera parameters	✓
<b>?</b> Matching	median of 26978.9 matches per calibrated image	✓
<b>?</b> Georeferencing	yes, no 3D GCP	⚠

## **?** Preview

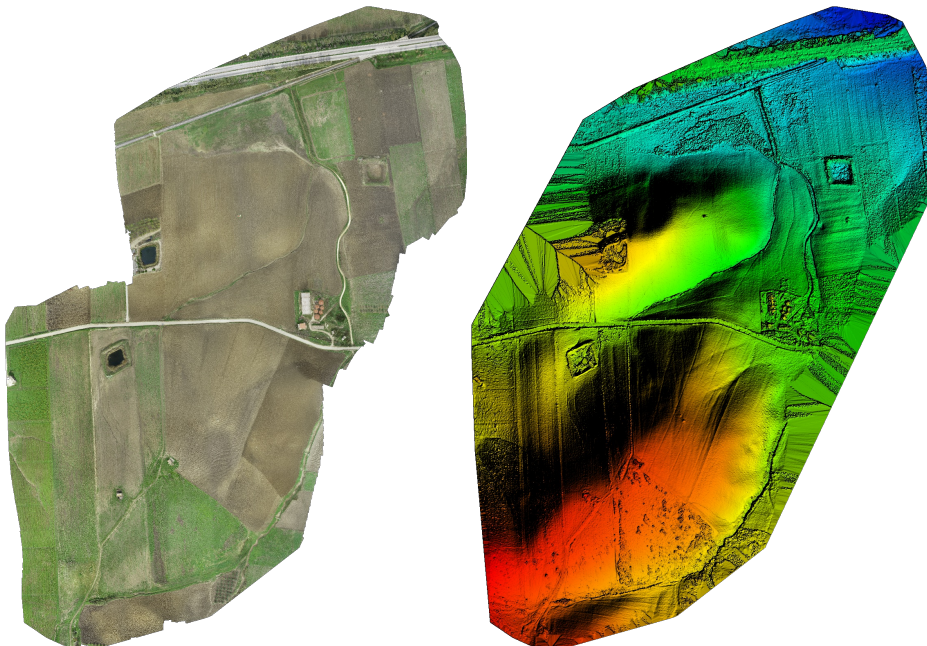


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

# Calibration Details



Number of Calibrated Images	983 out of 983
Number of Geolocated Images	983 out of 983

## Initial Image Positions

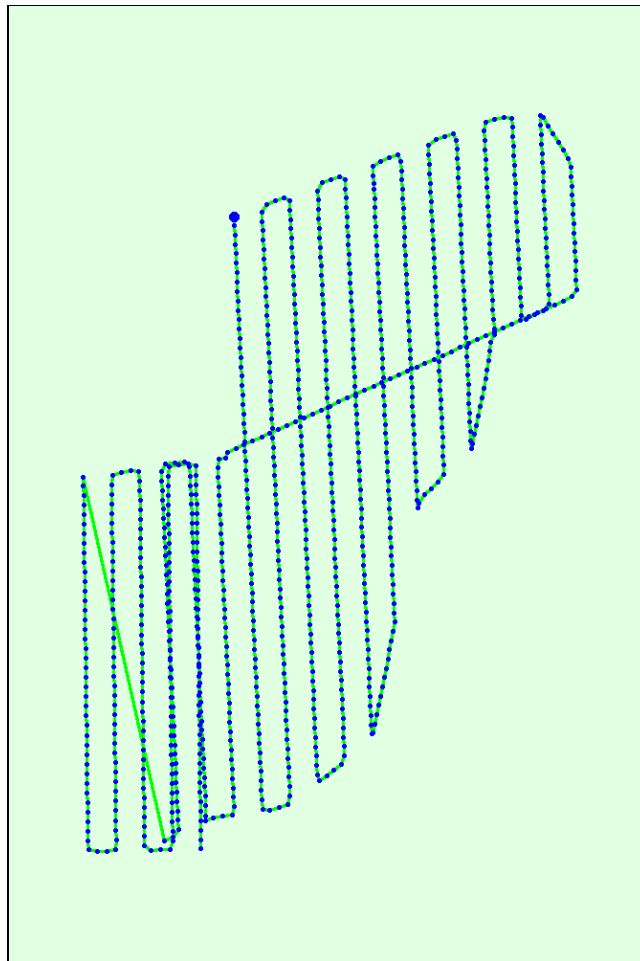
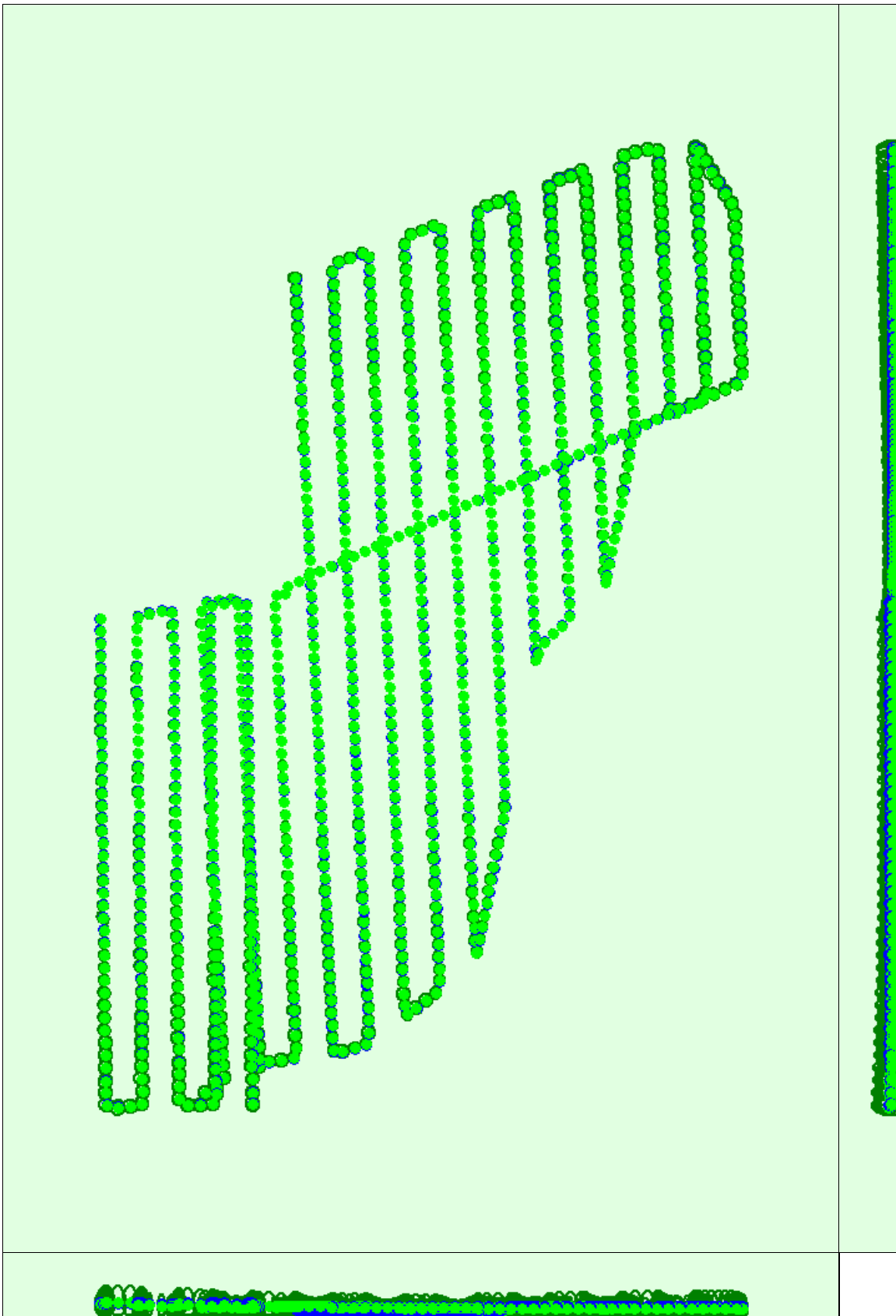


