

ABSTRACT NO: 141

Lessons from one decade of carbon dioxide exchange measurements in an oligotrophic minerotrophic mire in Northern Sweden

MATTHIAS PEICHL¹, JÖRGEN SAGERFORS¹, MIKAELL OTTOSSON-LÖFVENIUS¹, MATS NILSSON¹

¹ SWEDISH UNIVERSITY OF AGRICULTURAL SCI., SWEDEN

The important role of natural peatland ecosystems in the global carbon (C) cycle and its susceptibility to changes in climate patterns have been recognized and thus, identifying effects from climatic controls on the long-term peatland C sequestration potential has become a focus of concern in recent years. We present results from ten years (2001 to 2010) years of carbon dioxide (CO₂) exchange measurements in an oligotrophic minerotrophic peatland in Northern Sweden using the eddy-covariance technique. The seasonal patterns and inter-annual variation of the peatland net ecosystem exchange (NEE), gross ecosystem production (GEP) and ecosystem respiration (ER) and their underlying climatic and environmental controls were explored. The results suggest an annual net uptake of CO₂ commonly within the narrow range of -48 to -66 g C m⁻² y⁻¹ (for eight out of the ten years) and a decadal average (\pm standard deviation) of 57 ± 24 g C m⁻² y⁻¹. The exceptions were the years 2006 and 2008 in which the annual NEE was -17 and -113 g C m⁻² y⁻¹, respectively. Lower CO₂ uptake in 2006 occurred due to a late summer drought period and its associated reduction of GEP. Such deviation from the long-term mean indicates the possible negative implications of a future drier and warmer summer climate on the northern peatland CO₂ uptake potential. Nevertheless, overall this peatland persisted as continuous sink for atmospheric CO₂ under various climatic conditions indicating some general stability of the ecosystem functioning and resilience to moderate inter-annual climate variations.