**Atmospheric
Chemistry
and Physics
Discussions**

Interactive comment on "Large-scale atmospheric circulation biases and changes in global climate model simulations and their importance for regional climate scenarios: a case study for West-Central Europe" *by* A. P. van Ulden and G. J. van Oldenborgh

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Our paper has been chnged considerably, allthough the main structure has remained the same. Reasons for a drastic revision were the following:

- After submission of our first draft, simulations by all 23 global coupled models are now available in the IPCC data base. Therefore we have added the remaining models to our analysis of global pressure fields.

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- We have used a more objective way to rank the models, and used now the full ERA-40 data set for comparison. This led to some changes in the ranking of models, and to a slightly different selection of models to be used in the detailed analysis for Europe.

- We improved all figures, to make them better readable when printed in their final, smaller size.

- Other changes are primarily due to comments by the referees. These are discussed below.

Referee #1

1. We have added figure 1 to illustrate global bias patterns in SLP fields. Figure 15 was added to illustrate changes in pressure patterns over Europe, while figure 16 shows the corresponding precipitation changes over Europe.

2. We agree with this comment and have adapted our text and conclusions accordingly.

3. We agree with this comment and have removed the overly critical sentences in the paper.

4. Figure 7 was deleted and figure 4 discussed more carefully.

5. We have tried to make the reference list more balanced.

6. The information given in these figures has been replaced by more transparant information on distributions and distribution changes.

7. This figure has been replaced by a better figure and the text has been improved.

8. This information has been added where appropriate.

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9. We agree and have adapted the text.

10. Reference has been added and is briefly discussed.

11. Text had been adapted.

12. Has been added.

13. See (9).

14. This would be a lot of work and necessary information is not easily accessible. We have added a remark that the best performing models, are new high resolution models.

15. The title was shortened, and West-Central replaced by Central.

16. The overlap was removed from the abstract.

17. Text was changed.

18. Tables were adapted.

19. This explanation was included in the text in a more rigorous manner.

20. Text was adapted.

21. The use of abbriviations was made consistent throughout the paper.

22. Was replaced by a good performing model.

23. Figures were redrawn.

24. Indeed.

Referee #2

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1. The algoritm may be the same, but altitude and temperatures may be different for station data and for re-analysed and modeled fields.

2. We did not make orography corrections.

3. Just spatial. Explanation in the text was made more explicit.

4. The selection procedure was made more objective, and based on the quality for three latitude belts and all months.

5. The memory was calcutated estimating fisrt the regression coefficients without memory, and then estimating the memory in an iterated process, stating in January, the February etc. One iteration appeared to be sufficient. Three memory terms were kept because this led to the most stable results.

6. Here is some confusion. We used the regressions see if models behave similarly as the observations do and to estimate the mean bias. The residual bias is just the difference of the total bias and the circulation induced bias.

7. The last three comments do no longer apply to the new text.

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 7415, 2005.

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