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

## Computed Image/GCPs/Manual Tie Points Positions





Uncertainty ellipses 100x magnified

Figure 3: Offset between initial (blue dots) and computed (green dots) image positions as well as the offset between the GCPs initial positions (blue crosses) and their computed positions (green crosses) in the top-view (XY plane), front-view (XZ plane), and side-view (YZ plane). Dark green ellipses indicate the absolute position uncertainty of the bundle block adjustment result.

### 🔍 Absolute camera position and orientation uncertainties



	X[m]	Y[m]	Z[m]	Omega [degree]	Phi [degree]	Kappa [degree]
Mean	0.063	0.063	0.138	0.022	0.021	0.007
Sigma	0.012	0.012	0.027	0.003	0.003	0.000

## Overlap

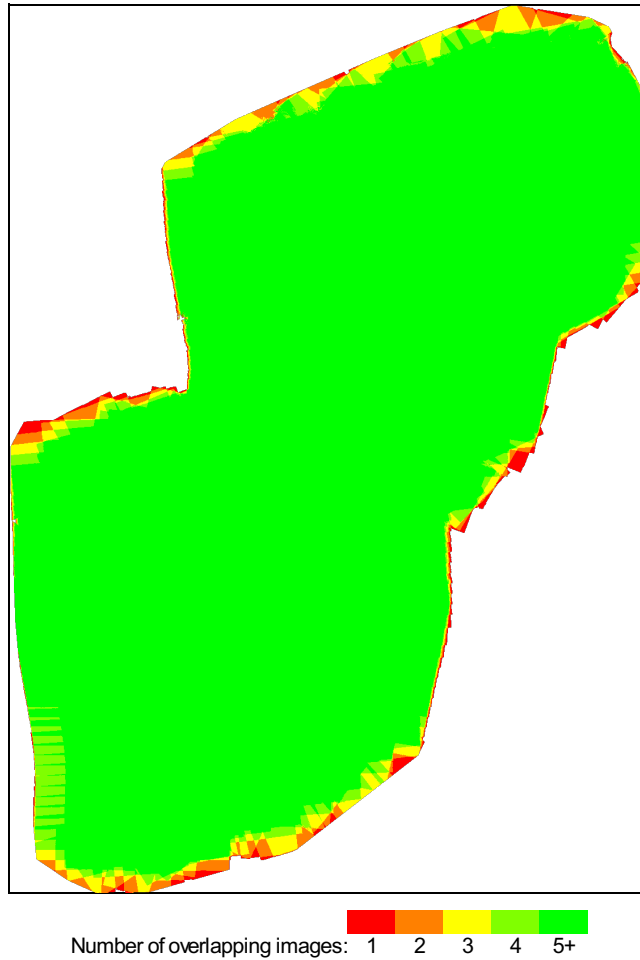


Figure 4: Number of overlapping images computed for each pixel of the orthomosaic. Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint matches is also sufficient for these areas (see Figure 5 for keypoint matches).

