



SMEX02 Soil Moisture Atmosphere Coupling Experiment (SMACEX), Iowa, Version 1

USER GUIDE

How to Cite These Data

As a condition of using these data, you must include a citation:

MacPherson, I. 2004. *SMEX02 Soil Moisture Atmosphere Coupling Experiment (SMACEX), Iowa, Version 1* [Indicate subset used]. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. <https://doi.org/10.5067/HX0S0ONCL8Y6>. [Date Accessed].

FOR QUESTIONS ABOUT THESE DATA, CONTACT NSIDC@NSIDC.ORG

FOR CURRENT INFORMATION, VISIT <https://nsidc.org/data/NSIDC-0232>



National Snow and Ice Data Center

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1 DETAILED DATA DESCRIPTION

1.1 Format

Data are provided in both a Microsoft Excel file and an ASCII text file.

1.2 Spatial Coverage

The study area was located in the Walnut Creek watershed in central Iowa, within in the following coordinates:

Southernmost Latitude: 41.85° N

Northernmost Latitude: 42° N

Westernmost Longitude: -93.9° W

Eastermost Longitude: -93.5° W

1.2.1 Spatial Resolution

Twin Otter flights were made on 6 tracks that varied in length from 3.04 to 6.5 km. Data were recorded at 32 Hz, at an airspeed of about 55 m/s. The resolution of the original time series was approximately 5 m.

1.3 Temporal Coverage

Measurements were taken between 15 June and 06 July 2002. Flights were made on the following days: 15, 16, 17, 18, 20, 21, 22, 23, 24, 25, 27, 29 June and 1, 3, 5, 6 July.

1.3.1 Temporal Resolution

Data were recorded at 32 Hz and are provided as averages per flight.

1.4 Parameter or Variable

1.4.1 Parameter Description

The following table describes the column headings in the data table, and the parameters and sensors used.

Column	Type	Units	Description	Sensor
Run			Run number	
GMT HR		hour	Greenwich Mean Time at start of run	
GMT MIN		minute	Greenwich Mean Time at start of run	
GMT SEC		seconds	Greenwich Mean Time at start of run	
Duration		seconds	Duration of flight in seconds	
DIST		km	Length of run	
PALT	run-mean	m	Pressure altitude above mean sea level	Paroscientific 1003D-02 Rosemount 858AJ28 Probe
RALT	run-mean	m	Radio-altimeter height above terrain	Sperry AA-200 Radio Altimeter
TEMP	run-mean	°C	Air temperature	LI-COR CO ₂ Analyzer Temp
DEWPT	run-mean	°C	Dew point temperature	E,G and G Model 137-S10
KT19	run-mean	°C	Radiometric surface temperature	Heitronics KT-19 Pyrometer
GRN	run-mean		Greenness Index (ratio of 730/660 nm reflected radiation)	Skye Industries Greenness sensor
NETRD	run-mean	W/m ²	Net radiation from wingtip sensor	Kipp and Zonen CNR-1
CO2	run-mean	ppm	CO ₂ concentration	LI-COR CO ₂ /H ₂ O Analyzer
HDG	run-mean	° true	Aircraft heading	Litton 90-100 IRS, Sperry C-12 Gyro Compass
WIND-dir	run-mean	° true	Wind direction	Rosemount probes
WIND-spd	run-mean	m/s	Wind speed	Rosemount probes
LWN-rms	rms	m/s	rms of wind component from north	

Column	Type	Units	Description	Sensor
LWE-rms	rms	m/s	rms of wind component from east	
WEP-rms	rms	m/s	rms of vertical wind component	
POT-rms	rms	°C	rms of potential temperature	
RCO2-rms	rms	mg/kg	rms of CO ₂ mixing ratio	LI-COR CO ₂ /H ₂ O Analyzer
RH2O-rms	rms	mg/kg	rms of H ₂ O mixing ratio	LI-COR CO ₂ /H ₂ O Analyzer
H	flux	W/m ²	Sensible heat flux	
LE	flux	W/m ²	Latent heat flux	
WC	flux	mg/m ² /s	CO ₂ flux	
U*	flux	m/s	Friction velocity computed from momentum flux	
Ozone Flux	flux	µg/m ² /s	Ozone flux, corrected	Scintrex Ozone Analyzer, TECO Ozone Analyzer

1.4.2 Sample Data Record

The following table shows just some of the data columns in the data file:



RUN	GMT HR	GMT MIN	GMT SEC	DURATION	DIST	PALT	RALT	TEMP	DEWPT	KT19	GRN	NETRD	C02	HDG
				sec	km	m	m	degC	degC	degC		W/m2	ppm	degT
TRACK	A													
2	15	29	32	104	4.93	355	38	22.0	9.9	30.4	1.30	570	373	352
3	15	32	32	87	5.29	354	38	22.0	9.9	30.4	1.33	518	373	179
4	15	36	6	102	5.00	352	36	21.9	10.0	31.2	1.33	569	373	353
5	15	39	3	86	5.34	350	33	21.9	9.9	31.2	1.33	515	373	180
6	15	42	16	103	5.20	349	32	22.0	10.2	31.5	1.38	569	373	353
7	15	45	29	88	5.33	351	34	21.8	9.9	31.9	1.33	523	373	178



