1. About the data set

Site name (AsiaFlux three letter code)	Kawagoe forest meteorology research site (KWG)
Period of registered data	From January 1, 1997 to December 31, 1997
This document file name	KWG_1997_001b.pdf
Corresponding data file name	KWG_1997_001.csv

Revision information

Date	Details of revision	Renewed file name
31 July 2012	First registration	KWG_1997_001a.pdf KWG_1997_001.csv
27 March 2013	Document file is updated. p.3, 3. Registered data: Pu is not available	KWG_1997_001b.pdf

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2. Site description

Hour line (Time difference from UTC)	Japan Standard Time (JST) (9 hours ahead of UTC)
Location (address)	Kawagoe, Saitama, Japan
Position	35.8725N, 139.4869E (World Geodetic System 1984)
Elevation	26m above sea level (World Geodetic System 1984)
Terrain type	flat
Slope	0 degrees
Area	approx. 40ha
Fetch	50-500m
Climate	Warm temperate (Köppen climate classification: Cfa)
Mean annual air temperature	15 degree C
Mean annual precipitation	1300mm
Vegetation Type	Deciduous broadleaf forest
Dominant Species (Overstory)	*Quercus serrata* (Konara oak), *Carpinus laxiflora* (red-leaved hornbeam), *Clethra barbineris* (japanese sweetspire), *Ilex macropoda*
Dominant Species (Understory)	-
Canopy height	Approx. 15m
Breast High Diameter	mainly 10-15cm
Age	NA
LAI	approx. 5.5 at max in early summer
Soil Type	Black soil Bl_D (Andosols)
Other information	A local street goes through the forest. Approx. 500m away from Kan-Etsu Expressway. Fallen leaves are occasionally swept away.

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3. Registered data

Observation items	Symbol	Unit	Height(s) Depth(s)	Instruments	Note
Date	DATE	-	-	-	yyyymmdd
Time	TIME	-	-	-	hhmm
Precipitation	PPT	mm	0.6m	RT-5 (IKEDA)	
Air temperature	Ta	degrees C	20.92 m	HMP-35D (VAISALA)	
Relative humidity	Rh	%	20.92 m	HMP-35D (VAISALA)	See Note [1]
Wind speed	U	$m{\cdot}s^{-1}$	21.13m	WM-30P (IKEDA)	
Wind direction	WD	-	25.9 m	WD-16 (IKEDA)	16 cardinal points (0-15) See Note [2]
Global solar radiation (incoming / downward)	Sd	$W{\cdot}m^{-2}$	25m	MR-22 (EKO)	See Note [3]
Reflected solar radiation (upward)	Su	$W{\cdot}m^{-2}$	25m	MR-22 (EKO)	See Note [3]
Photosynthetic active photon flux density (downward)	Pd	$micromol{\cdot}m^{-2}{\cdot}s^{-1}$	25m	ML020P (EKO) LI190(LI-COR)	See Note [3]
Reflected PAR (upward)	Pu	NA	NA	NA	
Net radiation	Rn	$W{\cdot}m^{-2}$	25m	MF-11 (EKO)	
Soil heat flux	G	$W{\cdot}m^{-2}$	-0.02m	MF-81 (EKO)	
Sensible heat flux	H	$W{\cdot}m^{-2}$	20.0m	DAT-300, DA-600-3T (KAIJO)	
Latent heat flux	lE	NA	NA	NA	
Friction velocity	Ust	$m{\cdot}s^{-1}$	20.0m	DA-600-3T (KAIJO)	
CO_2 flux	Fc	$micromol{\cdot}m^{-2}{\cdot}s^{-1}$	20.0m	DA-600-3T (KAIJO) LI-6262 (LI-COR) Or LI-6252(LI-COR)	Closed-path system, See 4-4 for QC
Storage change in canopy air layer	Sc	NA	NA	NA	
Net ecosystem exchange	NEE	$micromol{\cdot}m^{-2}{\cdot}s^{-1}$	-	-	NEE=Fc+Sc, Ust screening (Ust >= 0.2), gap filled
Ecosystem respiration	Re	$micromol{\cdot}m^{-2}{\cdot}s^{-1}$	-	-	gap filled
Gross primary production	GPP	$micromol{\cdot}m^{-2}{\cdot}s^{-1}$	-	-	GPP=-NEE+Re

Note

[1] value of >100% is replaced by 100%
[2] clockwise from north (=0) to north-northwest (=15)
[3] value in night time is replaced by 0.0

Gap filling

NEE	–NEE(daytime) = Agmax* alpha*APAR/ (Agmax+alpha*APAR) +C: Parameters were derived per 7days.
Re	Re = -NEE(nighttime & winter season) = a* b^(Ta/10) : Parameters (a & b) were derived yearly.

References

Data format

Data consists of fixed length (8 digits) comma separated format. Missing data is labeled as "-9999.00"

Line 1: Symbol (Date, Time, PPT, Ta, …..)

Line 2: Unit (yyyymmdd, hhmm, mm, degC, ….)

