Earth Syst. Sci. Data Discuss., referee comment RC2
https://doi.org/10.5194/essd-2021-56-RC2, 2021

Comment on essd-2021-56

Anonymous Referee #2

Referee comment on "A distributed time-lapse camera network to track vegetation phenology with high temporal detail and at varying scales" by Frans-Jan W. Parmentier et al., Earth Syst. Sci. Data Discuss., https://doi.org/10.5194/essd-2021-56-RC2, 2021

For more than a decade, digital cameras have been widely used in Europe, North America, and Japan to monitor vegetation phenology and long-term change, but observational sites in the high Arctic have, to date, been sparse. This paper describes a relatively small network of monitoring sites in the high Arctic valley of Adventdalen on the Svalbard archipelago, which thus helps to fill that gap, although the representativeness of the Svalbard relative to the vast (global) Arctic region is unclear. The monitoring sites described feature a range of sensors including soil temperature and moisture, spectral measurements for NDVI, and visible-wavelength digital cameras. These data are potentially useful and valuable for Arctic researchers worldwide, and may spur further efforts to expand Arctic monitoring across North America and Eurasia.

Details of the installations are somewhat lacking. For example, the camera settings (Auto white balance? Contrast adjustment? Sharpening? JPEG compression) need to be described in greater detail. Unlike other PhenoCam-type networks, which have generally adopted a standard camera and configuration, the data set described here includes cameras of a variety of makes and models. Since the make and model of camera undoubtedly has an effect on the image quality, RGB sensitivity, and GCC (both in absolute terms and in its variance) (see Sonnentag et al AFM 2012), it would be helpful to have some assessment of how camera choice impacts the underlying data and data quality (this is mentioned in passing on L302). I suspect that some of the inconsistency in relationships between NDVI and GCC (L260+) could be attributed to differences in cameras and/or camera settings.

The image alignment routine sounds very clever and effective, but there are many other aspects of the processing which appear to require human intervention and assessment. The authors might think about how to automate some of these other quality control steps, so that as the data volumes expand over time, the requirement for human intervention doesn’t become burdensome. (And somewhat related to this, given that we are now in 2021, it is surprising that that data set extends only to 2018—are there plans to keep this

up-to-date in the future?)

The authors allude (L290+) to the potential to use the camera data to compare with/evaluate satellite data products – it seems that some analysis of this type could have been done here, as a concrete example, demonstrating proof-of-concept. (Note that in more temperate regions, but in some cases including Arctic sites, many previous papers have conducted this sort of analysis already: Hufkens et al RSE 2012, Klosterman et al Biogeosci 2014, Zhang et al AFM 2018, Richardson et al Sci Reports 2018, and others).

The first sentence of the conclusion – "This paper shows that ordinary RGB cameras are a promising tool to identify temporal and spatial patterns in vegetation productivity and composition at a landscape scale" — is misleading. First, one might think that this paper represents the first time that this kind of monitoring has been attempted and proven successful, which is incorrect. Second, there was no quantitative analysis of differences in productivity in relation to differences in camera-derived indices presented here; Figure 6 is entirely anecdotal. I would therefore encourage re-framing the conclusion in a way that accurately represents the novel contributions of this work.

More generally, it seems that the seminal literature on using digital imaging to track vegetation on ≈ seasonal time scales could (should?) have been cited in various places throughout the manuscript. For example, Eric Graham's classic "Moss Cam" (Int J Plant Sci 2006) paper would seem highly relevant, even though that analysis was conducted in a more temperate setting. Likewise, with the exception of the paper by Brown et al 2016, the numerous papers that really established the viability of camera-based monitoring of vegetation (and the relation of GCC and other indices to e.g. ecosystem-scale fluxes of carbon and water and satellite-based products) by Nagai, Wingate, Richardson, Morellato and colleagues have been strangely ignored.

In terms of the data set itself, I was unable to figure out how to access it (this may be my own incompetence). The landing page (https://adc.met.no/datasets/10.21343/kbpq-xb91) is informative enough, but then the catalog resource (https://thredds.met.no/thredds/catalog/arcticdata/infranor/SnoEco/catalog.html) is cryptic. The data sets are stored as NetCDF files, which is a commonly used format, but not one I regularly use. The Java viewer that can be downloaded won't run under the current Mac OS because Java support has been discontinued. In the end, I wasn't actually able to download a file and see what was in it. While I understand the attraction of the netCDF format, it also seems that it might be easier for many data end-users if the basic arrays could also be included as flat ASCII or .csv files.

The review guidelines also ask a number of additional questions about the data set:

- is the data set accessible via the given identifier?
  - Yes, it would appear so
- Is the data set complete?

    - I was unable to verfy this
- Are error estimates and sources of errors given (and discussed in the article)?
    - No, quantitative error estimates are not provided
- Are the accuracy, calibration, processing, etc. state of the art? Are common standards used for comparison?
    - Calibration is not really discussed, although this would seem critical given the number of different types of cameras used
    - There is no common standard used for comparison