Stream Flow Storm Data (FIFE)

Summary:

The Storm Event Stream Flow Data Set were collected during storm events from five treatment areas within the Konza Prairie Long-Term Ecological Research (LTER) site located within the northwest quadrant of the FIFE study area. These data were recorded so that the hydrology of the streams draining the tallgrass prairie could be studied. Moreover, these data were collected to determine the effect of burn frequency of a watershed upon runoff. Data are available from June 14, 1985, through December 31, 1987.

The V-throated flume and standpipes used at the LTER weirs operated on the principle that the height of the water level in the standpipe at a specific location within a weir of known dimensions can be converted to volume of water in the stream. The change of this instantaneous volume with time could then be used to compute volumetric stream flow. The V-notch, sharp-crested weir used in watershed 1D operated on the principle that water flowing past a point of known dimensions per unit time could be converted through standard equations to volumetric flow.

Table of Contents:

1. Data Set Overview:

Data Set Identification:

Stream Flow Storm Data (FIFE)
(Storm Event Stream Flow).

Data Set Introduction:

The Storm Event Stream Flow Data Set contains water flow and stage height stream data collected during storm events.

Objective/Purpose:

The water flow through five creeks in the Konza LTER site during storm events was recorded so that the hydrology of the streams draining the tallgrass prairie could be studied. Moreover, these data were collected to determine the effect of burn frequency of a watershed upon runoff.

Summary of Parameters:

Water flow and stage height of streams during storm events.

Discussion:

These data were collected during storm events from five treatment areas within the Konza Prairie Long-Term Ecological Research (LTER) site, which is located within the northwest quadrant of the FIFE study area. Data are available from June 14, 1985 through December 31, 1987. These data indicate that burning affects the hydrology of a basin.

Related Data Sets:

- Daily Stream Flow Amounts.

  This data set contains daily stream flow data for the four LTER gauges on tributaries to Kings Creek and for the USGS gauge near the mouth of Kings Creek.

- Fifteen Minute Stream Flow Rates from USGS.

  This data set contains the 15 minute stream flow data from the USGS recording gauge on Kings Creek.

FIS Data Base Table Name:

STREAM_FLOW_STORM_DATA.

2. Investigator(s):

Investigator(s) Name and Title:

Staff Science
and
James R. Wang
NASA/GSFC

Title of Investigation:

Staff Science Soil Moisture and Hydrology Data Acquisition Program.

and

Estimation of Soil Moisture and Other Surface Parameters from Airborne and Satellite Visible, Infrared and Microwave Data.

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Requested Form of Acknowledgment.

This data product was produced by the Staff of the Konza Prairie Long-Term Ecological Research (LTER) site at Kansas State University and FIFE Investigator Team of James Wang from NASA/GSFC. Their dedicated work is greatly appreciated. The LTER staff collected these data under grant BSR 8514327 awarded to Kansas State University by the National Science Foundation.

3. Theory of Measurements:

The V-throated flume and standpipes used at the LTER weirs operated on the principle that the height of the water level in the standpipe at a specific location within a weir of known dimensions can be converted to volume of water in the stream. The change of this instantaneous volume with time could then be used to compute volumetric stream flow. See Replogle (1978) for a more in-depth discussion of the theory associated with this type of weir.

The V-notch, sharp-crested weir used in watershed 1D operated on the principle that water flowing past a point of known dimensions per unit time could be converted through standard equations to volumetric flow. The basic features of this type of weir is described in Bos (1976) with more information about their ratings in Chow (1964).

4. Equipment:

Sensor/Instrument Description:

At the LTER sites the weir created a V-throated flume. There was a standpipe associated with the weir through which the gauge height was measured.

The weir on watershed 1D was a 120 degree V-notch, sharp-crested weir.

Collection Environment:

Ground-based.

Source/Platform:

The LTER weir is built into the stream bed.

The weir on watershed 1D installed by the Wang et al. research team was installed across the stream bed.

Source/Platform Mission Objectives:

To measure the volume of stream flow during storms.

Key Variables:

Water flow, stage height of stream, and time.

