

LOCALIZZAZIONE

**REGIONE SICILIA**  
**PROVINCIA DI PALERMO**  
**COMUNI DI CAMPOFIORITO E CORLEONE**



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

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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 "CAMPOFIORITO"**

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

<b>REVISIONI</b>						
	00	09/10/2023	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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 PEC: accionablobalitalia@legalmail.it

PROGETTAZIONE E SERVIZI



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

CODICE ELABORATO

AC-CAMPOFIORITO-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 "CAMPOFIORITO"**  
 PROGETTO PER LA REALIZZAZIONE DI UN IMPIANTO AGRIVOLTAICO DELLA POTENZA  
 DI 50,32 MWpc (40,00 MW in immissione) E RELATIVE OPERE DI CONNESSIONE  
 ALLA RTN RICADENTE NEI COMUNI DI CAMPOFIORITO E CORLEONE (PA)

OGGETTO ELABORATO

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

Progettazione e Consulenza Ambientale	ELABORATO	PROPONENTE
	<p style="text-align: center;"><b>REPORT RILIEVO E RESTITUZIONE AEROFOTOGRAMMETRICA 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><i>IMPIANTO AGRIVOLTAICO "CAMPOFIORITO"</i>          PROGETTO PER LA REALIZZAZIONE DI UN IMPIANTO AGRIVOLTAICO DELLA POTENZA DI 50,32 MW<sub>pc</sub> (40,00 MW in immissione)          E RELATIVE OPERE DI CONNESSIONE ALLA RTN RICADENTE NEI COMUNI DI CAMPOFIORITO E CORLEONE (PA)</p>		

## 1. PREMESSA

Il presente documento costituisce il Report relativo alle operazioni di rilievo e restituzione ortofotogrammetrica delle aree entro cui è stato elaborato il progetto dell'impianto agrivoltaico "CAMPOFIORITO" della potenza di 50.322,72 kWp (pari a 50,32 MWp circa - 40 MW in immissione) e delle relative opere di connessione alla RTN che la società Acciona Energia Global Italia S.r.l. intende realizzare nei Comuni di Campofiorito e Corleone (PA).

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
	<p align="center"><b>REPORT RILIEVO E RESTITUZIONE AEROFOTOGRAMMETRICA 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 "CAMPOFIORITO"</i>  PROGETTO PER LA REALIZZAZIONE DI UN IMPIANTO AGRIVOLTAICO DELLA POTENZA DI 50,32 MWpc (40,00 MW in immissione)  E RELATIVE OPERE DI CONNESSIONE ALLA RTN RICADENTE NEI COMUNI DI CAMPOFIORITO E CORLEONE (PA)</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



Additional information about the sections



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

## Summary



Project	corleone
Processed	2023-09-14 11:50:58
Camera Model Name(s)	FC6310_8.8_5472x3648 (RGB)
Average Ground Sampling Distance (GSD)	4.57 cm / 1.80 in
Area Covered	1.494 km <sup>2</sup> / 149.3525 ha / 0.58 sq. mi. / 369.2491 acres
Time for Initial Processing (without report)	01h:19m:41s

## Quality Check



<b>Images</b>	median of 63847 keypoints per image	
<b>Dataset</b>	1028 out of 1028 images calibrated (100%), all images enabled	
<b>Camera Optimization</b>	1.6% relative difference between initial and optimized internal camera parameters	
<b>Matching</b>	median of 27927.1 matches per calibrated image	
<b>Georeferencing</b>	yes, no 3D GCP	

## Preview

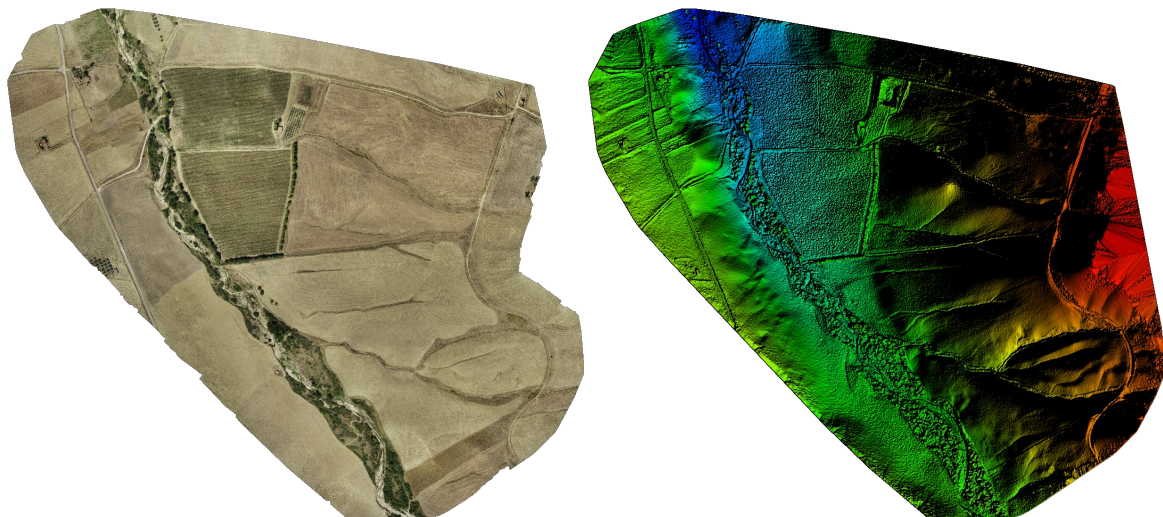


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

## Calibration Details



Number of Calibrated Images	1028 out of 1028
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**Initial Image Positions**

