Surface Flux Baseline 92 Derived (FIFE)

Summary:

The FIFE Surface Flux Baseline 92 Derived Data Set was compiled from the original surface flux data collected during FIFE (i.e., no measurements were made specifically for this data set). This data set contains data collected from mid-May through mid-October, 1987 at 21 stations located within 19 sitegrids spread throughout the FIFE study area. For a description of the theory behind the original surface flux measurements see the documentation for each of the original surface flux data sets.

Surface heat flux data routinely have erroneous jumps (i.e., spikes) in the latent and sensible heat flux time series in the early morning and evening hours due to small gradients in the measured data. A series of tests were developed to identify these spikes and flag them. Flux data obtained from Bowen ratio sites are also checked for energy imbalances. These data were also compared to model results. The consistency between these two methods is indicated in this data set.

Table of Contents:

1. Data Set Overview:

Data Set Identification:

Surface Flux Baseline 92 Derived (FIFE).
(Surface Flux Baseline 1992).

Data Set Introduction:

The FIFE Surface Flux Baseline 92 Derived Data Set was compiled from the original surface flux data collected during FIFE (i.e., no measurements were made specifically for this data set). This data set contains data collected from mid-May through mid-October, 1987 at 21 stations located within 19 sitegrids spread throughout the FIFE study area.

Objective/Purpose:

A standardized Surface Flux Baseline data set was produced to replace the Surface Flux Baseline July 1990 data set. In the data set described here 'spikes' and energy imbalances in the surface flux time series are flagged. In addition a model-based check on the reasonableness of the fluxes is provided.

Summary of Parameters:

Net radiation, sensible heat flux, latent heat flux, and ground heat flux.

Discussion:

Surface heat flux data routinely have erroneous jumps (i.e. spikes) in the latent and sensible heat flux time series in the early morning and evening hours due to small gradients in the measured data. A series of tests were developed to identify these spikes and flag them. Flux data obtained from Bowen ratio sites are also checked for energy imbalances. These data were also compared to model results. The consistency between these two methods is indicated in this data set. These data were collected from mid-May through mid-October, 1987 at 21 stations located within 19 sitegrids spread throughout the FIFE study area. During this time period measurements were made almost every day.

Related Data Sets:

- Eddy Correlation Surface Flux Observation (USGS).
- Eddy Correlation Surface Flux Observation (UNL).
- Eddy Correlation Surface Flux Observation (GSFC).
- Eddy Correlation Surface Flux Observation (UK).
- Eddy Correlation Surface Flux Observation (Argonne).
- Bowen Ratio Surface Flux Observation (GSFC).
- Bowen Ratio Surface Flux Observation (KSU).
- Bowen Ratio Surface Flux Observation (Smith).
- Bowen Ratio Surface Flux Observation (UNL).
- Bowen Ratio Surface Flux Observation (USGS).
- Bowen Ratio Surface Flux Observation (Fritschen).

FIS Data Base Table Name:

SURFACE_FLUX_BASELINE92_DERV.

2. Investigator(s):

Investigator(s) Name and Title:

Dr. Piers Sellers
Biospheric Sciences Branch

Title of Investigation:

Surface Flux Baseline 1992.

Contact Information:

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Requested Form of Acknowledgment.

The Surface Flux Baseline 1992 data were compiled at NASA Goddard Space Flight Center under the direction of Dr. P. Sellers. The dedicated effort of M. Heiser in the compilation of these data is particularly appreciated.

3. Theory of Measurements:

These data are compiled from the original surface flux data collected during FIFE. Consequently, no measurements were made specifically for this data set. For a description of the theory behind the original surface flux measurements see the documentation for each of the original surface data sets listed in the *Related Data Sets Section* above.

4. Equipment:

Sensor/Instrument Description:

A desktop computer was used to identify and flag the 'spikes' in the data. In addition, this computer was used to compute the model results which were compared to the original, field-measured fluxes.

Collection Environment:

See the *Sensor/Instrument Description Section*.

Source/Platform:

See the *Sensor/Instrument Description Section*.

Source/Platform Mission Objectives:

See the *Sensor/Instrument Description Section*.

Key Variables:

Net radiation, sensible heat flux, latent heat flux, ground heat flux, and flags indicating spikes and agreement with model results.

Principles of Operation:

See the *Sensor/Instrument Description Section*.

Sensor/Instrument Measurement Geometry:

See the *Sensor/Instrument Description Section*.

Manufacturer of Sensor/Instrument:

Not available at this revision.

