

Georeferencing in Agisoft Metashape

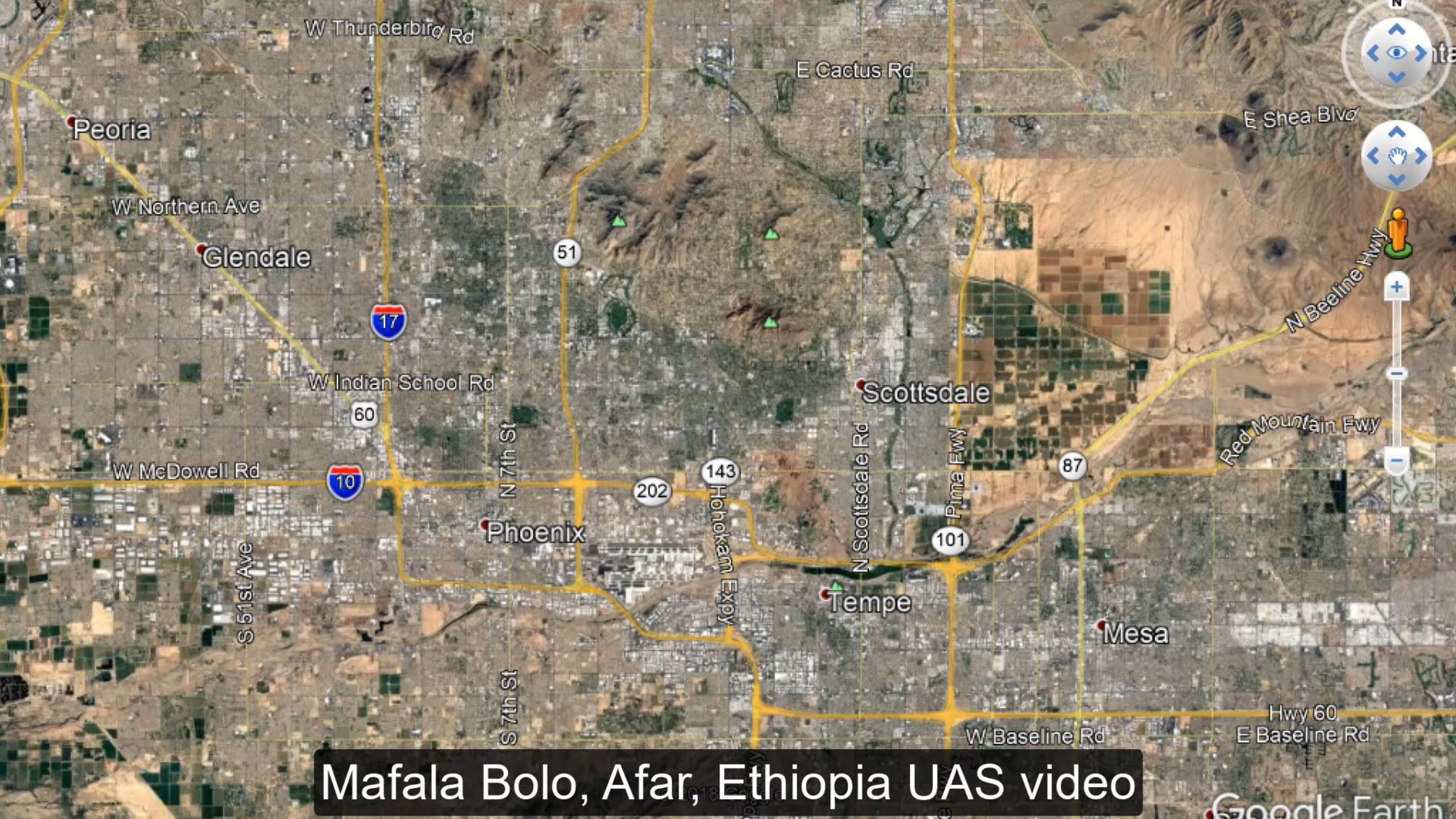
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Data collected with Erin N. DiMaggio
Pennsylvania State University

Tutorial notes
September 19, 2019

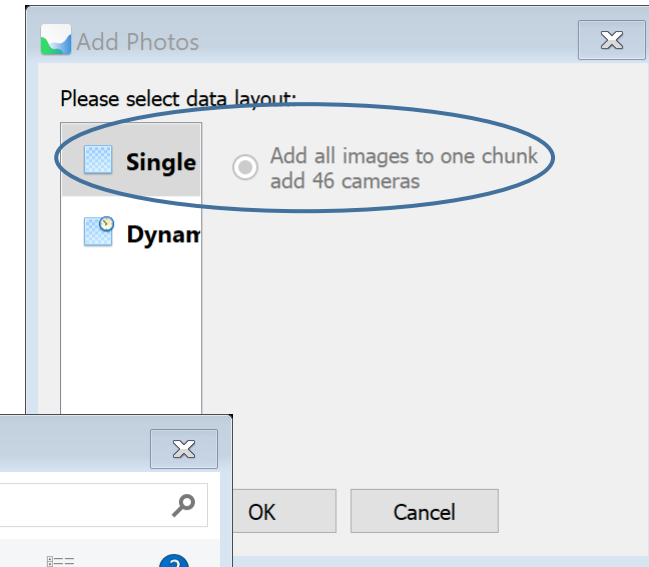
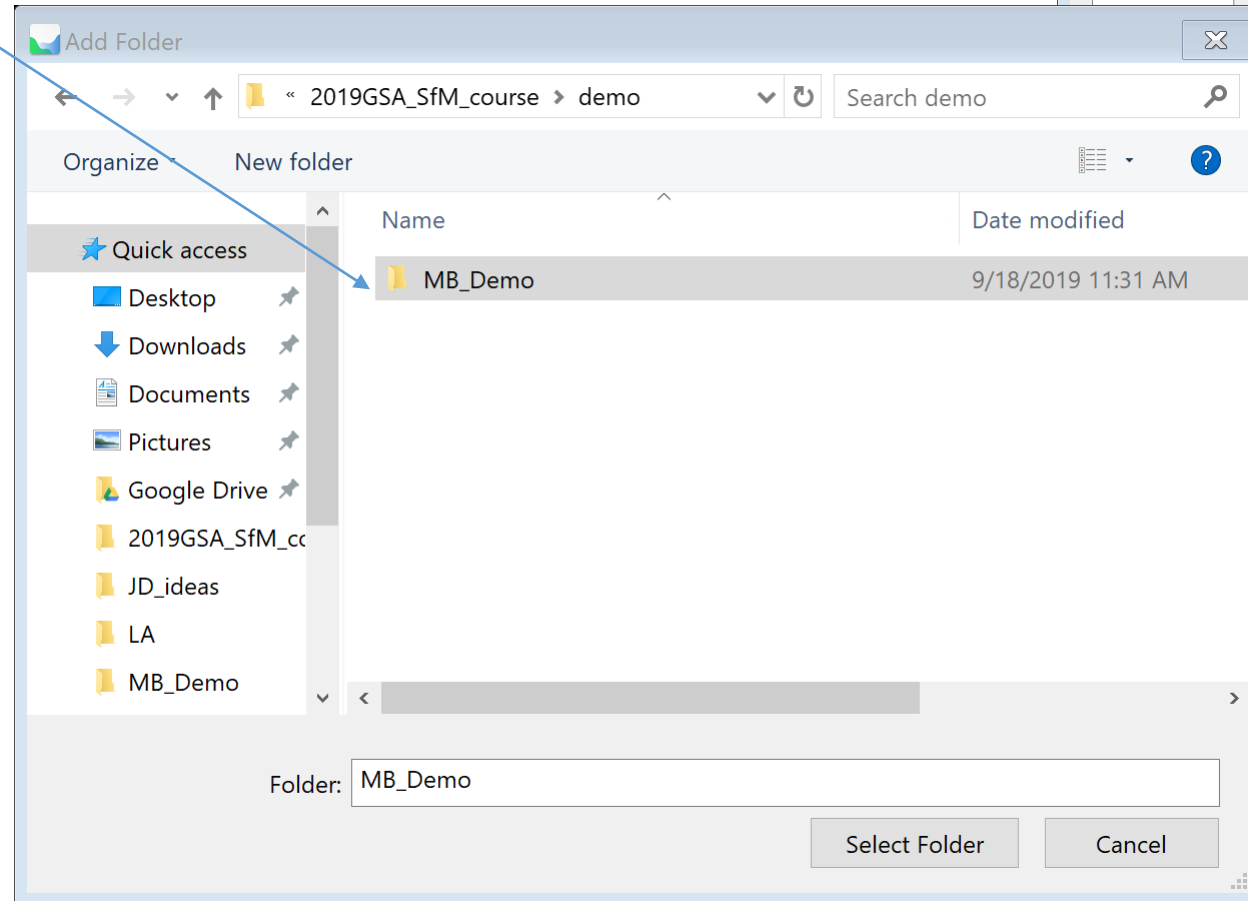
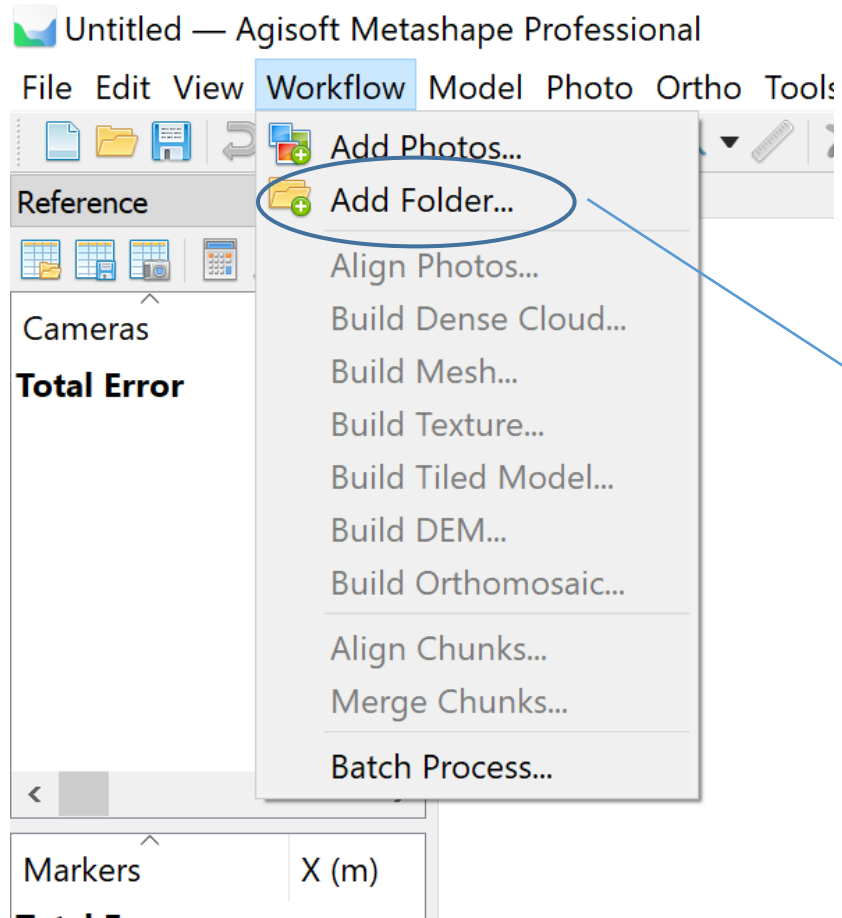


