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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Impacts of the solar eclipse of 29 March 2006 on the surface ozone and nitrogen dioxide concentrations at Athens, Greece" *by* C. Tzanis et al.

C. Tzanis et al.

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A. Authors response to the comments of Referee 2

1)Referee's Comment to the Introduction

"An important point, mentioned in introduction, is the time delay (10 minutes) of the maximum response of the surface ozone concentration on the solar eclipse of 11 August 1999 in Bulgaria. Next cited paper belongs to the authors of the current article and mentions 1 hour delay of the similar response. It is completely unclear why such difference is observed. Authors do not give any comment on such scatter of time response."

Author's response

This comment concerns with a misunderstanding on the discussion of the findings of two cited publications (one of our team and the other of the Bulgarian one) on the field of the present paper, notably: According to the paper of the Bulgarian team (Kolev et al., 2005), "ozone responded to variations in light intensity with a time delay: the O3 concentration started to decrease within 40 min after the beginning of the eclipse, and its minimum values were measured within 10 min after the maximum phase. In this case, the decrease of O3 concentration was about 40According to Figure 1 (http://www.cc.uoa.gr/~nsarlis/gndlayerleveloz/Figure1.doc) the duration of the maximum effect of the eclipse event to the surface ozone (SOZ) concentration was almost one hour. This finding is consistent with our discussion in the cited paper of our team (Tzanis, 2005). We will revise the two sentences mentioned by the reviewer to avoid this misunderstanding, notably: that there is scatter of time response in the findings at Greece and Bulgaria for the solar eclipse of 11 August 1999.

2)Referee's Comment to the Data

"...measurements of the surface ozone concentration and NO2 are done with resolution of 30 seconds." "ALL the graphs presenting concentration measurements are given with hourly resolution."

Author's response

At first, we note that this referee disagrees with the referee 3, who, for instance, verbatim comments that: "The time resolution of the nitrogen dioxide data is good." It is clearly stated in the data section of our paper that we employ "measurements of SOZ and nitrogen dioxide reported by the local air pollution monitoring network (National Service for Air Pollution Monitoring) with time resolution 30 s and accuracy ś1 ppb." It is therefore correct that we present the hourly mean values (derived from the observations with time resolution 30 s) at all figures. We think that the referee would be

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right, if we were performing hourly measurements (one measurement per hour) in order to search for a signal with duration of almost one hour. However, it is not the case, notably: Our data were obtained by the National Service for Air Pollution Monitoring which performs 120 measurements per hour reporting hourly means. Therefore, our measurements are the arithmetic mean value of 120 measurements obtained in an hour. In addition, the duration of the solar eclipse event was more than one hour (2 $\frac{1}{2}$ hours, approximately). Finally, inspection to figure 6 of Kolev et al., 2005 (fig.1) shows that the SOZ hourly mean values concentration resembles well to the reduction in SOZ concentration deduced from the solar eclipse event. Nevertheless, we intend to clarify this point in the revised data section of our paper.

3) Referee's Comment to the Discussion and results

Author's response

We will incorporate additional discussion at the points mentioned by the referee

4) Referee's Comment on the technical corrections

Author's response

We will perform all the suggested technical corrections

B. Author's response to the comments of Referee 3

General Referee's Comment In general the paper lacks focus.

Author's response At the end of the Introduction it is clearly stated that this paper is an observational study of the effect of a solar eclipse on the concentrations of surface ozone and nitrogen dioxide, exploiting the relevant observations during the solar eclipse that took place on 29 March 2006.

Specific Referee's Comments

Author's response

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There is no doubt that the shorter the time resolution, the more important the data becomes. In our case, the available observations were hourly means only. However, we do believe that the main effect of a solar eclipse on the concentrations of surface ozone and nitrogen dioxide is detectable by using hourly mean values (shown above in A2 and Fig.1 http://www.cc.uoa.gr/~nsarlis/gndlayerleveloz/Figure1.doc). We will add more discussion at the points suggested by the reviewer.

References

Kolev, N., Tatarov, B., Grigorieva, V., Donev, E., Simeonov, P., Umlensky, V., Kaprielov, B., and Kolev, I.: Aerosol lidar and in situ ozone observations in PBL over Bulgaria during solar eclipse on 11 August 1999, Int. J. Remote Sens., 26, 3567-3584, 2005.

Tzanis, C.: Ground-based observations of ozone at Athens, Greece during the solar eclipse of 1999, Int. J. Remote Sens., 26, 3585-3596, 2005.

Figure 1: http://www.cc.uoa.gr/~nsarlis/gndlayerleveloz/Figure1.doc

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 14331, 2007.