

Introduction to Phenology Data

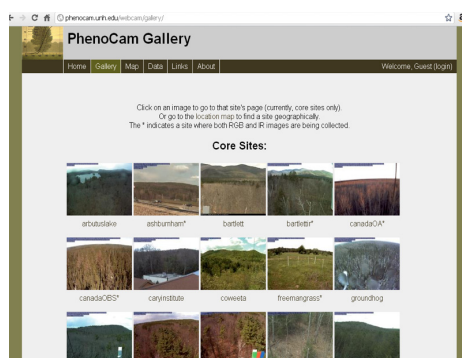
Downloading PhenoCam Images

Introduction

In this tutorial, you will learn how to download images from any site in the PhenoCam Network and get activity ideas for using the images with your students. Students can use the images to make time lapse series and analyze changes in phenology over time or use them to make Phenomovies. With more than 80 cameras at different sites uploading imagery to the PhenoCam server every half hour, there are many photos to choose from!

Estimated Time:
15-30 minutes

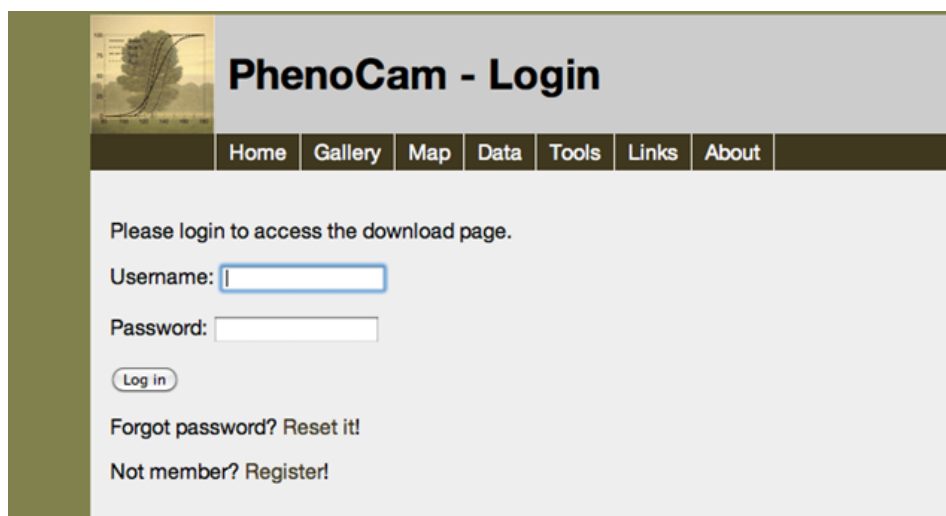
Materials: Internet connectivity, an Internet browser (e.g., Google Chrome, Mozilla Firefox, etc.)



Activity Instructions

Create an Account

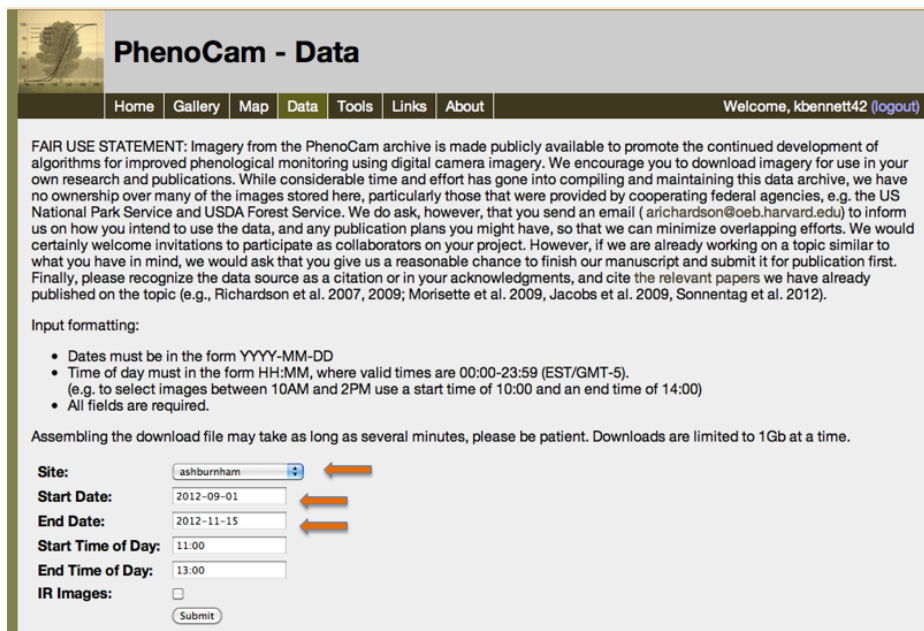
1. Go to the PhenoCam website. Click on the data tab. It will bring you to this page (see image below). Before you can download data you have to set up an account. It's easy and free - then you can log in.