Calibration:

Calibration is not applicable to this data set since the data are compiled from the original surface flux data. A description of the calibration procedures used for each of these underlying data sets can be found in the individual documentation for the Bowen ratio and Eddy correlation surface flux data sets (see the *Related Data Sets Section* for a list of these data sets).

Specifications:

See the *Calibration Section*.

Tolerance:

See the *Calibration Section*.

Frequency of Calibration:

See the *Calibration Section*.

Other Calibration Information:

See the *Calibration Section*.

5. Data Acquisition Methods:

The surface flux data were acquired from the FIFE Information System. These data are available on FIFE CD-ROM Volume 1 in the DATA\SUR_FLUX\30_MIN\ subdirectory.

6. Observations:

Data Notes:

Not available.

Field Notes:

Not applicable.

7. Data Description:

Spatial Characteristics:

The FIFE study area, with areal extent of 15 km by 15 km, is located south of the Tuttle Reservoir and Kansas River, and about 10 km from Manhattan, Kansas, USA. The northwest corner of the area has UTM coordinates of 4,334,000 Northing and 705,000 Easting in UTM Zone 14.

Spatial Coverage:

Data were compiled from 21 surface flux stations located in 19 sitegrids scattered throughout the FIFE study area.

SITEGRID	STN_ID	NORTHING	EASTING	LATITUDE	LONGITUDE	ELEV
1246-BRL	40	4331666	714212	39 06 35	-96 31 21	365
1445-BRL	42	4331160	714090	39 06 19	-96 31 27	400
1478-BRS	38	4331216	720603	39 06 15	-96 26 56	350
1916-BRS	2	4330296	708270	39 05 56	-96 35 30	340
2043-BRL	44	4330003	713536	39 05 42	-96 31 51	415
2516-BRK	14	4328956	708102	39 05 12	-96 35 38	405
2655-BRL	36	4328787	716070	39 05 00	-96 30 07	367
2731-ECA	4	4328678	711110	39 05 01	-96 33 34	446
2915-BRK	12	4328167	708028	39 04 47	-96 35 42	415
3129-BRK	8	4327702	710711	39 04 30	-96 33 51	430

3414-BRK	10	4327286	707854	39 04 19	-96 35 51	410
3479-BRL	34	4327134	720890	39 04 02	-96 26 49	420
4268-ECG	30	4325626	718574	39 03 15	-96 28 27	445
4268-BRK	32	4325626	718579	39 03 15	-96 28 27	445
4439-ECV	16	4325215	712794	39 03 07	-96 32 28	445
4439-BRV	18	4325218	712792	39 03 07	-96 32 28	445
4609-ECW	22	4324890	706705	39 03 02	-96 36 41	390
6340-BRL	20	4321484	713000	39 01 06	-96 32 23	410
6912-BRW	24	4320111	707336	39 00 26	-96 36 20	397
6943-ECW	28	4320147	713500	39 00 22	-96 32 04	415
8739-ECB	26	4316699	712845	38 58 31	-96 32 35	442

Spatial Coverage Map:

Not available.

Spatial Resolution:

The surface fluxes for each station are representative of an area extending approximately 100 meters upwind from the surface flux equipment.

Projection:

Not available.

Grid Description:

Not available.

Temporal Characteristics:

Temporal Coverage:

Surface fluxes were measured from May 26 to October 16 in 1987.

Temporal Coverage Map:

Not available.

Temporal Resolution:

Surface fluxes were reported at 30 minute intervals for all sites except for site 8739-ECB (site 26) which reported the data at 1 hour intervals.

Data Characteristics:

The SQL definition for this table is found in the SF_BL92.TDF file located on FIFE CD-ROM Volume 1.

Parameter/Variable Name	Parameter/Variable Description	Range	Units	Source
SITEGRID_ID	This is a FIS grid location code. Site grid codes (SSEE-III) give the south (SS) and the east (EE) cell number in a 100 x 100 array of 200 m square cells. The last 3 characters (III) are an instrument identifier.			
STATION_ID	The station ID designating the location of the observations.			
OBS_DATE	The date of the observations, in the format (DD-mmm-YY).			
OBS_TIME	The time that the observation was taken in GMT. The format is (HHMM).		[GMT]	
NET_RADTN	The Net Radiation. [meter^-2]	**	[Watts]	
LATENT_HEAT_FLUX	The Latent Heat flux. [meter^-2]	**	[Watts]	
SENSIBLE_HEAT_FLUX	The Sensible Heat flux. [meter^-2]	**	[Watts]	
SOIL_HEAT_FLUX	The Surface Soil Heat flux. [meter^-2]	**	[Watts]	

SPIKE_FLAG
A flag indicating if this data
is considered "spike" (or glich)
data. 0 means good data, 1 means
spike data, 2 means available
energy does not balance, 3 means
both 1 and 2.

