

Interactive comment on “A synthesis of carbon in international trade” by G. P. Peters et al.

R. ANDRES (Referee)

andresrj@ornl.gov

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This manuscript describes physical and embodied transfers of carbon on a global scale. It synthesizes this information from several previous studies. The manuscript also includes new calculations.

The authors only address uncertainty in their work from the perspective of the spread in results from several studies. Uncertainty quantification from independent data is not an easy exercise in this case, but the authors do not address this issue at all.

Overall, the scientific significance and scientific quality are rated as very good as the manuscript brings together a diverse set of literature as well as new calculations and presents them in a coherent manner.

The presentation quality of the manuscript is good. Suggestions for improvement are

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included below.

Detailed comments keyed to the manuscript:

page 3950, lines 16-17. We find that for embodied CO₂ emissions estimates -> We find that for embodied CO₂ emissions, estimates

page 3950, lines 17-18. differences between individual studies is not -> differences between individual studies are not

page 3954, lines 22-23. Within an MRIOT goods -> Within an MRIOT, goods

page 3955, line 15. European Commission et al., 2009 missing from references.

page 3955, line 18. European Commission et al., 2009 missing from references.

page 3955, lines 15-22. For final consumption, you list two end-consumers: government and individuals. Industry is seen as only an intermediary to supply the end consumers. Given this status of industry as an intermediary, why is government not treated in the same manner? Does government play a larger role than industry in supplying individuals and thus deserves status as an end-consumer? I would agree that government is a large consumer of goods and services and thus may merit separate tracking. But, by that same measure, is not industry not a large consumer of goods and services and thus merits separate tracking?

page 3956, line 22. I see production, consumption, imports and exports existing in your framework. Section 2.1.3 describes the assumption that stock changes are equal to zero over a given year. What I do not see accounted for in your “country X” framework are bunkers. Bunkers refers to fuels used in international trade, that is the areas between clearly defined country X borders. In the embedded carbon concept how are bunker fuels as well as the supplies used in transport (e.g., food) allocated (e.g., to the shipper, receiver, flag carrier, ...)?

page 3958, line 2. oxidisation -> oxidation

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page 3958, line 22. What is “protection” data? Do you mean production?

page 3958, line 24. In each region and each year the -> In each region and each year, the

page 3959, line 8. sector may mostly end -> sector may end

page 3959, line 9. sector may mostly end -> sector may end

page 3960, lines 17-19. I do not understand what this sentence means: “Since all the data is scaled by the carbon content, it is possible to scale the results up or down to represent different carbon contents.” I do understand that you have converted two types of wood from wet weight to dry weight and then to C content (the first phrase in the sentence). I do not understand the second phrase in the sentence where different C contents are invoked.

page 3961, lines 5-6. “requires additional calculations.” Are these additional calculations done in this study? The text is not clear on this point.

page 3962, line 20. different to the -> different than the

page 3963, line 29. controlled for to -> controlled to

page 3964, lines 15-17. Four items: 1) Table 1 does not specifically link regions and countries, rather it states growth rates in particular areas. So, line 15, rates between key -> rates of key. 2) Also, this sentence reads awkwardly with the use of ‘shows’ and ‘showing’. Please rewrite to clarify. 3) The column title states “Consumption growth rate” in Table 1, yet the text compares ‘consumption-based emissions’ and “consumption”. I only see one value given here so I do not see the both sets of data upon which the comparison statement is made. 4) Finally, given the extensive discussion of consumption definitions in section 2.1.1, which type of consumption is represented in Table 1?

page 3966, line 8. European Commission, 2009 missing from references.

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page 3969, line 14. What are “outliner” sectors?

page 3969, line 23. then -> than

page 3975, line 7. variables ...(Peters -> variables (Peters

page 3979, line 27. region -> regions

page 3980, line 4. Figure 12 is called in the text before figures 10 and 11. Please renumber.

page 3983, line 2. MtC),North -> MtC), North

page 3984, line 9. simply be down to chance -> simply be chance

page 3986, line 19. reports -> report

page 3986, line 23. primary -> primarily

page 3987, lines 24-25. Perhaps a few more words are needed here in terms of “balancing regional carbon budgets”. I think you are writing this in the context of atmospheric inversion studies. If so, attention would also need to be placed upon the oxidation rates of these carbon flows and the time interval of the inversion. For example at the annual time scale typically used for inversions, fossil fuels are assumed to be oxidized. However, for example, for the carbon flows discussed here, wood products have a very different oxidation rate.

page 3989, line 17. I am unsure exactly what your trying to say here; “the greatest need to for further research is to identify ”. I think there is an extra word (e.g., “to” or “for”) in the phrase.

page 3990, line 2. associate -> associated

page 3991, line 21. An updated version of the Andres et al. reference can be found on the BG website. The manuscript has moved from BGD to BG.

page 3993, line 3. European Commission, 2009a not cited in text.

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page 3993, line 6. European Commission, 2009b not cited in text.

page 4000, line 4. "The CDIAC global total does not include bunker fuels." I am confused by this statement. Do you mean the total reported in this table does not contain bunker fuels? The global total reported by CDIAC typically does contain bunker fuels whereas their sum of countries does not. Also, in Table 2 you state that CDIAC has bunker fuels in their global totals.

Also, does a positive % value indicate a value greater than or less than the CDIAC value?

For the top 10 differences section, differences in terms of what variable? I do not see a consistent ordering of values for any of the five metrics reported here.

page 4002, table 5. Does a positive % value indicate a data set is greater than or less than CDIAC?

For the top 10 differences section, differences in terms of what variable? I do not see a consistent ordering of values for any of the five metrics reported here.

page 4012, figure 1. The caption listing the various symbols used and associated studies is very small in size. This needs to be enlarged.

Have you thought about putting all the data onto a y-scale that includes zero? Or onto the same y-scale with the same min and max values? This would flatten the appearance of year-to-year variation, but it would make it easier to compare data from two different areas.

page 4013, figure 2. There is a lot of information here. Unfortunately, the x-axis country names are so compressed together that it is difficult to read them.

Also, does a positive % value indicate GTAP is greater than or less than GTAP+NAMEA?

page 4014, figure 3. There is a lot of information here. Unfortunately, the x-axis country

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names are so compressed together that it is difficult to read them.

Also, does a positive % value indicate GTAP is greater than or less than EDGAR?

page 4019, figure 8. Great diagram. It would be improved if the numbers were made larger for easier reading.

page 4020, figure 9. Another great diagram. It would be improved if the numbers were made larger for easier reading.

page 4022, figure 11. 200 ->200x. Missing digit from year.

page 4023, figure 12. Larger font size for numbers would be useful.

Interactive comment on Biogeosciences Discuss., 9, 3949, 2012.

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