OpenTopography
High-Resolution Topography Data and Tools



Mafala Bolo, Afar, Ethiopia UAS video

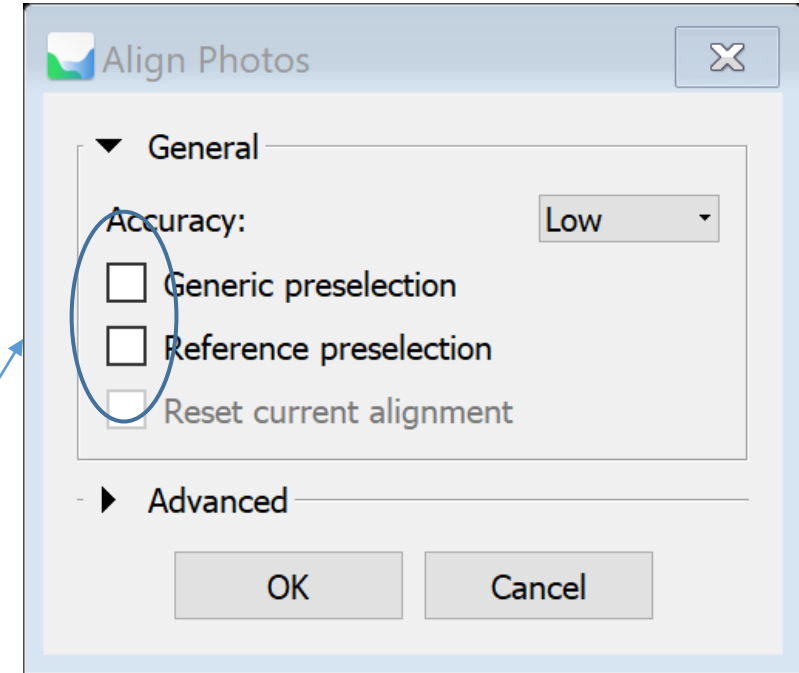
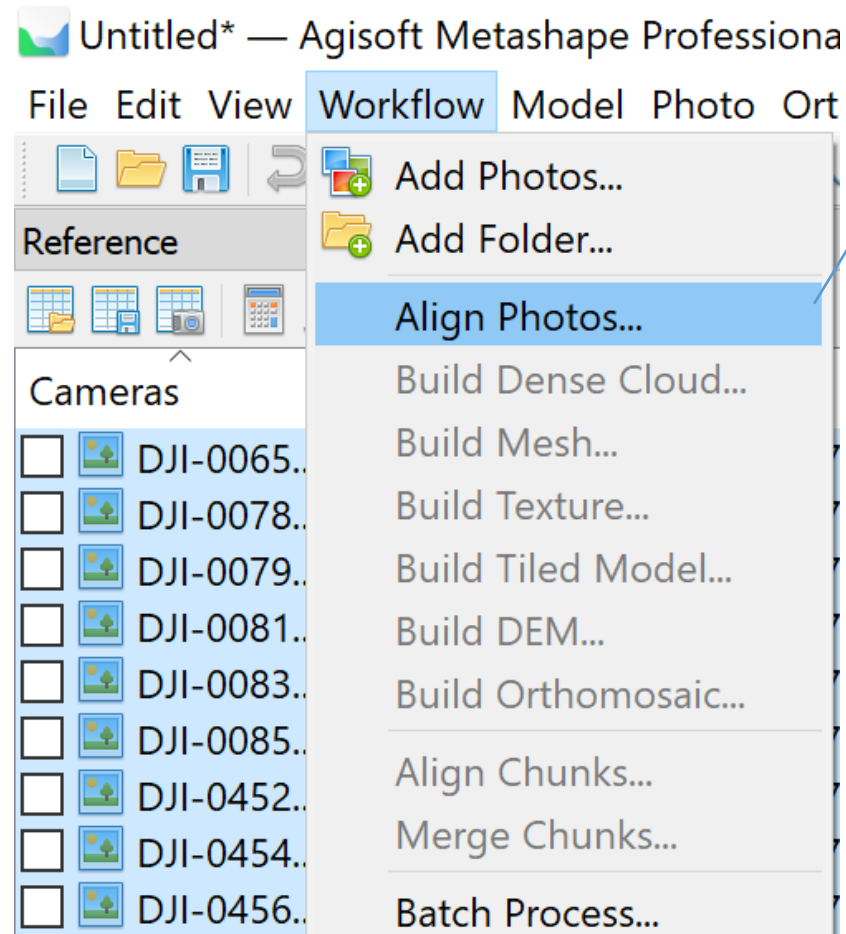
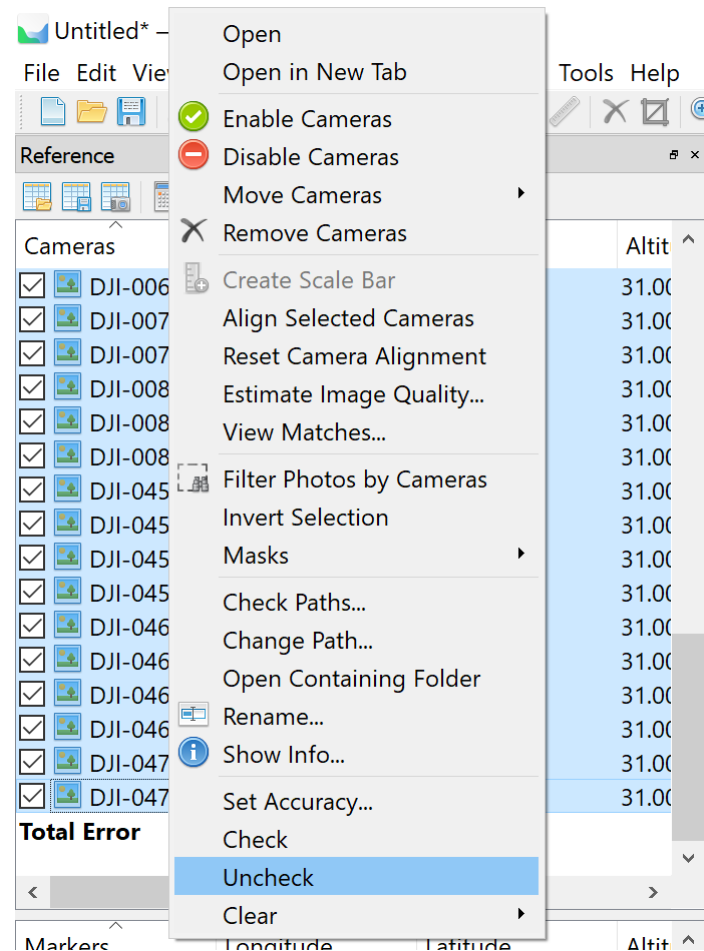
Step 1: Add Folder of photos



Step 2: Align photos (=SIFT plus Structure from Motion)

In this case, the image locations are bad. So, in the Reference pane select all the images and then uncheck. That way the software won't be confused.