Principles of Operation:

The LTER weirs were constructed in the stream bed with a specific configuration so that the height of the water as it flows through the weir could be measured using a pressure transducer. The gauge height is measured as the pressure of the water in a standpipe associated with the V-throated weir. This height is then converted to a volumetric flow since the geometry of the weir is known.

The 120 degree V-notch, sharp-crested weir established by the FIFE PI team (Wang et al.) was installed across the stream. The water backs up behind the metal plate installed across the stream.

The water flows through the V-notch in the metal plate. The height of the water in the pond behind the weir is recorded by an analog recorder.

Sensor/Instrument Measurement Geometry:

The LTER weirs were V-throated flumes.

The weir on watershed 1D established specifically for the FIFE experiment was a 120 degree V-notch, sharp-crested weir. The 1D weir was installed by digging a trench in the channel and putting pre-cut plywood panels into the channel and attaching a galvanized steel 120 degree sharp-crested notched weir. An instrument shelter, to house a FW-1 analog recorder was mounted on a plastic stilling well.

Manufacturer of Sensor/Instrument:

The LTER weirs were built by the staff of the Konza LTER site using a design described in Replogle et al. (1978).

Pressure transducers: Model No. PDCR 10/D

> Druck, Inc.
> P.O. Box 551
> Logan, UT 84321
> (801) 753-2342

Data logger: Model No. CR-21X

> Campbell Scientific Co.
> P. O. Box 551
> Logan, UT 84321

Data recorder: Model PC201

> Campbell Scientific Co.
> P. O. Box 551
> Logan, UT 84321

The weir on watershed 1D was built by the FIFE investigator team of Wang et al.

Calibration:

The LTER weirs were not calibrated during a storm flow. The weirs were only calibrated during normal stream flow (see the Daily Stream Flow Amounts document for a description of those calibration methods).

The weir on watershed 1D was calibrated by timed volumetric measurements during periods of recession when the head was constant. The calibration curve was parallel to the theoretical but slightly displaced (i.e., higher) from it.

Specifications:

The LTER weirs were calibrated at different discharge volumes. These calibrations indicate that the conversion from gauge height to volumetric flow employs different geometric relationships at gauge heights less that 18.25 cm and at heights above 18.25 cm.

Tolerance:

Tolerance of the LTER weirs and that of Wang et al. is not available at this revision.

Frequency of Calibration:

Gauge height for the LTER weirs is calibrated at least weekly by making actual measurements of the gauge height.

Frequency of calibration is unknown for the weir on watershed 1D.

Other Calibration Information:

None.

5. Data Acquisition Methods:

The stream gauge height on the LTER weirs was automatically measured every minute with the Druck pressure transducers. These one minute values were recorded and averaged every five minutes into 5 minute averages. The data were then dumped from the data logger to a cassette tape. These data were then dumped from tape to an IBM PC where they were then converted to volumetric stream flow.

The upstream head of water behind the weir at watershed 1D was recorded on an analog recorder.

6. Observations:

Data Notes:

Not available.

Field Notes:

The stream gauge on watershed 1D was installed especially for the FIFE experiment, in May of 1987.

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:

WATERSHED	SITEGRID_ID	STATION_ID	STATION_NAME	NORTHING	EASTING	LATITUDE	LONGITUDE
N1B	2422-STV	651	SN1	4329220	709380	39 05 16	-96 34 45
N2B	2421-STV	652	SN2	4329140	709260	39 05 17	-96 34 50
N4D	2323-STV	653	SN4	4329380	709560	39 05 25	-96 34 37
NUB	2423-STV	654	SNU	4329230	709620	39 05 20	-96 34 35
1D	3230-STW	655	S1D	4327570	711040	39 04 25	-96 33 38

Spatial Coverage Map:

Not available.

Spatial Resolution:

These are point data, however, they represent the total water flow from the portion of the watershed that is upstream from the weir.

Projection:

Not available.

Grid Description:

Not available.

Temporal Characteristics:

Temporal Coverage:

The overall time period of data acquisition was from January 1, 1987 through January 1, 1988.

