**Phenocam SOPs for Klima and Phenocam**

**(to be kept on GitHUB)**

**1. Code standards**

Universal code – standardization of code will be done on the GitHub repository, PhenoCamAnalysis (https://github.com/klostest/PhenoCamAnalysis). Steve is the administrator and can add new users.

In addition to uploading standard Matlab code for batch processing of sites, there will also be a test function that simply performs calculation of RGB means and GCC for an ROI, using a small number of photos (1-10). This code will be used to ensure that any new version in another language, for example, produces identical results.

**2. ROI lists**

ROIs on Klima must be in uncompressed TIF format. ROI names and types will be standardized using the following format:

site\_masktype\_xxxx\_nn.tif

Note that there are four components to the name:

site – the normal unique site name (e.g. harvard, oakridge1)

masktype – one of a fixed set of options, including deciduous, coniferous, canopy, grass, shrub, modis and reference panel. Canopy will be used when the entire visible canopy is included, whereas deciduous, coniferous, etc. will refer to a *homogeneous* *subset* of the visible canopy. Every site has a canopy mask and others are used as appropriate when there is homogeneity.

xxxx – 4-digit unique identifier for the ROI list that the ROI file is called by, to be generated on the Phenocam webpage (see *Section 6. Creating ROI lists*)

nn – 2-digit unique identifier for the ROI file itself

example: harvard\_decidous\_0003\_02.tif: in this example, this is for the harvard site, covering only deciduous trees; the ROI is the second (02) ROI in the sequence called by ROI list 0003.

ROI lists, in CSV format, will also follow a file naming convention:

site\_masktype\_xxxx\_roi.csv

Here is an example (uiefmaize\_grass\_0001\_roi.csv):

## ROI file for university of illinois energy farm maize site

#

# site: uiefmaize

# description: "corn field 2009+2011, soybean 2010"

#

start\_date,start\_time,end\_date,end\_time,maskfile,sample\_image

2001-04-29,00:00:00,2009-05-20,16:21:52,uiefgrass0001.tif,uiefmaize\_2009\_04\_07\_123736.jpg

2009-05-22,12:50:59,2009-07-30,08:18:48,uiefgrass0002.tif,uiefmaize\_2009\_07\_01\_141844.jpg

2009-07-30,09:18:48,2009-11-04,15:21:20,uiefgrass0003.tif,uiefmaize\_2009\_10\_02\_082113.jpg

**3. Standardized ROI output**

There will be standard time series output for all sites, to be stored in a subdirectory called ROI, along with the ROI files and ROI lists. There will be exactly one time series output for each ROI list, with matching filenames. The file name format is:

site\_masktype\_xxxx\_ts.csv

The time series will include the following fields:

year (YYYY), DOY(D.DDDD), Red DN, GreenDN, Blue DN, GCC, image file name (MM/sitename\_YYYY\_MM\_DD\_HHNNSS.jpg)

The time series files will include values for every single photo: no time or brightness filters applied. Any such filtering for graphing will be done on the fly. Alternatively, a simpler output could be created that uses standard filter values for quick plotting. RGB refer to the mean DN value for the ROI.

**4. Removing photos**

Bad photos will be moved to a badphotos folder on Klima, separate from the main image archive. Bad photos, including shots of someone’s office, hopelessly out of focus photos, etc. will be submitted as lists to Tom, who will move them to the badphotos folder.

**5. Organizing existing and new ROIs for each site**

Tom will set permissions on site ROI subfolders with group write permissions. ROIs that have been made by Steve and Mike will be uploaded and given unique identifiers by Tom. ROIs for new sites can be further created by Josh, Steve, and Mike, or anyone else who is involved or has interests in particular sites. It is suggested that ROIs be shared and looked at by others before being uploaded and set in stone as a permanent record. Most of the ROIs from 2011 REUs are questionable and not worth keeping.

**6. Creating ROI lists**

To keep track of ROI Lists (and publishable time-series data) we want a system for tracking them in the database. Rather than trying to store the all the list information in the database we’ve taken the approach of just tracking ROI List Identifiers in the database. The basic idea is that you allocate an ID for your ROI List using a web form. The database will associate that ROI List ID with your user-id and save basic information on the ROI List. It is up to you to create the CSV file, and fill it in properly.

One workflow I envision is that if you are creating an ROI List for routine processing you can allocate the ROI ID and use a “template” generated when the ROI List ID was allocated. You then fill in dates, times, mask files using the naming convention in the template file save the file in the appropriate directory (/data/archive/*sitename*/ROI/) along with the mask files and it will processed automatically. (NOTE: At present routine processing is not database driven so notify me if you’ve set up an ROI List for routine processing.)

Another workflow might be that you’ve created an ROI List in your own working directory and have been using it with your own tools (e.g. MATLAB). At some point you decide you want to save the ROI List because you are going to publish figures or want to share the ROI List with someone else. In this case you would allocate the ROI List ID and then you would have to rename files using the ROI List ID and our naming convention (shown in the template). Then you can put the files in the appropriate ROI directory and not worry that files for you list would conflict with someone else working on the same site.

**Viewing ROI List Information:**

The URL:

<http://phenocam.unh.edu/webcam/roi/>

brings up a page which is a list of sites with ROI Lists in database. If you are logged-in you will also see the link (styled like a button) to a form for creating a new ROI List.

sites_with_roi_lists.tiff

In the list the sitename is also a link, which takes you to a page listing all the ROI’s in the database for that site:

site_roi_list.tiff

Again the new ROI List button should only show up if you are logged in. In the table the ROI List “Name” is a link to a page for the ROI List. Clicking that link brings up something like:

roi_list_details.tiff

At the bottom of this page is the “template” for the ROI List. (At some point

this should show the actual ROI List CSV file if it exists.) Right now the template only shows up if you are logged in.

**Creating/Allocating a New ROI List**

To allocate a new ROI List ID go to:

<http://phenocam.unh.edu/webcam/roi/create/>

You will see a form like the following:

create_roi_list.tiff

To access this form you must be logged in AND be a “Staff” member. (We can make further restriction if necessary.) When you fill out the form and click the “Create” button the next ROI List ID will be allocated and you will be taken to a page showing

the results. The CSV template at the bottom of the page can be copied and pasted to

create the ROI List CSV file.