Then, Align Photos from the Workflow menu. Unselect the Generic and Reference preselection. Don't be too greedy on accuracy.

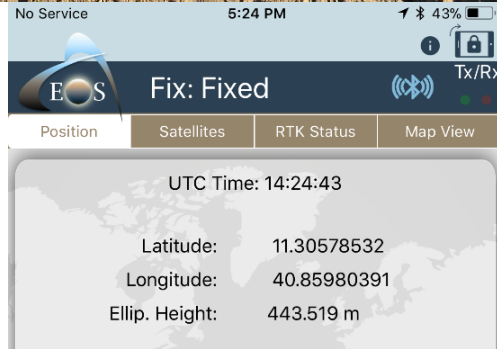


Satellite RTK for ~dm positioning

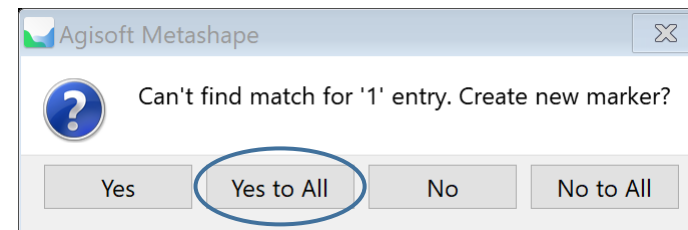
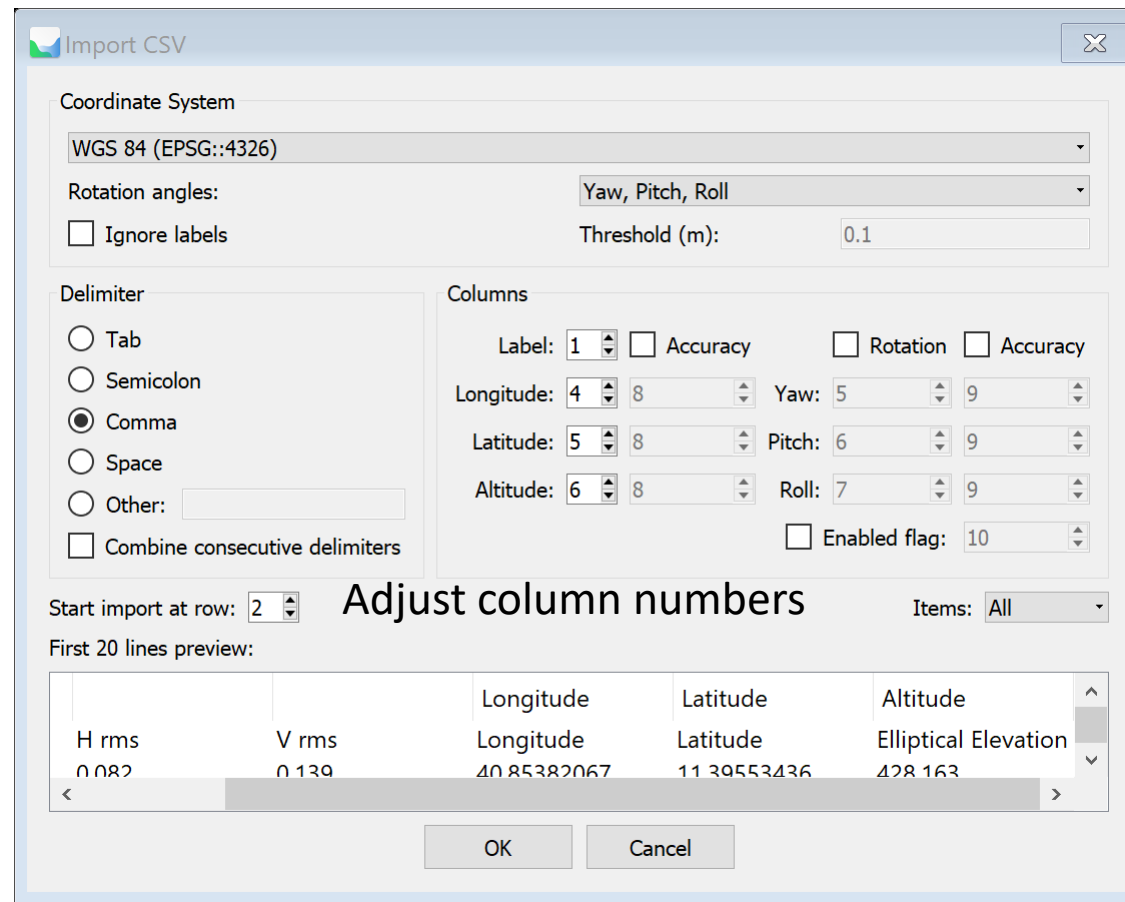
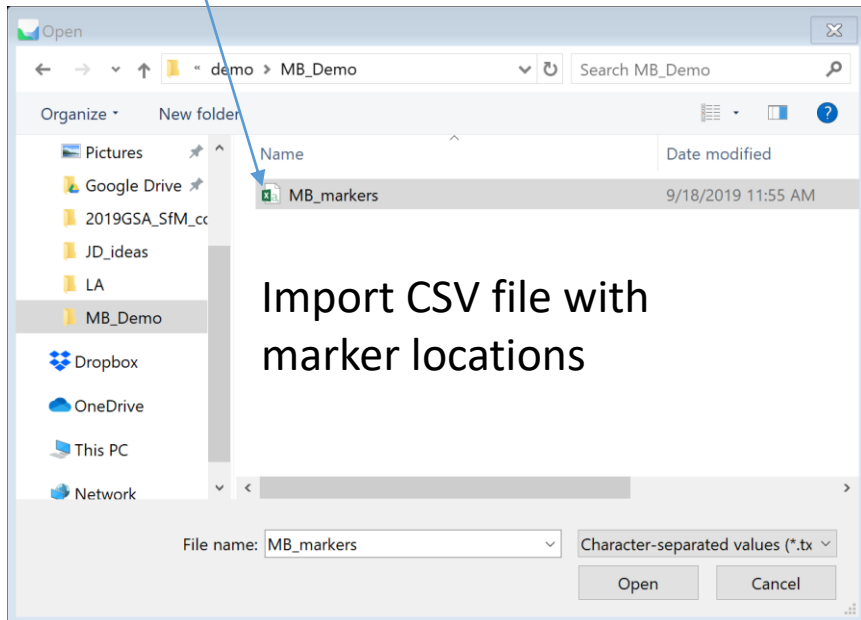
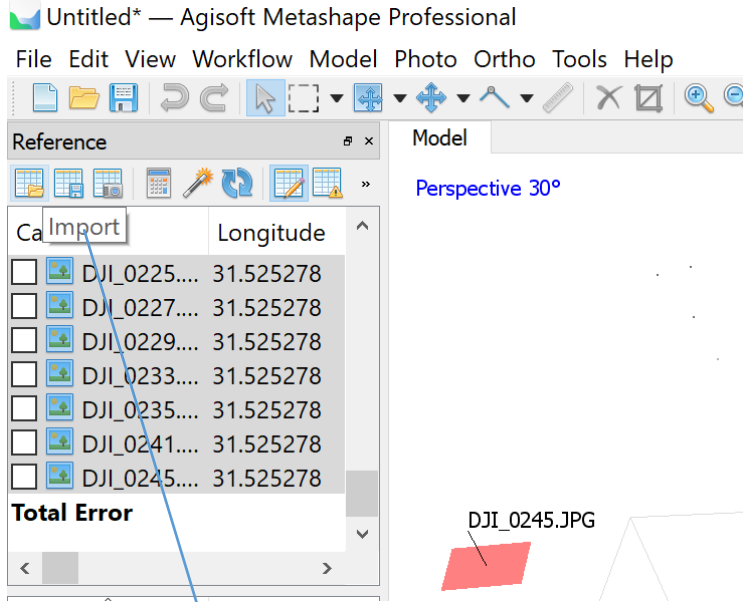


WGS84 Marker Locations

#	H rms	V rms	Longitude	Latitude	Elliptical Elevation
1	0.082	0.139	40.85382067	11.39553436	428.163
2	0.166	0.255	40.85378	11.39528655	428.107
3	0.115	0.117	40.85348805	11.39507987	427.347
4	0.248	0.379	40.85352617	11.39524682	428.625
5	0.09	0.101	40.8533159	11.39520853	427.543
6	0.185	0.322	40.85301412	11.39525232	427.456
7	0.191	0.34	40.85284532	11.39532724	427.655
8	0.16	0.161	40.85299551	11.39543654	428.243
9	0.76	0.616	40.8528101	11.39506009	432.342
10	0.166	0.161	40.85310882	11.39480686	439.807
11 (LC lft frt bmpr)	0.354	0.664	40.85328154	11.3949134	443.611
12	0.469	0.456	40.85341888	11.39473676	438.152
13	0.302	0.259	40.8536908	11.39493271	439.708
14	0.501	0.307	40.85399469	11.39524227	437.801



