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Biogeosciences Discussions

Interactive comment on "Spatial and temporal patterns of CH_4 and N_2O fluxes in terrestrial ecosystems of North America during 1979–2008: application of a global biogeochemistry model" *by* H. Tian et al.

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The authors developed a biogeochemistry model, DLEM, which couples vegetation, hydrology, soil biogeochemistry, land use, and enables the authors to estimate C, N, fluxes and pool sizes in the land systems. After calibration and validation, they used this model to simultaneously estimate the spatiotemporal pattern of CH4 and N2O over terrestrial ecosystem in the continental North America through the past 30 years. The results are consistent with other studies such as modeling study (Li et al. 1996, Potter et al. 2006), inverse results (Chen and Prinn 2006), and meta-analysis (Bar-

lett and Harriss 1993). The biome-level and country-level results are useful for policy making. Simultaneous covering multiple-biome is another feature of this study. This study provides useful information to broader scientific community, and fits the scope of Biogeosciences. It is well-written. I recommend publishing after minor revisions.

1) One latest study conducted by Kort et al (Kort et al. 2008) estimated the spatial variation of CH4 and N2O fluxes over the entire North America. The authors compare this study with the continental estimates from Kort et al. (2008). How is the difference between this study and Kort et al (2008) at spatial scale? 2) The authors used multiple-drivers, namely climate change, atmospheric nitrogen deposition, air pollution (O3), land use change, rising atmospheric CO2, for model simulation. The potential contribution of these factors to the continental and country-level flux might be useful for scientific community and policy making. However, there are no results or discussions on this issue. Suggestion to do the partitioning for factorial contribution. 3) Temperature and precipitation (some time soil moisture) are two major controller on CH4 and N2O flux (Bridgham et al. 2006). Is it possible to estimate the contributions from these two factors on the continental level terrestrial fluxes of CH4 and N2O. Please clarify. 4) Figure 8 shows the consistency between modeled N2O flux and estimations from Xu et al (Xu et al. 2008). Xu et alæŁŕ estimates are completely depending on temperature and precipitation. Does it mean estimated N2O flux is determined by temperature and precipitation in this study? 5) Figure 9. It seems that precipitation exert stronger controlling effects on both CH4 and N2O than temperature. The temperature even does not yield significant effects on CH4. Why?

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