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2. 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 Linux and Windows Metashape applications 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. To help you choose the right Metashape application that's best suited for your project, check out the **Benchmarks** below. **Linux Metashape apps are faster and cheaper.**

3. The **Elastic storage** type (standard/enhanced/fast) only affects the upload/download processes (depending on the speed of your local internet) and does not affect the processing itself. Use **Elastic Storage Standard** for processing with any Metashape apps.

4. The **Fixed storage** (standard/enhanced/fast) affects both the upload/download processes and the processing itself.

5. Metashape uses GPU for processes: **Match photos, Depth Maps, Build Texture, Build Model and Tiled Model from Depth Maps**.

6. 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 16/32/64GB without GPU may be used.

7. 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 96/192/256/384/768/1024/1536GB. Pay attention, that more than 96 vCPU are not used effectively. 48-64vCPU are most effective. See example here: Metashape 2.0.3: New instances with a lot of RAM for very large orthophoto projects

8. Processing in a Batch mode, you can automatically stop your computer using this script: Metashape script to stop computer in a Batch Process

9. 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

10. The table below shows **GPU/CPU/Cluster** usage at different processing steps. Using a **cluster configuration**, you can manage what type of computer is used for every processing step. **It makes the processing cost-effective.**

Process	GPU	GPU Usage	CPU	CPU Usage	Cluster
Match Photos	v	Multiple GPU	v	All CPU	yes
Align Cameras			v	All CPU	yes
Depth Maps	v	Multiple GPU	v	All CPU	yes
Point cloud:					
Step 1: Initializing and filtering depth maps			v	All CPU	yes
Step 2: Loading Depth maps, Points extraction and saving			v	Low CPU usage	yes
Step 3: Joining point clouds and saving in a project structure			v	Low CPU usage	no
3D Model from Depth Maps	v	Multiple GPU	v	All CPU	yes
Calculating vertex colors			v	All CPU	yes
Build Texture:					no
Step 1: Build UV			v	Low CPU usage	
Step 2: Build texture	v	Single GPU	v	Low CPU usage	
Build Tiled from Depth Maps					yes
Step 1: Generating model	v	Multiple GPU	v	All CPU	
Step 2: Parameterizing tiles			v	All CPU	
Step 3: Blending textures	v	Single GPU	v	All CPU	
Step 4: Generating textures			v	All CPU	
Build Tiled from Model			v	All CPU	yes
Step 1: Generating model			v	All CPU	
Step 2: Parameterizing tiles			v	All CPU	
Step 3: Blending textures	v	Single GPU	v	All CPU	
Step 4: Generating textures			v	All CPU	
Calibrate colors			v	All CPU	no
Ground point classification			v	All CPU	no
Generating DEM			v	Low CPU usage	yes
Orthomosaic (from DEM / Point Cloud)					yes
Step 1: Orthorectifying images			v	All CPU	
Step 2: Updating partition			v	All CPU	
Step 3: Updating orthomosaic			v	All CPU	
Export orthomosaic			v	All CPU	no
Export Point cloud			v	Low CPU usage	yes
Export DEM				All CPU	no
Export Model			v	Low CPU usage	no
Export Tiled Model			v	Low CPU usage	no

11. 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 To upload/download your data from different clouds, you can use **FileZilla Pro, Google Drive App or One Drive** installed in **Storage Assist Computer**.

12. 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						

3. Metashape 2.2.3: **942** nadir images (25MP) of the **SHARE 102S Pro** oblique camera for 3D Model and orthophoto

Image resolution is 6,144x4,096 pixels (25 Mpix) and a pixel size of 3.76 µm.

The purpose of the test is to compare different Metashape applications at different stages of processing.

First test: Metashape 48/192 4xT4 was used for all processing steps.

Second test: Metashape 32/64 CPU was used for Point cloud, DEM and Orthophoto (these steps do not require GPU).

Third test: Metashape 48/192 4xL4 was used for Matching, Alignment, Depth Maps and Tiled Model.

Metashape 16/32 CPU was used to export DTM, Point Cloud and Orthophoto

Processing steps	Parameters	Computer (Linux)	Price ($/h)	Time (h:m:s)	Price ($)	Computer (Linux)	Price ($/h)	Time (h:m:s)	Price ($)
Upload 942 images (8GB)	200Mbps	No		00:10:00					
Match Photos (High)	711,638	Metashape 48/192 4xT4	$10.716	0:06:28	$1.15	Metashape 48/192 4xT4	$10.716	0:06:28	$1.15
Align Cameras		Metashape 48/192 4xT4	$10.716	0:05:35	$1.00	Metashape 48/192 4xT4	$10.716	0:05:35	$1.00
Depth Maps (High-High, Mild)		Metashape 48/192 4xT4	$10.716	0:28:23	$5.07	Metashape 48/192 4xT4	$10.716	0:28:23	$5.07
Tiled Model (from Depth Maps)	2,39 cm/pix	Metashape 48/192 4xT4	$10.716	3:18:00	$35.36	Metashape 48/192 4xT4	$10.716	3:18:00	$35.36
Point Cloud (from Depth Maps)	728,566,997	Metashape 48/192 4xT4	$10.716	1:05:00	$11.61	Metashape 32/64 CPU	$6.226	0:47:14	$4.90
DEM (from Point Cloud)	4.70 cm/pix	Metashape 48/192 4xT4	$10.716	0:04:43	$0.84	Metashape 32/64 CPU	$6.226	0:03:05	$0.32
Calibrate colors (on DEM)		Metashape 48/192 4xT4	$10.716	0:01:00	$0.18	Metashape 32/64 CPU	$6.226	0:01:05	$0.11
Orthophoto (from DEM)	2.35 cm/pix	Metashape 48/192 4xT4	$10.716	0:23:09	$4.13	Metashape 32/64 CPU	$6.226	0:16:20	$1.69
Processing time/price				**5:32:18**	**$59.35**			**5:06:10**	**$49.61**
Match Photos (High)	711,638	Metashape 48/192 4xL4	$11.663	0:04:19	$0.84				
Align Cameras		Metashape 48/192 4xL4	$11.663	0:03:56	$0.76				
Depth Maps (High-High, Mild)		Metashape 48/192 4xL4	$11.663	0:19:30	$3.79				
Tiled Model (from Depth Maps)	2,39 cm/pix	Metashape 48/192 4xL4	$11.663	2:27:00	$28.57				
Point Cloud (from Depth Maps)	728,566,997	Metashape 32/64 CPU	$6.226	0:47:14	$4.90				
DEM (from Point Cloud)	4.70 cm/pix	Metashape 32/64 CPU	$6.226	0:03:05	$0.32				
Calibrate colors (on DEM)		Metashape 32/64 CPU	$6.226	0:01:05	$0.11				
Orthophoto (from DEM)	2.35 cm/pix	Metashape 32/64 CPU	$6.226	0:16:20	$1.69				
Processing time/price				**4:02:29**	**$41.00**				
Export DTM (8 tiles)	4.70 cm/pix	Metashape 16/32 CPU	$3.763	0:01:00	$0.06				
Export Point Cloud (6 GB laz file)		Metashape 16/32 CPU	$3.763	0:03:55	$0.25				
Export Orthophoto (25 tiles)	2.35 cm/pix	Metashape 16/32 CPU	$3.763	0:05:00	$0.31				
Total Export time/price				**0:09:55**	**$0.62**				

4. Metashape 2.2.3: **4,710** nadir&oblique images (25MP) of the **SHARE 102S Pro** oblique camera for 3D Model and orthophoto

All images have a resolution of 6,144x4,096 pixels (25 Mpix) and a pixel size of 3.76 µm. The focal length of a nadir camera is 25 mm, and of four oblique cameras is 35 mm. Flying altitude: 160 m; GSD: 2.4 cm; Mapping area: 1.52 km²
The project was implemented in several stages in Metashape (Agisoft) as a multi-camera system. The first stage involved calibrating all five cameras. The second stage involved creating the AT, a 3D model, and an orthophoto.

