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Comment

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 #1

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Kazantzidis et al. describe measurements of UV and PAR radiation at a number of sites in Greece during a solar eclipse. The data are evaluated for wavelength dependent changes in irradiance as the eclipse progresses. The eclipse was also simulated with 1-D and 3-D radiative transfer models, and the model results compared with the measured data. The paper provides new insights from both the number of sites in the eclipse region and the spectral data available, and provides a novel test for the models. Although the data is of interest in itself, the manuscript would benefit from a little more discussion and explanation of the results. For example, why does the 3-D model fail to reproduce the overturned ratio at 305/380 in Fig 5? Neither is it made clear why the two models were set to simulate the eclipse. Was it just a challenging test for the

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models, or to prove that 3-D is better than 1-D, or to try to provide an explanation for the observations?

More detailed comments are given below.

General comments

The use of % is sometimes confusing as it is used in several different ways in the manuscript: for sun coverage (text), sun visible (figures), difference between measurement and model, and model capture of the eclipse effects. a) can terminology in text and figures (eg Fig 2-6) be made consistent b) when using % differences for model - measurement comparison of effects observed changes should be compared, not resulting absolute values. For example the changes in ratios of different wavebands (P13486 line 6) are said to agree within 10% yet the model only captures half the change observed.

There are many instances of subjective quality statements e.g. P 13477 paragraph lines 9-25 contains 'quite well', 'good agreement' and 'more accurate' without providing any quantitative benchmark to define what is 'good'. Other examples can be found on P13476 line 14 'an agreement with measurements' ; P13480 line 1 'considered negligible'. Please quantify.

Specific comments:

Pages and line numbers refer to the version available for discussion i.e "<http://www.atmos-chem-physdiscuss.net/7/13475/2007/acpd-7-13475-2007.pdf>"

- 1.P13476 line 3 Radiometers would be a better term than actinometers
2. P13476 line 14 What was the agreement between 3-D model and measurements at UVB and visible wavelengths?
3. P13479 line 8 Was the lamp really 10,000 W?
4. P13480 line 7 Clarify. This could mean EITHER The spatial and temporal range of

ozone across all stations during the eclipse was 285 -355 DU OR The ozone ranged between 285 - 355 DU at each station during the eclipse.

5. P13480 line 9 certain extent

6. P13480 line 13 At no site was the sky clear during the eclipse. Line 17 rather clear? Either the sky was clear or it was not. Line 26 ..during the cloud free day closest to the eclipse..

7. P13481 lines 1-23 describe a double normalisation, first to the cloud free condition, and then to the pre-eclipse condition, producing 'ratios'. These could be better defined eg cloud-free ratio, or cloud-free normalisation ratios

8. P13482 line 7 ..for the largest solar zenith angle during the eclipse..

9. P13482 line 17 Reference for Atlas 3 is missing

10. P13483 line 25 relative (not relatively)

11. P13484 lines 1-2 ..the measured irradiance at 305 nm was 10% less...15% more than... pre-eclipse.

12. P13484 Line 6 Explain that a change in ozone during the cloud-free day used for normalisation would have the same result as a change in ozone on the eclipse day i.e. result in a before / after change in the normalised values.

13. P13484 Lines 7-13 This paragraph does not give a very good description of the agreement between model and measurement and should be rewritten. Repeat the rewrite on P13487.

14. P13484 Lines 23..measurements reveal significant and probably artificial..

15. P13485 line 7 What are the measurement uncertainties?

16. P13485 Line 9-12 What is the meaning of this paragraph? Are global measurement-model comparisons the same as those for direct sun?

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17. P13485 Line 14 ..emphasis given to... 18. P13486 line 23 If this behaviour is caused by total ozone, should it not go in opposite directions for Kastelorizo and Nicosia (where ozone changes were in opposite directions)?

19. P13487 line 26 Is the limb darkening correction applied to the derived ozone?

20. P13488 lines 3-4 This sentence is rather confusing. What has been corrected for total ozone? I thought that the ozone data are those under discussion? If not, what are 'measured differences' referred to?

21. P13489 line 2 ..due to the impact of the ozone profile..

22. P13489 lines 3-4 What are the differences in the ozone profiles, and which is most appropriate for the location? Were any ozone-sondes used in Greece on that day?

23. P13482 and P13488 Model results are convoluted with 'generic spectral responses' on P13482, but with 'Channel spectral responses' on P13488. What are 'generic' responses, and were they used for both models, or were the actual responses used in the 3-D case. If the latter, why were actual spectral responses not used in the 1-D case?

24. Model and measurement uncertainties are referred to several times in the manuscript, yet nowhere are they quantified. What is the estimated uncertainty in the double normalised data? Were the models run for clear sky conditions, and what are the overall uncertainties due to uncertainties in the model input parameters (only ozone is mentioned).

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

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