Step 3: External georeferencing



Yes to All

Step 3: External georeferencing

GSADEMO.psx* — Agisoft Metashape Professional

File Edit View Workflow Model Photo Ortho Tools Help

Reference Model DJI_0241.JPG

Double click on DJI_241 and then zoom in (middle mouse button)

Markers	Longitude
DJI_0225....	31.525278
DJI_0227....	31.525278
DJI_0229....	31.525278
DJI_0233....	31.525278
DJI_0235....	31.525278
DJI_0241....	31.525278
DJI_0245....	31.525278

Error

Markers	Longitude
10	40.853109
11 (LC lft ...	40.853282
12	40.853419
13	40.853691
14	40.853995

Error

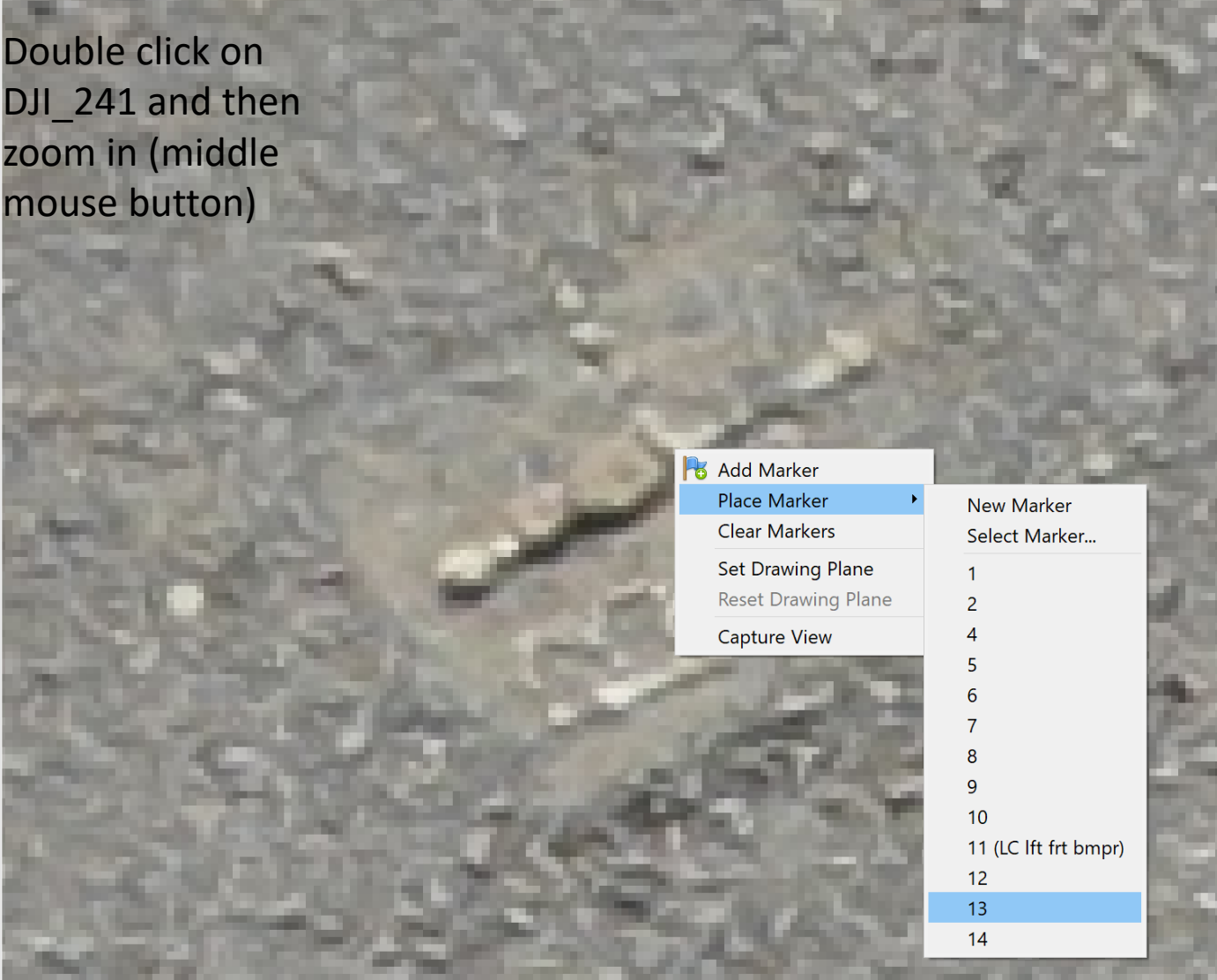
Control points
Check points

Scale Bars Distance (m)

Total Error

Control scale ...
Check scale b...

Anim... Works... Refer...

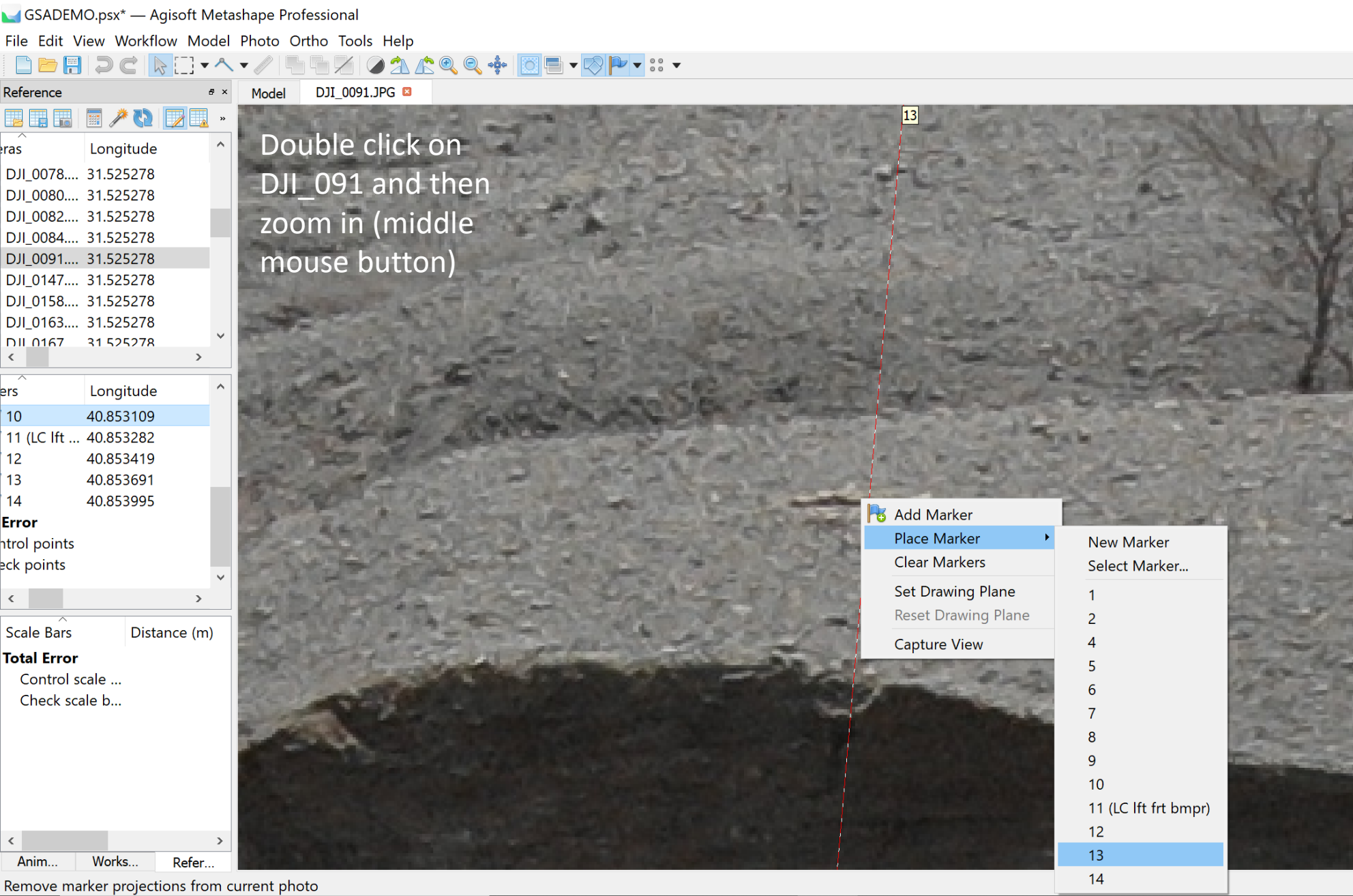


- Add Marker
- Place Marker
- Clear Markers
- Set Drawing Plane
- Reset Drawing Plane
- Capture View

- New Marker
- Select Marker...
- 1
- 2
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11 (LC lft frt bmpr)
- 12
- 13
- 14

This is marker 13. Right click and place marker right in the middle of it

Step 3: External georeferencing, cont'd



Double click on
DJI_091 and then
zoom in (middle
mouse button)

