

# Effects of climate model radiation, humidity and wind estimates on hydrological simulations by I. Haddeland, J. Heinke, F. Voß, S. Eisner, C. Chen, S. Hagemann and F. Ludwig

## Reviewer's comments

The study presented here compares the output of global hydrological models forced either with partly or completely bias corrected climate model output or with observational data. The reason for this is the fact that usually, forcing data derived from climate models is only corrected with respect to temperature and precipitation, but radiation, humidity and wind speed are left unchanged. This is an interesting as well as relevant topic. I have a few comments on the manuscript, but in general I consider the paper suitable for publication. References can be found in the manuscript.

1. It is mentioned several times in the manuscript that the output from climate models is corrected with respect to precipitation and temperature. The method used for this correction, however, is not described. Since there are other studies dealing with this topic, a detailed explanation in this manuscript is not necessary, but a short summary of the possible procedures in one or two sentences would certainly be useful for the reader.
2. The notation of equation 1 seems a bit misleading to me. It would be better to put the bar directly above the variable, e.g.  $\bar{V}_{\text{wfd}}(\text{m})$ , to make clear that it is a mean value over several years for a certain month.
3. Although the method for bias correction given in equation 1 seems reasonable, it would be nice to have a reference for this method. The references given for the bias correction of precipitation and temperature (e.g. Wood et al., 2004; Piani et al., 2010; Themeßl et al., 2010) seem to use different methods. The method used in Sperna Weiland et al. (2010) for bias correcting precipitation seems to be identical to the one used in this manuscript, this should be mentioned.
4. It should be pointed out that, by using long-term mean monthly values to bias correct the climate forcing variables, a possible trend in the correction function is neglected. This means that for the 2071-2100 scenarios, the correction factor might have a different value than for the 1971-2000 scenarios. Although it is mentioned briefly in the text, this source of uncertainty should be stated more clearly.
5. At the end of section 3.2. several basins are mentioned that do not appear in figure 2. If the analyses illustrated in figures 4 and 5 have also been made for these additional basins, it would be nice to have an overview of the results (e.g. a table with all basins, the mean evapotranspiration/runoff of a basin and the improvement in percent from original to bias corrected climate model forcing for each hydrological model).

6. Figures 4 and 5 are hard to read, it would be better if the bias corrected variables from ECHAM and IPSL were represented by symbols (e.g. filled black triangles and dots) instead of dashed lines.