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1. General comments on Metashape use and image upload speed.

1. Before starting to work, please read the User Manual (or at least paragraph 1 😊): https://www.geocloud.work/media/manual-pdf/GeoCloud_Manual_v5.0_hT6Ws8M.pdf
2. You can use different Metashape applications for Linux and Windows for different processes. Metashape Linux applications can also work with Elastic Storage for Linux, which is unlimited and uses exactly the amount of storage you need during processing.
3. Metashape uses GPU for processes: Match photos, Depth Maps, Build Mesh and Build Tiled Model.
4. Metashape uses only CPU for processes: Project and Image arranging, GCP measurements, Point cloud, DEM, Orthomosaic and all other processes. Depending on the size of your project, Metashape 16GB or 32GB without GPU may be used.
5. Point Cloud and Orthomosaic use a lot of RAM for large projects. For these processing steps the following CPU based instances can be used: Metashape 512/768/1024/1536GB. See example here: [Metashape 2.0.3: New instances with a lot of RAM for very large orthophoto projects](#)
6. Processing in a Batch mode, you can automatically stop your computer using this script: [Metashape script to stop computer in a Batch Process](#)
7. To speed up the processing, you can use Ephemeral disks, but **Pay attention!** Local drive D: exists only when the computer (Metashape) is operational. If you stop your computer, the D: drive will disappear along with all data. There is no way to recover data. Therefore, please copy the processing results back to Storage X: after processing is complete and before stopping the computer. Don't use the above script for automatic stopping of the computer in a batch mode if you use the Ephemeral disk for processing and saving the data. [Ephemeral disk D: for Metashape 16/32/64/128 and 192GB](#)
8. There are several methods to upload/download your data. Read paragraph 13 of the User Manual https://www.geocloud.work/media/manual-pdf/GeoCloud_Manual_v5.0_hT6Ws8M.pdf
9. The following table provides an overview on image upload speed for different images, storage types and upload methods (File Manager and FileZilla). These tests were done at the Internet upload speed of 250 Mbps. The upload time depends on the image size, the Internet speed, and your location in the world. Therefore, it is highly recommended, before starting a large project, to check the upload time from your location.

100 images					Upload with FileZilla at 250Mbps				Upload with FileManager at 250 Mbps			
					Storage Elastic for Linux		Storage Fixed		Storage Elastic for Linux		Storage Fixed	
Camera	Image size	File size	Color	Format	Standard	Fast	Standard	Fast	Standard	Fast	Standard	Fast
	(MP)	(MB)			Time (h:m:s)				Time (h:m:s)			
FC330 (4000x3000)	12	5	RGB	JPG	0:00:56	0:00:45	0:00:43	0:00:45	0:00:58	0:01:01	0:01:11	0:00:54
FC6310 (4864x3648)	17	8	RGB	JPG	0:01:04	0:01:16	0:01:28	0:00:58	0:01:11	0:01:23	0:01:25	0:01:12
FC6310R (5472x3648)	20	9	RGB	JPG	0:01:00	0:01:01	0:01:16	0:01:06	0:01:17	0:01:21	0:01:26	0:01:56
M3E (5280x3956)	21	12	RGB	JPG	0:01:08	0:01:22	0:01:09	0:01:16	0:01:28	0:01:45	0:02:03	0:02:03
DSC-RX1RM2 (7952x5304)	42	18	RGB	JPG	0:01:51	0:01:46	0:01:58	0:01:43	0:02:11	0:02:24	0:02:56	0:02:30
iXM-GR120 (13468x9564)	120	103	RGB	JPG	0:08:50	0:07:53	0:09:10	0:09:50	0:09:06	0:10:36	0:14:06	0:12:22
iXM-RS150F (14204x10652)	150	144	RGB	IIQ	0:11:01	0:12:04	0:12:19	0:12:47	0:13:08	0:12:21	0:22:16	0:18:48
iXM-RS150F (14204x10652)	150	433	RGB	TIF	0:30:05	0:31:26	0:36:27	0:30:43	0:37:26	0:35:50	0:56:26	0:59:58
iXM-RS150F (14204x10652)	150	578	RGBI	TIF	0:41:46	0:42:17	0:49:22	0:40:29	0:47:52	0:48:18	0:46:13	0:46:52
PAS280 (20150x14118)	280	814	RGB	TIF	0:55:15	0:55:26	1:11:56	1:00:26	1:06:13	1:10:04	1:02:43	1:01:49
UC Condor 4.1 (20488 x 14040)	119	114	PAN	TIF		0:07:51						
UC Condor 4.1 (48462x6150)	298	852	RGB	TIF		0:55:25						
UC Merlin 3020 (31300x14016)	439	1220	RGB	TIF		1:25:18						

2. Metashape 2.1.1: **1000 Vexcel UC Osprey 4.1** nadir images (288MP, 20544x14016) for regular and true orthophoto.

1. Block: Strips – 17 (~58 image/strip); Images – 1,000; Image size – 288MP (20544 x 14016); Image file size (TIF) – 864 MB;
2. Forward/Side overlap - 80%/70%; Flight altitude – 1,545 m; Image GSD – 7.26 cm; Ortho GSD – 7.26 cm; Ortho area – 88 sq.km;

	GPU	CPU	Parameters	RAM usage (GB)	Storage Elastic (Type)	Storage Elastic (GB)	Computer	Price (\$/h)	Time (h:m:s)	Price (\$)
OS							Linux			
Upload time for 1000 images at 80 Mbps			1000		Standard	864			17:00:00	
Match Photos (High)	v	v	604,961 tie points	4.25	Fast		Metashape 192GB 4xA10G	\$11.148	0:58:27	\$10.86
Align Cameras		v		1.95	Fast		Metashape 192GB 4xA10G	\$11.148	0:03:15	\$0.60
Depth Maps (High-High, Aggressive)	v	v		90.29	Fast		Metashape 192GB 4xA10G	\$11.148	4:53:00	\$54.44
Point Cloud 1 (from Depth Maps)		v	8,408,196,627	143.20	Fast		Metashape 512GB, No GPU	\$13.154	12:18:00	\$161.79
DEM 1 (from Point Cloud 1)		v	13.9 cm/pix		Fast		Metashape 512GB, No GPU	\$13.154	0:30:40	\$6.72
True-Orthophoto (from DEM 1)		v	6.93 cm/pix	10.71	Fast		Metashape 512GB, No GPU	\$13.154	3:09:00	\$41.44
Point Cloud 2 (Filtering Point Cloud 1 to 1 m/pix)		v	175,932,075		Fast		Metashape 512GB, No GPU	\$13.154	2:30:00	\$32.89
Classifying ground points on Point cloud 2		v	1m/pix	7.10	Fast		Metashape 512GB, No GPU	\$13.154	0:05:12	\$1.14
DEM 2 (from Point cloud 2)		v	1m/pix	0.39	Fast		Metashape 512GB, No GPU	\$13.154	0:00:32	\$0.12
Regular Orthophoto (from DEM 2)		v	7.26 cm/pix	8.76	Fast		Metashape 512GB, No GPU	\$13.154	1:54:00	\$24.99
Total Processing time/price						711			26:22:06	\$334.99
Export DTM (9 x12 tiles, 1 x 1 km)		v	13.9 cm/pix		Standard	12	Metashape 34GB, No GPU	\$2.971	0:45:00	\$2.23
Export Point Cloud (100GB laz file)		v	8,408,196,627		Standard	101	Metashape 34GB, No GPU	\$2.971	0:49:00	\$2.43
Export True-Ortho (9 x 12 tiles, 1 x 1 km)		v	6.93 cm/pix		Standard	75	Metashape 34GB, No GPU	\$2.971	0:42:00	\$2.08
Export DTM (1 tile, 8 x12 km)		v	1m/pix			0.2	Metashape 34GB, No GPU	\$2.971	0:00:30	\$0.02
Export Regular Ortho (8 x11 tiles, 1 x 1 km)		v	7.26 cm/pix		Standard	68	Metashape 34GB, No GPU	\$2.971	0:45:00	\$2.23
Total Export time/price									3:01:30	\$8.99
Elastic Storage time/price						1,831			46:23:36	\$145.00
Processing and Export time/price									29:23:36	\$343.98

3. Metashape 2.1.0: all main Metashape Windows and Linux steps with **100** drone 16MP (4864x3648) images

	GPU	CPU	Metashape 32GB	Metashape 32GB	Metashape 16GB	Metashape 16GB	Metashape 64GB	Metashape 64GB	Metashape 192GB	Metashape 192GB
OS			Windows 2019	Linux	Windows 2019	Linux	Windows 2019	Linux	Windows 2019	Linux
Storage			Storage X standard	Storage X standard	Storage X standard	Elastic standard	Storage X standard	Elastic standard	Storage X standard	Elastic standard
GPU			No GPU	No GPU	1 x TESLA T4	1 x TESLA T4	1 x TESLA T4	1 x TESLA T4	4 x TESLA T4	4 x TESLA T4
Processor type			AMD EPYC 7R13	AMD EPYC 7R13	Intel® Xeon® Platinum	Intel® Xeon® Platinum 8259CL	Intel® Xeon® Platinum 8259CL	Intel® Xeon® Platinum 8259CL	Intel® Xeon® Platinum 8259CL	Intel® Xeon® Platinum 8259CL
Processor configuration			2 CPU 2.65GHz 4vCPU	2 CPU 3.3GHz 4vCPU	2 CPU 2.50GHz 4vCPU	2 CPU 2.50GHz 4vCPU	4 CPU 2.50GHz 8vCPU	4 CPU 2.50GHz 8vCPU	24 CPU 2.50GHz 48vCPU	24 CPU 2.50GHz 48vCPU
RAM			32	32	16	16	64	64	192	192
Match Photos (High)	v	v	6m 28s	5m 47s	2m 14s	1m 56s	2m 12s	1m 53s	1m 29s	1m 23s
Align Cameras		v	49s	50s	1m 12s	1m 17s	28s	24s	19s	13s
Build model:										
a. generating Depth Maps	v	v		12h 5m	12m 41s	9m 51s	8m 24s	6m 10s	3m 29s	2m 11s
b. generating model	v	v		20m 40s	14m 5s	12m 24s	6m 39s	5m 47s	5m 26s	4m 23s
Build texture (from 3Dmodel)		v			6m 23s	8m 10s	3m 36s	3m 43s	3m 3s	3m 2s
Build tiled model (from Model, 8 levels)		v	33m 18s	26m 20s	33m 27s	30m 14s	13m 35s	10m 54s	11m 22s	8m 8s
Build tiled model (from Depth Maps, 9 levels)	v	v	1h 33m	1h 15m	1h 3m	57m 54s	28m 22s	24m 42s	24m 35s	18m 43s
Build Point Cloud (from Depth Maps)		v	16m 55s	16m 6s	24m 4s	21m 22s	8m 51s	6m 47s	7m 26s	3m 49s
Build DEM (from Point Cloud, 16 cm)		v	46s	40s	1m 1s	55s	41s	36s	36s	30s
Orthophoto (from DEM, 8 cm)		v	4m 37s	3m 44s	6m 20s	5m 16s	3m 18s	2m 43s	2m 52s	2m 19s

