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Interactive comment on “Atmospheric CO₂ modeling at the regional scale: an intercomparison of 5 meso-scale atmospheric models” by C. Sarrat et al.

Anonymous Referee #1

Received and published: 9 August 2007

General comments:

This is a well written paper describing an intercomparison of 5 high-resolution atmospheric models used for simulations of atmospheric CO₂ and various met. parameters during two days above a region in France. This is the first intercomparison of CO₂ models with a resolution of down to only 2 km that I am aware of and the detailed analysis and comparisons to observations as well as the conclusion regarding the shortcomings of such models is an interesting contribution to the field of atmospheric modelling of CO₂. I recommend that the paper is accepted for publication in BG after some minor revisions, see suggestions below.

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Specific comments:

The abstract should be extended with a few lines describing the main conclusions of the evaluation of the models. Add also the resolution of the models.

It would strengthen the paper if it was mentioned (in the introduction or in the conclusions) more clearly why this kind of models are interesting – what can they be used for.

p. 1925, l. 3: your use of the term "meso-scales" should be described more detailed here. Add e.g. that the size of the region in focus is xx km by xx km. Often a model with the resolution of e.g. 0.5 degree by 0.5 degree is called a meso-scale model....

Section 2: the description of the models should be set up in the same way (e.g. with bullets like for the WRF model) in order to harmonize the section. Information on e.g. fossil emissions and marine fluxes should only be mentioned in the beginning unless special information is added according to the setup of the relevant model. Information on initial/boundary conditions is not always given?

Will the RAMS-CEAM model in the future be extended to include CO2 or why is it included here?

P 1934, l. 17-25: Here the observed concentration in and above the ABL is discussed - I would expect the CO2 concentration to vary somewhat with height also in the ABL? Do you use a mean value over the ABL here? Please explain in the text.

P. 1935, l. 3-5: It is quite difficult to see the details on Fig. 11, hopefully it will be larger in the final paper. To me it is hard to see that the observed concentration is constant between 382 - 383 ppmv, I see larger variations. Do you refer to a specific timer period during the morning?

Technical corrections:

P 1926, l. 2: add "in 2006" (?)

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P 1927, l. 12: add "MPI" after Max-Planck Inst.

P 1927, l. 21: change "twwo" to "two"

P 1928, l. 8: "The adaptated ..." Some misspelling in this sentence, and not really clear what BRAMS-3.2 is? RAMS combined with LEAF3?

P 1928, l. 11: change "A 2-way nesting" to "Two-way nesting"

P 1931, l. 1: delete "The" before Fig. 3

P 1931, l. 5: "is less important" ? why? should it be "less pronounced"?

P 1931, l. 14: The sentence "Althought," Should be changed to e.g.: "Although, the synoptic situation generates an S-E wind over the cropland, the wind is from N-W over the forest and along the coast, due to the sea breeze development".

P 1931, l. 20: explain "Lagrangian..." Here or note that it will be describe in section xx.

P 1932, l. 5: delete "The" before Fig. 6

P 1932, l. 12: "of the Fig." change to e.g. "shown in Fig. 7"

P 1932, l. 20: "This day" what day? the 27 of May?

P 1932, l. 23: "all models are also" delete "also"

P 1932, l. 28: "In AURA" change to "At the AURA"; it would be easier to read if the results at the sites are described in the same order as the they are shown in Fig. 7: first AURA, then LEBR

P 1933, l. 2: "in the crop"change to "at the crop"

P 1924, l. 19 delete "The" before Fig. 10

P 1934, l 20: "in the both sites" change to "at both sites"

P 1934, l 24: change "in MARM" to "at the MARM"; "is LACS" to "at the LACS"

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P. 1935, l. 5: change "along the flight" to e.g. "during the flight"

P. 1935, l. 14: change "advected to within" to "advected into"

P. 1936, l. 1: "as possible a common framework" change to "as possible within a common framework"

P. 1937, l. 11 rephrase "..before to go further in regional modelling"

P.1939, l. 2: should the it be "2007" and not "2007b"?

Table 1: change text to e.g. "Description of the sites where surface fluxes are obtained"

Fig. 5. change "sbetween" to "between"

Fig. 10. change "HCLA as a"; to "Height of the ABL (ABLH) as a" change "in LACS/MARM" to "at LACS/MARM"

Fig.11 change "Altitude" to "Surface altitude"

You should check the paper and change to "Xkm" or "X km" to have consistency.

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