

Interactive comment on “A comparison of CO₂ fluxes via eddy covariance measurements with model predictions in a dominant subtropical forest ecosystem” by J.-H. Yan et al.

Anonymous Referee #1

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General remarks: The authors show results of EC flux measurements and modelling in terms of NEE and NPP of a subtropical forest in South China. Based on a 12-month measurement period the calculated NEE was around $-250\text{gCm}^{-2}\text{yr}^{-1}$. This value has been validated using previous studies. In general, use of the EC technique above forests is linked with huge efforts but it is a valuable tool to measure/validate atmospheric exchange of heat fluxes and trace gases above terrestrial ecosystems. The basis for proper analyses is an appropriate flux calculation and correction procedure. Concerning this matter I miss a more detailed description of the flux calculation. In this case the EC setup contains an open-path gas analyzer (LI-7500). But there is no statement in terms of the WPL correction needed. According to BURBA et al. (2008)

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there is an adapted density correction procedure for open-path gas analyzers to avoid overestimation of net CO₂ sinks or underestimation of CO₂ sources, respectively. This correction could result in major changes of e.g. the CO₂ budget. Was this correction applied? Furthermore, the use of an open-path gas analyzer (LI-7500) complicate the calculation of CO₂ budgets due to frequent data gaps during wet conditions. The authors consider this by applying a gap-filling procedure on daytime flux data. Otherwise, gaps in the nighttime flux data of more than 40% lead to an estimation of the overall nighttime NEE based on soil respiration (SR) and the ratio of SR and total ecosystem respiration (TER). Why the authors don't try to use the remaining 50-60% of nighttime data to model the TER or to validate the assumption mentioned above. A more detailed explanation of the chosen procedure should be given at least. Finally, a check of the energy balance closure gap would be helpful to show the reliability of the flux measurements.

In detail: P2918L2-4: It is not clear for me which the level of the CO₂ flux measurements is (38m or 27m?). P2918L9: “CO₂ mixing ratio” instead of “mixed ratio of fluxes” P2919L24: Please indicate the formula of the empirical functions. P2921L2-4: How did you parameterise the dependency of daytime CO₂ flux on PAR (several periods, VPD or Tair classes?). P2925L14: Baldocchi instead of Baadocchi P2935, legend of Fig. 4: “. . .of monthly daytime CO₂ fluxes . . .” instead of “. . .of monthly CO₂ fluxes . . .” P2937, legend of Fig. 6: “. . .half hour records for daytime CO₂ fluxes . . .” instead of “. . .half and hour records for CO₂ fluxes . . .”

Burba, George G., McDermitt, Dayle K., Grelle, Achim, Anderson, Daniel J. and Xu, Liukang (2008): Addressing the influence of instrument surface heat exchange on the measurements of CO₂ flux from open-path gas analyzers. *Global Change Biology*, 14, 1854 – 1876.

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