Biogeosciences Discuss.,
https://doi.org/10.5194/bg-2019-126-RC2, 2019

Biogeosciences Discussions

Interactive comment on "Using Remote Sensing to Monitor the Spring Phenology of Acadia National Park across Elevational Gradients" *by* Yan Liu et al.

Anonymous Referee #2

Received and published: 12 June 2019

In "Using Remote Sensing to Monitor the Spring Phenology of Acadia National Park across Elevational Gradients", Liu et al. have presented a comparative study of greenup phenology of a mixed species ecosystem on a climate gradient. The data were collected and compared for four consecutive years (2013-2016) using satellite remote sensing and field observations along three hiking trails from low elevation to the summit of the mountains. The topic is relevant, and the manuscript is potentially interesting, however, I have several major concerns regarding the method and analysis of the study, the presentation of the results and the discussion:

General Comments:

1) The greenup data (from remote sensing) are quantitative, as offered by vegetation indices such as EVI and EVI2 (in this study) but the current manuscript is almost entirely based on qualitative comparison of the data from different sources and at across years. While the authors have gathered data from several independent sources, unfortunately most claims in the manuscript are not supported by numbers. I strongly recommend the authors to perform a comprehensive quantitative analysis to compare the data and support the discussion. There are few places that this can be improved, here is a few: a) evaluate the effect of spatial heterogeneity across scales, as it is claimed but not proved in the manuscript, b) evaluate control of climate drivers in the study area, for example using a simple phenology model at varying spatial scales. Also, it is not clear how the leaf-out date is extracted from raw citizen-science data into species-level and plot-level data and then into the satellite cell size aggregated data.

2) The discussion and conclusion sections are very short without proper reference to the results. Additionally, the novelty of the manuscript and the "take-home-message" is not clearly stated. It is expected to see the most significant message in the abstract, introduction and supported by the result and restated in the discussion. I believe the manuscript should be significantly improved in this regard. The method section does not say much about how the main research questions, mentioned at the end of intro, are answered and how the analyses are performed.

3) The authors have shown many figures in the manuscript but in order to make the paper easier to read, presentation of the results and figures must be improved. For example, many figures are not critically important for the discussion and the result. Figure 6 and 7 are showing the same quantity (greenup) from different sources but hard to compare and see the differences between Landsat and VIIRS. Or Figures 10 to 14 can be organized if merged into a single figure. These are only a few examples and unfortunately there are more places that the figures can be improved. Also figure captions do not include any message.

4) The writing of the paper is generally fine but it needs a proofread throughout. There are many places that should be revised/corrected. For example, there are several instances of use of contraction in the text that should be generally avoided. I'm a surprised to see repetitive contracted phrases in the manuscript such as: "it's", "doesn't" . . ..

Special comments:

- P1, L22: "Therefore, the greenup . . ." , How? Why? The sentence does not appear to be logically connected to previous statement.
- P2, L1: ". . . , and so on.". Vague term, should be avoided
- P3, L3: Abrupt transition after ". . .were used as well."
- P4, L20: use of MODIS-based EVI for Landsat is not properly justified.
- P5, L14: Evergreen phenology actually plays a role in the overall trends of the vegetation indices. Can the fraction of EN to DB trees be estimated from the NLCD dataset?
- P5, L29: "it's" should be avoided. Revise to "it is"
- P7, L20, two back to back parentheses seems awkward.
- P8, L13: "it's" should be avoided. Revise to "it is"
- P9, L13: "it's" should be avoided. Revise to "it is"
- P16, F1: "doesn't" should be avoided. Revise to "does not"
- P20, F6: "doesn't" should be avoided. Revise to "does not"
- P21, F7: "doesn't" should be avoided. Revise to "does not"
- Fig 2 is not super informative. The overall trend of temperature would be more visible if only Tmean is shown. Several symbols is just confusing.
- Fig 3: Again, not very informative figure. Not sure why the first two words in the caption are in the title-case. Months can be shown different symbols too, particularly for B/W print.

- Fig 4: Different elevation zones are supposedly shown in different colors (polygons?) but not visible in the map
- Fig 5: How is the bias calculated. A color-base is missing, caption is not sufficient to describe the color scale. What does the 0.025 offset line mean?
- Fig 6 and 7 should be combined for easier comparison. Maybe showing the difference map?. "The Park" should be "the park".
- Fig 8: What is the bias? Is the RMSE calculated only from three points? What's the unit?
- Fig 9: report R-squared.
- Fig 10: Not clear what the message of this figure is. what is the trend across years, or elevation? "Greenup" should be in lower-case.
- Fig 10-14, how many observations for each box plot? What do the whiskers and boxes show?