## Bundle Block Adjustment Details



Number of 2D Keypoint Observations for Bundle Block Adjustment	26962568
Number of 3D Points for Bundle Block Adjustment	8060799
Mean Reprojection Error [pixels]	0.115

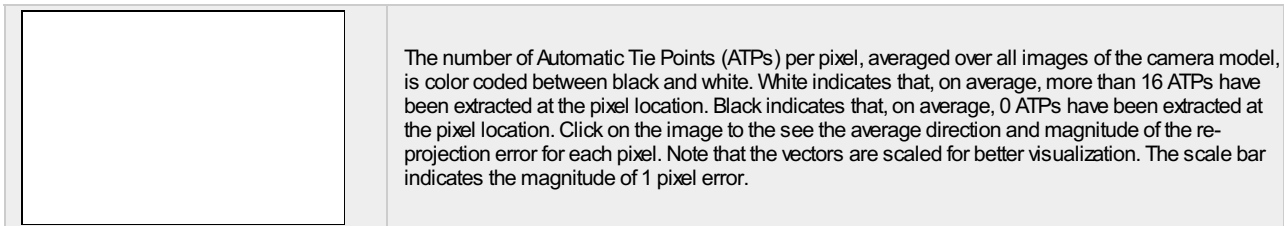
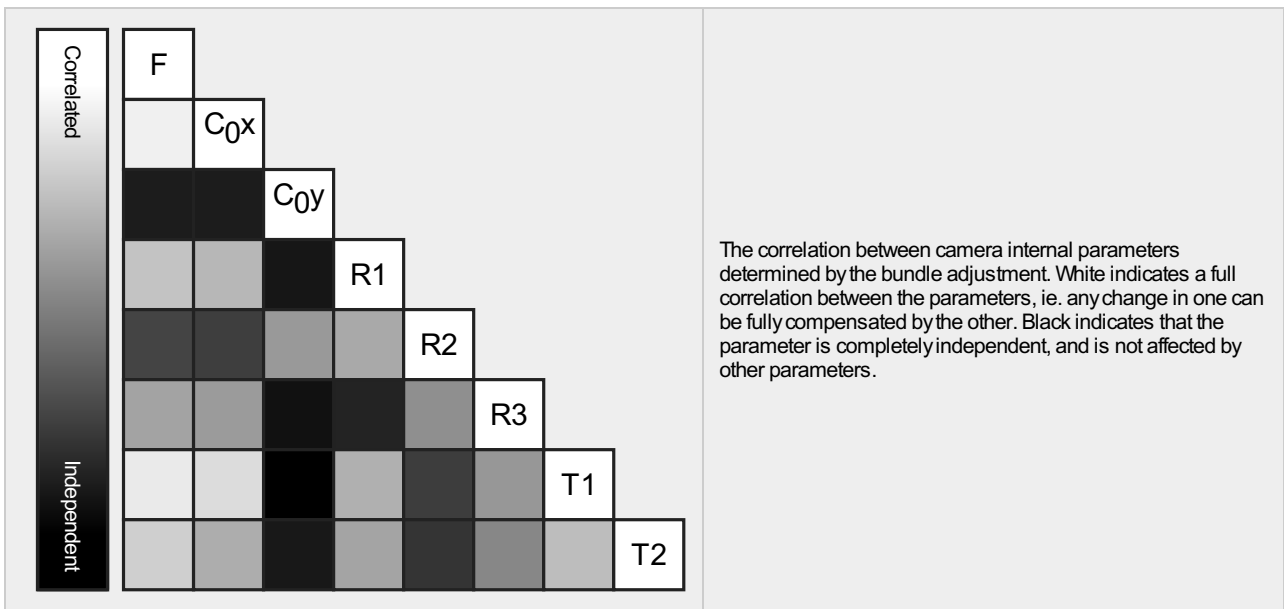
## Internal Camera Parameters

FC6310\_8.8\_5472x3648 (RGB). Sensor Dimensions: 12.833 [mm] x 8.556 [mm]



EXIF ID: FC6310S\_8.8\_5472x3648

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	3668.759 [pixel] 8.604 [mm]	2736.001 [pixel] 6.417 [mm]	1823.999 [pixel] 4.278 [mm]	0.003	-0.008	0.008	-0.000	0.000
Optimized Values	3775.132 [pixel] 8.854 [mm]	2714.902 [pixel] 6.367 [mm]	1806.208 [pixel] 4.236 [mm]	-0.015	0.004	0.007	-0.002	-0.001
Uncertainties (Sigma)	8.242 [pixel] 0.019 [mm]	0.160 [pixel] 0.000 [mm]	0.051 [pixel] 0.000 [mm]	0.000	0.000	0.000	0.000	0.000



### 2D Keypoints Table

	Number of 2D Keypoints per Image	Number of Matched 2D Keypoints per Image
Median	66132	26979
Mn	48993	3008
Max	81865	45968
Mean	66412	27429

### 3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	4383993
In 3 Images	1574117
In 4 Images	761463
In 5 Images	425304
In 6 Images	260295
In 7 Images	170977
In 8 Images	120457
In 9 Images	85712
In 10 Images	63532
In 11 Images	46472
In 12 Images	35687
In 13 Images	27446
In 14 Images	21639
In 15 Images	17311
In 16 Images	13110
In 17 Images	10740
In 18 Images	8569
In 19 Images	6689
In 20 Images	5606
In 21 Images	4351
In 22 Images	3664
In 23 Images	2969



In 24 Images	2433
In 25 Images	1944
In 26 Images	1614
In 27 Images	1343
In 28 Images	986
In 29 Images	755
In 30 Images	581
In 31 Images	386
In 32 Images	267
In 33 Images	148
In 34 Images	92
In 35 Images	71
In 36 Images	34
In 37 Images	22
In 38 Images	14
In 39 Images	5
In 40 Images	1