4. Metashape 2.1.0: **3223** drone 20MP (5472x3648) images for orthophoto

	GPU	CPU	Metashape 192GB	Metashape 192GB	Metashape 192GB
OS			Linux	Linux	Linux
Storage			Elastic standard	Elastic standard	Elastic standard
GPU			4 x A10G	4 x A10G	4 x A10G
RAM			192	192	192
Image/Orthomosaic resolution (cm)			2.1	2.1	2.1
Tie points			1,827,106	1,827,106	1,827,106
Point cloud (points)			535,683,303	31,046,253	<i>No point cloud</i>
DEM resolution (cm)			4.2	17.0	45.9
Point density (points/sq.m)			566.0	34.6	4.7
Match Photos (Medium)	v	v	4m 37s	4m 37s	4m 37s
Align Cameras		v	16m 47s	16m 47s	16m 47s
Depth Maps (High/Low, Aggressive)	v	v	1h 1m	17m 51s	<i>No Depth maps</i>
Point cloud (from Depth Maps)		v	6h 5m	21m 53s	<i>No Point cloud</i>
DEM		v	4m 20s	43s	24s *
Orthomosaic (from DEM)		v	1h 16m	54m 57s	48m 11s
Price (\$/h)			\$13.600	\$13.600	\$13.600
Total time (h)			8.79	1.94	1.10
Total time (h,m)			8h 47m	1h 56m	1h 10m
Total price			\$119.54	\$26.38	\$14.96
<i>* DEM from Tie points</i>					

5. Metashape 2.1.0: ELASTIC & FIXED STORAGE 100 drone 16MP (4864x3648) images for orthophoto and 3D modeling

	GPU	CPU	Metashape 192GB	Metashape 192GB	Metashape 192GB	Metashape 192GB	Metashape 488GB	Metashape 488GB	Metashape 256GB
OS			Windows 2019	Linux	Windows 2019	Linux	Windows 2019	Linux	Windows 2019
Storage			Fixed standard	Elastic standard	Fixed standard	Elastic standard	Fixed standard	Elastic standard	Fixed standard
GPU			4 x A10G	4 x A10G	4 x T4	4 x T4	4 x M60	4 x M60	4 x V520
Processor type			Intel® Xeon® Cascade Lake 24C	Intel® Xeon® Cascade Lake 24C	Intel® Xeon® Cascade Lake 24C	Intel® Xeon® Cascade Lake 24C	Intel® Xeon® E5-2686 v4	Intel® Xeon® E5-2686 v4	AMD EPYC 7R32
Processor configuration			1 socket 24 CPU@2.50GHz 48 vCPU	1 socket 24 CPU@2.50GHz 48 vCPU	1 socket 24 CPU@2.50GHz 48 vCPU	1 socket 24 CPU@2.50GHz 48 vCPU	2 socket 32 CPU@2.30GHz 64 vCPU	2 socket 32 CPU@2.30GHz 64 vCPU	1 socket 32 CPU@2.80GHz 64vCPU
RAM			192	192	192	192	488	488	256
Match Photos (High)	v	v	31s	22s	38s	30s	58s	40s	27s
Align Cameras		v	14s	11s	19s	13s	26s	16s	13s
Depth Maps (High-High, Aggressive)	v	v	3m 18s	1m 37s	3m 28s	2m 15s	5m 40s	3m 51s	3m 45s
Build Mesh (from Depth Maps, High/High)	v	v	4m 21s	3m 44s	5m 23s	4m 15s	6m 40s	5m 36s	4m 21s
Build Tiled (from Depth Maps, High/High, 9 levels)	v	v	20m 13s *	19m 43s *					
Build Tiled (from Model, High/High, 8 levels)	v	v	9m 45s	9m 17s	11m 4s	8m 11s	18m 45s	10m 9s	11m 27s
Point cloud (from Model)		v	5m 39s *	3m 20s *					
Point cloud (from Depth Maps)		v	5m 37s	2m 40s	7m 2s	3m 49s	10m 22s	3m 51s	6m 14s
DEM (from Point cloud)		v	28s	25s	36s	33s	41s	34s	27s
Orthomosaic (from DEM)		v	2m 18s	2m 14s	2m 46s	2m 21s	3m 30s	2m 46s	2m 13s
Price (\$/h)			\$15.381	\$13.600	\$12.853	\$11.148	\$14.862	\$11.834	\$11.981
Total time (h)			0.44	0.34	0.52	0.37	0.78	0.46	0.49
Total time (h,m)			27m	21m	31m	22m	47m	28m	29m
Total price			\$6.77	\$4.62	\$6.68	\$4.12	\$11.59	\$5.44	\$5.87

* Not included in the total time

6. Metashape 2.0.3: New instances with a lot of **RAM** for very large orthophoto projects

Metashape uses GPU for processes: Match photos, Depth Maps, Build Mesh and partially for Build Tiled.

Metashape uses only CPU for processes: Point cloud, DEM and Orthomosaic.

Point Cloud and Orthomosaic use a lot of RAM for large projects.

For these processing steps the following CPU based instances can be used: **Metashape 512/768/1024/1536GB**.

The following two examples present processing steps for GPU and CPU only based instances for 100 and 1012 drone images.

	GPU	CPU	Metashape 192GB	Metashape 192GB	Metashape 488GB	Metashape 512GB	Metashape 768GB	Metashape 1024GB	Metashape 1538GB
OS			Linux	Linux	Linux	Linux	Linux	Linux	Linux
Storage			Elastic standard	Elastic standard	Elastic standard	Elastic standard	Elastic standard	Elastic standard	Elastic standard
GPU			4 x T4	4 x A10G	4 x M60	No	No	No	No
Processor configuration			24 CPU@2.50GHz 48 vCPU	24 CPU@2.80GHz 48 vCPU	32 CPU@2.30GHz 64 vCPU	64 CPU@3.2GHz 128 vCPU	86 CPU@3.2GHz 192 vCPU	64 CPU@3.2GHz 128 vCPU	86 CPU@3.2GHz 192 vCPU
RAM			192	192	488	512	768	1,024	1,536
Match Photos (High)	v	v	29s	21s	39s	1m 42s	1m 51s	1m 54s	2m 1s
Align Cameras		v	12s	11s	16s	14s	22s	13s	29s
Depth Maps (High-High, Aggressive)	v	v	2m 11s	1m 35s	3m 44s	34m 19s	26m 53s	33m 59s	26m 59s
Build Mesh (from Depth Maps, High/High)	v	v	3m 52s	3m 19s	5m 38s	5m 27s	5m 38s	5m 20s	5m 40s
Build Tiled (from Mesh, High/High)	v	v	8m 43s	11m 25s	9m 54s	10m 21s	10m 1s	7m 43s	9m 17s
Point cloud (from Depth Maps)		v	3m 59s	3m 9s	3m 44s	2m 58s	2m 56s	2m 51s	2m 53s
DEM (from Dense cloud)		v	30s	25s	33s	25s	26s	26s	25s
Orthomosaic (from DEM)		v	2m 20s	1m 59s	2m 56s	1m 51s	1m 54s	1m 55s	1m 51s
Total time (h,m)			22m	22m	27m	57m	50m	54m	50m



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	GPU	CPU	Metashape 192GB	Metashape 1024GB
OS			Linux	Linux
Storage			Elastic standard	Elastic standard
GPU			4 x A10G	No
Processor configuration			24 CPU@2.50GHz 48 vCPU	64 CPU@3.2GHz 128 vCPU
Match Photos (High)	v	v	4m 25s	N/A
Align Cameras		v	4m 17s	N/A
Depth Maps (High-High, Aggressive)	v	v	16m 44s	N/A
Build Mesh (from Depth Maps, High/High)	v	v	29m 51s	N/A
Build Tiled (from Mesh, High/High)	v	v	1h 20m	1h 4m
Point cloud (from Depth Maps)		v	59m 25s	39m 11s
DEM (from Dense cloud)		v	1m 43s	1m 39s
Orthomosaic (from DEM)		v	40m 27s	38m 24s

