TITLE:
CEOP_Tsukuba_NIAES-MASE_20070101_20070630.flx

CONTACT(S):
1) Akira Miyata
National Institute for Agro-Environmental Sciences
Tsukuba 305-8604, Japan
E-mail: amiyat@niaes.affrc.go.jp
2) Masayoshi Mano
National Institute for Agro-Environmental Sciences
Tsukuba 305-8604, Japan
E-mail: mmano@niaes.affrc.go.jp

DATE OF THIS DOCUMENT:
14 May 2009

1. 0 DATASET OVERVIEW:

1.1 Introduction:
Mase paddy flux site was established in 1999 to monitor greenhouse gas exchange between paddy fields and the atmosphere, and since then, Mase site is operated as one of the key study sites of AsiaFlux (http://www.asiaflux.net/). Details of the study site and instrumentation are given in some references (Saito *et al*., 2005; Miyata *et al*., 2005; Han *et al*., 2007; Saito *et al*., 2007).

1.2 Time period covered by the data:
Start: 1 January 2007, 00:00 (UTC)
End: 30 June 2007, 23:30 (UTC)

1.3 Physical location of the measurement:
Latitude: 36° 03' 14.3" N
Longitude: 140° 01' 36.9" E
Elevation: 11 m a.s.l.
Landscape: Agricultural fields (paddy fields)
Soil characteristics: Soil type is Eutric Fluvisols. The site is flooded most of rice growing period (from the beginning of May to mid-September).

1.4 Data source:
Original data.

1.5 WWW address references:
http://www.asiaflux.net/network/007MSE_1.html
http://ecomdb.niaes.affrc.go.jp/e_level_page.php?select_area=1045&select_site=1121&select_period=9999

2.0 INSTRUMENTATION DESCRIPTION:

2.1 Platform:

A sonic anemometer and an open-path infrared gas analyzer are mounted at the top of a 3-m tall mast.

2.2 Description of the instrumentation:

Parameter	Model	Manufacturer
Sensible Heat Flux	DA600	Kaijo, Tokyo, Japan
Latent Heat Flux	DA600 LI7500	Kaijo, Tokyo, Japan LICOR, Lincoln, NE, USA
CO2 Flux	DA600 LI7500	Kaijo, Tokyo, Japan LICOR, Lincoln, NE, USA
Soil Heat Flux	MF-180M	Eko, Tokyo, Japan

2.3 Instrumentation specification:

Parameter	Sensor Type	Height of sensor (m)	Accuracy	Resolution
Sensible Heat Flux	Open-path eddy covariance	3.15	-	-
Latent Heat Flux	Open-path eddy covariance	3.15	-	-
CO2 Flux	Open-path eddy covariance	3.15	-	-
Soil Heat Flux	Thermopile-type heat flux plate	0.002*		-

* Depth of sensor.

3.0 DATA COLLECTION AND PROCESSING:

3.1 Description of data collection:
Data are retrieved weekly.

3.2 Description of derived parameters and processing techniques used:
1) Eddy covariance raw data were sampled at 10 Hz and stored.
2) Post-processing of retrieved eddy covariance data was done for every growing season and non-growing season. Block averaging, planar fit coordinate rotation and high-frequency response correction were applied.
3) Low-frequency response correction was not applied. Influence of low-frequency component on sensible and latent heat transport at Mase paddy flux site is discussed by Saito *et al*. (2007).
4) For sensible heat flux, influences of water vapour and cross-wind on temperature measurement were corrected.
5) The density correction was applied to latent heat flux.
6) Heat flux plates were set at three points. Data of the heat flux plates were sampled every 5 seconds and their 30-min averages were stored. The average of 30-min averages of the three plates was used for the soil heat flux at the site.

4.0 QUALITY CONTROL PROCEDURES:

1) Eddy covariance raw data (10 Hz data) was used for quality control of sensible heat flux, latent heat flux and CO2 flux (Vickers and Mahrt, 1997).
2) Sampling error (Finkelstein and Sims, 2001; Mano *et al*. 2007) was also used to discard erroneous eddy covariance flux data.
3) CO2 flux data were discarded when precipitation was observed.