Processes	GPU	CPU	Computer	Price ($)	Cluster	Time	Cost
Match Photos (4,109,770 tie points, Medium)	v	v	Metashape 48/192 4xL4	**$11.663**	1	0:12:13	$2.37
Align Cameras (Medium)		v	Metashape 48/192 4xL4	**$11.663**	1	0:17:51	$3.47
Depth Maps (Medium-High, Moderate)	v	v	Metashape 48/192 4xL4	**$11.663**	5	0:27:24	$26.63
Build Tiled Model from Depth Maps	v	v	Metashape 48/192 4xL4	**$11.663**	5	2:28:26	$144.26
Orthophoto (from Tiled Model)		v	Metashape 16/32 CPU@3.7GHz	**$3.763**	1	2:59:00	$11.23
Export Tiled Model		v	Metashape 8/16 CPU@3.7GHz	**$3.087**	1	0:02:00	$0.10
Export orthophoto			Metashape 4/16 CPU@3.7GHz	**$2.783**	1	0:10:00	$0.46
Total Time/Cost						**6:36:54**	**$188.53**

5. Metashape 2.2.2: **new version test**: main processing steps with **300** drone 16MP (4864x3648) images

	GPU	CPU	Metashape 96/384	Metashape 48/384	Metashape 48/192	Metashape 64/256	Metashape 64/512
OS			Linux	Linux	Linux	Linux	Linux
Storage			Elastic	Elastic	Elastic	Elastic	Elastic
GPU			4 x L4	4 x L40S	4 x L4	1 x L4	1 x L40S
CPU/RAM			96/364	48/384	48/192	64/256	64/512
Match Photos (High, 235,184 tie points)	v	v	0:01:21	0:01:17	0:01:24	0:02:25	0:01:49
Align Cameras		v	0:00:45	0:01:03	0:00:56	0:00:49	0:00:51
Build Model: Depth Maps (High-High, Mild filter)	v	v	0:03:39	0:03:16	0:03:53	0:10:13	0:07:06
Build Model: 3D Model (from Depth Maps, 28,746,838 faces, High/High)	v	v	0:12:51	0:13:07	0:13:17	0:15:33	0:13:52
Build Tiled (from Model, High/High, 9 levels, 8.28 cm/pix)	v	v	0:15:16	0:17:06	0:17:03	0:16:19	0:16:41
Build Tiled (from Depth Maps, High/High, 9 levels, 8.28 cm/pix)	v	v	0:35:21	0:35:00	0:36:14	0:34:03	0:37:47
Point cloud (from Model, 372,157,944 points)		v	0:05:01	0:05:23	0:05:28	0:06:08	0:05:25
Point cloud (from Depth Maps, 160,686,877 points)		v	0:07:47	0:09:24	0:09:18	0:08:18	0:08:15
DEM (16.2 cm/pix from Point cloud)		v	0:00:51	0:00:50	0:00:51	0:00:49	0:01:00
Orthomosaic (from DEM, 8.12 cm/pix)		v	0:05:10	0:04:30	0:04:55	0:04:04	0:06:59
Total time (h)			1:28:02	1:30:56	1:33:19	1:38:41	1:39:45
Price ($/h)			$14.485	$20.182	$11.663	$8.948	$15.719
Total price			$21.25	$30.59	$18.14	$14.72	$26.13

	GPU	CPU	Metashape 48/192	Metashape 64/256	Metashape 48/192	Metashape 96/192	Metashape 64/128
OS			Linux	Linux	Linux	Linux	Linux
Storage			Elastic	Elastic	Elastic	Elastic	Elastic
GPU			4 x A10G	1 x A10G	4 x T4	No GPU	No GPU
CPU/RAM			48/192	64/256	48/192	96/192	64/128
Match Photos (High, 235,184 tie points)	v	v	0:01:45	0:02:46	0:02:20	0:03:50	0:03:43
Align Cameras		v	0:01:26	0:01:02	0:01:17	0:00:33	0:00:37
Build Model: Depth Maps (High-High, Mild filter)	v	v	0:04:29	0:10:25	0:06:47	1:44:00	2:13:00
Build Model: 3D Model (from Depth Maps, 28,746,838 faces, High/High)	v	v	0:16:04	0:18:10	0:19:31	0:15:16	0:16:04
Build Tiled (from Model, High/High, 9 levels, 8.28 cm/pix)	v	v	0:19:43	0:18:11	0:24:21	0:15:58	0:16:37
Build Tiled (from Depth Maps, High/High, 9 levels, 8.28 cm/pix)	v	v	0:42:28	0:39:00	0:45:53	0:37:01	0:37:12
Point cloud (from Model, 372,157,944 points)		v	0:06:56	0:07:48	0:06:32	0:04:41	0:04:48
Point cloud (from Depth Maps, 160,686,877 points)		v	0:10:00	0:09:16	0:13:57	0:07:14	0:08:39
DEM (16.2 cm/pix from Point cloud)		v	0:01:00	0:00:58	0:01:07	0:00:49	0:00:49
Orthomosaic (from DEM, 8.12 cm/pix)		v	0:05:59	0:04:56	0:05:42	0:05:05	0:05:11
Total time (h)			1:49:50	1:52:32	2:07:27	3:14:27	3:46:40
Price ($/h)			$13.078	$9.919	$10.716	$10.925	$8.894
Total price			$23.94	$18.60	$22.76	$35.41	$33.60

6. Metashape 2.2.2: **1,108** images of **Phase One P5-GS128** (128MP) for orthophoto

The project contains 1108 images taken by Phase One P5-GS128 camera (13468x9564) from a UAV FLIRT Cetus, fixed wing.

Focal length: 80 mm; Flying altitude: 98 m; Image resolution: 4.23 mm/pix. Orthophoto resolution: 4.23 mm/pix.