IDF_FLAG
A flag showing the reasonableness
of the data (lower is better)
based on comparisons with model
results. See the
Processing Steps Section
of the document for the
meaning of the values.

FIFE_DATA_CRTFCN_CODE
The FIFE Certification Code for *
the data, in the following format:
CPI (Certified by PI), CPI-???
(CPI - questionable data).

LAST_REVISION_DATE
in the format (DD-MMM-YY).

Footnotes:

* Valid levels

The primary certification codes are:

EXM Example or Test data (not for release) PRE Preliminary (unchecked, use at your own risk) CPI Checked by Principal Investigator (reviewed for quality) CGR Checked by a group and reconciled (data comparisons and cross checks)

The certification code modifiers are:

PRE-NFP Preliminary - Not for publication, at the request of investigator. CPI-MRG PAMS data that is "merged" from two separate receiving stations to eliminate transmission errors. CPI-??? Investigator thinks data item may be questionable.

** Missing values are reported as -9999 or -8888.

Sample Data Record:

SITEGRID_ID	STATION_ID	OBS_DATE	OBS_TIME	NET_RADTN	LATENT_HEAT_FLUX
1916-BRS	2	27-MAY-87	515	-1.280	-55.390
1916-BRS	2	27-MAY-87	545	-2.190	-37.160
1916-BRS	2	27-MAY-87	615	-4.030	-30.740
1916-BRS	2	27-MAY-87	645	-6.610	-26.600

SENSIBLE_HEAT_FLUX	SOIL_HEAT_FLUX	SPIKE_FLAG	IDF_FLAG
42.650	14.020		
25.270	14.080		
18.750	16.020		
11.440	21.770		

FIFE_DATA_CRTFCN_CODE	LAST_REVISION_DATE
CGR	04-JAN-94
CGR	04-JAN-94
CGR	04-JAN-94
CGR	04-JAN-94

8. Data Organization:

Data Granularity:

The surface fluxes for each station are representative of an area extending approximately 100 meters upwind from the surface flux equipment. Surface fluxes were reported at 30 minute intervals for all sites except for site 8739-ECB (site 26) which reported the data at 1 hour intervals.

A general description of data granularity as it applies to the IMS appears in the EOSDIS Glossary.

Data Format:

The CD-ROM file format consists of numerical and character fields of varying length separated by commas. The character fields are enclosed with a single apostrophe. There are no spaces between the fields. Each file begins with five header records. Header records contain the following information:

Record 1 Name of this file, its table name, number of records in this file, path and name of the document that describes the data in this file, and name of principal investigator for these data. Record 2 Path and filename of the previous data set, and path and filename of the next data set. (Path and filenames for files that contain another set of data taken at the same site on the same day.) Record 3 Path and filename of the previous site, and path and filename of the next site. (Path and filenames for files of the same data set taken on the same day for the previous and next sites (sequentially numbered by SITEGRID_ID)). Record 4 Path and filename of the previous date, and path and filename of the next date. (Path and filenames for files of the same data set taken at the same site for the previous and next date.) Record 5 Column names for the data within the file, delimited by commas. Record 6 Data records begin. Each field represents one of the attributes listed in the chart in the *Data Characteristics Section* and described in detail in the TDF file. These fields are in the same order as in the chart.

9. Data Manipulations:

Formulae:

Derivation Techniques and Algorithms:

1. Variable Definitions:

   RN = net radiation [watts][m^-2]

   GH = ground heat flux [watts][m^-2]

   LE = latent heat flux [watts][m^-2]

   SH = sensible heat flux [watts][m^-2]

   m = meters

2. Available Energy Consistency Check

   DELTA = (RN - GH) - (LE + SH)

   At a given time, Bowen ratio stations should have equal available energies since RN and GH are used to calculate LE and SH. Flux data for Bowen ratio stations will fail the test if the absolute value of DELTA is greater than 1 [watts][m^-2]. Since eddy correlation stations measure LE and SH directly with RN and GH measured by other instruments, one would not expect the available energies to be equal. If they are equal it is assumed that the GH is computed as a residual. Therefore, if the absolute value of DELTA is less than 1 [watts][m^-2], GH is set to an undefined value.

