**Biogeosciences
Discussions**

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

L. M. P. Bruhwiler et al.

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We are grateful to the reviewer for her/his thoughtful comments, and we feel that our paper has improved through our responses to them!

General Comments-

We have tried to make our discussion of the resolution kernel more quantitative by adding discussion throughout the paper. In some cases, we found that our original language did not really describe the situation with respect to resolution as it might have. We hope that we have improved things. With respect to a threshold value, we attempted to treat this issue, but we note that one might also require threshold values for variance and covariance as well. That this is not generally done does not limit the

usefulness of these quantities.

We have also added brief descriptions of how the aggregated resolution kernel was calculated using the underlying TransCom 3 source regions.

Specific Comments-

p 4701, L 1 - We changed the wording, and hopefully this sentence is more clear now.

p 4703, L 5 - In this sentence, we are pointing out that we exclude sites we don't believe can be simulated by our model. To use these sites would potentially lead to large biases in the results. We make our judgements based on comparisons of forward simulations and a posteriori simulations to observations.

p 4705, L 2 - We mention that we use a lower limit of 1.0 GtC/yr for the prior uncertainty in NEP for each source region. Since the uncertainty is proportional to the NEP, there is a seasonal cycle in this quantity. We can't let the uncertainty approach zero however, since we'd like the inversion to be able to adjust the prior fluxes even when small. The lower limit is somewhat arbitrary, but it seems reasonable.

P 4707, L2 - The stations that were difficult to model are shown in red on the maps in Figure 1. We added a mention of this to the text as well as a couple of examples.

Method Section - We added a sentence to the introduction that points out that the underlying spatial resolution of our flux estimates are the TransCom 3 regions. Also, we mention that the a priori covariance matrix is diagonal.

Sect. 4.1 - We thank the reviewer for pointing out that our limiting case holds only for H square and non-singular. We do discuss the usual case where H is neither a paragraph or two below, but we were happy to add this clarification.

P4811 line 7ff - We agree with the reviewer and removed this section of the paragraph.

P4714, line 1f - We have re-worded this statement to be hopefully more precise and correct.

P4714 line 7 - We have added a more quantitative statement here.

P4715 line 10f - It is true that errors in the prescribed or pre-subtracted fossil fuel flux will be aliased into the estimated uptake by the oceans and terrestrial biosphere. In comparing global fluxes from the literature, we have tried to minimize the contribution of fossil fuel differences by comparing results for the period 1992-1996. Over this period, global fossil fuel use statistics show increases of less than 0.5 GtC/yr. Furthermore, all of the calculations in fact used the same spatial distributions and global total emissions, meaning that the differences are likely much smaller than 0.5 GtC/yr and arise from differences in interpolation. For example, Baker et al. (2006) note that their fossil fuel input may be about 0.16 GtC/yr larger than that of Gurney et al. (2004). Differences in global total uptake shown in our study are not likely to be accounted for by fossil fuel emissions. We added some text to this effect.

P4715, line 27 - We thank the reviewers for pointing this out, and we have added this information to the text.

P 4718, L14018 - The sentence was re-worded to be more clear.

P4724 lines 20-24 - We are planning future work that may help explain whether the seasonal cycle in the high-latitude oceans is an artifact of the inversion or whether any of the seasonal behavior comes from the oceans themselves.

Technical Corrections:

We thank the reviewer for pointing out these problems. We fixed them all, including fixing the alignment of the axes and notation for Figures 5 and 7 (now Figures 6 and 8).

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