

## ***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 #1**

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Review of the paper: Measurements of UV radiation on rotating vertical plane at Alomar observatory.; by Sobolewski et al.

The paper presents an interesting topic concerning the effect of non horizontal exposure of surfaces simulating parts of the human body. However, the analysis is not sufficient and the interpretation of the physical phenomena is not clear. The way the initial analysis have been presented here makes the acceptance of this work in ACP very difficult by only answering the questions below, as the first steps-methodology have to be changed. However, instruments and model calculations presented can be sufficient for reporting scientific advances for the specific interesting topic and most

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probably a re-submission of the manuscript if recommended changes will be taken into account, would be more appropriate.

More specific General comments essential for the paper publication Data and data analysis

- The description of the experiment and the way that the data are used is not clear. In page 25 line 5 the authors describe the motor movements and measurements. Timing described here suggests that for a full circle (and back) it takes about 33 minutes. Also, figure 3 (and number of points shown there) suggest that measurements at each azimuth angle is used for comparison with the horizontal KZ instrument. I do not see any physical meaning of figure 4 if a full 33 minutes average scan is not used or else analysis for separate azimuth and zenith angles is not present. Also, for high solar zenith angles I would expect that tilted surface KZ values at the sun's azimuth would be higher than the ones measured by the horizontal KZ.

- There is no information on solar zenith angle range used and what is the impact on the whole analysis. Also, what about clouds? Cloudy or not cloudy conditions are very important for such analysis and no information is given about these issues.

- The main conclusion of the authors is that there is a factor of 0.5 between the daily mean doses. Given the weak methodology, no physical explanation can be derived from that number as it is really a random number depending on the atmospheric conditions, solar elevation range, azimuth rotation choice, for the specific place and period.

- I have some objections about the use of the calibration matrix converting KZ measurements to CIE weighted UV. My impression is that this calibration matrix can be used only for horizontal surface instruments and certain alterations have to be made for the vertical one. For example: Let's assume that we have the case of an instrument with a spectral response not similar to the CIE action spectrum. A common issue is that such instruments have less sensitivity (than the CIE curve) in the UVA. So for a measurement at a very low solar zenith angle (eg: local noon) the contribution of the

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UVA part to the CIE erythral irradiance at this solar angle is high compared to other zenith angles. In addition, the direct sun irradiance contribution is high compared to the diffuse one. At the same time the vertical surface instrument is "sensing" the direct sun light by a less weighting as it proportional to the cosine of an incident higher angle. In this case the UVA contribution to the CIE irradiance would be different than the one on a horizontal plane thus the calibration matrix values are not valid. Similar examples could be mentioned for (common) deviations of such instruments from the CIE action spectrum in the UVB range.

The specific comments of reviewer #3 commenting on this paper have to be addressed.

For not repeating most of them I will just add the following:

- Page 26 , line 4 UVB and UVA measured by both radiometers can be clarified in this section too.
- Why day 162 are so different than the one of 163 ?(figure 4)
- There is no explanation based on physical or atmospheric phenomena to interpret results of figure 5
- The argument presented in the last of the general comments have to be considered for Vitamin-D results and weighting with this action spectrum.
- There is no explanation of what plane azimuth-sun azimuth means exactly at the description of the XX' axis of figure 6. What is the meaning of angles higher than 180 degrees ?
- If there are snow free conditions then surface albedo of 0.03 can be used.

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Interactive comment on Atmos. Chem. Phys. Discuss., 8, 21, 2008.

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