 **2D Keypoint Matches**



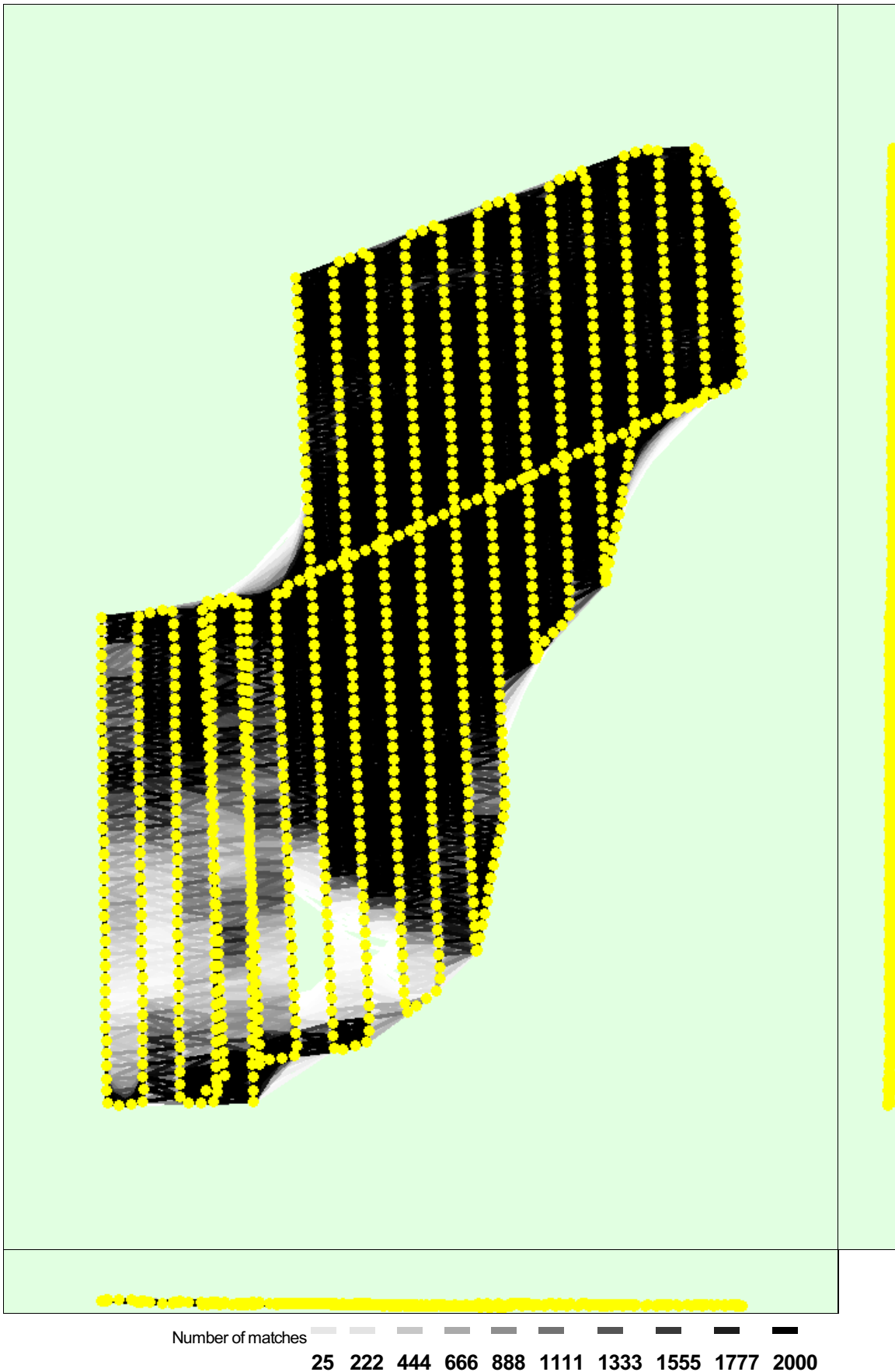


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images.

## Geolocation Details

## ? Absolute Geolocation Variance



Min Error [m]	Max Error [m]	Geolocation Error X [%]	Geolocation Error Y [%]	Geolocation Error Z [%]
-	-15.00	0.00	0.00	0.00
-15.00	-12.00	0.00	0.00	0.00
-12.00	-9.00	0.00	0.00	0.00
-9.00	-6.00	0.00	0.00	0.00
-6.00	-3.00	0.00	0.00	9.05
-3.00	0.00	47.10	48.32	38.15
0.00	3.00	52.90	51.68	45.37
3.00	6.00	0.00	0.00	7.43
6.00	9.00	0.00	0.00	0.00
9.00	12.00	0.00	0.00	0.00
12.00	15.00	0.00	0.00	0.00
15.00	-	0.00	0.00	0.00
<b>Mean [m]</b>		0.000000	0.000000	0.000000
<b>Sigma [m]</b>		0.322084	1.055109	2.113915
<b>RMS Error [m]</b>		0.322084	1.055109	2.113915

Min Error and Max Error represent geolocation error intervals between -1.5 and 1.5 times the maximum accuracy of all the images. Columns X, Y, Z show the percentage of images with geolocation errors within the predefined error intervals. The geolocation error is the difference between the initial and computed image positions. Note that the image geolocation errors do not correspond to the accuracy of the observed 3D points.

## ? Relative Geolocation Variance



Relative Geolocation Error	Images X [%]	Images Y [%]	Images Z [%]
[-1.00, 1.00]	100.00	100.00	100.00
[-2.00, 2.00]	100.00	100.00	100.00
[-3.00, 3.00]	100.00	100.00	100.00
<b>Mean of Geolocation Accuracy [m]</b>	5.000000	5.000000	10.000000
<b>Sigma of Geolocation Accuracy [m]</b>	0.000000	0.000000	0.000000

Images X, Y, Z represent the percentage of images with a relative geolocation error in X, Y, Z.

Geolocation Orientational Variance	RMS [degree]
Omega	0.263
Phi	0.629
Kappa	7.562

Geolocation RMS error of the orientation angles given by the difference between the initial and computed image orientation angles.

