**Atmospheric
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Interactive
Comment

Interactive comment on "First year of upper tropospheric integrated content of CO_2 from IASI hyperspectral infrared observations" *by* C. Crevoisier et al.

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Received and published: 26 June 2009

First, we d'like to thank the two anonymous reviewers for their very positive comments and suggestions. Some changes to the manuscript have resulted from them. Detailed responses to the questions raised by the reviewers may be found below.

Response to Anonymous Referee 1

●*Line 13: I recommend to replace accuracy (systematic error) by precision (random error)*

The change has been made in both the abstract and the conclusion.

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Interactive Discussion

Discussion Paper

•*Line 25: It is not clear if parts of the retrieved pattern are really due to biomass burning CO_2. I therefore recommend to add more evidence that this really has been observed or to remove item (4) listed in the Abstract.*

The reference to biomass burning has been omitted.

•*Section 3.3 Radiative bias removal Please add which assumptions on CO_2 have been used here.*

The need for the computation of radiative biases comes from the fact that the neural networks are trained using simulated brightness temperatures (BT) and then applied to observed BT. Hence, the radiative biases between computed and observed BT need to be taken into account to avoid biases in the retrievals and to avoid a perturbation of the correlation between the channels. In other words, these radiative biases are used to transfer the "observation world" into the "simulation world". Now, the simulations used as inputs to train the networks have been computed assuming constant profiles of CO_2 randomly chosen in a range centered on the TIGR reference value. Therefore, the radiative biases are computed assuming a constant CO_2 profile at the TIGR reference value (any change in that reference would induce a bias in the retrievals).

•*Section 4.1 Seasonal cycle Page 8202, line 4: Amplitude decrease with latitude: Is this in line with expecations or in contradiction to this? Please comment on this.*

This decrease in the cycle amplitude with latitude has been observed at the surface, by in-situ measurements (e. g. on the JAL/CONTRAIL observations), as well as retrieved by TOVS (Chédin et al., 2003) and AIRS.

•*Section 4.2 Geographic distribution Page 8205, paragraph starting with "Signatures of biomass burning ...". From the evidence given in the manuscript it is not clear if the observed CO_2 pattern are really due to biomass burning CO_2. It appears that the authors are also not entirely convinced about this (e.g., "might explain" in Line 13). I recommend to either provide more evidence or to replace statements such as "can be*

seen" (Line 5) with "can potentially be seen" or equivalent (also in the Abstract and in the Conclusions section).

Change has been made in the text. Although the signatures of CO_2 that are retrieved by IASI on the coasts of Africa exhibit spatio-temporal patterns which are in agreement with biomass burnings, and given the fact that the potential of infrared sounders to capture CO_2 emitted at the surface by tropical fires and transported to the mid-to-upper troposphere has been shown (Chédin et al., 2005, 2008), only the processing of IASI over land will validate this assumption.

• *Conclusions Page 8207, line 25: It has not been shown in the paper that IASI has already provided new insight into atmospheric transport pathways. I therefore recommend to replace "IASI retrievals bring ..." by "IASI retrievals potentially bring ...".*

Text has been changed.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 8187, 2009.