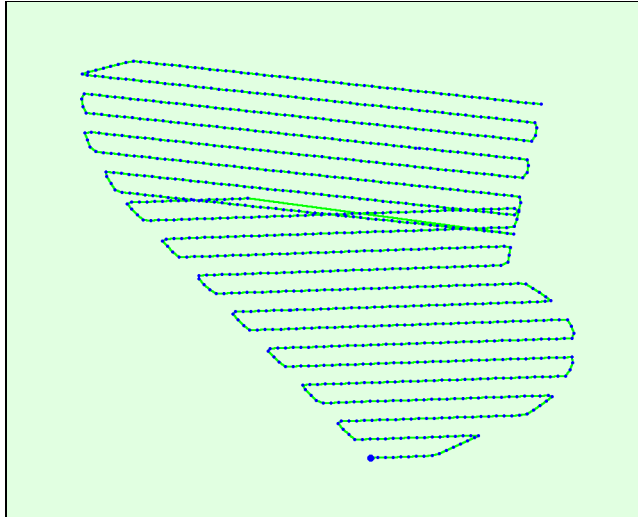
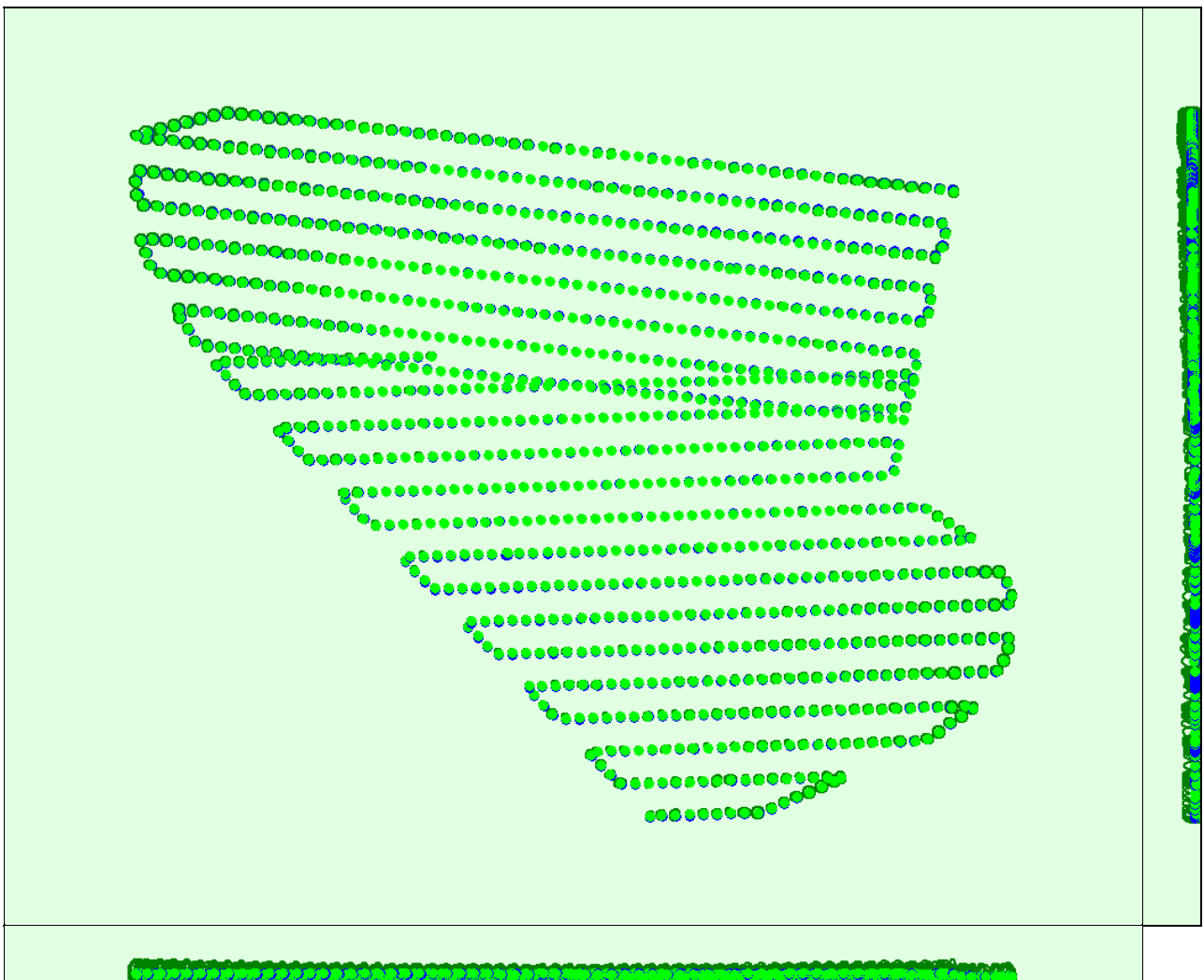


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

**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	0.065	0.064	0.141	0.018	0.017	0.006
Sigma	0.011	0.011	0.029	0.002	0.002	0.000