# Initial Processing Details



## System Information



Hardware	CPU: Intel(R) Core(TM) i7-10700 CPU @2.90GHz RAM: 16GB GPU: NVIDIA Quadro P1000 (Driver: 31.0.15.1740), Intel(R) UHD Graphics 630 (Driver: 27.20.100.8190), Virtual MonitorX (Driver: 17.10.42.834)
Operating System	Windows 10 Pro, 64-bit

## Coordinate Systems



Image Coordinate System	WGS 84 (EGM96 Geoid)
Output Coordinate System	WGS 84 / UTMzone 33N (EGM96 Geoid)

## Processing Options



Detected Template	CUDDIACURVE OK*
Keypoints Image Scale	Full, Image Scale: 1
Advanced: Matching Image Pairs	Aerial Grid or Corridor
Advanced: Matching Strategy	Use Geometrically Verified Matching: no
Advanced: Keypoint Extraction	Targeted Number of Keypoints: Automatic
Advanced: Calibration	Calibration Method: Standard Internal Parameters Optimization: All External Parameters Optimization: All Rematch: Auto, no

## Point Cloud Densification details



### Processing Options



Image Scale	multiscale, 1/2 (Half image size, Default)
Point Density	Optimal
Minimum Number of Matches	3
3D Textured Mesh Generation	yes
3D Textured Mesh Settings:	Resolution: Medium Resolution (default) Color Balancing: no
LOD	Generated: no
Advanced: 3D Textured Mesh Settings	Sample Density Divider: 1
Advanced: Image Groups	group1
Advanced: Use Processing Area	yes
Advanced: Use Annotations	yes
Time for Point Cloud Densification	45m:17s
Time for Point Cloud Classification	10m:41s
Time for 3D Textured Mesh Generation	17m:07s

### Results



Number of Processed Clusters	47
Number of Generated Tiles	5
Number of 3D Densified Points	96206954
Average Density (per m <sup>3</sup> )	122.59

## DSM, Orthomosaic and Index Details



### Processing Options



DSM and Orthomosaic Resolution	1 x GSD (2.87 [cm/pixel])
DSM Filters	Noise Filtering: yes Surface Smoothing: yes, Type: Sharp
Raster DSM	Generated: yes Method: Inverse Distance Weighting Merge Tiles: yes
Orthomosaic	Generated: yes Merge Tiles: yes GeoTIFF Without Transparency: no Google Maps Tiles and KML: yes
Grid DSM	Generated: yes, Spacing [cm]: 100
Raster DTM	Generated: yes Merge Tiles: yes
DTM Resolution	5 x GSD (2.87 [cm/pixel])

Contour Lines Generation	Generated: yes Contour Base [m]: 0 Elevation Interval [m]: 0.5 Resolution [cm]: 300 Minimum Line Size [vertices]: 10
Time for DSM Generation	38m:29s
Time for Orthomosaic Generation	01h:54m:38s
Time for DTM Generation	46m:44s
Time for Contour Lines Generation	07s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s



**Important:** Click on the different icons for:



Help to analyze the results in the Quality Report



Additional information about the sections



Click [here](#) for additional tips to analyze the Quality Report

## Summary



Project	gibellina 2 new
Processed	2022-11-22 18:14:15
Camera Model Name(s)	FC6310_8.8_5472x3648 (RGB)
Average Ground Sampling Distance (GSD)	3.40 cm / 1.34 in
Area Covered	0.478 km <sup>2</sup> / 47.8295 ha / 0.18 sq. mi. / 118.2503 acres
Time for Initial Processing (without report)	49m:56s

## Quality Check



<b>Images</b>	median of 68071 keypoints per image	
<b>Dataset</b>	375 out of 375 images calibrated (100%), all images enabled	
<b>Camera Optimization</b>	1.35% relative difference between initial and optimized internal camera parameters	
<b>Matching</b>	median of 41693.3 matches per calibrated image	
<b>Georeferencing</b>	yes, no 3D GCP	

## Preview

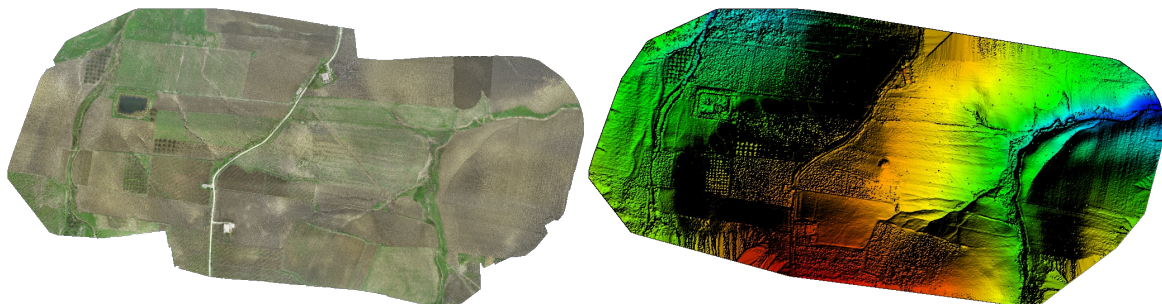


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

## Calibration Details



Number of Calibrated Images	375 out of 375
Number of Geolocated Images	375 out of 375