7. Metashape 2.0.3: ELASTIC & FIXED STORAGE 100 drone 16MP (4864x3648) images for orthophoto and 3D modeling

	GPU	CPU	Metashape 16GB	Metashape 16GB	Metashape 16GB	Metashape 192GB	Metashape 192GB	Metashape 192GB
OS			Windows 2019	Linux	Linux	Windows 2019	Linux	Linux
Storage			Fixed standard	Fixed standard	Elastic standard	Fixed standard	Fixed standard	Elastic standard
GPU			1 x A10G	1 x A10G	1 x A10G	4 x A10G	4 x A10G	4 x A10G
Processor configuration			1 socket 2 CPU 2.80GHz 4vCPU	1 socket 2 CPU 2.80GHz 4vCPU	1 socket 2 CPU 2.80GHz 4vCPU	1 socket 24 CPU@2.50GHz 48 vCPU	1 socket 24 CPU@2.50GHz 48 vCPU	1 socket 24 CPU@2.50GHz 48 vCPU
RAM			16	16	16	192	192	192
Match Photos (High)	v	v	47s	36s	37s	29s	19s	21s
Align Cameras		v	53s	48s	48s	13s	11s	11s
Depth Maps (High-High, Aggressive)	v	v	10m 4s	6m 23s	6m 27s	3m 15s	1m 24s	1m 35s
Build Mesh (from Depth Maps, High/High)	v	v	10m 23s	8m15s	8m 32s	4m 4s	2m 48s	3m 19s
Build Tiled (from Mesh, High/High)	v	v	37m 5s	28m 0s	26m 49s	18m 48s	10m 36s	11m 25s
Point cloud (from Depth Maps)		v	21m 28s	16m 20s	16m 27s	6m 0s	3m 5s	3m 9s
DEM (from Dense cloud)		v	47s	41s	44s	27s	24s	25s
Orthomosaic (from DEM)		v	4m 58s	4m 13s	4m 13s	2m 15s	2m 0s	1m 59s
Price (\$/h)			\$3.818	\$3.793	\$3.793	\$14.293	\$13.979	\$13.979
Total time (h)			1.44	1.09	1.09	0.59	0.35	0.37
Total time (h,m)			1h 26m	1h 5m	1h 5m	36m	21m	22m
Total price			\$5.50	\$4.13	\$4.13	\$8.43	\$4.89	\$5.17

	GPU	CPU	Metashape 192GB	Metashape 192GB	Metashape 192GB	Metashape 256GB	Metashape 488GB	Metashape 488GB	Metashape 488GB
OS			Windows 2019	Linux	Linux	Windows 2019	Windows 2019	Linux	Linux
Storage			Fixed standard	Fixed standard	Elastic standard	Fixed standard	Fixed standard	Fixed standard	Elastic standard
GPU			4 x T4	4 x T4	4 x T4	4 x V520	4 x M60	4 x M60	4 x M60
Processor configuration			1 socket 24 CPU@2.50GHz 48 vCPU	1 socket 24 CPU@2.50GHz 48 vCPU	1 socket 24 CPU@2.50GHz 48 vCPU	1 socket 32 CPU@2.80GHz 64vCPU	2 socket 32 CPU@2.30GHz 64 vCPU	2 socket 32 CPU@2.30GHz 64 vCPU	2 socket 32 CPU@2.30GHz 64 vCPU
RAM			192	192	192	256	488	488	488
Match Photos (High)	v	v	34s	28s	29s	25s	51s	39s	39s
Align Cameras		v	18s	12s	12s	13s	25s	16s	16s
Depth Maps (High-High, Aggressive)	v	v	3m 33s	1m 59s	2m 11s	3m 44s	5m 29s	3m 38s	3m 44s
Build Mesh (from Depth Maps, High/High)	v	v	5m 3s	3m 20s	3m 52s	4m 4s	6m 21s	4m 23s	5m 38s
Build Tiled (from Mesh, High/High)	v	v	11m 52s	7m 44s	8m 43s	13m 4s	24m 27s	9m 53s	9m 54s
Point cloud (from Depth Maps)		v	6m 59s	3m 54s	3m 59s	6m 12s	10m 27s	4m 16s	3m 44s
DEM (from Dense cloud)		v	35s	30s	30s	26s	41s	34s	33s
Orthomosaic (from DEM)		v	2m 51s	2m 22s	2m 20s	2m 13s	3m 42s	3m 3s	2m 56s
Price (\$/h)			\$11.720	\$11.410	\$11.410	\$11.788	\$11.641	\$11.531	\$11.531
Total time (h)			0.53	0.34	0.37	0.51	0.87	0.45	0.46
Total time (h,m)			32m	20m	22m	30m	52m	27m	27m
Total price			\$6.21	\$3.88	\$4.22	\$6.01	\$10.13	\$5.19	\$5.30

8. Metashape 2.0.1: ELASTIC vs FIXED vs EPHEMERAL STORAGE 1012 drone 20MP (5472x3648) images

			21/08/2023	21/08/2023	18/08/2023	18/08/2023	18/08/2023
	GPU	CPU	Metashape 192GB	Metashape 192GB	Metashape 192GB	Metashape 192GB	Metashape 192GB
OS			Windows	Windows	Linux	Linux	Linux
Storage			Fixed	Ephemeral	Fixed	Elastic	Ephemeral
GPU			4 x A10G	4 x A10G	4 x A10G	4 x A10G	4 x A10G
Processor type			Intel® Xeon® Cascade Lake 24C	Intel® Xeon® Cascade Lake 24C	Intel® Xeon® Cascade Lake 24C	Intel® Xeon® Cascade Lake 24C	Intel® Xeon® Cascade Lake 24C
Processor configuration			1 socket 24 CPU@2.50GHz 48 vCPU	1 socket 24 CPU@2.50GHz 48 vCPU	1 socket 24 CPU@2.50GHz 48 vCPU	1 socket 24 CPU@2.50GHz 48 vCPU	1 socket 24 CPU@2.50GHz 48 vCPU
RAM			192	192	192	192	192
Images			1012	1012	1012	1012	1012
Match Photos (High)	v	v	6m 34s	6m 0s	5m 12s	4m 45s	3m 58s
Align Cameras		v	5m 38s	5m 38s	4m 26s	4m 22s	4m 19s
Depth Maps (High-High, Aggressive)	v	v	36m 17s	35m 2s	16m 1s	17m 1s	14m 19s
Build Mesh (from Depth Maps, High/High)	v	v	41m 28s	39m 33s	30m 22s	30m 23s	23m 41s
Build Tiled (from Mesh, High/High)	v	v	2h 38m	2h 47m	1h 44m	1h 21m	1h 19m
Point cloud (from Depth Maps)		v	1h 35m	1h 33m	59m 22	53m 10s	54m 35s
DEM (from Dense cloud)		v	2m 3s	1m 54s	1m 46s	1m 42s	1m 34s
Orthomosaic (from DEM)		v	47m 25s	43m 53s	42m 31s	41m 33s	34m 59s
Price (\$/h)			\$13.979	\$13.979	\$13.979	\$13.979	\$13.979
Total time (h)			6.54	6.53	4.39	3.90	3.61
Total time (h,m)			6h 36m	6h 32m	4h 24m	3h 54m	3h 36m
Total price			\$91.42	\$91.28	\$61.37	\$54.52	\$50.46

9. Metashape 2.0.1: ELASTIC vs FIXED STORAGE 100 drone 16MP (4864x3648) images for orthophoto and 3D modeling

			10/04/2023	06/06/2023	10/04/2023	06/06/2023	10/04/2023	31/05/2023	10/04/2023	31/05/2023
	GPU	CPU	Metashape 16GB	Metashape 16GB	Metashape 16GB	Metashape 16GB	Metashape 256GB	Metashape 256GB	Metashape 192GB	Metashape 192GB
OS			Windows 2019	Windows 2019	Linux	Linux	Linux	Linux	Linux	Linux
Storage			Fixed	Elastic	Fixed	Elastic	Fixed	Elastic	Fixed	Elastic
GPU			1 x A10G	1 x A10G	1 x A10G	1 x A10G	1 x A10G	1 x A10G	4 x A10G	4 x A10G
Processor type			Intel® Xeon® Platinum 8259CL	Intel® Xeon® Platinum 8259CL	Intel® Xeon® Platinum 8259CL	Intel® Xeon® Platinum 8259CL	Intel® Xeon® Platinum 8259CL	Intel® Xeon® Platinum 8259CL	Intel® Xeon® Cascade Lake 24C	Intel® Xeon® Cascade Lake 24C
Processor configuration			1 socket 2 CPU 2.80GHz 4vCPU	1 socket 2 CPU 2.80GHz 4vCPU	1 socket 2 CPU 2.80GHz 4vCPU	1 socket 2 CPU 2.80GHz 4vCPU	1 socket 32 CPU 2.80GHz 64vCPU	1 socket 32 CPU 2.80GHz 64vCPU	1 socket 24 CPU@2.50GHz 48 vCPU	1 socket 24 CPU@2.50GHz 48 vCPU
RAM			16	16	16	16	256	256	192	192
Match Photos (High)	v	v	47s	57s	38s	39s	36s	37s	21s	22s
Align Cameras		v	54s	54s	50s	49s	11s	11s	11s	11s
Depth Maps (High-High, Aggressive)	v	v	10m 10s	10m 31s	6m 21s	6m 27s	3m 10s	3m 18s	1m 26s	1m 32s
Build Mesh (from Depth Maps, High/High)	v	v	10m 9s	11m 41s	8m 10s	8m 39s	3m 2s	3m 27s	2m 59s	3m 21s
Build Tiled (from Mesh, High/High)	v	v	36m 17s	37m 50s	27m 43s	27m 21s	10m 11s	10m 23s	11m 0s	11m 39s
Point cloud (from Depth Maps)		v	20m 25s	19m 55s	16m 10s	16m 11s	2m 49s	2m 48s	3m 0s	3m 4s
DEM (from Dense cloud)		v	49s	1m 8s	42s	46s	24s	26s	25s	27s
Orthomosaic (from DEM)		v	5m 12s	5m 36s	4m 17s	4m 14s	1m 58s	1m 55s	2m 8s	1m 56s
Price (\$/h)			\$3.818	\$3.818	\$3.793	\$3.793	\$12.043	\$12.043	\$13.979	\$13.979
Total time (h)			1.41	1.48	1.08	1.09	0.37	0.38	0.36	0.38
Total time (h,m)			1h 25m	1h 29m	1h 5m	1h 5m	22m	23m	22m	23m
Total price			\$5.38	\$5.65	\$4.10	\$4.13	\$4.46	\$4.58	\$5.03	\$5.31

