Simulations of ecosystem processes for different land use types in Western Australia

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Vegetation growth, soil climate, soil respiration and N_2O-emissions are simulated for one site in Western Australia, considering different land use types that occur in close vicinity to each other (plantations of *Pinus radiata* and *Eucalyptus globulus*, and a sheep grazed pasture). We used the process-based DNDC model (Li et al. 2000) for the simulation of soil processes and combined it with a new flexible vegetation module that can account for various types of forests as well as grassland or forest/grassland mixtures. The model framework has been adapted, so that total rooting depth instead of a fixed soil horizon is considered, and the phenological vegetation development is described more realistically. Simulations were run with measured daily weather data and results were evaluated with field measurements of soil water content and soil-borne greenhouse gas emissions. Fluxes of N_2O and CO_2 were measured for all three land use types during a period of approx. 8 months using an automatic chamber system.

We describe a procedure of applying complex process models to new ecosystems. Preliminary simulations show that the DNDC model is capable of representing site and temporal differences of soil emissions. Simulated soil water content was in close agreement to the measured values under all vegetation types. Using literature information and yield measurements we judge that the new model combination can realistically represent ecosystem water-, and nutrient cycling as well as seasonal vegetation development. More work is needed to ensure that the long-term development of soil and vegetation carbon and nitrogen pools is realistic.