

Interactive comment on “Problems regarding the tropospheric O₃ residual method and its interpretation in Fishman et al. (2003)” by A. T. J. de Laat and I. Aben

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We would like to take the opportunity to publish one short author comment with a summary of our criticism - before the deadline for commenting expires (January 9).

After considering the discussion as it has been published on ACPD, we think our arguments come down to the following issue: there is no proper validation and error estimation of this data product, and therefore it is not possible to assess the quality of the dataset.

A validation typically would be done by making a comparison of O₃ sonde measurements of the T_{TOC} with the satellite measured T_{TOC} for a considerable number of stations (this is typically also the method used to validate results from global 3-D chemistry-transport model simulations).

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However, the direct dependence of the satellite measured TTOC on the Logan climatology values would very much complicate such a validation: the Logan climatology is based on almost all available tropospheric O₃ measurement for 1979-1996 period. A validation of the TTOC dataset for this period - which is directly dependent on the Logan climatology - with the data that is being used to create the Logan climatology comes very close to validating a product with the same product.

This is why it appears to us that the direct dependence on the Logan climatology is a problem. We therefore suggest a slightly different retrieval method in our article for which the TTOC is not directly dependent on the Logan climatology anymore.

What is more, apart from the lack of a detailed validation, there is also no error estimate of the TTOC product. The error in the product would be dominated by the error in the SBUV profile, which is at least 5 % (~ 15-25 DU with a stratospheric O₃ column varying between 300 and 500 DU, see Bhartia et al. [1996]; the TOMS errors are considerably smaller). An error of 10% (5 DU) is probably necessary to observe typical variability.

According to our analysis it is very likely that the variations superimposed on the Logan climatology fall within the above-estimated error range (note that according to our analysis the variations on top of the Logan climatology due to the TOMS/SBUV measurements tend to average out when looking at TTOC values average over longer periods of time). If this is true, it implies that a lot of features as seen in the satellite-measured TTOCs simply fall within the magnitude of the errors and should not be considered as real variations.

In summary, we feel that (1) The dataset as it currently stands, should be used with extreme caution, due to the lack of this validation and any error estimates, and (2) The dependence of the dataset on the Logan climatology causes us to wonder whether or not such a validation is actually possible, while (3) Considering the error estimates for the SBUV O₃ profiles we think that the errors in the Fishman TTOC could be too large to distinguish between all the features as they are seen within the dataset, even though

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they appear to be real.

(note that we try to explain in our article why these features appear in the dataset, despite the fact the actual errors may be so large that they cannot be considered real)

Interactive comment on Atmos. Chem. Phys. Discuss., 3, 5777, 2003.

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