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PHENOCAM Field of View Analysis Package:

Site specific release for Nine Mile Prairie, NE

Package Contents

Datasets:

Rasters >

NE-Ortho30m_Clip.tif (and associated files)

High resolution orthographic areal GeoTiff image, clipped to the Nine Mile Prairie PHENOCAM site extent. (Accessed via *USGS EarthExplorer*)

NE-LIDARxDEM_Clip.tif (and associated files)

LAS LIDAR dataset converted to DEM raster and clipped to the Nine Mile Prairie PHENOCAM site extent. (Accessed via *USGS Earth Explorer*)

Vectors >

NE-PHENOCAM.shp (and associated files)

Point Shapefile with single feature representing the Nine Mile Prairie PHENOCAM site. This files attribute table incorporates required fields associated with the AmericaView/NCCSC PHENOCAM Project websites locational data, and also optical characteristics acquired from StarDot camera manufacture representative *Anthony Watts (*sales@stardot.com).

Scripts:

NE9mile_AOI-Analysis.py

This file was originally created as an exported ArcPy Model-Builder script. Subsequent editing included enabling virtual-layers for data-conservation, function divisions for efficient workflow, and general formatting for stand-alone copy and paste capabilities.

Package Procedures

Workspace Setup:

To prepare for use of this script, establish a saved ArcMap (*.mxd file) project in the directory of your choosing, (recommended you store in the location where this packages included datasets are stored). Once a project is saved and loaded into the ArcMap program, upload the two included raster files; *NE-Ortho30m_Clip.tif, NE-LIDARxDEM_Clip.tif*, and also the included Shapefile; *NE-PHENOCAM.shp*. Then assure that the loaded layers maintain a uniform coordinate system.

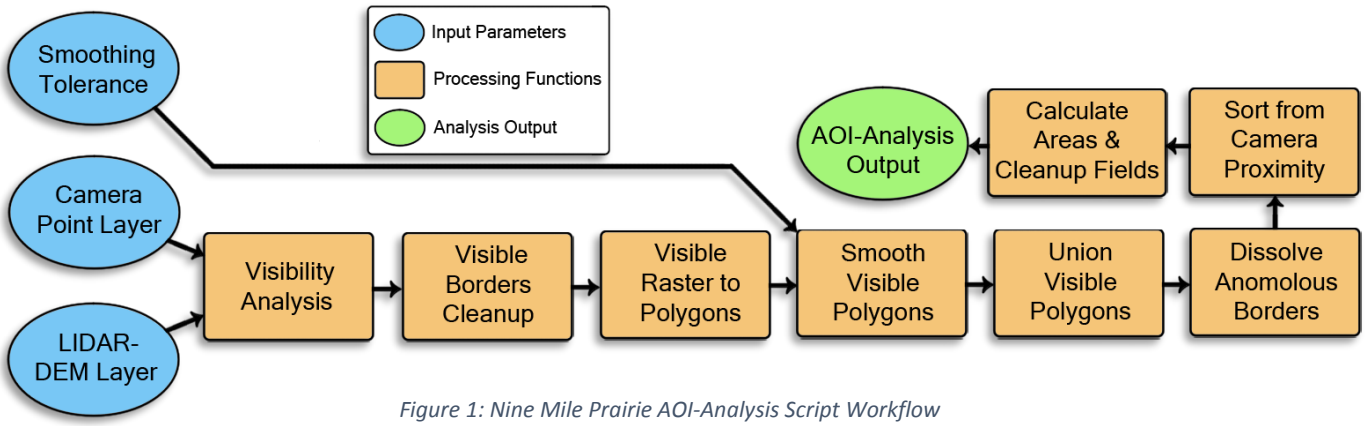

Figure 1: Nine Mile Prairie AOI-Analysis Script Workflow

Workflow Process:

Figure 1 depicts the general workflow of *NE9mile_AOI-Analysis.py.* To use this script, you must first establish the initial input parameters required (Blue ellipses in *Figure 1*). Open the document in any text or Python editor and navigate to the region bound by headers "FUNDAMENTAL PARAMETERS ABOVE/BELOW" in lines 56 – 67 of the script (*Figure 2*).

```
56    """==========vvv FUNDAMENTAL PARAMETERS BELOW vvv=========="""
57
58    # Locations of workspace, data-soucres, and data-outputs
59    arcpy.env.workspace = "C:\\...\\your-project.mxd"
60    DEM_raster_layer = "C:\\...\\your-directory\\...\\NE-LIDARxDEM-Clip.tif"
61    Camera_point_layer = "C:\\...\\your-directory\\...\\NE-PHENOCAM.shp"
62    AOI_output = "C:\\...\\your-directoy\\...\\your-output-filename.shp"
63
64    # Primary varriable : cleanup of polygon borders
65    Smoothing_Tolerance = "1 Meters"
66
67    """==========^^^ FUNDAMENTAL PARAMETERS ABOVE ^^^=========="""
```

Figure 2: NE9mile_AOI-Analysis Input Parameters

These inputs will need to be set / changed to the following:

('\\' Double-slashes must be used for subdirectors to assure ArcPy reads location exactly as typed. Alternatively you can use the prefix 'r' with single-slashes signifying a raw string; r"C:\nebraska.tif")

arpy.env.workspace = full file location where your ArcMap project is stored

DEM_raster_layer = full file location where *NE-LIDARxDEM_Clip.tif* is stored

Camera_point_layer = full file location where *NE-PHENOCAM.shp* is stored

AOI_output = full file location where you would like the AOI-Analysis output to be saved

Smoothing Tolerance = *Figure 1* shows this input parameters connection with the *Smooth Visible Polygons* function. Its adjustment can greatly affect the AOI-Analysis Output areas, thus value experimentation is necessary.

Once you have edited these required file locations and input variables, running the script is simple. With the relevant project open in ArcMap, start the Python Interpreter window (activation button highlighted in red from *Figure 3*).

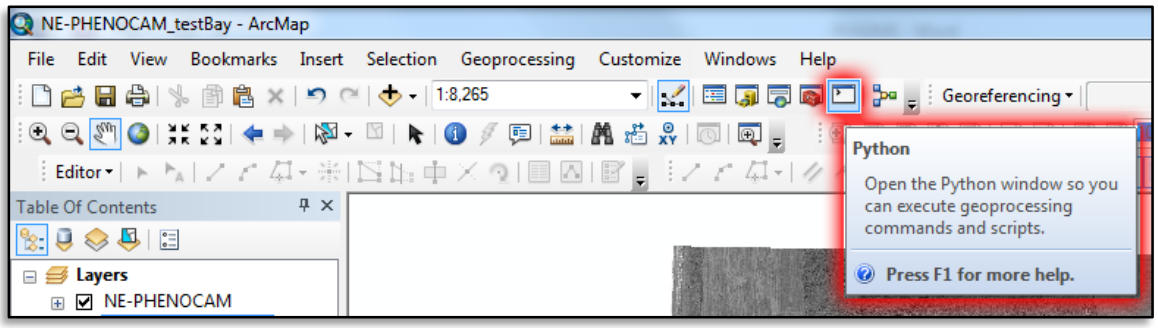

Figure 3: ArcMap Python Interpreter Access

In the same text or Python editor where you made the directory and parameter changes; select all of the script (keyboard combo *ctrl+a*), copy this whole selection (keyboard combo *ctrl+c*), then navigate to the Python Interpreter window in ArcMap and paste the copied selection (keyboard combo *ctrl+v*). Proof read the pasted script to assure the inputs are correct, then press the *Enter* key to run the analysis. After the script has completed, you should ideally result with a visibility foot print somewhat to the one expressed in *Figure 4*.

