

Interactive comment on “Impacts of the seasonal distribution of rainfall on vegetation productivity across the Sahel” by Wenmin Zhang et al.

Anonymous Referee #2

Received and published: 16 October 2017

General comments

The well-written and well-structured manuscript presents an analysis about the impact of the seasonal rainfall distribution on ANPP in the Sahel zone during the period 2001-2015. The authors utilized a gridded dataset of daily precipitation to compute different seasonal rainfall metrics and related these to NDVI SIN (derived from a time series of MOD09Q1) as a proxy for ANPP. The objective of the manuscript is addressed with a sound methodology and the findings of the authors are supported by the results. Overall, the topic is very interesting and relevant, e.g. for the food security and climate change community, and I support the acceptance of the manuscript after minor revisions. In general, I would like the authors to address a few more issues in the discussion/conclusion. First, please discuss the quality of the utilized data products, es-

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pecially the rainfall dataset, and if this could affect the obtained results. Second, please address the possibility of an adaptation of the vegetation (e.g. change in species composition) to a change in the seasonal rainfall distribution (related to the last paragraph in the summary and conclusion section). Furthermore, I would be interested if the authors tested if there is a relationship (correlation) between the different analysed seasonal rainfall metrics. But this does not need to be part of the paper (it is just curiosity). More specific comments are given below.

Specific comments

Line 12: “number of rainy days, rainfall intensity, number of consecutive dry days and heavy rainfall events” -> please specify that these metrics refer to the rainy season

Line 17: Please add a half sentence to shortly explain the meaning of “breakpoints” in this context

Line 26: remove “KM” from the reference

Line 29: “wet season which can be highly variable between years” -> the wet season is highly variable in time and space (please add the space component)

Line 34: “21st century climate change” -> add “predicted”

Line 89: Provide a reference/website where to access the RFE-2.0 data

Line 90: Please provide an explanation why you opted for the RFE-2.0 dataset and not another daily precipitation dataset like CHIRPS (see also comment of M. Marshall)

Line 109: “on day (Pi)” -> Is there something missing, e.g. “on a certain day”?

Line 122: Provide a reference for the MOD09Q1 product and/or a website where to access the product

Line 128: Please specify if you did the resampling of the NDVI data before or after applying TIMESAT

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Line 129: Provide a reference for both land cover maps; Specify how the masking was done (i.e., did you mask out water if both LC maps indicate water in a pixel or if at least one of the LC indicate water?)

Line 133: Please explain why you chose the Pearson's correlation coefficient and not for example the non-parametric Spearman's rank correlation coefficient

Line 134: Please provide the R package name for the GAMs

Line 135: "Team, 2014" should be "R Team, 2014"

Line 138: "individual rainfall variables" -> please use terms consistently, e.g. use "individual seasonal rainfall metrics" here

Line 151f: "The 95th percentile of NDIV SIN [...] for a given rainfall amount" -> It is not fully clear how you calculated the potential vegetation productivity: Did you calculate it pixel-wise? Does the "given rainfall amount" represent the mean annual rainfall sum of a pixel? -> please clarify the description of your calculations

Line 158: "with a later onset" -> should it not be "with an earlier onset"?

Line 166f: "with a near linear relationship" -> Fig. 4 does not look like a linear relationship

Line 182: "variations in seasonal rainfall distribution" -> Do you mean all seasonal rainfall metrics?

Line 239: "from where the rather low amount of vegetation loses sensitivity to even more extreme seasonal distribution" -> please reformulate as the phrase is not really clear

Line 255: RESTREND approach -> please explain a bit more this approach

Line 367f: Some information like publisher are missing for this publication

Line 390f: Information about journal volume, issue and pages missing

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Line 400: Some information like publisher are missing for this publication

Line 432f: Should be "R Team" instead of "Team, R"; there is twice the year 2014

Table 1: Definition of CDD: should it not include "during the wet season" or something similar

Figure 1: Here the study area is defined as the area between 100-700 mm annual rainfall. But in the description of the study area on page 4 you define your study area as the area between 100-800 mm annual rainfall -> Please choose one definition and use it consistently throughout the paper

Figure 5: Please provide a parameter and a unit for the color scale in the sub-figures

Figure 6: Maybe provide an r value for each sub-figure as in figure 5

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