Atmospheric Profiles: Brutsaert (FIFE)

Summary:

The FIFE Radiosonde Data Set contains temperatures, wind speed, and temperature profiles in the atmospheric boundary layer measured by means of radiosondes that were analyzed in the framework of Monin-Obukhov similarity theory, with the objective of determining the regional surface heat flux. Profiles of temperature, humidity and wind velocity in the atmosphere were measured by means of intensive radiosoundings conducted approximately between 900 and 1800 CDST in northeastern Kansas during the five FIFE Intensive Field Campaigns in spring, summer and fall of 1987, and in the late summer of 1989. Some 445 radiosondes were released to generate the measurements needed to obtain profiles of wind velocity dry-bulb and wet-bulb temperature. The launch site was located near the northern edge of the experimental area to ensure that these profiles reflect surface conditions over the fetch of the experimental area in the general direction of the prevailing southerly wind.

The raw radiosonde data described here have been corrected for sensor delays (see the FIFE Temperature and Humidity Profiles) and algorithm inconsistencies, (see the FIFE Radiosonde Wind Profiles) and have been interpolated to a set of standard pressure levels (see the FIFE Standard Pressure Level Radiosonde Data). These derived data sets are described separately.

Table of Contents:

1. Data Set Overview:

Data Set Identification:

FIFE Atmospheric Profiles: Brutsaert (FIFE)
(FIFE Radiosonde Data).

Data Set Introduction:

The FIFE Radiosonde Data Set contains variables measured directly by the instrument (i.e., raw data) these variables are pressure, dry-bulb temperature, wet-bulb temperature, azimuth angle of the balloons position, and elevation angle of the balloon position. In addition, the data set also includes the following derived variables: potential temperature, relative humidity, mixing ratio, wind velocity, wind direction, height above ground-level of radiosonde and height above ground-level of wind speed measurement.

Objective/Purpose:

In this study radiometrically obtained temperatures in hilly prairie terrain together with wind speed and temperature profiles in the atmospheric boundary layer measured by means of radiosondes were analyzed in the framework of Monin-Obukhov similarity theory, with the objective of determining the regional surface heat flux.

Summary of Parameters:

Atmospheric pressure, dry bulb temperature, wet bulb temperature, mixing ratio, potential temperature, wind speed, wind direction, wind height, relative humidity.

Discussion:

Profiles of temperature, humidity and wind velocity in the atmosphere were measured by means of intensive radiosoundings conducted approximately between 900 and 1800 CDST in northeastern Kansas during the five FIFE Intensive Field Campaigns in spring, summer and fall of 1987, and in the late summer of 1989.

These intensive radiosonde flights, conducted by Dr. Wilfred H. Brutsaert allowed the measurement of the atmospheric profiles of wind velocity (magnitude and direction), temperature and relative humidity. The raw radiosonde data described here have been corrected for sensor delays (see the FIFE Temperature and Humidity Profiles) and algorithm inconsistencies, (see the FIFE Radiosonde Wind Profiles) and have been interpolated to a set of standard pressure levels (see the FIFE Standard Pressure Level Radiosonde Data). These derived data sets are described separately.

Related Data Sets:

- FIFE Standard Pressure Level Radiosonde Data. This data set contains temperature and humidity values at standard levels (5 mb intervals) derived from Dr. Brutsaert raw radiosonde data.
- FIFE Radiosonde Wind Profiles. This data set includes corrected wind velocity values derived from Dr. Brutsaert radiosonde measurements.
- FIFE Temperature and Humidity Profiles. This data set contains corrected temperature and humidity profile data derived from Dr. Brutsaert radiosonde measurements.

FIS Data Base Table Name:

BRUT_SONDE_DATA.

2. Investigator(s):

Investigator(s) Name and Title:

Dr. Wilfred H. Brutsaert
Cornell University

Title of Investigation:

Radiosonde analysis of wind velocity measurements in the boundary layer above a hilly prairie.

Contact Information:

Contact 1:
Dr. Wilfred H. Brutsaert
Cornell University
Tel.: (607) 255-3676
Email: WBH@CORNELLA.BITNET
WHB@CORNELLA.CIT.CORNELL.EDU (Internet)

Requested Form of Acknowledgment.

The FIFE Radiosonde Data were measured by a team from Cornell University, directed by Prof. W. Brutsaert. Their contribution of these data is particularly appreciated.

