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Biogeosciences
Discussions

Interactive comment on "The European CO₂, CO, CH₄ and N₂O balance between 2001 and 2005" *by* S. Luyssaert et al.

J. Grace (Referee)

jgrace@ed.ac.uk

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GENERAL REMARKS The greenhouse gas balance of Europe is inevitably complex, as the land surface is intensively used as a resource, and it varies from country to country. Putting together the relevant data, evaluating the methods against each other, and estimating the uncertainty is therefore a Herculean task and one which results in a paper which is not easy to read and digest. The authors have improved considerably on the several attempts to do the same thing, notably the synthesis papers from the Carboeurope project (Schulze et al. 2009, cited above), by making the methods more explicit.

At national level, estimates of greenhouse gas emissions have been compiled from the year 1990, following published IPCC methodologies (although with some degree of variation between countries); now, it is certainly time to attempt 'verification' of these official figures which have mostly been gleaned from statistical reports on such things as fossil fuel consumption and changes in land use. However, for the paper to be accessible to policymakers some improvement in presentation is desirable.

MAIN CRITICAL COMMENTS 1. The tone was overly optimistic. For example, in the Abstract we are told that the comparison of the three main methods 'increases our confidence that current European GHG balances are accurate'; but when the confidence interval of the three estimates is compared we see that the uncertainty is huge (42, 15 and 33% respectively). Given this uncertainty, I think it is unwise to make such an optimistic statement. 2. There is some confusion about statements relating to carbon only and statements relating to the totality of greenhouse gases. The standard method of writing greenhouse gas units as CO2-eq is followed but the logic is not always right. An example is the first sentence of the introduction. We are told that on a global basis, terrestrial ecosystems have absorbed about 30% of anthropogenic emissions but the two papers cited in support refer only to carbon dioxide. This loose terminology should not occur in a science paper. The authors should check carefully the manuscript for further instances of this. 3. page 2012 line 10: the inversion approach needs to be better described: it involves a transport model as well but this is not stated. 4. I cannot see how forest fires are taken into account 5. The IPCC methodology cannot be expected to produce the same result as the methodology based on atmospheric measurement. This is because it is based on recording changes from year to year, rather than having the exact value of emissions; for example: even if the change in land use is properly recorded the IPCC method does not take into account any variation in the source/sink strength of vegetation caused by extreme weather (the drought of 2003 is an example). Likewise, the CO2 and CH4 fluxes over wetlands are poorly known whereas the IPCC method provides only standard data based on earlier research. This defect in the comparison should be acknowledged. 6. I find it hard to believe that inland waters

are a hotspot for C sequestration. The manuscript should be evaluated by a specialist in that area. No-one on the list of authors is a specialist aquatic bio-geochemist as far as I know. 7. Presentation of the results. The framework diagram in Fig 2 should be developed to show the individual fluxes. This would be useful to policymakers: as well as having Fig 2 as it is, have another version (Fig 4) wherein the codes are replaced by actual fluxes, with a code (variable number of asterisks?) to show where the different methods disagree by a stated percentage.

WHAT'S MISSING There needs to be a forward looking section to say how the uncertainties can be reduced in future, by having more atmospheric measurements. It would also be interesting to suggest whether the estimated can be somehow downscaled to country level.

MINOR EDITORIAL CORRECTIONS 2008 insert 'of greenhouse gases' after 'emissions' 2008 line 19 'and us such' do you mean 'as much as' 2009 line 23 is 'potential' really needed (I don't see what it means) 2011 line 17 insert 'the' before 'subject' 2012 lines 14, 21 'Where' should be 'where' as it isn't a new sentence 2012 line 15 insert 'of' before 'the different' 2014 line 2 some words seem to be lost 2014 equation 9 changes its font-size on the continuation line 2018 line 20 be consistent with the symbol for degree. 2018 line 18 'is expected assigning' isn't grammatical 2022 replace 'none existent' with 'non-existent' 2026 line 24 something wrong here at 'Zaehle'

Interactive comment on Biogeosciences Discuss., 9, 2005, 2012.