3. GH Smoothness Test

   Spikes have been observed in some ground heat flux data records. This can result in incorrect values for latent and sensible heat fluxes at Bowen ratio sites due to the manner in which these fluxes are derived. These points are flagged as being a spike when the absolute value of the rate of change of the ground heat

   flux exceeds 1.5 times the rate of change of the net radiation or 50.0 [watts][m^-2][hour^-1] (whichever is greater). This test is applied only to Bowen Ratio stations when the net radiation exceeds 100 [watts][m^-2] and must be true for both the time period leading up to and immediately following the time of the observation.

4. Spike Identification Test

As an initial spike identification test, the following conditions must be satisfied. The sensible heat flux must be either less than or greater than the values reported before and after the time in question.

AND

The latent heat flux must be either less than or greater than the values reported before and after the time in question.

5. 2nd Derivative Test

   The 2nd derivatives with respect to time of the latent and sensible heat fluxes must have opposite signs for a point to be a spike.

6. Absolute Departure Test

   LIM1 = (LE + SH) / 4.0

   Both the sensible and latent heat fluxes must exceed the average of the observations immediately preceding and following the flux observation time by LIM1 or 25 [watts][m^-2] (whichever is greater) for a point to be a spike. This test forces spike checking on points that deviate from the mean by at least 25 [watts][m^-2] thus preserving small variations in the flux time series that otherwise might be eliminated.

7. Heat Flux Jump Test

   In the early morning and evening hours, there are sometimes large absolute differences between the sensible and latent heat fluxes that are unrealistic. These points are eliminated if the absolute value of the difference between the sensible and latent heat flux exceeds 100 [watts][m^-2]. This test is only applied when the sum of the latent and sensible heat flux is less than 25 [watts][m^-2].

8. Isolated Point Test

   If both the latent and sensible heat fluxes preceding and following an observation time are undefined or flagged as a spike, the latent and sensible heat flux at the observation time is considered unreliable and flagged as a spike.

Data Processing Sequence:

Processing Steps:

1. Available Energy Consistency Check

   Do this for all available times before moving onto the next step (see the *Derivation Techniques and Algorithms Section*.

2. Adjust Net Radiation

   Do this for all available times before moving onto the next step (see the *Special Corrections/Adjustments Section*.

3. Apply Spike Filter

   This test for spikes is applied to the data for each observation time except for the first and last observations since the filter requires data preceding and following the time of the observation. The tests are run beginning with the second available observation time and ending with the next to last available observation time. both latent and sensible heat fluxes must be present at the time of the observation as well as at the immediately preceding or following times for these tests to be applied. If there are any absent data, the program moves on to the next observation time. (see the *Derivation Techniques and Algorithms Section*.

   For each observation apply:

   1. Ground heat flux smoothness test If the ground heat flux is not smooth, the data is considered unreliable, flagged as a spike and then the program moves on to the next observation.
   2. Spike Identification Test
   3. LE, SH 2nd Derivative Test
   4. LE, SH Absolute Departure Test

   The data must pass all three of these tests for it to be flagged as a spike.

4. Heat flux Jump Test

   Do this for all available times before moving onto the next step (see the *Derivation Techniques and Algorithms Section*.

5. Isolated Point Test

   Since this filter requires data preceding and following the time of the observation, these tests are run beginning with the second available observation time and ending with the next to last available observation time (see the *Derivation Techniques and Algorithms Section*.

6. Read in IDF flag for site/IFC

   Do this for each Intensive Field Campaign day in 1987 (see the *Confidence Level/Accuracy Judgment Section*.

Processing Changes:

None.

Calculations:

Special Corrections/Adjustments:

Net Radiation Adjustments

The net radiation for sites 1916-BRS (site 2), 8739-ECB (site 26) and 1478-BRS (site 38) is adjusted to correspond to the 'site mean' net radiation measured using Q*6 radiometers. The latent and sensible heat fluxes are also adjusted accordingly and the ground heat flux is left unchanged. Only these sites are adjusted but adjustment parameters for all stations have been included in the table below for comparison purposes. <RN> Site averaged Q*6 net radiation RN measured net radiation GH measured ground heat flux LE measured latent heat flux SH measured sensible heat flux XRN <RN> = 325 [watts][m^-2] YRN value of RN when <RN> = 325 [watts][m^-2] ARN adjusted net radiation ALE adjusted latent heat flux ASH adjusted sensible heat flux

A plot of the net radiation measured at each flux site against the site averaged Q*6 net radiation revealed that a regression using two linear functions would do the best job at adjusting the net radiation. One function describes the adjustment when RN is between 0 and YRN and the second function describes the adjustment when RN is greater than YRN. There is no adjustment made when RN is less than zero. Using the values in the table below, RN is adjusted as follows:

RN < YRN ..... ARN = (RN - YINT1) / SLOP1

RN > YRN ..... ARN = (RN - YINT2) / SLOP2

Allowing the ground heat flux to keep its original value, corresponding adjustments are then made to the sensible and latent heat fluxes using a ratio of the adjusted available energy to the original available energy.