What to learn more about PhenoCam Photos and Data? Check out the other Unit 3: Introduction to PhenoCam Data materials

Select the Data

2. Now you can choose a site, a start date, and an ending date. You can choose to look at a year or years in one location or just one growing season or phenology event such as bud burst.



PhenoCam - Data

Home Gallery Map **Data** Tools Links About Welcome, kbennett42 (logout)

FAIR USE STATEMENT: Imagery from the PhenoCam archive is made publicly available to promote the continued development of algorithms for improved phenological monitoring using digital camera imagery. We encourage you to download imagery for use in your own research and publications. While considerable time and effort has gone into compiling and maintaining this data archive, we have no ownership over many of the images stored here, particularly those that were provided by cooperating federal agencies, e.g. the US National Park Service and USDA Forest Service. We do ask, however, that you send an email (arichardson@oeb.harvard.edu) to inform us on how you intend to use the data, and any publication plans you might have, so that we can minimize overlapping efforts. We would certainly welcome invitations to participate as collaborators on your project. However, if we are already working on a topic similar to what you have in mind, we would ask that you give us a reasonable chance to finish our manuscript and submit it for publication first. Finally, please recognize the data source as a citation or in your acknowledgments, and cite the relevant papers we have already published on the topic (e.g., Richardson et al. 2007, 2009; Morissette et al. 2009; Jacobs et al. 2009; Sonnentag et al. 2012).

Input formatting:

- Dates must be in the form YYYY-MM-DD
- Time of day must in the form HH:MM, where valid times are 00:00-23:59 (EST/GMT-5).
(e.g. to select images between 10AM and 2PM use a start time of 10:00 and an end time of 14:00)
- All fields are required.

Assembling the download file may take as long as several minutes, please be patient. Downloads are limited to 1Gb at a time.

Site:

Start Date:

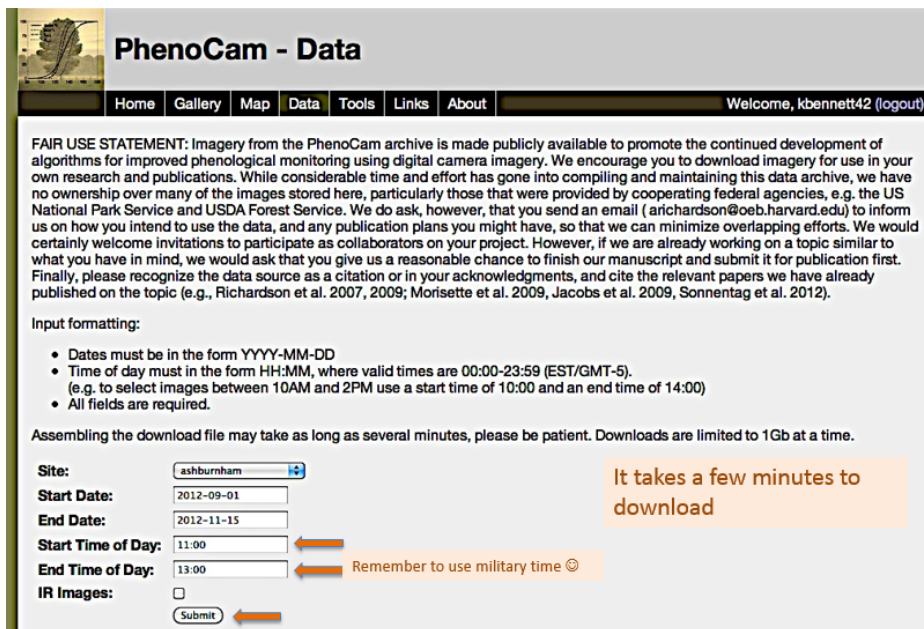
End Date:

Start Time of Day:

End Time of Day:

IR Images: ☐

3. Now you can choose a time range. You will probably want to start with images around noon for the best light. You can check on that site's page to see how many images are taken during that time and think about how many images you want. Remember to use military time. Then click submit. It takes a few minutes to download.



PhenoCam - Data

Home Gallery Map **Data** Tools Links About Welcome, kbennett42 (logout)

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Input formatting:

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- All fields are required.

Assembling the download file may take as long as several minutes, please be patient. Downloads are limited to 1Gb at a time.

Site:

Start Date:

End Date:

Start Time of Day:

End Time of Day:

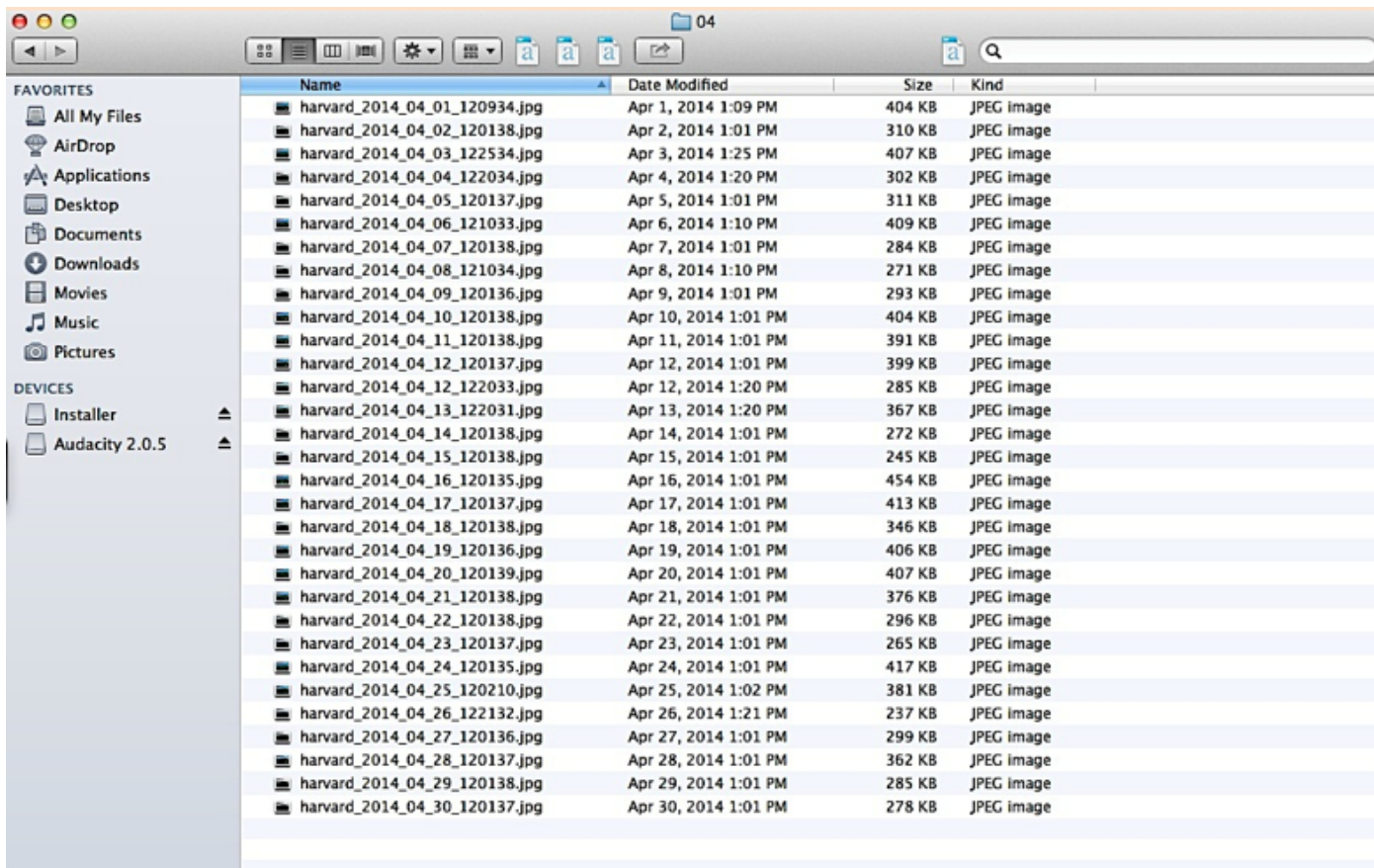
IR Images: ☐

It takes a few minutes to download

Remember to use military time ☺

View the Downloaded Data

4. Now you will have a folder (or folders) of the images you requested.



Name	Date Modified	Size	Kind
harvard_2014_04_01_120934.jpg	Apr 1, 2014 1:09 PM	404 KB	JPEG image
harvard_2014_04_02_120138.jpg	Apr 2, 2014 1:01 PM	310 KB	JPEG image
harvard_2014_04_03_122534.jpg	Apr 3, 2014 1:25 PM	407 KB	JPEG image
harvard_2014_04_04_122034.jpg	Apr 4, 2014 1:20 PM	302 KB	JPEG image
harvard_2014_04_05_120137.jpg	Apr 5, 2014 1:01 PM	311 KB	JPEG image
harvard_2014_04_06_121033.jpg	Apr 6, 2014 1:10 PM	409 KB	JPEG image
harvard_2014_04_07_120138.jpg	Apr 7, 2014 1:01 PM	284 KB	JPEG image
harvard_2014_04_08_121034.jpg	Apr 8, 2014 1:10 PM	271 KB	JPEG image
