



## Agisoft Processing Guide

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# Overview

The following guide describes the standard processing steps for processing ppk data collected by the E400 without ground control points (GCPs) in Agisoft Metashape Profession edition.











## Requirements

- 1) Imagery from flight
- 2) Geotags for imagery
- 3) Agisoft metascan professional

## Adding photos for standard cameras

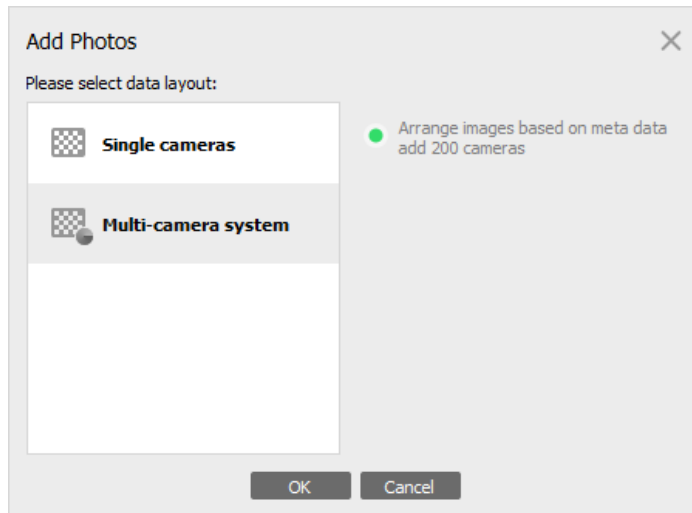
Select the **Add photos** command from the *Workflow* menu.

Browse the source folder and select files to be processed then click ok. The images will be added to the cameras tab.

Cameras	X (m)	Y (m)	Z (m)	Accuracy (m)	Error (m)	
<input type="checkbox"/>  0						
<input type="checkbox"/>  1						
<input type="checkbox"/>  2						
<input type="checkbox"/>  3						
<input type="checkbox"/>  4						
<input type="checkbox"/>  5						
<input type="checkbox"/>  6						
<input type="checkbox"/>  7						
<input type="checkbox"/>  8						
<input type="checkbox"/>  9						

## Adding photos for multispectral cameras

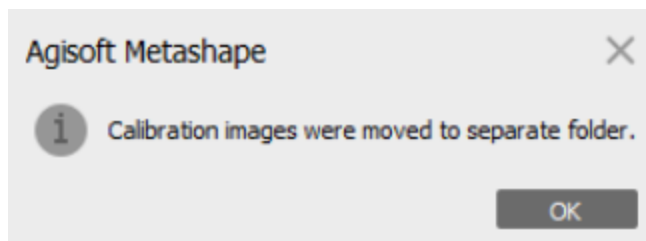
If working with a RGB camera skip to the importing references section of this manual. Open the Workflow menu and choose the Add Photos option. Select all images including reflectance calibration images and click the OK button. In the Add Photos dialog choose Multi-camera system option:



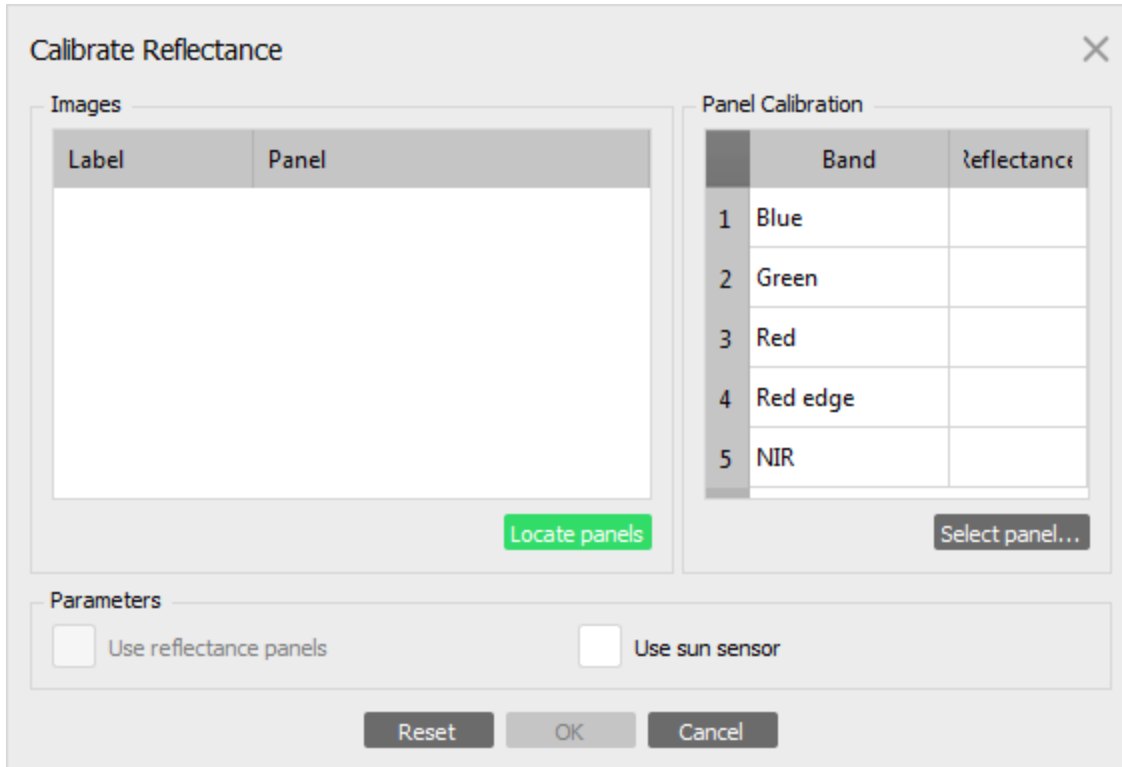
If the images are stored in several folders, the same operation should be repeated for each folder.

