

Open Source Data Processing With
OpenDroneMap

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Hands-On Exercises

These slides are a companion to the “Open Source Data Processing With ODM” session at DroneCamp 2020. They walk through the hands-on exercises. If you would like a paper copy of the exercises to use as we go, print these and have them on hand for the session.

- Part A – Processing
- Part B – Working With Outputs

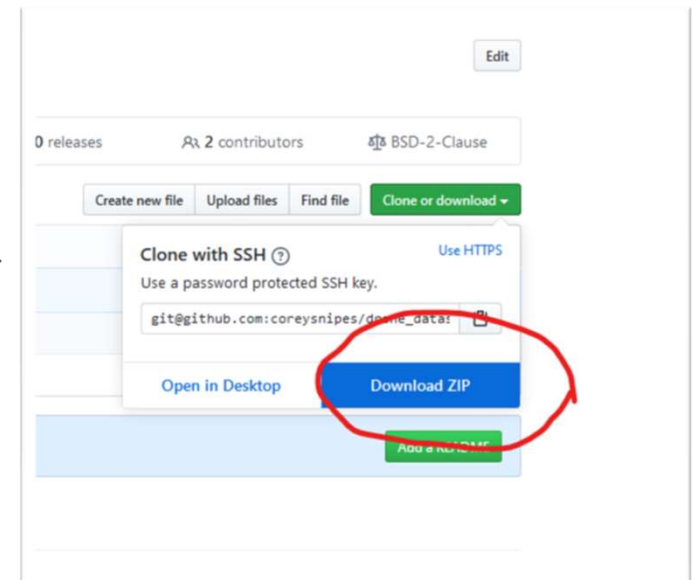
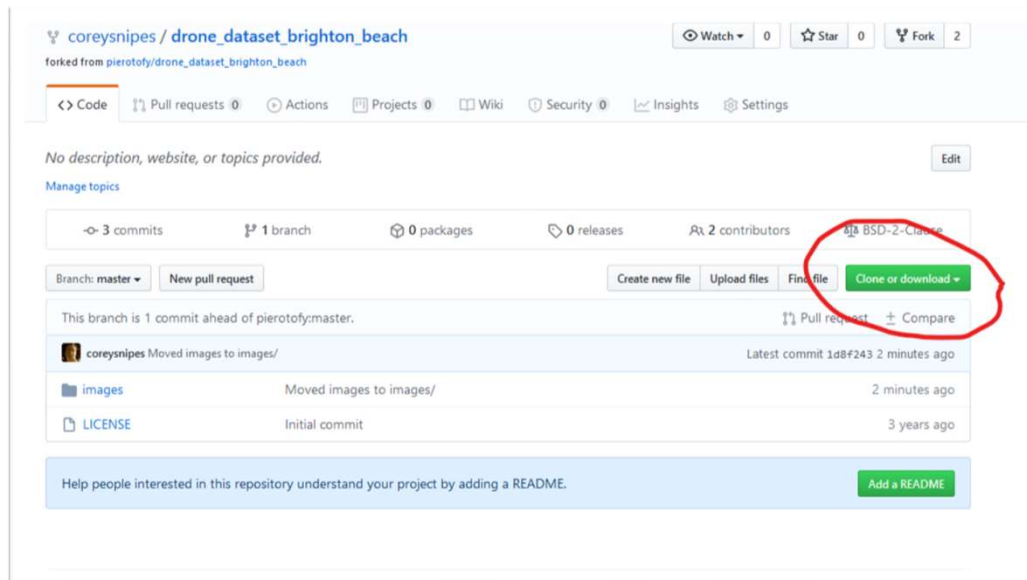


HANDS-ON WITH ODM

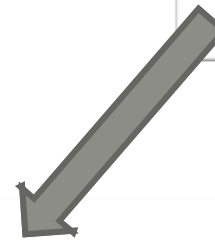
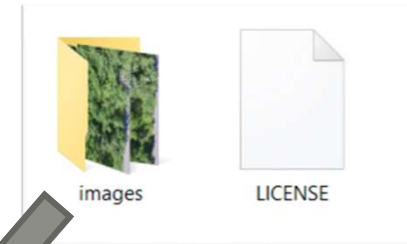
Part A - Start Processing

Download Sample Data

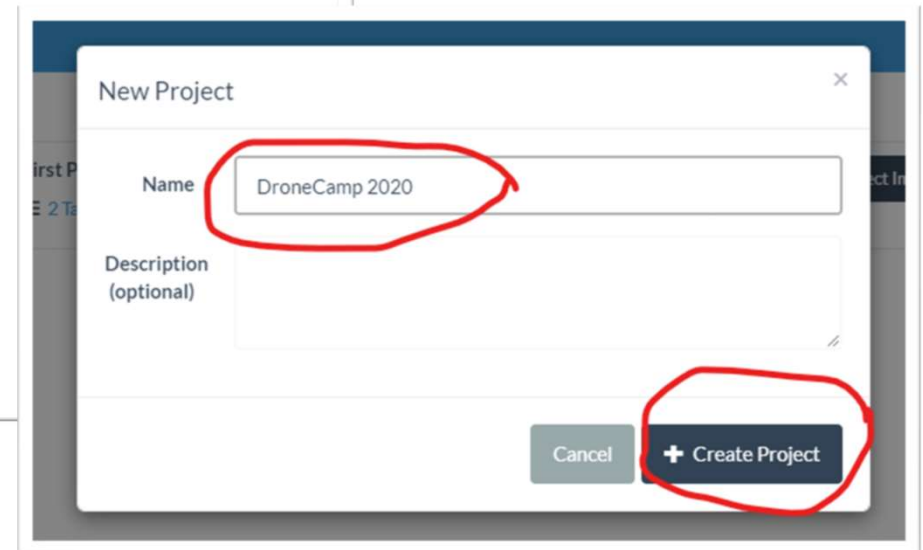
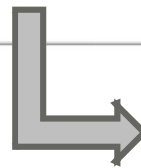
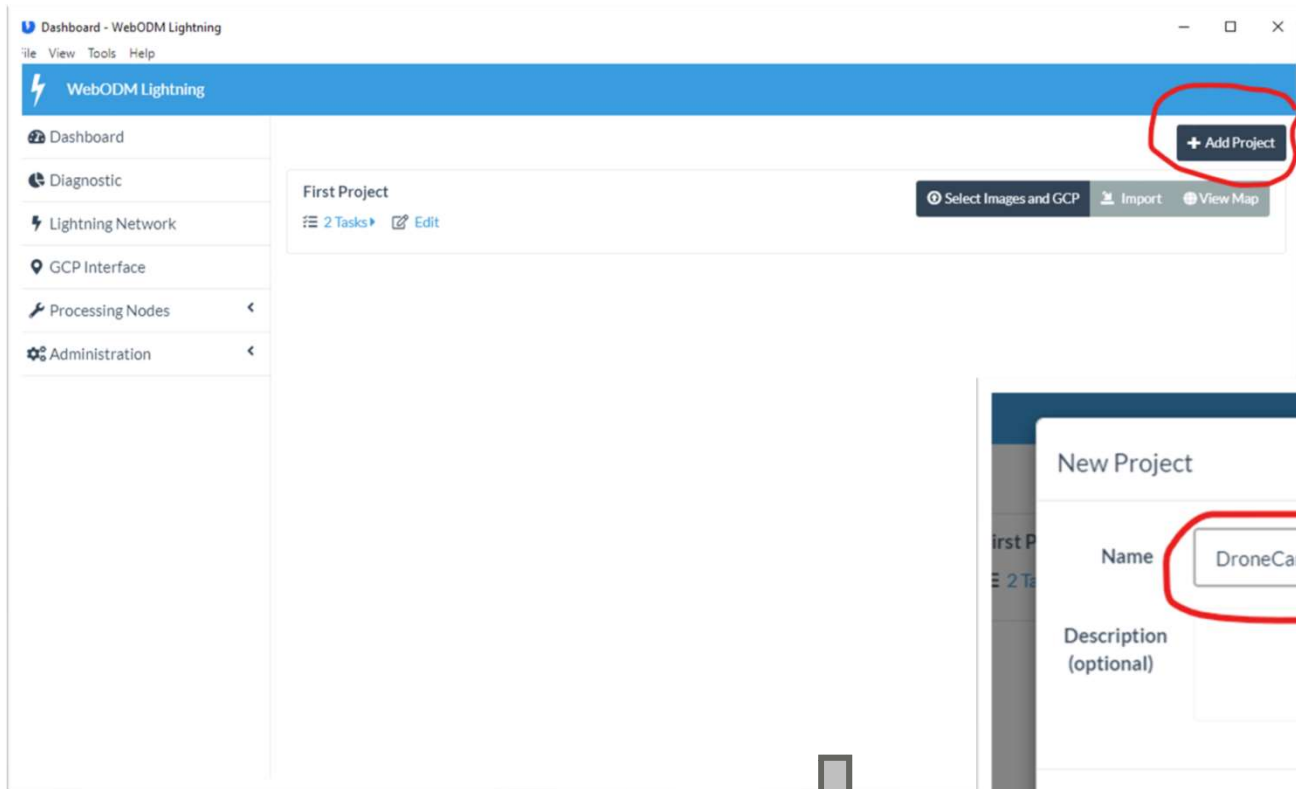
- https://github.com/coreysnipes/drone_dataset_brighton_beach