10. Metashape 2.0.1: **76,607** and **52,626** images of **DJI Mavic 3 Enterprise 21MP** for DSM/DTM and orthophoto

1. Images – 76.607 / 52.626; Image size – 21MP (5280 x 3956); File size (Jpeg) – 12 MB;
2. Forward/Side overlap - 70%/70%; Flight altitude – 114 / 200 m; Image GSD – 3 / 5 cm; Ortho GSD – 5 cm; Area – 64 / 184 sq.km;
3. **Apps: For 76,607 images - Cluster of 5 Metashape 192GB 4xA10G Linux;**
4. **Apps: For 52,626 images – Metashape 192GB 4xA10G and Metashape 768 CPU@3.2GHz for orthophoto processing.**

	GPU	CPU	Nodes working	Nodes max at the start	All computers processing time***		Processing time		Time proportion
					h/m/s	h1	h/m/s	h2	h1/h2
Match Photos 24 cm (Lowest)	v	v	5	95	5h 15m	5.25	1h 8m 48s	1.15	4.57
Align Cameras		v	5	940	12h 23m	12.38	3h 25m 5s	3.42	3.62
Depth Maps (Lowest, Aggressive)	v	v	5	1493	63h	63.00	13h 1m 20s	13.02	4.84
Point cloud (from Depth Maps)		v	5	100	3h 8m	3.13	40m 27s	0.67	4.67
DEM 47 cm (from Dense cloud)		v	5	8	20m 4s	0.33	8m 40s	0.14	2.36
Orthomosaic 5 cm (from DEM)		v	5	100	25h	25.00	5h 13m 20s	5.22	4.79
Processing time (h)					109h 5m	109.09	23h 47m	23.62	4.62
Price (\$/h)						\$13.978		\$13.978	
Total price						\$1,525		\$1,651	

All computers processing time*** Similar to processing a project on one computer

52,626 images	GPU	CPU	Processing time	
			h/m/s	h2
Match Photos 30 cm (Lowest)	v	v	2h 39m	2.65
Align Cameras		v	2h 29m	2.48
Depth Maps (Lowest, Aggressive)	v	v	24h 0m	24.00
Point cloud (from Depth Maps)		v	20h 16m	20.27
DEM 83 cm (from Dense cloud)		v	22m 0s	0.37
Orthomosaic 5 cm (from DEM)		v	17h 40m	17.67
Processing time (h)			67h 26m	67.44
Price (\$/h)				\$13.978
Total price				\$943

11. Metashape 2.0.1: **1012** and **44** images of PhaseOne iXM-RS150F 150MP for DSM/DTM and orthophoto

5. Images – 44 and 1012; Image size – 150MP; File size (Jpeg) – 130 MB;
6. Forward/Side overlap - 70%/25%; Flight altitude – 1,100m; Image GSD – 4.6 cm; Ortho GSD – 4.6 cm; Area – 3.8 and 71.0 sq.km;

	GPU	CPU	Metashape 192GB	Metashape 192GB	Metashape 192GB	Metashape 192GB	Metashape 192GB
Version			2.0.1	2.0.1	2.0.1	2.0.1	2.0.1
OS			Linux	Linux	Linux	Linux	Linux
Storage			Ephemeral 3800GB	Storage Fixed Fast	Ephemeral 3800GB	Storage Fixed Fast	Storage Elastic (NEW) Standard
GPU			4 x A10G	4 x A10G	4 x A10G	4 x A10G	4 x A10G
CPU			24 CPU @ 2.80GHz 48 vCPU	24 CPU @ 2.80GHz 48 vCPU	24 CPU @ 2.80GHz 48 vCPU	24 CPU @ 2.80GHz 48 vCPU	24 CPU @ 2.80GHz 48 vCPU
RAM			192	192	192	192	192
Images			44	44	1012	1012	1012
Match Photos (High)	v	v	36s	36s	10m 54s	11m 27s	11m 49s
Align Cameras (High)	v	v	6s	6s	3m 35s	3m 2s	2m 56s
Depth Maps (High/Aggressive)	v	v	2m 59s	3m 10s	1h 23m	1h 29m	1h 31m
Point Cloud (High/Aggressive)		v	22m 25s	22m 59s	10h 31m	11h 14m	10h 55m
DEM (from Dense Cloud)		v	3m 39s	3m 59s	1h 7m	1h 22m	1h 19m
Orthomosaic		v	8m 52s	10m 44s	2h 41m	3h 24m	3h 2m
Price (\$/h)			\$13.979	\$13.979	\$13.979	\$13.979	\$13.979
Total time (h)			0.63	0.69	15.94	17.72	17.03
Total time (h,m)			38m	42m	15h 56m	17h 43m	17h 2m
Total price			\$8.81	\$9.65	\$222.83	\$247.71	\$238.06
Image proportion (1012/44)					23.0	23.0	
Time proportion					25.3	25.7	

12. Metashape 2.0.1: 100 drone 16MP (4864x3648) images for orthophoto and 3D modeling

	GPU	CPU	Metashape 16GB	Metashape 16GB	Metashape 192GB	Metashape 192GB	Metashape 16GB	Metashape 128GB	Metashape 256GB
OS			Windows 2019	Linux	Windows 2019	Linux	Windows 2019	Windows 2019	Windows 2019
Storage			Storage X standard	Storage X standard	Storage X standard	Storage X standard	Storage X standard	Storage X standard	Storage X standard
GPU			1 x TESLA T4	1 x TESLA T4	4 x TESLA T4	4 x TESLA T4	1 x RADEON V520	2 x RADEON V520	4 x RADEON V520
Processor type			Intel® Xeon® Platinum 8259CL	Intel® Xeon® Platinum 8259CL	Intel® Xeon® Cascade Lake 24C	Intel® Xeon® Cascade Lake 24C	AMD EPYC 7R32	AMD EPYC 7R32	AMD EPYC 7R32
Processor configuration			1 socket 2 CPU 2.50GHz 4vCPU	1 socket 2 CPU 2.50GHz 4vCPU	1 socket 24 CPU@2.50GHz 48 vCPU	1 socket 24 CPU@2.50GHz 48 vCPU	1 socket 2 CPU@2.80GHz 4vCPU	1 socket 16 CPU@2.80GHz 32vCPU	1 socket 32 CPU@2.80GHz 64vCPU
RAM			16	16	192	192	16	128	256
Match Photos (High)	v	v	1m 25s	1m 10s	30s	29s	1m 7s	39s	29s
Align Cameras		v	1m 14s	1m 9s	17s	12s	53s	15s	13s
Depth Maps (High-High, Aggressive)	v	v	12m 45s	9m 23s	3m 30s	2m 3s	12m 16s	5m 2s	3m 32s
Build Mesh (from Depth Maps, High/High)	v	v	13m 3s	10m 30s	5m 6s	3m 24s	10m 33s	4m 26s	4m 3s
Build Tiled (from Mesh, High/High)	v	v	34m 19s	28m 45s	11m 24s	6m 38s	28m 32s	10m 41s	13m 53s
Point cloud (from Depth Maps)		v	24m 0s	20m 17s	6m 52s	3m 32s	19m 30s	5m 57s	6m 13s
DEM (from Dense cloud)		v	1m 2s	55s	35s	30s	48s	28s	27s
Orthomosaic (from DEM)		v	6m 38s	6m 7s	2m 54s	2m 30s	5m 11s	2m 29s	2m 16s
Price (\$/h)			\$2.860	\$2.811	\$11.720	\$11.410	\$2.845	\$7.136	\$11.788
Total time (h)			1.57	1.30	0.52	0.32	1.31	0.50	0.52
Total time (h,m)			1h 34m	1h 18m	31m	19m	1h 19m	30m	31m
Total price			\$4.49	\$3.65	\$6.09	\$3.65	\$3.73	\$3.57	\$6.13

	GPU	CPU	Metashape 122GB	Metashape 244GB	Metashape 244GB	Metashape 488GB	Metashape 488GB
OS			Linux	Windows 2019	Linux	Windows 2019	Linux
Storage			Storage X standard	Storage X standard	Storage X standard	Storage X standard	Storage X standard
GPU			1 x TESLA M60	2 x TESLA M60	2 x TESLA M60	4 x TESLA M60	4 x TESLA M60
Processor type			Intel® Xeon® E5-2686 v4	Intel® Xeon® E5-2686 v4	Intel® Xeon® E5-2686 v4	Intel® Xeon® E5-2686 v4	Intel® Xeon® E5-2686 v4
vCPU			1 socket 8 CPU 2.30GHz 16vCPU	1 socket 16 CPU@2.30GHz 32 vCPU	1 socket 16 CPU@2.30GHz 32 vCPU	2 socket 32 CPU@2.30GHz 64 vCPU	2 socket 32 CPU@2.30GHz 64 vCPU
RAM			122	244	244	488	488
Match Photos (High)	v	v	1m 28s	1m 6s	53s	56s	40s
Align Cameras		v	31s	25s	16s	25s	16s
Depth Maps (High-High, Aggressive)	v	v	10m 52s	7m 49s	5m 55s	5m 35s	3m 48s
Build Mesh (from Depth Maps, High/High)	v	v	6m 3s	6m 5s	4m 42s	6m 18s	4m 28s
Build Tiled (from Mesh, High/High)	v	v	12m 57s	15m 49s	10m 58s	23m 21s	10m 11s
Point cloud (from Depth Maps)		v	7m 12s	8m 37s	4m 54s	10m 7s	4m 34s
DEM (from Dense cloud)		v	37s	43s	34s	42s	33s
Orthomosaic (from DEM)		v	3m 21s	3m 43s	3m 3s	3m 41s	3m 3s
Price (\$/h)			\$4.702	\$7.038	\$6.827	\$11.641	\$11.531
Total time (h)			0.72	0.74	0.52	0.85	0.46
Total time (h,m)			43m	44m	31m	51m	28m
Total price			\$3.39	\$5.21	\$3.55	\$9.89	\$5.30