RATIO = (ARN - GH) / (LE + SH)

ALE = LE * RATIO

ASH = SH * RATIO

1987

STN_ID	SITEGRID	XRN	YRN	SLOPE 1	YINT1	SLOPE 2	YINT2
2	1916-BRS	325.00	331.55	1.020	0.000	1.170	-48.70

6	2132-BRK	325.00	338.45	1.041	0.000	0.973	22.23
8	3129-BRK	325.00	327.38	1.007	0.000	0.969	12.46
10	3414-BRK	325.00	330.92	1.018	0.000	0.973	14.70
12	2915-BRK	325.00	349.73	1.076	0.000	0.976	32.53
14	2516-BRK	325.00	339.82	1.046	0.000	0.934	36.27
16	4439-ECV	325.00	305.00	0.938	0.000	1.000	-20.00
18	4439-BRV	325.00	304.44	0.937	0.000	1.024	-28.36
20	6340-BRL	325.00	333.66	1.027	0.000	0.977	16.14
22	4609-ECW	325.00	323.62	0.996	0.000	0.955	13.25
24	6912-BRW	325.00	338.50	1.042	0.000	1.039	0.83
26	8739-ECB	325.00	344.68	1.061	0.000	1.060	0.18
28	6943-ECW	325.00	321.30	0.989	0.000	0.969	6.38
30	4268-ECG	325.00	310.83	0.956	0.000	1.085	-41.79
32	4268-BRK	325.00	327.03	1.006	0.000	0.978	9.18
34	3479-BRL	325.00	316.66	0.974	0.000	0.998	-7.69
36	2655-BRL	325.00	322.25	0.992	0.000	1.047	-18.02
38	1478-BRS	325.00	345.93	1.064	0.000	1.106	-13.52
40	1246-BRL	325.00	323.19	0.994	0.000	0.990	1.44
42	1445-BRL	325.00	322.27	0.992	0.000	1.016	-7.93
44	2043-BRL	325.00	315.61	0.971	0.000	1.077	-34.41

Calculated Variables:

- Latent heat flux and
- Sensible heat flux.

Graphs and Plots:

None.

10. Errors:

Sources of Error:

See the *Quality Assessment Section* below.

Quality Assessment:

It was recognized early in the study that standardization of "constants" (e.g. physical constants of the air, psychrometic constant, etc.), methods of computation, integration and reporting time, etc. were necessary. These were agreed upon in planning sessions. Preliminary data sets were compared among stations and instruments from different manufacturers for estimating net radiation, soil heat flux, water vapor density, temperature, solar radiation, and wind speed, it was necessary to have confidence that differences in observations were due to site differences and not due to instrumentation.

Data Validation by Source:

The hydrological Science Branch at NASA Goddard Space Flight Center was given the responsibility to compare flux data from all flux stations. This served two purposes: 1) as a data quality check, and 2) a preliminary analysis of site differences.

Confidence Level/Accuracy Judgment:

Model dependent flags by station and Intensive Field Campaign

This flag is computed based on computer runs using the Simple Biosphere (SiB) model. It gives an indication of the model's ability to reproduce the observed latent and sensible heat flux time series. A comparison of the canopy conductance computed for each IFC provides another check on the reasonableness of the data. Theory and observations suggest that this quantity should decrease from IFC-2 to IFC-4 as the site dries out. IFC-1 is disregarded since it was a wet period with high soil moisture contributions to the heat flux that would contaminate the calculated values of the canopy conductance.

Contradictions to this expectation are noted. Finally, a high canopy conductance in IFC-4 when the site was dry points to a bias in the data and is noted in the IDF_FLAG descriptor.

1. Variable definitions STN_ID Station number SITEGRID Sitegrid id IFC Intensive Field Campaign DF Response of the unstressed (maximum) canopy conductance to changes in the incident photosynthetically active radiation flux. (m^3/joules*10^-5) ERROR Model error (see below) IDF Model reasonableness flag (see below)
2. Error calculation

   SIGH = standard deviation between the observed and calculated sensible heat flux over a given day

   SIGE = standard deviation between the observed and calculated latent heat flux over a given day

   ABAR = average observed available energy for a given day

   SUM2 = SIGH * SIGH + SIGE * SIGE

   The error is computed by taking the square root of SUM2 and dividing that by ABAR.

