

## ***Interactive comment on “Effects of a windthrow disturbance on the carbon balance of a broadleaf deciduous forest in Hokkaido, Japan” by K. Yamanoi et al.***

**W. Eugster (Referee)**

werner.eugster@usys.ethz.ch

Received and published: 12 September 2015

The authors report on the effect of windthrow disturbance on the CO<sub>2</sub> budget of a Japanese broadleaf deciduous forest. Four years (2000–2003) of eddy covariance flux measurements before the devastating storm provide the basis for comparison with the years 2006–2012. The years 2004 and 2005 were not considered since the eddy covariance tower was destroyed during the storm on 8 September 2004, and the construction of a new tower with new instrumentation consumed part of year 2005.

In addition to this, the authors use biometric biomass increment estimates to assess the carbon budget before and after the storm and finally put their results into context

C5304

in Table 3 which provides an excellent overview and review of existing datasets (and knowledge) with respect to how such an extreme event can affect the long-term carbon budget.

The paper is of high quality and should be published with minor revisions. I am satisfied how the authors dealt with my technical feedbacks during the initial submission. A few minor technical and linguistic details should be resolved plus a few more relevant aspects that should be addressed in the final version as detailed below.

### MAJOR POINTS

1. In the caption to Table 2 it is stated that “net primary production (NPP) and soils respiration (Rs) were measured”, but line 24 on p. 10441 says “Net primary production was calculated” which is not the same. It is important to be specific: a deduction of a number from other measurements is not really a measurement. So please rectify, at least homogenize the terminology throughout the manuscript. The same applies to Rs: on line 25, p. 10441 it is stated that “Autotrophic (Ra), heterotrophic (Rh), and soil (Rs) respiration were separated from Re”, but no information is given on how this “separation” was done. This information must be added, and also here it seems that it was not a measurement, but some partitioning model that was applied, hence not really and independent measurement.
2. The authors are at the edge of using jargon with the term “carbon flow” and other word combinations with “carbon ...”. In reality, they mostly look at CO<sub>2</sub> fluxes, thereby ignoring any other carbon flux component (CH<sub>4</sub>, BVOC, ...).
3. On page 10429 it is written “As the impacts to forest ecosystems will increase because of projected more frequent and intensive winds under future climate change scenarios” without reference. The IPCC AR5 however also talks about the “Weakening Tendency of East Asian Summer Monsoon Circulation Since the End of the 1970s”,

C5305

and it also emphasizes that increasing sea surface temperatures actually reduce the near surface wind speeds (since the thermal contrast with the land decreases), so your statement needs a clear reference that the critical reader can double-check. Please be specific, which scenario for which region you address, and which reference provides the details.

4. The dehumidification and calibration mentioned on p. 10431 was never described for none of the systems. Please add this information.

5. Eq. (5) is probably taken from somewhere, but the reference is missing. Please add the reference. On the other hand side it is not 100% clear to me why  $\Delta y = \text{ANBI} + \text{Ld}$  as it is suggested by Eq. (5). Maybe it is a question of the sign convention: is Ld a positive or a negative number? Please add details on sign convention and an explanation how a dead tree can produce stem and branch biomass in a given year. I would have expected that a dead tree does not produce anything anymore ( $\text{Ld} = 0$ ). So this whole paragraph describing Eq. (5) needs careful revision to be understandable. It may simply be a linguistic issue, but it is completely obscure to me as it is.

#### MINOR AND TECHNICAL/LINGUISTIC POINTS

10426/14: to net a carbon → to a net carbon

10426/15: light enrichment is not the correct term, there is no such enrichment; what you mean is that there is less absorption of light by the canopy, so that more light reaches the ground surface. This is not an “enrichment”. Please change the wording, e.g. “Because auf increased light levels at the forest floor”

10427/17: continual → continuing, persistent, prolonged, . . .

10428/24 and else: large numbers such as 272,000 ha are most likely not accurate to  $\pm 1$  ha and hence are better reported in  $\text{km}^2$ . Please also recall that English texts use the comma as the separator for thousands, not the short space (as German typeset-

C5306

ters tend to put it; you had it correct in the previous version, so this may have been introduced by the typesetter)

10429/22: replace “from” with “since”

10431/23: this is not really a “multisampling system” that you describe. The correct term here might be “valve switching unit”

10432/20: if you maximised the covariance then you tend to heavily overestimate respiration (since the maximum is the highest number, which induces a tendency towards increased respiration). In contrast, the largest uptake (negative covariance) is found by minimizing the covariance. Make sure that you use the correct procedure, which most likely is that you used the absolute value of the covariance. Please double-check and adjust the wording accordingly.

10434/11: did you really cut eight stands? Or do you want to say eight trees or individuals? From what follows I expect that it must be trees, not stands.

10435: mention somewhere that your percentages are with respect to dry weight.

10435/23: “light transport” is not the correct wording. Maybe “light penetration” or “light transmission”?

10436/13: this is one place where actually “Seasonal changes in  $\text{CO}_2$  fluxes” should be written (not carbon flux).

10441: there is a mixture of mass given in kg C and in g C. It simplifies things if you homogenize and use kg C throughout the text (SI default) or generally use g C to get rid of the decimals.

10441/12: be aware that writing “A was 2.1 times greater than B” it will always be confusing for the reader whether the authors now mean  $A = 3.1 \times B$ , (so B plus  $2.1 \times B$ ). If the first is meant, then write: “increased rate was 3.1 that of the . . .”, if the latter is meant then write “increased rate was 2.1 that of the . . .”

C5307

10443/16–17: the word “axis” is not correct here, you probably want to write “margin”

10443/28: add “is” before “unknown”

10444/4–6: this phrase seems completely unrelated to your discussion. But if it is important, then state the two hypotheses, otherwise it is useless for the reader.

10444/27–10445/1: light enrichment → higher transmission (or less absorption); please reword.

Table 1: add the units of the numbers either to the caption or after “Carbon pool” in the header line of the table (in parentheses). Currently it is only in the two footnotes.

Table 2: add the units to the caption (move it from the footnotes to the caption)

Figure 4: also here in my view the y-axis title should say CO<sub>2</sub> flux, not Carbon flux.

Figure 7: The data in this figure are quoted from → Data are taken from (is this what you wanted to say?)

Figure 8: photosynthesis → photosynthetic

---

Interactive comment on Biogeosciences Discuss., 12, 10425, 2015.