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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Acetone-CO enhancement ratios in the upper troposphere based on 7 years of CARIBIC data: New insights and estimates of regional acetone fluxes" *by* Garlich Fischbeck et al.

Anonymous Referee #2

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The paper of Fischbeck et al. uses a multi annual record of measurements of acetone and CO during IAGOS-CARIBIC in the upper troposphere to estimate emissions of acetone with focus on North America and East Asia. They use observed enhancement ratios of acetone and CO from scatter plots to link them to emission ratios. To focus on distinct air masses instead of spurious incidents of correlated data their method accounts for consecutive data points for slope determination, which thus can be linked to spatially continuous structures. They analyse the tropospheric fraction of data to estimate the emission ratios of Acetone. To deduce this quantity they combine emissions from different inventories for different types of emissions and species. They account

for the chemical evolution and diffusion of the plume during transport by using a box model, which gives the sensitivities of the enhancement ratios to different processes during transport. Based on the model sensitivity studies they define a threshold based on the CO production as indicator for plume ageing and for selecting 'young plumes'. Based on this they estimate seasonally resolved enhancement ratios. They derive fluxes of acetone for North America and south East Asia, which are consistent with the inventories for North America, but derive higher values of acetone fluxes than given in the inventories for East Asia. The paper is in general well written clearly structured and clearly provides a new measurement based approach to estimate fluxes. I therefore recommend it for publication with small changes, which mainly concern the discussion of the potential errors.

What are the contributions to the error for the fluxes (just a statistics) (e.g. for eqn.12)?

What is the range of uncertainty for the curves in Figure 3, when applying e.g. the uncertainties of the main reaction rates? How does this transfer to eqn.12? Further I would appreciate a figure, which shows the derived slopes (or a subset e.g. for Asia) and their variability on the basis of the measured data.

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