## ? Overlap

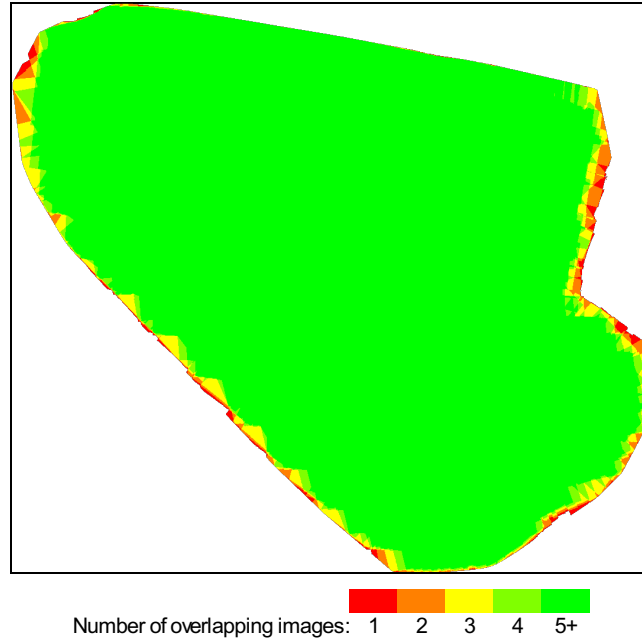


Figure 4: Number of overlapping images computed for each pixel of the orthomosaic. Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint 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	27120153
Number of 3D Points for Bundle Block Adjustment	7852774
Mean Reprojection Error [pixels]	0.121

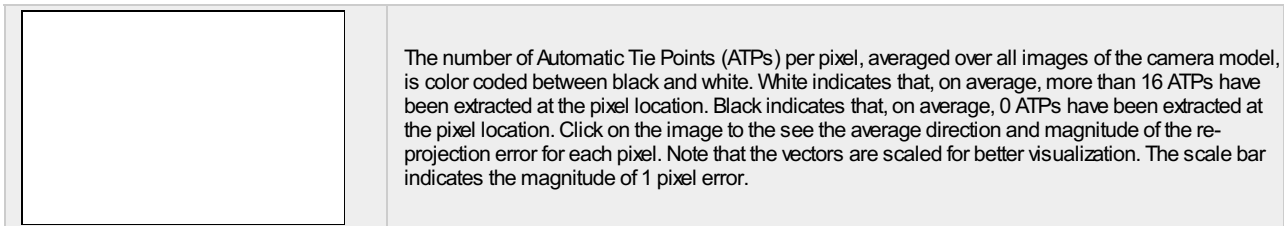
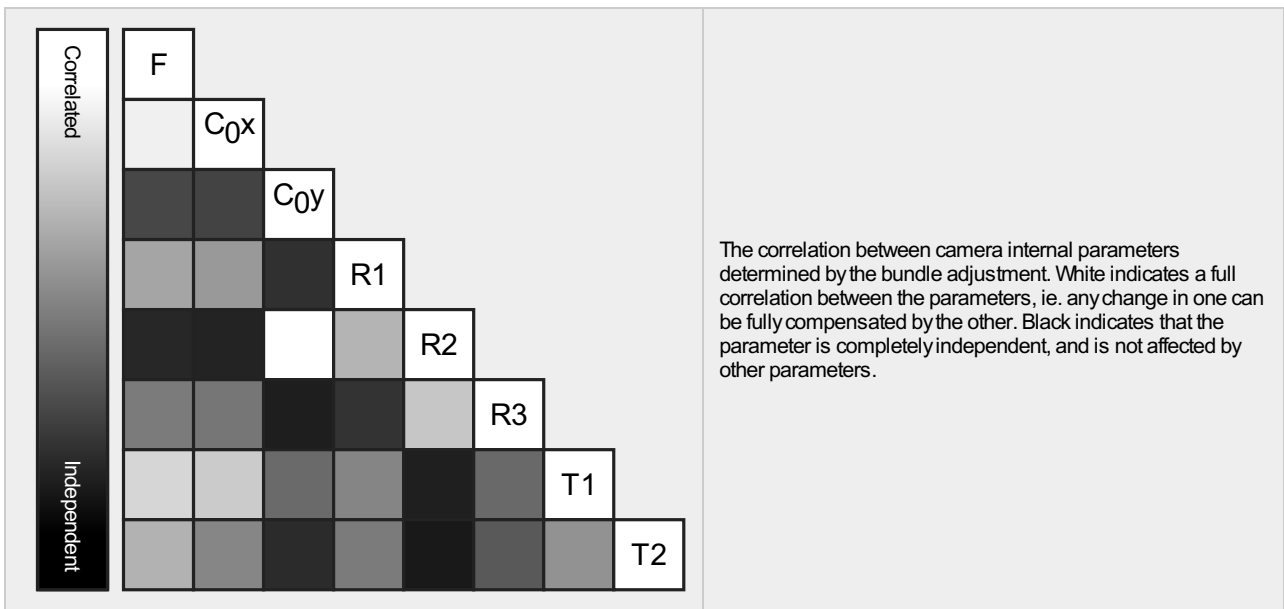
## ? Internal Camera Parameters

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	3727.626 [pixel] 8.742 [mm]	2714.419 [pixel] 6.366 [mm]	1806.578 [pixel] 4.237 [mm]	-0.014	0.003	0.006	-0.002	-0.001
Uncertainties (Sigma)	6.492 [pixel] 0.015 [mm]	0.149 [pixel] 0.000 [mm]	0.045 [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	63847	27927
Mn	50675	8889
Max	79816	41618
Mean	64891	26381

### 3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	4311251
In 3 Images	1500859
In 4 Images	711397
In 5 Images	398029
In 6 Images	247438
In 7 Images	165137
In 8 Images	121025
In 9 Images	85332
In 10 Images	58392
In 11 Images	44466
In 12 Images	35083
In 13 Images	28294
In 14 Images	22901
In 15 Images	19114
In 16 Images	16177
In 17 Images	12951
In 18 Images	10567
In 19 Images	8423
In 20 Images	7365
In 21 Images	6316
In 22 Images	5346
In 23 Images	4888

