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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The effect of the total solar eclipse of 29 March 2006 on meteorological variables in Greece" *by* D. Founda et al.

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1 Summary

Given my own recent efforts to model the atmospheric effects of the total solar eclipse of 4 December 2002 using a global model (Eckermann et al. 2007), I was particularly interested to read about the authors' observations and mesoscale modeling of near–surface atmospheric responses to the 29 March 2006 event.

I enjoyed reading the paper. I had a few questions and comments, motivated more out of personal interest than anything else. I welcome any comments the authors might have.

I was interested in some of the details of the WRF runs. First, I am unfamiliar with the "*Global Final (FNL) Analyses*" that the authors use to initialize their runs. Is this an intrinsic NOAA/NCAR analysis product used by WRF or is it from some other source (e.g., operational NCEP Global Forecast System analyses)? Are these fields used to update the lateral boundary conditions periodically? I presume the model is not run here in a full forecast (hindcast) mode with periodic assimilation update cycles?

Were all the different domains outlined in Figure 1 nested, as suggested in section 3.2.1, or were some run independently? If the former, was the nesting one-way or two-way? Finally, how much of the upper part of the domain to 100 hPa was sponge layer and what kind of sponge layer formulation was used?

I was also interested in the way the authors specified time-varying eclipse effects in their model, given my own efforts to do the same (see Appendix A of Eckermann et al. 2007). I presume your eclipse data are taken straight from the as-yet-unpublished paper of Gerasopoulos et al. (2007)? To make this paper a little more self-contained, it might be a nice idea to plot the path of the umbral shadow or some other similar eclipse path parameter in Figure 1, as an aid to readers.

A particularly interesting finding (Page 10647 L5–9) is the lack of any significant low-level wind response in the WRF simulations. While, as the authors note, Gross and Hense (1999) found some effect in their mesoscale model runs, another mesoscale modeling study by Vogel et al. (2001) found less of an effect, with simulated wind changes mostly confined to regions where the topography or land surface was highly inhomogenous or there was strong land-sea contrast. In more homogenous terrain they found essentially no effect on winds. Thus I wonder if the authors would care to speculate on what the origin of these modeling differences might be (e.g., different resolutions, different surface schemes)? I was also interested in the authors comment (Page 10647 L22) that the higher elevation sites show a faster temperature response in the model. Again, any ideas why? Perhaps this is related to the wind response to the eclipse on the slopes of mountains found by Vogel et al. (2001)?

ACPD

7, S3495–S3497, 2007

Interactive Comment

Finally, in Figure 10b, is the temperature response scale saturated (clipped) at a maximum 2.75 K response? More generally in these figures, I think it might be helpful to readers and future modeling studies to quote the values and locations of the maximum and minimum responses, either on the panel or in the caption.

Thanks again for an interesting paper.

2 Minor Typos

Page 10639 L8: due to its...
Page 10640 L2: “has leaded” → “led.”
Page 10644 L19: “run” → “ran.”
Page 10648 L12: “detect” → “simulate.”

3 Supplementary References

Eckermann, S. D., D. Broutman, M. T. Stollberg, J. Ma, J. P. McCormack, and T. F. Hogan: Atmospheric effects of the total solar eclipse of 4 December 2002 simulated with a high-altitude global model, *J. Geophys. Res., 112*, D14105, doi:10.1029/2006JD007880, 2007.

Vogel, B., M. Baldauf, and F. Fielder: The influence of a solar eclipse on temperature and wind in the Upper-Rhine Valley – A numerical case study, *Meteorol. Z., 10*, 207–214, 2001.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 10631, 2007.

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7, S3495–S3497, 2007

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