

We would like to thank anonymous Reviewer #1 for his/her helpful comments and suggestions to improve the manuscript.

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

Anonymous Referee #1

Reading your reply on my general comments, the scientific merits of your study became clearer to me. Make sure that you write the revision in a way that explanation beyond the manuscript will not be necessary, i.e. that the ‘story’ becomes clear from the manuscript. (C8)

Answer: Thank you, we did our best to incorporate all the necessary explanations in the revised manuscript.

You write ‘However, the bias correction approach assumes that the biases in the model for the observed period remain the same in the future.’ How do you contribute to resolve this issue? (C9)

Answer: Per definition the model bias is the systematic deviation of the model from the observation. With the dynamic models it usually means that there is/are some problem/problems in description of physical processes or with parameterization. This problem remains the same independently on modeled time period and therefore the assumption is that also the bias produced by this problem remains quantitatively the same in the future. Of course it could be that the process is non-linear – the same model problem produces higher or lower bias under the completely different future climatic conditions (under changing climate). Also the similar inconsistencies could be produced when comparing the model with the imperfect observation data (which is mostly the case). We are well aware of all these problems: so our hypothesis and assumption is that bias is invariant in time. The extended simulation ensemble which we implement in the revised manuscript should show the relation between the effect of model bias and the variability range of different models and model runs (simulations).

Your mention ‘Nobody has shown this analysis for these areas before : : ’. To me this argument is not sufficient. I guess you mean that you look at these regions as case studies from which you can derive general statements and conclusions. This would, however needed to be demonstrated in the discussion. For which areas/applications are your findings representative? (C10)

Answer: Indeed we looked at these temperate regions as case studies. However, in the revised manuscript we will extend our analysis for the whole Germany now with different spatial heterogeneity to strengthen our general conclusions. Please, see our first reply to reviewer #3.

In your answer to my comment C2 you refer to the objectives of your research project. Please consider distinguishing between reporting from your project from writing an article on a specific scientific subject. I would strongly suggest concentrating here on the latter. To me the project goals are less relevant for this manuscript than the question, what did you actually to discuss here. The SPI this is not bioenergy crop specific. You write 'The biological aspects are therefore negligible at this stage, but will be addressed later.' What comes later is irrelevant for this manuscript. So then keep it as it is, a generalized assessment of biological effects rather than a contribution to the special question of bioenergy cropping or add some material that makes this analysis specific for bioenergy cropping. (C11)

Answer: You are absolutely correct, the SPI is not crop specific, we will reformulate the text.

'p5157, l 25: Why 'field areas' Answer: Why not? We can rename it into "bioenergy areas" The appropriate term would be '(bioenergy) cropping areas', I guess. (C12)

Answer: Thank you for your suggestion. We think Göttingen area and Grossfahner area would better suite our study. However, we have extended our analysis to the area of Germany in the revised manuscript. So those terms are irrelevant, now.

'p5162, l5: 'The climate change signal of SPI'-> 'The SPI' Answer: We do not agree with the suggested improvement: it is not the SPI itself that demonstrates the "wetting" of the winter in future, but the SPI-change.' I understand, but then you should probably write 'the change in future SPI' (C13)

Answer: The most precise wording would be "climate change signal in the SPI". We now realize that we should put an explanation into the methods section about the meaning of the climate change signal. The revised manuscript will include a definition: "Our analysis includes the climate change signal in the SPI which is the difference between the projected SPI averaged over a 30 years period at the end of the twenty-first century (2071-2100) to a control period representing current SPI (1971-2000)."

I appreciate your answers to C6 and C7. Make sure that the answer to C7 enters the

discussion in the manuscript.(C14)

Answer: Yes, we will include this answer in the discussion section of the manuscript.