Biogeosciences Discuss., 9, C301–C303, 2012
www.biogeosciences-discuss.net/9/C301/2012/
© Author(s) 2012. This work is distributed under
the Creative Commons Attribute 3.0 License.

Biogeosciences
Discussions

Interactive comment on "Chapter G2 Carbon emissions from land use and land-cover change" *by* R. A. Houghton et al.

Anonymous Referee #1

Received and published: 14 March 2012

This is a well-written and well-organized paper that clearly outlines the major differences between various models that compute estimates of carbon emissions from land use and land-cover change (LULCC). The paper begins with an overview of recent model estimates of these emissions and then describes in detail the possible reasons behind the range of estimates that are presented. The discussion is very thorough and provides a useful overview of modeling approaches for researchers in this field. I recommend it for publication and provide the following comments and suggestions for the authors, as listed below:

1) The authors indicate in Section 1 of their paper that emissions from LULCC are not the same as the flux of carbon between the land and atmosphere, but that it is difficult to separate this flux into the net emissions attributable to LULCC and those attributable to

natural and indirect human effects. However, they do not give many details of how each model attempts to separate these effects when computing their estimates of emissions from LULCC. They do hint on this a little in Section 6, but some further information (if available) about the attribution methods in these models would be useful (i.e., do they compare simulations both with and without land-use, compare results both with and without climate change, etc).

2) The various methods of estimating changes in land-cover area that are given in Section 2 only appear to include FAO and satellite data. However, both of these sources of data are only available a few decades back in time and no additional information is given about how estimates of changes in land-cover area are determined before that.

3) In Section 3.2 the authors describe the importance of legacy fluxes on the estimates of current emissions and state that if most carbon cleared during previous land uses is burnt (i.e. sent straight to the atmosphere), that the legacy fluxes will be small. However, the resulting impact on the carbon density of that land today might be quite large, and this in turn could effect the current (contemporary) emissions from LULCC.

4) In Section 4.1 the authors discuss the effect of including emissions from forest degradation (wood harvesting and shifting cultivation) in models. They give some estimates of emissions that result from including these processes in models, but don't really specify how the magnitude and spatial pattern of wood harvesting and shifting cultivation is determined. They do mention in Section 2.2.1 that rates of deforestation for shifting cultivation can be determined from satellite data, but is this the only way to determine this (especially before the satellite record)? They might be interested in the paper of Hurtt et al. 2011 (in Climatic Change) which gives details of the harmonized land-use datasets being used by models for the IPCC Fifth Assessment Report. The paper describes how the authors produced estimates of historical national wood harvest demand as well as their subsequent spatial allocation of this demand to various land-use areas. Also in this paper is a sensitivity study that shows the impact of including wood harvest and/or shifting cultivation on model estimates of committed emissions, sec-

ondary land area/age, etc. The impact of the historical start date for model estimates is also included in this sensitivity study (which might be relevant for item 3 above).

5) Also in Section 4.1, the authors state that constant rates of logging and subsequent recovery will lead to a net flux of zero. However, won't this depend on the relative rates of logging vs. recovery and whether the logged forests are allowed to recover fully before being logged again?

Interactive comment on Biogeosciences Discuss., 9, 835, 2012.