harvard_2014_04_09_120136.jpg	Apr 9, 2014 1:01 PM	293 KB	JPEG image
harvard_2014_04_10_120138.jpg	Apr 10, 2014 1:01 PM	404 KB	JPEG image
harvard_2014_04_11_120138.jpg	Apr 11, 2014 1:01 PM	391 KB	JPEG image
harvard_2014_04_12_120137.jpg	Apr 12, 2014 1:01 PM	399 KB	JPEG image
harvard_2014_04_12_122033.jpg	Apr 12, 2014 1:20 PM	285 KB	JPEG image
harvard_2014_04_13_122031.jpg	Apr 13, 2014 1:20 PM	367 KB	JPEG image
harvard_2014_04_14_120138.jpg	Apr 14, 2014 1:01 PM	272 KB	JPEG image
harvard_2014_04_15_120138.jpg	Apr 15, 2014 1:01 PM	245 KB	JPEG image
harvard_2014_04_16_120135.jpg	Apr 16, 2014 1:01 PM	454 KB	JPEG image
harvard_2014_04_17_120137.jpg	Apr 17, 2014 1:01 PM	413 KB	JPEG image
harvard_2014_04_18_120138.jpg	Apr 18, 2014 1:01 PM	346 KB	JPEG image
harvard_2014_04_19_120136.jpg	Apr 19, 2014 1:01 PM	406 KB	JPEG image
harvard_2014_04_20_120139.jpg	Apr 20, 2014 1:01 PM	407 KB	JPEG image
harvard_2014_04_21_120138.jpg	Apr 21, 2014 1:01 PM	376 KB	JPEG image
harvard_2014_04_22_120138.jpg	Apr 22, 2014 1:01 PM	296 KB	JPEG image
harvard_2014_04_23_120137.jpg	Apr 23, 2014 1:01 PM	265 KB	JPEG image
harvard_2014_04_24_120135.jpg	Apr 24, 2014 1:01 PM	417 KB	JPEG image
harvard_2014_04_25_120210.jpg	Apr 25, 2014 1:02 PM	381 KB	JPEG image
harvard_2014_04_26_122132.jpg	Apr 26, 2014 1:21 PM	237 KB	JPEG image
harvard_2014_04_27_120136.jpg	Apr 27, 2014 1:01 PM	299 KB	JPEG image
harvard_2014_04_28_120137.jpg	Apr 28, 2014 1:01 PM	362 KB	JPEG image
harvard_2014_04_29_120138.jpg	Apr 29, 2014 1:01 PM	285 KB	JPEG image
harvard_2014_04_30_120137.jpg	Apr 30, 2014 1:01 PM	278 KB	JPEG image

What can you do with PhenoCam images?

