

Interactive comment on “Mapping trends in woody cover throughout Namibian savanna with MODIS seasonal phenological metrics and field inventory data” by Vladimir R. Wingate et al.

Anonymous Referee #2

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Review of "Mapping trends in woody cover throughout Namibian savanna with MODIS seasonal phenological metrics and field inventory data"

The study aims to map, describe and explain trends in woody vegetation cover in Namibia. In the current shape of the manuscript, I cannot recommend a publication in Biogeosciences.

The methods and results are not described/presented in a way that allows to understand the results. The methods need to provide more details about how phenological metrics are defined and how they were computed. In addition, the description of random forest setup need to be substantially improved. From the Methods section, I

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assumed that one random forest model was trained for all field observations but then on page 13 line 4, a "2007 model" is stated. So did you train random forest models for each year separately? In addition, it is not clear which predictors were included in the random forest models. Table 1 lists DSI, MeanDS, MaxWS and DSINT but then other predictors (partly year-specific) are mentioned in Figure 3. Please replace Table 3 with an overview Table about all random forest models that were trained and which predictors were included in each model.

I find it also confusing that different results for different years are shown. For example, Figure 3 shows the importance of predictors for 2008 but Figure 4 shows the random forest fits (? - axis labels are missing!) for 2016. Is there any reason why you selected these different years or why you are not showing results for all years?

Relation to previous studies: The authors refer to Brandt et al. (2017) and Song et al. (2018). These two studies show for Namibia an increase in woody vegetation cover and in short vegetation, respectively, which is contrary to the results of this study. A more direct comparison and discussion of these results is necessary.

Specific comments

Section 2 "Material and methods": This section misses currently a logical structure because it jumps back and forth between data description, methods, different types of datasets etc. I suggest revising the structure as following:

The current section 2.2 "Study region" (including Fig. 1) can be easily merged with the section 1.2 of the introduction. Then the new structure could be:

2.1 Method overview (= 2.1 Approach + reference to Figure 2)

2.2 Datasets

2.2.1 Field data (= 2.4 + 2.5)

2.2.1 Satellite and ancillary data (= 2.3 + 2.6 + 2.7)

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2.3 Estimation of phenological metrics - includes smoothing filter description from 2.3 and a substantially improved description of the phenological metrics (2.8) and how their were estimated)

2.4 Estimation of woody vegetation cover (= 2.8 without the description of phenological metrics + 2.9 + 2.11)

2.5 Trend analysis

Sections 3 and 4: Both section have very similar sub-sections (e.g. 3.3. and 4.1 Trends in relation to biomes). Hence, the entire text is very lengthy and repetitive. I suggest to combine sections 3 and 4 into "Results and discussions". Please also assess if there are four different sub-section on "Trends in relation to . . ." needed.

P 1 L 20-25: Please indicate for which periods trends were computed.

P 9 L 1-5: Please clarify if the average percentage woody cover is representative for the variability in a field plot.

P 9 section 2.8: This section describes both the random forest modelling approach and the phenological metrics. I suggest to split these into two sections because the description of phenological metrics is currently not understandable.

P 9 L 30 – P 10 L 3: I do not understand what you are trying to say here. Please revise the paragraph.

P 13 L 3-4: I would rather state first which variables are the most important ones.

All figures: Please remove the black background in all figures. This is a waste of ink if somebody one to print the paper.

Fig. 2: It is confusing that the legend ranges from +0.8 to -0.2; please reverse. The inset map of Africa hides parts of the data; please change.

Fig. 3: The names of the predictors do not correspond to the abbreviations listed in

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Table 1. Make sure to list the correct names of ALL predictor variables in Table 1.

Fig. 5: The intention of this figure is unclear to me. What do you want to show here? What do the error bars show? Why are you comparing 2016 woody cover with tree cover (which year?).

Fig. 6: Their no units for the percentage changes.

Fig. 7 + Fig 8: These figures could be smaller and combined in one figure.

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