This is marker 13 with
an estimate of where it
should be (red dashed
line). Right click and
place marker right in
the middle of it

Step 3: External georeferencing, cont'd

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File Edit View Workflow Model Photo Ortho Tools Help

Reference Model DJI_0058.JPG

Cameras

Cameras	Longitude
<input type="checkbox"/> DJI_0055....	31.525278
<input type="checkbox"/> DJI_0056....	31.525278
<input type="checkbox"/> DJI_0057....	31.525278
<input type="checkbox"/> DJI_0058....	31.525278
<input type="checkbox"/> DJI_0060....	31.525278
<input type="checkbox"/> DJI_0061....	31.525278
<input type="checkbox"/> DJI_0062....	31.525278
<input type="checkbox"/> DJI_0063....	31.525278
<input type="checkbox"/> DJI_0065....	31.525278

Markers

Markers	Longitude
<input checked="" type="checkbox"/> 6	40.853014
<input checked="" type="checkbox"/> 7	40.852845
<input checked="" type="checkbox"/> 8	40.852996
<input checked="" type="checkbox"/> 9	40.852810
<input checked="" type="checkbox"/> 10	40.853109
<input checked="" type="checkbox"/> 11 (LC lft ...)	40.853282
<input checked="" type="checkbox"/> 12	40.853419
<input checked="" type="checkbox"/> 13	40.853691
<input checked="" type="checkbox"/> 14	40.853905

Scale Bars

Distance (m)

Total Error

Control scale ...

Check scale b...

Anim... Works... Refer...

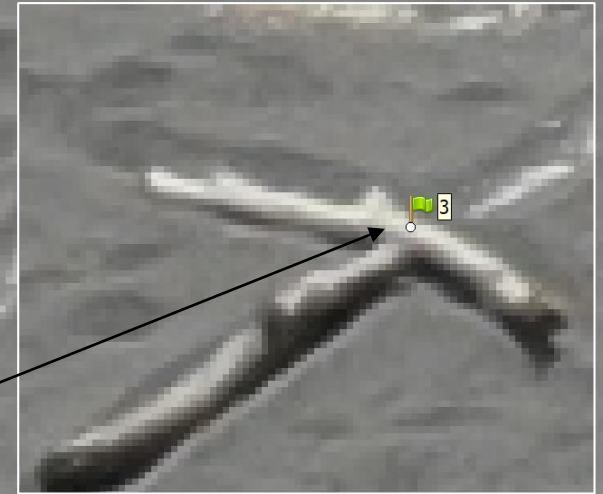
Double click on DJI_058 and then zoom in (middle mouse button)

This is marker 11 (left front bumper of the Landcruiser). Right click and place marker right in the middle of it

Step 3: External georeferencing, cont'd

Double click on DJI_080 and then zoom in (middle mouse button)

This is marker 3. Left click and correct the position.



Reference

Model DJI_0080.JPG

Cameras

	Longitude
<input type="checkbox"/> DJI_0068....	31.525278
<input type="checkbox"/> DJI_0070....	31.525278
<input type="checkbox"/> DJI_0071....	31.525278
<input type="checkbox"/> DJI_0073....	31.525278
<input type="checkbox"/> DJI_0075....	31.525278
<input type="checkbox"/> DJI_0078....	31.525278
<input checked="" type="checkbox"/> DJI_0080....	31.525278
<input type="checkbox"/> DJI_0082....	31.525278
<input type="checkbox"/> DJI_0084	31.525278

Markers

	Longitude
<input checked="" type="checkbox"/> 6	40.853014
<input checked="" type="checkbox"/> 7	40.852845
<input checked="" type="checkbox"/> 8	40.852996
<input checked="" type="checkbox"/> 9	40.852810
<input checked="" type="checkbox"/> 10	40.853109
<input checked="" type="checkbox"/> 11 (LC lft ...	40.853282
<input checked="" type="checkbox"/> 12	40.853419
<input checked="" type="checkbox"/> 13	40.853691
<input checked="" type="checkbox"/> 14	40.853995

Scale Bars

Distance (m)

Total Error

Control scale ...

Check scale b...

Step 3: External georeferencing, cont'd

Move through all the photos a couple of time and add and update the markers

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File Edit View Workflow Model Photo Ortho Tools Help

Reference

Cameras	Longitude	Latitude	Altitude (m)	Accuracy (m)	Error (m)
<input type="checkbox"/> DJI_0055....	31.525278	31.525278	31.000000	10.000000	
<input type="checkbox"/> DJI_0056....	31.525278	31.525278	31.000000	10.000000	
<input type="checkbox"/> DJI_0057....	31.525278	31.525278	31.000000	10.000000	
<input type="checkbox"/> DJI_0058....	31.525278	31.525278	31.000000	10.000000	
<input type="checkbox"/> DJI_0060....	31.525278	31.525278	31.000000	10.000000	
<input type="checkbox"/> DJI_0061....	31.525278	31.525278	31.000000	10.000000	
<input type="checkbox"/> DJI_0062....	31.525278	31.525278	31.000000	10.000000	
<input type="checkbox"/> DJI_0063....	31.525278	31.525278	31.000000	10.000000	
<input type="checkbox"/> DJI_0065	31.525278	31.525278	31.000000	10.000000	

Update

Markers	Longitude	Latitude	Altitude (m)	Accuracy (m)	Error (m)
<input checked="" type="checkbox"/> 9	40.852810	11.395060	432.342000	0.005000	
<input checked="" type="checkbox"/> 10	40.853109	11.394807	439.807000	0.005000	
<input checked="" type="checkbox"/> 11 (LC lft ...	40.853282	11.394913	443.611000	0.005000	
<input checked="" type="checkbox"/> 12	40.853419	11.394737	438.152000	0.005000	
<input checked="" type="checkbox"/> 13	40.853691	11.394933	439.708000	0.005000	
<input checked="" type="checkbox"/> 14	40.853995	11.395242	437.801000	0.005000	

Total Error

Control points

Check points

Scale Bars	Distance (m)	Accuracy (m)	Error (m)
Total Error			
Control scale ...			
Check scale b...			

Animation Workspace Reference

Recalculate georeferencing parameters

Model

Perspective 30°

Then, Click on update to apply the transformations to the camera positions

7,491 points

Y
Z

Step 4: Reset the current alignment

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File Edit View Workflow Model Photo Ortho Tools Help

Reference

- Add Photos...
- Add Folder...
- Align Photos...**
- Build Dense Cloud...
- Build Mesh...
- Build Texture...
- Build Tiled Model...
- Build DEM...
- Build Orthomosaic...
- Align Chunks...
- Merge Chunks...
- Batch Process...

Cameras	Altitude (m)	Accuracy (m)	Error (m)
DJI_0055...	31.000000	10.000000	2412100.191563
DJI_0056...	31.000000	10.000000	
DJI_0057...	31.000000	10.000000	
DJI_0058...	31.000000	10.000000	
DJI_0060...	31.000000	10.000000	
DJI_0061...	31.000000	10.000000	
DJI_0062...	31.000000	10.000000	
DJI_0063...	31.000000	10.000000	
DJI_0065...	31.000000	10.000000	

Markers	Longitude	Latitude	Altitude (m)	Accuracy (m)	Error (m)
<input checked="" type="checkbox"/> 9	40.852810	11.395060	432.342000	0.005000	
<input checked="" type="checkbox"/> 10	40.853109	11.394807	439.807000	0.005000	
<input checked="" type="checkbox"/> 11 (LC lft ...)	40.853282	11.394913	443.611000	0.005000	0.801882
<input checked="" type="checkbox"/> 12	40.853419	11.394737	438.152000	0.005000	
<input checked="" type="checkbox"/> 13	40.853691	11.394933	439.708000	0.005000	0.967117
<input checked="" type="checkbox"/> 14	40.853995	11.395242	437.801000	0.005000	
Total Error					
Control points					0.766441
Check points					

Scale Bars	Distance (m)	Accuracy (m)	Error (m)
Total Error			
Control scale ...			
Check scale b...			

Align Photos

General

Accuracy: Low

- Generic preselection
- Reference preselection
- Reset current alignment

Advanced

OK Cancel

Model

Perspective 30°

7,491 points

Animation Workspace Reference

Align cameras

Step 4: Reset the current alignment, cont'd

Reference

Cameras

	Long. est	Lat. est	Alt. est (m)
<input type="checkbox"/> DJI_0071....	40.853380	11.395216	452.231267
<input type="checkbox"/> DJI_0073....	40.853377	11.395193	451.878568
<input type="checkbox"/> DJI_0075....	40.853639	11.395132	442.581790
<input type="checkbox"/> DJI_0078....	40.853628	11.395145	442.361350
<input type="checkbox"/> DJI_0080....	40.853436	11.395331	442.922376
<input type="checkbox"/> DJI_0082....	40.853125	11.395292	445.223120
<input type="checkbox"/> DJI_0084....	40.853036	11.395455	443.810150
<input type="checkbox"/> DJI_0091....	40.853588	11.395365	441.287049
<input type="checkbox"/> DJI_0147	40.853263	11.395076	446.807037

Markers

	Long. est	Lat. est	Alt. est (m)
<input checked="" type="checkbox"/> 9	40.852810	11.395060	432.342000
<input checked="" type="checkbox"/> 10	40.853109	11.394807	439.807000
<input checked="" type="checkbox"/> 11 (LC lft ...	40.853282	11.394913	443.599326
<input checked="" type="checkbox"/> 12	40.853419	11.394737	438.152000
<input checked="" type="checkbox"/> 13	40.853691	11.394933	439.712227
<input checked="" type="checkbox"/> 14	40.853995	11.395242	437.801000

Total Error

Control points

Check points

Scale Bars

Distance est (m)	Accuracy (m)	Error (m)

Total Error

Control scale ...

