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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Comparison of TOMS retrievals and UVMRP measurements of surface spectral UV radiation in the United States" *by* M. Xu et al.

Anonymous Referee #1

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General remarks

The authors present a study aiming at a more complete understanding of TOMS UV retrieval biases. Is is based on a comparison of spectral ultraviolet (UV) irradiances retrieved from TOMS data and UV irradiances measured at 27 climatological sites maintained by the USDA UV-B Monitoring and Research Program. New is that the authors quantitatively identify systematic biases in the TOMS retrieval for all spectral channels. Spectral biases are discussed and explaind in view of local conditions, especially due to effects of air pollution (SO2, NO2, O3), aerosol loading, and cloud cover. The authors submit a comprehensive paper with a cognizable rationale. It is clearly written,

well structured, and worthwhile to be published in ACP.

Beyond that I am interested in the following aspects which could be taken into account in chapters presenting results, respectively in concluding remarks:

1. The authors focus on summertime months (May-September) in the US to avoid possible contamination of snow cover, as they state. Considering the whole globe regions can certainly be found being snow free over the entire period from October to April but likewise affected by aerosols or pollution. What would be the magnitude of biases the authors expect for solar zenith angles being greater in the period from October to April (compared to May-September) but still relevant to surface UV?

2. Is the temporal resolution of noontime satellite UV measurements sufficient in view of possible daytime dependent changes in aerosol loading and pollution? How would aspects of spatial and temporal resolution come into question here?

3. The authors mention in the summary that the latest OMI retrieval algorithm can at least be improved based on the findings presented. However, regarding the whole globe and the long-term UV data sets from TOMS, I would conclude that it is de facto very difficult or almost impossible to improve retrieved UV irradiance data sets due to the lack of concurrent AAOD or pollution data. Is this true?

4. Related to 3.: The first sentence in the introduction repeats the well-known fact that UV is harmful to humans, livestock, agricultural crops, and forest ecosystems and that high-quality UV information should be provided. On the other hand, humans, livestock, crops, and (cultivated) forest are prevalently found in or near to areas of higher population density where aerosol loadings or pollution are concentrated. How would the authors comment on this?

Minor comments:

Page 17: RM for SO2 for 311nm in Table 3 (0.42) is different to the number (0.43) given in line 356 on page 17.

Table 1: An additional map showing the geographical distribution of measuring sites would be more illustrative. Maybe areas with heavy pollution and enhanced aerosol loading can somehow be marked (also related to explanations given on page 21).

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 10969, 2010.