## Reflectance calibration (for multispectral cameras only)

Agisoft will automatically detect reflectance calibration images taken before and after flight.



Open Tools menu and choose the Calibrate Reflectance option. Press Locate Panels button:



The 'Calibrate Reflectance' dialog box is divided into three main sections. The top-left section, titled 'Images', contains a table with two columns: 'Label' and 'Panel'. Below this table is a large empty rectangular area and a green 'Locate panels' button. The top-right section, titled 'Panel Calibration', contains a table with three columns: an index, 'Band', and 'Reflectance'. The bottom section, titled 'Parameters', contains two checkboxes: 'Use reflectance panels' and 'Use sun sensor'. At the very bottom are three buttons: 'Reset', 'OK', and 'Cancel'.

Label	Panel

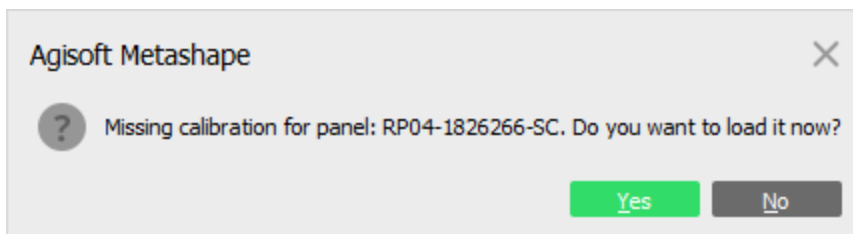
	Band	Reflectance
1	Blue	
2	Green	
3	Red	
4	Red edge	
5	NIR	

Parameters

☐ Use reflectance panels      ☐ Use sun sensor

Reset    OK    Cancel

As a result, the images with the panel will be moved to a separate folder and the masks would be applied to cover everything on the images except the panel itself. If you are using the panel for the first time, and its calibration is not added to Metashape Pro internal database yet, you will be prompted to load a calibration from a CSV file:



The 'Agisoft Metashape' dialog box displays a question mark icon followed by the text: 'Missing calibration for panel: RP04-1826266-SC. Do you want to load it now?'. At the bottom are two buttons: 'Yes' (highlighted in green) and 'No'.

Agisoft Metashape

? Missing calibration for panel: RP04-1826266-SC. Do you want to load it now?

Yes    No

If you don't have a CSV file with calibration information, you can input calibration values manually at the next step. If you own MicaSense radiometric panel, you can request the corresponding CSV file from MicaSense directly: <https://www.micasense.com/prv>

After the panels are located, the reflectance values corresponding to each band should be input according to the panel certificate.

Calibrate Reflectance

Images

Label	Panel
IMG_0000_1...	RP04-1826266-SC (5/5)
IMG_0001_1...	RP04-1826266-SC (5/5)
IMG_0002_1...	RP04-1826266-SC (5/5)

Locate panels

Panel Calibration

	Band	Reflectance
1	Blue	0.51
2	Green	0.51
3	Red	0.509
4	Red edge	0.509
5	NIR	0.508

Select panel...

Parameters

☒ Use reflectance panels

☒ Use sun sensor

Reset

OK

Cancel

## Run reflectance calibration (for multispectral cameras only)

Check on Use reflectance panels and Use sun sensor options in the Calibrate Reflectance dialog to perform calibration based on panel data and/or image meta information. Click OK to start the calibration process.

# Importing references

To import the camera coordinate data from the CSV file, click *the **Import Reference*** button on the **Reference pane**. Browse to the file containing recorded reference coordinates and click the **Open** button.

**Import CSV**

Coordinate System: WGS 84 (EPSG::4326)

Rotation angles: Yaw, Pitch, Roll

Ignore labels: ☐ Threshold (m): 0.1

Delimiter: ☒ Tab ☐ Semicolon ☐ Comma ☐ Space ☐ Other:

Combine consecutive delimiters: ☐

Columns:

Label	1	Accuracy	Rotation	Accuracy
Longitude	3	8	Yaw	12
Latitude	2	8	Pitch	10
Altitude	4	8	Roll	13
			Enabled flag	10

Start import at row: 1 Items: All

First 20 lines preview:

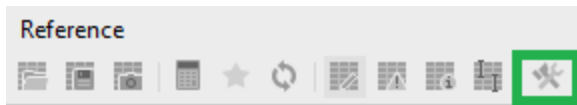
	Label	Latitude	Longitude	Altitude
1	275.jpg	41.03901672	-81.53502224	356.856
2	274.jpg	41.03871075	-81.53502788	355.6757
3	273.jpg	41.03842006	-81.53503035	355.0086
4	272.jpg	41.03813867	-81.53503826	355.8031
5	271.jpg	41.0378734	-81.53504847	354.8554

OK Cancel

In the **Import CSV** dialog, set the parameters for import (coordinate system, delimiter, columns, etc.)

Geotagging method	Latitude	Longitude	Altitude
PPK	Dependant on base coordinate	Dependant on base coordinate	Dependant on base coordinate
Companion Computer	WGS84	WGS84	MSL

# Setting Geotag Accuracy



Click the reference settings tab.

A dialog box titled "Reference Settings" with a close button (X) in the top right corner. It contains several sections: "Coordinate System" with three dropdown menus, each set to "WGS 84 (EPSG::4326)" and a small star icon to the right; "Rotation angles:" with a dropdown menu set to "Yaw, Pitch, Roll"; "Measurement Accuracy" with four input fields: "Camera accuracy (m):" set to "10" (highlighted with a green box), "Camera accuracy (deg):" set to "10", "Marker accuracy (m):" set to "0.005", and "Scale bar accuracy (m):" set to "0.001"; "Image Coordinates Accuracy" with two input fields: "Marker accuracy (pix):" set to "0.5" and "Tie point accuracy (pix):" set to "1"; and "Miscellaneous" with a label "Capture distance (m):" and an empty input field. At the bottom are "OK" and "Cancel" buttons.