3. IDF Flag Definitions

IDF	DEFINITION
0	Good data
1	The model did not have a good fit to the observed latent and sensible heat fluxes for that day. This condition was considered met when the error was greater than or equal to 0.10 for a particular IFC.

2 The results are contrary to the expectation of decreasing values of DF through IFC's 2, 3, 4 as suggested by theory and observations.

3 Error conditions 1 and 2 are met.

4 Abnormally high values of DF in IFC-4 suggest a bias in the data. Any values of DF in IFC-4 greater than 1.29e-5 (m^3/joules) (the average DF plus one standard deviation)were considered abnormally high.

5 Error conditions 1 and 4 are met.

6 Error conditions 2 and 4 are met.

7 Error conditions 1, 2 and 4 are met.

NOTE: IDF condition 1 is added only to that IFC.

IDF condition 2 is added to all IFCs.

IDF condition 4 is added to all IFCs.

4. IDF Table

STN_ID	SITEGRID	IFC	DF	ERROR	IDF
2	1916-BRS	1	2.58	0.041	0
2	1916-BRS	2	2.43	0.105	1
2	1916-BRS	3	1.18	0.049	0
2	1916-BRS	4	1.13	0.046	0
10	3414-BRK	1	-9.99	-9.990	0
10	3414-BRK	2	4.30	0.067	0
10	3414-BRK	3	3.15	0.080	0
10	3414-BRK	4	0.87	0.028	0
12	2915-BRK	1	1.78	0.060	0
12	2915-BRK	2	3.35	0.025	0
12	2915-BRK	3	1.23	0.072	0
12	2915-BRK	4	0.30	0.045	0
14	2516-BRK	1	0.75	0.025	0
14	2516-BRK	2	1.79	0.033	0
14	2516-BRK	3	1.20	0.041	0
14	2516-BRK	4	0.73	0.036	0

5.	16	4439-ECV	1	3.57	0.093	0
6.	16	4439-ECV	2	3.38	0.067	0
	16	4439-ECV	3	1.53	0.085	0
	16	4439-ECV	4	0.62	0.033	0
	18	4439-BRV	1	2.95	0.054	0
	18	4439-BRV	2	2.97	0.066	0
	18	4439-BRV	3	1.56	0.088	0
	18	4439-BRV	4	0.76	0.043	0
	20	6340-BRL	1	7.45	0.113	1
	20	6340-BRL	2	3.35	0.062	0
	20	6340-BRL	3	1.53	0.050	0
	20	6340-BRL	4	0.94	0.049	0
	22	4609-ECW	1	4.37	0.085	0
	22	4609-ECW	2	3.20	0.068	0
	22	4609-ECW	3	1.54	0.044	0
	22	4609-ECW	4	0.44	0.029	0
	24	6912-BRW	1	6.45	0.145	1
	24	6912-BRW	2	4.18	0.111	1
	24	6912-BRW	3	2.63	0.066	0
	24	6912-BRW	4	0.43	0.033	0
	26	8739-ECB	1	4.40	0.056	0
	26	8739-ECB	2	4.72	0.070	0
	26	8739-ECB	3	1.66	0.031	0
	26	8739-ECB	4	1.03	0.083	0
	28	6943-ECW	1	2.34	0.087	0
	28	6943-ECW	2	1.66	0.068	0
	28	6943-ECW	3	1.30	0.113	1
	28	6943-ECW	4	1.04	0.104	1
	32	4268-BRK	1	-9.99	-9.990	6
	32	4268-BRK	2	2.34	0.065	6
	32	4268-BRK	3	2.74	0.120	7
	32	4268-BRK	4	1.37	0.039	6
	34	3479-BRL	1	3.42	0.087	0
	34	3479-BRL	2	1.85	0.113	1
	34	3479-BRL	3	1.49	0.133	1
	34	3479-BRL	4	1.10	0.232	1
	36	2655-BRL	1	5.98	0.104	1
	36	2655-BRL	2	4.80	0.076	0
	36	2655-BRL	3	2.37	0.037	0
	36	2655-BRL	4	0.85	0.048	0
	38	1478-BRS	1	4.40	0.111	1
	38	1478-BRS	2	3.42	0.072	0
	38	1478-BRS	3	1.96	0.066	0
	38	1478-BRS	4	0.33	0.037	0
	40	1246-BRL	1	3.21	0.061	4
	40	1246-BRL	2	3.01	0.045	4
	40	1246-BRL	3	2.62	0.076	4
	40	1246-BRL	4	1.40	0.086	4
	42	1445-BRL	1	3.43	0.052	2
	42	1445-BRL	2	1.76	0.077	2
	42	1445-BRL	3	1.07	0.042	2
	42	1445-BRL	4	1.17	0.103	3
	44	2043-BRL	1	3.37	0.035	4
	44	2043-BRL	2	5.00	0.053	4
	44	2043-BRL	3	3.03	0.070	4
	44	2043-BRL	4	1.73	0.047	4

