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Biogeosciences Discussions

Interactive comment on "Effect of land use on carbon dioxide, water vapour and energy exchange over terrestrial ecosystems in Southwestern France during the CERES campaign" *by* N. Jarosz et al.

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We thank the referee for all the comments, suggestions and corrections that we answered in this list of corrections.

First, as suggested, the description of sites and instruments has been summarized in one table in order to make the material and methods section easier to read.

Second, the analysis is unfortunately based on less than 2 months of data but as the title announced it the purpose of the paper was to show the effect of land use ...

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during the CERES campaign that lasted 6 weeks. However, uncertainty has to be better taken into account. One way is to analyse energy balance closure, which was already done in Table 2. In order to analyze further the significance of the results on fluxes, some statistics were done. We first analyze how the number of samples affects the significance of the results presented in Figure 4 and 5. On a weekly basis, the number of samples is less than 30. In order to check that they follow a normal law, we performed the Kolmogorov-Smirnov test of normality, for each half hour and for each site. At α = 0.05, the difference between the cumulated empirical and theoretical distributions was not significant. Then, we concluded that samples follow a normal law whatever both the flux and the site. Knowing that, it was possible to calculate confidence intervals for both each flux and sites as follows:

$IC_{95\%} = \overline{x} \pm t \frac{s}{\sqrt{n}}$

where $IC_{95\%}$ is the 95% confidence interval, $\overline{x}$ is the half hourly mean value of x (NEE, H or LE), s the standard deviation of x, n is the sample size and t is a variable that follows a Student law at (n-1) degrees of freedom. Here the t values used for each number of samples (from week to 6-weeks period):

n	t
7	2.45
20	2.09
21	2.09
40	2.02

$IC_{95\%}$ for NEE, H or LE has been added to graphs (Figure 4 and 5).

Third, we also think that multi-year data are needed but this was not the purpose of our paper and above all this kind of experiment is difficult to follow. However, we think that this dataset from 10 more or less nearby sites can precisely provide a good basis to be used in models and finally quantify the effect of the different land use at regional scale. We try to make this clear in the introduction of the paper.

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Fourth, Figure 4 has been changed. We selected sites representative of trends we observed: forest, clear-cut, summer and winter crops, within 95% confidence interval.

Fifth, we added a section method in order to explain better the description of the data processing and WUE calculation, which were missing :

- data processing

Data were corrected with the storage term. Changes in CO_2 storage (F_{cs}) were calculated as described in Aubinet et al (2001) but with only one measuring height for CO_2 concentration (except at LBR with a profile of 13 heights of CO_2 concentration) :

$F_{cs} = \frac{P_a}{RT_a} \int_0^{h_{ec}} \frac{dc(z)}{dt}\, dz$

where h_{ec} is the EC system height, P_a is the atmospheric pressure at h_{ec}, T_a is the air temperature at h_{ec}, R is the molar gas constant, and c is the CO_2 concentration at height z. Then, a friction velocity (u*) criteria was used to determine periods within the low turbulence regime when fluxes are systematically underestimated by EC measurements because of advection (Aubinet, 2008, Aubinet et al., 2000; Falge et al., 2001; Gu et al., 2005; Papale et al., 2006; Reichstein et al., 2005). Here, a u* threshold was determined with the Reichstein et al. (2005) automatic method for each site and for all the campaign period. Flux data below this threshold were discarded from the dataset.

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Site	u* threshold (m s-1)
LBR	0.04
BIL	0.02
AUR	0.06
COU	0.03
CSB	0.03
CSM	0.04
LAM	0.06
MAR	0.03
SAR	0.04
FAU	0.04

- WUE calculation

WUE has been calculated from half-hourly data as the regression slope between values of NEE and evapotranspiration (Baldocchi, 1994). This definition of WUE is representative of the ecosystem functioning at the plot scale, as it includes different processes as crop photosynthesis, crop and soil respiration, crop transpiration and soil evaporation. Latent heat flux data during and after rain and irrigation events have been removed from the dataset because of data filtering linked with the use of open path Li7500, and thus, these values have not been taken into account in WUE calculations.

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