Forward/Side overlap: 90% / 70%; Coverage area: 0.24 sq.km;

Process	GPU	CPU	Computer	Price ($/hour)	Time	Cost ($)
Match Photos (High, 777,545 tie points)	v	v	Metashape 48/192 4xL4	**$11.663**	0:17:41	**$3.437**
Align Cameras		v	Metashape 48/192 4xL4	**$11.663**	0:04:07	**$0.800**
Depth Maps (High-High, Agressive)	v	v	Metashape 48/192 4xL4	**$11.663**	1:41:00	**$19.633**
Point cloud (from Depth Maps, 4,141,799,661 points)		v	Metashape 48/96 CPU	**$7.970**	5:37:00	**$44.765**
Build Tiled (from Depth Maps, High/High, 9 levels)	v	v	Metashape 64/256 1xL4	**$8.948**	17:14:00	**$154.204**
Ground points classification (7.5/0.09/5.0/50)		v	Metashape 64/128 CPU	**$8.894**	22:56:00	**$203.969**
DEM (0.8 cm/pix from Point cloud)		v	Metashape 8/32 CPU	**$3.087**	0:20:57	**$1.078**
Orthomosaic (from DEM, 0.4 cm/pix)		v	Metashape 16/32 CPU	**$3.763**	1:59:00	**$7.463**
Total time (h)					**50:09:45**	**$435.349**
True Orthomosaic (from PointCloud, 0.8 cm/pix)		v	Metashape 16/32 CPU	**$3.763**	1:59:00	**$7.463**

7. Metashape 2.2.2: **75,969** images of **DJI M3E 21MP** (5280x3956) for orthophoto

Focal length: 12.29 mm; Flying altitude: 134 m; Image and orthophoto resolution: 2.94 cm/pix. Forward/Side overlap: 82% / 70%; Coverage area: 65.3 sq.km;

The DSM (point cloud) contains 25.7 billion points with a density of 290 points/m² and a resolution of 5.87 cm/pixel. The orthophoto resolution is 2.94 cm/pixel.

Processes	GPU	CPU	RAM report (GB)	RAM max (GB)	CPU max (%)	Storage up to (TB)	Computer	Price ($)	Cluster	Processing Time	Cost	Total computer time	Comments
Images 75969						1.3							
Match Photos 1 (30,310,848 tie points, High, Source)	v	v			2	1.6	Metashape 48/192 4xL4	$11.663	10	1:45:00	$204		All workers with GPU up to 97%.
			134	140			Metashape 48/192 CPU	$8.804	1	0:26:52	$4		One worker without GPU
Total for Match Photos										2:11:52	$208	15:41:00	
Align Cameras (High)		v	57	59	100	1.4	Metashape 48/96 CPU	$7.970	1	3:24:36	$27		One worker for Alignment all the time
Align Cameras (High)		v		13	100		Metashape 48/96 CPU	$7.970	9	1:25:00	$102		Stopped at 80% of processing
Total for Alignment										3:24:36	$129	11:13:00	
Depth Maps (High-High, Moderate filter, 75523) **Step 1**: Neighboring Image Analysis		v		14	100		Metashape 64/256 CPU	$10.264	1	0:45:00	$8		First 45 min only one worker without GPU
Step 2: Depth Maps	v	v	31	34	53	2.9	Metashape 48/192 4xT4	$10.716	10	12:21:09	$1,324		All workers with GPU
Total for Depth Maps										13:06:09	$1,331	114:00:00	
Point cloud (from Depth Maps, **25,730,342,987** points) **Step 1**: Initializing		v				1.9	Metashape 48/96 CPU	$7.970	1	0:34:15	$5		One worker for 34 min (4%).
Step 2: Filtering depth maps		v	31	64	100	2.2	Metashape 48/96 CPU	$7.970	10	5:46:00	$460		All workers up to 69%.
Step 3: Loading Depth maps, Points extraction and saving		v		14	80	2.5	Metashape 16/32 CPU	$3.763	10	2:43:30	$103		From 69% to 90%
Step 4: Joining point clouds and saving in a project structure		v		5	41	2.9	Metashape 4/16 CPU	$2.783	1	0:45:04	$2		From 90% to the end
Total for Point cloud										9:48:49	$569	84:00:00	
DEM (from Point cloud, 239405x117556, 5.87 cm/pix)		v	0.9	7	85	2.3	Metashape 8/32 CPU	$3.087	5	1:29:13	$23	7:06:00	
Orthomosaic (from DTM, 2.94 cm/pix) **Step 1**: Analyzing DEM		v	2.2	7	91		Metashape 16/32 CPU	$3.763	1	0:06:04	$0.38		
Step 2: Orthomosaic		v		7	66	3.2	Metashape 16/32 CPU	$3.763	10	4:00:00	$151	22:29:00	
Total for DEM and Orthomosaic										5:35:17	$174	29:35:00	
Total Time/Cost for 75,969 images						3.2				34:06:43	$2,411	254:29:00	

8. Metashape 2.2.1: **24,102** images of **DJI M3E 21MP** (5280x3956) for orthophoto

The project contains 24,102 images taken by DJI M3E camera (5280x3956).

Focal length: 12.29 mm; Flying altitude: 142 m; Image resolution: 3 cm/pix. Orthophoto resolution: 3 cm/pix.
Forward/Side overlap: 80%/72%; Coverage area: 22.9 sq.km;

The processing was performed in a single and a cluster configuration using different Metashape applications for different processing steps, making the processing cost-effective.

Single Metashape processing

Processes	GPU	CPU	RAM * report (GB)	RAM * max (GB)	CPU (%)	Computer	Price ($)	Time	Cost	Storage (GB)	Storage max*	Price	Cost
Images 24,102 (21MP)										290			
Match Photos (**7,190,542** tie points, High, Source)	v	v	59	70	6	**Metashape 48/192 4xL4**	$11.663	1:26:00	**$16.72**	364		$0.350	**$0.50**
Align Cameras (High)		v	15	82	100	**Metashape 48/192 4xL4**	$11.663	3:00:00	**$34.99**	364		$0.350	**$1.05**
Depth Maps (High-High, Moderate filter)	v	v	38	41		**Metashape 48/192 4xL4**	$11.663	10:51:00	**$126.54**	847	1200	$0.623	**$6.76**
Point cloud (from Depth Maps, **7,540,851,643** points)		v	37	40	60-100	**Metashape 48/96 CPU@3.7**	$7.970	18:36:00	**$148.24**	943	970	$0.666	**$12.39**
DEM (from Point cloud, 6 cm/pix)		v	0.4			**Metashape 8/32 CPU@3.7**	$3.087	1:12:00	**$3.70**	968	968	$0.680	**$0.82**
Orthomosaic 1 (from DTM, 3 cm/pix)		v	1.4	5	75	**Metashape 16/32 CPU@3.7**	$3.763	5:15:00	**$19.76**	1200	1200	$0.821	**$4.31**
Total Time / Cost for 24,102 images								**40:00:00**	**$369.38**				**$25.83**
Orthomosaic 2 (from DTM, 3 cm/pix)		v		6	30	**Metashape 48/96 CPU@3.7**	$7.970	**4:55:00**	**$39.19**	1200	1200	$0.821	**$4.04**

Comments:
Storage max includes temporary files
RAM reprot - process memory usage not including memore required for the project itsefl
RAM max - maximal memory used during processing
Orthomosaic 1 and 2 were processed on different computers for comparison.