Measurement Error for Parameters:

The errors associated with the original flux measurements are described in the documents describing the original data sets. See the documents listed in the *Related Data Sets Section* for this information.

Additional Quality Assessments:

FIS staff applied a general QA procedure to the data to identify inconsistencies and problems for potential users. As a general procedure, the FIS QA consisted of examining the maximum, minimum, average, and standard deviation for each numerical field in the data table. Inconsistencies and problems found in the QA check are described in the *Known Problems with the Data Section*.

Data Verification by Data Center:

The data verification performed by the ORNL DAAC deals with the quality of the data format, media, and readability. The ORNL DAAC does not make an assessment of the quality of the data itself except during the course of performing other QA procedures as described below.

The FIFE data were transferred to the ORNL DAAC via CD-ROM. These CD-ROMs are distributed by the ORNL DAAC unmodified as a set or in individual volumes, as requested. In addition, the DAAC has incorporated each of the 98 FIFE tabular datasets from the CD-ROMs into its online data holdings. Incorporation of these data involved the following steps:

- Copying the entire FIFE Volume 1, maintaining the directory structure on the CD-ROM.
- Using data files, documentation, and SQL code provided on the CD-ROM to create a database in Statistical Analysis System (SAS).
- Creating transfer files to transfer the SAS metadata database to Sybase tables.

Each distinct type of data (i.e. "data set" on the CD-ROM), is accompanied by a documentation file (i.e., .doc file) and a data format/structure definition file (i.e., .tdf file). The data format files on the CD-ROM are Oracle SQL commands (e.g., "create table") that can be used to set up a relational database table structure. This file provides column/variable names, character/numeric type, length, and format, and labels/comments. These SQL commands were converted to SAS code and were used to create SAS data sets and subsequently to input data files directly from the CD-ROM into a SAS dataset. During this process, file names and directory paths were captured and metadata was extracted to the extent possible electronically. No files were found to be corrupted or unreadable during the conversion process.

Additional Quality Assurance procedures were performed as follows:

- Statistical operations were performed to calculate minimum and maximum values for all numeric fields and to create a listing of all values of the character fields. During this process, it was determined that various conventions were used to represent missing values. (Note: no modifications were made to any data by the DAAC). In most cases,

missing value identification conventions were discussed in the accompanying .doc file. Based on a visual check of the minimum and maximum values, no glaring errors or holes were identified that might indicate errors introduced during CD-ROM mastering by the FIFE project or data ingest by the DAAC.

- Some minor inconsistencies and typographical errors were identified in some of the character fields and column labels, however, no modifications were made to the data by the DAAC.
- Some conversions of ASCII data were necessary to move the data from a DOS platform to a UNIX platform. Standard operating system conversion utilities were used (e.g., dos2unix).
- Much of the metadata required for archival is imbedded in the narrative documentation accompanying the data sets and extracted manually by DAAC staff who have read the .doc files provided on the CD-ROM and have hand entered this information into the metadata database maintained by the DAAC. QA procedures have been performed on these metadata to identify and eliminate typographical errors and inconsistencies in naming conventions, to ensure that all required metadata is present, and to ensure the accuracy of file names and paths for retrieval.
- Data requested for distribution to users are checked to verify that files copied from disk to other media remain uncorrupted.

As errors are discovered in the online tabular data by investigators, users, or DAAC staff, corrections are made in cooperation with the principal investigators. These corrections are then distributed to users. CD-ROM data are corrected when re-mastering occurs for replenishment of CD-ROM stock.

11. Notes:

Limitations of the Data:

Not available.

Known Problems with the Data:

The following problem were encountered by the FIS staff during their general QA procedures:

1. Unusually high latent heat flux values of 896 [watts][m^-2] were reported on October 6, 1987 at station 2 (1916-BRS).
2. Unusually high sensible heat flux values of greater than 1000 [watts][m^-2], with a maximum of 4368 [watts][m^-2], were reported on nine occasions from October 2 through October 4, 1987 at station 36 (2655-BRL).