In 24 Images	4138
In 25 Images	3512
In 26 Images	3177
In 27 Images	2800
In 28 Images	2354
In 29 Images	2015
In 30 Images	1745
In 31 Images	1555
In 32 Images	1434
In 33 Images	1250
In 34 Images	1108
In 35 Images	1039
In 36 Images	883
In 37 Images	735
In 38 Images	653
In 39 Images	572
In 40 Images	482
In 41 Images	438
In 42 Images	375
In 43 Images	308
In 44 Images	249
In 45 Images	203
In 46 Images	159
In 47 Images	135
In 48 Images	109
In 49 Images	102
In 50 Images	99
In 51 Images	82
In 52 Images	57
In 53 Images	52
In 54 Images	45
In 55 Images	30
In 56 Images	30
In 57 Images	16
In 58 Images	22
In 59 Images	18
In 60 Images	12
In 61 Images	10
In 62 Images	9
In 63 Images	6
In 64 Images	1
In 65 Images	2
In 66 Images	1
In 68 Images	1

 **2D Keypoint Matches**





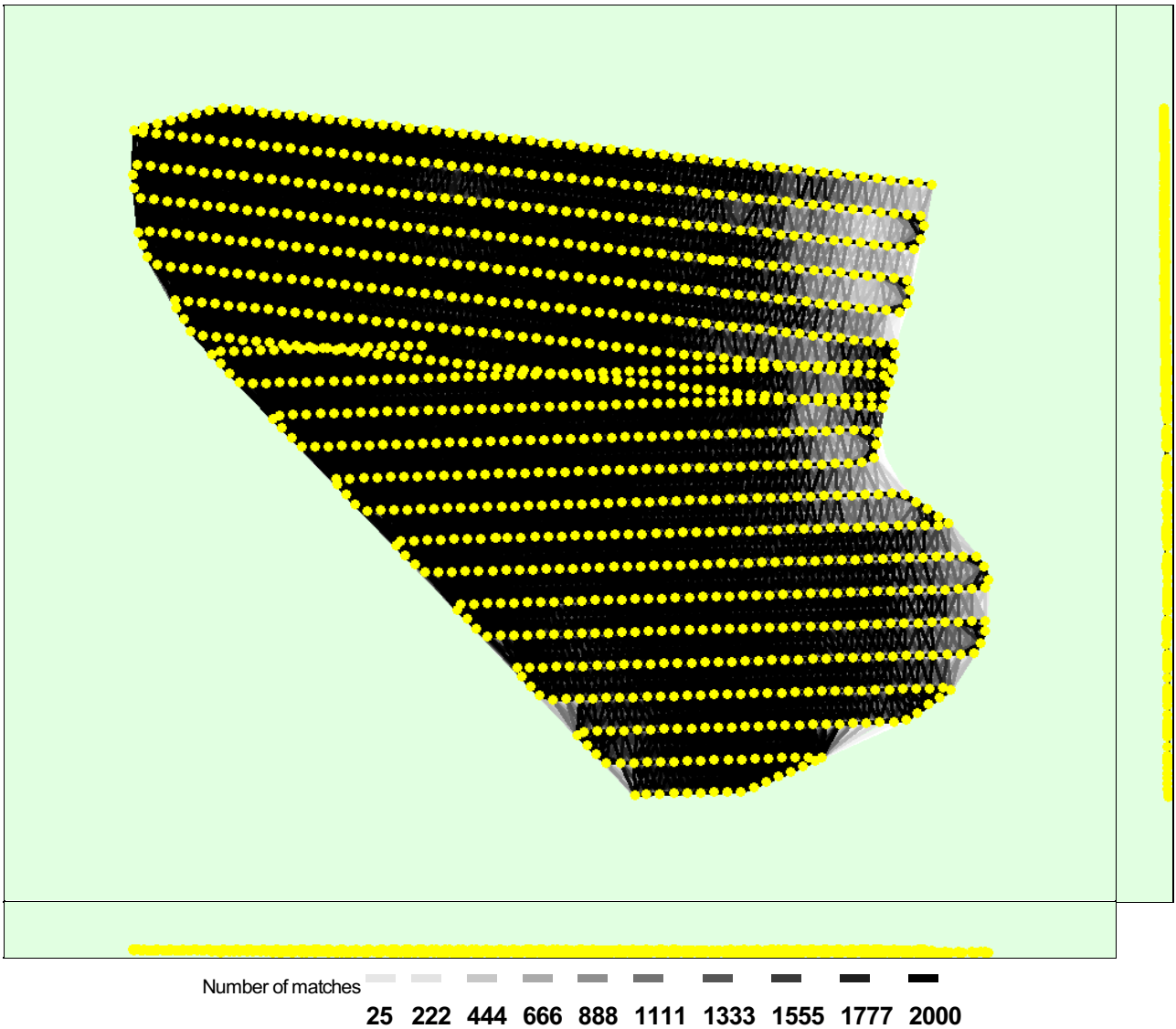


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images.

