

Interactive comment on “Multi-model ensemble simulations of tropospheric NO₂ compared with GOME retrievals for the year 2000” by T. P. C. van Noije et al.

T. P. C. van Noije et al.

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We thank Referee #2 for reviewing our manuscript.

Response to comments:

Page 2983. The collocation of model output with the GOME measurement requires that the data are processed at a high resolution. We have now clarified at the beginning of Section 4 that the model data are sampled at the locations of the scenes that are actually included in the BIRA/KNMI retrieval. Since the retrieval is processed on a resolution of 0.5 x 0.5 degrees, the model data are also mapped to this resolution initially.

We have added that the GOME forward scan pixel area of 320 km x 40 km corresponds to approximately 3 x 0.4 degrees at the equator.

As explained above, the same scenes are selected for all models. Although MATCH_MPIC and IMAGES only supplied monthly mean fields, we sampled these models in the same way (assuming that the column on a particular day is given by the mean column in that month). It is shown in Section 5.3 that in this way we do account for sampling biases in the retrievals due to correlations on seasonal time scales between local cloud cover and tropospheric NO₂ columns. This is true for all models. Obviously, for MATCH_MPIC and IMAGES the sampling cannot account for sampling biases related to correlations on day-to-day time scales. However, as shown in Figure 7, this also holds for the climate models of ensemble B, which did provide daily local time output.

Page 2969. We have rephrased the text as suggested.

Page 2980. We have rephrased the text as suggested.

Page 2986. We fully agree with this.

Page 2987, lines 8-11. In the revised document we have clarified that removal of CH₄ by OH is diagnosed even though CH₄ was fixed, and that this is used to calculate the lifetime.

Page 2987, lines 13-15. We have removed the word "relatively" at three different positions. We do not want to quote numbers here, as the exact magnitudes of the differences are not very important for the argument.

Table 4. We now quote the means and standard deviations as suggested.

Page 3-35. We have reformulated the caption for Figure 8 as well as the accompanying text in Section 5.4.

Pages 3037-3040. We consistently use brown for p-TOMCAT and purple for TM5. As

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can be seen in the online pdf version of our document, these colors are quite different. We will ask the editorial staff of the journal to enlarge these figures in the printer-friendly version of the paper.

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