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Geoscientific Model Development Discussions

Interactive comment on "A methodology for estimating seasonal cycles of atmospheric CO_2 resulting from terrestrial net ecosystem exchange (NEE) fluxes using the Transcom T3L2 pulse-response functions" *by* C. D. Nevison et al.

Anonymous Referee #1

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The manuscript "A methodology for estimating seasonal cycles of atmospheric CO2 from terrestrial net ecosystem exchange (NEE) fluxes using the Transcom T3L2 pulse-response functions" by C. D. Nevison et al. presents a methodology for calculating monthly atmospheric CO2 concentrations from air-surface CO2 exchange fluxes by so-called pulse response functions. The pulse-response functions are derived from13 different atmospheric transport models for the Transcom 3 Level 2 set up corresponding to a total of 22 land and ocean source regions globally. Applying the pulse response functions to net terrestrial CO2 fluxes simulated by the Community Lnad Model showed

that the mismatch between modelled and observed atmospheric CO2 concentrations is larger than the differences in the modelled CO2 concentrations due to the transport uncertainties.

The authors claim that the pulse response functions are a new methodology for calculating the seasonal cycle of atmospheric CO2 from modelled net terrestrial CO2 fluxes. However, this pulse response functions (sometimes also called Jacobian matrices) methodolgy has first been introduced in 1996 by Kaminski et al. to also estimate the seasonal cycle of atmospheric CO2 from model derived net terrestrial CO2 fluxes.

In recent years, these pulse response functions have been frequently used in either atmospheric CO2 and CH4 inversions (e.g. Kaminski et al., 1999; Houwelling et al., 1999) or also in model validation studies (Sitch et al., 2003). In addition, the pulse response functions presented here are limited to 22 geographical regions globally whereas pulse response functions are easily available on a grid level for several transport models.

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Interactive comment on Geosci. Model Dev. Discuss., 5, 2789, 2012.