DATA META FILE 2004
This file describes the instrumentation, field setup, and quality control procedures associated with the climate and flux data collected for 2004 at the University of Minnesota, Rosemount Research Experiment Station (UMORE Park) located near St. Paul Minnesota.

Metafile Created: January 31, 2006
Metafile Updated: February 28, 2006
Climate Data Files First Posting: January 31, 2006
Climate Data Files Updated: February 19, 2006
Flux Raw Data Files First Posting: March 1, 2006
Flux Raw Data Files Updated: March 1, 2006

Investigators
Please direct all questions, comments, or errors related to these data to:

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Site Location and Description

Rosemount Research and Outreach Center (RROC), Upper Midwest, St. Paul, Minnesota
2 Flux stations in corn-soybean Rotation

Site G21 Conventional Management of Corn-Soybean Rotation
Note that 2004 was a soybean year.

Site G19 Modified Management of Corn-Soybean Rotation (Strip Tillage and Cover Cropping)
Note that 2004 was a soybean year.

RROC Station Coordinates

Latitude 44° 42’ Longitude 93° 05’

Met Tower G21:	44° 42' 51.50931"	93° 05' 23.43557"	259.7385 m
Met Tower G19:	44° 43' 18.16391"	93° 05' 21.62062"	259.7393 m

Last AmeriFlux Site Visit: August 2004

Key Reference Papers

"Examining Strategies to Improve the Carbon Balance of Corn/Soybean Agriculture using Eddy Covariance and Mass Balance Techniques", J.M. Baker and T.J. Griffis, (*Agricultural and Forest Meteorology*, 2005, 128: 163-177)

"Seasonal Dynamics and Partitioning of Isotopic CO_2 Exchange in a C_3/C_4 Managed Ecosystem" T.J. Griffis, J.M. Baker and J. Zhang, (*Agricultural and Forest Meteorology*, 2005, 132: 1-19)

Climate Variables and Data Structure
There are currently 11 variables contained within a [17568 x 11] comma delimited array. This array represents our best measure/quality control of the climate variables to date and is subject to revision. See dates above for recent updates concerning the data file and metadata.

The following data are provided without headers for field sites **G21** and **G19**:

Column	Variable	Units	Instrument	*Notes
1	Year	-	-	-
2	DOY	-	-	-
3	DDOY	-	-	-
4	Time (hour/minute)	-	-	-
5	Solar radiation (K↓)	W/m2	Eppley PSP	3.7 m
6	Net radiation (Rn)	W/m2	Kipp&Zonen Components	3.7 m
7	Ground heat flux (Qg)	W/m2	Huskeflux HFP01SC	
8	Air temperature (Ta)	^{o}C	Vaisala HMP35C	3.0 m
9	Soil temperature (Ts)	^{o}C		
10	Relative humidity (%)	-	Vaisala HMP35C	3.0 m
11	Precipitation	mm	weighing Geonor T200B	

Instrumentation and Calculations
*All heights provided above are relative to the ground surface

Soil heat flux is measured at a soil depth of 10 cm and corrected using the calorimetric method with thermocouples position above (but offset from) the HFP01SC self calibrating heat flux plates.

Net radiation is a composite variable consisting of the best component fluxes (upward and downward facing pyranometers and pyrgeometers, Eppley Laboratory Inc.) and all-wave measurements (Kipp&Zonen NRLite).

Soil temperature is an average of thermocouples integrated over a depth of 10 cm.

Calibration Notes
Photosynthetically active radiation (PAR) was measured in 2004. A calibration drift was discovered and the sensor was replaced for 2005. PAR can be approximated from the incoming global solar radiation signal by dividing by a factor of 2.1.

Data Files Recently Posted (February 19, 2006)
g21climatedata2004.txt (comma delimited)
g19climatedata2004.txt (comma delimited)

Eddy Covariance Flux Measurements (Year 2004)

Basic System Information
Prior to DOY 118 (G21) and DOY 183 (G19) all eddy covariance data collection and calculations were performed on a CR23X Campbell Scientific Data Logger. All signals were acquired at 10 Hz and half-hourly fluxes calculated and stored internally. Since DOY 118 (G21) and DOY 183 (G19) all eddy covariance data collection has been performed on a CR5000 Campbell Scientific Data Logger. All signals are acquired at 10 Hz. Post processing of these data is done at the University of Minnesota using custom Matlab software.

The eddy covariance system consists of a 3-dimenisonal sonic-anemometer-thermometer (CSAT3, Campbell Scientific Inc.) and an open-path infrared gas analyzer (LI-7500, Li-cor). CO_2 profiles are obtained using a Trace Gas Analyzer (TGA100, Campbell Scientific Inc.).

Basic Post-Processing

1. Raw covariances are determined from 30 minute block averaging
2. Two-dimensional coordinate rotation is applied following Baldocchi et al., (1988)
3. Webb-Pearman-Leuning (WPL) & Schotanus simultaneous solution
4. Co-spectral corrections following analytical model of Massmann (2000)
5. Filter1: Fluxes are flagged using a friction velocity threshold of 0.1 ms^{-1}
6. Filter2: Fluxes are flagged for relative humidity values exceeding 98%

Please Note: These Eddy Flux Files are considered "RAW" and have not been filtered using final assessment of the co-spectra/stationarity/statistical properties. Final filtered and gap-filled Eddy Flux Files will be posted in the near future.

Key Reference Papers

"Examining Strategies to Improve the Carbon Balance of Corn/Soybean Agriculture using Eddy Covariance and Mass Balance Techniques", J.M. Baker and T.J. Griffis, (*Agricultural and Forest Meteorology*, 2005, 128: 163-177)

"Measuring Field-Scale Isotopic CO_2 Fluxes with Tunable Diode Laser Absorption Spectroscopy and Micrometeorological Techniques" T.J. Griffis, J.M. Baker, S. Sargent B. Tanner and J. Zhang (*Agricultural and Forest Meteorology*, 2004, 124: 15-29)

Flux Variables and Data Structure

There are currently 13 variables contained within a [17568 x 13] comma delimited array. This array represents flux variables that have been screened using Filter 1 and Filter 2 above. They are subject to revision. See dates above for recent updates concerning the flux data file and metadata.

Column	Variable	Units
1	DDOY	-
2	net ecosystem CO2 exchange	μmol m-2 s-1
3	latent heat flux	W m-2
4	sensible heat flux	W m-2
5	friction velocity	m s-1
6	wind speed	m s-1
7	sonic temperature	K
8	sonic virtual temperature	oC
9	dry air density	g m-3
10	sat vap pressure	kPa
11	vapor pressure	kPa
12	specific humidity	g/kg
13	air pressure	kPa

Data Files Recently Posted (March 1, 2006)

g21fluxdata2004.txt (comma delimited)
g19fluxdata2004.txt (comma delimited)

Biomass DATA

Leaf area index was measured with an AccuPAR handheld sensor (AccuPAR, Model PAR-80, Decagon Devices Inc.,Pullman, WA, USA).

The leaf area index are currently stored as 8 variables within a comma delimited array. The variables include: Year, DOY, Time, Field ID, Crop Type, LAI, Latitude, Longitude

Biomass Files Posted (April 30, 2006)

G21_LAI2004.txt
G19_LAI2004.txt