Cluster Metashape processing

Processes	GPU	CPU	Computer	Price ($)	Cluster	Time	Cost	Comments
Match Photos 1 (**7,190,542** tie points, High, Source)	v	v	**Metashape 48/192 4xL4**	$11.663	**5**	0:52:57	**$51.46**	All workers all the time
Align Cameras (High)		v	**Metashape 48/192 4xL4**	$11.663	1	1:20:18	**$15.61**	One worker for Alignment all the time
Align Cameras (High)		v	**Metashape 48/192 4xL4**	$11.663	1	0:30:00	**$5.83**	Stopped after 30 min (76% of processing)
Align Cameras (High)		v	**Metashape 48/192 4xL4**	$11.663	1	0:30:00	**$5.83**	Stopped after 30 min (76% of processing)
Align Cameras (High)		v	**Metashape 48/192 4xL4**	$11.663	1	0:30:00	**$5.83**	Stopped after 30 min (76% of processing)
Align Cameras (High)		v	**Metashape 48/192 4xL4**	$11.663	1	0:30:00	**$5.83**	Stopped after 30 min (76% of processing)
Total for Alignement						**2:13:15**	**$67.07**	
Depth Maps (High-High, Moderate filter)	v	v	**Metashape 48/192 4xL4**	$11.663	**5**	3:28:06	**$202.26**	One wroker first 6 min. After that all 5 workers
Point cloud (from Depth Maps, **7,540,851,643** points) **Step 1**:Initializing and filtering depth maps		v	**Metashape 48/96 CPU@3.7**	$7.970	5	3:05:00	**$122.87**	One worker for Initializing, 9 min 5 workers up to 69% of processing
Step 2: Loading Depth maps, Points extraction and saving		v	**Metashape 16/32 CPU@3.7**	$3.763	5	2:00:00	**$37.63**	5 workers from 69% to 90% of processing
Step 3: Joining point clouds and saving in a project structure		v	**Metashape 4/16 CPU@3.7**	$2.783	1	0:29:03	**$1.35**	One worker from 90% to the end
Total for Depth Maps and Point cloud						**9:02:09**	**$364.10**	
DEM (from Point cloud, 6 cm/pix)		v	**Metashape 8/32 CPU@3.7**	$3.087	2	0:48:50	**$5.02**	
Orthomosaic (from DTM, 3 cm/pix)		v	**Metashape 16/32 CPU@3.7**	$3.763	5	1:34:28	**$29.62**	
Total for DEM and Orthomosaic						**2:23:18**	**$34.65**	
Total Time/Cost for 24,102 images						**13:38:42**	**$465.82**	
Match Photos 2 (**7,190,542** tie points, High, Source)	v	v	**Metashape 48/192 4xL4**	$11.663	1	1:43:28	**$20.11**	One worker for Matching
Align Cameras (High)		v	**Metashape 48/96 CPU@3.7**	$7.970	1	1:06:39	**$8.85**	One worker for Alignment all the time
Align Cameras (High)		v	**Metashape 48/96 CPU@3.7**	$7.970	1	0:30:00	**$3.99**	Stopped after 30 min (76% of processing)
Align Cameras (High)		v	**Metashape 48/96 CPU@3.7**	$7.970	1	0:30:00	**$3.99**	Stopped after 30 min (76% of processing)
Align Cameras (High)		v	**Metashape 48/96 CPU@3.7**	$7.970	1	0:30:00	**$3.99**	Stopped after 30 min (76% of processing)
Align Cameras (High)		v	**Metashape 48/96 CPU@3.7**	$7.970	1	0:30:00	**$3.99**	Stopped after 30 min (76% of processing)
Total for Alignement						**2:50:07**	**$44.91**	

Match Photos 1 and 2 were processed on different computers for comparison

9. Metashape 2.2.1: **new version test**: main processing steps with **300** drone 16MP (4864x3648) images

	GPU	CPU	Metashape 96/384	Metashape 48/192	Metashape 64/256	Metashape 48/192	Metashape 48/192
OS			Linux	Linux	Linux	Linux	Linux
Storage			Elastic Standard	Elastic Standard	Elastic Standard	Elastic Standard	Elastic Standard
GPU			4 x L4	4 x L4	1 x L4	4 x A10G	4 x T4
RAM			364	192	256	192	192
Processor configuration			48 CPU@2.65GHz 96 vCPU	24 CPU@2.65GHz 48 vCPU	32 CPU@2.65GHz 64 vCPU	24 CPU@2.80GHz 48 vCPU	24 CPU@2.50GHz 48 vCPU
Match Photos (High)	v	v	0:01:20	0:01:29	0:02:17	0:01:41	0:02:06
Align Cameras		v	0:00:46	0:00:53	0:00:50	0:01:04	0:01:12
Build Model: Depth Maps (High-High, Mild filter)	v	v	0:04:08	0:04:22	0:10:06	0:04:35	0:06:20
Build Model: 3D Model (from Depth Maps, 28,752,311 faces, High/High)	v	v	0:13:39	0:14:26	0:15:13	0:17:13	0:18:49
Build Tiled (from Model, High/High, 8 levels, 8.3 cm/pix)	v	v	0:15:06	0:16:40	0:16:00	0:18:27	0:23:06
Build Tiled (from Depth Maps, High/High, 9 levels, 8.3 cm/pix)	v	v	0:32:11	0:34:00	0:33:57	0:40:26	0:44:34
Point cloud (from Model, 160,723,009 points)		v	0:04:51	0:04:39	0:04:50	0:05:43	0:06:19
Point cloud (from Depth Maps, 65,624,346 points)		v	0:08:21	0:09:50	0:09:09	0:11:09	0:12:43
DEM (16.2 cm/pix from Point cloud)		v	0:00:48	0:00:49	0:00:47	0:00:59	0:01:05
Orthomosaic (from DEM, 8.1 cm/pix)		v	0:03:44	0:03:44	0:03:51	0:04:49	0:05:14
Total time (h)			1:24:54	1:30:52	1:37:00	1:46:06	2:01:28
Price ($/h)			$15.706	$12.250	$8.980	$13.654	$11.284
Total price			$22.22	$18.55	$14.52	$24.14	$22.84

	GPU	CPU	Metashape 96/384	Metashape 48/192	Metashape 64/256	Metashape 48/192	Metashape 48/192
OS			Linux	Linux	Linux	Linux	Linux
Storage			Fixed Fast	Fixed Fast	Fixed Fast	Fixed Fast	Fixed Fast
GPU			4 x L4	4 x L4	1 x L4	4 x A10G	4 x T4
RAM			364	192	256	192	192
Processor configuration			48 CPU@2.65GHz 96 vCPU	24 CPU@2.65GHz 48 vCPU	32 CPU@2.65GHz 64 vCPU	24 CPU@2.80GHz 48 vCPU	24 CPU@2.50GHz 48 vCPU
Match Photos (High)	v	v	0:01:32	0:01:19	0:02:18	0:01:37	0:01:51
Align Cameras		v	0:00:43	0:00:51	0:00:49	0:01:03	0:01:12
Build Model: Depth Maps (High-High, Mild filter)	v	v	0:03:40	0:03:49	0:09:33	0:04:02	0:05:32
Build Model: 3D Model (from Depth Maps, 6,692,826 faces, High/High)	v	v	0:12:42	0:12:45	0:13:42	0:15:33	0:16:52
Build Tiled (from Model, High/High, 8 levels, 8.29 cm/pix)	v	v	0:15:13	0:16:39	0:15:49	0:18:49	0:22:24
Build Tiled (from Depth Maps, High/High, 9 levels, 8.29 cm/pix)	v	v	0:30:46	0:30:39	0:31:39	0:36:33	0:39:54
Point cloud (from Model, 156,331,934 points)		v	0:04:07	0:04:09	0:04:10	0:05:12	0:05:51
Point cloud (from Depth Maps, 65,624,346 points)		v	0:08:18	0:08:40	0:07:45	0:11:01	0:12:28
DEM (16.2 cm/pix from Point cloud)		v	0:00:54	0:00:47	0:00:49	0:00:58	0:01:04
Orthomosaic (from DEM, 8.08 cm/pix)		v	0:05:38	0:03:59	0:04:49	0:05:37	0:05:16
Total time (h)			1:23:33	1:23:37	1:31:23	1:40:25	1:52:24
Price ($/h)			$15.706	$12.250	$8.980	$13.654	$11.284
Total price			$21.87	$17.07	$13.68	$22.85	$21.14