Change the **Camera accuracy** based on your geotag accuracy.

Geotagging method	Accuracy
PPK	.05m
Standard Accuracy	5m



# Camera Calibration

Select **Camera Calibration** from the **Tools** menu.

Camera Calibration

ILCE-6100, E 20mm F2.8  
276 images, 6000x4000

Camera type: Frame

Pixel size (mm): 0.004 x 0.004

Focal length (mm): 20

☒ Enable rolling shutter compensation

Film camera with fiducial marks ☐

Initial Adjusted Bands GPS/INS Offset

	Reference	Accuracy	Adjusted	Variance
X (m):	0	0.05		
Y (m):	0	0.05		
Z (m):	.143	0.01		
Yaw (°):	0	2		
Pitch (°):	0	2		
Roll (°):	0	2		

☒ Enable reference

Adjust GPS/INS offset ☐

Camera label	Resolution	Camera model	Focal length	Date & time
0	6000x4000	ILCE-6100	20	2019:06:12 17:20:02
1	6000x4000	ILCE-6100	20	2019:06:12 17:34:08
10	6000x4000	ILCE-6100	20	2019:06:12 17:34:27
100	6000x4000	ILCE-6100	20	2019:06:12 17:38:31
101	6000x4000	ILCE-6100	20	2019:06:12 17:38:33
102	6000x4000	ILCE-6100	20	2019:06:12 17:38:34

OK Cancel

Select the following settings depending on your camera.

<b>A6100</b>	
Rolling shutter	Enabled
PPK Z offset (m)	.143
PPK Z accuracy	.001

<b>RX1RII</b>	
Rolling shutter	Disabled
PPK Z offset (m)	.1529
PPK Z accuracy	.001

<b>A7R IV</b>	
Rolling shutter	Disabled
PPK Z offset (m)	.149
PPK Z accuracy	.001

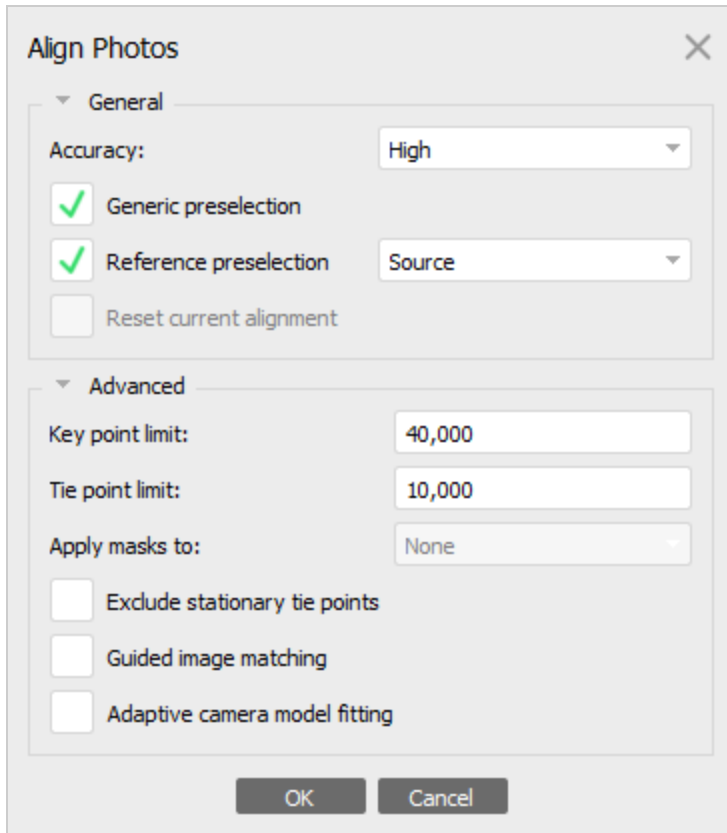
<b>Altum-PT</b>	
Rolling shutter	Disabled
PPK Z offset (m)	.113
PPK Z accuracy	.001

<b>RedEdge-P</b>	
Rolling shutter	Disabled
PPK Z offset (m)	.144
PPK Z accuracy	.001

# Align Photos

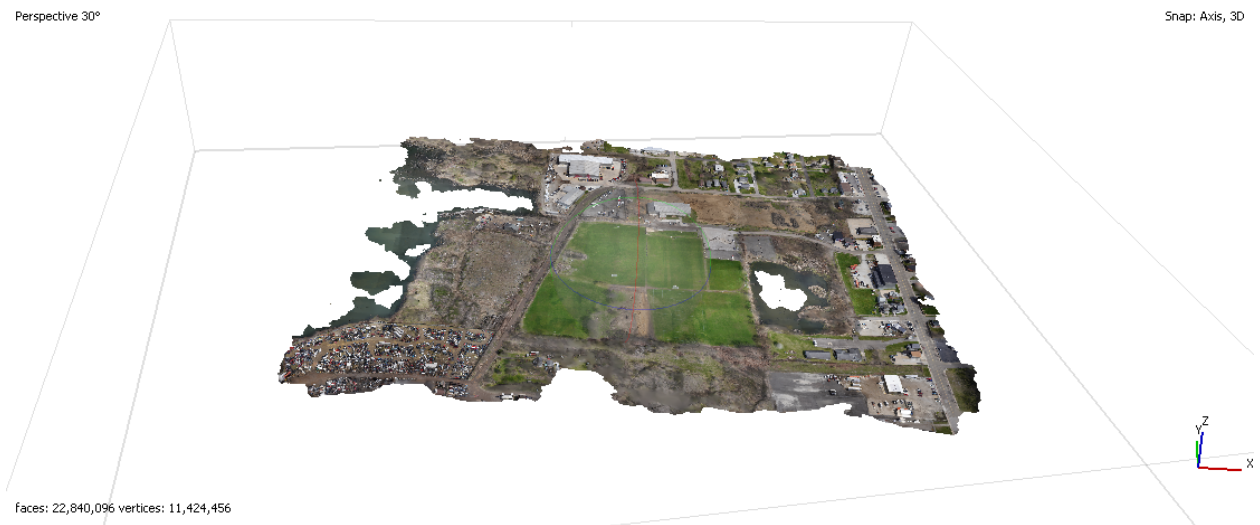
Select the **Align Photos** command from the **Workflow** menu.

