

## ***Interactive comment on “Climate change impact on groundwater levels: ensemble modelling of extreme values” by J. Kidmose et al.***

### **Anonymous Referee #2**

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#### General

This paper is of interest to HESS. Main interest lies in the fact that with a state of the art approach the climate change impact on groundwater is analyzed focusing on extremely high groundwater levels. However, in order to be of more general interest it would be good to open the scope of the paper and address the different cases for which these extreme value analysis would be of interest. This concerns also low groundwater levels under drought conditions. Now the paper is too much centered on a specific case study. The paper needs also to improve at many places. The English and figures have to be improved, and often explanations need to be better as well. I recommend therefore major revision.

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#### Detailed comments

Page 7837, L 21-L23: What about importance of low groundwater levels? Can you dedicate some words to that? It is for example important for wetland preservation.

P7844, Eq. 1. Where is the regularization term? Why are there multiple terms for  $h$ ?

P7846, L 13-L16. See also Stoll et al. (2011, HESS). They conclude something different and are less positive about the delta change method.

P 7846, L17-L26. In the context of applying downscaling methods in climate change impact studies I suggest to have a look at Stoll et al. (2011, HESS).

P 7847. Explain symbols in equation (throughout the paper). This is not always done.

P 7848, L 7- L13. Unclear. More details needed. Why 9 series?

P 7849, L 7-L8: What do you mean and why?

P7850, L 5: With what do they disagree? Specify that this is a comparison between the different climate model runs.

P 7850. What about other important influence factors like changing pumping activities?

P7851, L11-L12: Reformulate and explain why this illustrates that this is an important source of uncertainty.

P7855, L2: However, that analysis was associated with quite some uncertainty. I suggest explaining and discussing this.

P7855, L12-L13. Specify. Where? What?

#### Editorial comments

Page 7836, L 4: “is represented” instead of “are represented”.

Page 7838, L 3: “were compared” instead of “was compared”.

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P 7839, L 20-L21: Reformulate “is critically near to the motorway”.

P 7840, L7-L8: “were deposited” and “were used”: change back to singular.

P 7840, L 19- L 20: Rephrase, unclear. What variation?

P 7840, L 21: west?

P 7842, L 1- L 2. Unclear.

P 7843, L1: Change to: “the river discharge station”.

P 7844, L6: “outside this”. Please rephrase.

P 7848, L 18-L19: Rewrite.

P 7848, L 22. Rephrase. What is this?

P 7849, L 10-L12: Repetition.

P 7849, L 28- P7850, L2. Rephrase sentence.

P7850, L17-L20: Rephrase.

P7850, L23-L24. What are you saying? Please reformulate.

P7850, L25. “is similar” instead of “are similar”.

P7851, L8. Rephrase.

P7851, L21-L24. Unclear, reformulate.

P7853, L4-L5. Rephrase

P7854, L10. Change “(...) only have (...)” to “(...) only has (...)”

P7855, L5-L7. Rewrite.

P7855, L22: “thus” instead of “this”.

P7856, L10: “is”, not “are”.

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P7856, L13: “concludes” instead of “conclude”.

P7856, L14-L15. Rephrase / shorten.

P7856, L19. “and” instead of “but also the”.

P7856, L25: “future change” instead of “future changes”.

P7857, L4: “ensemble”. Write out DBS.

P7857, L7: “ensemble”.

Fig.1. Where is the area located? Unclear from map.

Fig.2 . The figure is somewhat unclear.

Fig. 5. New figure needed. Very unclear. Please explain also the symbols.

Fig. 6. Remove colors in figure.

Fig. 7. Too many lines in graphs. Replace “show” with “shows”.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 9, 7835, 2012.

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