3rd International Conference on Earth System Modelling
Vol. , 3ICESM-267, 2012
3rd International Conference on Earth System Modelling

Terrestrial CO_2 and N2O emissions under future climate

D. Kracher (1), C. H. Reick (1), and B. R. Parida (2)

(1) Max-Planck-Institute for Meteorology, Land in the Earth System, Hamburg, Germany (daniela.kracher@zmaw.de), (2) University of California, Los Angeles, USA

Without drastic reduction of anthropogenic CO_2 emissions, climate change is expected to get more significant during the 21st century. This will in particular lead to modified surface temperatures and precipitation patterns. Microbial processes in the soil are highly sensitive to soil temperature and soil moisture. Therefore, the release of CO_2 and N2O via soil respiration, nitrification and denitrification, respectively, will be affected.
In addition to the climatic changes, increased CO_2 concentration in the atmosphere is likely to promote plant growth. The magnitude of the resulting additional C sequestration will be dependent on nutrient availability, which in turn will be influenced by increased biomass productivity, fertilizer application and N deposition. Availability of N will also have an impact on microbial processes responsible for CO_2 and N2O emissions.
Earth system models (ESMs) are useful tools to examine these interactions from a global perspective. In our study we apply JSBACH, the land component of the MPI-ESM, which was recently extended by a submodel for the terrestrial nitrogen cycle coupled to the existing carbon dynamics. The impact of future changes in CO_2 concentration, temperature and precipitation pattern as well as land use change and anthropogenic N addition on the sink and source strength of the terrestrial biosphere for CO_2 and N2O are examined with scenario simulation experiments.