Set the parameters in the **Align Photos** dialog window:

The image shows the 'Align Photos' dialog window. It has a title bar with a close button (X). The dialog is divided into two sections: 'General' and 'Advanced'. In the 'General' section, there is a dropdown for 'Accuracy' set to 'High', a checked checkbox for 'Generic preselection', a checked checkbox for 'Reference preselection' with a dropdown set to 'Source', and an unchecked checkbox for 'Reset current alignment'. In the 'Advanced' section, there is a text input for 'Key point limit' set to '40,000', a text input for 'Tie point limit' set to '10,000', a dropdown for 'Apply masks to:' set to 'None', and three unchecked checkboxes: 'Exclude stationary tie points', 'Guided image matching', and 'Adaptive camera model fitting'. At the bottom are 'OK' and 'Cancel' buttons.

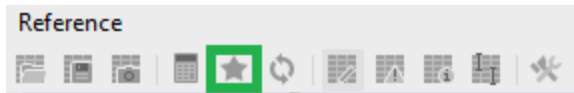
Click the **OK** button. The progress dialog box will appear displaying the current processing status. To cancel the processing, click the **Cancel** button.

Alignment having been completed, computed camera positions, and a sparse point cloud will be displayed in the *Model* view.

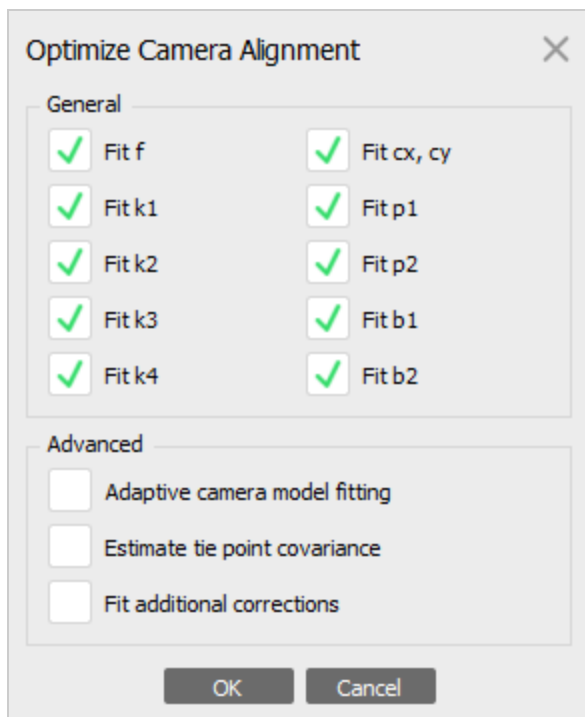


## Optimize camera locations

Click the **Optimize** toolbar button on the **Reference** pane.



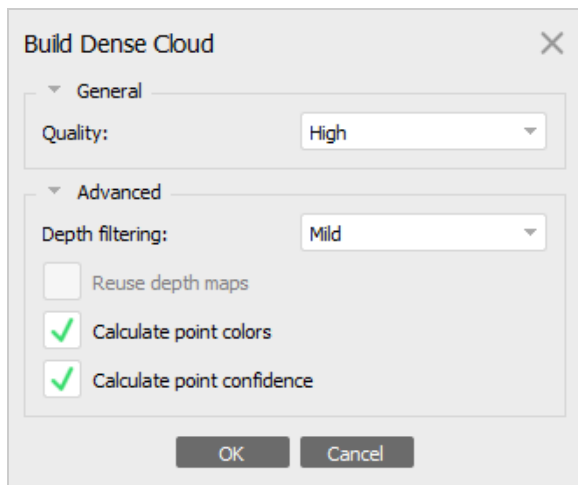
In the **Optimize Camera Alignment** dialog box, check additional camera parameters to be optimized.



Click the **OK** button to start optimization.

# Build Dense Cloud

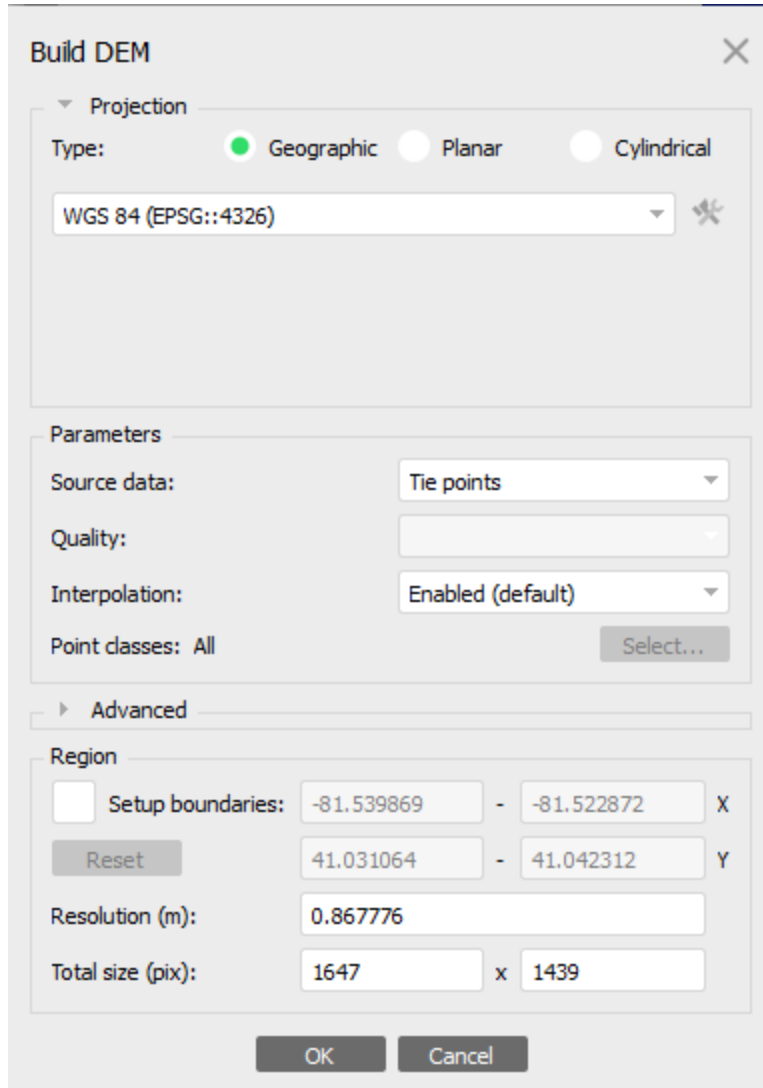
1. Select **Build Dense Cloud** command from the *Workflow menu*.
2. In the **Build Dense Cloud** dialog box select the desired reconstruction parameters and click *the OK* button.