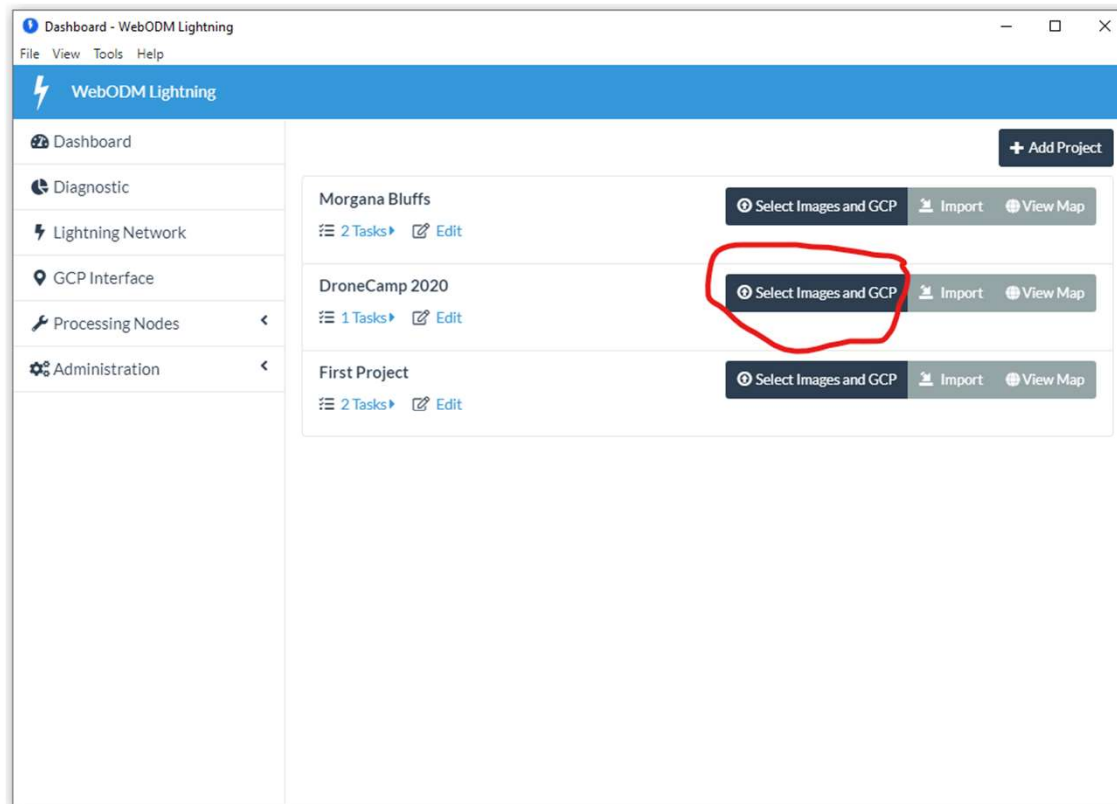
Unzip Files



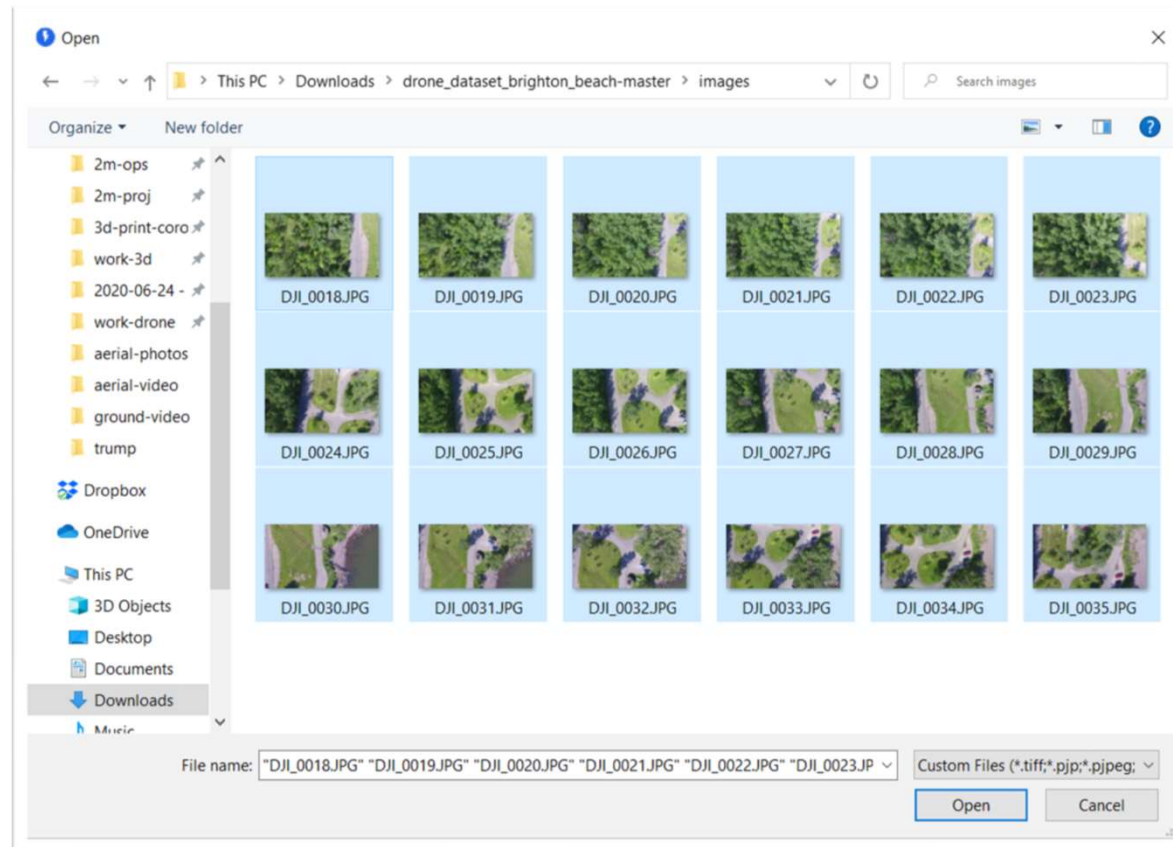
Open WebODM Lightning



Add Images



Add Images



Set Configuration


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[Edit](#) [Select Images and GCP](#) [Import](#) [View Map](#)

18 files selected. Please check these additional options:

Name

Processing Node Auto

Options Default 


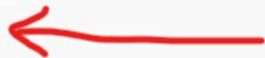
Resize Images Yes px



[Cancel](#) [Review](#)

First Project




Set Configuration

18 files selected. Please check these additional options:

Name	Sample Dataset	
Processing Node	Auto	
Options	Default	
Resize Images	<div>(Custom) Default High Resolution Fast Orthophoto DSM + DTM Forest Point of Interest Buildings 3D Model Volume Analysis Multispectral</div>	<div>px</div> 


 



First Project

 Select Images and GCP  Import  View Map

Set Configuration


18 files selected. Please check these additional options:

Name	Sample Dataset	
Processing Node	Auto	
Options	DSM + DTM	
Resize Images	<div><div>No</div><div>✓ No</div><div>Yes</div></div>	

 Cancel  Review



Start Processing

18 files selected. Please check these additional options:

Name	Sample Dataset
Processing Node	Auto ▼
Options	DSM + DTM ▼ 
Resize Images	No ▼

18 files selected. Please check these additional options:

Name	Sample Dataset
Processing Node	Auto ▼
Options	dsm:true, dtm:true
Resize Images	No ▼

Processing Status

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Select Images and GCP Import View Map

1 Tasks Edit

Sample Dataset 18 --:--:--

Uploading images to processing node

Created on: 6/12/2020, 9:16:12 PM
Processing Node: Lightning (auto)
Options: dsm: true

Cancel Delete

Task Output: On **Off**

Running

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Select Images and GCP

Import

View Map

1 Tasks

Edit

Sample Dataset

18

00:01:25

Running

Created on: 6/12/2020, 9:30:58 PM

Processing Node: Lightning (auto)

Options: dsm: true, dtm: true

Task Output:

On

Off

done importing nvm file:

[INFO] Running dense reconstruction. This might take a while.