"hhmm" shows intermediate time of averaging period.

i.e. "1215" labels half-hourly average (or sum) of data from 12:00 to 12:30

Line 3: Comment

Line 4: Data

:

Data example

```
    Date, Time,      PPT,       Ta,       Rh,        U,       WD,       Sd,       Su,       Pd,       Pu, ...........
yyyymmdd, hhmm,       mm,    degC,        %,     ms-1,      deg,    Wm-2,     Wm-2,     (*1),     (*1), ...........
File= KWG_2000_001.CSV; Created: 20100326; Gap= -9999.0; (*1): micro-mol m-2 s-1                       ...........
20000101, 0015,      0.0,     3.34,    87.19,     1.58, -9999.0,      0.1, -9999.0,      0.1,      0.0, ...........
20000101, 0045,      0.0,     3.12,    88.14,     1.44, -9999.0,      0.0, -9999.0,      0.1,      0.0, ...........
20000101, 0115,      0.0,     2.36,    90.51,     1.15, -9999.0,     -0.3, -9999.0,      0.1,      0.0, ...........
20000101, 0145,      0.0,     2.14,    91.32,     0.83, -9999.0,      0.0, -9999.0,      0.1,      0.0, ...........
20000101, 0215,      0.0,     2.28,    88.96,     0.49, -9999.0,     -0.3, -9999.0,      0.1,      0.0, ...........
20000101, 0245,      0.0,     2.24,    89.82,     0.35, -9999.0,     -0.2, -9999.0,      0.2,      0.0, ...........
20000101, 0315,      0.0,     2.05,    89.49,     1.50, -9999.0,      0.1, -9999.0,      0.2,     -0.1, ...........
20000101, 0345,      0.0,     2.41,    87.25,     1.27, -9999.0,      0.0, -9999.0,      0.2,      0.0, ...........
20000101, 0415,      0.0,     2.31,    86.83,     1.12, -9999.0,     -0.2, -9999.0,      0.1,      0.0, ...........
20000101, 0445,      0.0,     2.84,    83.36,     0.54, -9999.0,     -0.6, -9999.0,      0.0,      0.0, ...........
20000101, 0515,      0.0,     2.53,    83.32,     1.23, -9999.0,      0.2, -9999.0,      0.2,      0.0, ...........
20000101, 0545,      0.0,     1.59,    87.54,     1.29, -9999.0,     -0.6, -9999.0,      0.0,      0.0, ...........
20000101, 0615,      0.0,     1.89,    85.13,     0.94, -9999.0,      0.4, -9999.0,      0.3,      0.0, ...........
20000101, 0645,      0.0,     1.77,    82.40,     0.83, -9999.0,      3.5, -9999.0,      8.5,      0.4, ...........
20000101, 0715,      0.0,     2.67,    76.83,     1.38, -9999.0,     45.8, -9999.0,     71.9,     11.6, ...........
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4. Observation and calculation

4-1. Flux observation system and data acquisition

Type of sonic anemometer	DAT-300, DA-600-3T (KAIJO)
Type of IRGA	LI-6262, LI-COR
Sampling rate	5Hz
Averaging time	30 min
Flux measurement height #1	20.0m
Zero-plane displacement	
Roughness length	
Calibration information	LI-6262 was calibrated using standard gases (six times a day)
Other information	

4-2. Flux calculation

Calculation methods		Note
Flow attenuation [*4-6]	Applied	
Coordinate rotation [*1-3]	Applied	first-rotated
Lag removal [*2, 7, 8]	Applied	Manual

4-3. Flux corrections

Correction methods		Target flux	Note
Cross wind correction[*9, 10]		sensible heat flux (H)	
Vapor correction		sensible heat flux (H)	
High frequency loss	Band-pass covariance method [*12]	CO_2 flux (Fc)	
	Experimental approach *[2]		
Low frequency loss (Detrending)	Linear detrend [*16]	sensible heat flux (H), friction velocity (Ust), CO_2 flux (Fc)	
WPL Correction[*17-21]		(Not applied)	
Others [*22-24]			

4-4. Quality control [*25-26]

<table>
<tr><td colspan="3">QC methods</td><td></td><td>Note</td></tr>
<tr><td rowspan="8">Raw data test [*25,26]</td><td colspan="2">Spike test [*27]</td><td>Applied</td><td></td></tr>
<tr><td colspan="2">Absolute limits</td><td>Applied</td><td></td></tr>
<tr><td colspan="2">Absolute variance</td><td>Applied</td><td></td></tr>
<tr><td rowspan="2">Higher-moment statistics</td><td>skewness</td><td>Applied</td><td></td></tr>
<tr><td>kurtosis</td><td>Applied</td><td></td></tr>
<tr><td rowspan="2">Discontinuities</td><td>Harr mean test</td><td>Applied</td><td></td></tr>
<tr><td>Harr variance test</td><td>Applied</td><td></td></tr>
<tr><td colspan="2">Visual inspection</td><td>Applied</td><td></td></tr>
<tr><td colspan="3">Non steady state test[*25]</td><td>Not applied</td><td></td></tr>
<tr><td colspan="3">Absolute thresholds</td><td>Not applied</td><td></td></tr>
<tr><td colspan="3">Others</td><td colspan="2"></td></tr>
</table>

4-5. Storage term

Target storage		Note
CO_2	From CO_2 profile data (16, 12, 8, 4 m) Sampling interval: 5 minute at each height	

References

5. Important events

Date	Events
1997/ 5/17 - 1997/ 5/28	electrical outage occurred a few times during this period
1997/ 7/14 - 1997/ 7/28	electrical outage occurred during this period
1997/ 8/12 - 1997/ 8/19	electrical outage occurred during this period
1997/ 8/26 - 1997/ 9/1	electrical outage occurred during this period

Please note that there may be more electrical outages other than listed above.

6. Publications relating to this site

YASUDA Yukio, WATANABE Tsutomu (2001) Comparative measurements of CO_2 flux over a forest using closed-path and open-path CO_2 analyzers. Boundary-Layer Meteorology, 100(2):191-208

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Publication lists:

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Flux calculation

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Flux correction

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