The progress dialog box will appear displaying the current processing status. To cancel the processing, click on *the Cancel* button.

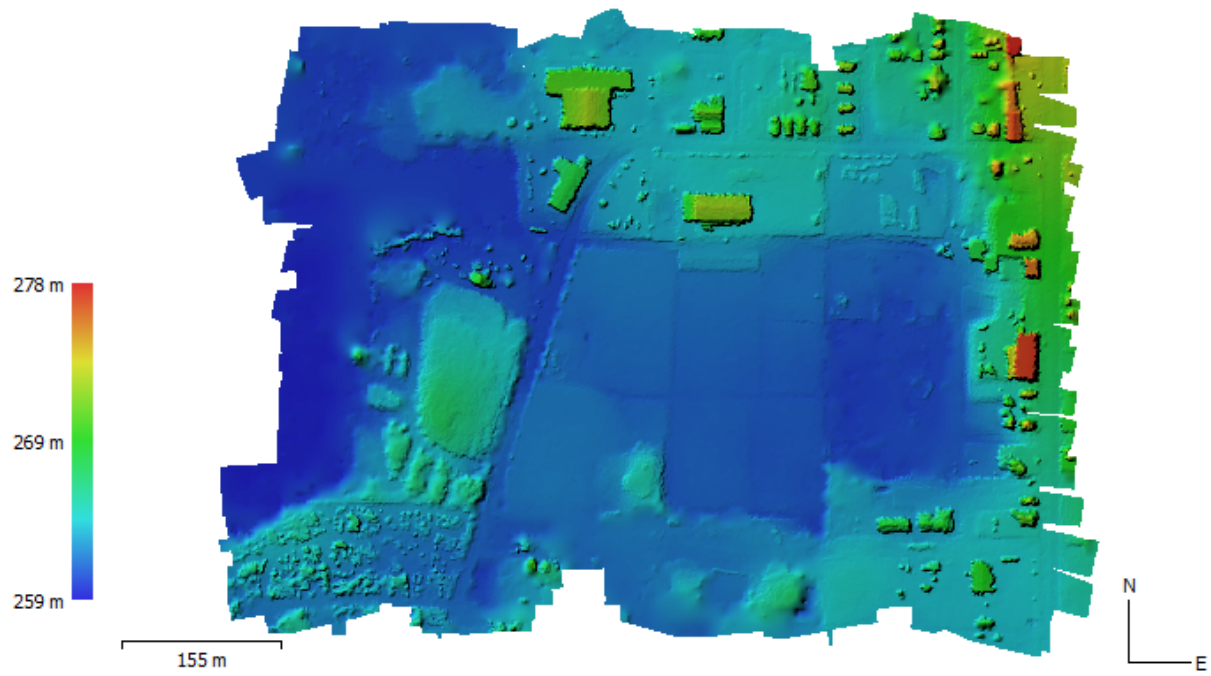
# Build DEM

Select the **Build DEM** command from the **Workflow** menu.

The image shows a 'Build DEM' dialog box with a close button (X) in the top right corner. It is divided into three main sections: 'Projection', 'Parameters', and 'Advanced'. The 'Projection' section has a 'Type' field with three radio buttons: 'Geographic' (selected), 'Planar', and 'Cylindrical'. Below it is a dropdown menu showing 'WGS 84 (EPSG::4326)' with a star icon to its right. The 'Parameters' section contains four rows: 'Source data:' with a dropdown menu showing 'Tie points'; 'Quality:' with a dropdown menu; 'Interpolation:' with a dropdown menu showing 'Enabled (default)'; and 'Point classes: All' with a 'Select...' button. The 'Advanced' section is expanded and contains a 'Region' section with a 'Setup boundaries:' label and a 'Reset' button. The boundaries are defined by four input fields: X1 (-81.539869), X2 (-81.522872), Y1 (41.031064), and Y2 (41.042312). Below the region fields are 'Resolution (m):' with a value of 0.867776, and 'Total size (pix):' with values 1647 and 1439. At the bottom are 'OK' and 'Cancel' buttons.

In the **Build DEM** dialog box, set your required parameters.

Click *the* **OK** button. The progress dialog box will appear displaying the current processing status. To cancel processing, click *the* **Cancel** button.

