

***Interactive comment on* “Spatial and temporal resolution of carbon flux estimates for 1983–2002” by L. M. P. Bruhwiler et al.**

Anonymous Referee #1

Received and published: 30 January 2008

In their paper Bruhwiler and co-authors investigate the degree of spatial and temporal resolution that can be achieved when using a coarse resolution atmospheric transport model to estimate carbon fluxes in and out of the ocean as well as the terrestrial biosphere on the basis of atmospheric CO₂ data from the existing world-wide monitoring network. This topic is important, and results from such studies inform us to what extent terrestrial CO₂ fluxes can be distinguished from oceanic fluxes, given present day datasets. The authors have previously published numerous papers on the CO₂ flux estimation problem and they are experts in the field. The model and datasets used in this study are state-of-the-art and suitable for addressing the objectives.

I agree with most conclusions of the paper, however, I find that the presentation of the theoretical concepts (chapter 4) and of the results (chapter 5) can be improved

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significantly. Specific comments and suggestions follow below.

My overall rating is:

Scientific Significance: Excellent (1) Scientific Quality: Good (2) Presentation Quality: Fair (3)

I recommend publishing the paper in Biogeosciences after major revisions as outlined below.

Specific comments:

- There are a number of annoying errors that need to be corrected:

Page 4709 eq 2: replace "++" by "+"

Page 4710 eqs 4 and 5: R on the right-hand-side non-italic

Page 4710 eq 6: Q on the right-hand-side non-bold (or matrices in bold throughout the paper)

Page 4716 line 1: the authors obviously refer to table 3, not 1

- Chapter 4.1: The authors should explain the significance of the special cases they discuss. Are these scenarios realistic? What kind of observational network or model would be required to meet the requirements?

- Pages 4713ff: The authors should clearly separate in chapter 5 presentations of CO₂ flux results from results of the resolution analysis.

- Page 4714, line 3 and caption of figure 3: Explain how resolution information is obtained for integral properties of the model (e.g., global land or ocean fluxes).

- I suggest deleting Table1. It is never referred to in the text, is very long and does not provide important information in the present context. What is the meaning of the last column?

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- Page 4719: Instead of Table 3, provide a map with the regions used in this paper. Ideally this figure should also show the TransCom3 regions. At the very least, there should be a reference to the TransCom3 region map.

- Figure 1: Delete the station labels. Most of them overlap and can't be read anyway.

- I find Figures 3, 4, 5, 7, 8a, 8b, 10a and 10b that are supposed to contain and convey the main results of the paper difficult to interpret and understand, especially when there is no map showing the different region and there ID number. In addition, differences between the different observational networks (one of the main themes of the paper) are hard to identify, especially for the small-size figures 8 and 10. The authors should consider other ways of presenting the core information and/or consider reducing the number of such figures.

Interactive comment on Biogeosciences Discuss., 4, 4697, 2007.

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