## Geolocation Details



### ? Absolute Geolocation Variance



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	0.10	0.00
-3.00	0.00	49.12	50.58	52.53
0.00	3.00	50.88	47.76	47.47
3.00	6.00	0.00	1.56	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>		0.000000	0.000000	0.000000
<b>Sigma [m]</b>		0.840972	1.317787	0.660240
<b>RMS Error [m]</b>		0.840972	1.317787	0.660240

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	0.768
Phi	0.243
Kappa	5.419

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	 curve 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	51m:09s
Time for Point Cloud Classification	10m:12s
Time for 3D Textured Mesh Generation	21m:25s

## Results



Number of Processed Clusters	45
Number of Generated Tiles	4
Number of 3D Densified Points	89061191
Average Density (per m <sup>3</sup> )	58.01

## DSM, Orthomosaic and Index Details



### Processing Options



DSM and Orthomosaic Resolution	1 x GSD (4.57 [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: yes 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 (4.57 [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	32m:59s
Time for Orthomosaic Generation	01h:37m:55s
Time for DTM Generation	31m:48s
Time for Contour Lines Generation	10s
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	campofiorito_1
Processed	2023-09-13 11:17:27
Camera Model Name(s)	FC6310_8.8_4864x3648 (RGB)
Average Ground Sampling Distance (GSD)	4.57 cm / 1.80 in
Area Covered	1.409 km <sup>2</sup> / 140.9256 ha / 0.54 sq. mi. / 348.4150 acres
Time for Initial Processing (without report)	01h:42m:16s

## Quality Check



<b>Images</b>	median of 67667 keypoints per image	
<b>Dataset</b>	1084 out of 1084 images calibrated (100%), all images enabled	
<b>Camera Optimization</b>	1.54% relative difference between initial and optimized internal camera parameters	
<b>Matching</b>	median of 32417.6 matches per calibrated image	
<b>Georeferencing</b>	yes, no 3D GCP	

## Preview

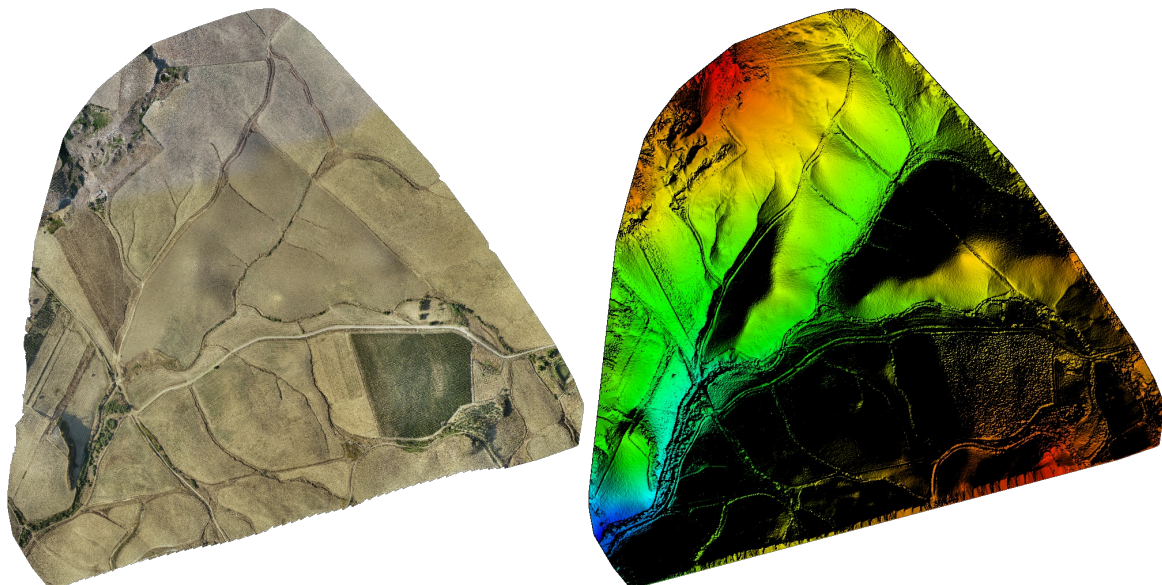


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

# Calibration Details



Number of Calibrated Images	1084 out of 1084
Number of Geolocated Images	1084 out of 1084