Temporal Coverage Map:

Not available.

Temporal Resolution:

Observations are made every 5 minutes during a storm.

Data Characteristics:

The SQL definition for this table is found in the STRM_ST.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 east (EE) cell number in a 100 x 100 array of 200 m square cells. The last 3 characters(III) are an instrument identifier.			FIS
STATION_ID			

```
The station ID designating the        min = 651,                          KANSAS
location of the observations.         max = 655                           STATE
UNIVERSITY
```

```
OBS_DATE
The date of the observations.         min = 01-JAN-87,                    KANSAS
max = 01-JAN-88                 STATE
UNIVERSITY
```

```
OBS_TIME
The time of the observation,          min = 0,          [GMT]             KANSAS
modified from CST.                    max = 2400,                         STATE
missing = 9999                  UNIVERSITY
```

```
WATER_FLOW
The water flow rate through           max = .872,       [meters^3]        WEIR
the gauge during the storm event.     missing = -9.999  [sec^-1]
```

```
STREAM_STAGE_HEIGHT
The stage height of the stream,       min = -10,        [cm]              KANSAS
the height of the water flowing       max = 44.88                         STATE
through the V-flume.
UNIVERSITY
```

```
FIFE_DATA_CRTFCN_CODE
The FIFE Certification Code for       ** CPI=checked                      FIS
the data, in the following format:    by principal
CPI (Certified by PI), CPI-???        investigator,
(CPI - questionable data).            CPI-MRG=merged
```

```
LAST_REVISION_DATE
data, in the format (DD-MMM-YY).      max = 23-APR-90
```

Footnote:

** Decode the FIFE_DATA_CRTFCN_CODE field as follows:

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 which is "merged" from two separate receiving stations to eliminate transmission errors. CPI-??? Investigator thinks data item may be questionable.

Sample Data Record:

SITEGRID_ID	STATION_ID	OBS_DATE	OBS_TIME	WATER_FLOW	STREAM_STAGE_HEIGHT
2421-STV	652	02-MAY-87	1200	.007000	6.760
2421-STV	652	02-MAY-87	1500	.007000	6.670
2421-STV	652	02-MAY-87	1800	.007000	6.500
2421-STV	652	02-MAY-87	2100	.007000	6.450

FIFE_DATA_CRTFCN_CODE	LAST_REVISION_DATE
CPI	11-MAY-89
CPI	11-MAY-89
CPI	11-MAY-89
CPI	11-MAY-89

8. Data Organization:

Data Granularity:

These are point data, however, they represent the total water flow from the portion of the watershed that is upstream from the weir. Observations were made every 5 minutes during a storm.

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:

Gauge height measurements made by the LTER staff at SITEGRID IDs 2422-STV, 2421-STV, 2323-STV, 2423-STV are converted to stream discharge using the rating curves (Replogle et. al. 1978) that follow.

Use the following equation when gauge height is > 18.25 cm:

Q[m^-3][sec^-1] = 4.64 [10^-5] [s^2.587]

Use the following equation when gauge height is between 0 - 18.25 cm:

Q[m^-3][sec^-1] = 4.49 [10^-5] [s^2.4714]

where:

Q = discharge in cubic meters per second
s = gauge height in cm

The data at SITEGRID_ID 3230-STW (watershed 1D) is converted to stream discharge using the basic weir equation (Kulin and Compton 1975), which is valid for any notch angle.

Q = [8 / 15][2g^0.5] [Ce] [tan (theta / 2)] [He^1.5]

where:

theta = notch angle
He = measured head + correction factor, taken as 32.2
Ce = weir coefficient, taken as 0.69 for 120 degree weir
g = acceleration of gravity

Therefore:

Q = 5.1118 [H^1.5]

where:

H = measured head in feet
Q = [Ft^3]/sec

Converting so that Q is expressed in Liters/sec:

Q = 14.313 [H^1.5]

This is the theoretical equation for a sharp-crested 120 degree V-notch weir. Actual flow rates may vary from this theoretical because of 1) upstream flow conditions, 2) the weir does not have a knife sharp edge, or 3) effective velocity at the stilling well greater than zero. To correct for these differences, the weir was calibrated volumetrically in the field. The resulting flow equation was used in computing the flow rates:

Q = 6.52 H^1.24

where:

H is expressed in feet.
Q = Liters/sec

Derivation Techniques and Algorithms:

Not available at this revision.