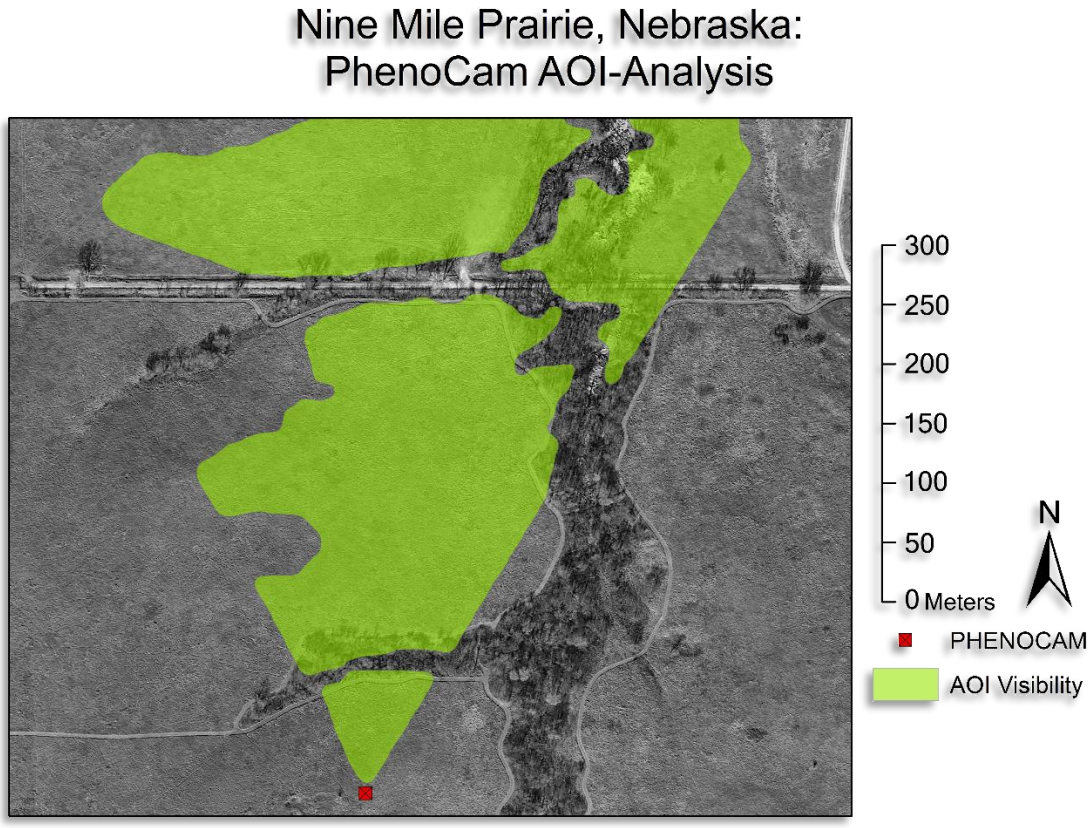

Figure 4: Nine Mile Prairie, NE : AOI-Analysis Test (20 Meter Smoothing Tolerance)

Conclusions:

The script incorporated into this package is significantly reduced in terms of processing steps compared to the original test script created for the Quickbird PHENOCAM site in WY. This is due to two primary causes. First cause being the quality of DEM data available. For the Nine-Mile-Prairie location, a high resolution LAS LIDAR dataset was available. This allowed for improved initial accuracy in the results of the ArcMap Visibility Tool, and therefore less post-processing was necessary. An

additional aspect contributing to a reduction in processing functions stems from the significant difference in topographic relief of the two regions (Nine-Mile and Quickbird). It is hypothesized that with an increase in landform relief, comes greater need for clarification of where segmentation of the overall footprint occurs in terms of the PHENOCAMs oblique image.

It is also important to note that the addition (or removal) of offered ArcMap Tools from this preliminary workflow might greatly improve the results for your region. The script includes a high level of annotation based on the terminology used in the ArcMap Toolbox. This helps provide guidance when opting to breakdown the given workflow and process each step manually; adding, adjusting, or removing processing steps as needed.