	GPU	CPU	Metashape 16GB	Metashape 16GB	Metashape 256GB	Metashape 192GB	Metashape 192GB
OS			Windows 2019	Linux	Linux	Windows 2019	Linux
Storage			Storage X standard	Storage X standard	Storage X standard	Storage X standard	Storage X standard
GPU			1 x A10G	1 x A10G	1 x A10G	4 x A10G	4 x A10G
Processor type			Intel® Xeon® Platinum 8259CL	Intel® Xeon® Platinum 8259CL	Intel® Xeon® Platinum 8259CL	Intel® Xeon® Cascade Lake 24C	Intel® Xeon® Cascade Lake 24C
Processor configuration			1 socket 2 CPU 2.80GHz 4vCPU	1 socket 2 CPU 2.80GHz 4vCPU	1 socket 32 CPU 2.80GHz 64vCPU	1 socket 24 CPU@2.50GHz 48 vCPU	1 socket 24 CPU@2.50GHz 48 vCPU
RAM			16	16	256	192	192
Match Photos (High)	v	v	47s	38s	36s	34s	21s
Align Cameras		v	54s	50s	11s	13s	11s
Depth Maps (High-High, Aggressive)	v	v	10m 10s	6m 21s	3m 10s	3m 23s	1m 26s
Build Mesh (from Depth Maps, High/High)	v	v	10m 9s	8m 10s	3m 2s	4m 24s	2m 59s
Build Tiled (from Mesh, High/High)	v	v	36m 17s	27m 43s	10m 11s	21m 13s	11m 0s
Point cloud (from Depth Maps)		v	20m 25s	16m 10s	2m 49s	6m 1s	3m 0s
DEM (from Dense cloud)		v	49s	42s	24s	28s	25s
Orthomosaic (from DEM)		v	5m 12s	4m 17s	1m 58s	2m 26s	2m 8s
Price (\$/h)			\$3.818	\$3.793	\$12.043	\$14.293	\$13.979
Total time (h)			1.41	1.08	0.37	0.65	0.36
Total time (h,m)			1h 25m	1h 5m	22m	39m	22m
Total price			\$5.38	\$4.10	\$4.46	\$9.29	\$5.03

13. Metashape 1.8.4: **589** drone 42MP (7952x5304) images for orthophoto and 3D modeling

	GPU	CPU	Metashape 192GB	Metashape 192GB	Metashape 192GB	Metashape 192GB
OS			Linux	Linux	Linux	Linux
Storage			Storage X enhanced another segment	Local disk D:	Storage X enhanced same segment	Local disk D:
Volume (GB)			250	900	250	3700
GPU			4 x TESLA T4	4 x TESLA T4	4 x A10G	4 x A10G
Processor configuration			1 socket 24 CPU@2.50GHz 48 vCPU	1 socket 24 CPU@2.50GHz 48 vCPU	1 socket 24 CPU@2.80GHz 48 vCPU	1 socket 24 CPU@2.80GHz 48 vCPU
RAM			192	192	192	192
Match Photos (High)	v	v	7m 28s	6m 2s	4m 41s	4m 29s
Align Cameras		v	2m 0s	2m 0s	1m 44s	2m 8s
Depth Maps (High, Moderate)	v	v	32m 30s	29m 29s	19m 43s	17m 51s
Dense Cloud		v	1h 24m	1h 18m	1h 3m	57m 22s
DEM (from Dense cloud)		v	3m 50s	2m 53s	2m 46s	2m 20s
Orthomosaic (from DEM)		v	33m 32s	20m 47s	21m 22s	17m 42s
Price (\$/h)			\$11.356	\$11.356	\$13.913	\$13.913
Total time (h)			2.72	2.32	1.89	1.70
Total time (h,m)			2h 43m	2h 19m	1h 53m	1h 42m
Total price			\$30.89	\$26.35	\$26.30	\$23.65
Build Tiled (from Depth Maps, High/High)	v	v		1h 50m	1h 45m	2h 6m

14. Metashape 1.8.4: **932** drone 12MP (4032x3024) images for orthophoto and 3D modeling

	GPU	CPU	Points/Resolution	Metashape 192GB
Version				1.8.4
OS				Linux
Storage				Storage X standard
GPU				4 x TESLA T4
Processor configuration				24 CPU@2.50GHz 48 vCPU
RAM				192
Match Photos (High)	v	v	1,091,304	9m 40s
Align Cameras		v		6m 19s
Depth Maps (Medium, Moderate)	v	v		6m 8s
Dense Cloud		v	90,728,857	18m 17s
Build Tiled (from Depth Maps, Medium/High)	v	v		56m 31s
DEM (from Dense cloud)		v	3.47 mm/pix	2m 29s
Orthomosaic (from DEM)		v	1.73 mm/pix	4m 8s
Price (\$/h)				\$11.36
Total time (h)				1.73
Total time (h,m)				1h 44m
Total price				\$19.60
Depth Maps (Low, Moderate)	v	v		4m 36s
Dense Cloud		v	21,101,114	4m 57s
Depth Maps (Medium, Moderate)	v	v		6m 8s
Dense Cloud		v	90,728,857	18m 17s
Build Mesh (from Depth Maps, Medium/High)	v	v		8m 3s
Build Tiled (from Depth Maps, Medium/High)	v	v		56m 31s
Depth Maps (High, Moderate)	v	v		12m 51s
Dense Cloud		v	386,166,196	47m 47s
Build Mesh (from Depth Maps, High/High)	v	v		34m 56s
Build Tiled (from Depth Maps, High/High)	v	v		1h 48m

15. Metashape 1.8.3: **37,344** of **PhaseOne** and **Hasselblad** 100MP images on different cluster configurations

Storage of 45TB was used for processing of all three blocks simultaneously.

Block	1	2	3	Total
Images	15,550	9,510	12,284	37,344
GSD (cm)	6	8	6	
Match Photos (Highest, h)	38	14	34	
Align Cameras (h)	6	3	2	
Depth Maps (Low, Aggressive, h)	62	20	38	
Dense Cloud (h)	2	2	4	
Ground classification (h)	1	1	3	
Orthomosaic (h)	165	50	117	
Total computer time (h)	273	91	197	
Computers in a cluster	5	5	5	
Total working time (h)	55	18	39	112

16. Metashape 1.8.3: 1,389 images of PhaseOne PAS280 280MP images with New NVIDIA GPU A10G computers

1. Images – 1,389; Image size – 280MP; File size (Tiff) – 880 MB;
2. Side/Forward overlap - 70%; Flight altitude – 1140m; GSD – 4.7 cm; Area - 189 sq.km;

			Metashape 192GB 4xA10G Ephemeral disk D - 3.9 TB				Metashape 256GB 1xA10G Ephemeral disk D - 1.9 TB			
	GPU	CPU	App used	Unit Price \$/hour	Processing Time (h)	Total price App+Storage (\$)	App used	Unit Price \$/hour	Processing Time (h)	Total price App+Storage (\$)
Upload (IIQ, Left & Right images)		v	Storage X: 3TB Fast	\$4.47	4.28	\$19.15	Storage X: 3TB Fast	\$4.47	4.28	\$19.15
Transform IIQ to TIFF Combined	v	v	PhaseOne iX Capture 2*Radeon V520	\$5.49	4.05	\$40.35	PhaseOne iX Capture 2*Radeon V520	\$5.49	4.05	\$40.35
Copy TIFF images of 1.2 TB from Storage X to local disk D		v	Metashape 192GB 4*A10G Linux	\$13.91	1.00	\$18.39	Metashape 256GB 1*A10G Linux	\$11.99	1.00	\$16.46
Match Photos (5cm, High)	v	v	Metashape 192GB 4*A10G Linux	\$13.91	0.31	\$5.70	Metashape 256GB 1*A10G Linux	\$11.99	0.62	\$10.21
Align Cameras (5cm, High)		v	Metashape 192GB 4*A10G Linux	\$13.91	0.06	\$1.10	Metashape 256GB 1*A10G Linux	\$11.99	0.05	\$0.82
Depth Maps (37cm, Low/Agressive)	v	v	Metashape 192GB 4*A10G Linux	\$13.91	0.62	\$11.40	Metashape 256GB 1*A10G Linux	\$11.99	1.18	\$19.42
Dense Cloud (37cm,Low/Agressive) with "Point color calculation"		v	Metashape 192GB 4*A10G Linux	\$13.91	1.33	\$24.45	Metashape 256GB 1*A10G Linux	\$11.99	1.32	\$21.73
Classify ground points (Total points - 1,446,807,306)		v	Metashape 192GB 4*A10G Linux	\$13.91	0.89	\$16.36	Metashape 256GB 1*A10G Linux	\$11.99	0.88	\$14.48
DEM (from Dense Cloud, 37 cm)		v	Metashape 192GB 4*A10G Linux	\$13.91	0.24	\$4.41	Metashape 256GB 1*A10G Linux	\$11.99	0.23	\$3.79
Color adjustment		v	Metashape 192GB 4*A10G Linux	\$13.91	0.42	\$7.72	Metashape 256GB 1*A10G Linux	\$11.99	0.48	\$7.90
Orthomosaic (DEM) with "Refine seamlines"		v	Metashape 192GB 4*A10G Linux	\$13.91	5.87	\$107.93	Metashape 256GB 1*A10G Linux	\$11.99	5.70	\$93.82
Export orthophoto tiles		v	Metashape 192GB 4*A10G Linux (to D:)	\$13.91	0.84	\$15.45	Metashape 256GB 1*A10G Linux (to X:)	\$11.99	0.84	\$13.83
Total					19.91	\$272.42			20.63	\$261.96

