**Atmospheric
Measurement
Techniques
Discussions**

Interactive comment on "Tropospheric ozone column retrieval from the Ozone Monitoring Instrument by means of a neural network algorithm" *by* P. Sellitto et al.

Anonymous Referee #2

Received and published: 4 July 2011

This paper discusses the retrieval of tropospheric ozone from OMI using a statistically neural network algorithm. I regard this contribution as potentially important and may be published once the issues raised below are adequately solved.

MAJOR ISSUES

a) The statistical NN retrieval method presented in the paper is applicable only to the 30N-60N region. This limitation should be properly reflected in the title, abstract and conclusions.

b) The analysis of the NN results is performed only in the same geographical region of the OS stations used for the NN training. The performance of the OMI-TOC NN over

the complete 30N-60N region should be assessed by adding comparison of the NN to the OE and TOR results over the ocean regions (Pacific and Atlantic) as well as the Eurasia region where no OS stations are available.

c) In the same way, the validity of the NN results outside the time covered by the training period should be assessed, i.e. comparisons with measurements in 2009 and 2010 should be included.

DETAILED COMMENTS

Page 2493, lines 5-12. The meaning of the fist sentence is not clear. Limb and occultation sensors for obtaining "height-resolved atmospheric ozone" (e.g. MIPAS, GOMOS, etc.) are not mentioned at all.

Page 2493, lines 28-29. Add a references to the CCD method applied to GOME:

- P. J. M. Valks, R. B. A. Koelemeijer, M. van Weele, P. van Velthoven, J. P. F. Fortuin, and H. Kelder (2003), Variability in tropical tropospheric ozone: Analysis with Global Ozone Monitoring Experiment observations and a global model, J. Geophys. Res., 108, 4328, doi:10.1029/2002JD002894.

Page 2493, lines 18-23. Only the advantages of the NN methods are listed. The disadvantages of statistically NN methods should be also discussed (e.g. need of external measurements for training, dependency of the results on the quality of the external measurements, limitation to geographical regions where training data is available, etc.).

Page 2495, lines 9-10. Clarify, justify and provide references to the sentence: "NNs are based on biological nervous systems, and, as such, are organized as parallel structures."

Page 2496, lines 12-13. Add references to GOME and SCIAMACHY:

- Burrows, J., et al. (1999), The Global Ozone Monitoring Experiment (GOME): Mission concept and first scientific results, J. Atmos. Sci., 56, 151–175.

- Bovensmann, H., Burrows, J., Buchwitz, M., Frerick, J., Noel, S., Rozanov, V., Chance, K., and Goede, A.: SCIAMACHY: Mission objectives and measurement modes, J. Atmos. Sci., 56, 127–150, 1999.

Page 2496, line 17. What is exactly mean with "to look between clouds"?

Page 2496, lines 22-23. Properly justify why the total ozone is used as input to the NN. What is the difference on NN TOCs obtained with and without total ozone?

Page 2499, lines 14-20. Include a table listing the exact 19 wavelengths selected

Page 2499, lines 22-23. The viewing geometry is only partially described with the SZA. Properly justify why the viewing zenith angle and relative azimuth angles are not used.

Page 2499. OMI as all UV instruments has a relative strong degradation. Using ratios of radiance to irradiances compensates only partially the degradation effects. Therefore the NN input vector should include time information to allow the NN to also compensate for degradation.

Page 2500, lines 3-5. Specify how the different seasonal and regional effects are actually being considered for the training.

Page 2500, lines 13-14. The assertion "MLPs) have been found to have the best-suited topology for classification and inversion problems" is not generally valid; the best NN topology is problem dependent. Either remove this sentence or provide a reference that properly justifies this assertion.

Page 2501, lines 13-14. Indicate the number of ground pixels per orbit.

Page 2501, lines 2-24. Discuss why the NN algorithm is insensitive to clouds as it is expected that clouds will shield the tropospheric ozone measured with UV/VIS spectrometers. Summarize this discussion on the Conclusions (page 2506, line 11).

Page 2501, lines 25-26. Include in Fig. 10 the TOC from the OE algorithm as well as the corresponding averaging kernels.

Pages 2513-2524. Add figures or tables showing the comparisons between the NN and TOR.

Pages 2523-2524. Put together Fig. 11 and Fig 12 as they show results for similar test cases.

Interactive comment on Atmos. Meas. Tech. Discuss., 4, 2491, 2011.