Usage Guidance:

Not available at this revision.

Any Other Relevant Information about the Study:

Not available at this revision.

12. Application of the Data Set:

Not available at this revision.

13. Future Modifications and Plans:

The FIFE field campaigns were held in 1987 and 1989 and there are no plans for new data collection. Field work continues near the FIFE site at the Long-Term Ecological Research (LTER) Network Konza research site (i.e., LTER continues to monitor the site). The FIFE investigators are continuing to analyze and model the data from the field campaigns to produce new data products.

14. Software:

Software to access the data set is available on the all volumes of the FIFE CD-ROM set. For a detailed description of the available software see the *Software Description Document*.

15. Data Access:

Contact Information:

ORNL DAAC User Services
Oak Ridge National Laboratory

Telephone: (865) 241-3952
FAX: (865) 574-4665

Email: ornldaac@ornl.gov

Data Center Identification:

ORNL Distributed Active Archive Center
Oak Ridge National Laboratory
USA

Telephone: (865) 241-3952
FAX: (865) 574-4665

Email: ornldaac@ornl.gov

Procedures for Obtaining Data:

Users may place requests by telephone, electronic mail, or FAX. Data is also available via the World Wide Web at http://daac.ornl.gov.

Data Center Status/Plans:

FIFE data are available from the ORNL DAAC. Please contact the ORNL DAAC User Services Office for the most current information about these data.

16. Output Products and Availability:

The Surface Flux Baseline 1992 data are available on FIFE CD-ROM Volume 1. The CD-ROM filename is as follows:

\DATA\SUR_FLUX\BASEL_92\GRIDxxxx\YyyMmm\ydddgrid.SFB

Where *xxxx* is the four digit code for the location within the FIFE site grid, *yy* is the last two digits of the year (e.g. Y87 = 1987), *mm* is the month of the year (e.g. M12 = December), and *ddd* is the day of the year, (e.g. 061 = sixty-first day in the year). Note: capital letters indicate fixed values that appear on the CD-ROM exactly as shown here, lower case indicates characters (values) that change for each path and file.

The format used for the filenames is: *ydddgrid.sfx*, where *grid* is the four-number code for the location within the FIFE site grid, *y* is the last digit of the year (e.g. 7 = 1987, and 9 = 1989), and *ddd* is the day of the year. The filename extension (*.sfx*), identifies the data set content for the file (see the *Data Characteristics Section* and is equal to .SFB for this data set.

17. References:

Satellite/Instrument/Data Processing Documentation.

Not available at this revision.

Journal Articles and Study Reports.

Sellers, P.J., M.D. Heiser and F.G. Hall. 1992. Relations between surface conductance and spectral vegetation indices at intermediate (100 [m^2] - 15 [km^2]) length scales. J. Geophys. Res. 97:19,033-19,059.

Archive/DBMS Usage Documentation.

Contact the EOS Distributed Active Archive Center (DAAC) at Oak Ridge National Laboratory (ORNL), Oak Ridge, Tennessee (see the *Data Center Identification Section*). Documentation about using the archive and/or online access to the data at the ORNL DAAC is not available at this revision.

18. Glossary of Terms:

A general glossary for the DAAC is located at Glossary.

19. List of Acronyms:

DAAC Distributed Active Archive Center EOS-DIS Earth Observing System-Data and Information System FIFE First ISLSCP Field Experiment FIS FIFE Information System IFC Intensive Field Campaign ISLSCP International Land Surface Climatology Project ORNL Oak Ridge National Laboratory PAMS Portable Automatic Mesonet URL Uniform Resource Locator

A general list of acronyms for the DAAC is available at Acronyms.

20. Document Information:

April 26, 1994 (citation revised on October 15, 2002).

Warning: This document has not been checked for technical or editorial accuracy by the FIFE Information Scientist. There may be inconsistencies with other documents, technical or editorial errors that were inadvertently introduced when the document was compiled, or references to preliminary data that were not included on the final CD-ROM. Previous versions of this document have been reviewed by the Principal Investigator, the person who transmitted the data to FIS, a FIS staff member, or a FIFE scientist generally familiar with the data.

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Strebel, D. R. Landis, K. F. Huemmrich, and B. W. Meeson (eds.), Collected Data of the First ISLSCP Field Experiment, Vol. 1: Surface Observations and Non-Image Data Sets. CD-ROM. National Aeronautics and Space Administration, Goddard Space Flight Center, Greenbelt, Maryland, U.S.A. (available from http://www.daac.ornl.gov).

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