Check scale b...

Animation Workspace Reference

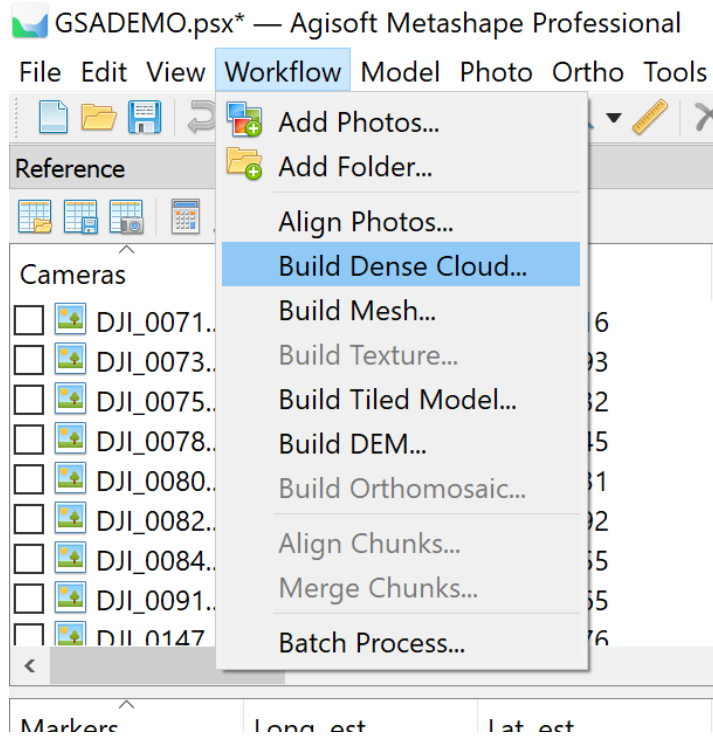
Model

Perspective 30°

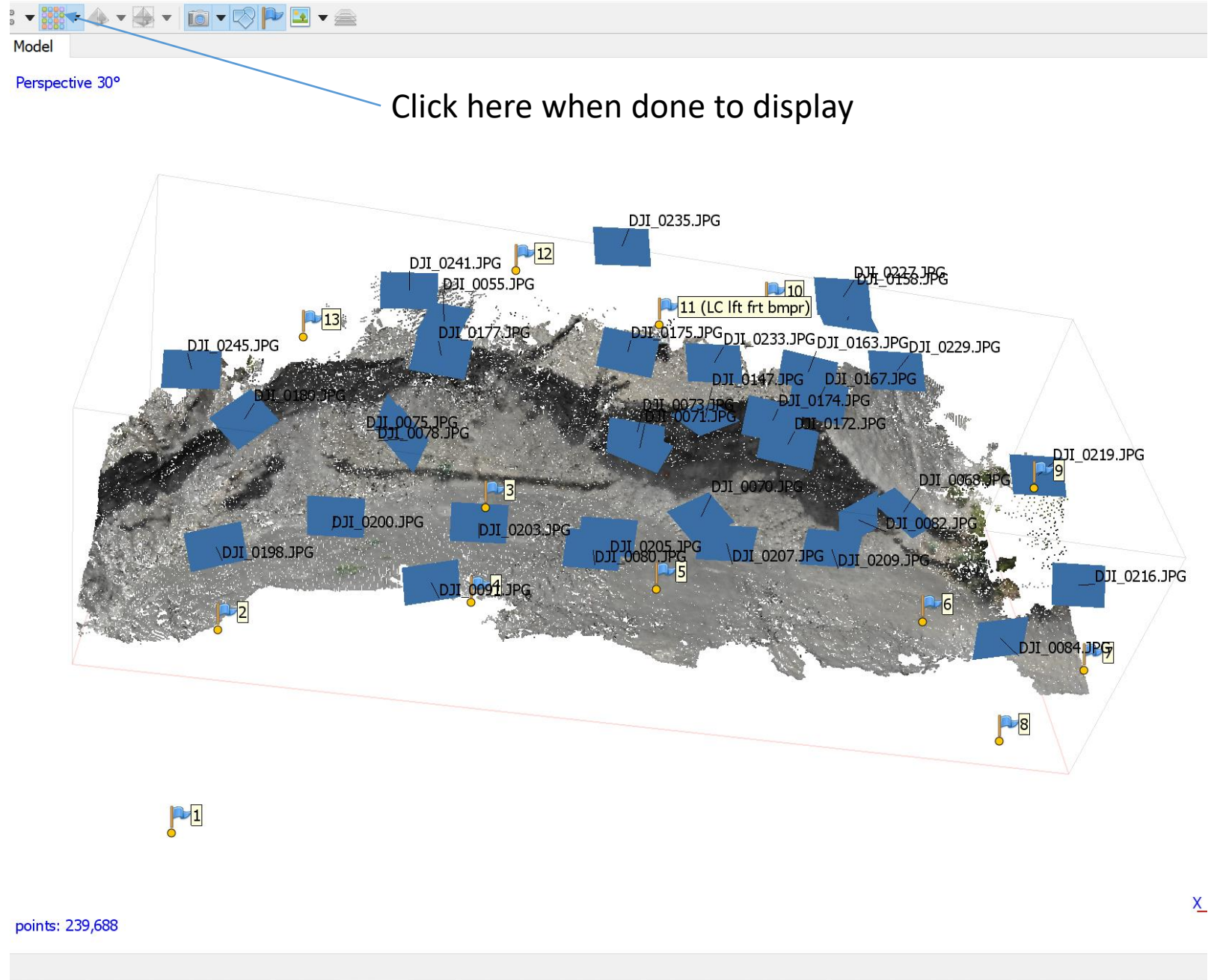
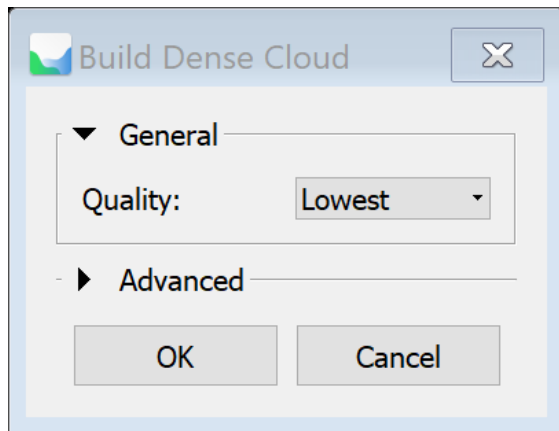
Note the estimated camera positions now (view Estimated)

