Atmos. Chem. Phys. Discuss., 5, S2552–S2554, 2005
www.atmos-chem-phys.org/acpd/5/S2552/
European Geosciences Union

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

Anonymous Referee #2

Received and published: 9 September 2005

This manuscript analyzes over Europe the temperature and precipitation response of the GCMs involved in IPCC-AR4. The reliability of the models is analyzed through their ability to reproduce the large-scale circulation over the region. An original analysis method is proposed to decompose temperature and precipitation into local and circulation induced contribution. The question of the sample length to ensure statistical

stability of the averages is also addressed. This study is clearly written with a good balance of figures and tables. It brings new ideas in the analysis of GCM climates. It is therefore worth publishing with some minor corrections or additions.

Specific comments:

P3, sect. 2, line 7: ERA40, the GCMs, and barometer observations use the same algorithm to transform surface pressure into sea-level pressure; there is no special advantage in ERA40.

P5, para 2, line 3: how far is the excellent agreement in screen level temperature over land ? Is it comparable to figure 1 where the rms difference is explained just by 30-year sampling ? Is there an orography correction between ERA40 model elevation and CRU grid elevation ?

P5, para 3, line 6: is the 0.95 correlation just spatial or does it include month-to-month variability ? If it is temporal correlation, does it include the seasonal cycle ?

P5, para 4: I find the selection procedure a bit strange. If, for the sake of clarity, it is not possible to include all models, why the best 8 and the worst 2 ? Using the best 5 and the worst 5 would be more equilibrated. Otherwise, if one considers that a good agreement on a small domain can be obtained just by chance, one should eliminate the outliers and take the 10 median GCMs as representative of IPCC-AR4.

P6, last para: I do not understand how M is calculated. If it is a regression by the previous month TA, it is clearly an exponentially decaying memory, but then why 3 months, and why past circulations. As Eq.2 is central to the paper, I think it important that the reader can use the method with his own data

P8 : in figures 10 and 12, the residual bias is compared to the circulation-induced bias. The residual should be uncorrelated with the circulation-predicted variable (so that the variances are additive). For this, one should not apply variance inflation, since it would provide an additional contribution to the residual, which is no longer minimum in least

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Interactive Comment

squares. The text does not mention about it, but the authors should be aware of this.

Technical comments:

P2, 1 line from bottom: estimate

P4, para 2, line 2: thousands

Figure 7: January

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