	GPU	CPU	Metashape 48/192	Metashape 48/192	Metashape 64/256	Metashape 64/256	Metashape 48/192
OS			**Windows**	**Windows**	**Windows**	**Windows**	**Windows**
Storage			**Fixed Fast**	**Fixed Fast**	**Fixed Fast**	**Fixed Fast**	**Fixed Fast**
GPU			**4 x L4**	**4 x A10G**	**4 x V520**	**1 x L4**	**4 x T4**
RAM			**192**	**192**	**256**	**256**	**192**
Processor configuration			24 CPU@2.65GHz 48 vCPU	24 CPU@2.80GHz 48 vCPU	32 CPU@2.80GHz 64vCPU	32 CPU@2.65GHz 64 vCPU	24 CPU@2.50GHz 48 vCPU
Match Photos (High)	v	v	0:01:55	0:02:05	0:02:24	0:02:49	0:02:36
Align Cameras		v	0:01:07	0:01:14	0:01:10	0:01:05	0:01:37
Build Model: Depth Maps (High-High, Mild filter)	v	v	0:09:52	0:09:57	0:10:41	0:21:45	0:10:37
Build Model: 3D Model (from Depth Maps, 28,752,311 faces, High/High)	v	v	0:20:28	0:20:55	0:21:00	0:21:30	0:24:19
Build Tiled (from Model, High/High, 8 levels, 8.3 cm/pix)	v	v	0:33:24	0:34:28	0:41:47	0:39:57	0:38:46
Build Tiled (from Depth Maps, High/High, 9 levels, 8.3 cm/pix)	v	v	0:50:52	0:53:26	0:58:07	0:56:22	1:01:00
Point cloud (from Model, 160,723,009 points)		v	0:10:05	0:10:43	0:10:10	0:09:44	0:12:27
Point cloud (from Depth Maps, 65,624,346 points)		v	0:20:01	0:20:41	0:18:00	0:18:03	0:23:23
DEM (16.2 cm/pix from Point cloud)		v	0:00:59	0:01:02	0:01:00	0:00:56	0:01:18
Orthomosaic (from DEM, 8.1 cm/pix)		v	0:04:48	0:05:22	0:05:15	0:04:46	0:06:40
Total time (h)			**2:33:31**	**2:39:53**	**2:49:34**	**2:56:57**	**3:02:43**
Price ($/h)			**$14.631**	**$16.116**	**$13.909**	**$12.184**	**$13.678**
Total price			**$37.44**	**$42.94**	**$42.94**	**$35.93**	**$41.65**

10. Metashape 2.2.1: **5,848** images of **Phase One P5-GS128** (128MP) for orthophoto

The project contains 5848 images taken by Phase One P5-GS128 camera (13468x9564) from a UAV FLIRT Cetus, fixed wing.

Focal length: 35 mm; Flying altitude: 117 m; Image resolution: 1.1 cm/pix. Orthophoto resolution: 4.4 cm/pix. Forward/Side overlap: 90% / 70%; Coverage area: 13.7 sq.km; Flight time: 2h 16m; UAV speed: 20m/s; Total length of all strips: 163 km.

The processing was performed in a cluster configuration using different Metashape applications for different processing steps, making the processing cost-effective.

Processes	GPU	CPU	RAM (GB)	CPU usage	Application	Price ($)	Cluster (workers)	Cluster Time	Cost	All workers time (report time)	Processing progress	Comments
Match Photos (**5,015,318** tie points, High, Guided matching)	v	v	20.13	Low	Metashape 48/192 4xL4	**$12.250**	1	1:26:49	$17.73	1:26:00		Can be processed on multiple workers
Align Cameras (High)		v	3.11	High	Metashape 48/192 4xL4	**$12.250**	1	0:21:47	$4.45	0:21:28		Can be processed on multiple workers
Depth Maps (Medium-Medium, Agressive filter)	v	v	24.02	High	Metashape 48/192 4xA10G	**$13.965**	3	1:59:55	$83.73	5:52:00		All workers all the time
Point cloud (from Depth Maps, **6,443,677,933** points)										11:22:00		
Step 1:Initializing and filtering depth maps		v	14.89	High	Metashape 48/96 CPU	**$8.003**	3	0:30:01	$12.01		0- 69%	Initially one worker (5-10%) at low CPU, after - all workers at high CPU up to 100%, it continues up to 1 active worker
Step 2: Loading Depth maps, Points extraction and saving		v		Low	Metashape 16/32 CPU	**$3.796**	3	3:07:52	$35.66		70 - 89%	All workers, low CPU (up to 50%), low RAM. At this step, the workers can be changed to less powerful ones with 16-32 CPU
Step 3: Joining point clouds and saving in a project structure		v		Low	Metashape 4/16 CPU	**$2.816**	**1**	0:41:00	$1.92		90-100%	No parallelization. One worker at very low CPU, joining 922 point clouds
Ground points classification(**4,569,685,635** ground points)		v	49.57	Low	Metashape 32/128 CPU	**$7.134**	**1**	8:35:50	$61.33	8:35:00		No parallelization. Large RAM required for faster processing (less processing blocks), processed on one worker only, mostly at low CPU with short spikes of up to 100%
DEM (from Point cloud, **4.44 cm/pix**)		v	0.48	Low	Metashape 8/32 CPU	**$3.120**	3	0:22:56	**$3.58**			All workers all the time. Low RAM and CPU usage
Calibrate color		v		High	Metashape 8/32 CPU	**$3.120**	**1**	1:08:37	**$3.57**	0:55:32		No parallelization. one worker at 90-98% CPU
Orthomosaic (from DTM, **1.11 cm/pix**)		v	6.60	High	Metashape 48/96 CPU	**$8.003**	3	3:10:38	**$76.28**	9:19:00		All workers all the time. Low RAM and high CPU (up tp 90%) usage
Total Time/Cost for 5848 images								**21:25:25**	**$300.26**	**38:20:38**		

11. Metashape 2.2.0: Estimation for **200,000** images of **SONY DSC-RX1RM2** (42MP) for orthophoto

The pilot-project contains 1549 images taken by SONY DSC-RX1RM2 (7952x5304) camera.
Focal length: 35 mm; Flying altitude: 128 m; Image resolution 1.7 cm/pix.