[INFO] running /code/SuperBuild/src/elib/mve/apps/dmrecon/dmrecon -s3 --progress=fancy --local-neighbors=2 "/va

MVE Depth Map Reconstruction (built on May 21 2020, 19:25:15)

Initializing scene with 18 views...

Initialized 18 views (max ID is 17), took 0ms.

Reading Photosynther file (18 cameras, 6825 features)...

Reconstructing all views...

0 of 18 completed (0.00%)

Cancel

Delete



HANDS-ON WITH ODM

Part B – Working with ODM Outputs

WebODM vs. WebODM Lightning

- WebODM
 - *Install for free*
 - *Process locally for free*
- WebODM Lightning 
 - *Commercial service*
 - *Install for free*
 - *Process in the cloud (\$)*

Still Running?

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Select Images and GCP Import View Map

1 Tasks Edit

Sample Dataset 18 00:01:25 Running

Created on: 6/12/2020, 9:30:58 PM
Processing Node: Lightning (auto)
Options: dsm: true, dtm: true

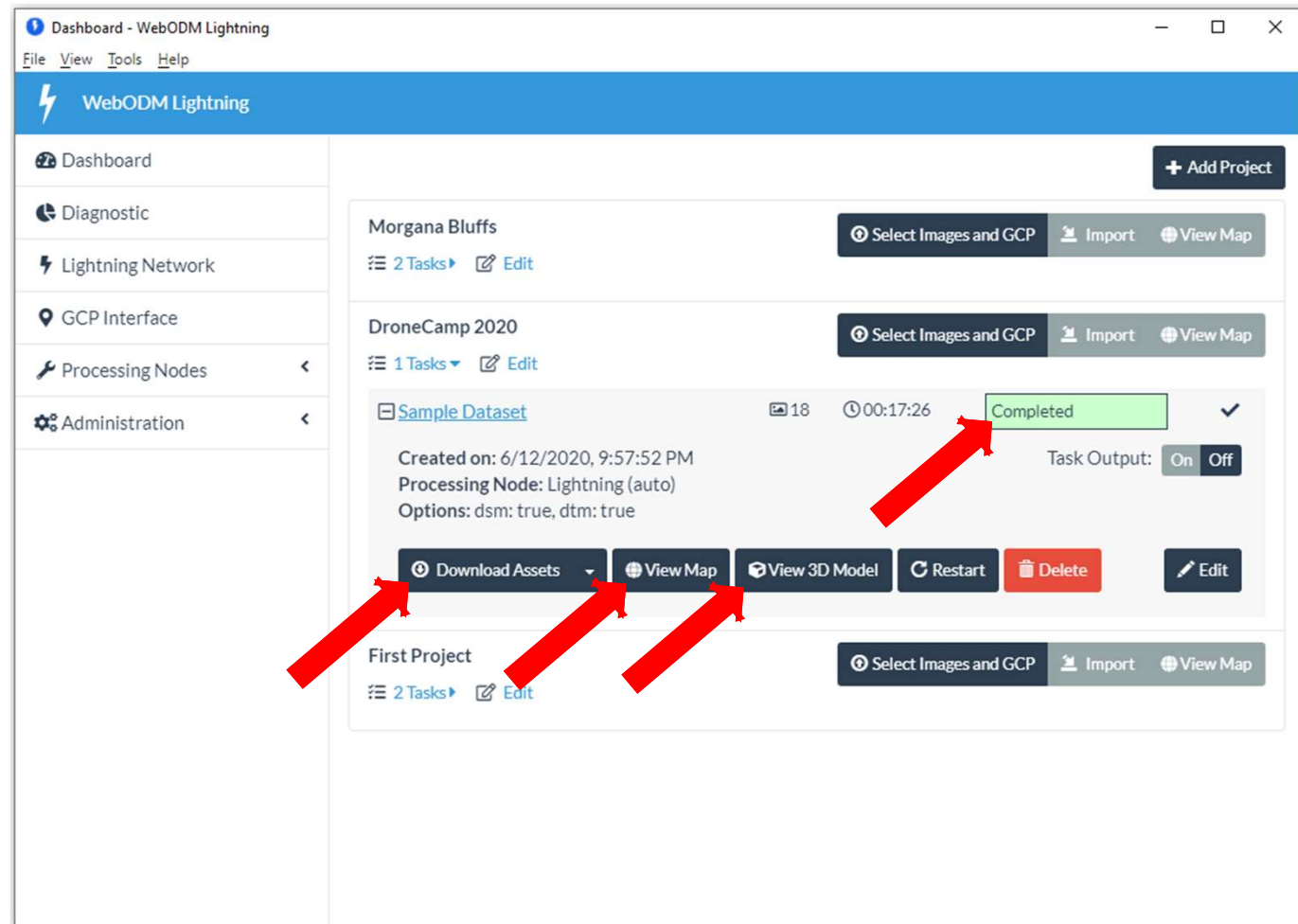
Task Output: On Off

```
done importing nvm file:  
[INFO] Running dense reconstruction. This might take a while.  
[INFO] running /code/SuperBuild/src/elib/mve/apps/dmrecon/dmrecon -s3 --progress=fancy --local-neighbors=2 "/va  
MVE Depth Map Reconstruction (built on May 21 2020, 19:25:15)  
Initializing scene with 18 views...  
Initialized 18 views (max ID is 17), took 0ms.  
Reading Photosynther file (18 cameras, 6825 features)...  
Reconstructing all views...  
0 of 18 completed (0.00%)
```