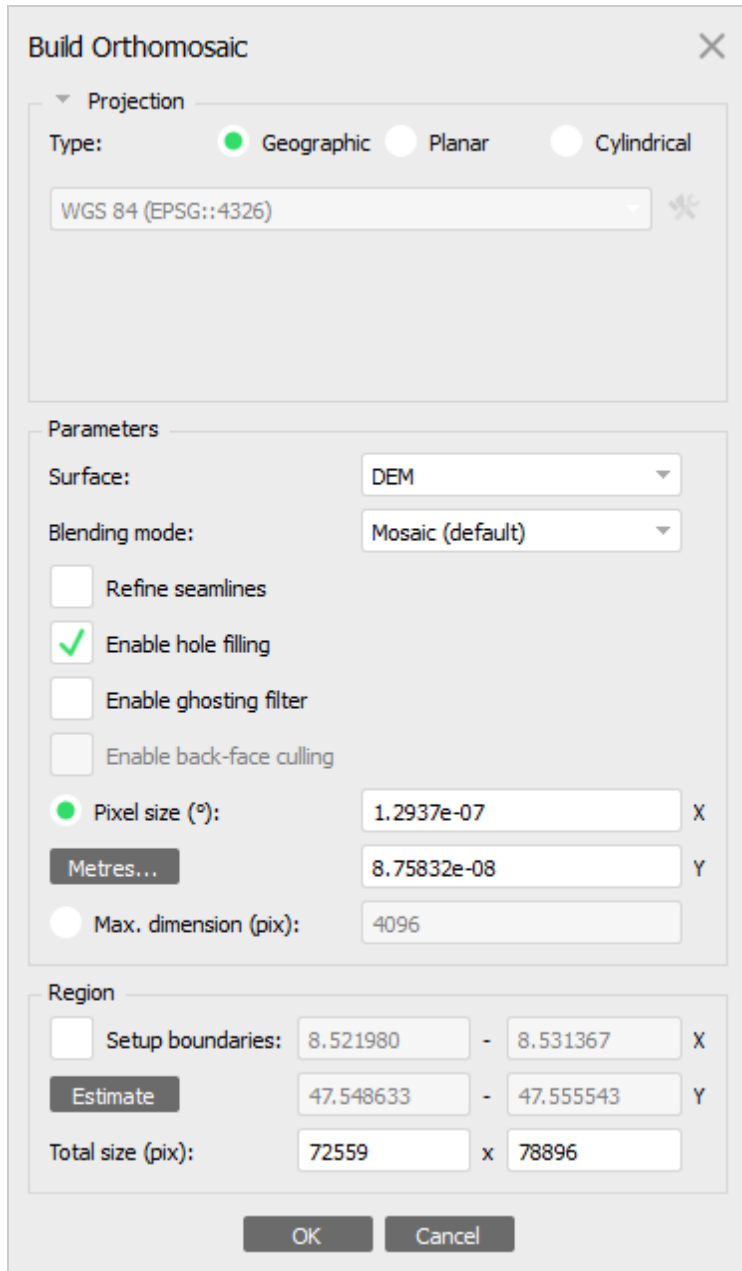




# Build Orthomosaic

Select the **Build Orthomosaic** command from the **Workflow** menu.

Set parameters in the **Orthomosaic** dialog window.

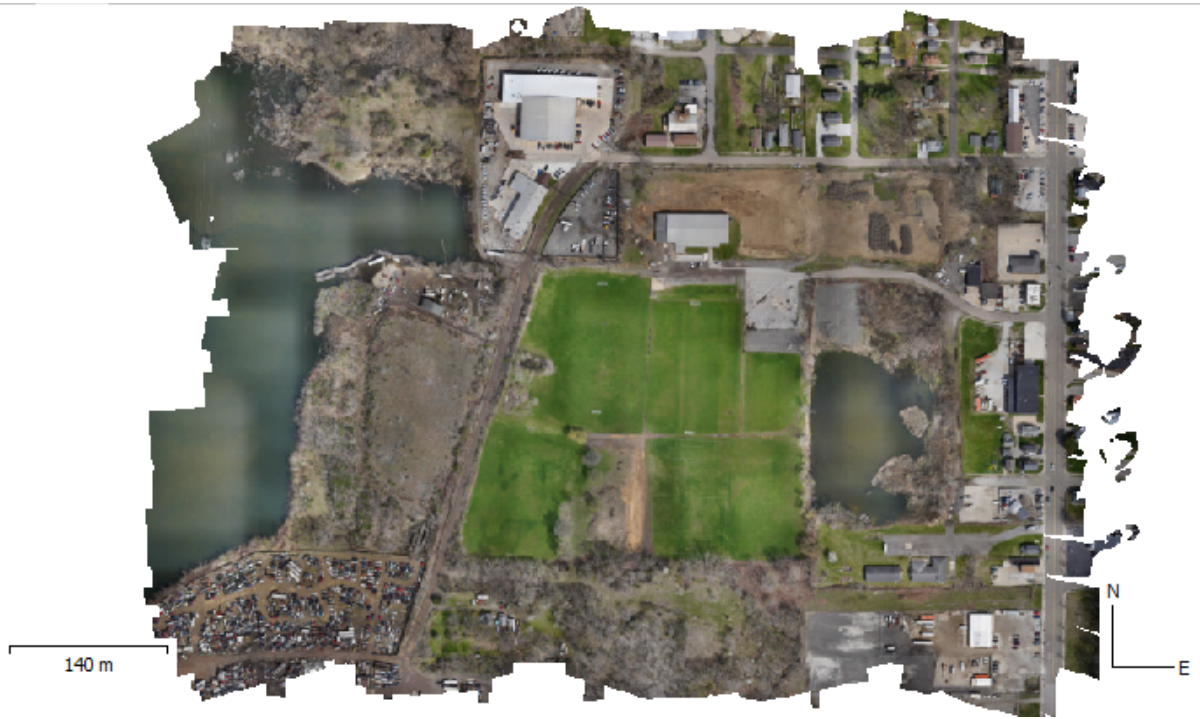


The "Build Orthomosaic" dialog window is shown with the following settings:

