**Atmospheric
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Interactive comment on "Measurements of UV radiation on rotating vertical plane at the ALOMAR Observatory (69° N, 16° E), Norway, June 2007" *by* P. Sobolewski et al.

Anonymous Referee #3

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The paper "Measurements of UV radiation on rotating vertical plane ..." by Sobolewski et al. deals with a topic that is of interest for ACP and presents measured data that are of relevance. Thus it should be published, but with major modifications.

General:

The paper shows measured data of UV irradiances on vertically oriented receivers for different azimuth against Sun azimuth. However, results for different solar elevations are mixed, as well as cloudy and cloud free data. Nothing is said by the authors with respect to reasons for different results, neither for measurements itself, nor differences against modeled data. Moreover, for the modeled data it seems to be the case that

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other solar conditions have been modeled (March and June, only cloud free) than used for the measurements (June, all cloud conditions). However, the authors say nothing to cloudiness and solar elevation during the measurements: The reader is not informed how many days where cloudy; not what has been done (if at all) if cloudiness changed during a measurement cycle; no information is given on solar zenith angle although it is well known that the effect of the ratio between radiation on the vertical and on the horizontal plane strongly depend on this quantity. The general azimuth definition is not clear: How is it possible that the difference between the azimuths of Sun and receiver becomes larger than $+-180°$?

The general conclusion of the authors, i.e. a factor of 0.5 between the daily mean dose on a vertically and on a horizontally receiver, is very weak because it depends on the coincidental atmospheric conditions during the half month of measurements at a position $70°$ north during the time of midnight sun.

These topics should be improved and, as a consequence, also the abstract.

Major improvements:

Page 24 / line 14: "relative UV exposure" should be defined with an equation, at least on page 27. Is there any difference between "relative" and "normalized". Does "rotating vertical plane" mean values averaged over the azimuth from $0°$ to $360°$?

25/ 1 What is the effect of the dark horizon that can be seen in Fig 1 for a small section? How is the sky obstruction for the other azimuths?

25/9 The solar zenith angles must be mentioned, in general and in combination with the azimuth.

25/10–15 Has it been taken into account in the analysis of the measurements that the cosine for the direct sun on the vertical receiver is different to that for the horizontal one, used for the calibration matrix. This effect should be discussed, even if the conclusion would be that it is of no relevance.

25/18 Fig 2 can be omitted. The information that the radiometers agree quite good can be given directly. If Fig 2 will be shown, it should be used to explain cloud free and cloudy and other atmospheric conditions. To compare the results of different figures (e.g. Fig.3) either day of the year or the date should be used

26/15 What is the information content of Fig.3 ? If it is only to show the effects of clouds or the diurnal cycle. the figure should be omitted. If it is used to explain the difference between horizontal and vertical plane for cloudy and cloud free conditions, it could be used. But then this topic must be discussed in general and not only for UVA and for the two days.

26/23 Here clearly has to be mentioned that the measurements on the vertical plane are not averaged over the azimuth, but individual for each azimuth. The results should be discussed, some explanations should be given. E.g.: Are the dotted results for UVI due to low number of digits for CIE weighted UV? What are the reasons for increased number of points at the two branches at the left and close to the bisection line, which clearly can be seen for UVI but also for CIE weighted UV? How would the figure look like, if cloudy and cloud free data have been separated? What is the effect of solar elevation?

26/27 How is the mean ratio calculated? Simply the mean over all measurements? At least the mean solar elevation and the relative amount of cloudiness should be mentioned.

26/28 For Figure 5 the differences between UVI and UVA should be discussed.

27/22 Fig. 6: How is it possible that the difference between the azimuth of sun and instrument becomes larger than $+-180°$? What is the reason for the unbalance of the measurement with respect to the azimuth? The explanation: "... large negative azimuth... plane is illuminated by direct sun..." I do not understand. What are the conditions for the same angle in the east? Is this an effect of sky obstruction? Are the horizontal lines artificial or effect of overcast conditions?

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28/18 Why are data modeled for 21 of March? Why are such data compared with measurements from June only? What about solar elevation?

29/3 and 7 Why for the modeling of UVA not the real spectral sensitivity curve of the instrument has been taken into account?

29/13–23 What part of the variability in Fig 8 is due to solar elevation, what due to ozone variation? Is it correct that all other variables have bee not changed? Same question as for Fig.6 with respect to the azimuth difference larger than $+-180°$.

32/14 Validity and variability of the average ratio 0.5?

36/ Tab1. To give more importance to this table, the variability – as mentioned already for Fig.8 – due to solar elevation and due to ozone should be mentioned

Minor improvements:

25/4 What direction is azimuth $0°$?

28/8 Radonic instead of Rodonic

39 Fig 3: x-Axis of is not time but day or something similar

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