**Atmospheric
Chemistry
and Physics
Discussions**

Interactive
Comment

Interactive comment on "Tropospheric ozone from IASI: comparison of different inversion algorithms and validation with ozone sondes in the northern middle latitudes" *by* C. Keim et al.

C. Keim et al.

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The authors thank the referees for their interest in the article and their suggestions for improvements.

The comments made are addressed below.

Reply to Referee #2:

Two major points arise from the review of referee #2. The first point concerns the differences and the common properties of the compared retrieval algorithms. As proposed we included a table which summarises the individual properties. In the

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rewriting of the manuscript we also considered this comment, especially with the addition of a dedicated paragraph to discuss this new table.

The other point addresses the NN retrieval at EUMETSAT. We included some more details about the training and the retrieval in the revised version. We agree, that the selection of the training dataset and of the parameterisation of the retrieval impacts the retrieval quality. But the information on this selection does not change the quality, it only helps to understand. The retrieval algorithm analysed in this paper is pre-operational and not published yet, therefore we can not give more details.

itemised points:
p. 11449, l. 8 (*LISA uses ozone spectroscopic data from the MIPAS database rather than HITRAN. Are there differences in ozone between MIPAS and HIITRAN databases, if yes please describe and explain the possible impact on the intercomparison/ validation results?*): The new HITRAN version (2004) contains the 'MIPAS' data for ozone. The phrase has be rewritten.

p. 11451, l. 10-17 (*I do not understand this paragraph. Why are only "odd pixels" used in the neural net retrieval. I do not understand why a scaling of total ozone by a factor of 10(!) has to be applied.*): The legal size of a WMO-BUFR message, used by EumetCast, is not big enough to contain the L2 results of all 120 pixels of one swath. Therefore only half of the pixels are transmitted. In the beginning there was an error in the scaling, the ozone columns was wrong by exactly a factor of ten. We corrected this before the comparison. The phrases are reworded in the revised version.

p. 11451, l. 23 (*"The profile in the hidden part is selected by use of the visible part". This sounds awkward. Neural networks also learn from "a priori" profiles, which are provided by the training data set. If there are certain correlations of higher layers with the surface layer, then the neural network will use this to provide information on*

the "hidden" surface layer.).: No retrieval method is able to 'see' the hidden part of the profile. The retrievals, compared in this paper, differ in the estimation of this part of the profile. In a simplified description, the optimal estimation uses the a priori profile if no other information is available, as is the case for the first kilometres of the atmosphere. With this approach, the hidden part has the same value for any measurement.

Also simplified, the neural network chooses the profile(s) from the training dataset whose spectra fit best to the measured one. As the hidden part does not impact in the measured spectra, it does not impact in the selection of the fitting profile. If there is a correlation between the hidden part and the visible part, the hidden part is assigned a different value for different measurements. To not confuse the reader, we use the term a priori profile only in the sense of optimal estimation retrieval, and not for the neural network training dataset.

The addressed section was rewritten and this comment was considered.

Minor points:

p. 11447, l. 28 (*"absorption cross-sections for the heavier molecules". What means here "heavier", are the lighter molecules from a different database than HITRAN 2004.*): We rewrote the phrase.

p. 11452, l. 2 (*The burst height of ozone sondes is generally about 30 km rather than the cited 35 km.*): We agree, than 35km is too high.

p. 11453, l. 2 (*Level-3 ozone column data from OMI are gridded (1degx1deg) but not assimilated.*): It is corrected in the revised manuscript

Fig. 2a (*in figure caption change 2008 to 2007*): It is corrected in the revised manuscript

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Fig. 2b and Fig. 3a (*Explain the difference between plots in columns 1 and 2 (similarly 3 and 4 as well as 5 and 6) in the figure caption (ppmv vs %). Similarly for Fig. 3a.*) and Fig. 4 (*Mention in figure caption the differences between plots in columns 1 and 2 (3 and 4), e.g. AK versus no AK.*): We reformulated the captions.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 11441, 2009.