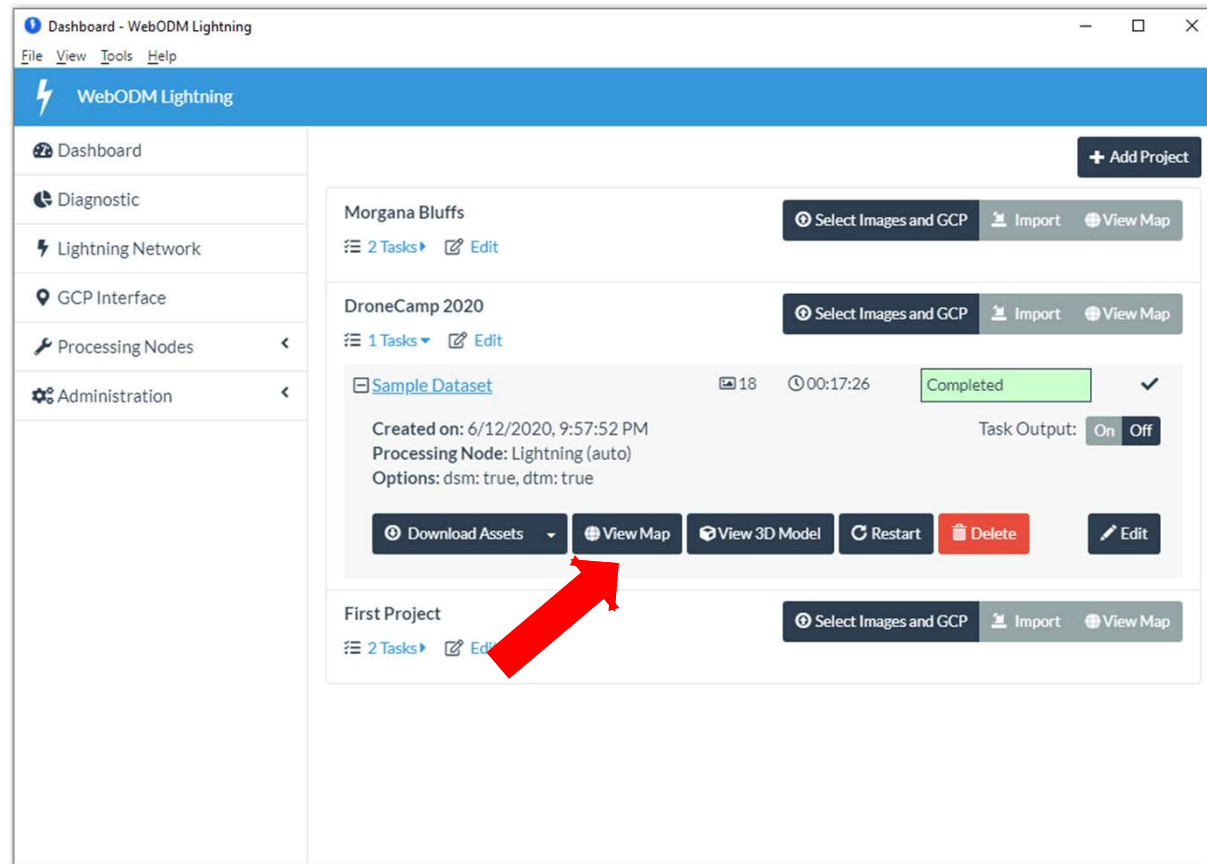
Cancel Delete

Finished

- Today,
Speed > Quality

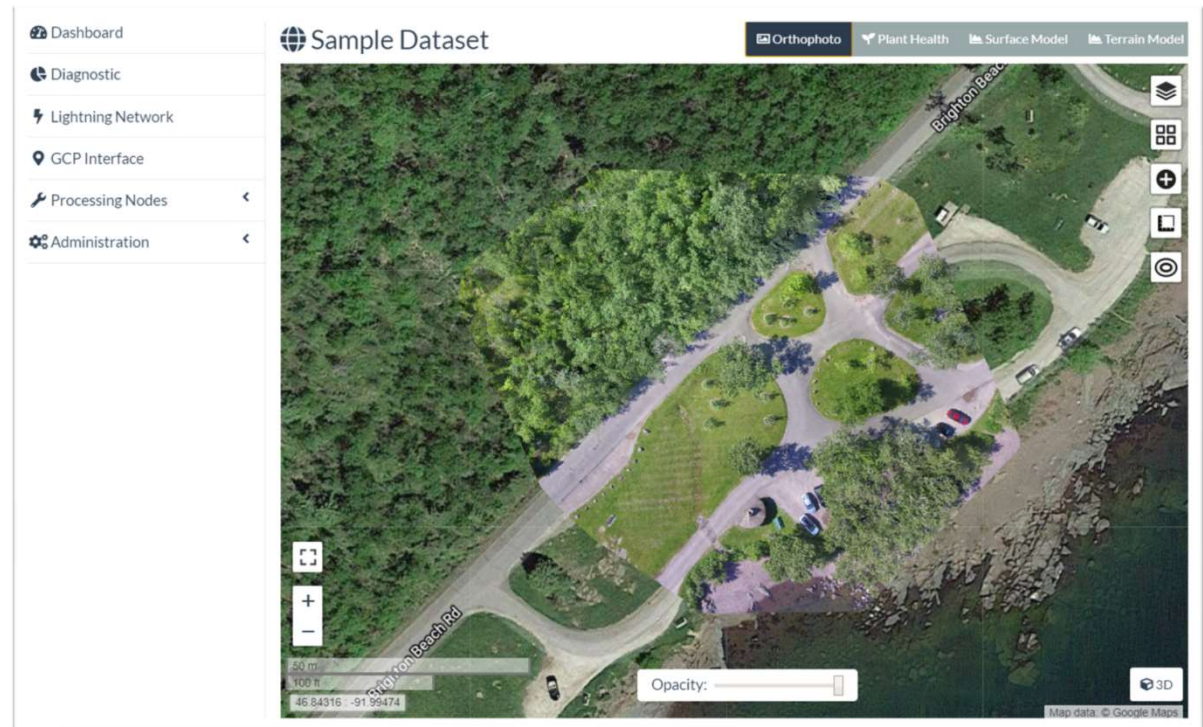


Exercises – 2D Orthophoto



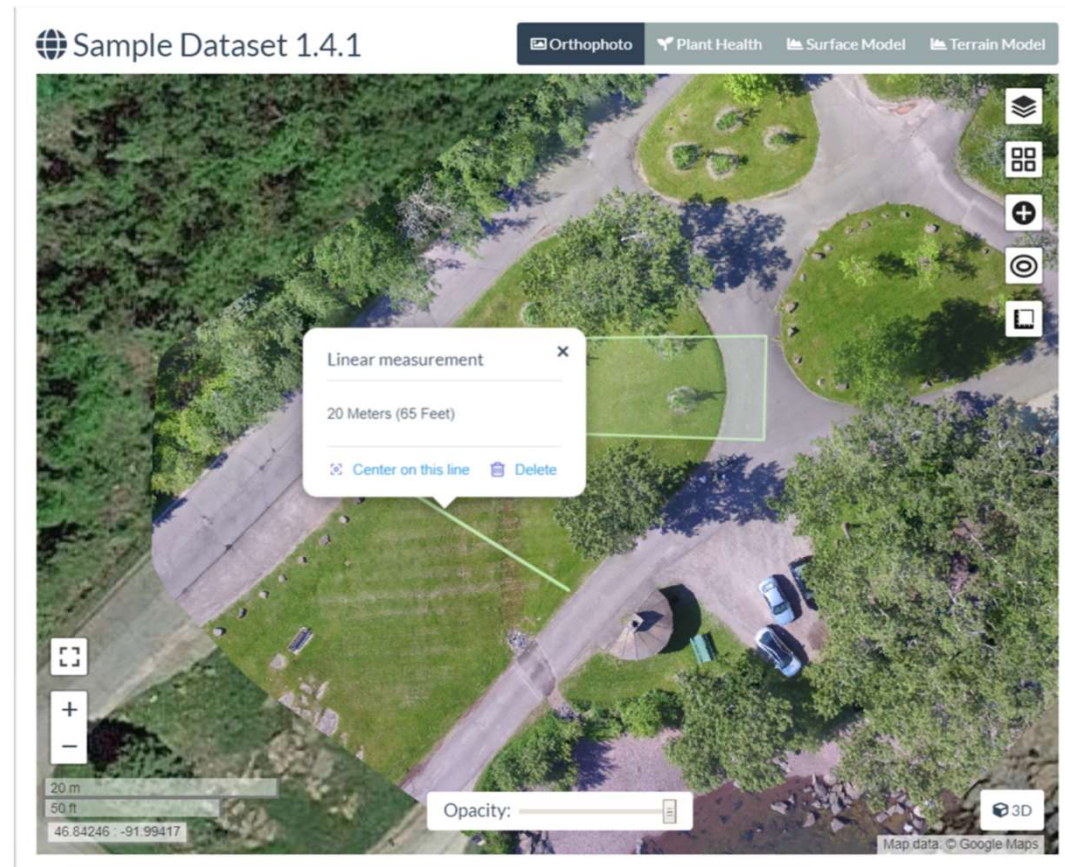
#1 – Orthophoto - Navigate

- A. Click+hold = move map
- B. Scroll wheel = zoom in/out
- C. Map controls +/- = zoom
- D. Map control square = full screen
- E. Top buttons:
 - A. *Ortho*
 - B. *Plant Health*
 - C. *Surface Model*
 - D. *Terrain Model*



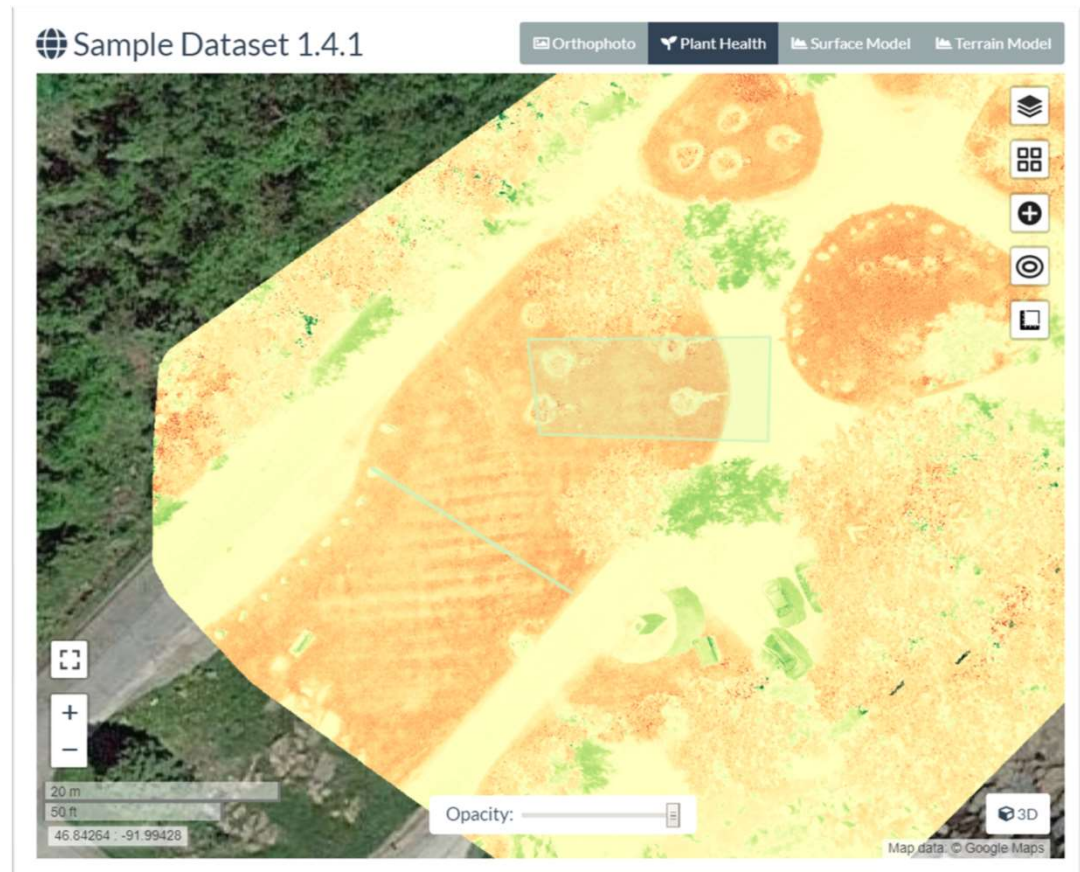
#2 – Orthophoto - Measure

- A. Click ruler (4th on right)
- B. Create new measurement
- C. Click 2 points on map
- D. Click “Finish measurement”
- E. View calculations in white balloon
- F. Close balloon with “x”
- G. Click ruler again, new measurement
- H. Click 4 points on map to make a box, click “Finish”
- I. View calculations
- J. Click “Delete” to remove it