Data Processing Sequence:

Processing Steps:

The data collected at the 4 LTER stations is processed using the following steps:

1. The raw data from each watershed is read from the cassette tape for that watershed and placed on-line.
2. These raw data are reformatted into a condensed more easily read form.
3. These data are then compared to the log sheets for the data loggers. The data processor is looking for indications that the data loggers have drifted and the amount of that drift. The data loggers are routinely monitored for drift. An observer periodically measures the actual stage height of the stream and compares this value with that recorded by the data logger. When a drift is detected the observer changes the recorded value on the data logger to the measured value and notes the time and change in the logbook.
4. Recorded stage height values are then corrected for the detected drift in one of 4 ways:

a) When all values are off by the same amount a value is added or subtracted from all entries.

b) When values are wrong on both ends of a time period or at one end and not the other, a linear regression derived from the actual stage height recorded on the log sheets is performed.

c) When there is no flow observed yet there is an indication of flow on the data logger all values are changed to 0.

d) When there is no drift, the data is not altered.

5. These data are then converted to discharge using the formulas in the *Formulae Section* above.

The data collected at SITEGRID_ID 3230-STW is processed using the following steps:

1. The analog records are manually transcribed and reduced to instantaneous flow rates (liters/sec) for non-uniform time periods. These periods were chosen by slope changes on the analog record.

Processing Changes:

None known at this revision.

Calculations:

See the *Formulae Section* above.

Special Corrections/Adjustments:

None known at this revision.

Calculated Variables:

- Steam discharge, and
- Flow rates.

Graphs and Plots:

None.

10. Errors:

Sources of Error:

Errors in the data collected by the LTER site staff may arise from several sources:

1. The transducers which detect the stage height have a tendency to drift. Errors can result if this drift is not detected.
2. Power outages occur occasionally thereby preventing the recording of data to the data loggers.
3. Occasionally the data loggers themselves malfunction.
4. Data can be lost or corrupted when it is transferred from the data loggers to the cassette tapes.

Errors in the data collected by the investigator team at SITEGRID_ID 3230-STW (watershed 1D) may arise from several sources:

1. The V-notch weirs used at this site require considerable channel gradient to generate a free-flow over-fall which is required for accurate measurements. If such a gradient was not present substantial errors could result.
2. The V-notch weirs used at this site can tolerate no backwater and it is preferable that the backwater be kept two inches below the weir crest. If this condition existed, errors would have occurred.

Quality Assessment:

Data Validation by Source:

The LTER site staff make spot checks of the stage height during storm events. These spot calibrations are used to create a calibration for the stage height during the storm event. The data validation activities were periodically performed by the personnel on site at watershed 1D and field calibration checks were made periodically.

Confidence Level/Accuracy Judgment:

The quality of the data collected by the staff of the LTER site is thought to range from poor to excellent, generally it is considered to be excellent data. No formal quality assurance is done, however, missing values are inserted when the data is known to be very poor. A course check is routinely made of these data.

The data collected by the research group Wang et. al. are thought to range from good to excellent.

Measurement Error for Parameters:

The measurement error for the data collected by the staff of the LTER site is unknown.

The errors for the weir on watershed 1D at SITEGRID_ID 3230-STW was as follows:

Flow rates	Accuracy
< 2.0 liters/sec	<5%
> 2.0 liters/sec	8-10%

Additional Quality Assessments:

FIS staff applied a general Quality Assessment (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. An attempt was made to find an explanation for unexpected high or low values, values outside of the normal physical range for a variable, or standard deviations that appeared inconsistent with the mean. In some cases, histograms were examined to determine whether outliers were consistent with the shape of the data distribution.

No discrepancies were identified.

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:

None known at this revision.

