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Atmospheric Measurement Techniques Discussions

Interactive comment on "The TROPOMI surface UV algorithm" *by* Anders V. Lindfors et al.

Anonymous Referee #2

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The manuscript under review provides the algorithm and background information for determining the surface ultraviolet (UV) radiation at specific wavelengths, temporal spans, and cloud conditions as observed by the TROPOMI instrument on the soon-to-be-launched Sentinel-5 Precursor. The TROPOMI surface UV values will extend the long surface UV data record originating with the Nimbus-7 TOMS instrument in 1978. This is an important data set in that it validates the purpose of the Montreal Protocol by showing increases in the surface UV radiation during the ozone depletion phase and hopefully will show stabilization and decreases in surface UV radiation as the ozone layer recovers. However, it is pointed out that changes due to climate, circulation, and aerosols may result in a different surface UV situation than there was back at the beginning of the data set. Thus the importance of continuing these observations and the data set.

General Comments:

P 1, L6-7. There are several occasions throughout this paper beginning here with 'OMI' and 'AC SAF' when the spelled out name of an acronym is given in parentheses following the acronym. The proper format is to provide the spelled out name first followed by the acronym in parentheses.

P1, L24. Please provide references for each of these statements: ' increased during the last decades of the 20th century', 'strongest place in the high latitudes of the southern hemisphere', 'Artic and mid-latitudes in both hemispheres have experienced UV increases'.

P2, L18. It is also important to note that the TROPOMI is a backscatter instrument and that total column ozone observations are limited to the sun-lite portions of the earth. Of course where there is no sun light there is no UV at the surface.

P3, L26. Add 'respectively' to the references as they match the European and North American regions.

P4, L14. Somewhere in the 'Heritage' section it should be noted what the Equator crossing times were for the previous surface UV observing satellites. This is important to know at what time the actual observations were made when combining data sets.

P6, L12. The effect of enhanced UV at the surface depends upon the integration time (dosage) instantaneous increases as noted have been observed, but these are not sustained over longer time integrations (minutes to hour).

P7, L11. An additional piece of information would be that this effect is in the order of 3% and that the earth is closest the sun in early January and furthest in July.

P11, L16. Where or how is the aerosol absorption optical depth determined?

P12, L4. Why is the aerosol correction applied after the erythemal and vitamin-D values are determined? Why can't the aerosol corrected UV irradiances be used to compute the erythemal and vitamin-D values?

P12, L15. How many scan positions are there in each swath?

P12, L32. The relationship is easy to state: UVI = 0.4 *Erythemal Dose Rate (W/sq m).

P13, L5. There is a small crescent shaped area just south of the Black Sea of high reflectance. There are mountains there. Is the high reflectance due to snow, clouds or both? This area translates into lower UV values.

P13, L6. Not to add too many more plots, but it would be nice to see observations from Jokioinen and Sodankyla on entirely clear days to show that the observations do lay on top of the green curve. Figure 5 is useful to show the potential error in computing the daily dosage from one overpass per day. However, since the overpass time and solar noon at most points along the orbit are within ± 2 hours the error from overpass time to solar noon should be smaller unless rapid cloud conditions do occur.

P15, L12. Instead of telling the reader later in the paragraph that the errors were assessed at high latitudes, add that piece of information in the beginning sentence.

P15, L 27. This phrase does not make sense: ‘continues to present date thanks on the OMI UV record’.

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