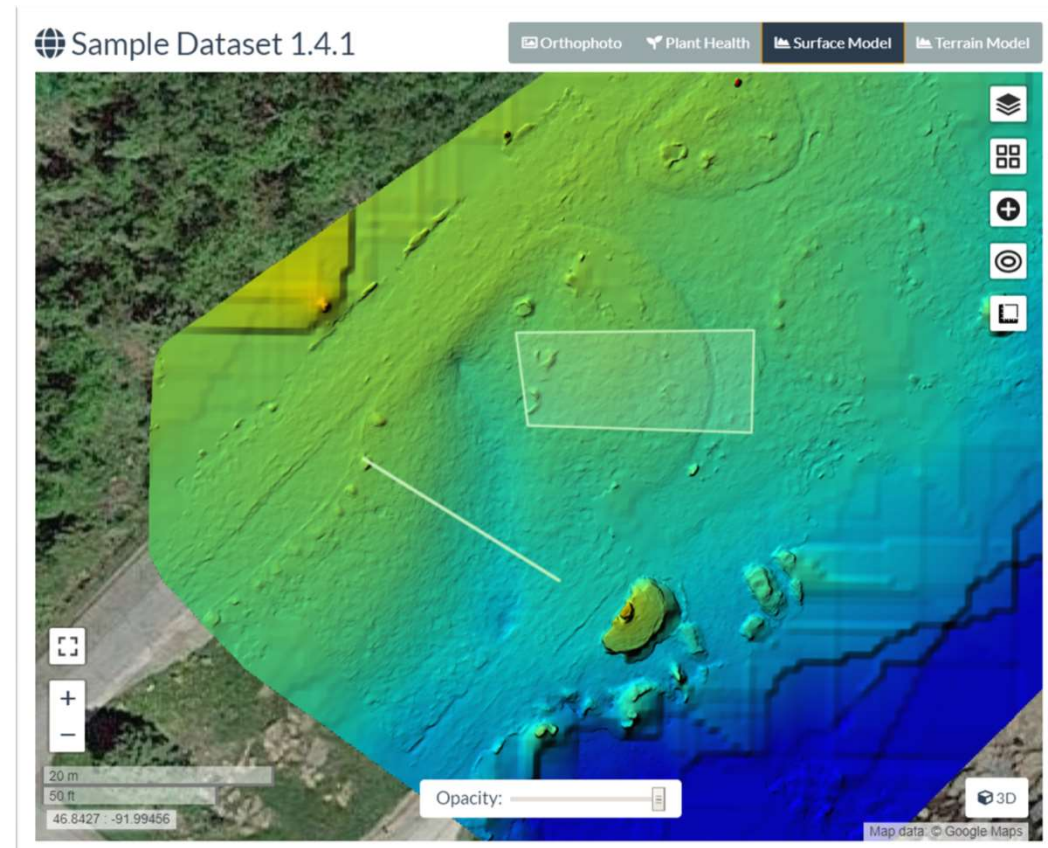
#3 – Plant Health

- A. 2nd Top Button: Plant Health
- B. Note color differences in different grassy areas
- C. Click top right “layers” icon
- D. View “Algorithm” options
- E. View “Color” options
- F. Drag min/max bars
- G. Export GeoTIFF



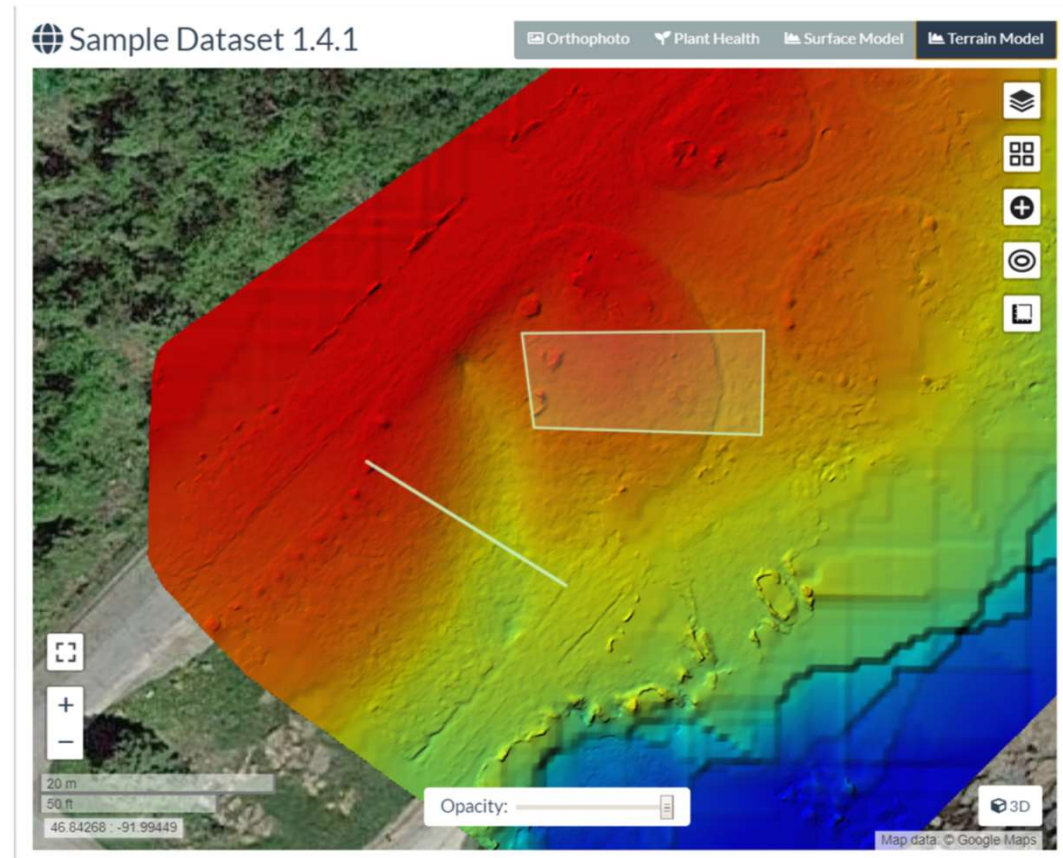
#4 – Surface Model (DSM)

- A. 3rd Top Button: Surface Model
- B. Wait for calc/load
- C. Note color varies by altitude
- D. Click top right “layers” icon
- E. View “Color” options
- F. Drag min/max bars
- G. Wait for refresh
- H. Export GeoTIFF

