

## ***Interactive comment on “First year of upper tropospheric integrated content of CO<sub>2</sub> from IASI hyperspectral infrared observations” by C. Crevoisier et al.***

**Anonymous Referee #2**

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Review Crevoisier et al. ‘First year of upper tropospheric integrated content of CO<sub>2</sub> from IASI hyperspectral infrared observation’, ACP, 2009

Crevoisier et al. attempt to my knowledge for the first time to use IASI data to retrieve atmospheric CO<sub>2</sub>. They investigate rationally whether there are any channels and if so which channels are ideal to use for retrievals. They then use a neural network inversion approach to estimate upper troposphere lower stratosphere CO<sub>2</sub> in the tropics over the oceans for one year. I was pleased that the approach does not use any prior assumptions as those make it very difficult to disentangle what really is signal in the radiances measured by the satellite. They finally discuss main features and compare

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with independent data.

This is an impressive amount of work and the results are interesting – particularly the information of phasing of signals propagating through the atmosphere. Potential inclusions in the paper could be addition of surface data (mentioned but not displayed) in the analysis of signal propagation and inclusion of model results for the same purpose. Also inclusion of CO e.g. from MOPITT could possibly have shed some more light on the features in 2d maps attributed to biomass burning somewhat in conflict with model vertical transport information. Nonetheless the paper is already sufficiently interesting by what it presents for being accepted for publication.

More specific suggestions: p. 8196 second paragraph: instrument noise level is above all the sensitivities – is that a concern ? if not why not ?

last paragraph: ‘allows retrieval of tropospheric integrated content...’ – really upper troposphere CO<sub>2</sub> – no ?

p 8198 ‘...a set of representative patterns...’ do you mean profiles ? can you be more precise ?

p. 8199 first paragraph: how many output variables ? just one – right ? maybe add

p. 8200 ‘... IASI channels ... mostly sensitive to UPPER tropospheric variations’ ?

p.8201 ‘All together, 11 tests...’ what do you mean by tests ? can you be more precise ?

Last paragraph: ‘upper tropospheric integrated ...’ do you mean ‘mean’ instead of integrated ? if integrated be more precise ?

p. 8202 first paragraph: please include surface record in figure

p. 8204 first paragraph: ‘Monthly CO<sub>2</sub> averages have been removed from both datasets’ unclear what you mean – do you detrend ? explain more carefully / detailed. Also here would have been nice to include model simulations.

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p. 8207 'However, the retrieved cycle is lagged . . .' – I think you could document this a bit more – its possibly the most interesting bit.

Next sentence: 'phasing of seasonal cycle with altitude . . . a feature not well simulated by atmospheric transport models ' I think we don't really know – you should to give a reference or proof yourself.

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

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