Workshop - Phenocam and phenology syntheses

Google Form

Get people to fill it out this week! But also building that shared list of where the sites are and what the sample sizes are so that we can ponder what syntheses could be done.

https://survey123.arcgis.com/share/5ae5ab7756fc44dca35a4a68322a2baf

At this form you can let the UTEP group know if you have phencams available for synthesis.

Methods notes

Futura - for image alignment - Katie
https://camerafutura.com/

Phenopix
https://cran.r-project.org/web/packages/phenopix/phenopix.pdf

You can look at RGB images in other colour space including HSV - Craig
https://en.wikipedia.org/wiki/HSL_and_HSV

Link to GitHub?

Phenocam data that are available “in the room”

LTER phenocams:

- Toolik, Utqiagvik, Atkasuk, Niwot

Alaska:

- Tussock phenocams (Ned Fletcher’s team, Bjorn Larson)
- Team Shrub ToolikCams (Ruby An, Elise Gallois, Isla Myers-Smith)

Greenland:

- Zackenberg (10 landscape phenocams - plants not very visible), Disko (there are other phenocams here that are not Anne's?), Narsasuaq (Toke's sites - 50 or more at the flower level, might also have more landscape ones), Kangerlusuaq (Jeff's network - 30 or more)

Team Shrub phenocams:

- Qikiqtaruk (Yukon), Kluane (Yukon), Toolik (not the LTER ones) - replicated phenocams across the landscape - around 60 phenocams across these three sites

Anne's EDGE lab phenocams:

- Latnja, Svalbard (three valleys), Disko - around 80 phenocams? across these three sites (maybe more?)

Canadian Arctic?

- Trail cams with a timelapse setting (Parks Canada, Yukon Parks, etc.)

What are the big phenology questions that we can ask using different types of phenocam syntheses?

1. Using the entire vegetated part of the viewscape

Is less sensitive to camera movement, is quite sensitive to what is in the imagery (vegetated versus non-vegetated surfaces, snow patches etc.) RGB Greenness metrics, NDVI cameras, etc.

Example questions:
Does the duration between snowmelt and peak greenness vary predictably over space (climate covariates), or interannualy (need met station data)

- How variable is the peak of the growing season across tundra sites?

- How does tundra seasonality vary in warmer versus colder years? Trends in phenocams in relation to climate - response to variability - we could use the approach that Elise used of comparing the seasonal signal in warmer versus colder years applying those methods to more sites.

- Does the peak of greenness that we see on the ground match the peak of greenness we see in the satellite over the same area?

- How do extreme events (e.g. "flash droughts" or "flash floods", "heat waves", extreme winter events in the following summer) influence tundra phenology?

- Earth system modelers and how wrong they get phenology - collaboration with NGEE Arctic?

2. Using focal vegetation patches within viewscapes

Requires more processing and specific view angles, allows for the use of RGB Greenness metrics (and NDVI as appropriate).

Example questions:

- Do plant communities have different phenological seasonality relative to the large satellite pixel that encompasses multiple community types?

- Why do wetter parts of the landscape stay green for longer - is it the plant composition or the soil moisture?

3. Using focal plants identifiable within viewscapes

Extract phenophases off of phenocams (not necessarily greenness based) - doesn't have to require image processing, but does require visible plants within the viewscape.

Example questions:

- Can we capture patterns of phenology in a single plant species across gradients (environmental, latitudinal, etc.)?

- Integrating phenocam data into the ITEX phenology database - Postdoc on Team Shrub will start work on this in 2024

Technical Questions

- Is distribution of hue in HSV colorspace related to diversity?

- How many sites have shrub and graminoid communities?
    a. Or use moisture gradient?

- How many cameras are plot vs landscape level?

- Do long term climate trends relate to seasonal phenology?

- Don't want to do a bunch of surveys for each site, so working through process to submit one for interest and another way to showcase variation in images
    b. >5 send us this spreadsheet or add to this google doc.
        i. Move this up to first questions

- Rough precision of coordinates?
    c. Make sure you add coordinates in properly

- Submit google earth screenshot?

- Can people edit their data once they submit it?
    d. Would be easier for them to fix this right away rather than sending email to change responses in survey.

- What data are already published?
    e. Just send the link or site for this instead of going into survey

Future phenocam synthesis workshops

Funding for two workshops from UTEP - Craig

People available to work on phenocam syntheses

Team Shrub is hiring a postdoc to work on phenology questions: https://ubc.wd10.myworkdayjobs.com/en-US/ubcfacultyjobs/job/Postdoc-position--Plant-phenology-change-over-time-across-spatial-scales_JR16337

Hopefully this person will start the position in the coming months and will lead the phenophase synthesis project bringing together phenocam and the ITEX phenology dataset and potentially compare to seasonal signals from satellites.