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Interactive comment on “Implications of CO₂ pooling on $\delta^{13}\text{C}$ of ecosystem respiration and leaves in Amazonian forest” by A. C. de Araújo et al.

A. C. de Araújo et al.

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General Comments:

Length and quite descriptive nature of the manuscript

We agree with Referee #1. We have followed the suggestions and the manuscript was shortened considerably.

Tables and figures (e.g. Table 1 and Fig. 4) of enough relevance

We partially agree with Referee #1. Indeed, Table 1 is redundant with former Figs. 3 and 6 and therefore it was removed from the manuscript. However, we have decided to maintain former Fig. 4 because it shows how variable the relation between

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$\delta^{13}\text{C}$ and ca was on the slope and in the valley during the three consecutive nights in August 2004, as compared to that on the plateau. Although former Fig. 4 shows the same information as in former Fig. 3, it allows a better visualization of the identity of each nighttime period because the temporal evolution of both $\delta^{13}\text{C}$ and ca was omitted.

Figure 8 and respective text

We agree with Referee #1. We have removed Fig 8 as well the sections 3.5 (Carbon isotope discrimination by sunlit leaves), 4.5 (Temporal and spatial variability of $\delta^{13}\text{C}$, ci/ca ratio and ci) and 5.5 (Temporal and spatial variability of $\delta^{13}\text{C}$ and ci/ca ratio) from the manuscript.

Specific Comments:

Page 4460 The observed pattern of $\delta^{13}\text{C}$ leaf suggests that water-use efficiency (WUE) may be higher on the plateaus than in the valleys.

We agree with Referee #1 and we have removed this statement from the manuscript.

Page 4466 Sampling of foliage and litter: How often were leaf samples taken in August 2004 and October 2006? What were the heights for the vertical gradient?

Leaf samples were taken only once in August 2004 and October 2006. In August 2004, leaf samples were collected from about 3 to 30 m agl on the plateau and slope, and from about 3 to 25 m agl in the valley. The sampling heights were not uniform among the topographical sections, as follows: Plateau (3, 10, 17, 21, 24, 26, and 30 m agl), Slope (3, 8, 10, 12, 20, 26, 28, 30 m agl), and valley (3, 7, 20, 25 m agl).

Page 4467, equation 2: may be omitted in order to save space.

The equation was omitted.

Page 4468, Section 3.5

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As mentioned above we agreed with Referee #1 and we have removed the sections 3.5 (Carbon isotope discrimination by sunlit leaves) from the manuscript.

Page 4471 Spatial variability of $\delta^{13}\text{C}_{\text{leaf}}$ and $\delta^{13}\text{C}_{\text{litter}}$: Please explain why there is a difference among sites in $\delta^{13}\text{C}_{\text{leaf}}$ but not in $\delta^{13}\text{C}_{\text{litter}}$? Was the vertical representation (samples taking in different heights) similar at all sites?

Although the litter samples had been collected randomly, they comprise a mix of litter-fall from different canopy heights and decomposition stages on the soil surface. It is very likely that the reduced number of litter samples per topographical section might have not been representative of the site variability. As mentioned before, the sampling heights were different among topographical sections.

Page 4473 line 25 to page 4474 line 10: Please rephrase or add figure. This paragraph is unclear but might be important to explain why $\delta^{13}\text{C}_{\text{CR}}$ does not show a consistent pattern across sites.

We agree with Referee #1. The paragraph was unclear and did not explain why $\delta^{13}\text{C}_{\text{CR}}$ does not show a consistent pattern across sites therefore we have decided to remove it from the manuscript. We have discussed the possible causes of the inconsistent patterns of $\delta^{13}\text{C}_{\text{Ca}}$ and $\delta^{13}\text{C}_{\text{Ca}}$ across sites in section 5.3, because of their influence on the variability of $\delta^{13}\text{C}_{\text{CR}}$ among the nights studied.

Page 4476:4.5: see above, I suggest omitting or completely rephrasing this part.

As mentioned before, section 4.5 (Temporal and spatial variability of $\delta^{13}\text{C}_{\text{leaf}}$, $\delta^{13}\text{C}_{\text{ci}}$ ratio and $\delta^{13}\text{C}_{\text{ci}}$) was removed from the manuscript.

Page 4477 5.1: Delete WUE in title, as it is not mentioned in the paragraph. It was removed.

Page 4478, line16: Is horizontal stratification correct or vertical stratification?

The Referee #1 is correct. The correct form is vertical stratification.

Page 4480 line 2/3: Please give a reference for the first sentence.

It was given "Pataki et al., 2003a"

Page 4480 line 14/15: According to Fig. 5, $\delta^{13}\text{C}_{\text{soil}}$ was higher than $\delta^{13}\text{C}_{\text{CR}}$ only for the plateau. At both sites, it was the opposite. Please rephrase.

We agree with Referee #1 and the sentence was rephrased to: In our site, $\delta^{13}\text{C}_{\text{soil}}$ was higher than $\delta^{13}\text{C}_{\text{Reco}}$ only on the plateau, whereas on the slope and in the valley it was the opposite (explained below) (Fig. 5).

Page 4481 and 4482, 5.4: Wouldn't we expect that the tree at the plateau have a longer time lag than the trees in the valley since they are taller? It might be good to add a few sentences on uncertainty of this kind of analysis as there are only 3 data points in each regression.

We agree with Referee #1. We have edited what we have written in the submitted manuscript to: We do not have a clear explanation for the time lag of plateau being shorter than for the slope and valley in August 2004 (Table 5) as it is somewhat counterintuitive, because trees are taller on the plateau than on the slope and in the valley. It is likely that the high variability of $\delta^{13}\text{C}_{\text{Reco}}$ on the slope and in the valley may have contributed to this. As mentioned before, it is very likely that lateral drainage of air enriched in ^{13}C from upslope areas occurs at our site, which leads to unexpected values of $\delta^{13}\text{C}_{\text{Reco}}$ on the slope and in the valley. Nevertheless, in October 2006, the time lags for plateau and valley were 7 and 6-days, respectively.

Page 4482, 5.5: see above, I suggest omitting this part.

As mentioned before, section 5.5 (Temporal and spatial variability of leaf and ci/ca ratio) was removed from the manuscript.

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