Geophysical Research Abstracts
Vol. 15, EGU2013-4873, 2013
EGU General Assembly 2013

Modeling Nitrous Oxide emissions and identifying emission controlling factors for a spruce forest ecosystem on drained organic soil

Hongxing He (1), Åsa Kasimir Klemedtsson (1), Per-Erik Jansson (2), Josefine Nylinder (1), Astrid Meyer (3), Azad Nousratpour (3), and Leif Klemedtsson (3)

(1) University of Gothenburg, Department of Earth Sciences, Gothenburg, Sweden (hongxing.he@gvc.gu.se), (2) Royal Institute of Technology (KTH), Land and Water Resources Engineering, Stockholm, Sweden, (3) University of Gothenburg, Department of Biological and Environmental Sciences, Gothenburg, Sweden

High Nitrous Oxide (N2O) emission has been identified in hemiboreal forests on drained organic soils. However, the controlling factors regulating the emissions are unclear. To examine the importance of different factors on the N2O emission, a modeling approach was accomplished, using CoupModel with Monte-Carlo based multi-criteria calibration method. The model was made to represent a forest on drained organic soil in south-west Sweden (Skogaryd) where data of fluxes combined with basic information about soil and plant conditions were used. The model was constrained to a good performance with measurement data of soil temperature, groundwater level and soil moisture during 2008 and N2O emissions during 2007-2009. Both dynamics and magnitude of N2O emissions were well simulated compared to measurements (coefficient of determination R2 = 0.31, simulated: 1.74 $\pm$ 0.49 kgN2O-N ha-1 year-1 and measured: 1.70 $\pm$ 0.34 kgN2O-N ha-1 year-1).
Our modeling exercise primarily provide a parameter set for process modeling of N2O emission for Northern forest systems on drained organic soils. By correlating posterior model parameter values with the simulated emissions, parameters regulating soil mineralization and nitrification processes show the highest correlation coefficients. N availability is therefore identified as the main controlling factor for N2O emissions of Skogaryd. In addition, soil moisture at 30 cm depth is found to be important for N turnover regulation and hence influence the emissions. A suggested practical mitigation option for N2O emission would thus be a reduced drainage.