Biogeosciences Discuss., 7, C3303–C3306, 2010
www.biogeosciences-discuss.net/7/C3303/2010/

Biogeosciences Discussions

Interactive comment on "ENSO and IOD teleconnections for African ecosystems: evidence of destructive interference between climate oscillations" *by* C. A. Williams and N. P. Hanan

Anonymous Referee #2

Received and published: 13 October 2010

Review of Interactions reverse climate teleconnections typical of African ecosystems by Williams and Hanan

General comments This paper explores the impact of the two main modes of tropical SST variability – ENSO and IOD – on the vegetation photosynthetic activity over Africa. It aims in particular at identifying their joint influence. The paper offers interesting results about regions/seasons where the two SST modes have a significant influence or noticeable interferences but these results worth to be deeper analysed and discussed, considering in particular the relationship between rainfall and photosynthesis and between photosynthesis and Fpar, the asymmetry between ENSO/LNSO events impacts.

In addition given the few number of years taken into consideration for the composites samples, it might be valuable to work with partial correlations for the interference analyses as well.

Specific comments Methods: you are too laconic in this section. SiB3: you should mention clearly here which output variable you use (photosynthesis) and not in the appendix only. ANOVA and ANCOVA: please explain further these methods referring to previous studies where they have been employed. Additionally, it's not clear in the paper where the results from the ANCOVA analysis are : Figure 3 ?

Results: There are several weaknesses in that section mainly because you don't take care enough of (i) the mean rainfall amounts and photosynthesis level involved and (ii) the asymmetry between ENSO and LNSO events. I suggest that (i) you provide for each season, the mean rainfall amounts and photosynthesis level (in new figures or new columns in your tables) and (ii) you don't consider regions and seasons when the dry season occurs (i.e. DJF over the Sahel, Ethiopia, JAS over Namibia ...). For instance in your table 1, it is difficult to evaluate the importance of the anomalies given that you don't provide the mean values. -47mm in DJF for SE Africa is negligible if in mean it rains 470mm . . ..

ENSO association: "A general pattern of negative . . ... Chad and Sudan" : which season are you speaking about ? The seasonal shift: the opposite behaviour in South Africa between spring and summer rainfall has been described as a main mode of variability by Richard et al. (2002). These authors don't explore whether this rainfall mode is significantly related to ENSO or not but this study must be mentioned.

"Regarding drivers . . .." : your comment of that table 1 is too laconic whereas there is a lot of interesting information contained: persistence effects for photosynthesis anomalies, delayed answer to rainfall anomalies, asymmetry between ENSO and LNSO. Moreover it is not stated strongly enough that the ENSO, LNSO, IOD+ and IOD- years are the ones reported in figures 1ab, i.e. composites where pure and coincident events

BGD

7, C3303–C3306, 2010

are merged. In addition, an insight on the relationships between fPar and photosynthesis (i.e. slope and regression coefficient) would be welcome for each season and region to better understand the intensity of the answer to the rainfall.

IOD association: in DJF and MAM the Sudanian and Sahelian region experience their dry season. Therefore I have doubts about the reliability of the photosynthesis signal produce by SiB3. Moreover the NDVI data over that region during that seasons are known to be contaminated by desert aerosols.

Independent vs Interactive effects: you should recall or provide the evolution along the seasonal cycle of the relationship between ENSO and IOD indexes because it is not stable. Indeed in DJF you have few pure IOD events and on the contrary to SON, DJF and MAM positive IOD events seem coincident with negative ENSO events (LNSO) and not positive ones. This can be a clue for the apparent disappearance of interference in DJF. Moreover, given the few number of years available for compositing (1 or 2 for some seasons) it would worth carrying partial correlation analyses between R, Ph, V and the SST indexes which results could consolidate the composites ones.

Results for Tanzania are curious for ENSO/LNSO events. I can see the reversal of sign in SON between pure and coincident events for the three parameters but how do you explain that negative (positive) rainfall anomalies are associated with positive (negative) Fpar and Ph ones ?

Figure 1ab: for your DJF seasons could you precise if DJF 1983 is “D82” and “JF83” or “D83” and “JF84”

Table 2: why are you using a monthly time-step and do not work on the four seasons you have defined previously? It would be useful to discriminate these seasons when the interactive effects are present. Please develop the ANOVA in the method section so that we understand fully the results of that table.

Tables 2 & 3: as for Table 1 you must more clearly explain which years and how many

BGD

7, C3303–C3306, 2010

years are used in the different composites. In table 2, it is not clear if ENSO and IOD are pure only or pure and coincident (as in fig1ab and table 1).

Technical corrections p7: “satellite or gage based records ...” change for “gauge” p8: “Positive (negative) phase ENSO ...” change for “negative” Figure 2 caption: change “inset” for “insert”

Interactive comment on Biogeosciences Discuss., 7, 6323, 2010.