Metashape 192GB 4xL4 Linux with Elastic Storage for Linux

High		Medium	
Match Photos (1,570,622 tie points, **High**)	0:09:52	Match Photos (1,570,622 tie points, **High**)	0:09:52
Align Cameras	0:05:34	Align Cameras	0:05:34
Depth Maps (**High-High**,Moderate filter)	0:49:12	Depth Maps (**Medium-Medium**, Moderate filter)	0:16:40
Point cloud (from Depth Maps, **1,816,028,941** points)	2:24:00	Point cloud (from Depth Maps, **457,012,240** points)	0:33:28
DEM (from Point cloud, **3.3 cm/pix**)	0:09:24	DEM (from Point cloud, **6.6 cm/pix**)	0:02:45
Orthomosaic (from DTM, **2.5 cm/pix**)	0:35:51	Orthomosaic (from DTM, **2.5 cm/pix**)	0:27:09
Total time (h)	**4:13:53**	**Total time (h)**	**1:35:28**
Price ($/h)	**$12.250**	**Price ($/h)**	**$12.250**
Total price	**$51.83**	**Total price**	**$19.49**
Low		Lowest	
Match Photos (1,570,622 tie points, **High**)	0:09:52	Match Photos (1,570,622 tie points, **High**)	0:09:52
Align Cameras	0:05:34	Align Cameras	0:05:34
Depth Maps (**Low-Low**, Moderate filter)	0:09:31	Depth Maps (**Lowest-Lowest**, Moderate filter)	0:08:45
Point cloud (from Depth Maps, **119,012,060** points)	0:09:56	Point cloud (from Depth Maps, **30,402,585** points)	0:05:07
DEM (from Point cloud, **13.2 cm/pix**)	0:00:57	DEM (from Point cloud, **26.3 cm/pix**)	0:00:26
Orthomosaic (from DTM, **2.5 cm/pix**)	0:23:44	Orthomosaic (from DTM, **2.5 cm/pix**)	0:21:53
Total time (h)	**0:59:34**	**Total time (h)**	**0:51:37**
Price ($/h)	**$12.250**	**Price ($/h)**	**$12.250**
Total price	**$12.16**	**Total price**	**$10.54**

Medium	Computer	Price ($)	Time	Cost
Match Photos (1,570,622 tie points, **High**)	Metashape 192GB 4xL4	**$12.250**	0:09:52	**$2.01**
Align Cameras (**High**)	Metashape 192GB 4xL4	**$12.250**	0:05:34	**$1.14**
Depth Maps (**Medium-Medium**, Moderate filter)	Metashape 192GB 4xL4	**$12.250**	0:16:40	**$3.40**
Point cloud (from Depth Maps, **457,012,240** points)	Metashape 192GB CPU@3.7	**$8.837**	0:30:29	**$4.49**
DEM (from Point cloud, **6.6 cm/pix**)	Metashape 192GB CPU@3.7	**$8.837**	0:02:42	**$0.40**
Orthomosaic (from DTM, **2.5 cm/pix**)	Metashape 192GB CPU@3.7	**$8.837**	0:23:55	**$3.52**
Total Time/Cost for 1549 images			**1:29:12**	**$14.96**
Pilot project images				1,549
Total number images				200,000
Total hours for 200,000 images for one computer				**191:57:06**
Total days for 200,000 images for one computer				8.00
Total Cost for 200,000 images				**~$2,000**

Comments: In a cluster of 9-10 computers it is possible to process 200,000 images in one day.

12. Metashape 2.2.0: **216 Phase One iXM-RS100** (100MP) images for railroad 3D Model and orthophoto

The block contains 216 images taken by Phase One iXM-RS100 (11664x8750) camera. Two flight lines.
Focal length: 80 mm; Flying altitude: 52 m; Image resolution 2.5 mm/pix.

	GPU	CPU	Metashape 192GB	Metashape 192GB
OS			**Windows 2019**	**Linux**
Storage			**Fixed Enhanced**	**Elastic Standard**
GPU			**4 x A10G**	**4 x L4**
RAM			**192**	**192**
Processor configuration			24 CPU@2.80GHz 48 vCPU	24 CPU@2.65GHz 48 vCPU
Match Photos (High)	v	v	0:04:34	0:02:43
Align Cameras		v	0:01:15	0:00:34
Point cloud: Depth Maps (High-High, Aggresive)	v	v	0:25:50	0:14:10
Point cloud (from Depth Maps,1,668,613,591 points)		v	2:03:00	1:26:00
3D Model (from Depth Maps, 391,620,393 faces, High/High)	v	v	3:07:00	1:54:00
Texture		v	0:15:16	0:11:26
Blending		v	0:23:49	0:30:45
DEM (**4.96 mm/pix** from Point cloud)		v	0:19:06	0:13:29
Orthomosaic (from DEM, **2.48 mm/pix**)		v	0:51:24	0:31:31
Total time (h)			**7:31:14**	**5:04:38**
Price ($/h)			**$15.811**	**$12.250**
Total price			**$118.91**	**$62.20**
Tiled Model (from Depth Maps, High-High)	v	v		5:13:00

13.   Metashape 2.2.0: **52,300 GoPro HERO 10&12 Black** (23MP) underwater nadir and oblique images for 3D Model ▶

The block contains 52,300 nadir and oblique images taken by GoPro HERO 10&12 Black (5568x4176) underwater camera. Image resolution 0.57 mm/pix.

Process	Quality, Resolution	Cluster time	Report time *	RAM usage	Cluster/ Single	Computers Used	Computer type	$/h	Total price ($)
Match Photos	34,056,906	8:41:50	33:00:00	68	Cluster	4	4 x Metashape 192GB 4xL4	12.250	426.16
Align Photos	Medium	12:32:07	21:35:00	65	Cluster	1	1 x Metashape 192GB 4xL4	12.250	153.56
					Cluster	2	2 x Metashape 192GB CPU	8.837	221.55
Optimization	Adaptive fitting	4:25:00	4:25:00		Single	1	1 x Metashape 128GB 1xA10G	7.069	31.22
Build Depth Maps	High	9:06:56	34:00:00	32	Cluster	4	4 x Metashape 192GB 4xL4	12.250	446.66
Build Model	Faces: 486,056,048 Vertices: 243,085,546	13:25:50	49:00:00	108	Cluster	4	4 x Metashape 192GB 4xL4	12.250	658.10
Decimating faces	2,000,000	0:03:54	0:03:54		Single	1	1 x Metashape 192GB CPU	8.837	0.57
Build Texture: UV Mapping	2,000,000	0:06:23	0:06:23	2		1	1 x Metashape 128GB 1xA10G	7.069	0.75
Build Texture: Blending	2,000,000	4:27:00	4:27:00	8	Single	1	1 x Metashape 128GB 1xA10G	7.069	31.46
DEM	1.0 cm	0:32:28	0:32:28	38	Single	1	1 x Metashape 192GB CPU	8.837	4.78
Orthomosaic	0.5 cm	1:55:40	6:30:00	4	Cluster	4	4 x Metashape 192GB CPU	8.837	68.14
Total time/Price		**55:17:08**	**153:39:45**						**2,043**
Storage (up to 1.4 TB)		**55:17:08**						**1.400**	**77**
Tiled Model (from Model)	Medium	4:25:21	13:38:00	25	Cluster	4	4 x Metashape 192GB 4xL4	12.250	**216.70**