- Projection**
  - Type: ☒ Geographic ☐ Planar ☐ Cylindrical
  - WGS 84 (EPSG::4326)
- Parameters**
  - Surface: DEM
  - Blending mode: Mosaic (default)
  - ☐ Refine seamlines
  - ☒ Enable hole filling
  - ☐ Enable ghosting filter
  - ☐ Enable back-face culling
  - ☒ Pixel size (°): 1.2937e-07 X
  - ☐ Metres...: 8.75832e-08 Y
  - ☐ Max. dimension (pix): 4096
- Region**
  - ☐ Setup boundaries: 8.521980 - 8.531367 X
  - ☒ Estimate: 47.548633 - 47.555543 Y
  - Total size (pix): 72559 x 78896

Buttons: OK, Cancel

3. Click *the* **OK** button. The progress dialog box will appear displaying the current processing status. To cancel the processing, click *the* **Cancel** button.



## Calculating required index information (for multispectral cameras only)

Use the Set Raster Transform option from the Tools menu to open the Raster Calculator dialog.

On the Transform tab specify the index values that you would like to calculate from the source data.

The screenshot shows the 'Raster Calculator' dialog box with the 'Transform' tab selected. The 'Input Bands' list on the left includes B1 - Blue, B2 - Green, B3 - Red, B4 - Red edge, B5 - NIR, and B6 - LWIR. The 'Output Bands' list on the right contains three rows, each with a band number, a formula, and a checkmark in the 'OK' column. The formulas are: 1.  $(B5 - B3) / (B5 + B3)$ , 2.  $2.5 * (B5 - B3) / (B5 + 2.4 * B3 + 1)$ , and 3.  $B5 + 0.5 - (0.5 * \sqrt{(2 * B5 + 1)^2 - 8 * (B5 - (2 * B3))})$ . Below the lists is a grid of mathematical operators: +, -, sqrt, sin, asin, \*, /, log, cos, acos, (), ^, exp, tan, and atan. At the bottom left is an unchecked checkbox labeled 'Enable transform'. At the bottom center are 'OK', 'Cancel', and 'Apply' buttons.

Input Bands:	Output Bands:
B1 - Blue	1 $(B5 - B3) / (B5 + B3)$ ✓
B2 - Green	2 $2.5 * (B5 - B3) / (B5 + 2.4 * B3 + 1)$ ✓
B3 - Red	3 $B5 + 0.5 - (0.5 * \sqrt{(2 * B5 + 1)^2 - 8 * (B5 - (2 * B3))})$ ✓
B4 - Red edge	
B5 - NIR	
B6 - LWIR	

Operators: +, -, sqrt, sin, asin, \*, /, log, cos, acos, (), ^, exp, tan, atan

☐ Enable transform

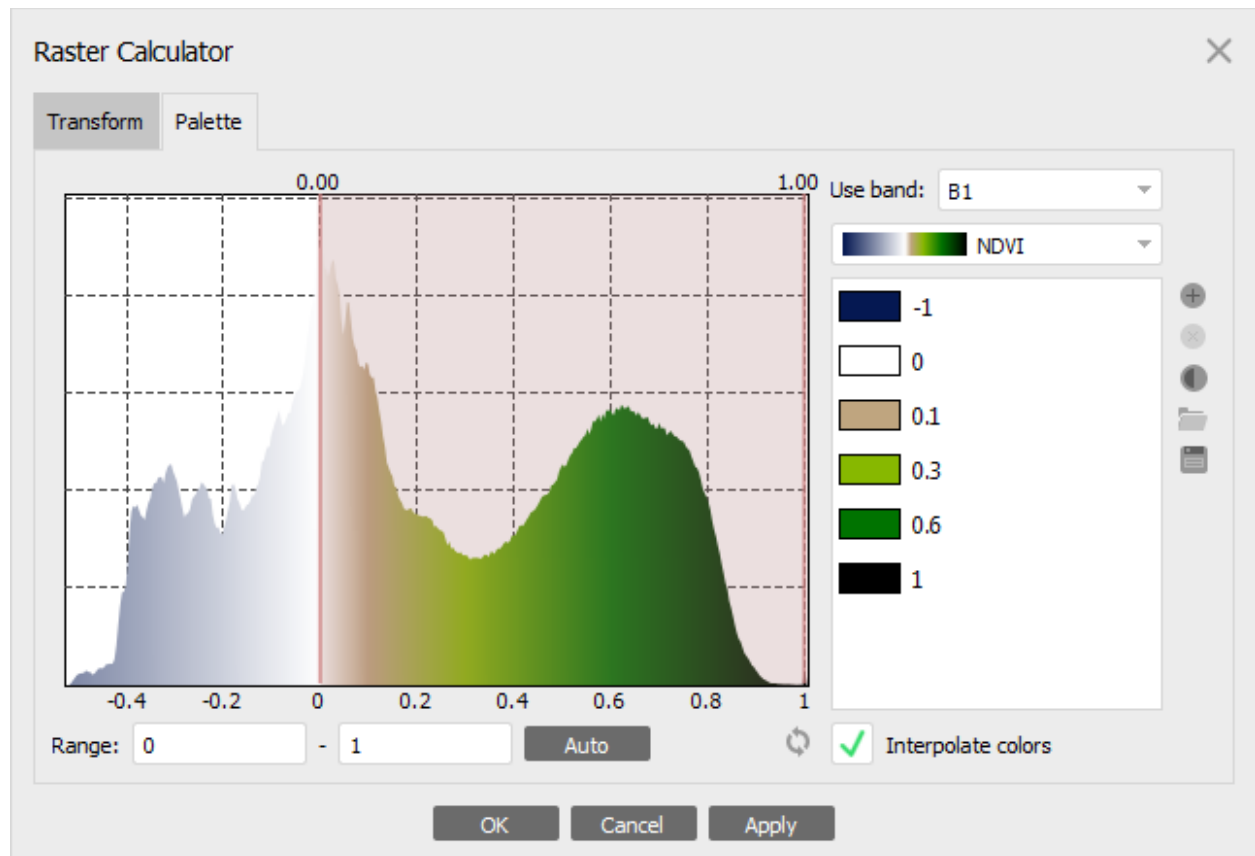
OK Cancel Apply

More than one formula can be input, if it is necessary to export the orthomosaic with several output bands related to the different indices, or if the calculated indices should be represented in false colors mode.

