Atmos. Chem. Phys. Discuss., 9, C8681–C8683, 2009
www.atmos-chem-phys-discuss.net/9/C8681/2009/

Interactive comment on "A numerical evaluation of global oceanic emissions of α-pinene and isoprene" *by* G. Luo and F. Yu

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Received and published: 18 December 2009

The authors thank the editor for the helpful comments. Our responses to the comments are given below.

*As pointed out during this online review process, the lifetime of α-pinene is longer than that of isoprene. The boundary layer budget equation imposes an additional physical constraint on the relative ratio between isoprene and α-pinene fluxes. [E.g. (Flux(α-pinene)/Flux(isoprene) $\sim$ (tau(isoprene)*C(α-pinene))/((tau(α-pinene)*C(isoprene))]. Assuming comparable lifetimes (tau) and concentrations (C), the α-pinene flux would be expected to be in the same range as the isoprene flux. It needs to be explained why the modeled α-pinene flux is more than a factor of 10 higher than the modeled*

isoprene flux, while their observed concentrations are very similar.

The explanation for the difference between the global oceanic emissions of α-pinene and isoprene has been discussed in the reply to referee 1. Detailed budget analysis for selected locations has been provided in the supplement.

Also, I was unable to find reference material on how monoterpene oxidation is incorporated in GEOS-CHEM (e.g. http://acmg.seas.harvard.edu/geos/wiki_docs/chemistry/chemistry_updates_v6.pdf). It will be helpful to the reader to include either a reference or an appendix that documents the chemical reactions which are considered for a-pinene/monoterpene oxidation.

In GESO-Chem, the monoterpene oxidation is treated in the code carbon_mod.f, while the isoprene oxidation is treated in SMVGEAR solver. The reaction rates of α-pinene with OH, O_3 and NO_3 are calculated as following:
KO3 = 56.15e-18*EXP(ACT_O3 * (1.0/298.0 - 1.0/T))
KOH = 84.4e-12* EXP(ACT_OH * (1.0/298.0 - 1.0/T))
KNO3 = 6.95e-12* EXP(ACT_NO3 * (1.0/298.0 - 1.0/T))
where ACT_O3= 732.0, ACT_OH= -400.0 and ACT_NO3=-490.0, and T represent temperature in air.
The reaction rates of isoprene in GEOS-Chem with OH, O_3 and NO_3 are calculated as following:
KO3 = 1.05d-14 * EXP(-2000.d0 / T)
KOH = 2.70d-11 * EXP(390.d0 / T)
KNO3 = 3.03d-12 * EXP(-446.d0 / T)

The above reaction rates have been described in the supplement.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 20721, 2009.