

Interactive
Comment

Interactive comment on “Water supply patterns in two agricultural areas of Central Germany under climate change conditions” by M. H. Tölle et al.

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Received and published: 20 July 2012

We would like to thank anonymous Reviewer #3 for his/her helpful comments and suggestions. We hope that we have adequately addressed the expressed concerns.

Anonymous Referee #3 From the paper it is not obvious what new scientific question/result is dealt with. It discusses the impact of emission scenarios and climate model biases. This has been discussed in many papers already and a few examples are cited in the paper. It supports the conclusion that close together areas are potentially differently affected by climate change. But, this has been discussed by analyzing projections in two small areas only. It would be interesting to be able to make more general conclusions like “in temperate central Europe drought frequency changes by xx% within xx km on average” or “spatial heterogeneity decreases/increases with continen-

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tality". Since REGNIE is used as precipitation reference data set at least the variability in Germany is easy to investigate.

Answer: In the revised manuscript we extended the models ensemble, investigated the range of variability among individual models and model runs (CCLM and REMO for A1B and B1) and compared it to the spread in the climate change signal with and without bias correction. We clearly point out that the SPI is a good predictor for future drought which does not need to be bias corrected. Following the suggestion by the reviewer we extended our analysis to all of Germany including different areas with different spatial heterogeneity to strengthen our general conclusions. The results are novel. We now see that the motivation for performing this study needs to be put in the context of our broader study. We have added this motivation to the revised paper in the introduction.

In their reply to the comments of Reviewer #1 (www.biogeosciences-discuss.net/9/C1814/2012/) the authors announce that a new version of this paper will assess the uncertainties of drought and flood projections by consideration of multiple emission scenarios and two regional climate scenarios. But, they still plan to use only one bias correction method (quantile mapping). A full investigation of the uncertainty sources would imply application of multiple global climate forcings and multiple bias correction methods. Especially, the latter is important here, since the discussion of the effect of bias correction on precipitation is discussed. The authors should also consider recent critical discussions on applicability of bias correction (e.g. Ehret et al. (2012) HESS Opinions "Should we apply bias correction to global and regional climate model data?", Hydrol. Earth Syst. Sci. Discuss., 9, 5355-5387, doi:10.5194/hessd-9-5355-2012; Chun Kit et al. (2012) Calibration Strategies: A Source of Additional Uncertainty in Climate Change Projections. Bull. Amer. Meteor. Soc., 93, 21–26. doi: <http://dx.doi.org/10.1175/2011BAMS3110.1>)

Answer: We thank the Referee #3 for the additional information on manuscripts of applicability of bias correction. Those manuscripts were online after we had submitted our

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manuscript. We will add and discuss those manuscripts in the context of our findings and it will certainly improve our manuscript. We do not agree with the suggestion to test additional bias correction approaches. In the revised manuscript we aim to show that the SPI can be used without bias correction. Please see also answer to reviewer #2. Our analysis is based on the data which are available including bias corrected data for Germany.

The Standardized Precipitation Index (SPI) is used as an indicator of water scarcity in the climate projections. What is the effect of the bias correction of the precipitation time series on SPI? I guess a very minor with SPI standardizing the data.

Answer: In response to this comment, we will compare the bias corrected values with the non-bias corrected values within the extended ensembles to show the effect of the bias correction of the precipitation time series of SPI and to compare it with the variability caused by RCMs choice. We will discuss our findings in the revised manuscript.

Interactive comment on Biogeosciences Discuss., 9, 5153, 2012.

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