Referee 1

page 6-7 lines 154-156: the same sentence occurs two times.

Response: Thank you very much for pointing out this. It is deleted.

Referee 2

I would like to thank the authors for the comprehensive reply to the reviewer comments, and I would like to apologize for my very late review.
In the new version of the manuscript, parts of the discussion of the results are more clear, and sections of the methodology have very much improved!
Three questions or worries remain:
1. Are the NDVI differences calculated against monthly mean NDVI or yearly mean NDVI?
In line 211 I read: 'For the calculation of the correlation coefficients, NDVI time series were linearly detrended and its mean seasonal cycle was removed', which suggests that the mean seasonal cycle was not removed for the other analyses?

And in line 240 I read: 'To compare NDVI in different months and locations, differences (anomalies) of individual NDVI values against NDVI mean throughout the study period were calculated.'
I would highly recommend to remove the mean seasonal cycle form the NDVI for all analyses, specifically for fig 7 and fig 8. Removing the seasonal cycle would help you to tackle the problem of 'event-III', as described in section 3.4.1 and fig S4. Because fig S4 now shows (mainly) the seasonal cycle, and not the effect of the drought that you are interested in.

Response: Thank you for pointing out this comment.

I)- Regarding the calculation of NDVI differences (Fig.7,8, and 9), we believe there are some confusions. So, let's break it down.

Fig.7 is to find out if the impact of drought on vegetation can be found based on the selection of the first month and the last month from each of drought episodes from SPI-3, -6, and -12 analysis (drought episodes are marked with green rectangles in Fig.2 and S1). For Example, Fig.7a represents the vegetation anomaly in the first month (October 2005) of the first drought episode or "Event-I", while Fig.7d represents the vegetation anomaly in the last month or at the end of that first drought episode (October 2006). In other words, Fig.7a displays the vegetation anomaly, which was calculated from the difference between **October 2005** and **October-mean** over all the study period 2000-2022. Another example, if the selected month is January (or April) of a specific year, the difference was made between January (or April) of that year and January-mean (or April-mean) over the whole study period. The procedure was the same for the second drought episode or "Event-II" (Fig.7b and e) and the third drought episode or "Event-III" (Fig.7c and f). So, for

the case of the whole of Fig.7, the NDVI differences were calculated between each selected month and their corresponding monthly mean over the study period 2000-2022.

For the case of Fig.8, it is to find out if the impact of drought on vegetation can be found based on the selection of the first year and the last year from each of drought episodes during both seasonal and annual SPI (Fig.S2). As an example, for the case of the first drought episode or "Event-I": Fig.8a represents NDVI difference (or anomaly) between the year **2005** (which is the beginning year of the first drought episode) and the **year-mean of the whole study period**, while Fig.8c is the anomaly at its ending year (2006) against the year-mean of the whole study period. (The second drought episode or "Event-II" was not considered in this case). And the same concept also was applied for the third drought episode or "Event-III" and shown in Fig.8d and 8d. So, for the case of the whole of Fig.8, the NDVI differences are made between these selected years based on Fig.S2 and the year-mean of the whole study period 2000-2022.

And lastly for the case of Fig.9, it is the same concept, but the NDVI differences are seasonally and annually made based on the selected years which are found with lower SPI values from the wet season SPI analysis (Fig.S2a as marked with green circles). For example, Fig.9a represents the NDVI differences between the **wet season of 2006** (NDJFM-2006) and the **wet season of the whole study period.** The aim of the Fig.9 is to see if the most prominent drought during the wet season of a specific year has impacts on vegetation during the wet season of that year. Though, the figures (Fig.9b, e, h) and (Fig.9c, f, i) are additional analyses for the dry season and annual NDVI differences, respectively, but still based on the same selected year from the wet season SPI.

II)- Regarding the correlation analysis, yes, we used NDVI detrended anomaly before the calculation of the correlation between SPI and NDVI. And for the NDVI differences, the anomalies are treated differently based on the selection type of the NDVI differences either month (Fig.7), or year (Fig.8), or season (Fig.9) as we have explained in the previous paragraphs.