3. Theory of Measurements:

Combination of surface potential temperature with potential temperature and wind speed profiles in the atmospheric boundary layer allows the application of similarity theory to estimate surface sensible heat flux. The relevant profile equations have been described (Sugita and Brutsaert 1990), taking into consideration the stability correction functions for momentum and sensible heat. Some 445 radiosondes were released to generate the measurements needed to obtain profiles of wind velocity dry-bulb and wet-bulb temperature. The launch site was located near

the northern edge of the experimental area to ensure that these profiles reflect surface conditions over the fetch of the experimental area in the general direction of the prevailing southerly wind.

4. Equipment:

Sensor/Instrument Description:

The radiosonde system (type AIR-3A, Atmospheric Instrumentation Research) consisted of disposable sondes with dry-bulb and wet-bulb temperature and pressure sensors, a receiving unit on the ground and an optical theodolite to track the sonde.

Collection Environment:

Airborne.

Source/Platform:

Free flying balloons tracked by optical theodolite. Measurements were transmitted to a ground-based receiver and stored on tape and on floppy disks.

Source/Platform Mission Objectives:

To measure atmospheric profiles with pressures down to 600 hPa.

Key Variables:

Variables measured directly by the instrument (i.e., raw data) are pressure, dry-bulb temperature, wet-bulb temperature, azimuth angle of the balloons position, and elevation angle of the balloon position. Both azimuth and elevation angles are measured with the manually operated (from ground) optical theodolite.

Variables derived from the raw data are potential temperature, relative humidity, mixing ratio, wind velocity, wind direction, height above ground-level of radiosonde and Height above ground-level of wind speed measurement.

Principles of Operation:

Every 5 to 6 seconds, pressure, dry-bulb temperature and wet-bulb temperature, together with azimuth and elevation angles of sonde position (optical theodolite) are measured by the ascending sonde.

Sensor/Instrument Measurement Geometry:

Spintype "Airsonde" (Standard deployment).

Manufacturer of Sensor/Instrument:

Air, Inc.
8401 Baseline Road
Boulder, C0 80303

Calibration:

Information on the Calibration of the radiosonde system (type AIR-3A, Atmospheric Instrumentation Research) is provided by the manufacturer (Air, Inc. of Boulder, Colorado).

Specifications:

Not available at this revision.

Tolerance:

Not available at this revision.

Frequency of Calibration:

Not available at this revision.

Other Calibration Information:

Not available at this revision.

5. Data Acquisition Methods:

Not available at this revision.

6. Observations:

Not available at this revision.

7. Data Description:

Spatial Characteristics:

The FIFE site 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:

The radiosonde data was collected from balloon releases within the FIFE site.

SITEGRID_ID	STATION_ID	NORTHING	EASTING	LATITUDE	LONGITUDE	ELEVATION
0928-RSB	102	4332188	710674	39 06 55	-96 33 48	342

For each flight the spatial coverage can be deduced from the horizontal distance and direction the sonde traveled from the launch site.

Spatial Coverage Map:

Not available.

Spatial Resolution:

These are point data. The vertical resolution is approximately 15 to 20 m.

Projection:

Not available.

Grid Description:

Not available.

Temporal Characteristics:

Temporal Coverage:

The data was collected during FIFE's five IFC's, covering the period from May 26, 1987 through August 12, 1989.

IFC#	Dates
IFC-1	05/26/87 - 06/06/87
IFC-2	06/25/87 - 07/11/87
IFC-3	08/06/87 - 08/21/87
IFC-4	10/05/87 - 10/16/87
IFC-5	07/24/89 - 08/12/89

Temporal Coverage Map:

Not available.

Temporal Resolution:

The soundings were made at 2 to 3 hour intervals, depending on weather conditions.

During flight the sonde measures and transmits the data in cycles of approximately 4.8 seconds in the following sequence: dry-bulb temperature is measured at time zero; 0.6 and 1.8 seconds later wet-bulb temperature and pressure are measured, respectively; then after approximately 3.0 seconds the dry-bulb temperature measurement is made again to begin the next cycle. According to the manufacturer, the response of the pressure sensor is practically instantaneous, but the dry-bulb and wet-bulb sensors have time constants of 3 and 12 seconds, respectively.

