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Atmospheric Chemistry and Physics Discussions

Interactive comment on "First steps towards the assimilation of IASI ozone data into the MOCAGE-PALM system" *by* S. Massart et al.

Anonymous Referee #3

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General Comments

This paper provides a thorough discussion of the development of assimilation capabilities for IASI ozone data within the MOCAGE-PALM assimilation system and evaluation of the impact of IASI measurements on ozone analyses through comparisons with previous MLS plus SCIAMACHY analyses, ozonesondes and OMI-DOAS total column ozone measurements.

Largest impacts of assimilation of MLS plus IASI are found in the upper troposphere of the south polar region. Based on comparison with ozonesondes the combined MLS plus IASI analysis shows significant improvements in this region.

Of particular scientific interest is the use of existing MOCAGE-PALM ozone analyses

to perform indirect validation of the IASI neural network retrievals prior to assimilation of the new measurements. This indirect validation is also used to determine necessary bias corrections, and provide estimates of observation error variances for the IASI retrieval assimilation.

The only major shortfall of the development is the neglect of retrieval apriori and averaging kernels in the SCIAMACHY and IASI observation operators, which is acknowledged in the conclusions. The SCIAMACHY apriori and averaging kernels could be easily incorporated into the analysis system through modification of the observation operator. However, since the IASI retrieval uses a neural net approach it is not clear to this reviewer how such information could be included.

The development of bias corrections and observational error covariance estimates as outlined may partially address this issue by inflating the errors in the IASI retrievals in the lower troposphere and upper stratosphere (where IASI retrievals are dominated by apriori information). This point should be addressed in the conclusions.

Specific Comments

Please clarify whether the bias corrections for the SCIAMACHY and IASI data varies with latitude or just time.

Please clarify whether the SCIAMACHY and IASI data is cloud cleared prior to assimilation and if not, what impacts this may have on the resulting tropospheric ozone analysis.

With regard to the discussion of Figure 11. Why does the MLS plus IASI assimilation show a mean bias with respect to the MLS plus SCIAMACHY assimilation if the IASI data has been bias corrected?

Please comment on whether the approach for bias adjustment and observational error covariance estimates compensates for not accounting for the IASI apriori and averaging kernals in the observation operator.

ACPD

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Technical Corrections

Pg 6696: change “refereed” to “referred to”

Pg 6714: change “constraining” to “constrained”

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 6691, 2009.

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Interactive Comment