Hydrology and Earth System Sciences Discussions

Hydrol. Earth Syst. Sci. Discuss., referee comment RC1
https://doi.org/10.5194/hess-2021-209-RC1, 2021

Comment on hess-2021-209

Veit Blauhut (Referee)

Referee comment on "Drought impact links to meteorological drought indicators and predictability in Spain" by Herminia Torelló-Sentelles and Christian L. E. Franzke, Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2021-209-RC1, 2021

Dear authors,

many thanks for your highly interesting submission to HESS/NHESS. I'm always glad to see some added value/application off the EDII.

Overall the manuscripts reads very well and is embedded in the current state of literature. Nevertheless, I do have some major points of critique I would like to discuss:

Data:

One of your first take home messages is "We encourage drought impact information to continue to be collected and given importance in future drought impact studies". I'm sorry to say, but this is nothing novel. All publications with or on EDII data claim this…which brings me to my major point of critique.

the version of EDII data you applied is quite outdated (I guess you downloaded the online version at EDC). Besides well known reporting biases in space and time, you missed recent major drought event(e.g. 2017/18). Therefore your data is likely lacking

representativity (?).You should invest some time to update the Spanish case (you might contact ruth.stephan@hydrology.uni-freiburg.de or me for assistance and an actual offline version of the EDII). Furthermore, I'm afraid you did not do an EDII-data quality check of the Spanish case? Since 2015 we did learn quite a lot of how to use the data (more below).

From the methodological site, I appreciate your work using RF. Nevertheless I do have remarks to consider. Furthermore, some ideas to upgrade (?) your paper and to move from "showing a method which has been done already for the case of Spain" towards a little bit more.

The EDII data is a collection of impact reports which were attributed to 1 of >100 impact types. These impact types are categories to 1 of 15 impact categories. Accordingly, these impact categories pool sometimes very different drought types together! E.g. agriculture (1.2 – Reduced productivity of permanent crop cultivation; 1.7. Regional shortage of feed/water for livestock, 1.8 others). These impacts occur at very different stages and/or types of drought. Furthermore, "others" can be anything related to drought. Forestry for example might be "impacts on mushroom harvest" but also reduced tree growth/ dieback of trees. Again, very different effects needed to cause these impacts.

The method to "simply use the impacts categories (as Stagge et. all and Blauhut et al. did) is not as easy and requires "a dive into the data" to maybe re-categorise impact types or not to use all impact types within a single category. Anyway, I cannot at all recommend to use all impact categories together. Yes, Bachmair et al. did it, BUT you will get a way better signal if you do it category separated. You will probably not be able to use all, only the ones with good data, and monthly data, but this will make way more sense this way. Also, you should consider the "logic" of impact occurrence with regard to their nature (time of occurrence and duration). E.g. agricultural impacts can only seldom have a beginning and end by month. Normally, harvest is "weighted" ones a year. There is not "drought impacts on grain occurred from May to July). Its only quantified ones! Of cause, impacts on meadows might occur three times a year (at least in Germany). In contrast, impacts on hydropower production can of cause have a clear timestamp on it (low flow from may – September). Hence – this is another reason why you cannot merge the impact categories.

Using total numbers of impact reports is ambiguous- but possible. Nevertheless, the strong bias over time (1976- 2020) has to be considered somehow. Reporting culture and media has changed dramatically since. à you might consider also testing on binary signals, rather than totals.

Since you are using RF, I would like to consider some more factors which could increase your model performance. Blauhut et al (2016) included vulnerability factors as

determinants (vulnerability factors) to explain LIO beyond the hazard. Including such increased model performance for most cases!

With regard to model quality I please you to also present the Area under ROC curve characteristics, as Stagge, Sutanto and Blauhut did. A cross-correlation is not expedient. Furthermore, you could use your novel, self-investigated data to test your model?

By now your work is only a copy of… if you would separate the impact types as Blauhut et al 2015/6 and apply your indices, and forecasting… this would become a more beneficial contribution. Furthermore, you could consider to include catchment specific characteristics (vulnerability factors) such as is the catchment managed (yes/no), how many reservoirs ….a lot of opportunities to consider and I would be happy to discuss about.

Some minor comments on text and figures can be found in the PDF.

To wrap up, I highly appreciate your work! But you should take the chance to give it a bigger meaning for the community. Thus, the first step would be to investigate more impacts and then 2nd you should consider to re-categorise the impact reports, only use specific impact types (e.g. with high counts of reports) or maybe use different prediction models in comparison (e.g. zero inflated models?). Anyway, a big added value to the community would be a comparison of such.

Please feel free to contact me for an open discussion or assistance.

Please also note the supplement to this comment:
https://hess.copernicus.org/preprints/hess-2021-209/hess-2021-209-RC1-supplement.pdf