## Initial Image Positions



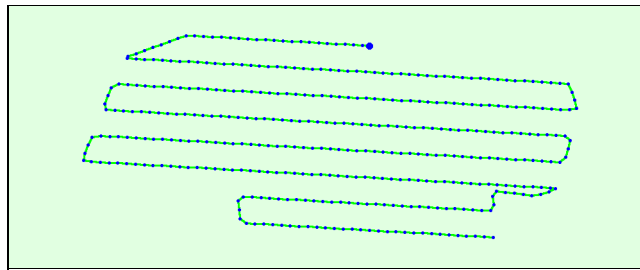
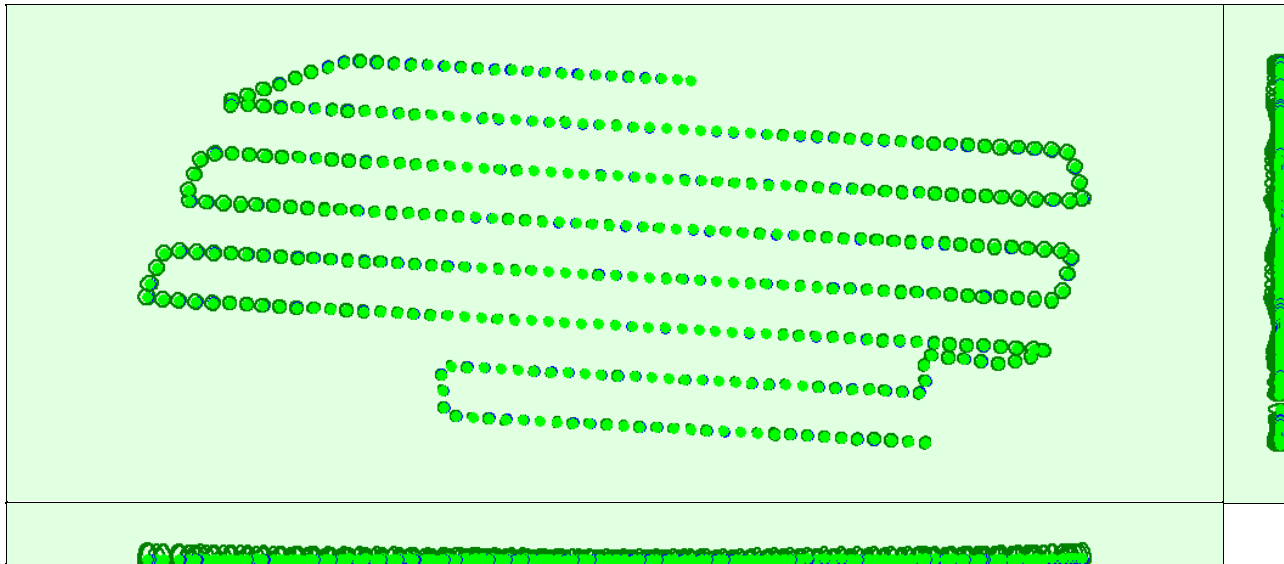


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

### Computed Image/GCPs/Manual Tie Points Positions



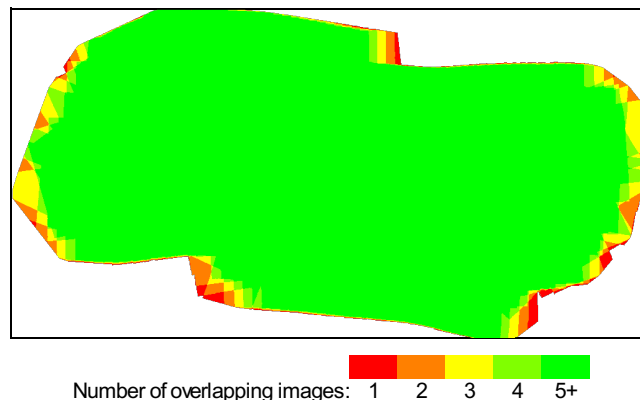
Uncertainty ellipses 50x magnified

Figure 3: Offset between initial (blue dots) and computed (green dots) image positions as well as the offset between the GCPs initial positions (blue crosses) and their computed positions (green crosses) in the top-view (XY plane), front-view (XZ plane), and side-view (YZ plane). Dark green ellipses indicate the absolute position uncertainty of the bundle block adjustment result.

### Absolute camera position and orientation uncertainties

	X[m]	Y[m]	Z[m]	Omega [degree]	Phi [degree]	Kappa [degree]
Mean	0.104	0.103	0.205	0.042	0.033	0.016
Sigma	0.020	0.020	0.034	0.001	0.004	0.000

### Overlap



Number of overlapping images: 1 2 3 4 5+

Figure 4: Number of overlapping images computed for each pixel of the orthomosaic. Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint matches is also sufficient for these areas (see Figure 5 for keypoint matches).

# Bundle Block Adjustment Details



Number of 2D Keypoint Observations for Bundle Block Adjustment	15478095
Number of 3D Points for Bundle Block Adjustment	4113363
Mean Reprojection Error [pixels]	0.152

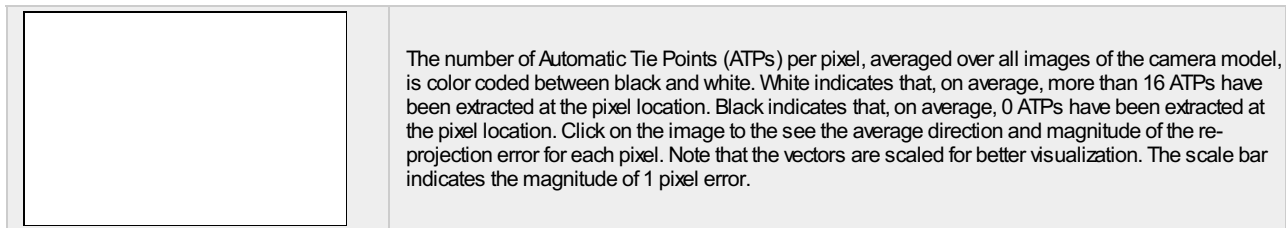
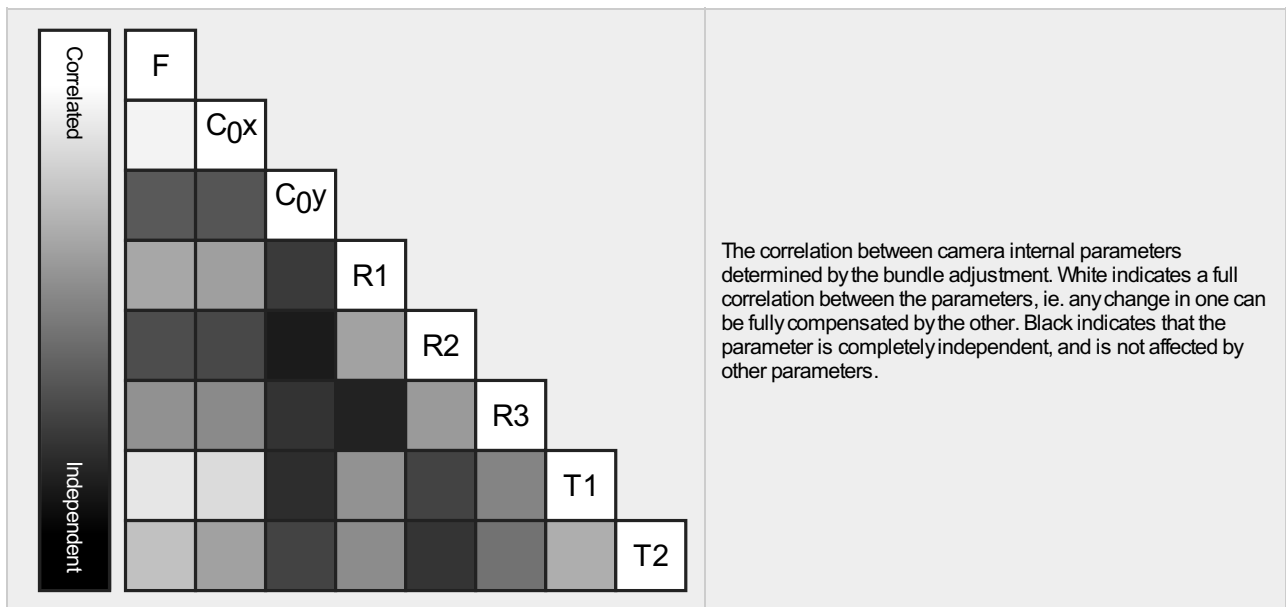
## Internal Camera Parameters