17. Metashape 1.7.5: 828 images of Phase One iXM-RS100F (40mm)

1. Image size – 100 MP (11608 x 8708); File size (Jpeg) – 90 MB
2. Images – 828; Side/Forward overlap - 70%; Flight altitude – 433m; GSD – 4.4 cm; Area - 23.4 sq. km

				30-12-21	30-12-21	30-12-21	30-12-21
	GPU	CPU	Config	Metashape 192GB	Metashape 192GB	Metashape 192GB	Metashape 192GB
OS				Linux	Linux	Linux	Linux
Storage				Storage X 1000 GB Enhanced	Storage D-D Ephemeral 900 GB Enhanced	Storage X 1000 GB Enhanced	Storage X 1000 GB Enhanced
GPU				4 x TESLA T4	4 x TESLA T4	4 x TESLA T4	4 x TESLA T4
Processor type				Intel® Xeon® Cascade Lake 24C	Intel® Xeon® Cascade Lake 24C	Intel® Xeon® Cascade Lake 24C	Intel® Xeon® Cascade Lake 24C
vCPU				1 socket 24 CPU @ 2.5GHz 48 vCPU	1 socket 24 CPU @ 2.5GHz 48 vCPU	1 socket 24 CPU @ 2.5GHz 48 vCPU	1 socket 24 CPU @ 2.5GHz 48 vCPU
RAM				192	192	192	192
Computers				1	1	3	5
Images				828	828	828	828
Match Photos (High)	v	v	Cluster	9m 22s	13m 53s	10m 33s	8m 44s
Align Cameras (High)		v	Cluster	2m 51s	2m 54s	1m 44s	1m 25s
Depth Maps (Medium/Agressive)	v	v	Cluster	37m 44s	37m 3s	17m 19s	15m 1s
Dense Cloud (Medium/Agressive) without "Point color calculation"		v	Cluster	45m 13s	42m 1s	18m 2s	11m 34s
DEM (from Dense Cloud)		v	Cluster	11m 18s	6m 15s	4m 21s	2m 42s
Orthomosaic (DEM) NO "Refine seamlines"		v	Cluster	1h 20m	1h 27m	40m 43s	24m 14s
Time (h)				3.11	3.15	1.55	1.06
Price (\$/h/computer)				\$11.356	\$11.356	\$11.356	\$11.356
Total price				\$35.32	\$35.77	\$52.81	\$60.19
Optimizaiton parametrs		v	Single	4s	4s	4s	4s
Ground classification		v	Single	25m	25m	25m	25m
Export orthophoto tiles		v	Single	35m	35m	35m	35m

18. Metashape 1.7.5: 100 drone 16MP images with AMD RADEON V520 GPU and CPU@3.8GHz based (no GPU) computers

1. Drone area survey: FC6310; Images – 100;
2. File size (JPG) – 7.5 MB; Side/Forward overlap - 70%; Flight altitude – 300m; GSD – 8 cm; Area - 1.35 sq. km

			19-12-21	19-12-21	19-12-21	19-12-21	20-12-21	24-12-21
	GPU	CPU	Metashape 16GB	Metashape 64GB	Metashape 128GB	Metashape 256GB	Metashape 192GB	Metashape 512GB
OS			Windows 2019	Windows 2019	Windows 2019	Windows 2019	Linux	Linux
Storage			Storage X STANDARD	Storage X STANDARD	Storage X STANDARD	Storage X STANDARD	Storage X STANDARD	Storage X STANDARD
GPU			1 x RADEON V520	1 x RADEON V520	2 x RADEON V520	4 x RADEON V520	No GPU	No GPU
Processor type			AMD EPYC 7R32	AMD EPYC 7R32	AMD EPYC 7R32	AMD EPYC 7R32	Intel Xeon Scalable Cascade Lake	Intel Xeon Platinum 8259CL
Processor configuration			1 socket 4vCPU@2.8GHz	1 socket 16vCPU@2.8GHz	1 socket 32vCPU@2.8GHz	1 socket 64vCPU@2.8GHz	1 socket 48vCPU@3.8GHz	1 socket 64vCPU@2.5GHz
RAM			16	64	128	256	192	512
Match Photos (Highest)	v	v	2m 1s	2m 6s	1m 20s	1m 3s	2m 21s	2m 42s
Align Cameras		v	44s	17s	14s	10s	10s	13s
Depth Maps (Ultra High, Aggressive)	v	v	36m 59s	28m 41s	15m 12s	9m 4s	4h 10m	4h 17m
Dense Cloud		v	1h 32m	31m 37s	23m 5s	20m 33s	16m 51s	19m 44s
DEM (from Dense cloud)		v	3m 38s	2m 18s	2m 2s	2m 0s	1m 29s	1m 52s
Orthomosaic (from DEM)		v	8m 1s	4m 8s	3m 40s	3m 42s	3m 25s	4m 18s
Price (\$/h)			\$2.814	\$4.770	\$7.085	\$11.715	\$11.828	\$11.819
Total time (h)			2.39	1.15	0.76	0.61		
Total time (h,m)			2h 23m	1h 9m	46m	36m		
Total price			\$6.73	\$5.49	\$5.38	\$7.15	\$0.00	\$0.00
Tiled model (from Dense cloud, Ultra High/High)	v	v				4h 59m		
Tiled model (from Depth Maps, Ultra High/High)	v	v				2h 38m		

Comments:

CPU based images recommended to use for the steps that are not requiring GPU processing. It is also good for use in a cluster configuration for the step of orthophoto processing for very large projects with very large image size while a lot of RAM is required for processing.

19. Metashape 1.7.5: 15,130 images of UAV Batmap II + Sony a6000 24MP camera on a single and cluster configuration

1. GSD – 4.2 cm; Forward/Side overlap - 80%/80%; Area – 40.6 sq.km;
2. Frame size – 24MP (6000 x 4000), Image file type – JPEG, Image file size – 20 Mb

	GPU	CPU	Metashape 192GB	Metashape 192GB	Metashape 256GB
OS			Windows 2019	Linux	Windows 2019
Storage			Storage X 1000 GB Standard	Storage X 2000 GB Enhanced	Storage X 2000 GB Enhanced
GPU			4 x TESLA T4	4 x TESLA T4	4 x Radeon V520
Processor type			Intel® Xeon® Cascade Lake 24C	Intel® Xeon® Cascade Lake 24C	Intel® Xeon® Cascade Lake 24C
vCPU			1 socket 24 CPU @ 2.5GHz 48 vCPU	1 socket 24 CPU @ 2.5GHz 48 vCPU	2 socket 32 CPU @ 2.8GHz 64 vCPU
RAM			192	192	256
Computers			1	1	5
Images			15,130	15,130	15,130
Match Photos (High)	v		9h 53m	7h 33m	2h 36m
Align Cameras (High)		v	1h 51m	1h 29m	54m
Optimiaztion parametrs		v	3 m	3m	3m
Depth Maps (Medium/Agressive)	v		4h 36m	2h 46m	2h 14m
Dense Cloud (Medium/Agressive) without "Point color calculation"		v	11h 25m	4h 23m	1h 26m
DEM (from Dense Cloud)		v	44m	31m	21m
Orthomosaic (DEM) NO "Refine seamlines"		v	5h 14m	3h 28m	1h 19m
Time (h)			33.77	20.22	8.88
Price (\$/h/computer)			\$11.648	\$11.356	\$11.908
Total price			\$393.35	\$229.62	\$528.72

20. Metashape 1.7.3: **10,338** images of DJI M300rtk and ZenmuseP1 (35mm) on a single and cluster configuration

Corridor mapping length – 30 km; Number of images – 10,348

Frame size – 45MP (8192 x 5460); Image file type – JPEG; Image file size – 20 Mb

Forward/Side overlap - 75%/75%; GSD – 1.65 cm.

	GPU	CPU	Metashape 192GB	Metashape 192GB	Metashape 192GB	Metashape 192GB
OS			Windows 2019	Linux	Windows 2019	Linux
Storage			Storage EBS 2000 GB Enhanced	Storage EBS 2000 GB Enhanced	Storage EBS 2000 GB Enhanced	Storage EBS 2000 GB Enhanced
GPU			4 x TESLA T4	4 x TESLA T4	4 x TESLA T4	4 x TESLA T4
Processor type			Intel® Xeon® Cascade Lake 24C	Intel® Xeon® Cascade Lake 24C	Intel® Xeon® Cascade Lake 24C	Intel® Xeon® Cascade Lake 24C
vCPU			1 socket 24 CPU @ 2.5GHz 48 vCPU	1 socket 24 CPU @ 2.5GHz 48 vCPU	1 socket 24 CPU @ 2.5GHz 48 vCPU	1 socket 24 CPU @ 2.5GHz 48 vCPU
RAM			192	192	192	192
Computers			1	1	5	5
Images			10,348	10,348	10,348	10,348
Match Photos (High)	v		4h 23m	3h 46m	1h 32m	1h 20m
Align Cameras (High)		v	51m	39m	34m	19m
Depth Maps (Medium/Agressive)	v		5h 36m	3h 24m	2h 1m	2h 11m
Dense Cloud (Medium/Agressive) without "Point color calculation"		v	12h 6m	4h 33m	2h 41m	1h 9m
DEM (from Dense Cloud)		v	2h 22m	1h 10m	32m	16m
Orthomosaic (DEM) NO "Refine seamlines"		v	11h 59m	5h 58m	4h 46m	2h 10m
Time (h)			37.28	19.50	12.10	7.42
Price (\$/h/computer)			\$11.648	\$11.356	\$11.648	\$11.356
Total price			\$434.24	\$221.44	\$704.70	\$421.31

21. Metashape 1.7.3: 1,000/3,450/4,500 of PhaseOne iXM-RS150F 150MP (RGB+NIR) on a single and cluster configuration

Blocks of images – 1,000 / 3,450 / 4,500;
 Image type – PhaseOne 150MP 4-band RGB+NIR;
 Image file size – 600 MB;
 Forward/Side overlap - 80%/50%;
 GSD – 4.6 cm.

