

Interactive comment on “Contrasting effects of invasive insects and fire on ecosystem water use efficiency” by K. L. Clark et al.

Anonymous Referee #1

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Summary: ———

This manuscript is for submission to a special issue about the impact of disturbances on carbon dynamics. The study describes three different forests in NJ that were impacted by both gypsy moths and prescribed burns. This is a unique dataset that would fit nicely into the special issue and should be of interest to BG readers. The study provides insights into how these phenomena affect the carbon dynamics within the forest.

I feel there are a few items (detailed below) which could use further clarification.

Major Questions: —————

1. One of the main conclusions (p. 9584) is that the carbon dynamics are much more sensitive to these disturbances than the "hydrologic fluxes". Do the hydrologic fluxes

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include run-off? Or only Et and groundwater recharge? A clearer definition of what is meant by "hydrologic fluxes" would be useful. Looking at Fig.3 the trends in GEP and Et seem very similar...it's unclear how the conclusion that hydrologic fluxes were unaffected was reached.

2. In the nighttime NEE data shown in Fig. 2 the oak forest is largely affected by the disturbance whereas the other forests show a much smaller effect. Why are these forests acting so differently at night?

3. p.9572, l5-10, I think Falge 2001 used T.soil to determine Reco. Why did you choose to use air temperature and how much does that choice affect the results/conclusions?

4. p.9567, l20-24, If Reco is relatively invariant to disturbances why does that produce large variations in NEE?

5. There are a few other studies related to the effect of beetle mortality on forests and how this affects ecosystem fluxes that you might consider to include in the references (these are listed at the end of this review). These studies typically involve more dramatic disturbances, but perhaps add some insight.

Minor Comments: —————

* why does NEE have the subscript "c"? It seems like this is not necessary.

* p. 9568, l.25, define "SD" first time it's used. Also, sometimes "SE" is used which should also be defined.

* sect 2.1, some description of how far apart the sites are would be useful—do the tower footprints have any overlap?

* p.5970, l.13 (and other places), for some reason people started to call this company "Li-Cor". It should be LI-COR.

* p.9571, l.5-8 (also, p.9572, l.25), what percentage of data were gap-filled? Was it similar for all three stands?

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- * p.9573, l.1, how big was the fetch?
- * p.9573, l.28, why was 10mm of precip chosen for the cut-off (this seems like a fair amount of rain).
- * p.9574, l.17-20, seems surprising that the LAI for the pine forest changed so much going from summer to winter...any explanation for this?
- * p.9576, l.7 (and elsewhere)...there are references to Fig 3a, 3b, and 3c, but in Fig 3 there is no "a", "b", or "c".
- * p.9584, l.3, how do you know this all goes into groundwater?
- * p.9584, l.13: Does recent data from 2013 show how the recovery has progressed?
- * p.9584, l.14, why do you call this "actual" Reco?
- * p.9585, l.7, change "probability" to "likelihood"
- * Table 3, define the columns "df" and "F"

A few other papers which may be relevant: _____

Biederman, J. A, et al 2014: Increased evaporation following widespread tree mortality limits streamflow response. *Water Resources Research*, DOI: 10.1002/2013WR014994

Levy-Varon, J. H, et al. 2014: Rapid rebound of soil respiration following partial stand disturbance by tree girdling in a temperate deciduous forest, *Oecologia*, v174.

Moore, D.J.P, Trahan, N.A., et al 2013: Persistent reduced ecosystem respiration after insect disturbance in high elevation forests. *Ecology Letters*, doi:10.1111/ele.12097. (and references therein)

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