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Interactive comment on "The European forest sector: past and future carbon budget and fluxes under different management scenarios" *by* Roberto Pilli et al.

Anonymous Referee #3

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Pilli and collaborators use the CBM26 inventory model to estimate the C sink of the European forest sector between 2000 and 2030. Parametrization and validation of the model were described in previous papers and as such this manuscript focusses on simulating the total and national carbon budgets of the EU member states (+ Croatia). Although the results are new for this specific model, they mainly confirm observation and model studies performed by other groups making use of different tools. In my opinion the value of this manuscript is twofold: it calculates a detailed and consistent carbon balance for the EU member states, and it shows that a consistent approach can reproduce earlier budget estimates that often contained (minor) methodological inconsistencies. The study appears free of flaws and the reporting of the work in bal-

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Discussion paper

anced in terms of its achievements and limitations. Hence, I feel that the manuscript is acceptable for publication.

General comments Although I have few scientific comments (see below), the text flow could be greatly improved. The manuscript contains several single sentence paragraphs, this distracts the reader and makes it hard to follow the thinking of the authors. I would strongly advice the authors to improve the use of paragraphs. Several captions and paragraphs start with none informative wording, i.e., figure captions starting with "This figure shows . . .". Rewrite these captions and figures by making use of more informative subjects. Several sentences are very long and need to be read twice before they can be understood. Consider splitting these sentences is shorter sentences. Not being a native speaker myself I cannot judge the quality of the English but it appears to me that some expressions are translated from the author's native tongue (for example, L428 the use of the verb 'cover', L439 the use of 'of course',. . .). I would recommend to ask a native speaker who likes text editing, to carefully edit the manuscript.

It is clear how CBM26 differs from data driven approach followed in Ciais et al 2008 and the summary presented in Luyssaert et al 2010 but is less clear what the advantages are of CBM26 over EFISCEN. Both approaches seem rather similar, so why was CBM26 selected and why it was believed that CBM26 outperforms EFISCEN? The value of the study does not depend on CBM26 being unique or better than other approaches but it would help to understand why CBM26 was developed.

I understand that the country level is relevant for policy issues (which is probably why the JRC is doing this kind of study) but do you expect to find regional similarities in for example turnover times if soil-climate-ecoregions (for example, Metzger, M. J., Shkaruba, A. D., Jongman, R. H. G. & Bunce, R. G. . Descriptions of the European Environmental Zones and Strata. 2012) rather than countries would be analysed? The underlying question is whether national practices and laws change the physical/biological system or whether the physical/biological system dominates the properties of the forest sector?

Although the uncertainty analysis is far from complete, I really appreciate the effort the authors have made in trying to address the issue.

Specific comments L 89: shouldn't biogeochemical be biophysical? L270: this refers to a model-model comparison, right? Are there any direct observation for HWP and its decomposition rates? Even the turnover time of the different wood pools cannot be measured precisely and is uncertain for the medium-lived pools, the long-lived pools and wood in landfills. If you agree, it would be fair to mention this as it implies that all HWP estimates come with a substantial uncertainty. L376-381: The content of this (single sentence) paragraph is good but the paragraph should be completed with the consequences of this decision on the carbon balance. Also consider splitting the sentence. L393-396: I agree with this sentence but try to better develop your thought and at least give an indication of whether those emissions resulted in a too low or a too high estimate of the NSE? Use some literature references to give an idea of whether those effects can overturn the findings of this study or would just nuance it? Which conditions, if any, could result in overturning the main results? L481: The license was paid for so there is no need to give the company free advertisement. The time that the software determined the result lays well behind us. Instead mention the test (for example, ordinary regression with an uncertainty on both X and Y and/or the method used to fit (LS, maximum likelihood,. . .). That kind of information contributes more to the reproducibility of the study than knowing the software package. L585-589: Is this correct? The "parameters" of CBM26 (i.e., yield curves, growth expectations, . . .) are based on observations and those observations are driven by environmental change. Hence, CBM26 assumes that the effect of environmental change between 2012 and 2030 will be identical to the effect between 2000 and 2012. This is not the same as saying that the effect is not accounted for. L597: Seems like ORCHIDEE was misclassified. ORCHIDEE (IPSL - ESM) and JULES (Hadley ESM) are process-based surface schemes (they both contribute to IPCC through CMIPs.

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