

Interactive comment on “Modelling effects of seasonal variation in water table depth on net ecosystem CO₂ exchange of a tropical peatland” by M. Mezbahuddin et al.

Anonymous Referee #2

Received and published: 4 October 2013

This manuscript presents the results of adapting ecosys to tropical peatlands and compares the results to that of the eddy covariance (EC) site in Palangkaraya Peat Swamp Forest (PPSF) in Kalimantan, Indonesia. Tropical peatlands are an important reservoir for belowground carbon, but they have been significantly understudied to this date in comparison with temperate and boreal peatlands. This paper therefore addresses a key research need in trying to establish a modeling framework for these ecosystems. I have some concerns about the paper, in particular its use of the EC data, but these results are important.

General comments 1. My central concern with the paper is its relationship with the EC data at PPSF. The paper describes very little about the EC measurements and
C5733

the methodology, including how the data were gap filled. I realize that much of this information is explained in the Hirano et al paper, but since the EC data are central to this paper, a brief overview of how they were obtained and filled is critical.

2. A better description of the EC data is especially important because there is a significant, systematic difference between the gap-filled and modeled GPP and R. Although the NEP numbers are close, the divergence in GPP and R is large enough to warrant further investigation. Have the authors tried different gap-filling methods to see if similar differences between model and measurements arise?

3. Section 2.2.4 discusses how water table depth is modeled in ecosys. The drivers of vertical exchanges are clear, and the description of how lateral flows are calculated according to distance, hydraulic gradient, and external WTD makes sense. How this is applied in this paper needs to be better clarified. If the external WTD is 0.45m below the surface, how far away is that external WTD, and what sort of lateral flow arises as a result? And what sort of role does this play in the site's overall water balance?

4. The drained vs. undrained simulation investigates a very important scientific problem with big policy implications. Why isn't the simulation in the results section? It seems that sections 4.5 and 4.6 should at least in part be in section 3.

Specific comments:

Figures: Figures 1-4 would benefit if the x-axis read “Day of year 2002”, etc. as the year is buried in the long caption text.

Abstract: you may wish to point out the source/sink directionality for NEP for those of us who usually work in NEE

13357 L27-13358 L2 This very long sentence needs to be broken up into more digestible chunks – all the ideas are important, but it's hard to pick apart. I.e. “Due to differences in dominant vegetation, the effects of WTD on productivity are very different in tropical peatlands than temperate and boreal peatlands. The mosses common

in temperate and boreal peatlands have shallow rhizoids and no stomatal regulation, resulting in different water and nutrient uptake than a tropical peatland where trees have well-developed root systems.”

13355 L16 – define RMSD

13370 L9 and 13374L24 – there are only scant mentions of methane in this paper, and it isn't the focus. This could be removed.

Interactive comment on Biogeosciences Discuss., 10, 13353, 2013.

C5735