7,145 points

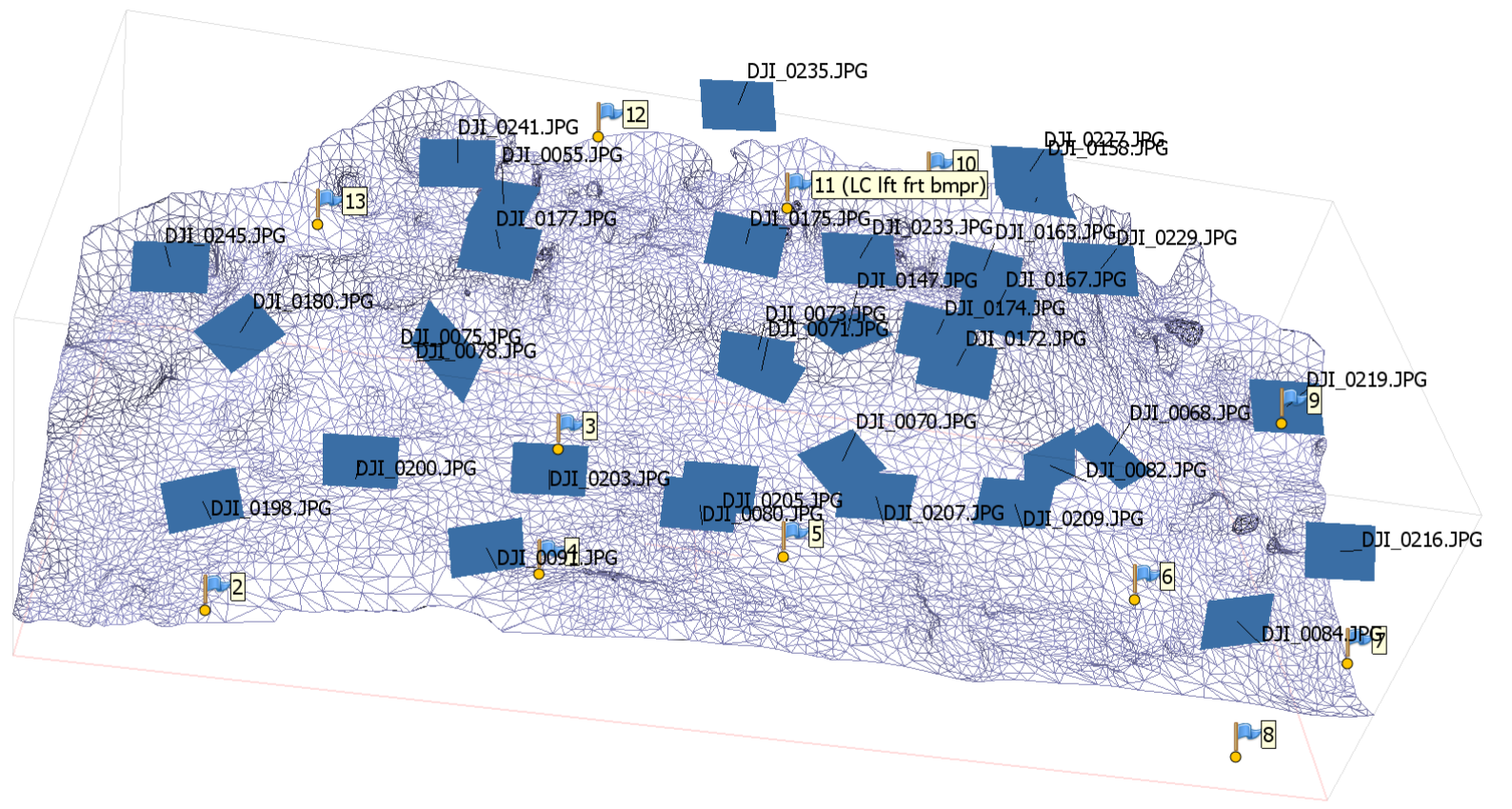
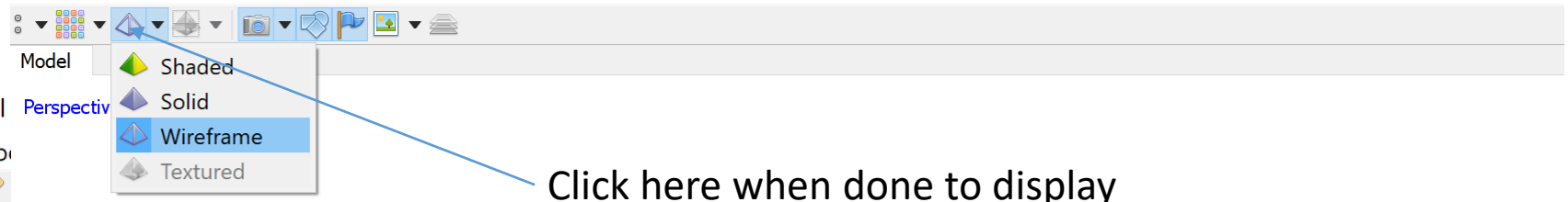
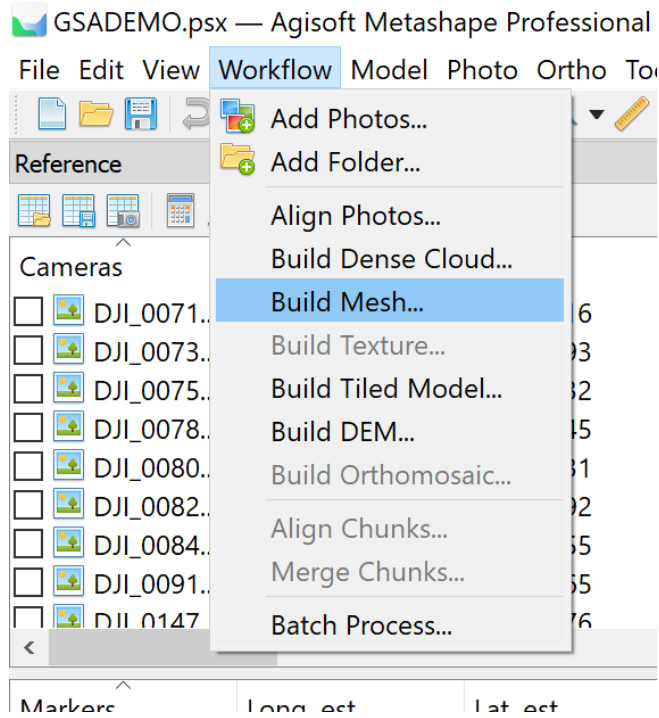
Step 5: Build the dense cloud (multiview stereo)



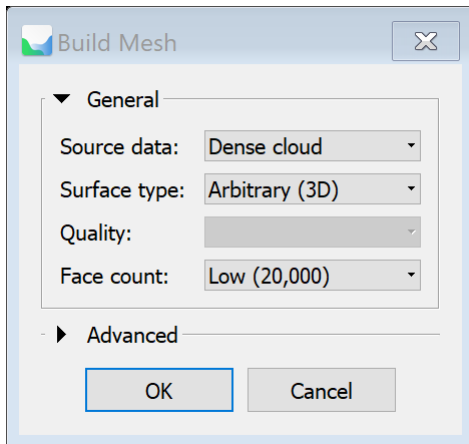
Don't be too greedy on quality.



Step 6: Build the mesh

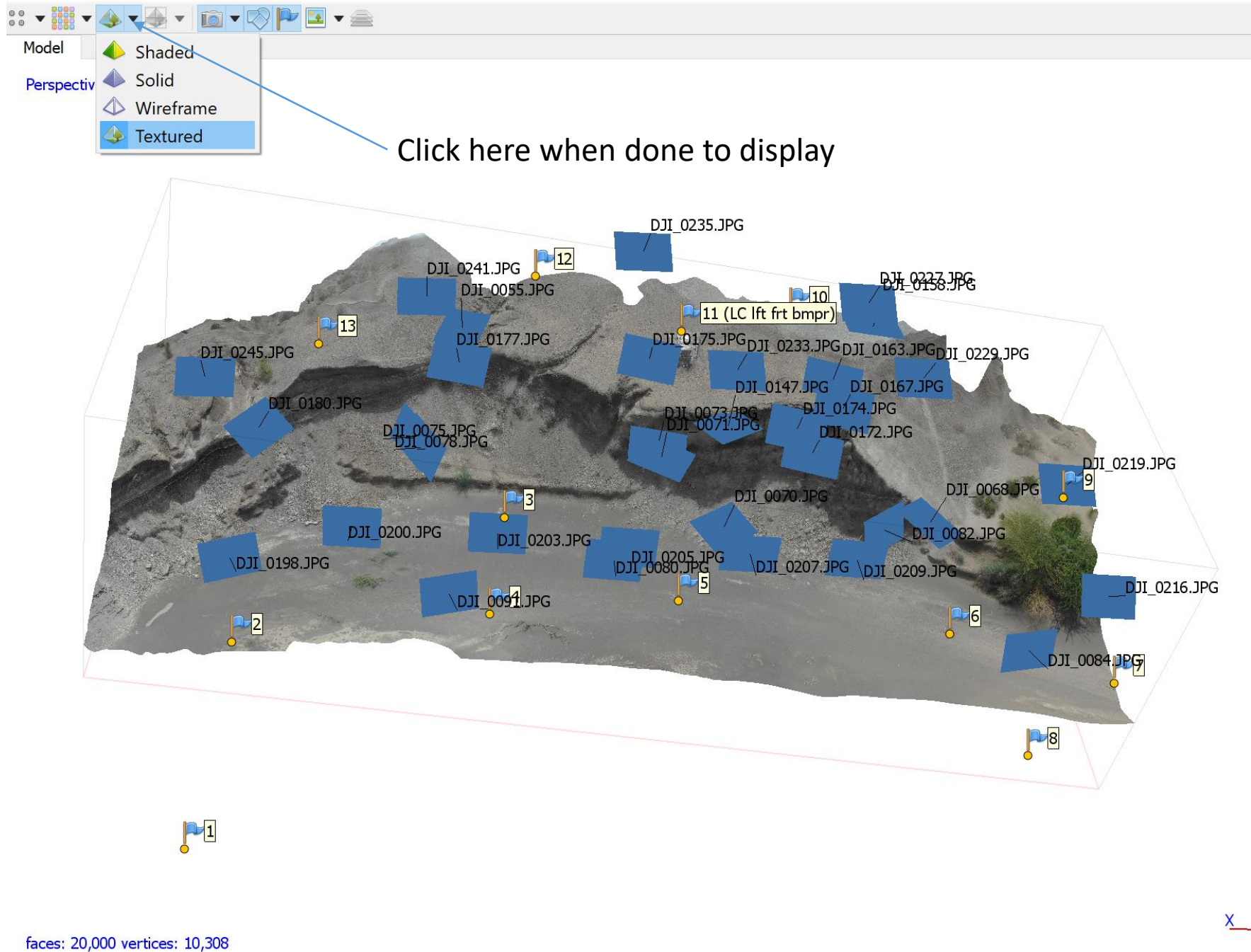
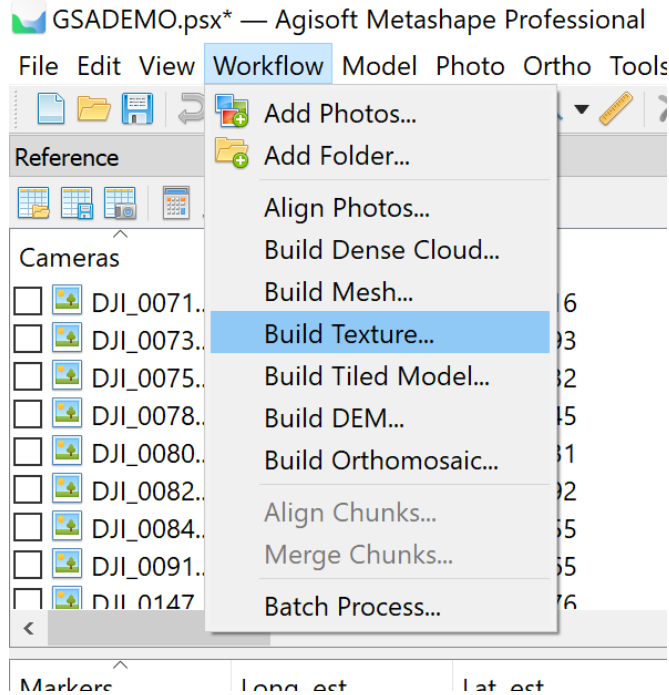


