

GENERAL INFORMATION

author(s)	De Bie J
year	1998
English title	Evaluation of the flux profile method for the determination of the CO ₂ exchange between a broadleaved forest and the atmosphere
original title	Evaluatie van de flux-profielmethode ter bepaling van de CO ₂ -uitwisseling tussen een loofbos en de atmosfeer
reference	MSc thesis, Ghent University, Ghent
pages	134
type	dissertation (d2)
ecosystem service	regulating - C
keywords	FORUG, footprint model
taxa	
project	
supervisor	Lemur R, Samson R
institution	Laboratory of Plant Ecology
document	pdf_short, hardcopy at the Laboratory of Plant Ecology
data	

MATERIALS & METHODS

study area	5n (measuring tower)
time period	September–October 1997
goal	Test whether the flux profile method can be used in the Aelmoeseneie forest: small, high surface roughness, data averaged over several time periods. If the flux profile method is applicable, quantify the CO ₂ exchange between the forest and the atmosphere, based on the meteorological and ecological parameters that change through the growing season.
set-up	
data collection	measuring tower (5 height levels) <ul style="list-style-type: none">- temperature (30 min data): 14.6 m, 21.6 m, 36 m, - 30 cm- wind speed (30 min data): 37, 32.7, 30.6, 28.6 m- wind direction (30 min data): 37, 28.6 m CO ₂ fluxes (IRGA) <ul style="list-style-type: none">- tower (30 min data): 37, 32.7, 30.6, 28.6 m
remarks	soil respiration from Rottiers_1998_th FORUG model from Samson_etal_1997_SilvGand_1

RESULTS

The set-up of the measuring instruments was evaluated, and suggestions for improvement were formulated: the IRGA was too imprecise, the frequency of temperature measures was too low, the funnels used to suck in the air for temperature measurements should not warm up in the sun, more measures of the temperature difference during the 30 min time period.

The parameters for the flux profile method were determined. Wind direction at 28.6 m was influenced by the forest. Wind speed was not correlated with wind direction and the anemometer measures at the different measuring heights were well-correlated. The 4 measures of wind speed were needed to calculate the displacement height; the displacement height was overestimated at low wind speed values. The displacement height decreased with increasing wind speed. The mean displacement height during the

growing season was 21.8 m (= 0.81 h); the roughness length was 3.4 m (0.13 h). The surface of the Aelmoeseneie forest is rough.

The differences in CO₂ concentration measured above the Aelmoeseneie forest were low, due to the high surface roughness and the small forested area (oasis effect). The calculated CO₂ fluxes (flux profile method) were lower than (September) and similar to (October) the results of the models (FORUG, soil respiration Rottiers_1998_th). The flux profile method yields representative results if only vertical fluxes occur; in September, the oasis effect did also induce horizontal fluxes.