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Biogeosciences Discussions

Interactive comment on "Upside-down fluxes Down Under: CO_2 net sink in winter and net source in summer in a temperate evergreen broadleaf forest" *by* Alexandre A. Renchon et al.

Anonymous Referee #1

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General comments: Renchon et al. present a well-written analysis of the net ecosystem exchange of an evergreen sclerophyll forest near Sydney. Using eddy covariance techniques, the authors demonstrate that the forest behaves in contrast to the conventional pattern where hot, rainy summers are more productive than mild, dry winters. Instead, the higher microbial respiration in the wet summer season outweighs the benefit of increased summer photoperiod causing the forest to be a net carbon source in the summer and sink in the winter. The authors use additional vegetation/leaf level measurements of photosynthesis and conductance to strengthen their assertions of flux dynamics, although the discussion of these results feels rather like a tangential addition. These findings could be more strongly incorporated into the discussion of dif-

ferences in fluxes from old and young leaves and into the discussion of the influence of diurnal cycles and hysteresis on seasonal trends. The work of A. Griebel on anisohydricity induced by mistletoes in these ecosystems could be drawn upon in greater detail during the discussion of leaf specific measurements and trends in seasonal response to moisture availability as it is likely as highly relevant to ecosystem carbon dynamics as it is to water dynamics.

Specific concerns: The authors conclude that diurnal patterns of NEE, GPP, and ER have central roles in determining the seasonal carbon source/sink dynamics, but a stronger analysis would significantly bolster this claim –a wavelet coherence analysis of the time series could be an informative addition that would support this conclusion more thoroughly. A more complete discussion of the old and young leaf-level data would likewise improve support for the conclusion that GPP was limited by leaf age in the summer. Following these additions, strong conclusions regarding the influence of global climate change on the future carbon exchange in these forests can be drawn. Lastly, while this paper makes a significant contribution without it, an analysis of GPP in comparison to solar induced fluorescence (SIF) which has been recently shown as a better proxy for GPP than NDVI may prove very interesting.

Technical corrections: L243: Were leaves actually measured at 1.5km height as this sentence suggests? From what light environment were measured leaves collected?

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