Don't be too greedy on quality.

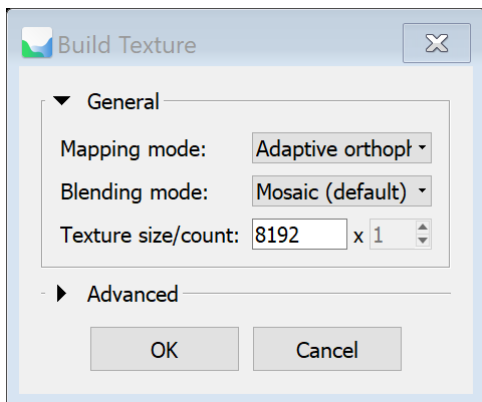


faces: 20,000 vertices: 10,308

Step 7: Build the texture



Don't be too greedy on quality.



Step 8: Rerun to increase quality and create derived products

After you have run through everything, keep saving and then you can start again through the sequence, progressively increasing quality.

You will probably want to Build a DEM, and Build the Orthomosaic

Workflow menu items:

- Add Photos...
- Add Folder...
- Align Photos...
- Build Dense Cloud...
- Build Mesh...
- Build Tiled Model...
- Build DEM...
- Build Orthomosaic...
- Align Chunks...
- Merge Chunks...
- Batch Process...

Cameras	Long. est	Lat. est	Alt. est (m)
<input type="checkbox"/> DJI_0071...			
<input type="checkbox"/> DJI_0073...			
<input type="checkbox"/> DJI_0075...			
<input type="checkbox"/> DJI_0078...			
<input type="checkbox"/> DJI_0080...			
<input type="checkbox"/> DJI_0082...			
<input type="checkbox"/> DJI_0084...			
<input type="checkbox"/> DJI_0091...			
<input type="checkbox"/> DJI_0147			

Markers	Long. est	Lat. est	Alt. est (m)
<input checked="" type="checkbox"/> 9	40.852810	11.395060	432.34200

Build DEM dialog box:

- Projection: Type: Geographic Planar Cylindrical
- Parameters: Source data: Dense cloud; Interpolation: Enabled (default); Point classes: All
- Region: Setup boundaries: 40.852780 - 40.853917 X; 11.394793 - 11.395386 Y; Resolution (m): 0.160246; Total size (pix): 774 x 409

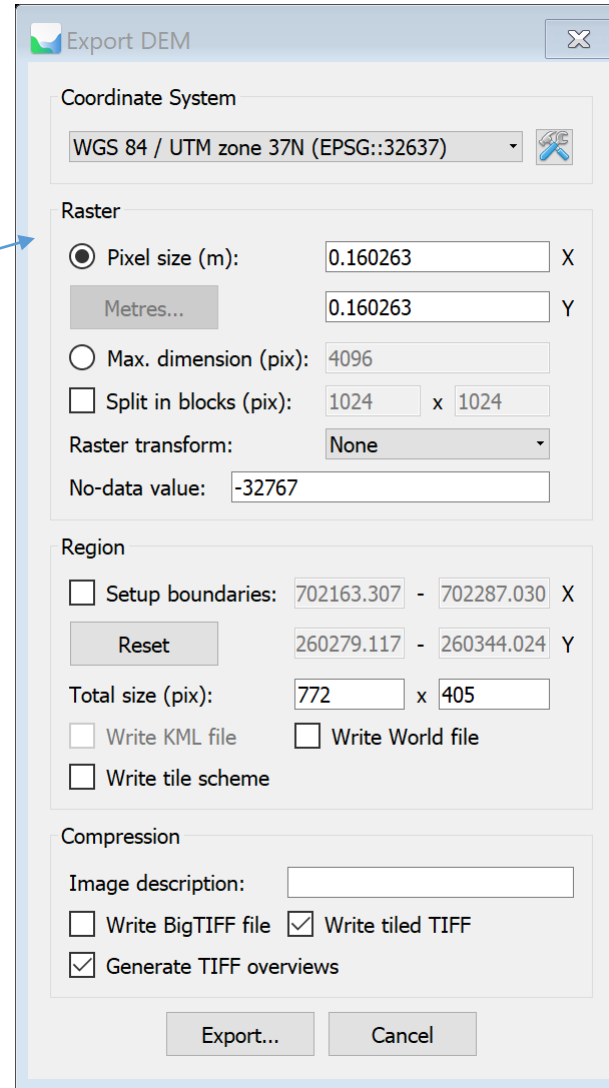
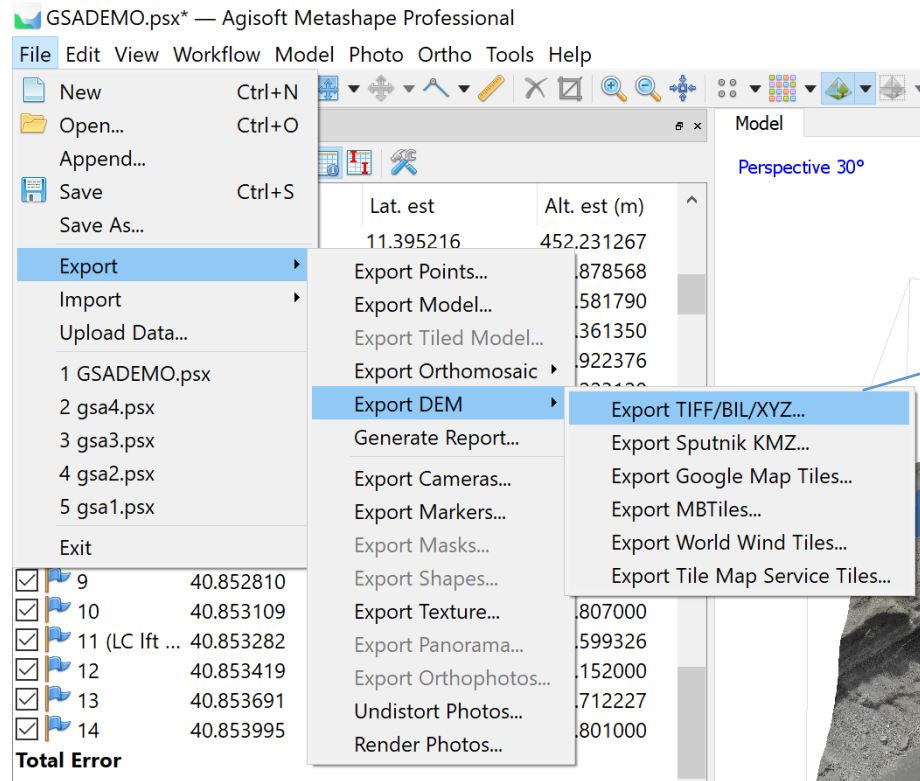
Select Coordinate System dialog box:

- Coordinate System: Projected Coordinate Systems
- Projected Coordinate Systems: WGS 84 / UTM zone 37N (EPSG::32637)
- Linear Units: metre (EPSG::9001)
- Projection Method: Transverse Mercator
- Geographic Coordinate System: WGS 84 (EPSG::4326)

Mind the coordinate system

Step 8: Rerun to increase quality and create derived products

DEMs and Orthophotos have to be built before they are exported.



You could change the coordinate system here on export as well

Step 9: Quick check with ArcMap if the exported product is in the right place

