Hydrol. Earth Syst. Sci. Discuss., 12, C4987–C4991, 2015
www.hydrol-earth-syst-sci-discuss.net/12/C4987/2015/

Hydrology and Earth System Sciences
Discussions

Interactive comment on "A quantitative analysis to objectively appraise drought indicators and model drought impacts" *by* S. Bachmair et al.

Anonymous Referee #1

Received and published: 24 November 2015

General comments this paper is well written, the topics fit the HESS journal, and both the methodologies discussed and the results presented are valuable. As a general recommendation, I see that the paper deserves the publication. However, in my opinion, there are some crucial issues that can (I do not say must) be resolved to improve the readability of the manuscript and the scientific soundness of the paper. Here I list the major issues, below I also detail on specific comments. - The paper is too long, in particular chapter 4 and 5 are double the optimal length for a paper that presents exploratory results regarding somehow new methodologies and results. I suggest avoiding to discuss each single finding in the manuscript, also because the tables and the figures are informative and very well presented. - The discussion about the methodology, in particular the part regarding the RF method, is sometimes too descriptive.

Just a couple of proper citations when the method is not new (though its application is new) are enough - This work is somehow pioneeristic, so I applaud the efforts of the authors from the data collection to the application of different methods and to results. But my general opinion is that there is too much at stake, so maybe splitting the study into two (meterological indicators AND groundwater-streamflow indicators) may be a solution that the authors would ponder. - It seems that the EDII is the most problematic source of drawback in this study: the collection of reports, their use, their further selection can bias the final outputs. however, there are many other sources of possible bias because the authors make many choices to structure the outputs (regionalization, thresholds, aggregation, minimum number of events, indicators, etc.). These possible drawbacks are always correctly reported by the authors, so I do not criticize them for hiding the possible biases, on the contrary I applaud their presentation. But the sum of possible biases may eventually make the final outputs a bit weak, compared to the huge effort made by the authors. - Last point: checking the quality of input data (I mean precipitation and temperature data or streamflow data, etc.) with tests implemented by the authors would make the outputs stronger for readers that usually deal with quality checks or homogenization of climatic data.

To summarize, this is a valuable study, but in my opinion what could mostly prevent it from publication is its excessive length and the manifold sources of biases that involve the various steps. So, I suggest going through major revision before publication.

Specific comments and technical comments

Abstract P9438 L14 You can remove "random forest", the general kind of method is enough in the abstract. P9438 L18 Two hydrological indicators: please, name them in the abstract.

Introduction P9349 L7 Avoid words like "creeping" in a scientific paper. P9440 L18-20 Some typo errors in this sentence. P9441 L16 Which other types? Briefly list them besides the citations.

Data P9443 L22-23 These indicators are important, but you name them for the fist time after a few pages. I suggest to cite them also in the abstract or at least in the introduction. P9444 L1 The EOBS have been subsequently updated till version 12. Every version shows a not marginal improvement in terms of data quality and quantity. Have you just used the gridded data as they are or have you performed quality checks or homogeneity tests? Though the problems of earlier versions are mostly out of your areas of interest (i.e., UK and GER), some robust quality test before the use would be desirable. P9444 L4-10 Why didn't you choose a common reference period? At least for each country. P9444 L13-26 Have you checked the quality with your own tests? this would enhance the reliability of the outputs, as they strongly depend on the quality of input data. P9445 L15 How can you be completely sure that such impact (e.g., crop loss for that year) depends on drought, should it be partially or totally dependent? Because in a previous paragraph you said that it's not easy to understand how drought impacts many sectors because the cause of such an impact (crop loss, for example) is often unclear or undetermined. I mean, your effort is relevant, but how you decide to use a document in the EDII in your calculations? Is there a selection? Are all the entries considered? Are some possible entries discarded before being included into the EDII database? It seems to me that you did a considerable effort in collecting the impacts, so you might want to briefly report about this selection also in this paper (not only citing the proper reference), in order to convince the readers that the input for the calculations shown in this manuscript are robust. P9447 L14-16 How do you think this lack of reported impact may affect your calculations? though you only selected regions with at least 10 months of impacts, do you think that this lack could bias the models or the outputs even for these regions?

Methods P9449 L15 - P9450 L6 In my opinion you go too much in details with random forest steps. Just cite the method and summarize in a couple of short sentences how it works.

Results P9454 L8 what's your opinion on this fact? Is it due to lack of reported impacts

regarding other seasons? Lack of impacts? I'm interested in your opinion, I'm not arguing on this fact. P9458 L1-10 what do you exactly mean for "false-positive impacts"? Predicted/modeled impacts that did not effectively occur? A simple point could be: no impacts occurred or no impact reports have been included into the EDII? P9458 L13-14 So the aggregation at NUTS1 may be a limit? Moving to NUTS2 would limit the "false-positive" records? This section seems a bit too long in my opinion.

Discussion P9459 L12-14 These potential EDII error sources seem the most limiting factor, despite the remarkable validity of your analyses. P9461 L13-29 your observations are interesting, but at this point it seems that studying meteorological drought indicators as the SPI and the SPEI and studying in parallel streamflow and groundwater drought indicators is a really difficult task and it may be considered a splitting of these two main kinds of indicators into two different papers. This is not a suggestion, but the results shown in this paper are too many and sometimes it's not easy to follow a path during the long chapters. P9462 L1-5 However I do recognize the overall validity and complexity of your work and I agree with this comment. P9462 L20 Should you just choose one, which one would you suggest? Personal curiosity. P9463 L6 why? To simplify the calculations? To focus on "long seasonal events/impacts"? P9463 L24-25 This is crucial and maybe it is discussed a bit "too far" in the manuscript. P9465 5.3 Personal taste: learnt instead of learned. P9467 L10 This subchapter 5.3 in my opinion is too long, you could evaluate the possibility to summarize the entire chapter in a couple of sentences in the conclusions and dedicate a brand new paper which preliminary explore the suitability of RF method applied to drought impacts. This kind of topic surely deserves a dedicated study and I would be really glad to read it.and I'm sure that I'd not be the only one sharing this opinion.

Conclusion(s) - Use plural, if you please. P9467 L20-23 I would say additional empirical evidence, because these findings are not new to scientific community. You might also add a couple of citations here. P9648 L9 Compared to the length of chapters 4 and 5, the conclusions in my opinion are too short and do not effectively summarize the most

relevant findings except of a fast recall of concepts analyzed. Improving conclusions might help the appeal of the paper, because some readers (let's blame on them, by the way) just read the abstract, skip the core text, and jump to conclusions.

References Okay

Tables and Figures Well presented and suitable to the level of this journal.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 9437, 2015.