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Storm Effects on Net Ecosystem Productivity in Boreal Forests

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Regional carbon budgets are to some extent determined by disturbance in ecosystems. Disturbance is believed to be partly responsible for the large inter-annual variability of the terrestrial carbon balance. When neglecting anthropogenic disturbance, forest fires have been considered the most important kind of disturbance. However, also insect outbreaks and wind-throw may be major factors in regional carbon budgets. The effects of wind-throw on CO₂ fluxes in boreal forests are not well known due to lack of data. Principally, the reduced carbon sequestration capacity, increased substrate availability and severe soil perturbation following wind-throw are expected to result in increased CO₂ fluxes from the forest to the atmosphere. In January 2005, the storm Gudrun hit Sweden, which resulted in approx. $66 \cdot 10^6 \text{ m}^3$ storm-felled stem wood distributed over an area of approx. 272 000 ha. Eddy covariance flux measurements started at storm-felled areas in Asa and Toftaholm in central Sweden during summer 2005. Data from the first months suggests increased CO₂ fluxes by a factor of 2.5-10, as compared to normal silviculture (clear-cutting). An important question is how long such enhanced CO₂ fluxes persist. The BIOME-BGC model will be calibrated against measured CO₂ fluxes from both sites for 2005 through 2009. Modeled data will be used to fill gaps in the data sets and annual carbon balances will be calculated. Data from Asa and Toftaholm will be presented at the conference.