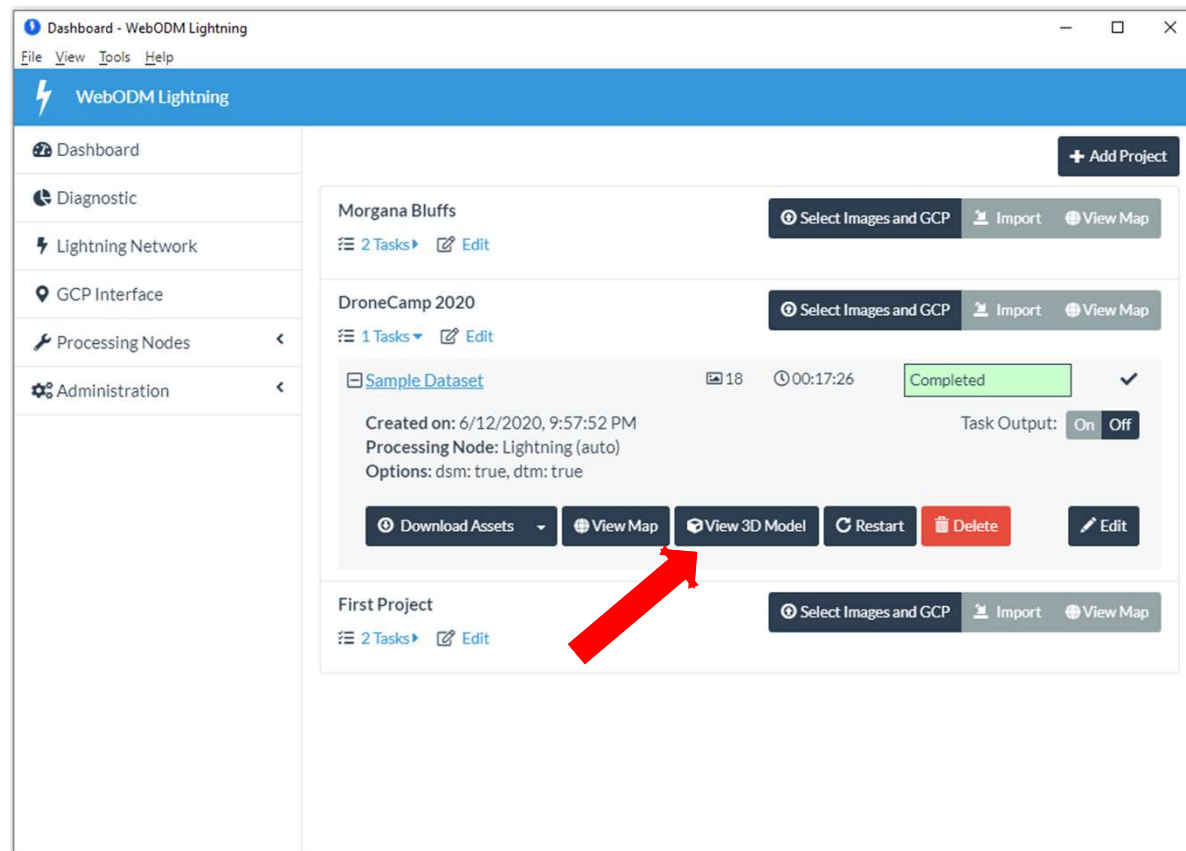


#5 – Terrain Model (DTM)

- A. 4th Top Button: Terrain Model
- B. Wait for calc/load
- C. Note color varies by altitude
- D. Click top right “layers” icon
- E. View “Color” options
- F. Drag min/max bars
- G. Wait for refresh
- H. Export GeoTIFF

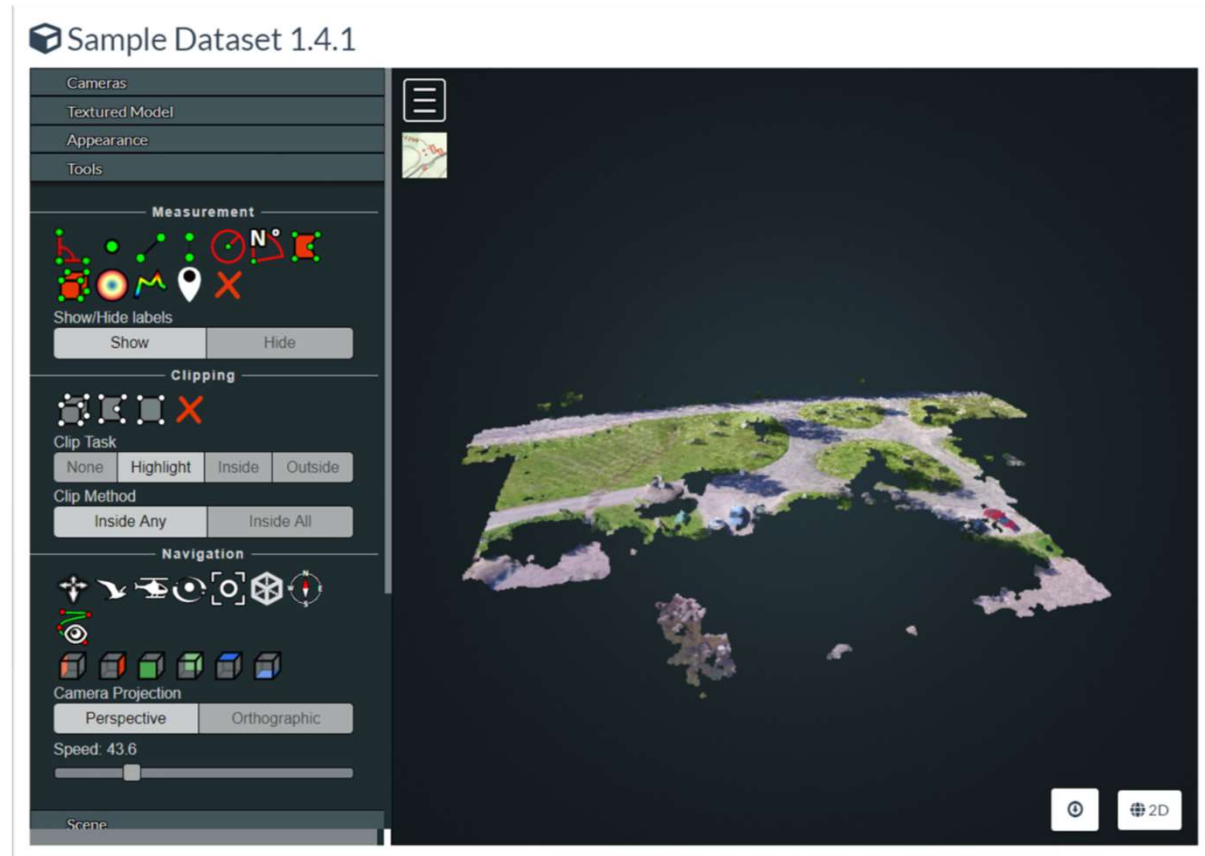


Exercises – 3D Model



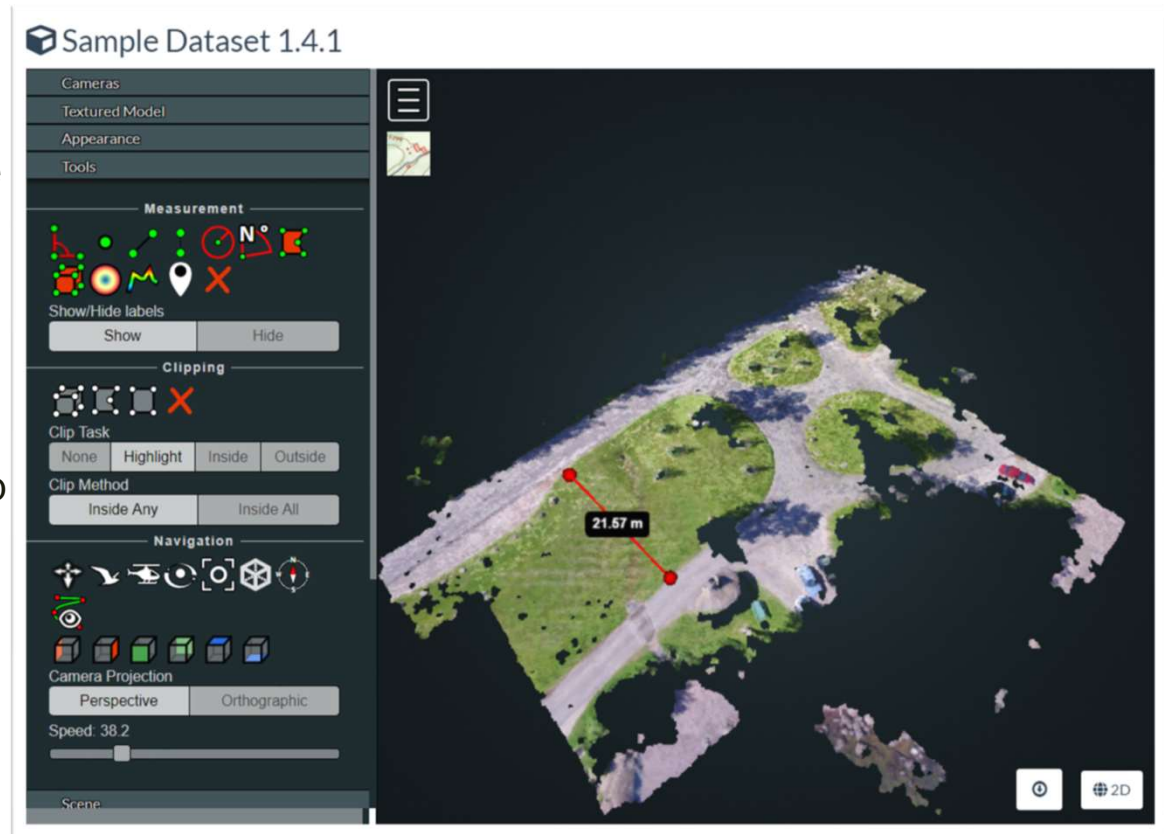
#6 – 3D Model - Navigate

- A. Left click+drag = rotate model
- B. Right click+drag = move model
- C. Scroll wheel = zoom in/out
- D. Top left (3 bars) button = collapse tools
- E. Top left (map) button = show model location
- F. Tools
 - A. *Measure*
 - B. *Navigation*
- G. Appearance
- H. Scene