On the Palette tab select how one of the calculated indices should be visualized or use False Colors representation for three output bands (note that for this approach the values of the output bands used should be in 0 - 1 range for proper RGB representation, the values would be automatically scaled to 8-bit RGB representation in False Colors mode).

The following picture shows the representation of the single output band defined on the Transform tab (B1 in this case). The color representation of the index can be selected from the list of presets, loaded from \*.clr file or modified manually, if necessary.

Range values under the histogram define the absolute values for the selected index (output band), the color values from the palette section will be scaled to the selected range in the following way: Min. Range value corresponds to the 0 value in the palette color scale and Max. Range value corresponds to 1 value of the color palette:



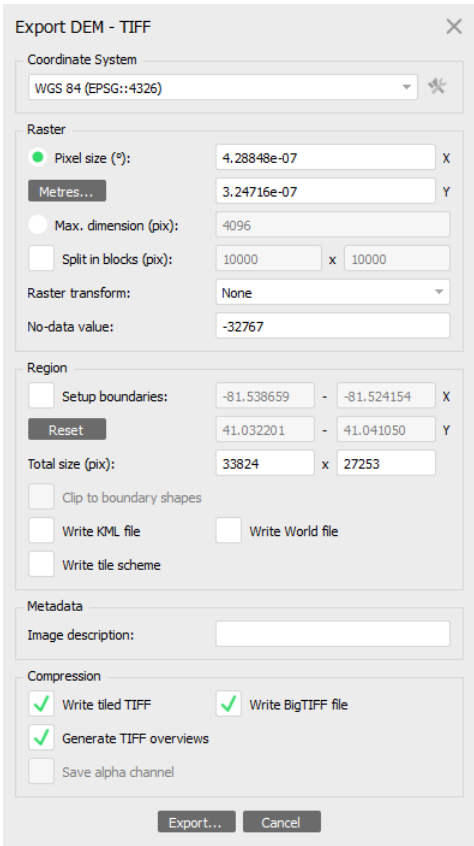
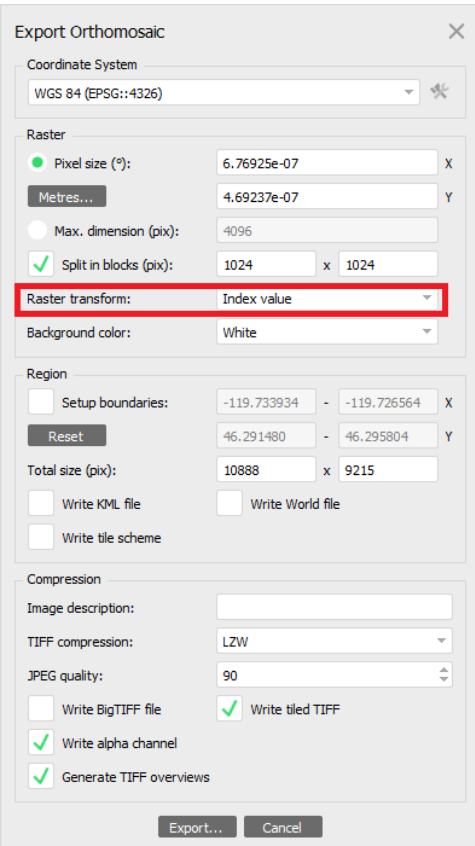
When the False Colors option is selected the histogram area can be ignored. It is only necessary to select the correspondence between the output bands and RGB colors in the False Colors mode:



## Exporting the results

Select **Export DEM** command from the **File** menu.

In the **Export DEM** dialog, specify the desired coordinate system for DEM export. Check **Write KML file** and/or **Write World file** options to create files needed to georeference the orthomosaic in the Google Earth and/or a GIS-application, if necessary.

RGB camera example settings	Multispectral example settings
	

Click the **Export** button to start the export.

Browse the destination folder, choose the file type, and print in the file name. Click *the* **Save** button.

The progress dialog box will appear displaying the current processing status. To cancel the processing, click *the* **Cancel** button.

## Export Orthomosaic

Select **Export Orthomosaic** command from the *File* menu.

2. In the **Export Orthomosaic** dialog box specify the coordinate system for the Orthomosaic to be saved in.

Export Orthomosaic - TIFF

Coordinate System  
WGS 84 (EPSG::4326)

Raster  
☒ Pixel size (%): 2.14424e-07 X  
Metres... 1.62358e-07 Y  
☐ Max. dimension (pix): 4096  
☐ Split in blocks (pix): 10000 x 10000  
Raster transform: None  
Background color: White

Region  
☐ Setup boundaries: -81.536355 - -81.525616 X  
Reset 41.033864 - 41.039475 Y  
Total size (pix): 50081 x 34563  
☐ Clip to boundary shapes  
☐ Write KML file ☐ Write World file  
☐ Write tile scheme

Metadata  
Image description:

Compression  
TIFF compression: LZW  
JPEG quality: 90  
☒ Write tiled TIFF ☒ Write BigTIFF file  
☒ Generate TIFF overviews  
☐ Save alpha channel

Export... Cancel

Click *the* **Export** button to start the export.

Browse the destination folder, choose the file type, and print in the file name. Click *the* **Save** button.

The progress dialog box will appear displaying the current processing status. To cancel the processing, click *the **Cancel*** button.