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Interactive comment on “Characterization of non-methane hydrocarbons in Asian summer monsoon outflow observed by the CARIBIC aircraft” by A. K. Baker et al.

Anonymous Referee #1

Received and published: 8 September 2010

Review of "Characterization of non-methane hydrocarbons in Asian summer monsoon outflow observed by the CARIBIC aircraft" by A. K. Baker et al.

General Comments

It is reported in this study that non-methane hydrocarbons (NMHCs) are enhanced in the Asian monsoon outflow in the upper troposphere during summer (June – September 2008). In-situ measurements of NMHCs are obtained during the CARIBIC commercial aircraft project in 2008. The large enhancements of combustion tracers indicate strong influence of convective uplift of the boundary layer air and biofuel burning in the monsoon outflow region. In-situ measurements of short-lived tracers over this region

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seem to be scarce and useful at the same time. The scientific result presented in this study is convincing. And I would highly recommend the publication of this article in ACP. However, I do have a number concerns, which I would like to see addressed in the revised version.

Specific Comments

1. The background of the Asian monsoon circulation and how it affects the transport in the broad region of Southeast Asia is well described in the introduction. However, it seems to me that the definition and/or background of the monsoon outflow needs to be addressed more clearly in this study. For example, a regional map showing the location of the anticyclone, seasonal mean circulation showing strong easterly and westerly flows, the location of deep convection, and biomass burning activities will be very useful to be included in this work. Figure 2 does not seem to be very useful in this regard since the westerly flow in the high latitudes seems to be very prominent.
2. It would be useful to have some other comparisons. How about the flight paths from Frankfurt to other Asian countries, such as, China and Philippines?
3. The authors have concluded that the enhancements in the tracers are related to convective uplifts and biofuel burnings. A climatological map of convective uplift and inventory of biomass/biofuel will be necessary to support the conclusion.
4. It is mentioned in section 3 that the biomass burning is expected to be low since it is rainy monsoon season. Is there any wash out effect in the tracers due to rain?
5. I think the back trajectory calculations are very useful in this study. And some trajectory statistics (or a map) showing transport times adjacent to the monsoon outflow would be very useful.
6. In section 6 first paragraph – 1) Research flights should be replaced by commercial aircrafts. And 2) measurements in the monsoon outflow (if it is defined this way) would be more appropriate than within the Asian monsoon circulation.

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Technical Comments

1. There are three Liu et al. (2009) papers in the references. They need to be distinguishable.
2. Figure 1 – It is not mentioned that what the dots and solid lines mean.
3. Figure 4 – It would be more interesting if fewer species with stronger gradient and other months were included rather than only for summer for better comparisons.

Interactive comment on *Atmos. Chem. Phys. Discuss.*, 10, 18101, 2010.

ACPD

10, C7331–C7333, 2010

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