



Hydrological regulation of the peatland CO₂ exchange. A model analysis of the eddy-covariance measurements.

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Large areas in a boreal region are occupied by patterned peatlands. CO₂ exchange of the individual microforms within a peatland (hummock, lawn, hollow or pool) can vary significantly both seasonally and on a long term. One important factor, determining the variation, is a position of the water table within a particular microform.

Eddy-covariance technique was used to monitor the daily CO₂ fluxes over the lawn microform at Degerö Stormyr peatland (Northern Sweden). Here we make an additional analysis of those data with a help of the ecosystem model. More specific aim of the study is to derive and analyze the curve (both modeled build on the data from the flux tower observations), which shows a dependency of the CO₂ uptake on the water table depth in the peatland.

To allow application to a peatland site the general ecosystem model GUESS coupled with was modified in a following way:

- A new water balance scheme was introduced
- Modifications were done in the model of photosynthesis to account for the dependency of the moss photosynthetic activity on the water content. Parameters in equations describing the autotrophic respiration were revised.
- Specific coefficients were used to describe decomposition of the Sphagnum litter and peat. Parameterization of decomposition in anaerobic condition was included in a soil organic matter dynamics model.

We have run the model for the measurement period 2001-2003 and performed the validation and the sensitivity analysis. Based on the measured values and the model runs we could conclude that the maximum CO₂ uptake take place when the water table is in a range between 10 and 20 cm. Higher or lower position of the water table is associated with a smaller CO₂ uptake. We use a model to speculate about the reasons.