Development of new Earth system model with carbon and nitrogen cycle

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The Earth system models, which is a climate model with land and ocean biogeochemistry components, have been developed to understand enviromental dynamics and used to project climate change. It has been pointed out that because most of ESMs did not have explicit nitrogen cycle and nuturient limitation on plant growth in land ecosystem component, carbon uptake by land might be overestimated by the models. Additionaly, nitrogen cycle on land are associated with emission of GHG: nitrous oxide. In this research, we have developed a new Earth system model that incorporate explicit global carbon and nitrogen cycles and their interactions. From the sensitivity analysis, we found the new model exhibits similar level of CO2 fertilizasion effect compared with previous model, and the CO2 fertilization effect in the model is actually affected by nitrogen cycle. In this presentation, we focus on land carbon and nitrogen cycle, and introduce related topics of ocean biogeochemistry.

Keywords: Earth system modeling, Carbon cycle, Nitrogen cycle