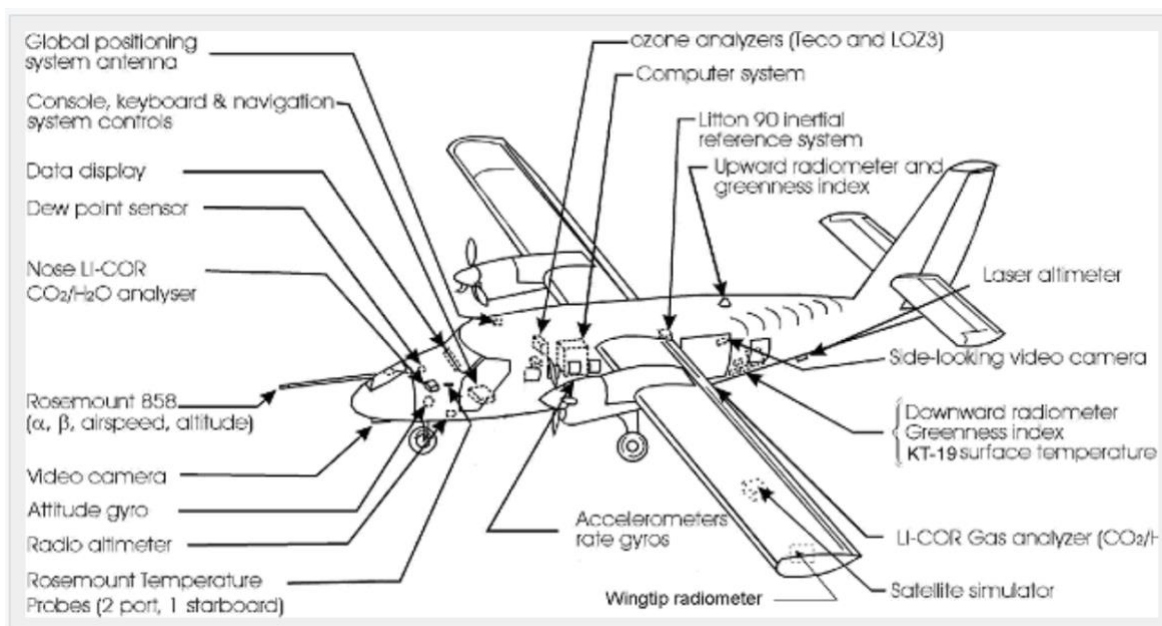
2 DATA ACQUISITION AND PROCESSING

2.1.1 Processing Steps

Data were acquired by the various sensors on the aircraft and fed into a computer. Processing took place in September 2002 at NRC, employing updated calibrations as well as a Kalman filtering technique that removes small biases in the measured horizontal wind components. For complete information on processing, please refer to the SMACEX Special Report, available in the data directory.

2.2 Sensor or Instrument Description

Please see the parameter section for a list of the sensors used in the study. The figure below shows where the sensors were placed on the aircraft during SMACEX.



3 REFERENCES AND RELATED PUBLICATIONS

Airborne Atmospheric Research, Remote Sensing and Aeromagnetics

Anderson, M.C. et al. 2003. Comparison of Aircraft- and Tower-Measured Fluxes Acquired During SMACEX with Predictions from a Regional Atmosphere-Land Exchange Model. Proceedings of the 17th Conference on Hydrology, American Meteorological Society. Long Beach, California, Feb. 9-12, 2003.



Kustas, W. P. et al. 2003. An Overview of the Soil Moisture Atmosphere-Coupling Experiment (SMACEX) in Central Iowa. Proceedings of the 17th Conference on Hydrology, American Meteorological Society. Long Beach, California, Feb. 9-12, 2003.

MacPherson, J. I., D.L. Marcotte, and J. E. Jordan. 2001. The NRC Atmospheric Research Aircraft. Canadian Aeronautics and Space Journal IAR 50th Anniversary Issue, Vol. 47, No. 3, pp. 147-157.

MacPherson, J. I. and M. Wolde. 2002. NRC Twin Otter Operations in the Soil Moisture-Atmosphere Coupling Experiment (SMACEX). National Research Council of Canada Report LTR-FR-190. 91 pp.

MacPherson, J. I., M. Wolde, W. P. Kustas, and J. H. Prueger. 2003. Aircraft and Tower-Measured Fluxes over Rapidly Growing Corn and Soy Bean Crops in Central Iowa. Proceedings of the 17th Conference on Hydrology, American Meteorological Society. Long Beach, California, Feb. 9-12, 2003.

Prueger, J. H. et al. 2003. Spatial Variability of Turbulent Fluxes Across a Corn/Soybean Production Region in Central Iowa. Proceedings of the 17th Conference on Hydrology, American Meteorological Society. Long Beach, California, Feb. 9-12, 2003.

SMACEX Special Report, available in the data directory.

4 CONTACTS AND ACKNOWLEDGMENTS

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5 DOCUMENT INFORMATION

5.1 Publication Date

April 2004

5.2 Date Last Updated

22 March 2021