Atmos. Chem. Phys. Discuss., 13, C7037–C7039, 2013
www.atmos-chem-phys-discuss.net/13/C7037/2013/

Atmospheric Chemistry and Physics Discussions

Open Access

ACPD

13, C7037–C7039, 2013

Interactive Comment

Interactive comment on "Impacts of aerosols on the chemistry of atmospheric trace gases: a case study of peroxides and HO_2 radicals" *by* H. Liang et al.

H. Liang et al.

zmchen@pku.edu.cn

Received and published: 18 September 2013

Thanks for your constructive and thoughtful comments. We have revised our manuscript, according to your comments. Below is our response, as shown in answer (A), to your comments.

General: This is a sound study on peroxides, mainly studied in field measurements in Beijing, China which in a modelling part also deals with the impact of aerosol particles on gas phase HO_2 and hence H_2O_2. The field measurement part contains a number of interesting results. The modeling part much resembles recent work by Mao et al.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

Overall, the paper can be published in ACP subject to a few revisions.

A: Thank you for your constructive comments.

Page 16557, line 7: The model mechanism which has been used should be fully documented. It is not sufficient to state "it has been chiefly drawn"....The full documentation can be given in a supplement.

A: Yes, we have given the full documentation as a table in the Supplement (Table S1).

P 16562, l 24: Schuchmann and von Sonntag

A: Yes, we have corrected it.

P 16572, l 15ff: Please give evidence that really diffusion is a very important difference between aerosol and haze periods. That might also be due to different aqueous phase chemical conversion as concentration change.

A: Yes. We think that the aqueous phase diffusion of HO_2 is really important for the differences between non-haze and haze periods. According to Jacob (2000), the corresponding characteristic time of aqueous phase diffusion and chemical reactions in aerosols could be given as follows:

$$\tau_{diff} = \frac{r^2}{\pi^2 D_l}$$

$$\tau_{chem} = \frac{1}{k_{chem}}$$

where r is the radius of the particle (m), D_l is the aqueous phase diffusion coefficient (m^2 s^{-1}), and k_{chem} is the first-order reaction rate constant. For HO_2, both τ_{diff} and τ_{chem} are on the order of 10^{-6}- 10^{-5} s, indicating that both processes could affect the uptake coefficient of HO_2. Larger particle radius in the haze period would lead to a slower aqueous phase diffusion and hence a smaller γ_{HO2}. We agree that in addition to diffusion, γ_{HO2} is affected by the different chemical conversions due to the HO_2 concentration change. We have rewritten the relevant statement in the revised manuscript as follows: “We estimated the characteristic times of aqueous phase diffusion (τ_{diff})

ACPD

13, C7037–C7039, 2013

and chemical reactions (τ_{chem}) for HO_2 according to the equations given by Jacob (2000), and found that both τ_{diff} and τ_{chem} were on the same order. This indicates that γ_{HO2} would be determined by the combination of both processes."

References

Jacob, D. J.: Heterogeneous chemistry and tropospheric ozone, Atmos. Environ., 34, 2131-2159, 10.1016/S1352-2310(99)00462-8, 2000.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 16549, 2013.

ACPD

13, C7037–C7039, 2013

Interactive Comment