#7 – 3D Model – Measure (Linear)

- A. Adjust the model so you can see
- B. Click 3rd Measurement tool (angled line)
- C. LEFT click 2 points in a grassy area on the map
- D. Now RIGHT click the last point to finish
- E. View measured distance (m)
- F. Click red “X” in measurement tools, to delete



#8 – 3D Model – Measure (Area)

- A. Adjust the model so you can see
- B. Click top right Measurement tool (red box)
- C. LEFT click 4 points in a grassy area on the map
- D. Now RIGHT click the last point to finish
- E. View measured distances (white)
- F. View measured area (green)



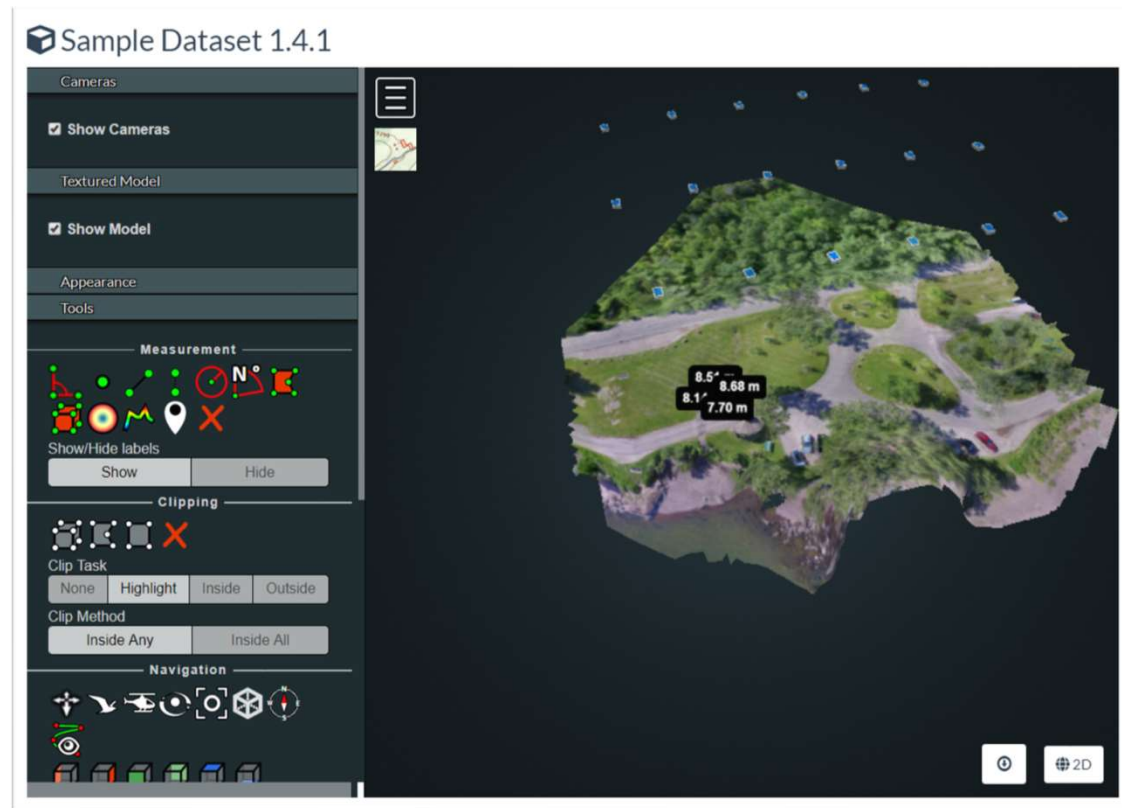
#9 – View Textured Model

- A. Find “Textured Model” near the top of the tool menu
- B. Click to expand, then click “Show Model”
- C. Wait a few seconds
- D. View how the scene becomes more detailed, holes are filled
- E. Uncheck and check the box to turn off, and on
- F. Move the model around to view other parts
- G. Edges of model = lots of error
Interior of model = better precision

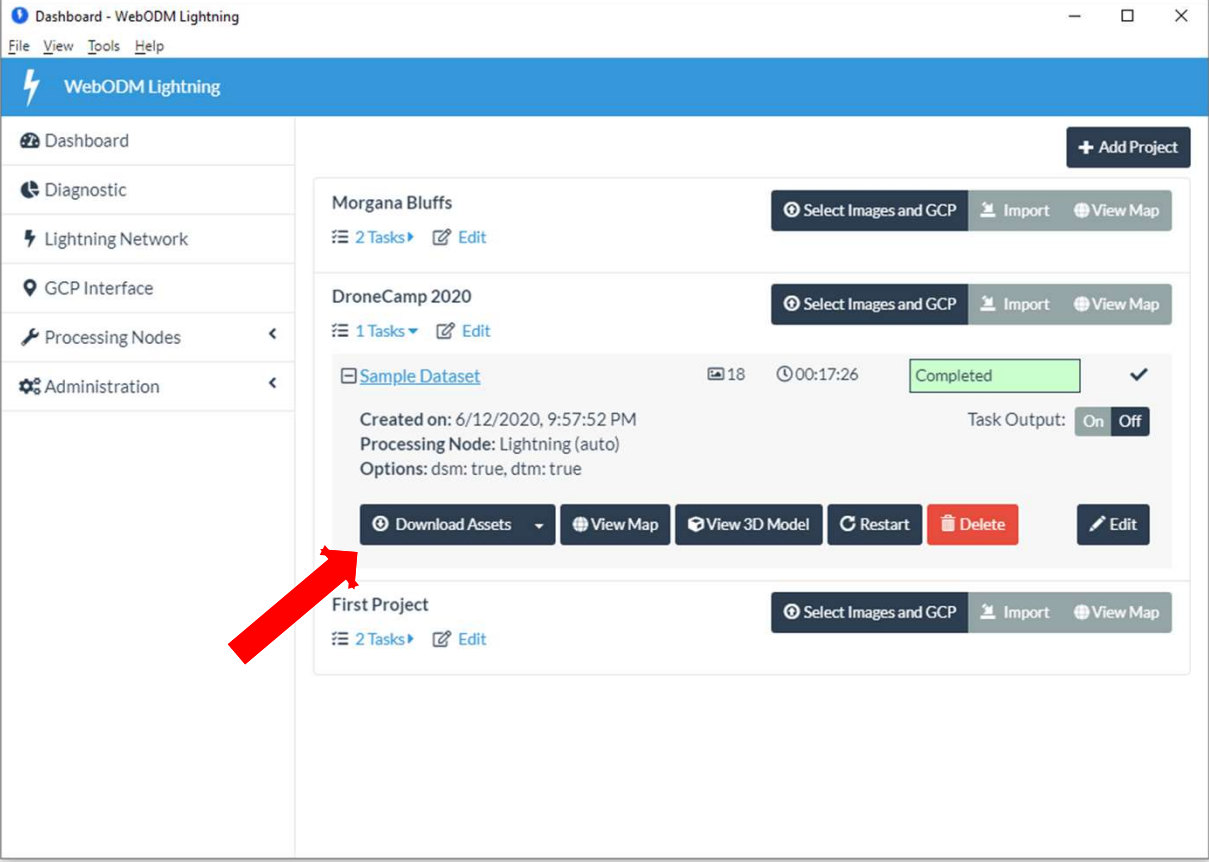


#10 – View Cameras

- A. Find “Cameras” near the top of the tool menu
- B. Click to expand, then click “Show Cameras”
- C. Zoom out (scroll) until you see the blue squares floating above the scene
- D. Note positions, angles of cameras
- E. Click one camera to see the photo from that position



Exercises – Download



The screenshot displays the WebODM Lightning dashboard interface. On the left is a sidebar with navigation links: Dashboard, Diagnostic, Lightning Network, GCP Interface, Processing Nodes, and Administration. The main content area shows a list of projects. The first project is 'Morgana Bluffs', followed by 'DroneCamp 2020'. Under 'DroneCamp 2020', a 'Sample Dataset' is listed with a status of 'Completed'. A red arrow points to the 'Download Assets' button for this dataset. Other buttons visible include 'Select Images and GCP', 'Import', 'View Map', 'View 3D Model', 'Restart', 'Delete', and 'Edit'.