OS		Single computer				Cluster of computers (on-demand)						
		Win 2019	Linux	Win 2019	Win 2019	Linux						
Application		Metashape 192GB		Metashape 256GB		Metashape 192GB						
Number of computers in a cluster		1	1	1	1	5	10	10	6	5	4	2
Storage (TB)		2	2	10	2 x 1.2	Not limited	Not limited	Not limited	Not limited	Not limited	Not limited	Not limited
Images		1,023	1,023	1,000	1,000	1,000	4,500	3,450	3,450	3,450	3,450	3,450
Match Photos	4.6 cm/pix	55m 45s	56m 41s	1h 12m	58m 38s	14m 12s	26m 18s	34m 19s	31m 28s	37m 33s	47m 18s	57m 55s
Align Cameras	4.6 cm/pix	5m 27s	5m 5s	3m 33s	3m 21s	1m 17s	7m 37s	5m 44s	7m 8s	7m 5s	8m 18s	10m 47s
Depth Maps	74 cm/pix	2h 22m	1h 43m	2h 7m	25m 50s	27m 0s	44m 40s	1h 15m	1h 33m	1h 48m	2h 17m	4h 2m
Dense Cloud	74 cm/pix	10m 45s	4m 56s	9m 15s	9m 6s	1m 27s	3m 37s	3m 6s	4m 38s	5m 20s	6m 29s	11m 39s
Classify ground points	15/0.25/100	2m 24s	1m 32s	3m 9s	3m 15s	2m 45s	12m 59s	9m 35s	9m 55s	10m 22s	10m 35s	7m 16s
DEM (from Dense Cloud)	74 cm/pix	1m 21s	58s	1m 25s	1m 22s	41s	1m 2s	1m 3s	1m 34s	1m 38s	2m 31s	3m 20s
Color adjustment		25m 0s	25m 0s	25m 0s	18m 25s	25m 16s	1h 57m	1h 31m	1h 28m	1h 30m	1h 30m	1h 30m
Orthomosaic (DEM)	4.6 cm/pix	5h 5m	4h 3m	4h 50m	3h 23m	1h 22m	2h 13m	2h 36m	2h 37m	2h 50m	3h 32m	6h 26m
Procissing price (\$/h)		\$11.648	\$11.356	\$11.908	\$11.908	\$11.356	\$11.356	\$11.356	\$11.356	\$11.356	\$11.356	\$11.356
Fast storage price (\$/h)		\$4.040	\$4.040	\$6.140	\$4.040	\$6.140	\$6.140	\$6.140	\$6.140	\$6.140	\$6.140	\$6.140
Total time (h)		10.38	8.59	10.11	8.83	3.83	5.77	6.26	6.55	7.17	8.57	13.48
Total price		\$162.84	\$132.25	\$182.47	\$140.82	\$240.98	\$690.67	\$749.32	\$486.51	\$451.14	\$441.90	\$388.92
Price per 100 image		\$15.92	\$12.93	\$18.25	\$14.08	\$24.10	\$15.35	\$21.72	\$14.10	\$13.08	\$12.81	\$11.27
Processing speed (image/h)		99	119	99	113	261	780	551	527	481	403	256

22. Metashape 1.7.2: 1,023 images of PhaseOne iXM-RS150F 150MP RGB+NIR

Strips – 15; Number of images – 1,023

Forward overlap - 80%; Side overlap – 50%; Flight altitude – 890 m; GSD – 4.6 cm; Area – 36.4 sq.km.

Orthophoto RGB+NIR (4-band) GSD = 4.6 cm

Image size – 150 MP (14204 x 10652)

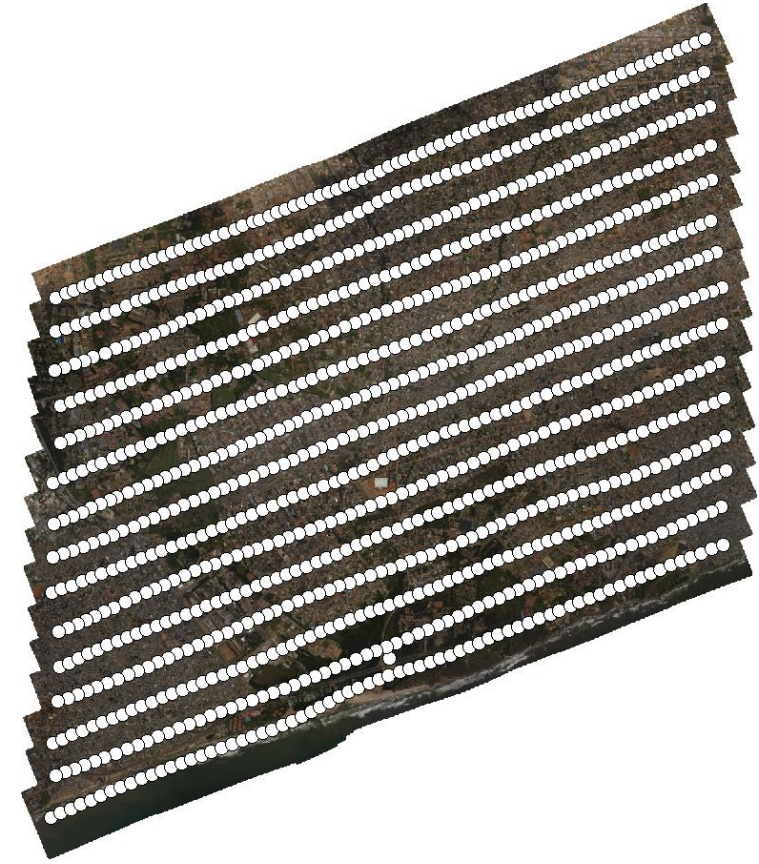
Image type – RGB+NIR (4-band)

Image file volume (TIFF) – 600 MB

Total image files volume – 576 GB

Metashape project volume – 693 GB

Exported orthophoto volume – 78 GB

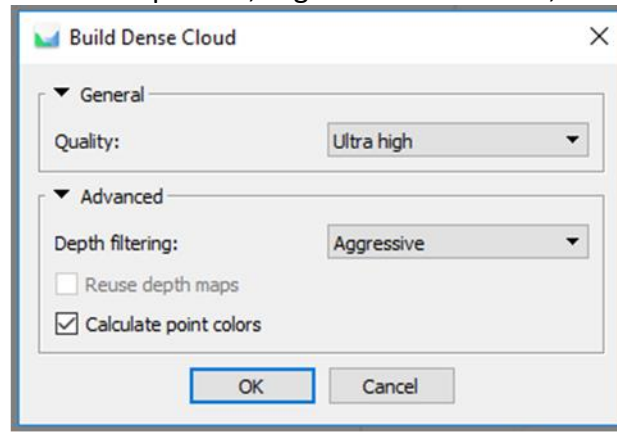
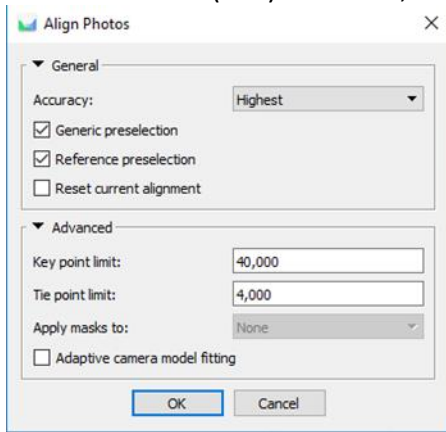


OS				Win 2019	Linux	Linux
Metashape 1.7.2				Metashape 192 GB	Metashape 192 GB	Metashape 192 GB
Storage				FAST Storage X	FAST Storage X	Local D
Storage volume (GB)				2000	2000	900
	GPU	CPU	Parameters			
Copy of images from Storage X to local disk D						40m
Generating masks		v		1m 20s	1m 20s	1m 20s
Match Photos	v		4.6 cm/pix	55m 45s	56m 41s	14m 46s
Align Cameras		v	4.6 cm/pix	5m 27s	5m 5s	6m 50s
Depth Maps	v		74 cm/pix	2h 22m	1h 43m	22m 35s
Dense Cloud		v	74 cm/pix	10m 45s	4m 56s	4m 20s
Classify ground points		v	15/0.25/100	2m 24s	1m 32s	1m 33s
DEM (from Dense Cloud)		v	74 cm/pix	1m 21s	58s	59s
Color adjustment		v		12m 0s	12m 0s	11m 58s
Orthomosaic (DEM)		v	4.6 cm/pix	5h 5m	4h 3m	3h 28m
Orthomosaic Export (TIFF)		v	56 tiles of size 1000 m x 1000 m	1h 16m	1h 6m	1h 7m
Procissing price (\$/h)				\$11.648	\$11.356	\$11.356
Fast storage price (\$/h)				\$3.420	\$3.420	\$3.420
Total time (h)				10.00	8.24	7.32
Total time (h,m)				10h 0m	8h 14m	7h 19m
Total price				\$150.68	\$121.75	\$108.16