Data Characteristics:

The SQL definition for this table is found in the BRUT_SND.TDF file located on 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.			
STATION_ID The Station ID number for the location of the observations.			
OBS_DATE The observation date for this radiosonde flight.	min = 26-MAY-87, max = 12-AUG-89		CORNELL UNIVERSITY
OBS_TIME The time the observation was taken.	min = 1407, max = 2212	[GMT]	FIS
OBS_SECONDS The seconds portion of the OBS_TIME.	min = 0, max = 30	[GMT]	FIS

FLIGHT_NUM This is the flight number of the radiosonde balloon flight where the data was recorded.			FIS
ATMOSPHERIC_PRESS The air pressure at the observation height.	min = 1, max = 1	[millibars]	ANEROID SENSOR
HEIGHT_ABV_GRND_LVL The height above the ground-level where this UNIVERSITY observation was made.	min = 0, max = 8541, missing = -999	[meters]	CORNELL
DRY_BULB_TEMP The temperature measured THERMISTOR using a conventional thermometer.	min = -21.61, max = 37.21	[degrees Celsius]	
WET_BULB_TEMP The temperature to which air THERMISTOR may be cooled by evaporating water into it at a constant pressure until it is saturated.	min = -15.38, max = 26.36, missing = -999	[degrees Celsius]	
MIX_RATIO The mixing ratio of water to air: grams of water per kilogram of dry air (mass of air minus mass of water).	min = -.51, max = 22.2, missing = -999	[grams] [kg^-1 of air]	FIS
POTNTL_TEMP The potential temperature at the observation height; UNIVERSITY the temperature an air sample attains if reduced to 1000 millibars pressure without any external heat exchange.	min = -.01, max = 503.54	[degrees Kelvin]	CORNELL
AZIM_ANG The azimuth angle of the radiosonde balloon, as viewed from the ground.	min = 85.8, max = 259.1	[degrees from North]	FIS

ELEV_ANG The elevation angle of the radiosonde balloon as viewed from the ground.	min = 85.8, max = 259.1	[degrees]	FIS
WIND_SPEED The velocity of the wind at RADIOSONDE the observation height.	min = 0, max = 360	[meters] [sec^-1]	
WIND_DIR The direction from which the wind is blowing.	min = 0, max = 360	[degrees]	NOAA
WIND_HEIGHT This is the height of the wind measurement, in meters.		[meters]	
REL_HUMID The relative humidity at the observation height.	min = 14.82, max = 98.4	[percent]	FIS
FIFE_DATA_CRTFCN_CODE * The FIFE Certification Code for the data, in the following format: CPI (Certified by PI), CPI-??? (CPI - questionable data).	CPI=Checked by Principal Investigator		FIS
LAST_REVISION_DATE data, in the format (DD-MMM-YY).	max = 08-AUG-90		

Footnote:

* 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.

Sample Data Record:

SITEGRID_ID	STATION_ID	OBS_DATE	OBS_TIME	OBS_SECONDS	FLIGHT_NUM
0928-RSB	102	28-MAY-87	1228	42	5
0928-RSB	102	28-MAY-87	1228	47	5
0928-RSB	102	28-MAY-87	1228	52	5
0928-RSB	102	28-MAY-87	1228	57	5

ATMOSPHERIC_PRESS	HEIGHT_ABV_GRND_LVL	DRY_BULB_TEMP	WET_BULB_TEMP
972.9	23	15.990	14.870
969.8	49	16.060	14.760
966.5	79	16.080	14.620
963.2	108	16.040	14.450

MIX_RATIO	POTNTL_TEMP	AZIM_ANG	ELEV_ANG	WIND_SPEED
10.510	291.4300	16.980	15.300	-999.0000
10.390	291.7600	12.770	20.060	13.1500
10.260	292.0600	11.170	23.530	13.1500
10.120	292.3100	11.000	25.330	9.4900

8. Data Organization:

Data Granularity:

This data set contains point data collected via soundings that were made at 2 to 3 hour intervals, depending on weather conditions. The vertical resolution is approximately 15 to 20 m.

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:

The wind velocity data listed in the original data files were calculated by means of an algorithm (developed by the manufacturer) involving the radius of the Earth, the curvature of the surface, etc. This algorithm is correct but produces wind speeds and directions with a large degree of noise and scatter. Corrected values using a simpler "flat-Earth" algorithm are found in the FIFE Radiosonde Wind Profiles document on FIFE CD-ROM Volume 1.