Check out the activity ideas on the following pages!

Activity Ideas

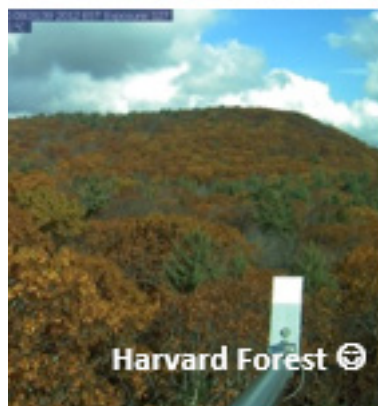
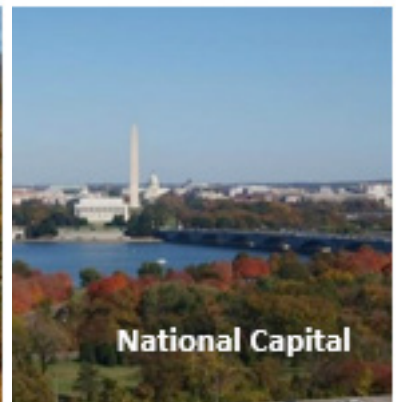
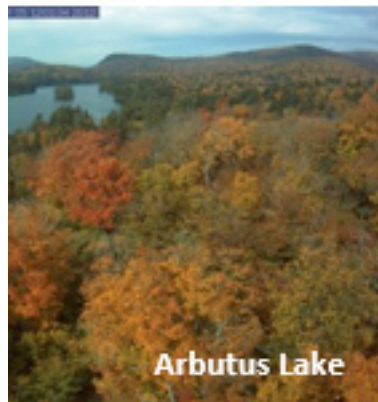
PhenoCam Image Activities

1. Make PhenoMovie Trailers (*Phenology 101 Unit 1 Activity* - <http://budburst.org/phenology-101>)



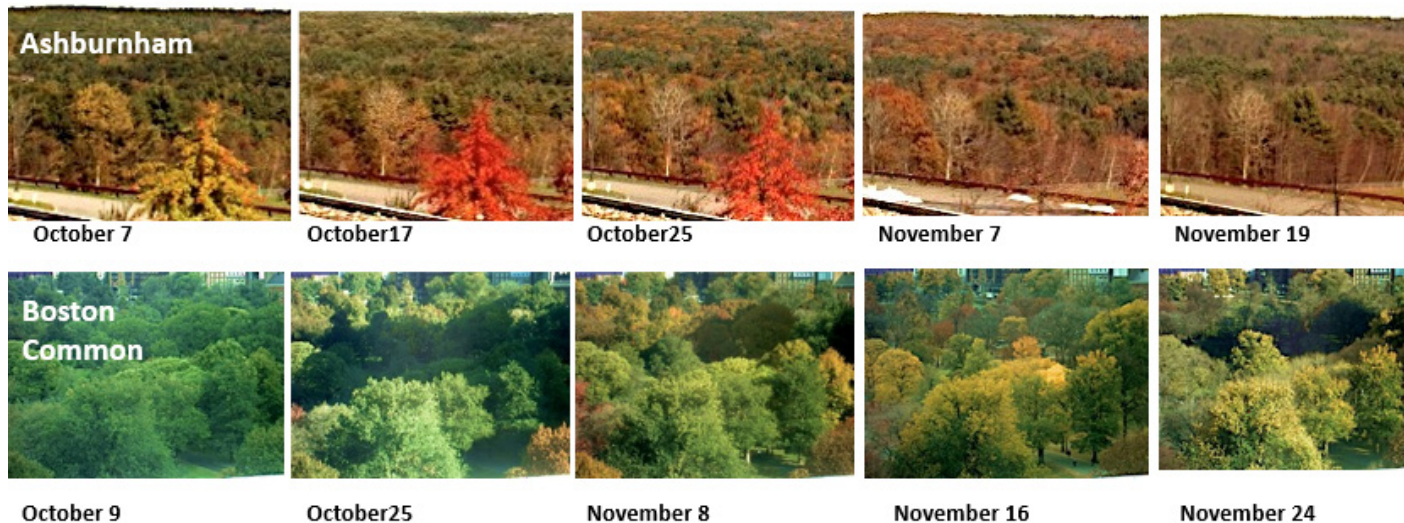
2. Use Phenocam images to compare the timing of major phenological events in different latitudes, elevations, or climates.