FC6310\_8.8\_5472x3648 (RGB). Sensor Dimensions: 12.833 [mm] x 8.556 [mm]



EXIF ID: FC6310S\_8.8\_5472x3648

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	3668.759 [pixel] 8.604 [mm]	2736.001 [pixel] 6.417 [mm]	1823.999 [pixel] 4.278 [mm]	0.003	-0.008	0.008	-0.000	0.000
Optimized Values	3718.549 [pixel] 8.721 [mm]	2713.888 [pixel] 6.365 [mm]	1805.981 [pixel] 4.236 [mm]	-0.014	0.004	0.006	-0.002	-0.001
Uncertainties (Sigma)	10.860 [pixel] 0.025 [mm]	0.228 [pixel] 0.001 [mm]	0.067 [pixel] 0.000 [mm]	0.000	0.000	0.000	0.000	0.000



## 2D Keypoints Table



	Number of 2D Keypoints per Image	Number of Matched 2D Keypoints per Image
Median	68071	41693
Mn	54261	24426
Max	83251	56430
Mean	67535	41275

## 3D Points from 2D Keypoint Matches

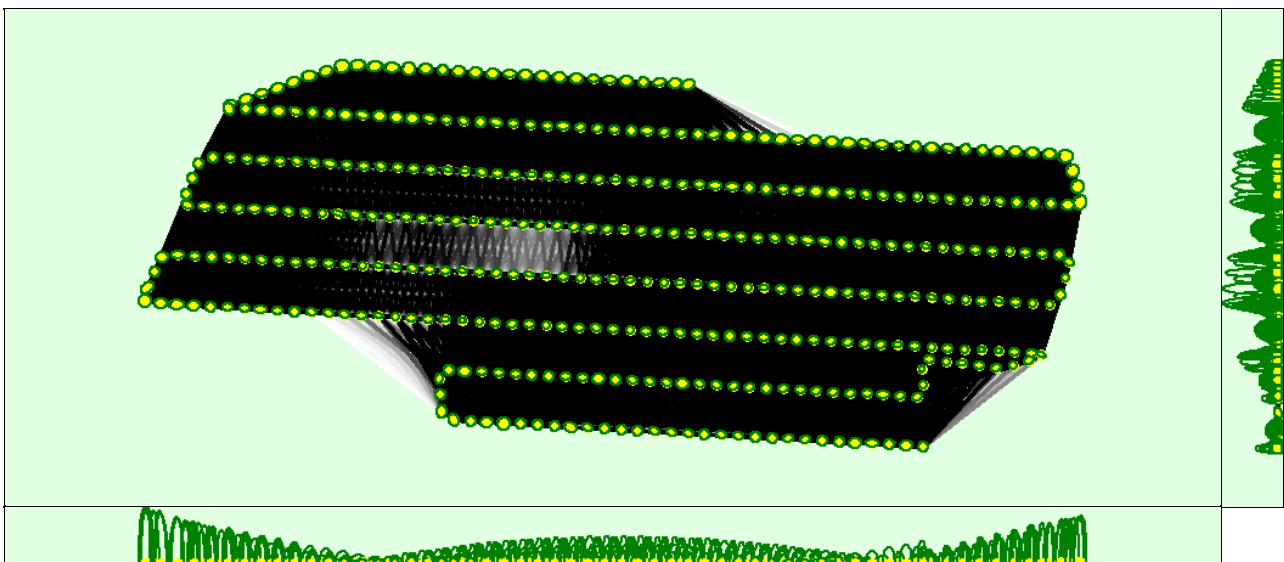


	Number of 3D Points Observed
In 2 Images	2124753



In 3 Images	735241
In 4 Images	370836
In 5 Images	227970
In 6 Images	155367
In 7 Images	108856
In 8 Images	77123
In 9 Images	59836
In 10 Images	47880
In 11 Images	39498
In 12 Images	32200
In 13 Images	26366
In 14 Images	21543
In 15 Images	17357
In 16 Images	14122
In 17 Images	11374
In 18 Images	9253
In 19 Images	7174
In 20 Images	5606
In 21 Images	4330
In 22 Images	3404
In 23 Images	3063
In 24 Images	2342
In 25 Images	1773
In 26 Images	1478
In 27 Images	1176
In 28 Images	913
In 29 Images	686
In 30 Images	556
In 31 Images	406
In 32 Images	301
In 33 Images	230
In 34 Images	151
In 35 Images	76
In 36 Images	57
In 37 Images	29
In 38 Images	17
In 39 Images	10
In 40 Images	5
In 41 Images	4
In 42 Images	1

**2D Keypoint Matches**



Uncertainty ellipses 500x magnified

Number of matches

25 222 444 666 888 1111 1333 1555 1777 2000

Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images. Dark green ellipses indicate the relative camera position uncertainty of the bundle block adjustment result.

