

Abstract No: A-293

CARBON DIOXIDE BALANCE OF A SECONDARY TROPICAL PEAT SWAMP FOREST IN SARAWAK, MALAYSIA

Frankie Kiew^{1,2*}, Ryuichi Hirata², Takashi Hirano¹, Wong Guan Xhuan^{1,2}, Edward Baran Aries², Kevin Kemudang², Joseph Wenceslaus² and Lulie Melling²

¹Laboratory of Environmental Informatics, Graduate School of Agriculture, Hokkaido University, Sapporo, 060-8589, Japan.

²Tropical Peat Research Laboratory Unit, Chief Minister's Department of Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia.

³National Institute for Environmental Studies, Tsukuba 305-8506, Japan

*Corresponding author: kiew.frankie@gmail.com

Tropical peatlands are important reservoirs of terrestrial carbon. Therefore, net ecosystem exchange (NEE) of carbon dioxide (CO₂) from this ecosystem is potentially important to the global carbon cycle. We conducted an eddy covariance observation over a secondary tropical PSF in Betong division in Sarawak, Malaysia (01°24'N, 111°23'E). The objectives of our study were: 1) to investigate the environmental controls on CO₂ fluxes of ecosystem photosynthesis (GPP) and ecosystem respiration (RE), 2) to investigate seasonality in CO₂ fluxes and 3) to assess annual NEE and discuss its inter-annual variation. CO₂ and energy fluxes were measured at the height of 41 m from October 2010 using a sonic anemometer/thermometer (CSAT3, CSI) and an open-path CO₂/H₂O analyser (LI7500A, LICOR). CO₂ profile was also measured at six heights for CO₂ storage change estimation. NEE was calculated as the sum of eddy CO₂ flux and CO₂ storage change every 30 minutes and partitioned into RE and GPP using a conventional method. Meteorological data were also measured along with ground water level (GWL) and volumetric soil water content. Annual values for NEE, RE and GPP from 2011 to 2014 were 198 ± 198 , 4012 ± 377 and 3815 ± 265 g C m⁻² yr⁻¹ (Mean \pm 1 SD) respectively. Annual NEE was most negative in 2011, when annual precipitation was the largest (2,965 mm yr⁻¹). Annual RE decreased with the increase in precipitation except in 2014, with lowest precipitation. Night-time NEE, corresponding to RE, showed a negative linear relationship with both GWL and soil water content (p<0.05). Annual GPP increased from 2011 to 2013 but decreased in 2014. Maximum GPP obtained from light-response curve fitting also showed a pattern of increase over time. In general, GPP was slightly lower in the rainy season from December to February because of relatively lower solar radiation.

Keywords:-