23. Metashape 1.6.5: Parallel processing of 10 blocks on the same Storage with 10 x Metashape 192GB computers

Drone survey: FC6310 (8.8mm); Image size – 16 MP (4864 x 3648); Images - 100

File size (JPG) – 7.5 MB; Side/Forward overlap - 70%; Flight altitude – 320m; GSD – 8 cm; Area - 1.35 sq.km;



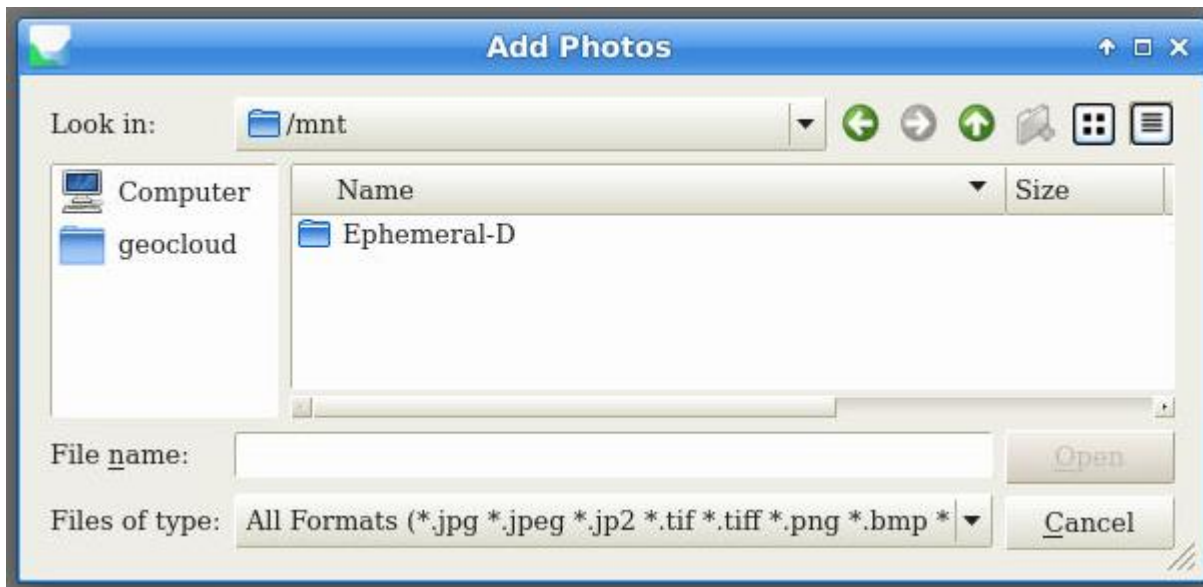
			Single project	10 parallel running projects on the same storage									
	GPU	CPU	1	1	2	3	4	5	6	7	8	9	10
OS			Windows 2019	Windows 2019	Windows 2019	Windows 2019	Windows 2019	Windows 2019	Windows 2019	Windows 2019	Windows 2019	Windows 2019	Windows 2019
Storage			Storage 750GB enhanced	Storage 750GB enhanced	Storage 750GB enhanced	Storage 750GB enhanced	Storage 750GB enhanced	Storage 750GB enhanced	Storage 750GB enhanced	Storage 750GB enhanced	Storage 750GB enhanced	Storage 750GB enhanced	Storage 750GB enhanced
GPU			4 x TESLA T4	4 x TESLA T4	4 x TESLA T4	4 x TESLA T4	4 x TESLA T4	4 x TESLA T4	4 x TESLA T4	4 x TESLA T4	4 x TESLA T4	4 x TESLA T4	4 x TESLA T4
Processor type			Intel® Xeon® Cascade Lake 24C	Intel® Xeon® Cascade Lake 24C	Intel® Xeon® Cascade Lake 24C	Intel® Xeon® Cascade Lake 24C	Intel® Xeon® Cascade Lake 24C	Intel® Xeon® Cascade Lake 24C	Intel® Xeon® Cascade Lake 24C	Intel® Xeon® Cascade Lake 24C	Intel® Xeon® Cascade Lake 24C	Intel® Xeon® Cascade Lake 24C	Intel® Xeon® Cascade Lake 24C
vCPU			1 socket 24 CPU@2.50GHz 48 vCPU	1 socket 24 CPU@2.50GHz 48 vCPU	1 socket 24 CPU@2.50GHz 48 vCPU	1 socket 24 CPU@2.50GHz 48 vCPU	1 socket 24 CPU@2.50GHz 48 vCPU	1 socket 24 CPU@2.50GHz 48 vCPU	1 socket 24 CPU@2.50GHz 48 vCPU	1 socket 24 CPU@2.50GHz 48 vCPU	1 socket 24 CPU@2.50GHz 48 vCPU	1 socket 24 CPU@2.50GHz 48 vCPU	1 socket 24 CPU@2.50GHz 48 vCPU
RAM			192	192	192	192	192	192	192	192	192	192	192
Match Photos (Highest)	v		1m 1s	36s	38s	37s	37s	40s	33s	37s	36s	36s	42s
Align Cameras (Highest)		v	26s	26s	25s	25s	25s	25s	26s	25s	25s	25s	26s
Depth Maps (Ultra High)	v		9m 23s	8m 50s	8m 44s	8m 52s	9m 24s	9m 10s	8m 47s	8m 51s	9m 7s	9m 5s	8m 43s
Dense Cloud (Ultra High)		v	26m 56s	30m 22s	30m 19s	30m 36s	30m 22s	29m 55s	29m 20s	30m 4s	29m 16s	28m 9s	27m 16s
DEM		v	2m 27s	3m 8s	3m 17s	3m 18s	3m 20s	3m 18s	2m 37s	4m 27s	4m 58s	5m 45s	6m 19s
Orthomosaic		v	3m 51s	4m 42s	4m 38s	4m 42s	4m 44s	4m 33s	4m 16s	4m 47s	4m 40s	4m 43s	4m 28s
Total time (h)			0.73	0.80	0.80	0.81	0.81	0.81	0.77	0.82	0.82	0.81	0.80
Total time (h,m)			44m	48m	48 m	49m	49m	49m	46m	49m	49m	49m	48m
Build Tiled (from Depth Maps, Ultra High/High)	v	v	2h 34m	2h 41m	2h 37m	2h 42s	2h 41m	2h 39m	2h 36s	2h 41m	2h 34s	2h 38m	2h 38m

24. Ephemeral disk D: for Metashape 16/32/64/128 and 192GB

Using a local D drive for your data (images, project and log file) can improve processing performance by 11% for Metashape 16GB, 18% for Metashape 32GB, and 68% for Metashape 192GB (see second table for 150MP benchmarks). Processing performance improves mainly on GPU-based processes.

In our tests, there was only an improvement for 150MP large format frames, and there was only minor improvement for small 7.5MB frames. To get started with local drive D: you need to copy data from Storage X: to D:

To access the local drive from Metashape on Linux-based computers, select the folder: Computer / mnt / Ephemeral-D



Pay attention!

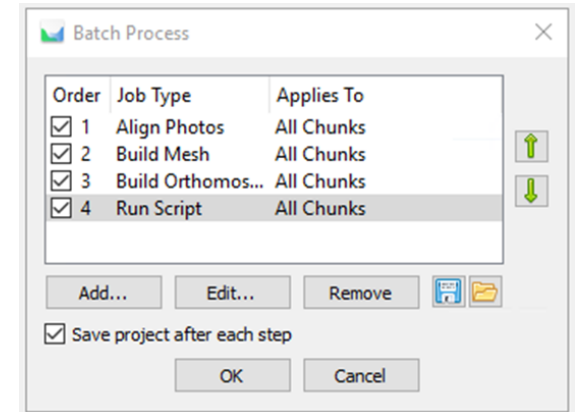
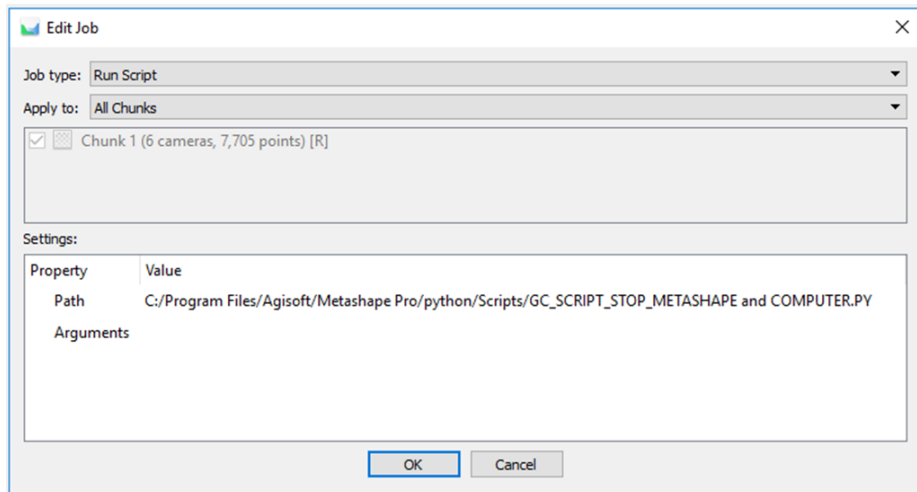
Local drive D: exists only when the computer (Metashape) is operational. If you stop your computer, the D: drive will disappear along with all data. There is no way to recover data. Therefore, please copy the processing results back to Storage X: after processing is complete and before stopping the computer. **Don't use the following script for automatic stopping of the computer in a batch mode if you use the Ephemeral disk for processing and saving the data.**

25. Metashape script to stop computer in a Batch Process

To exit Metashape and stop your computer in a Batch Process of Metashape use the script

Windows

C:/Program Files/Agisoft/Metashape Pro/python/Scripts/GC_SCRIPT_STOP_METASHAPE and COMPUTER.py



Linux

/home/geocloud/Metashape-pro/python/Scripts/GC_SCRIPT_STOP_METASHAPE and COMPUTER.py

