**Atmospheric
Chemistry
and Physics
Discussions**

Interactive
Comment

Interactive comment on "Variability of the total ozone trend over Europe for the period1950–2004 derived from reconstructed data" *by* J. W. Krzyścin and J. L. Borkowski

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Anonymous Referee #2

The reviewer wrote:

'UV radiation, and lack of long-term UV-times series, is used more or less as a justification for this paper. However, the authors should be/are aware of the fact that trends in ozone do not directly translate to trends in UV or UV-related effects, as the UV burden puts a far more larger weight to the warm/summer period. Hence, an unequal weighting of ozone values is intrinsic when it comes to UV or UV-related effects. This issue should be clarify to the reader.'

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Our response.

In the paper we analyze the long-term pattern of total ozone separately for the cold (October- next year April), and warm period (May-September). We add comment why such data division is important for estimation of danger due to UV overexposure effects. 'The normal level of UV irradiation is high during the warm period of the year and decisive for the annual accumulated UV doses. Moreover, outdoor people activities are also more frequent in this part of the year. The trend analysis will be applied separately to the subsets of ozone data, warm (May-September) and cold (October-next year April). It allows to estimate more precisely risk of the UV overexposure due to the ozone changes.', end of section 1.

'Readers not familiar with NIWA and COST-726 reconstructed ozone might wonder why not use the NIWA-data set instead of the reconstructed ozone. As the reference Krzyscin JGR 2007 is in press, the authors are invited to explain more how the COST data set is validated, the difference with NIWA (also the trivial ones like data period), the advantage of its use, and how it was derived.'

Our response.

The status of mentioned reference has been changed. Now, the paper is accessible as it has been published, see Krzyscin, Statistical reconstruction of daily total ozone over Europe 1950 to 2004, J.Geophys.Res., 113, D07112, doi:10.1029/2007JD00888, 2008. The validation of the statistical model, the differences with NIWA, ground-based stations, and ERA-40 ozone data were discussed in this paper. Because our model has been trained on the NIWA ozone it reproduces almost exactly long-term pattern of the ozone changes in the NIWA data.

'A plot of an unsmooth time series, zonal mean ozone for instance, might help the reader to see the problem and grasp the claimed benefit of the method proposed in the paper. Also is should be made clear or shown why ordinary smoothing fails.'

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Our response

Figure 3a shows why it is better to use a smooth curve to describe the long-term pattern of ozone. Moreover, the trend pattern derived from the zonal means over Europe (see Fig.4) illustrates that a steadily ozone decline does not appear throughout the whole analyzed period, i.e., the assumption of linear trend fails. We add few new lines to clarify this problem. 'Fig. 3a shows that a linear approximation, as provided by the kernel smoother with bandwidth of 55-year, underestimates the ozone values at the beginning of the time series and overestimates at the end. The linear trend concept could not be applied for the whole analyzed period as a lessening of the ozone negative trend or leveling off seems to occur since the mid 1990s.', section 3 in paragraph 3.

'Editorial The main message of the paper is some what diluted and should be brought more forward.'

Our response.

It is clarified in the revised manuscript 'The total ozone data over Europe are available for only few ground-based stations in the pre-satellite era disallowing examination of the spatial trend variability over the whole continent. A need of having gridded ozone data for a trend analysis and input to radiative transfer models stimulated a reconstruction of the daily ozone values since January 1950. Description of the reconstruction model and its validation were a subject of our previous paper. The data base used was built within the objectives of the COST action 726 'Long-term changes and climatology of UV radiation over Europe'. Here we focus on trend analyses ...' , beginning of Abstract.

'Figures are rather unclear. Map appearance should be improved, at least remove grid. Figure 4 and 5 show 3 -lines, what are they? Fig 6 and 7, difference between 'thick' and 'thin' lines is too small. Maps in fig 8 and 9 become solid black in printout, hence no information can be read from these figure.'

Our response.

New Figures have been prepared taking into account the reviewer comments.

'Small remarks Use of symbol lambda is usually wavelength and phi is usually an angle'

Our response

Greek letters are not used in the revised manuscript.

'The use of articles ("the" and "a") can be better.'

Our response.

Let's hope that use of articles is better in the revised manuscript.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 47, 2008.