

Interactive comment on “A global analysis of the impact of drought on net primary productivity” by T. Chen et al.

B. van den Hurk (Editor)

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The manuscript presents a valuable evaluation of the correlation between NPP and SPEI derived from a mixture of models and observations, and contains enough new information to be published in HESS. During the constructive review process the authors have improved their manuscript clearly. However, a number of scientific and editorial comments remain that I feel need to be resolved prior to accepting the manuscript for HESS.

You chose not to detrend their data prior to calculation the correlations. In your discussion section you emphasize the importance of the variability rather than the average trends (L252). To my feeling this is exactly the reason why you should apply this de-

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trending. From the results shown in Figs 2 and 4 I do get the impression that in many cases (and certainly at the global scale) a considerable portion of the correlation is caused by the trend. Maybe the spatial structure is not (Fig 3), but the significance of the correlation (Table 2) may certainly be. It can also be that after detrending effects of anomalous conditions like the 2003 European heatwave stand out even more clearly. I thus recommend you to detrend your data prior to calculating the correlations.

Another scientific point refers to the discussion of Fig 6, where you point at the collocated anomalies of NPP and SPEI during the European 2003 event. From visual inspection I can see that the location of the SPEI anomaly is quite a bit more northerly than the NPP anomaly. I suggest to bring in some horizontal lines in this figure, and put a disclaimer about this lack of exact spatial overlap.

Furthermore, the application of Penman Monteith using a reference grass area for calculating potential evaporation may seem physically correct, but is troublesome in semi-arid areas, where the “potential” evaporation for the local vegetation type may be much lower than for grassland, which has substantially higher net radiation levels due to low albedo and low surface temperatures. A recommend to include a notion on this artefact of following FAO rules to calculate PE.

Finally, the motivation for SPEI is that it is “a more meaningful for expressing vegetation responses”, but the phrase “more meaningful” (repeated in different forms multiple times) is not strongly substantiated. My feeling is that one should consider the notion of drought propagation from rain to soil moisture to streamflow (see the recent PhD thesis by Anne van Loon, Wageningen University, or v Loon et al, HESS 2012), and position the vegetation response in this propagation framework.

Editorial comments are found in the decision letter to the authors.

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