1. Extracted Tau images from video using ffmpeg on the raspberry pi, at 8fps and using an uncompressed format (like .bmp)
    a. *Not for future work: There are still compression artifacts in the images, this is because a lossless video codec should have been used instead of the default, this would be changed in the ffmpeg settings when initially recording.*
2. Removed images from both Micasense and Tau data from before and after flight, as well as any obvious exposure issues (extremely occasional very overexposed or totally black images)
3. Stitched together micasense images in Agisoft using default settings (make sure to import it as a multi-camera system)
    a. Aligned photos with high accuracy, generic preselection, and reference preselection, key point limit of 80,000 and tie point limit of 4,000.
    b. Created a high-quality mesh with medium face count and constructed orthomosaics with the mesh as the surface and mosaic blending mode.
    c. Calibrated reflectance in the Micasense images
        i. First, the reflectance panel was located in an image and put in a separate folder called "Calibration images"
        ii. Then, applied a mask and removed the rest of the image except the panel
        iii. The calibration values, obtained from the manufacturer, are below:
        For RedEdge-MX with serial RX01 or lower, all RedEdge-M and RedEdge 3 cameras, and Altum cameras with serial AL04 or lower:

blue	*0.97*	*97.32%*
green	*0.98*	*97.76%*
red	*0.98*	*98.37%*
re	*0.99*	*98.54%*
nir	*0.99*	*98.56%*

    d. Set the raster transform to each band individually, set them to the same scale and a black and white gradient, and then exported them as individual band rasters.
    e. (Also created a visible light ortho because it's easier to look at)

4. Stitched together Tau images
    a. Similar to micasense, but it only partially aligned, so kept moving the unaligned images into a new chunk, realigning, moving the yet remaining images into another chunk, etc, until there were ~15-20 chunks of partially mosaiced images
    b. Aligned photos with high accuracy, generic preselection, and reference preselection, key point limit of 80,000 and tie point blank (no limit).
    c. Created a high-quality mesh with medium face count and constructed orthomosaics with the mesh as the surface and mosaic blending mode.
    d. Exported orthomosaics, numbering them using the numbers of the photos from which they originated (there's only one band)
5. Aligned everything in ArcPro
    a. Used GCP coordinates to georeference the visible light orthomosaic, and field notes to identify the correct GCPs
    b. Imported the other Micasense orthos and align them using georeferencing (affine transform) with 9 points
    c. Aligned the partial Tau images (affine transform) using markers and clues from photo numbers, didn't use them if the alignment was too poor or uncertain (scrapped if <4 points to align them or if the imagery was obviously distorted)
    d. Mosaiced the Tau images into one big raster using the minimum value so the high values are not included when the white border of a raster overlaps with another.
6. Created polygons for the plot locations
    a. Drew them by hand, as close to right inside the PVC as possible, didn't force them to be squares since occasionally there was a little warping in the image/the plot was slightly askew
    b. Added a value for plot number to the attribute table and numbered the plots based on field notes
7. Remove values in plots above a certain threshold using "set null" function
    a. These represent the very reflective PVC pipes included due to small misalignments
    b. This process used each layer separately as both the "conditional" and "false" raster, with an equation to set values to null greater than a certain threshold.

    c. The threshold values were different depending on the wavelength, and they were obtained by exploring the image to find what value would reliably exclude PVC pipes but not bright grass (at this stage the values are still scaled 0-255 representing 0-100% reflectance).
        i. Removed >225 for SWIR
        ii. Removed >180 for NIR and rededge
        iii. Removed >140 for the visible wavelengths

8. Used zonal statistics as table to calculate the mean and standard deviation for each wavelength and time of day, ignoring “no data” so that the null values from the previous step do not affect the results
9. The plot IDs were lost in this process, so the correct plot values were added manually to each of these layers’ attribute tables based on field notes *(this tedious step could be avoided with scripting in the future)*
10. The attribute tables from the zonal statistics were all joined to the plot polygons on Plot ID
11. Export table was used to create a csv file of these values
12. Export the NIR layer for each time of day for texture analysis
    a. Rotated and cropped these images so it was easier to select the plots
13. Calculated homogeneity using MATLAB to be used as a texture metric (see code)
    a. Performed these calculations on each plot for each time of day using user input to determine the locations of the plots
14. Statistical analysis in R, along with field data table (see code)