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Comment

## ***Interactive comment on “Assessing temporal clear-sky errors in assimilation of satellite CO<sub>2</sub> retrievals using a global transport model” by K. D. Corbin et al.***

**M. Heimann (Editor)**

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I am sorry that this took way too long to pass the review stage. All addressed reviewers either declined or did not respond.

I went now myself through the paper and have the following two remarks, which the authors should respond to. Then the paper can go to ACP.

I concur with the first reviewer regarding the value and limitation of this study. It effectively consists of a sequel to two previous studies on the same topic.

1) It is not clear to me how the grid cell mean (annual or seasonal) column average CO<sub>2</sub>

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is computed in the model. It seems to me that there are two issues here: (1) the satellite samples the column only at a specific time of the day, and (2) it samples the column only under clear sky conditions. Is the "true mean" or "grid cell mean" calculated by sampling the model every 3 hours? In this case it seems to me that the effect (1) should dominate the error signal over vegetated areas in summer. However, in this case e.g. over the Siberian taiga the JJA-error would be expected to be negative since the satellite "sees" the column only during midday when concentrations in the PBL are on average lower than during the night. Or is the "true mean" or "grid cell mean" calculated from the model values only at the time of the satellite overpass irrespective of cloud cover, so that only effect (2) is generating the error pattern?

2) It is disappointing that the authors do not make any attempt to explain or at least speculate on the physical causes of some of the clear sky error patterns deduced in the model study. Without this, the reader has no way to judge if the presented results are intrinsic to this particular model only, or whether they might be also found in other models (and maybe even in the real world). Without some physical/meteorological reasoning, the manuscript would essentially remain a technical comment.

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Interactive comment on Atmos. Chem. Phys. Discuss., 8, 12887, 2008.

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