Atmos. Chem. Phys. Discuss., 7, S5749–S5752, 2007
www.atmos-chem-phys-discuss.net/7/S5749/2007/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Attenuation of global ultraviolet and visible irradiance over Greece during the total solar eclipse of 29 March 2006" *by* A. Kazantzidis et al.

Anonymous Referee #3

Received and published: 8 October 2007

General comments:

This paper summarizes the variability of ultraviolet and photosynthetically active radiation during the solar eclipse of 29 March 2006. The attenuation of global ultraviolet radiation and visible irradiance over Greece is studied using measurements from the Greek NILU-UV network and model calculations. The attenuation of solar irradiances, as well as the spectral effect of solar eclipse on surface irradiances is studied. The behaviour of total ozone amount during the eclipse is also discussed.

In the paper, the model calculations are compared with measurements. The results are interesting, but the motivation of using model comparisons is not clear. The authors

refer well to earlier studies, but the novelty and the main point of the paper is not clearly pointed out. What is the key question where they answer?

Before the paper can be accepted for publicaton in ACP, the authors should address carefully the issues given below.

Specific comments:

1. The title of the paper suggests that the attenuation of global UV and visible irradiance is presented. In the Abstract, only model comparisons, as well as the spectral effect are discussed. The amount of attenuation should also be presented or the title of the paper changed.

2. Make clearer why the 1D and 3D models are used.

3. In the Introduction, it is stated that the new thing is to present the ozone column derived from multi channel radiometers during the eclipse. What is the new thing concerning the irradiance measurements?

4. Page 13481, line 2: How small is the difference of SZA for the same time between the studied days?

5. Page 13481, line 8: The differences in cloud cover affect as well.

6. Chapter 3.2. Do the model calculations represent clear sky situations?

7. Page 13482: line 23: What do you mean with "generic spectral response". How did you obtained it?

8. Chapter 4.2: There is a lack of discussion about the attenuation amount of UVA and PAR.

9. From figures 2-3, it is difficult to see the order of magnitude of the differences between the model and measurements. Ratios could be shown in some figures.

10. In the Chapter 5.1, you have compared the PAR radiation with the irradiance at 380

ACPD

7, S5749–S5752, 2007

nm. Does the comparison of a wide band (PAR) and narrow band (irradiance at 380 nm) introduce any extra effect which should be considered?

11. Which are the possible reasons for the underestimation of the spectral effect at UVA and PAR radiation in the model calculations?

12. At the end of the Chapters 5.2 and 6, you speculate about the influence of the increasing contribution of diffuse radiation. What is the effect of the ozone profile, when the ratio of diffuse and direct radiation changes?

13. In the Chapter 5.2 both the 1D model and 3D model calculations are studied. It is not clear from the text, which model is ploted in the the Figure 5.

14. Page 13487, line 18-19: Make clearer:”...the change in irradiance at 312 nm is influenced strongly by the eclipse...”.

15. It would be interesting to see the ratios of the irradiances at 305 nm and 320 mn as they are used to derive the total ozone amount.

16. Chapter 6: Why the increasing of ozone is not observed at Nicosia and Kastelorizo before the totality?

17. Chapter 6: Are the discussed ozone changes bigger than the measurement uncertainties? The measurement conditions are challenging, which increases the measurement uncertainties. How about the effect of changing radiative conditions on the angular response of the instrument?

18. Chapter 7: How big are the differences between the model MYSTIC and the measurements? The ratios could be added in the figure 7.

19. Chapter 7. Was the tropical ozone profile representative for the real situation? What is the difference compared with the mid-latitude profile?

20. Conclusions: Make clearer: “ The irradiance at UVA and visible spectral regions was almost 30 times less for the same conditions.”

ACPD

7, S5749–S5752, 2007

Technical corrections:

1. 13484: line 16 ...is of the same magnitude THAN FOR 305 NM....

2. Table 2. The cloud cover amount in octas could be included in the Table.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 13475, 2007.

ACPD

7, S5749–S5752, 2007