

ミズゴケ湿原へのササの侵入が炭素収支に与える影響 Effects of the expansion of vascular plants in *Sphagnum*-dominated bog on carbon balance

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Peatland ecosystems have accumulated a huge amount of soil organic carbon for millennia. However, it is reported that the soil carbon has become vulnerable because of global warming and land-use change. Such disturbances potentially enhance oxidative peat decomposition, and consequently a large amount of CO₂ is emitted into the atmosphere. In Sarobetsu Mire in northern Hokkaido, which has the largest *Sphagnum*-dominated bog in Japan, vascular plants, *Sasa*, have invaded into *Sphagnum* bog because of the change of the hydrological environment, which was due to drainage for agriculture. To understand the effects of the expansion of *Sasa*-dominated area in *Sphagnum* bog on carbon balance, we measured CO₂ flux using the eddy covariance technique at a *Sphagnum*-dominated area (B site) and a *Sasa*-dominated area (T site) and compared CO₂ balance between the two sites.

Flux measurement was conducted during the four snow-free seasons from mid-April through early November in 2007 to 2010. Eddy sensors of CO₂ (LI7500, Licor) and wind speed (CSAT3, Campbell) were installed at the heights of 2.0 and 2.3 m, respectively, at B and T sites. The outputs from the sensors were recorded with a datalogger (CR1000, Campbell) at 10 Hz. Net ecosystem CO₂ exchange (NEE) was calculated on a half-hourly basis as a sum of eddy CO₂ flux and CO₂ storage change calculated from CO₂ concentration measured by LI7500. NEE was partitioned into gross primary production (GPP) and ecosystem respiration (RE) using an empirical conventional method.

Both GPP (gross ecosystem photosynthesis) and RE were larger at T site than B site. In 2008 with dry summer, cumulative NEE for 6.5 months of the snow-free season was -129 and -179 gC m⁻², respectively, at T site and B site. The negative NEE values indicate that the two peatland ecosystems functioned as CO₂ sinks in the season. In addition, sink strength was higher at T site. In 2010 with hot, wet summer, however, cumulative NEE was -238 and -159 gC m⁻², respectively, at T site and B site. Although NEE increased largely at B site, it decreased at T site. *Sphagnum* moss grew more under the hot and moist environment, which increased GPP more than RE. In contrast, although growth and resultant GPP also increased at T site, RE increased more than GPP because of high temperature. This result suggests that net CO₂ uptake will decrease by the invasion of *Sasa* plants under the warming environment in the near future.

キーワード: 泥炭, CO₂ フラックス, 渦相関法, 温暖化

Keywords: Peatland, CO₂ flux, Eddy covariance technique, Global warming