

Author comment on “Global and zonal tropospheric ozone variations from 2003 - 2011 as seen by SCIAMACHY” by F. Ebojie et al. Atmos. Chem. Phys. Discuss., 15, C7515–C7516, 2015.

Response to anonymous reviewer #2 and editor

We thank the reviewer for this review and highly appreciate the comments and suggestions. Please find below a response to the comments.

Anonymous reviewer and editor (Comments to Author):

General comment:

The manuscript is very nice and should be published, after addressing some smaller points and a few technical remarks. The paper focuses on the statistical analysis of the SCIAMACHY tropospheric ozone columns retrieved by limb-nadir-matching. The data are reasonable and for most of the observed trends reasonable causes are given.

Reply: *We thank the anonymous reviewer for the encouraging comments.*

However, are systematic effects (instrumental drifts) excluded? Was this tested in the validation activity in the previous paper (Ebojie et al. 2014)? Only the overall deviation is mentioned here. To really exclude and correct for instrumental effect is very hard if not impossible. At least a short comment could be included whether or not a drift was observed during the validation or comparison with other data.

Reply: *Thank you for this, the exclusion of instrumental effects or drifts is challenging. The level 1 radiance are verified and validated independently. Drifts in level 1 influence level 2 data products such as the total O₃ column and the vertical O₃ column used to determine the TOC. The TOC themselves determined from SCIAMACHY LNM observations were thoroughly validated by comparison with a large suite of correlative TOC data sets derived from balloon-borne platforms and concurrent satellite measurements. The results of these extensive validation were described in Ebojie (2014) and Ebojie et al., (2014). These studies demonstrate the high quality of SCIAMACHY TOC. There were no observable drifts in the validation with other tropospheric O₃ data sets. However, further improvement for the limb vertical profile may reduce the error on the TOC.*

Minor comments:

P24099 L25ff: The sentence beginning with “The small insignificant positive change...” is mathematically incorrect. Be $\epsilon < 0$, then $(\epsilon + n \cdot 0)/(n+1) < 0$, no matter how large n is. But of course it is clear what you mean: “The small positive trend results from many small positive and negative trends, most of them are statistical insignificant.”

Reply: *Thank you for this, we have modified the statement. It now read as “The small negligible positive trend in TOC over this region results from many small positive and negative trends, most of them are statistically insignificant”*

In section 3.4.2 regional tropospheric O₃ changes are discussed. For most regions a possible cause for the observed trend is given. For region A (Alaska) only the large variability and the large number of gaps are given as explanation. So to me it is not clear if the authors think this trend is a real atmospheric change or just a retrieval artefact.

Reply: *We have modified the statement over region A (Alaska). The statement now read as “The significant positive change could be a result of changes in precursors emissions from biomass burning*

(Stohl et al., 2007, Oltmans et al., 2010). Changes in transport from the stratosphere or lower latitudes as well as the influence of rapid climate change may also play a role (Oltmans et al., 2013). The variability in TOC over this region is high, which could probably be a result of the gaps in the TOC time series.”

Technical comments:

P24093 L6 Please add last access date to the cited webpage, double check the complete manuscript.

Reply: *Thank you for this, we have added the last access date and checked the complete manuscript.*

P24096 L7 "Similar wind patterns observed are observed ...“delete the first observed

Reply: *Thank you for this, we have deleted the word.*

P24104 L3 "... over US as observed reported in..."replace by "... over the US as reported in ...“

Reply: *Thank you for this, we have modified the statement.*