

Interactive comment on “Contributions of secondary forest and nitrogen dynamics to terrestrial carbon uptake” by X. Yang et al.

Anonymous Referee #2

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Comments:

1. Over all, the manuscript was sufficiently organized and prepared. Topics discussed in this paper are relevant and quite interesting not only for the global modeling people but also field biogeochemists. One critical weak point is that the discussions on precision or uncertainty of simulated results are poor. The authors used their simulated results for conclusions without any examinations their uncertainties. Considering of the applications of the simulations using this model for the actual scenario making or countermeasure planning, the reliability of simulated results is critically important. I understand that the authors were not directly aiming to show the utility value on these practical applications, but the careful examination on calculation uncertainty is obviously needed also for the research level.

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2. Processes of secondary forest regrowth must have wide variety depending on the geographical situations. In Japanese cases, for example, most of secondary forests are not naturally developed, but are plantations. Also many regions in the tropical Southeast Asia, palm plantation has extensively developed after clear-cut of the rain forests. It is considered that there are great difference of biomass growth rate between natural forest development and plantations. This might affect the heterogeneity in the N cycling effect in the tropical regions, which the authors pointed out.

3. In addition to above factor, there is another factor potentially generate the heterogeneity in the N cycling effect in the tropical regions. Except the tropical rain forests closely distributed near equator, there are various types of seasonal variations of precipitation in tropical and subtropical regions. Conventions of two independent seasonalities; N dynamics seasonality (mineralization, nitrification, and denitrification rates) and hydrological seasonality regulating dissolved nitrogen leaching, controls pool size and its seasonal variations of available N in soils. Influences of monsoon climatic system generate significant seasonal variations of precipitation in the East Asia, Northern Australia, Eastern Africa and Southeast American US. These regional discussions can be possible using their simulated results. In general, terrestrial N dynamics is strongly controlled and regulated by various regional conditions, such as regional climatic system, distribution of emissions and vegetation conditions. Therefore, the discussion on heterogeneity of terrestrial N dynamics naturally requires regional focus and information. If the authors could address this issue, the discussions and conclusions on the effect of the N dynamics on carbon uptake can be more robust.

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