Report time*   total computers processing time

14. Metashape 2.1.2: **5000 Vexcel UC Osprey 4.1** (288/150MP) nadir and oblique images for 3D Model ▶️

The block contains 5,000 UltraCam Osprey 4.1 nadir and oblique images. Parameters of the aerial survey are as follows:

- Strips – 17 (~290 image/strip)
- Images – 5,000 (4254 after filtering out of left/right/forward/backward images not covering the AOI)
- Image size:
  - Nadir – 288MP (20544 x 14016); Image file size (TIF) – 864 MB
  - Oblique – 150MP (14144 x 10560); Image size (TIF) – 448 MB
- Forward/Side overlap - 80%/70%
- Flight altitude – 1,545 m
- Image GSD – 7.26 cm
- Area – 88 sq.km

Processing steps	Computer type Linux	Price ($/h)	Time (h:m:s)	Price ($)	Time (h:m:s)	Price ($)
			Single computer		**Cluster of 5 computers**	
Match Photos (High)	Metashape 192GB 4xA10G	$13.6	1:41:00	$22.89	1:05:30	$74.23
Align Cameras	Metashape 192GB 4xA10G	$13.6	0:31:27	$7.13	0:06:00	$6.80
Depth Maps (High-High, **Pix=5,8 cm**)	Metashape 192GB 4xA10G	$13.6	10:55:00	$148.47	3:28:51	$236.70
Tiled Model (from Depth)	Metashape 192GB 4xA10G	$13.6	131:00:00	$1,781.60	26:14:40	$1,784.62
Elastic Storage Fast time/price		$5.0	**144:07:27**	**$721**	**30:55:01**	**$155**
Processing time/price			**144:07:27**	**$1,960**	**30:55:01**	**$2,102**
Total price				**$2,681**		**$2,257**

15. Metashape 2.1.1: **1000 Vexcel UC Osprey 4.1** (288MP) nadir images 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;

Processing steps	Parameters	Computer (Linux)	Price ($/h)	Time (h:m:s)	Price ($)
Ulpoad time for 1000 images at 80 Mbps	1000			**17:00:00**	
True-Orthophoto					
Match Photos (High, tie points)	604,961	Metashape 192GB 4xA10G	$11.148	0:58:27	$10.86
Align Cameras		Metashape 192GB 4xA10G	$11.148	0:03:15	$0.60
Depth Maps (High-High, Aggressive)		Metashape 192GB 4xA10G	$11.148	4:53:00	$54.44
Point Cloud 1 (from Depth Maps)	8,408,196,627	Metashape 512GB, No GPU	$13.154	12:18:00	$161.79
DEM 1 (from Point Cloud 1)	13.9 cm/pix	Metashape 512GB, No GPU	$13.154	0:30:40	$6.72
True-Orthophoto (from DEM 1)	6.93 cm/pix	Metashape 512GB, No GPU	$13.154	3:09:00	$41.44
Total Processing time/price				**21:52:22**	**$275.86**
Regular Orthophoto					
Match Photos (High, tie points)	604,961	Metashape 192GB 4xA10G	$11.148	0:58:27	$10.86
Align Cameras		Metashape 192GB 4xA10G	$11.148	0:03:15	$0.60
Depth Maps (High-High, Aggressive)		Metashape 192GB 4xA10G	$11.148	4:53:00	$54.44
Point Cloud 1 (from Depth Maps)	8,408,196,627	Metashape 512GB, No GPU	$13.154	12:18:00	$161.79
Point Cloud 2 (Filtering Point Cloud 1 to 1 m/pix)	175,932,075	Metashape 512GB, No GPU	$13.154	2:30:00	$32.89
Classifying ground points on Point cloud 2	1m/pix	Metashape 512GB, No GPU	$13.154	0:05:12	$1.14
DEM 2 (from Point cloud 2)	1m/pix	Metashape 512GB, No GPU	$13.154	0:00:32	$0.12
Regular Orthophoto (from DEM 2)	7.26 cm/pix	Metashape 512GB, No GPU	$13.154	1:54:00	$24.99
Total Processing time/price				**22:42:26**	**$286.83**
Export data					
Export DTM (9 x12 tiles, 1 x 1 km)	13.9 cm/pix	Metashape 34GB, No GPU	$2.971	0:45:00	$2.23
Export Point Cloud (100GB laz file)	8,408,196,627	Metashape 34GB, No GPU	$2.971	0:49:00	$2.43
Export True-Ortho (9 x 12 tiles, 1 x 1 km)	6.93 cm/pix	Metashape 34GB, No GPU	$2.971	0:42:00	$2.08
Export DTM (1 tile, 8 x12 km)	1m/pix	Metashape 34GB, No GPU	$2.971	0:00:30	$0.02
Export Regular Ortho (8 x11 tiles, 1 x 1 km)	7.26 cm/pix	Metashape 34GB, No GPU	$2.971	0:45:00	$2.23
Total Export time/price				**3:01:30**	**$8.99**

16. 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	*No point cloud*
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	*No Depth maps*
Point cloud (from Depth Maps)		v	6h 5m	21m 53s	*No Point cloud*
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**

* DEM from Tie points

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

	GPU	CPU	21/08/2023	21/08/2023	18/08/2023	18/08/2023	18/08/2023
			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**

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18. 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**

19. 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/Aggresive)	v	v	2m 59s	3m 10s	1h 23m	1h 29m	1h 31m
Point Cloud (High/Aggresive)		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	

20. 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

21. 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

22. Metashape 1.8.3: 37,344 of Phase One 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

23. Metashape 1.8.3: 1,389 images of Phase One 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;

	GPU	CPU	Metashape 192GB 4xA10G Ephemeral disk D - 3.9 TB				Metashape 256GB 1xA10G Ephemeral disk D - 1.9 TB			
			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

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24. Metashape 1.7.5: 828 images of Phase One iXM-RS100F (100MP)

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; Focal length: 40mm

	GPU	CPU	Config	30-12-21 Metashape 192GB	30-12-21 Metashape 192GB	30-12-21 Metashape 192GB	30-12-21 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
Optimiaztion parametrs		v	Single	4s	4s	4s	4s
Ground classification		v	Single	25m	25m	25m	25m
Export orthophoto tiles		v	Single	35m	35m	35m	35m

25. 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

26. Metashape 1.7.3: 10,338 images of DJI M300rtk and ZenmuseP1 (42MP) 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; Focal length – 35 mm;
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

