

Interactive
Comment

Interactive comment on “Wildfire particulate matter in Europe during summer 2003: meso-scale modeling of smoke emissions, transport and radiative effects” by A. Hodzic et al.

A. Hodzic et al.

Received and published: 16 July 2007

General Comment: This paper describes the effect of wildfire particulate matter on air quality over a large part of Europe in 2003. It uses MODIS daily smoke emission inventory and a simple parameterization of injection altitude to prescribe the wildfire emissions in a meso-scale chemistry transport model. The authors conclude that the wildfire resulted in a significant enhancement of PM₁₀ ground concentrations over a large part of Europe, exerted a strong radiative forcing and had a substantial effect of photolysis rates and photochemistry.

The paper is very well written, the methods are very well established and the results are interesting. The paper is an extension of the analysis presented in Hodzic et al.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

2006a). While I feel that the new manuscripts contains a substantial amount of new work and therefore should be published in ACP, it would be desirable that the authors point out more clearly the new methods and results compared to the 2006 paper.

Answer: As suggested by both reviewers the objectives and new work performed in the present study have been pointed out more clearly in the manuscript. Specifically, the following paragraph has been added:

“Hodzic et al. (2006a) reported large inconsistencies in predicted aerosol concentrations and optical properties over Europe during summer 2003 caused by unaccounted emissions from wildfires. The present study extends this work by developing a new modeling framework that includes wildfire emissions and their effect on air quality. The objective of the paper is twofold: (i) First, a simple parameterization of smoke emission and transport is presented and evaluated with observations; (ii) Second, the effects of smoke emissions on air quality in Europe are examined during the summer 2003 fire season, including both the direct impact on ground concentrations of pollutants and the indirect impact on photolysis rates and atmospheric radiative forcing.”

Minor Comments:

- 1) p. 4713, l. 3-8: Fig. 1 should be referenced here. Done.
- 2) p. 4714, l. 17: change "can be overestimated" to "can be an overestimate". Done.
- 3) p. 4726, l. 16-17: the authors should consider directly reproducing Fig. 6 from Hodzic et al. (2006a). Answer: Direct comparison of model results with lidar data is not possible as the arbitrary units are used to indicate the relative strength of the lidar backscatter. Also, the Figure 7 of the present paper is more suitable in this study as it inter-compares 3 model simulations which cannot be displayed in Figure 6.
- 4) Section 4.3.1: The authors demonstrate the effect wildfire particulate matter on photolysis rates by comparing the REF and H_FIRE runs. Furthermore, CHIMERE reference model ozone concentrations are compared with measurements. Is this reference

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

model different from REF? Is online ozone chemistry also included in the REF and H_FIRE model runs? If yes, ozone concentrations from both runs should be compared in order to directly identify the wildfire effect on ozone.

Answer: The aerosol-induced changes in photolysis rate coefficients were calculated offline, and therefore do not give direct estimate of changes in ozone production. Model improvements are underway to fully couple the aerosol radiative effects into the chemistry and transport model.

5) pp. 4736, l. 2-4: revise verb "can reinforced" in this sentence. Answer: The sentence has been changed to: "This heating could have contributed to reinforcing the atmospheric stability and to maintaining the heat-wave conditions during summer 2003."

6) For many of the figures, fonts used for labels and numbering are too small even if the figures are scaled to ACP format (e.g., Figs. 4, 5, 6, 11, 12, 14). I would suggest using only one larger color bar for all model subfigures in Fig. 6 and, similarly, one for MODIS and one for the model results in Fig. 5.

Answer: Fonts have been made bigger in figures 4, 11, 12, 14. We could not produce a better plot for figures 5 and 6, and we kept the same presentation as in our previous paper (Hodzic et al., 2006). The Figure 13 has also been updated due to an error that occurred in the unit scale.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 4705, 2007.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper