Biogeosciences Discuss., 5, S3254–S3258, 2009 www.biogeosciences-discuss.net/5/S3254/2009/ © Author(s) 2009. This work is distributed under the Creative Commons Attribute 3.0 License.



BGD

5, S3254-S3258, 2009

Interactive Comment

# Interactive comment on "Can we use hourly $CO_2$ concentration data in inversions? Comparing high resolution WRF-VPRM simulations with coastal tower measurements of $CO_2$ " by R. Ahmadov et al.

## A. Meesters (Referee)

antoon.meesters@falw.vu.nl

Received and published: 4 March 2009

### **General comments**

This paper compares high-resolution simulations of  $CO_2$ -concentration to both observations and low-resolution (global model) results. Compared to earlier work on the CERES experiment, novel points are the use of a whole month of observations, and the comparison of models having different resolutions. The results are surely interesting and timely. Compression of the introduction and results section are recommended, as the text is rather long in comparison to the presented results. The text also needs



**Printer-friendly Version** 

Interactive Discussion



linguistic improvement and some clarification.

In the following I have skipped the points which were already mentioned by the very valuable and complete comment of the first Referee.

#### **Specific comments**

Title: I agree with the first Referee that the first sentence of the title could be better deleted, as the paper does not contain any experiment with inversion. On the other hand, the title should reflect among others the comparison with global models, which is a very important topic.

Abstract (and also conclusions): Differences between model results are attributed to the difference in resolution. But to what extent can differences in the parameterization of vertical transport in the PBL play a role? This matter should certainly be discussed in the paper.

The introduction is well written, but it needs substantial compression and cutting, as it contains much which is of no relevance for the present investigation, and it also contains pieces which, though relevant, could well be replaced with references to existing literature.

4752, line 20: "These parameters ...": which? The preceding sentence suggests meteorological parameters, that sentence may have been put at a wrong place.

4754, lines 20-21: It is stated here that TM3 is optimized with observed concentration values, whereas LDMZ is not. But on page 4753, lines 10-12 it is said that for the LDMZ results also some tuning to observed concentrations had been done.

5, S3254-S3258, 2009

Interactive Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion



Section 3: It should be explained why concentration measurements from only one site have been used. The CERES experiment also involved concentration measurements at other sites.

Section 3, last sentence: The attractiveness of the Biscarosse site for fine scale modeling should not be exaggerated. A clear disadvantage is that if the wind is from the ocean (which is often the case), the concentration is hardly influenced by the land fluxes, so it cannot be used to retrieve the latter. See e.g. 4761, first three lines.

Section 4 needs compression as it is rather long in comparison to the presented results.

4756, lines 25-26: "all the models perform reasonably well in capturing day to day variability of the concentration": This does not hold for what concerns the amplitudes.

4758, lines 26-27: correlations between tracers: what is the usefulness of this remark?

4759, line 4: "advected lateral boundary conditions": a more exact formulation is needed.

4759, line 8: Is the effect not put before the cause here? Reformulate this eventually.

4759, lines 16-17: "rectifier effect": does not this term have a longer history than suggested by the references given here?

4760, line 3: Is the nocturnal stagnation caused by the land-breeze effect? If so, it would be clarifying to use that term in the text.

# BGD

5, S3254-S3258, 2009

Interactive Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion



4760-4761 divided paragraph: (1) This case is introduced as "synoptic disturbance" but I am not sure about what is meant by this. Is not most of what one sees here, typical for a wind from the ocean, irrespective whether the wind is variable or steady? (2) Possibly this case could be treated already before the case of figure 5, as it is relatively simple and does not involve small-scale effects.

4761, lines 21-22: "All models show quite good agreement": That does not hold for TM3.

4762, lines 8-10: See comment on Abstract.

4763, lines 2-4: The present formulation "... buildup ... interrupted ..." sounds as if the sea-breeze interrupts the upward  $CO_2$ -flux. The reality is more complicated (the sea-breeze re-circulates old  $CO_2$  etc.). This sentence should be reformulated.

4763, lines 17-18: "flux covariance with meteorology": a more exact formulation is needed.

4763, line 20 etc.: The text contains too strong statements about the usefulness of the present work for inversion. Such statements have to wait until the inversions have been tried out.

#### **Technical corrections**

general: one should not use "by" before a reference within brackets.

4754, line 11:  $CO_2$ -field: the  $CO_2$ -field.

# BGD

5, S3254-S3258, 2009

Interactive Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion



4754, lines 17-20: "the adding this model": reformulate this.

4754, lines 20-23: Sentences say practically the same.

4758: line 12: were : was?

4758, line 21: delete "tracer".

4759, line 6: put "the" before "LMDZ CO<sub>2</sub> field". Transport: transport model?

4760, line 6: add more words, e.g. "concentration" after CO<sub>2</sub>. "with": replace with "at"

4760, lines 12-13: reformulate.

Figure 3: I recommended to stretch out the figure horizontally if possible. Otherwise it is hard to follow the description on page 4757, 1<sup>st</sup> paragraph.

Interactive comment on Biogeosciences Discuss., 5, 4745, 2008.

## BGD

5, S3254-S3258, 2009

Interactive Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

