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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Global Distribution and 14-Year Changes in Erythemal Irradiance, UV Atmospheric Transmission, and Total Column Ozone 2005–2018 Estimated from OMI and EPIC Observations" *by* Jay Herman et al.

Anonymous Referee #1

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General comments:

This paper focuses on the analysis of the global distribution and changes (2005-2018) of UV erythemal irradiance (also UV Index) retrieved from OMI and EPIC satellite data. Overall, it is a good and useful paper. Nevertheless, the next two specific points must be carefully revised before publication:

Specific comments:

1. The manuscript must be reduced because in my opinion it is too long. This reviewer

proposes some suggestions but the authors should perform a great synthesis exercise in order to lead the manuscript to a smaller size (and more readable) than the current one:

- In Section 2 "Erythemal Time Series and LS Linear Trends" which reports results from OMI, Figures 2A, 2B, 6A and 6B can be removed together with their discussions because of they are related to EPIC. Additionally, the comparison between Northern and Southern sites (Lines 322-331 and Figure 7) is within Subsection 2.3 "Southern Hemisphere". Please removed it or add to a new subsection.

- In Section 3 "Global view of E distribution from EPIC", the analysis of Everest data could be removed (Lines 393-405 and Figures 10A-10B). In addition, the subsection 3.5 "Zonal average E and 14-years trends" shows results from OMI data instead of EPIC (see captions Figures 16, 17, 18 and 19).

2. The results reported in this manuscript derived all from satellite instruments, mainly the UV radiation trend, must be compared with results derived from ground-based stations. This reviewer misses this type of comparison in the discussion of the results which could clarify the quality of the satellite data. The authors should add to the discussion more references about papers with analysis of UV trends using well-calibrated and well-maintained instrumentation at surface. Here some possible works to cite in the manuscript:

Bernhard, G., C. Booth and J. Ehramjian, Climatology of ultraviolet radiation at high latitudes derived from measurements of the National Science Foundation's Ultraviolet Spectral Irradiance Monitoring Network, in UV Radiation in Global Climate Change, ed. W. Gao, J. Slusser and D. Schmoldt, Springer, Berlin Heidelberg, 2010, pp. 48–72.

Eleftheratos, K., S. Kazadzis, C. S. Zerefos, K. Tourpali, C. Meleti, D. Balis, I. Zyrichidou, K. Lakkala, U. Feister, T. Koskela, A. Heikkila and J. M. Karhu, Ozone and spectroradiometric UV changes in the past 20 years over high latitudes, Atmos.-Ocean, 2015, 53, 117–125.

Fountoulakis, I., A. F. Bais, K. Fragkos, C. Meleti, K. Tourpali and M. M. Zempila, Short- and long-term variability of spectral solar UV irradiance at Thessaloniki, Greece: effects of changes in aerosols, total ozone and clouds, Atmos. Chem. Phys., 2016, 16, 2493–2505.

Hooke, R.J., M. P. Higlett, N. Hunter and J. B. O'Hagan, Long term variations in erythema effective solar UV at Chilton, UK, from 1991 to 2015, Photochem. Photobiol. Sci., 2017, 16, 1596–1603.

Krzyścin, J.W., and P. S. Sobolewski, Trends in erythemal doses at the Polish Polar Station, Hornsund, Svalbard based on the homogenized measurements (1996–2016) and reconstructed data (1983–1995), Atmos. Chem. Phys., 2018, 18, 1–11.

Liu, H., B. Hu, L. Zhang, X. J. Zhao, K. Z. Shang, Y. S. Wang and J. Wang, Ultraviolet radiation over China: Spatial distribution and trends, Renewable Sustainable Energy Rev., 2017, 76, 1371–1383.

Román, R., J. Bilbao and A. de Miguel, Erythemal ultraviolet irradiation trends in the Iberian Peninsula from 1950 to 2011, Atmos. Chem. Phys., 2015, 15, 375–391.

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