## Initial Image Positions

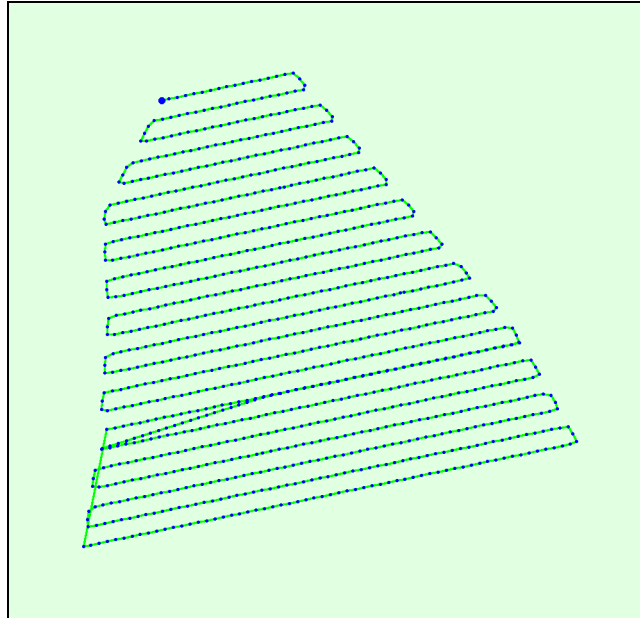
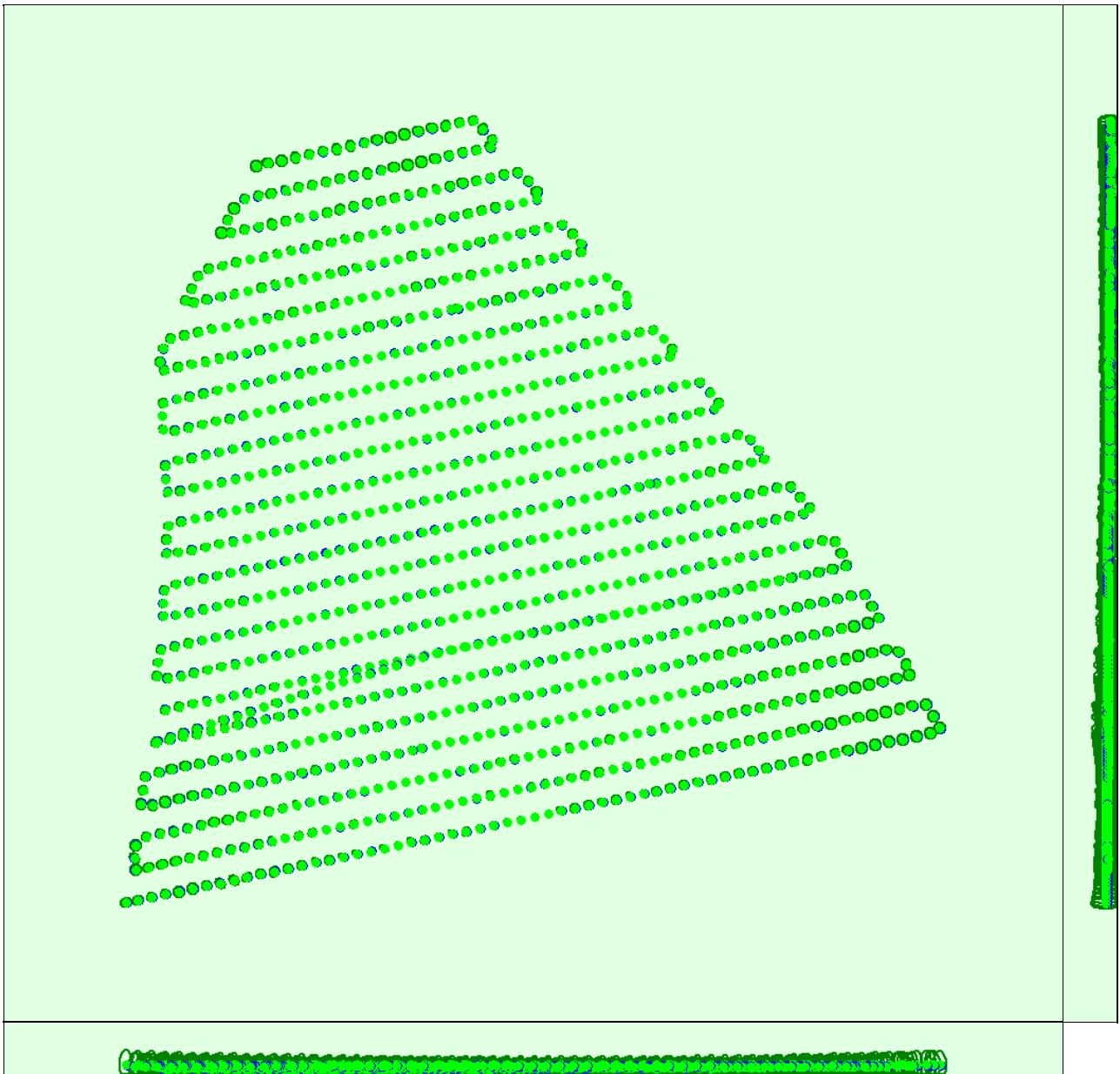


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

## 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	0.059	0.059	0.130	0.016	0.016	0.006
Sigma	0.009	0.010	0.027	0.003	0.002	0.000

**? Overlap**



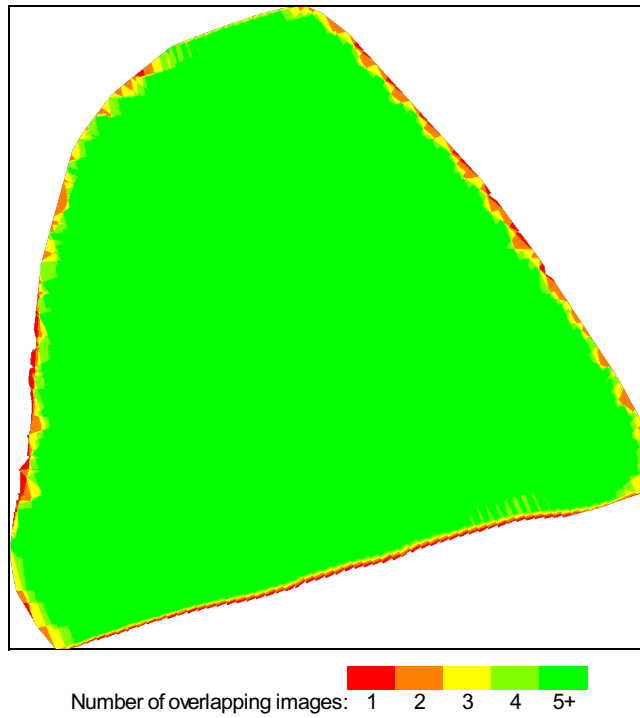


Figure 4: Number of overlapping images computed for each pixel of the orthomosaic. Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint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