Usage Guidance:

The data collected by the LTER site staff should be used with caution. It should be checked against the spot measurements which are available from the LTER site at Kansas State University (KSU). See the *Contact Information Section* for contact information.

Any Other Relevant Information about the Study:

None known at this revision.

12. Application of the Data Set:

This data set can be used to study the hydrology of the streams draining the tallgrass prairie and determine the effect of burn frequency of a watershed upon runoff.

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 Storm Event Stream Flow data are available on FIFE CD-ROM Volume 1. The CD-ROM filename is as follows:

\DATA\HYDROLGY\STRM_ST\GRIDxxxx\YyyMmm\ydddgrid.SST

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), and *mm* is the month of the year (e.g., M12 = December). 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 (e.g., 061 = sixty-first day in the year). The filename extension (*.sfx*), identifies the data set content for the file (see the *Data Characteristics Section*) and is equal to .SST for this data set.

17. References:

Satellite/Instrument/Data Processing Documentation.

Anonymous. 1993. Methods Manual for Konza Prairie Research Natural Area. Konza LTER publication.

Bos, M.G. (ed). 1976. Discharge Measurement Structures, Publication No. 161. Delft Hydraulics Laboratory. Delft. The Netherlands. 464 pgs.

Chow, V.T. 1964. Handbook of Applied Hydrology: 7-47. McGraw-Hill Book Company. N.Y.

Kulin, G. and P.R. Compton. 1975. A Guide to Methods and Standards for the Measurement of Water Flow. National Bureau of Standards. Spec. Publ. 421.

Replogle, J.A., H. Reikert, B.F. Swindel. 1978. Water Monitoring in Coastal Forest Watershed Studies. IMPAC Report 2, Vol. 3. No. 2.

Southwestern Forest Expt. Station. USDA. Gainesville, Florida.

Journal Articles and Study Reports.

Engman, E.T., G. Angus, W.P. Kustas, J.R. Wang. 1989. Relationships Between the Hydrologic Balance of a Small Watershed and Remotely Sensed Soil Moisture. Proceedings. IAHS Third Scientific Assembly. Baltimore. IAHS Publication No. 186. pp 75-84.

Peck, E.L., T.R. Carrol, D.M. Lipinski. 1990. Airborne Gamma Radiation Soil Moisture Measurements Over Short Flight Lines. Symposium on FIFE. Am. Meteorol. Soc. Boston, Massachusetts. p 79-84

Sellers, P.J., F.G. Hall, G. Asrar, D.E. Strebel, and R.E. Murphy. 1988. The First ISLSCP Field Experiment (FIFE). Am. Meteor. Soc. 69:22-27.

Sivapalan, M., K.J. Beven, and E.F. Wood. 1987. On Hydrologic Similarity: A Scaled Model of Storm Runoff Production. Water Resource Res. 23:2266-2278.

Wang, J.R., J.C. Shiue, T.J. Schmugge, E.T. Engman. 1989. The Soil Moisture Variation of Two Small Watersheds in Konza Prairie as Estimated from the L-Band Radiometric Measurements. Remote Sensing of the Environment. 27:305-312.

Wood, E.F. 1990. Water Balance Model for Kings Creek. Symposium on FIFE. Am. Meteorol. Soc. Boston, Massachusetts. p. 163-166.

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:

CD-ROM Compact Disk-Read Only Memory DAAC Distributed Active Archive Center EOSDIS Earth Observing System Data and Information System FIFE First ISLSCP Field Experiment FIS FIFE Information System KSU Kansas State University ISLSCP International Satellite Land Surface Climatology Project ORNL Oak Ridge National Laboratory URL Uniform Resource Locator UTM Universal Transverse Mercator

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

20. Document Information:

May 11, 1994 (citation revised on October 14, 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.

Document Review Date:

September 22, 1996.

Document ID:

ORNL-FIFE_STRM_ST.

Citation:

Cite this data set as follows:

Wang, J. R. 1994. Stream Flow Storm Data (FIFE). Data set. Available on-line [http://www.daac.ornl.gov] from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A. doi:10.3334/ORNLDAAC/120. Also published in D. E. 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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