### Relative camera position and orientation uncertainties

	X[m]	Y[m]	Z[m]	Omega [degree]	Phi [degree]	Kappa [degree]
Mean	0.010	0.008	0.036	0.009	0.017	0.002
Sigma	0.001	0.001	0.022	0.006	0.009	0.000

## Geolocation Details

### Absolute Geolocation Variance

Mn Error [m]	Max Error [m]	Geolocation Error X[%]	Geolocation Error Y[%]	Geolocation Error Z[%]
-	-15.00	0.00	0.00	0.00
-15.00	-12.00	0.00	0.00	0.00
-12.00	-9.00	0.00	0.00	0.00
-9.00	-6.00	0.00	0.00	0.00
-6.00	-3.00	0.00	0.00	0.00
-3.00	0.00	50.93	42.40	48.27
0.00	3.00	49.07	57.60	51.73
3.00	6.00	0.00	0.00	0.00
6.00	9.00	0.00	0.00	0.00
9.00	12.00	0.00	0.00	0.00
12.00	15.00	0.00	0.00	0.00
15.00	-	0.00	0.00	0.00
<b>Mean [m]</b>		0.000001	0.000028	0.003004
<b>Sigma [m]</b>		0.544018	0.298764	0.398610
<b>RMS Error [m]</b>		0.544018	0.298764	0.398621

Min Error and Max Error represent geolocation error intervals between -1.5 and 1.5 times the maximum accuracy of all the images. Columns X, Y, Z show the percentage of images with geolocation errors within the predefined error intervals. The geolocation error is the difference between the initial and computed image positions. Note that the image geolocation errors do not correspond to the accuracy of the observed 3D points.

### Relative Geolocation Variance

Relative Geolocation Error	Images X[%]	Images Y[%]	Images Z[%]
[-1.00, 1.00]	100.00	100.00	100.00
[-2.00, 2.00]	100.00	100.00	100.00
[-3.00, 3.00]	100.00	100.00	100.00
<b>Mean of Geolocation Accuracy [m]</b>	5.000000	5.000000	10.000000
<b>Sigma of Geolocation Accuracy [m]</b>	0.000000	0.000000	0.000000

Images X, Y, Z represent the percentage of images with a relative geolocation error in X, Y, Z.

Geolocation Orientational Variance	RMS [degree]
Omega	0.780
Phi	0.241

Geolocation RMS error of the orientation angles given by the difference between the initial and computed image orientation angles.

## Initial Processing Details


### System Information

Hardware	CPU: Intel(R) Core(TM) i7-10700 CPU @2.90GHz RAM: 16GB GPU: NVIDIA Quadro P1000 (Driver: 31.0.15.1740), Intel(R) UHD Graphics 630 (Driver: 27.20.100.8190), Virtual MonitorX (Driver: 17.10.42.834)
Operating System	Windows 10 Pro, 64-bit

### Coordinate Systems

Image Coordinate System	WGS 84 (EGM96 Geoid)
Output Coordinate System	WGS 84 / UTMzone 33N (EGM96 Geoid)

### Processing Options

Detected Template	 CUDDIACURVE OK*
Keypoints Image Scale	Full, Image Scale: 1
Advanced: Matching Image Pairs	Aerial Grid or Corridor
Advanced: Matching Strategy	Use Geometrically Verified Matching: no
Advanced: Keypoint Extraction	Targeted Number of Keypoints: Automatic
Advanced: Calibration	Calibration Method: Standard Internal Parameters Optimization: All External Parameters Optimization: All Rematch: Auto, yes

## Point Cloud Densification details

### Processing Options

Image Scale	multiscale, 1/2 (Half image size, Default)
Point Density	Optimal
Minimum Number of Matches	3
3D Textured Mesh Generation	yes
3D Textured Mesh Settings:	Resolution: Medium Resolution (default) Color Balancing: no
LOD	Generated: no
Advanced: 3D Textured Mesh Settings	Sample Density Divider: 1
Advanced: Image Groups	group1
Advanced: Use Processing Area	yes
Advanced: Use Annotations	yes
Time for Point Cloud Densification	22m:58s
Time for Point Cloud Classification	04m:36s
Time for 3D Textured Mesh Generation	09m:48s

### Results

Number of Processed Clusters	6
Number of Generated Tiles	3
Number of 3D Densified Points	36160224

## DSM, Orthomosaic and Index Details



### Processing Options



DSM and Orthomosaic Resolution	1 x GSD (3.4 [cm/pixel])
DSM Filters	Noise Filtering: yes Surface Smoothing: yes, Type: Sharp
Raster DSM	Generated: yes Method: Inverse Distance Weighting Merge Tiles: yes
Orthomosaic	Generated: yes Merge Tiles: yes GeoTIFF Without Transparency: no Google Maps Tiles and KML: yes
Grid DSM	Generated: yes, Spacing [cm]: 100
Raster DTM	Generated: yes Merge Tiles: yes
DTM Resolution	5 x GSD (3.4 [cm/pixel])
Contour Lines Generation	Generated: yes Contour Base [m]: 0 Elevation Interval [m]: 0.5 Resolution [cm]: 300 Minimum Line Size [vertices]: 10
Time for DSM Generation	13m:43s
Time for Orthomosaic Generation	31m:46s
Time for DTM Generation	15m:41s
Time for Contour Lines Generation	04s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s