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# ***Interactive comment on “Variability and budget of CO<sub>2</sub> in Europe: analysis of the CAATER airborne campaigns – Part 2: Comparison of CO<sub>2</sub> vertical variability and fluxes from observations and a modeling framework” by I. Xueref-Remy et al.***

**Anonymous Referee #2**

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General comments:

Sorry for this delayed review!

In this paper Xueref -Remy et al. study and discuss models ability to simulate the vertical profile of CO<sub>2</sub> in the atmosphere. Both a mesoscale and a global transport model is used in combination with different biosphere models and the results are compared to profiles from two campaigns with airplanes over western Europe. Xueref -Remy et al. also describe two different metods to estimates the flux pattern at the regional scale.

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All in all the objective of the paper is very interesting and the evaluation of state-of-the-art models against vertical CO<sub>2</sub> profiles is certainly needed, as pointed out in other models intercomparisons. And only few data sets of vertical profiles exist so far.

However, the paper is rather hard to read and needs to be checked very carefully for ordinary mistakes and “badly” written English. Below I list some of the more general mistakes/problems that I found.

I recommend the paper for publication in ACP as the topic is highly relevant and the methods used are sound. But a revision of the paper is needed.

Specific comment:

As also pointed out by the first reviewer, the figure captions need to be clearer.

Fig. 7 is as far as I can see not mentioned in the text. Maybe some text is missing in section 3.1? Is the flux as calculated by the Radon method given here – no? In general the calculation of the flux with this method needs to be explained better. It would also make the text more clear if you used only one name for this method.

In section 3.2. it seems like the reference to Fig. 8a, 8b is mixed up?

In general, when referring to a paper directly in the text (e.g. like on line 23, p. 4282) the () around the ref. should be moved: ... shown by (Yi et al. 2004) ..... -> ..... shown by Yi et al. (2004) .... This is seen several times in the text.

Technical comments:

There are many, so I will not list them here, but hope that the authors will go through the paper again....

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Interactive comment on *Atmos. Chem. Phys. Discuss.*, 10, 4271, 2010.

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