

Response to comment of Referee #1

Please find in Black the reviewer's comments and in Blue our responses.

General comment: "Dear authors,

Many thanks for your careful revision. I highly appreciate your efforts. With regard to my major concern, impact data I appreciate your honesty, but still do not understand why you did not take the time to collect more impact information on your own!. It was known right from the beginning that the data is gappy and biased... This "minor" effort would have strongly improved your study and furthermore would have been of great benefit to the community! Now your manuscript ends "like all the others"... "we recommend to collect more impact information and do sector specific analysis"...but If no one take the effort to collect the information... this will not become possible.

- Nevertheless, I see that you will not change this anymore.
- Besides this caveat, I really appreciate:
- Your very nice verification that reporting culture does not seem to affect RF results."

Reply: Dear Veit Blauhut, we thank you again for your constructive comments on our manuscript. Please find our answers to your suggestions below.

General comment: "And your efforts of including additional vulnerability factors starting a discussion on the effects of longer time series vs. (maybe) more appropriate drivers. Nevertheless, this section could need some more discussion to others studies be would be of pleasure, which used similar factors and resulted in similar/different ? results."

Reply: We have now added a paragraph in lines 564-569 discussing and comparing the results of our vulnerability analysis to another study that used similar vulnerability factors:

"The vulnerability analysis revealed that some vulnerability factors may also be appropriate drought impact drivers. When we compare our vulnerability analysis results to the results from Blauhut et al. (2016), who investigated drought risk in Europe using vulnerability factors and drought hazard indices, we find some similarities. For instance, they found that for the Western Mediterranean region, some of the best performing vulnerability factors included: area of agriculture, seminatural areas and wetlands. These results agree with our findings (see Fig. 12). They also did not find factors such as GDP per capita or public water supply to be good predictors. They also showed that overall, vulnerability factors improved model accuracy."

General comment: "Some technical aspects commented in the PDF.

I'm looking forward to see your paper being published after minor revision! All the best and many thanks for your contribution!"

Reply: Thank you, please find below our replies to the technical aspects commented in the PDF.

Comment (line 265): "This might require some explanation"

Reply: We have now modified this statement to explain it better and we give an example. We now say: "We visually examined impact reports, specifically their durations and

descriptions, to make sure that their quantification to impact occurrences was sensible regarding the nature of each impact. For instance, we made sure that impacts that usually do not last more than one month by nature, were reported in such a way (e.g. impacts on wildfires). Similarly, we checked that longer-lasting impacts (e.g. impacts on agriculture and livestock, and on freshwater and terrestrial ecosystems) occurred over longer periods of time. We found that overall, the time of occurrence and duration of impact reports matched with their descriptions well.” (See lines 252-257).

Comment (line 267): “Please give an example, the issue is hard to imagine though.”

Reply: To clarify and avoid confusion, we have included parts of this statement in the paragraph discussed in the previous comment. (See lines 252-257).

Comment (line 269): “I guess this should be given in discussion and not here? Highlighting this caveat right at the beginning might question why you did use the data that way—”

Reply: We agree and have removed this. This statement is already partly integrated in the discussion in lines 574-575.

Comments (lines 470 and 476): “don't discuss in result-sections”

Reply: We have removed this statement from the results section.

Comments (lines 493): “I guess you investigated drought risk as a function of hazard indicators, exposure, vulnerability factors and impact information. Blauhut (2020) defined this as a hybrid data approach using a statistical model, also claiming this to be the most appropriate way to go for...”

Reply: We now describe our approach as a hybrid data approach: “We also investigated the potential for vulnerability factors to be used as impact drivers. This means we used a hybrid data approach, as defined by Blauhut (2020), to investigate drought risk as a function of hazard indicators, exposure and vulnerability factors, and impact information using a statistical model.” (See lines 472-474).

Comments (lines 507): “I would appreciate some comparison to other studies in Spain (Mediterranean) predicting drought impacts using drought indices. E.g. Gudmundsson et al. 2015 (forest fires), or the variety of work from Vincente Serrano, e.g. agriculture, tree rings etc.!”

Reply: In lines 487-491 we now add: “These meteorological indices have already been linked to drought impacts in Spain or the Mediterranean region in several studies. For example, the SPI has been used to successfully forecast above normal summer wildfire activity (Gudmundsson et al., 2014). The SPEI has been used to detect drought impacts on vegetation activity (Gouveia et al., 2017), and the SPI has been correlated to tree ring widths to determine the impacts of drought on forest growth (Pasho et al., 2011).”

Comments (lines 533): “even though its not directly linked to the impact detection, drought and teleconnections is studied quite well and should be references/ discussed to (e.g. Kingston et al. 2015, Hannah et al. 2014...etc.)”

Reply: In the ‘Drought indicators and data sets’ section, we already present studies that have shown links between teleconnection patterns and precipitation or drought indices. This is to present the motivation for choosing specific teleconnection patterns. We have now

added two more references (in this section) following your suggestions and reference this section in the discussion (see lines 167-174 and 496).

Comments (lines 605): “you might add (“such as 2017-18”) Please also consider to claim for “Europe wide, regularly updated impact database!””

Reply: We have changed the line to “A later major drought event (2017-2018) was not included...” (see line 575). In line 65, we already mention that “database collects reported drought impacts for different European countries”.

Regarding the statement on the regular updates, we are currently no longer able to access the original data nor the updated version online. Communication with Kerstin Stahl (August 2021) confirmed that at that moment the website was not working anymore. The problem still seems to persist hence, we chose to not claim that the database is regularly updated.

Thank you again for your comments, we believe they have helped improve the quality of our manuscript.