

Interactive comment on “Seasonal variation of ozone deposition to a tropical rain forest in southwest Amazonia” by U. Rummel et al.

U. Rummel et al.

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We like to thank reviewer #1 for his positive evaluations and helpful comments. Our responses to specific comments are listed below:

RC #1: " p.7404, l.8: How were the periods for measurements actually chosen? They are defined as the end of the wet and dry seasons, respectively. Looking at Figure 2 the periods look more like the end and the beginning of the wet season. More extreme situations could probably be found by measuring in the middle of the wet and dry season respectively. However, it is a bit strange that the SHD for LBA- EUSTACH-2 is close to that of the peak dry season even after a considerable amount of rain. Is there any explanation for that?"

AC: With the focus on surface exchange processes in the present paper, the terms "dry

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season" and "wet season" cannot solely be associated with the precipitation distribution as shown in Fig.2. Surface exchange fluxes mainly depend on groundwater table and vegetation activity that are significantly delayed compared to the rainfall pattern (Hodnett et al., 1996; Rottenberger et al., 2005; see References in Discussion paper). They start to decline about in June and have their minima 2-3 month later than the monthly precipitation. That is the reason why burning activity, which depends on the "dryness" of the vegetation, takes place mainly between July and October (see Fig. 2). In addition, in this part of Amazonia the months with lowest rain amounts are influenced regularly by cold fronts from the south, so called "friagems". These cold air masses partly cause day to day differences in maximum temperature up to 10 K and provide the lowest monthly mean temperatures during the driest period of the year (see Culf et al., 1996). Consequently the monthly mean SHD values are limited by this influence and are thus not much higher than mean values determined during the experimental period of LBA-EUSTACH 2.

RC #1: " p.7406, l.14: I suppose the calibration unit included an O₃ generator?"

AC: Yes, we included this information in the following form: "A gas-phase dilution/titration unit (ANSYCO SYCOS K/GPT, Germany), containing a UV lamp as O₃ source was used together with pressurized cylinders of zero-air and NO standard (10 ppm) for combined calibrations of the O₃, NO, and NO₂ analyzers."

RC #1: " p.7406, l.19: Does this imply that each height was measured for about 2 minutes. Which part of the measurements were used to calculate the means for each height?"

AC: Yes, two complete cycles of sequentially sampled profile data were generally averaged to obtain half-hourly data sets of vertical trace gas profiles. Within the 15-min-cycle, the dwell time at each height was 1.5 minutes of which the first 30 s were generally rejected to allow adaptation to the new height. The net measuring time per level was therefore 2 minutes per half-hour.

RC #1: " p.7408, l.10: "What is the justification for choosing 0.01 m/s as the threshold for u^* ."

AC: Please see the answer on the RC of reviewer #2 to that point.

RC #1: " p.7409, eq.1: "I miss a few details about how storage flux was calculated."

AC: The storage flux was calculated as the vertically integrated temporal change of the mixing ratio (based on the half hour profiles) within the considered air column between the soil surface and the measuring height. We added the following sentence in Section 3.2 (p. 7409, l.18): "...for the correct determination of the ozone deposition processes. The storage change was calculated from the temporal change of the measured ozone profiles (see Section 2.3 and Fig. 3)."

RC #1: " p.7413, l.13: If the purpose of Fig.6 is to show co-variance between O_3 and SHD, Fig. 7 is sufficient."

AC: Please see the answer on the RC of reviewer #2 to that point.

RC #1: " Fig 8: It would improve the readability if the figure was annotated with "wet season" and "dry season" above the columns. The same holds for figs. 9, 10 and 11."

AC: The annotations were added to the figures.

RC #1: " p.7415, l.14: I suppose the deposition velocity was always calculated as the ratio of the storage-corrected flux and O_3 mixing ratio. Delete "generally."

AC: Deleted.

RC #1: " p.7416, l.26: I suppose it should be the average SHD found in the dry season during daytime (10:00-18:00, as stated in the legend to Fig. 7)."

AC: No, the SHD threshold of 10 g/kg is oriented at the maximum SHD average (10:00-18:00) found during the wet season (LBA-EUSTACH 1) experiment.

RC #1: " p.7418, l.28: The depletion of O_3 during night is not only by deposition, but

also by chemical reactions."

AC.: Now: "...and the near surface layers get depleted of ozone by deposition and chemical reactions."

RC #1: " p.7428, l.2ff: Like reviewer no. 2, I find that this part is somewhat speculative and does not add substantial new information."

AC.: We removed this paragraph.

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