Site Name	Latitude
shenandoah	38.5926
national capital	38.8882
usgsreston	38.9471
woodshole	41.5495
caryinstitute	41.7839
northattleboroma	41.9837
springfieldma	42.1352
harvard	42.5378
ashburnham	42.6029
hubbardbrook	43.9439
arbutuslake	43.9821
bartlett	44.0646
queens	44.565



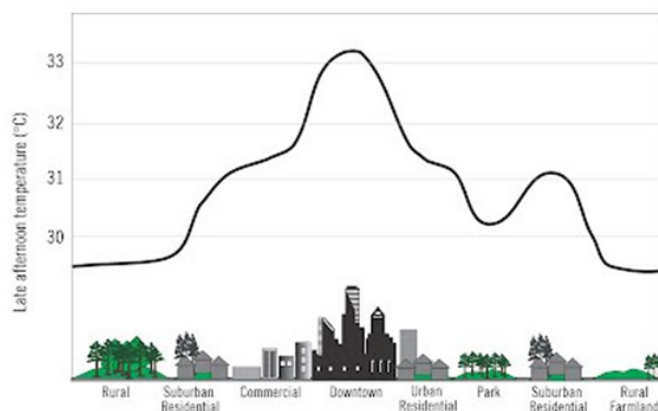
PhenoCam Image Activity Ideas (cont.)

3. Compare rural and urban sites to look at the urban heat island effect (see below). For example, you could have students compare the images from Ashburnham, MA to those from Boston Commons.



Background Information: Urban Heat Island

As developed areas expand, the amount of heat retained also grows and the amount of air that is warmed, expands. This process is sometimes referred to as the "Urban Heat Island Effect." This compounding warming effect in turn triggers variability in phenophase timing. A red maple (*Acer rubrum*) in a developed area, may experience initial stages of the leaves unfolding sooner than a red maple in an undeveloped area. On a smaller spatial scale, a red maple next to an asphalt road, may also flush sooner than a red maple that is close to the interior of a forest, or to a stream filled with cool running water.



PhenoCam Image Activity Ideas (cont.)

4. For younger learners: Look at the seasons or even the weather on particular dates, such as holidays or on their birthdays, at various locations. For example, you might compare how a PhenoCam near you looks versus a PhenoCam near a relative's home.

Ashburnham, Massachusetts throughout the year

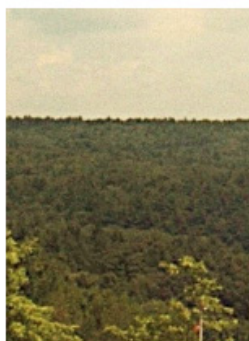
January 5



April 24



July 16



October 17



November 28



Wrap-up

Summary and Next Steps

By downloading images from the PhenoCam website, your learners will have access to phenology data from across the United States. The activities described above are intended to spark ideas for using PhenoCam images with your learners and by no means are an exhaustive list!

What's next?

If your learners are comfortable working with PhenoCam images, you might consider introducing them to Green Chromatic Coordinate or GCC data (see image to the right). GCC values are the green level in an image divided by the levels of red, blue, and green added together. This number can tell you when bud burst happened and when the leaves turn color in the fall. The following resources will help you get started with GCC data:

Phenology 101 - Unit 3

Introduction to Phenology Data - Background Guide

PhenoCam Data Matching - Activity

Graphing PhenoCam Data - Activity