## Bundle Block Adjustment Details i

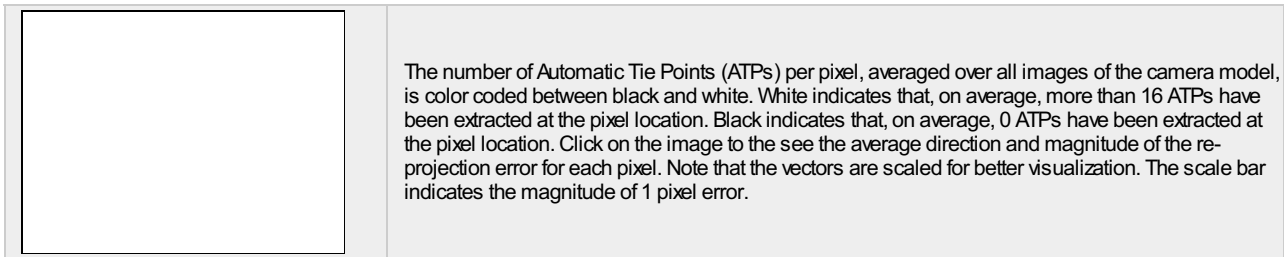
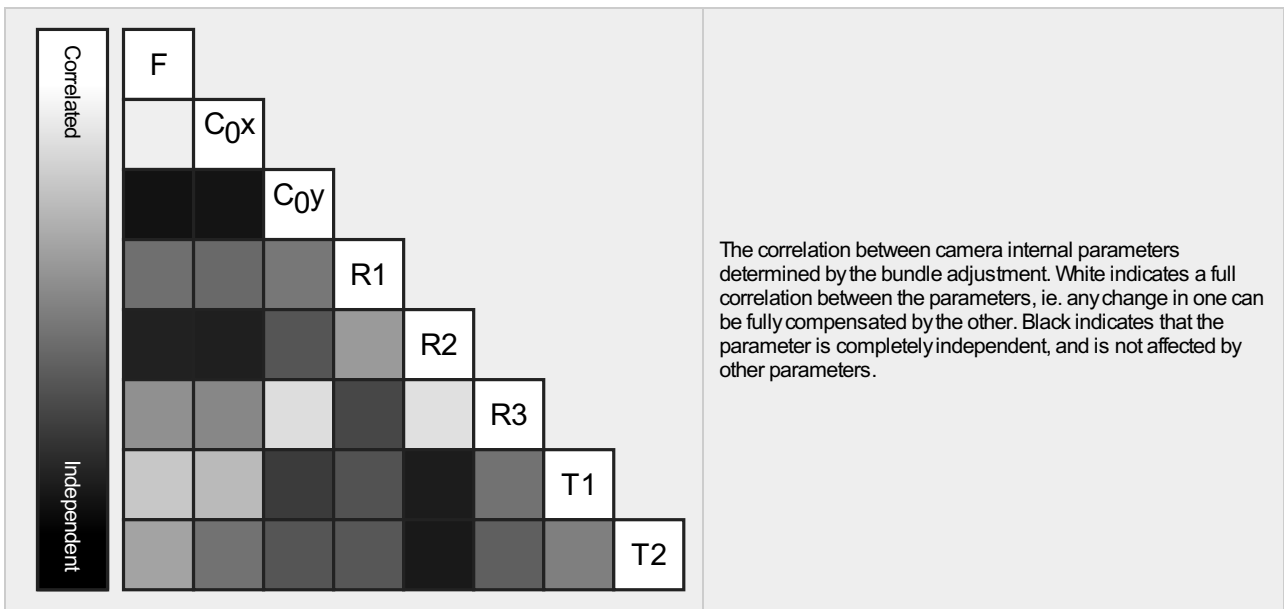
Number of 2D Keypoint Observations for Bundle Block Adjustment	33863764
Number of 3D Points for Bundle Block Adjustment	8952643
Mean Reprojection Error [pixels]	0.121

### ? Internal Camera Parameters

📷 **FC6310\_8.8\_4864x3648 (RGB). Sensor Dimensions: 11.407 [mm] x 8.556 [mm]** i

EXIF ID: FC6310S\_8.8\_4864x3648

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	3666.955 [pixel] 8.600 [mm]	2432.001 [pixel] 5.704 [mm]	1823.999 [pixel] 4.278 [mm]	0.004	-0.017	0.019	-0.000	0.000
Optimized Values	3723.494 [pixel] 8.733 [mm]	2410.059 [pixel] 5.652 [mm]	1806.014 [pixel] 4.236 [mm]	-0.012	-0.004	0.014	-0.002	-0.001
Uncertainties (Sigma)	4.697 [pixel] 0.011 [mm]	0.110 [pixel] 0.000 [mm]	0.035 [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	67667	32418
Mn	45297	2016
Max	79923	45298
Mean	66354	31240

## 3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	4505672
In 3 Images	1729257
In 4 Images	871837
In 5 Images	510518
In 6 Images	328188
In 7 Images	224216
In 8 Images	160133
In 9 Images	118100
In 10 Images	90232
In 11 Images	71250
In 12 Images	56229
In 13 Images	45350
In 14 Images	37531
In 15 Images	30790
In 16 Images	25271
In 17 Images	21077
In 18 Images	17919
In 19 Images	15204
In 20 Images	13092
In 21 Images	11095
In 22 Images	9586



