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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Exploring the link between drought indicators and impacts" *by* S. Bachmair et al.

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This study investigates whether commonly used drought indices can predict drought impacts as reported in the media and collated in a data base. This is an interesting and important research question and I believe most of the results are well interpreted, insightful and of interest to a broad audience. Below follow some comments and suggestions.

[1] Line 8 and a few other places) It seems you are using the term "ground truthing" here to describe the translation of drought index to impact. By contrast, the interpretation a reader may well make (like I did) is that 'ground truthing' means testing the accuracy of estimation using ground measurements of the same thing. Hence suggest rephrasing.

[2] Please provide a some description of the nature of the drought impacts contained in your data base to go with Figure 2. What sort of impacts were reported in each of the 12 categories, in what sort of sources were they reported, and in what way were they described?

[3] When comparing Fig 2 a and c there is suggestion of a drought impact cascade, in that minor drought lead to reported impacts mainly in agriculture, whereas the severest drought in 2003 had a whole host of impacts, several of which I imagine may have been experienced never or rarely before. This is important in the context of resilience and adaptive potential; it is far easier to adapt to predictable drought impacts (typically associated with droughts with a shorter return time) than to poorly predictable ones associated with return times of say 25 years. In fact, there is a case to be made that a drought that returns more often than that should not be called a “drought” but just a “dry year”, as it is evidently not an extreme event. For rare events landscape, infrastructure, society, agricultural practices, water management etc can all change enormously in the intervening time, to the extent that we may barely be able to anticipate drought impacts and hence also not robustly manage for them. (For an example in an Australian context see http://onlinelibrary.wiley.com/doi/10.1002/wrcr.20123/abstract). None of this invalidates your analysis, but some discussion of these aspects is necessary for appropriate interpretation and also will enhance the insights from this study.

[4] Given the prominence of the 2003 drought some interpretation and discussion of the relative importance of extreme temperature and low rainfall is needed. In your opening sentences you use a (fairly old) ‘rainfall-focused’ definition of drought but both the better performance of SPEI and the wider range of impacts in 2003 suggests that you cannot ignore the importance of compounding extremes.

[5] Please define what impacts are considered associated with hydrological drought, and which not. For example, where do crop damage, wild fires related to desiccation and water quality problems fit? Which drought impacts are clearly not hydrological?

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[6] To call a correlation >0.9 perfect is a contradiction in terms. Call it ‘very strong’, or such.

[7] If I am interpreting the analysis results correctly you are typically dealing with very small sample sizes (e.g. 7 drought years, 14 states). I don’t see this as a huge problem but it does require you to be more careful with interpretation of correlations and significance and use methods developed for small samples. Please describe how you did this.

[8] Section 4.2. There are links between return time, resilience and efficiency that could be discussed here. It is relatively easy to adapt to frequent drought events, but typically at the cost of reduced production efficiency in normal years. By comparison, adapting management to be resilient to rare events is usually prohibitive from the perspective of opportunity costs. Furthermore, at the end of this section, you might like to consider the difference between “event-dependence” between regularly recurring ‘droughts’ (dry years) and rare extreme events.

[9] page 7604, top) It strikes me that this provides a clear argument to focus on developing (bio-) physically meaningful drought measures rather than conceptual indices? After all, that would allow us to take into account any spatial differences in susceptibility to drought as a function of soil properties, vegetation type, etc?

Overall, congratulations on an interesting analysis!

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 2, 7583, 2014.