4) CO_2 flux data were discarded when the fluxes were negative during fallow period even if sampling error (Finkelstein and Sims, 2001) was taken into account.
5) CO_2 flux data were discarded when the nighttime fluxes were negative during rice growing period even if sampling error (Finkelstein and Sims, 2001) was taken into account.
6) CO_2 flux data were discarded when they were out of the normal range (from -50 to +20).
7) Erroneous data of soil heat flux were flagged.

5.0 GAP FILLING PROCEDURES:
1) Gap filling was applied to data of sensible heat flux, latent heat flux and CO_2 flux. Not only missing data but also discarded data were gap-filled. An on-line gap-filling tool (http://gaia.agraria.unitus.it/database/eddyproc/) based on the look-up table method was used for gap-filling.
2) No gap-filling was applied to soil heat flux data.

6.0 DATA REMARKS:

6.1 PI's assessment of the data:
None.

6.1.1 Instruments problems
None.

6.1.2 Quality issues
1) Energy imbalance is commonly observed at the present study site not only during rice growing period when the site is flooded but also during fallow period. Correction was applied neither to sensible nor latent heat fluxes.
2) Apparent downward CO_2 flux is often observed at the site in fallow period with no vegetation. It was found that the problem was caused by insufficient application of the density correction (Ono *et al*., 2007; 2008), but effective procedure of correcting those erroneous data is still under development. For this reason, no correction was applied to the problematic data in fallow period, but in the quality control procedure described above, some of those data were discarded and gap-filled.

6.2 Missing data periods:
1) There is no long missing period.
2) CO_2 data are not provided at this stage because they are in preparation for publication. Please contact PIs when you request CO_2 data on personal basis.

6.3 Data intercomparisons:
None.

7.0 REFERENCE REQUIREMENTS:

Original data were collected in the framework of Research Project for Global Warming Monitoring by National Institute for Agro-Environmental Sciences (NIAES). The project is funded by Ministry of Agriculture, Forestry and Fisheries, Ministry of Environment and NIAES.

8.0 REFERENCES

Finkelstein, P. L. and P. F. Sims., Sampling error in eddy correlation flux measurements. J Journal of Geophysical Research, 106, 3503-3509, 2001.
Han, G.H., H. Yoshikoshi, H. Nagai, T. Yamada, K. Ono, M. Mano, A. Miyata, Isotopic disequilibrium between carbon assimilated and respired in a rice paddy as influenced by methanogenesis from CO2. Journal of Geophysical Research, 112, G02016, doi:10.1029/2006JG000219, 2007.
Mano, M., A. Miyata, H. Nagai, T. Yamada, K. Ono, M. Saito and Y. Kobayashi, Random sampling errors in CO2 fluxes measured by the open-path eddy covariance method and their influence on estimating annual carbon budget. Journal of Agricultural Meteorology, 63, 67-79, 2007. (in Japanese with English abstract and captions)
Miyata, A., T. Iwata, H. Nagai, T. Yamada, H. Yoshikoshi, M. Mano, K. Ono, G. H. Han, Y. Harazono, E. Ohtaki, Md. A. Baten, S. Inohara, T. Takimoto, and M. Saito, Seasonal variation of carbon dioxide and methane fluxes at single cropping paddy fields in central and western Japan, Phyton, 45(4), 89-97, 2005.
Ono, K., R. Hirata, M. Mano, A. Miyata, N. Saigusa, Y. Inoue, Systematic differences in CO2 fluxes measured by open- and closed-path eddy covariance systems: influence of air density fluctuations resulting from temperature and water vapor transfer. Journal of Agricultural Meteorology, 63, 139-155, 2007. (in Japanese with English abstract and captions)
Ono, K., A. Miyata, T. Yamada, Apparent downward CO_2 flux observed with open-path eddy covariance over a non-vegetated surface, Theoretical and Applied Climatology, 92, 195-208, DOI 10.1007/s00704-007-0323-3, 2008.
Saito, M, A. Miyata, H. Nagai, and T. Yamada, Seasonal variation of carbon dioxide exchange in rice paddy field in Japan. Agric. Forest Meteorol. 135, 93-109, 2005.
Saito, M., J. Asanuma, A. Miyata, Dual-scale transport of sensible heat and water vapor over a short canopy under unstable conditions. Water Resources Research, 43, W05413, doi:10.1029/2006WR005136, 2007.
Vickers, D. and L. Mahrt, Quality control and flux sampling problems for tower and aircraft data. Journal of Atmospheric and Oceanic Technology,14, 512-526, 1997.