27. Metashape 1.7.3: 1,000/3,450/4,500 of Phase One iXM-RS150F (150MP) (RGB+NIR) on a single and cluster configuration
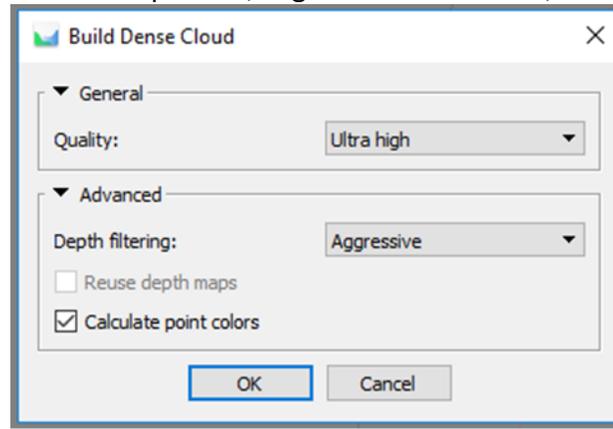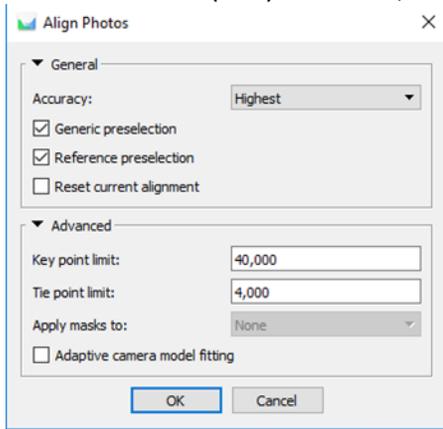
Blocks of images – 1,000 / 3,450 / 4,500;
Image type – PhaseOne 150MP 4-band RGB+NIR;
Image file size – 600 MB;
Forward/Side overlap - 80%/50%;
GSD – 4.6 cm.

		Single computer				Cluster of computers (on-demand)						
OS		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

28. 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;

Align Photos

General
Accuracy: Highest
☑ Generic preselection
☑ Reference preselection
☐ Reset current alignment

Advanced
Key point limit: 40,000
Tie point limit: 4,000
Apply masks to: None
☐ Adaptive camera model fitting

OK   Cancel

Build Dense Cloud

General
Quality: Ultra high

Advanced
Depth filtering: Aggressive
☐ Reuse depth maps
☑ Calculate point colors

OK   Cancel

	GPU	CPU	Single project 1	10 parallel running projects on the same storage										
				1	2	3	4	5	6	7	8	9	10
			Metashape 192GB	Metashape 192GB	Metashape 192GB	Metashape 192GB	Metashape 192GB	Metashape 192GB	Metashape 192GB	Metashape 192GB	Metashape 192GB	Metashape 192GB	Metashape 192GB
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 59s	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	48,m
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

29. 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
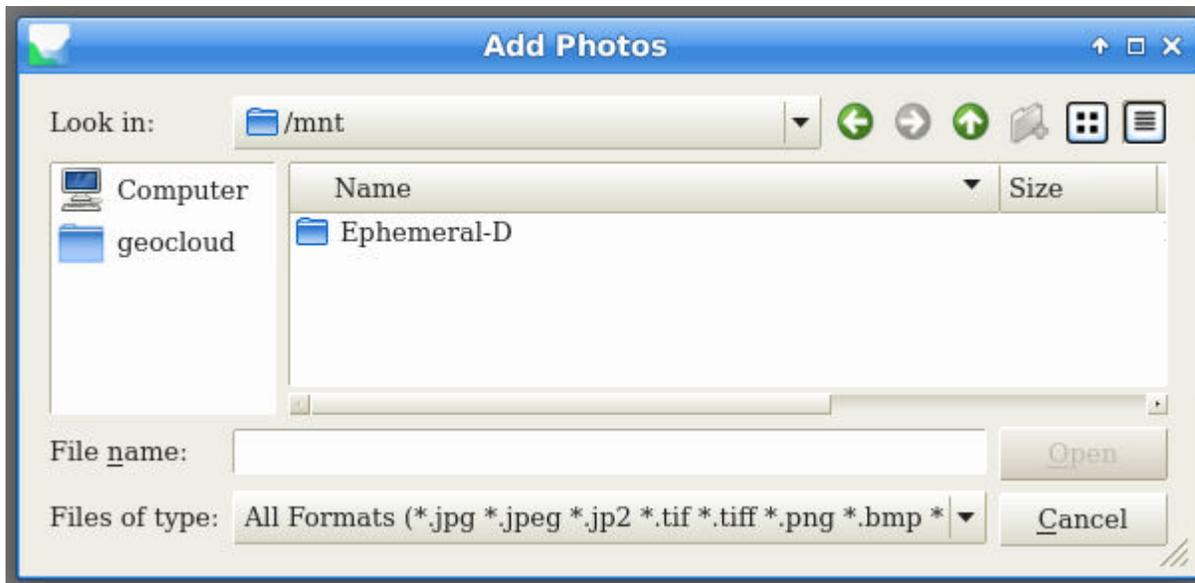

Pay attention!

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.**

30. 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
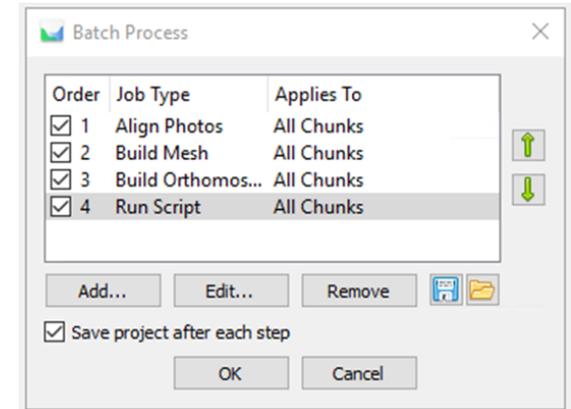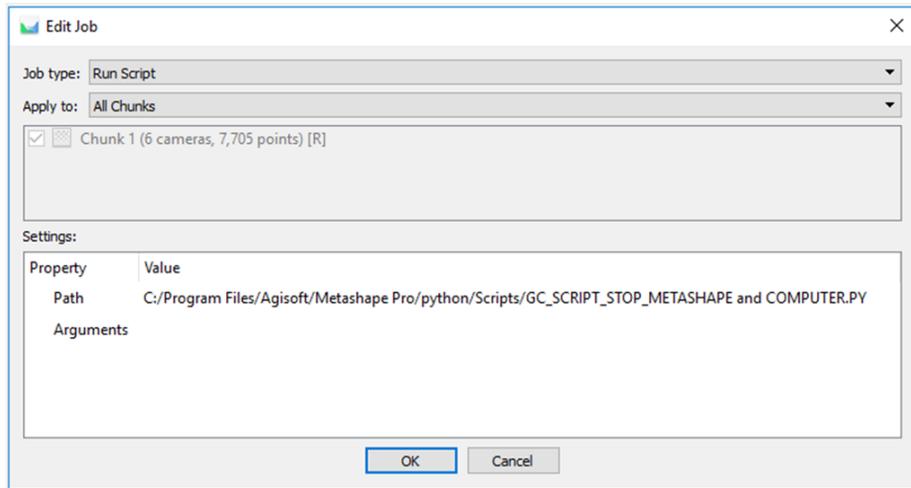
Linux
/home/geocloud/Metashape-pro/python/Scripts/GC_SCRIPT_STOP_METASHAPE and COMPUTER.py