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Discussions

Interactive comment on "Internal respiration of Amazon tree stems greatly exceeds external CO₂ efflux" *by* A. Angert et al.

A. Angert

angert@huji.ac.il

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I would like to thank both reviewers for the interest they found in our work. However, I would like to clarify the main questions this study addressed, which based on the comments of reviewer #2, were not emphasize enough in the current version of the manuscript. These questions are:

1) Is internal CO2 transport important in tropical trees?

2) If internal CO2 transport is important, will it result in net release of CO2 respired in the roots at the stem, or will it cause the opposite effect of net removal of stem-respired CO2?

It should be also emphasized that no other research to date studied internal CO2 trans-

port in tropical trees. For this reason we developed the ARQ method, which is especially suited for application at remote locations. As reviewer #1 wrote: "This paper provides strong evidence for upward transport of CO2 in xylem, for the first time in tropical trees.". We will clearly state all these points in the next version of the manuscript.

The possible variability in the strength of the transport mechanism between species and between wet and dry seasons is a second-order question, which is outside the scope of the current manuscript. However, our measurements on different species and during different seasons, outside and inside the stem, indicate that the conclusion of net removal of respired CO2 from tropical trees stems (ARQ<1) is robust over these different experiments.

We agree with reviewer #2 that it will be interesting in future studies to combine the ARQ measurement with measurement of sap flow rates, and of the xylem carbon concentrations along the stem.

It should be also noted that the current manuscript adds two important theoretical considerations to that we made in the earlier method paper: 1) We added a numerical model of the stem chamber, which enables the exploration of important questions that were not addressed by the simple analytical model. One result of this model leads to measuring ARQ both out of steady-state and in steady-state (which were found to result in similar average values). 2) We showed that O2 based respiration rates can be calculated from two concentrations measurements, if the second measurement is taken when the chamber air is in steady-state. We used O2 measurement on 5 trees for proof-of-concept of this idea.

We are waiting for the final review and editor decision, for revising the manuscript and clarifying these points, and for writing the final reply letter.

Interactive comment on Biogeosciences Discuss., 9, 11443, 2012.