In 23 Images	8429
In 24 Images	7241
In 25 Images	6422
In 26 Images	5511
In 27 Images	4686
In 28 Images	3965
In 29 Images	3377
In 30 Images	3043
In 31 Images	2621
In 32 Images	2224
In 33 Images	1955
In 34 Images	1714
In 35 Images	1517
In 36 Images	1288
In 37 Images	1115
In 38 Images	872
In 39 Images	748
In 40 Images	631
In 41 Images	505
In 42 Images	397
In 43 Images	385
In 44 Images	274
In 45 Images	239
In 46 Images	204
In 47 Images	164
In 48 Images	116
In 49 Images	96
In 50 Images	86
In 51 Images	67
In 52 Images	53
In 53 Images	34
In 54 Images	34
In 55 Images	28
In 56 Images	18
In 57 Images	10
In 58 Images	9
In 59 Images	10
In 60 Images	5
In 61 Images	1
In 62 Images	1
In 64 Images	1

 **2D Keypoint Matches**



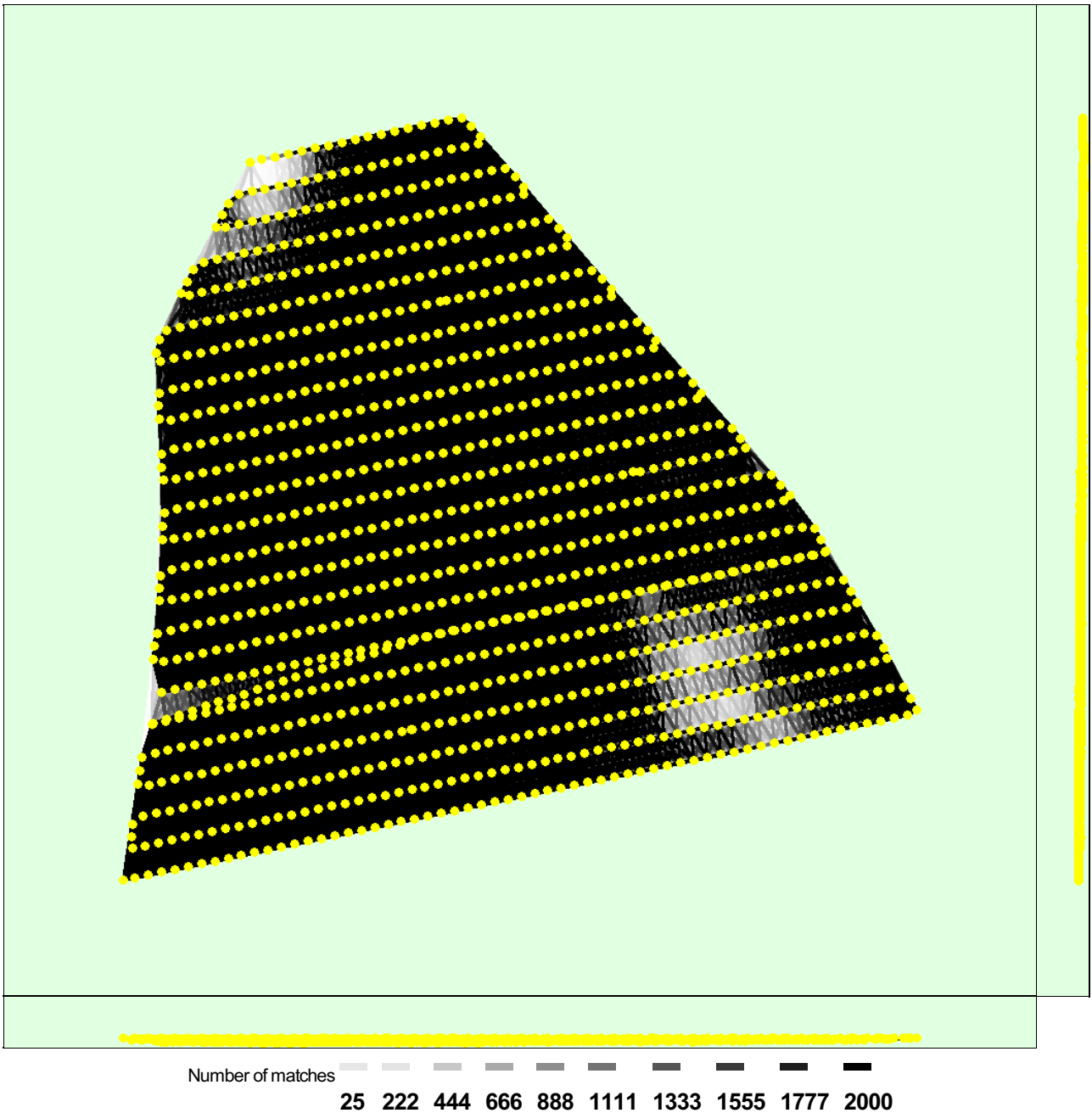


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images.

## Geolocation Details



### ? Absolute Geolocation Variance



Mn Error [m]	MaxError [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	59.41	51.20	58.12
0.00	3.00	40.59	48.80	41.88
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>		0.000000	0.000000	-0.000000
<b>Sigma [m]</b>		0.802673	0.425661	0.861529
<b>RMS Error [m]</b>		0.802673	0.425661	0.861529

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	0.710
Phi	0.248
Kappa	9.149

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	 curve 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	44m:50s
Time for Point Cloud Classification	09m:26s
Time for 3D Textured Mesh Generation	20m:21s

## Results



Number of Processed Clusters	61
Number of Generated Tiles	4
Number of 3D Densified Points	70317245
Average Density (per m <sup>3</sup> )	51.44

# DSM, Orthomosaic and Index Details



## Processing Options



DSM and Orthomosaic Resolution	1 x GSD (4.57 [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: yes 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 (4.57 [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	27m:43s
Time for Orthomosaic Generation	01h:40m:56s
Time for DTM Generation	30m:34s
Time for Contour Lines Generation	12s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s