III)- Thank you for pointing out to remove the mean seasonal cycle from Fig.7 and 8, which made us realize that the concept and the purpose of Fig.7, 8 and 9 are not well understood. As we explained in previous paragraphs, Fig.7,8 and 9 are based on the differences of selected months/years/wet seasons of specific years against the month-mean/year-mean/seasonal-mean over the whole study period. So, in this case, Fig.7,8 and 9 are already anomalies relative to their corresponding means based on the selection type either month, year or season. In other words, there are no seasonal cycles in these figures since we simply compared the anomaly at the beginning and the ending of each drought episode relative to the whole mean of each selection type. And regarding the mentioned "problem" in "Event-III" in Fig.7d and c, actually it is not an issue, rather it is among the crucial findings to reveal that the selection based on months by referring to the beginning and ending months of a drought episode is not appropriate due to the regeneration of vegetation which is connected to the rainfall annual cycle. We have mentioned and explained it in the line (L388-402), but here we just took some part of the lines: "..additional analyses were performed to comprehend the increase in vegetation cover at the end of Event-III

(Fig. 7f)…This suggests that it is not appropriate to assess vegetation loss based on months' selection by referring to the starting and ending months of the drought episode (or the continuous occurrence of negative SPI values). This is because whenever the starting month falls within the negative peak months (from August to November, Fig.S3 and S4) and the ending month falls in other months, the intensity of vegetation loss is always greater during these negative peak months than in other months…"

So, to sum up all the explanations, we have made additional paragraphs to better understand the concept and purpose of Fig.7, 8 and 9, in lines (L 347-372).

2. In section 3.4.3, NDVI differences are discussed for the dry and wet season of three specific drought years. Figure 9 compares the mean seasonal NDVI over three selected years with the mean yearly NDVI over the study period. The magnitude of the NDVI difference for the wet season is larger than for the dry season (Fig. 9), or actually, NDVI difference is positive rather than negative during the dry season. It is concluded that (line 415): "The results show that the smaller negative SPI amplitudes found in these selected years during the wet season have huge impacts on declining the wet season vegetation amounts over the whole study area compared to the dry season." Is there a reason that the vegetation could have increased due to droughts in the dry season? Generally, I think that the comparison between the wet and the dry season is a bit unfair. For most (or all) regions in Madagascar, the wet season NDVI values are larger than the dry season NDVI values. Therefore, finding a large decrease in NDVI during the dry season is less likely than finding a similar large decrease in NDVI during the wet season.

Response: Thank you for this comment. As we have explained in the answer to the first question regarding Fig.9 that the purpose of Fig.9 is to see if the drought (or the years with smaller SPI values) during the SPI wet season analysis (Fig.S2a) have impacts on the wet season's vegetation of these years. And indeed, based on the results on **Fig.9a,d,g**, the vegetation losses are well perceived during the wet season of these selected years as almost the whole country is covered by negative NDVI difference values. Regarding the dry season and annual NDVI differences, as we mentioned earlier, they are just additional analyses to see how the vegetation during the dry season and annual analyses look like during the same selected years from the drought of the wet season. In other words, it is to see whether droughts during the wet season have also impacts on the dry season and annual's vegetation. Then, as based on the findings, the droughts during the wet season did not influence much the dry season's vegetation (Fig.9b,e,h) as they did during the wet season itself. This is understandable since the selected drought years were taken during the wet season SPI (Fig.S2a) while these years present less drought intensities during the SPI dry season (Fig.S2b) compared to the ones of SPI wet season. Moreover, we have added these explanations in line (453-457): "It is obvious if the wet season's vegetation (Fig.9a, 9d, and 9g) is found to be more vulnerable to droughts since it is the season when vegetation should grow abundantly. On the other side, the vegetation's gain during the dry season (Fig.9b, 9e, and 9h) might be related to the delay of the wet season rainfall due to the occurrence of drought during the wet season. In other words,

the drought during the wet season (November to April) might be connected to delayed rainfall, and therefore it might lead to vegetation growth later in the dry season (May to October).

3. Line 211 “This indicates that drought occurrences are indeed among the factors contributing to the deterioration of Madagascar’s vegetation.” I would think that a detrended and deseasonalized time series cannot be used to draw conclusions about a slow evolving process like ‘deterioration of the vegetation’. Because, if there is a long-term trend of deterioration of the vegetation, this trend will have been removed from the time series. Rather, I think that the results indicate that above or below average NDVI is – to some extent – related to above or below average precipitation.

Response: Thank you for pointing out this.

The mentioned sentence is taken from line (500-505): “It is worth mentioning that, even though the correlation coefficient values are generally low (i.e. less than 0.5), they are statistically significant at the 95% confidence level. **This indicates that drought occurrences are indeed among the factors contributing to the deterioration of Madagascar’s vegetation.** However, it is not only drought that caused the changes in vegetation, but there are also other factors, such as human-induced deforestation as the population relies heavily on fuelwood.”

Alright, we have removed the word “deterioration” and paraphrased the sentence in line (501-503), as: “This indicates that drought occurrences are indeed among the factors contributing to Madagascar’s vegetation changes, i.e., below average NDVI is to a certain extent connected to lower precipitation amounts and drought occurrence (evaluated using SPI).”