Dashboard - WebODM Lightning

File View Tools Help

WebODM Lightning

+ Add Project

Morgana Bluffs

Select Images and GCP Import View Map

2 Tasks Edit

DroneCamp 2020

Select Images and GCP Import View Map

1 Task Edit

Sample Dataset 18 00:17:26 Completed ✓

Created on: 6/12/2020, 9:57:52 PM Task Output: On Off

Processing Node: Lightning (auto)

Options: dsm: true, dtm: true

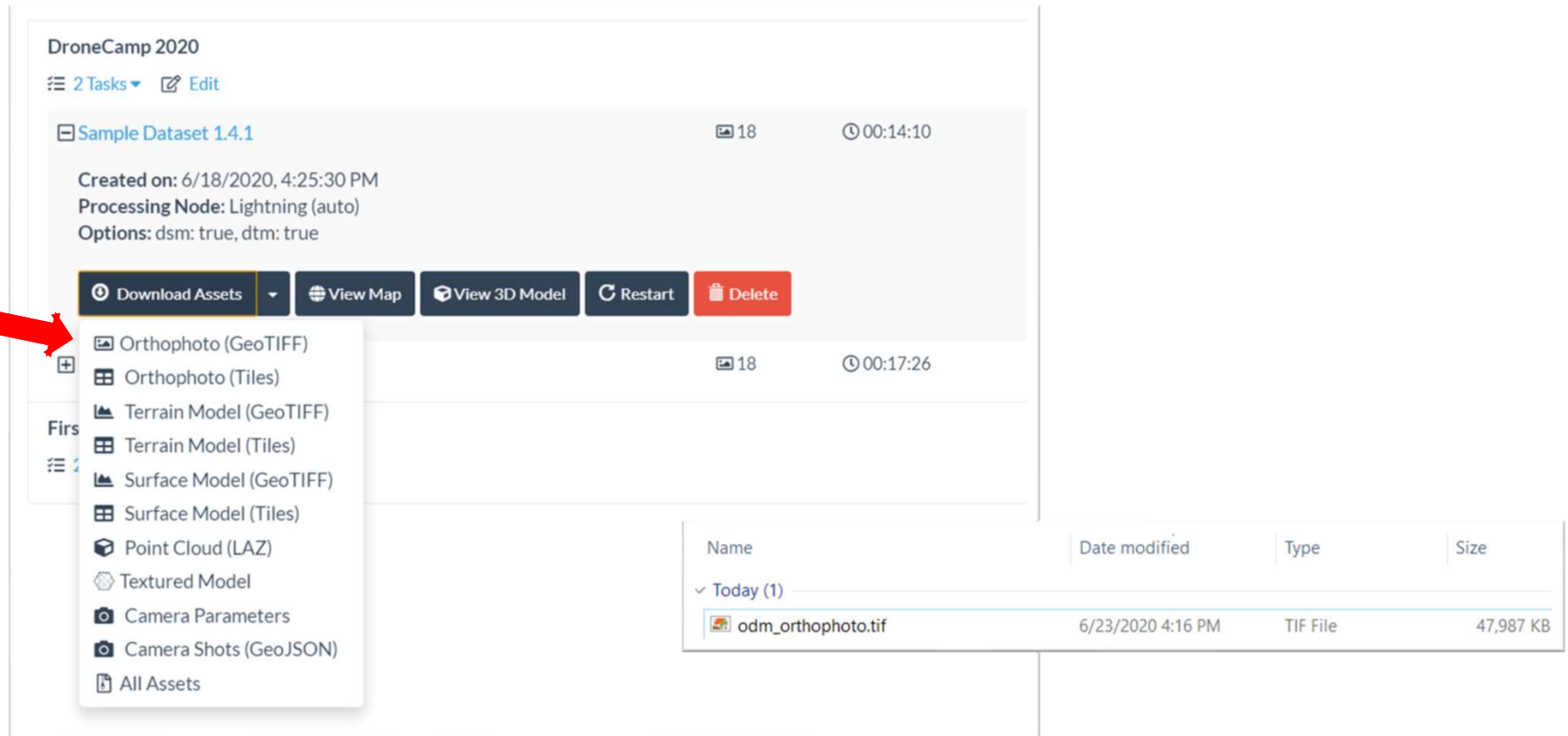
Download Assets View Map View 3D Model Restart Delete Edit

First Project

Select Images and GCP Import View Map

2 Tasks Edit

#11 – Download Orthophoto



DroneCamp 2020

2 Tasks ▾ Edit

Sample Dataset 1.4.1 18 00:14:10

Created on: 6/18/2020, 4:25:30 PM
Processing Node: Lightning (auto)
Options: dsm: true, dtm: true

Download Assets ▾ View Map View 3D Model Restart Delete

Orthophoto (GeoTIFF)
Orthophoto (Tiles)
Terrain Model (GeoTIFF)
Terrain Model (Tiles)
Surface Model (GeoTIFF)
Surface Model (Tiles)
Point Cloud (LAZ)
Textured Model
Camera Parameters
Camera Shots (GeoJSON)
All Assets

Name	Date modified	Type	Size
Today (1)			
odm_orthophoto.tif	6/23/2020 4:16 PM	TIF File	47,987 KB

#12 – Download All

DroneCamp 2020


2 Tasks ▾ Edit

Sample Dataset 1.4.1 18 00:14:10

Created on: 6/18/2020, 4:25:30 PM
Processing Node: Lightning (auto)
Options: dsm: true, dtm: true

Download Assets ▾ View Map View 3D Model Restart Delete

- Orthophoto (GeoTIFF)
- Orthophoto (Tiles)
- Terrain Model (GeoTIFF)
- Terrain Model (Tiles)
- Surface Model (GeoTIFF)
- Surface Model (Tiles)
- Point Cloud (LAZ)
- Textured Model
- Camera Parameters
- Camera Shots (GeoJSON)
- All Assets



all.zip

- dsm_tiles File folder
- dtm_tiles File folder
- entwine_pointcloud File folder
- odm_dem File folder
- odm_georeferencing File folder
- odm_orthophoto File folder
- odm_report File folder
- odm_texturing File folder
- orthophoto_tiles File folder
- cameras.json JSON File
- images.json JSON File

odm_textured_model.conf

odm_textured_model.mtl

odm_textured_model.obj

odm_textured_model_geo.mtl

odm_textured_model_geo.obj

odm_textured_model_material0000_map_Kd.png

odm_textured_model_material0001_map_Kd.png

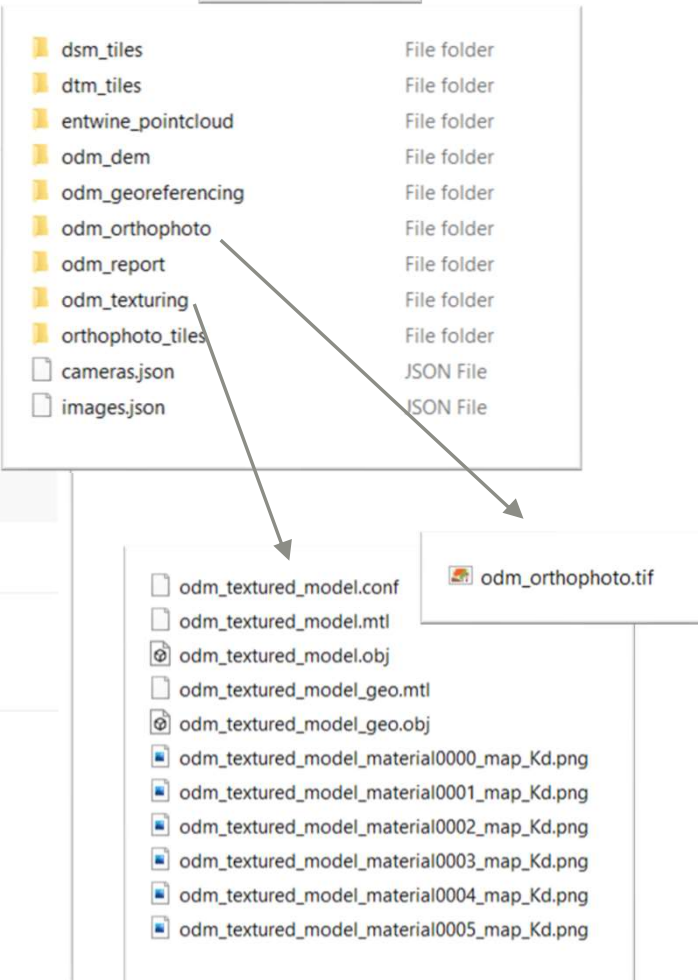
odm_textured_model_material0002_map_Kd.png

odm_textured_model_material0003_map_Kd.png

odm_textured_model_material0004_map_Kd.png

odm_textured_model_material0005_map_Kd.png

odm_orthophoto.tif



END

Hands-On Exercises
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