Biogeosciences Discussions

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Comment on bg-2021-360

Anonymous Referee #2

Referee comment on "Monitoring Vegetation Condition using Microwave Remote Sensing: The Standardized Vegetation Optical Depth Index SVODI" by Leander Moesinger et al., Biogeosciences Discuss., https://doi.org/10.5194/bg-2021-360-RC2, 2022

This paper describes the development of a vegetation index that combines VOD data from multiple sensors. The work is relevant to the journal. The evaluation strategy and the discussion of results could use some improvements.

Main comments:

The paper should justify the strategy of rescaling all products to AMSR-E. Why not use the newer sensor AMSR2 as the reference? This rescaling approach will smooth out the contribution of each band, which as noted in the manuscript has different sensitivity to different parts of the vegetation. The implication of potential loss of information should be discussed.

The paper compares data an older sensor (AVHRR) as analogs for optical data. I strongly suggest the use TCI and VCI from more modern sensor such as MODIS.

The patterns of improvements (Figure 7) is not consistent with prior studies, as claimed in the article. In Figure 4a of Moesinger et al. 2020, the correlation pattern is very different. For example, the correlations are strong in the eastern US and weak in the west. Similarly correlations are strong in vegetated areas like Amazon and Congo. Here, because SVODI is an anomaly product, the semi-arid areas stand out more?

Similarly, the patterns in Figure 8 backup the statement that correlations are strongest in places where vegetation growth is limited by water availability. For example, over the agricultural areas in North America degradations are seen (see Kumar et al. 2020 ; https://hess.copernicus.org/articles/24/3431/2020/). Is that because ERA5 doesn't get the soil moisture patterns over agricultural areas, but SVODI do? You can also see similar features over Eastern China and Indus(?)

Some of the discussions around the Figures is pretty minimal and doesn't go into any depth. For example, for Figure 11 – there is no discussion of the middle and the right columns. Why have them? Similarly, Section 4.2.5 and Figure 12 provide little added information to the paper. I encourage the authors to remove extraneous and distracting results and focus on tightening the key contributions of the paper.

Other specific comments:

Page 2, para 2: A more comprehensive review of the vegetation remote sensing can be found at: Houborg, R., Fisher, J. B., and Skidmore, A. K.: Advances

in remote sensing of vegetation function and

traits, Int. J. Appl. Earth Obs. Geoinformation, 43, 1–6,

https://doi.org/10.1016/j.jag.2015.06.001, 2015

Line 39: A standalone sentence as a paragraph?

Line 48: The wording needs to be more precise. By ‘normal’, I assume that the authors are talking about deviations in a normalized distribution? Here ‘normal conditions’ sounds like the long-term average described in the previous para.

Line 51. Add a space between ‘low.Some’

Line 64-65: The lit review needs to broader. There are lots of other work evaluating the use of VOD as an above ground biomass analog. Some are listed below:

Konings, A. G., Rao, K., and Steele-Dunne, S. C.: Macro

to micro: microwave remote sensing of plant water content

for physiology and ecology, New Phytol., 223, 1166–1172,

https://doi.org/10.1111/nph.15808, 2019.

Teubner, I. E., Forkel, M., Camps-Valls, G., Jung, M., Miralles,

- G., Tramontana, G., van der Schalie, R., Vreugdenhil, M.,

Mâ□□singer, L., and Dorigo, W. A.: A carbon sink-driven approach

to estimate gross primary production from microwave

satellite observations, Remote Sens. Environ., 229, 100–113,

https://doi.org/10.1016/j.rse.2019.04.022, 2019.

Line 68-70: Have you established the issue of heteroscedasticity with VODCA data? It will be important to show an example and how the use of SVODI helps to reduce the noise to backup this claim.

Section 2.1.2: I suggest describing the sensors in chronological order, starting with the earliest (SSMI, TMI, WindSat, AMSR-E, AMSR2)

Figure 1: There are hardly any warm colors visible in this plot. I suggest revising the colorbar to be from 0 to 1, so that it has a better contrast.

Line 186: Revise to '… are drawn and p is calculated for them, …'

Line 218: What is the rationale for 16 days?

Line 240: Change to 'latter is explained in more detail below.'

Section 3.2.1: What is the rationale for examining the temporal shifts? What are you expecting to find?

Section 3.2.2: Similar to the previous section, please explain what the objective of examining the extreme values is. A reader will not know what the 'plots in Van Der Schrier et al (2013)'are.

Line 301: Is the positive trend statistically significant?

Line 310: Figure 7a shows SVODI and VCI correlation (and not VHI)

Line 311: This figure is not in line with previous studies as claimed here.

Line 365: needs a closing bracket.