Section 3

Video: Processing drone imagery in ArcGIS Drone2Map

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Time	Caption
0:00	♪ [music] ♪
0:08	Welcome to this overview of processing in Drone2Map.
0:13	These are the topics that we'll cover in this demonstration video.
0:21	For this project, we're processing 507 drone images that were taken over
0:26	the Esri campus in Redlands, California, using ArcGIS Drone2Map.
0:33	For output products, we'll create a spatially accurate,
0:36	orthorectified mosaic image,
0:39	sometimes called an orthomosaic, or simply an ortho.
0:45	We'll also create a digital surface model, or DSM,
0:49	which shows the elevation of all top-surface features,
0:54	a digital terrain model, or DTM, which shows an estimate of
0:59	the ground elevation without surface features,
1:02	a 3D point cloud showing the project area as millions of points extracted
1:09	from the images, and a 3D textured mesh, which is one type of 3D model,
1:17	symbolized with the colors extracted from the imagery.
1:23	Now we'll explore how to create those imagery-derived products.
1:30	Imagery must be captured properly by a drone.
1:33	It must have GPS for each image, and the images should overlap by
1:39	70 percent or more, hopefully using a good-quality camera.
1:46	To generate 2D orthomosaics, images are typically oriented
1:50	straight down, which is called a nadir image.
1:54	For 3D products, images may be captured at an oblique angle,
1:58	perhaps 25 degrees to 35 degrees from vertical.

2:03	Unless the project area is very large, you'll get best results with
2:07	two drone flights combining both nadir and oblique imagery.
2:12	When you start ArcGIS Drone2Map, you have different template choices.
2:17	The 2D template creates orthomosaics and elevation models,
2:20	and the 3D template creates point clouds and textured meshes.
2:26	For this project, we want all the 2D and 3D products, so we'll start
2:31	with the 2D template and then add the 3D products.
2:36	Give your project a name, and then browse to the input folder where
2:40	the images are stored to start your project.
2:44	Once the software loads the images, you can hit the Create button,
2:48	and what you'll see are the image locations over the basemap
2:52	because each image includes a GPS point.
2:56	From the Manage pane, you'll see that the 2D products are enabled.
3:00	Since we also want a 3D mesh and 3D point cloud,
3:04	we'll add those products in the Manage pane.
3:10	Next, it is recommended that you use ground control points, or GCPs,
3:15	to ensure that your outputs are accurate.
3:18	Control points refer to something that you can see in the imagery
3:21	that has known accurate location on the ground.
3:26	For professional projects, you'd use a surveyor or high-accuracy GPS
3:30	to get the coordinates for control points.
3:34	However, here, I'll demonstrate how you can add control points
3:36	using the Imagery basemap from Esri.
3:40	On the ribbon, click the Control Manager button.
3:43	Now, I will update the basemap so that we are looking at the Imagery basemap.
3:49	Now, I will browse to something distinct on the ground,
3:54	not on top of a building, such as this concrete corner.
3:59	In the Control Manager interface, I'll click on Add Control From Map,

4:03	and then click on the basemap, and we'll see a green cross appear.
4:10	Now, in the Control Manager, I'll show the Image Links Editor
4:14	to open the editor and add links to our photos.
4:20	Using the Image Links Editor, I'll click
4:22	that same feature in at least three images.
4:25	When we process later, the software will automatically find what is called
4:29	tie points to connect images to each other, but control points
4:33	are needed to connect the images to ground coordinates.
4:38	You'll want to create three or more control points
4:41	in different areas of your project.
4:43	Then, you can generate accurate outputs.
4:47	To run the processing, from the ribbon, click the Start button.
4:52	When processing is complete, the 2D output products appear
4:56	in the Contents pane of the 2D map.
4:59	And you would also get a 3D scene with 3D outputs if you created those.
5:05	You can separate and link these two views if you'd like.
5:09	This is the end of the basic process to create a project
5:12	and generate typical output products.
5:15	However, there is much more to learn about Drone2Map
5:18	and how it works with other parts of the ArcGIS system.
5:22	You can work with the 2D and 3D outputs here in Drone2Map,
5:27	or if you have ArcGIS Pro, you can use the Open In ArcGIS Pro button
5:34	in Drone2Map to open your full project in ArcGIS Pro.
5:40	This option is very helpful if you want to do analysis of your data
5:43	or integrate it into your GIS database.
5:48	Going back to Drone2Map, you can also publish your outputs
5:52	to ArcGIS Online by going to the Share tab and publishing
5:57	either the tile layer or the scene layer,

5:59	such as this web map showing the orthomosaic,
6:04	or in another tab, a 3D scene, like this,
6:10	with the point cloud or the textured mesh or both.
6:15	Note that these can be accessed by anyone with a web browser.
6:19	No other software is required.
6:22	This is a subset of the full Esri campus project.
6:26	It is a best practice to review the Processing Report
6:30	and look for any warnings or errors.
6:34	A few specific items to look for in the Processing Report
6:38	are the dataset information, here, to verify
6:42	that all or nearly all of your images were processed
6:46	and the mean reprojection error, here, which is measured in pixels,
6:53	to verify that your accuracy is less than 1 pixel.
6:59	You'll want to read the help documentation to understand
7:01	all of the other information in the Processing Report.
7:11	Earlier, I recommended that you always use ground control points.
7:15	But if your project is in a purely natural environment,
7:18	with no permanent features visible in the Imagery basemap,
7:21	and you don't have a GPS unit,
7:24	adding ground control points is not mandatory.
7:27	After the initial project setup, you could click Start to run
7:31	the image processing immediately, skipping that process that I showed
7:35	to add ground control points.
7:38	However, if we compare our results to the Imagery basemap,
7:42	note that your orthomosaic and elevation models may be
7:45	at an incorrect horizontal location by a few meters
7:48	and your 3D outputs may float above or below the ground.
7:54	So, if accuracy is not important, you can process

7:57	without ground control points, and the results
8:00	may still be usable for some applications.
8:04	But, if accuracy is important, you'll want accurate control points
8:08	from a GPS unit or a surveyor.
8:12	Be sure to read the help documentation regarding
8:14	how to convert some control points to checkpoints.
8:18	So, this has been a quick look at processing drone imagery
8:22	using ArcGIS Drone2Map.
8:25	You can learn more by clicking the links provided with this video.