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Interactive comment on “Carbon allocation to biomass production of leaves, fruits and woody organs at seasonal and annual scale in a deciduous- and evergreen temperate forest” by M. Campioli et al.

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We thank the Reviewer #2 for her/his important input and constructive comments. We took into great consideration his/her concern about the GPP estimates. After a detailed re-analysis of the Brasschaat fluxes, we realized that our previous assumption about the pine stand being the largest contributor to the eddy-fluxes was erroneous. Moreover, because of the large site heterogeneity, filtering and gapfilling of non-pine fluxes (determined with a footprint model) proofed not to be satisfactory as the numbers and distribution of gaps were too large to be properly gapfilled in a standard way. We came

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therefore to the conclusion that fluxes from the Eddy tower in Brasschaat can not be used for high quality C allocation studies linking GPP and NPP. Although GPP could have been produced in a different way (e.g. process-based modeling), we decided to make a major change in the manuscript, namely skip the Brasschaat site and the site comparison section. This because the Hesse site is more suited for production of GPP estimates representative of the target ecosystem and datasets available at Hesse are more extended and richer. The topic of the paper (NPP-GPP ratio) has not changed but instead of the inter-species comparison, we focused on the temporal variability of the NPP-GPP ratio in a more complete way i.e. not only considering the seasonal variability in NPP-GPP ratio but also (and in even greater details) the interannual variability.

(1) –R. you need to discuss to which extent the choice of a specific flux-partitioning method may impact the obtained GPP. Specifically how it could impact the seasonal evolution of the obtained GPP and thus of the ratio NPP/GPP, which is a major focus of your paper. You can rely for example on Desai et al. (2008), AFM for this discussion.
–A. In the new version of the paper, we will present GPP estimates obtained from 5 methods differing in (i) accounting of non-footprint fluxes, (ii) in gapfilling method and (iii) in partitioning method. The way the different methods affect the seasonal evolution of GPP will be described in detail. Results will be compared with the analysis presented by Desai et al. (2008) and at finer time scale.

(2) –R. You need to prove the robustness of your GPP estimations by performing an uncertainty analysis in your flux partitioning method. This is especially true for the site of Brasschaat because this site presents limitations in terms of the representativeness of the target ecosystem in the eddy flux measurements. Looking at Nagy et al. (2006), it's obvious that a very huge amount of eddy flux data must be filtered out of the dataset to limit the influence of anthropogenic activities or pastures surrounding the site (surprisingly, these statistics are never given in your paper nor in Nagy et al., 2006). It should result in huge data gaps that will increase the confidence intervals in your GPP and could potentially alter the seasonal evolution of this GPP depending

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on the gaps distribution from season to season or from year to year. The sentence: “At Brasschaat, GPP biased introduced by footprint-inconsistencies were low during the study period (7%).” does not help in this context. It is hardly understandable and footprint-inconsistencies effects on GPP are not discussed in the cited reference. –A. As mentioned above, according with the reasoning of the Reviewer #2, we have realized that Brasschaat site is not suited for estimation of EC-derived GPP to be used for detailed C allocation studies and we decided to exclude the site from our analysis. The site of Brasschaat is indeed very heterogeneous and removal of fluxes not dominated by pines would create gaps too large to be gapfilled in a proper way. On the other hand, the more homogenous site of Hesse can provide reliable estimates of GPP by using standard flux processing methodology. We associated an uncertainty to the mean GPP data by using a sample of five estimates of GPP, all of which were valid for Hesse. The five GPP estimates were derived as follows: (i) GPP derived from non-footprint corrected NEE, gapfilled with marginal distribution sampling MDS (Reichstein et al. 2005) and partitioned with short term air temperature regression (Reichstein et al. 2005). (ii) GPP from non-footprint corrected NEE, gapfilled with artificial neural network ANN (Papale et al. 2003) and partitioned with short term air temperature regression as above. (iii) GPP from footprint corrected NEE, gapfilled with MDS and partitioned with short term air temperature regression as above. (iv) GPP from footprint corrected NEE, gapfilled with ANN and partitioned with short term air temperature regression as above (v)) GPP from footprint corrected NEE and gapfilled/partitioned with the modelling approach (based on light-response curve) of Lasslop et al. (2010).

(3) –R. I’m surprised by the statement on page 7580 line 21 in the site description part (“Only few mature trees other than Scots pine are present . . .”) and the fact that you identify Brasschaat as a Scot pine site regarding GPP. According to Carrara et al. (2003) and to Nagy et al. (2006), the NEE obtained from this site should be seen as representative of a mixed forest. From Nagy et al. (2006) (Table 2, page 350), *Pinus Sylvestris* contribute between 54 and 60 % to the CO₂ eddy-flux, mature deciduous trees (mainly *Quercus Robur*) having a contribution roughly between 25 and 30%. This

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point, added to the fact that under storey vegetation is non negligible at Brasschaat (as discussed by the authors on page 7591) and could bias the GPP estimation of mature Pines, raise some doubts about the GPP estimation for Brasschaat and therefore about the remarkably low NPP to GPP ratio (17%) for this pine stand. I think that these questions are all in the scope of the paper and should be addressed to strengthen the presented results. I also note that previous estimates of NPP to GPP ratio for the Brasschaat site are far away from yours. Indeed, Nagy et al. (2006) propose a ratio of 0.47 (in their abstract). –A. As described above, we skipped Brasschaat from our study.

Specific comments:

(4) –R. P7581L22: the exact method of flux partitioning is not given. I guess that it's the short term air temperature regression from Reichstein et al. 2005. The reader is not necessarily aware of the “recommendations of the euroflux network”. –A. Flux processing methods and estimation of GPP will be given in full details in the next version of the manuscript. A summary of the methods used to determine GPP is given in the answer to remark (2).

Technical corrections:

–A. All technical corrections will be applied.

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