Data Processing Sequence:

Processing Steps:

Not available at this revision.

Processing Changes:

Not available at this revision.

Calculations:

Special Corrections/Adjustments:

For details see the FIFE Radiosonde Wind Profiles document and the FIFE Temperature and Humidity Profiles document on FIFE CD-ROM Volume 1.

Calculated Variables:

The height above ground-level, mixing ratio, potential temperature, wind velocity, wind direction, wind height and relative humidity data in this data set are derived values.

Graphs and Plots:

None.

10. Errors:

Sources of Error:

The humidity values become inaccurate when the Wet-Bulb reservoir dries out or freezes, or when the air temperature goes below 0 degrees C.

Quality Assessment:

The derived variables height above ground-level, mixing ratio, potential temperature, wind velocity, wind direction, wind height and relative humidity for most applications are sufficiently accurate. However, for certain detailed analyses, especially wind speed and humidity in the boundary layer, the user may wish to redo these calculations from the raw data by means of his/her own algorithms.

Data Validation by Source:

In the column RELATIVE_HUMIDITY, value -999 refers to data that is missing. If there are good values for wet-bulb and dry-bulb temperatures the humidity may have been lost in data transfer between cassette tape and floppy disk. Humidity values may become greater than 100% due to small errors in the wet-bulb and dry-bulb temperatures. This usually happened when the sonde went through clouds. Wet-bulb temperatures and humidity become questionable (if not completely wrong) when the wet-bulb thermometer freezes, i.e. has negative values. The humidity values greater than 100% were left in the data set to give the user a sense of the accuracy of the data.

Confidence Level/Accuracy Judgment:

Not available at this revision.

Measurement Error for Parameters:

Not provided by Principal Investigator.

Additional Quality Assessments:

This data set is composed of "raw" data submitted as recorded and processed by the radiosonde receiving instrumentation. No attempt was made before submission to "clean" these data, under the assumption that the user would re-analyze the raw data as appropriate for each application. Subsequently, several cleaned or improved data sets were also produced (see the *Related Data Sets Section*).

FIS staff applied a general QA procedure to the data to identify inconsistencies and problems for potential users. There were some inconsistencies in the way missing values were recorded. In all obvious cases, these values were converted to -999 in preparing the data for publication on CD-

ROM. However, there may still be some cases in the data where positive sequences of 9's (of different lengths) occur.

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 deviation 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. Note, however, that there are almost 140,000 data records from some 400 balloon flights. the resources were not available to examine the details of each flight or each suspect data record. The user is advised to conduct a detailed analysis for specific uses (see also the *Usage Guidance Section*).

The discrepancies, which were identified, are reported as problems in the *Known Problems with the Data Section*. In general, there are two main sources of problems, both of which should be obvious upon inspection of the data for a specific flight. There is a "leader" of 10 - 100 data records before the actual release of the balloon. During this period, indicated by constant near zero, and sometimes negative heights, the reported values are unreliable (manual checks and launch positioning are occurring).

A second suspect period occurs at the end of each flight, as the sonde unit descends after the balloon bursts. These descending values are not generally considered usable data, since the rapid rate of descent generally outpaces the time lags in the instruments. Also, the explosion of the balloon itself causes a release and rapid expansion of the helium gas within it. In some cases, the sonde appears to be buffeted by the shock wave generated by the expanding gas, or even to enter the gas cloud for a period. The effects on the instruments, and their permanence, are unknown. These occurrences are evident in the data record by a minimum in the pressure (maximum in height) values. The values of all variables generally show erratic behavior, for varying lengths of time, after this.

A third variety of problem occurs when the balloon enters a cloud and manual tracking of its position ceases. In these cases, identified by loss of the azimuth and elevation angle data, the instruments still continue to function normally as the balloon ascends. The loss of the positional information, however, compromises the usefulness of the remaining values.

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); and
- 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:

As of the revision data of this document, the following discrepancies or errors in the data have been reported:

Results of the FIS staff quality assessments:

- The pressure should range from surface values of approximately 1000 to around 600 or 500 where the balloon breaks. Values above the 1100 and below 0 occur in the data records, usually associated with the pre-ascent or descent flight phases (see the *Additional Quality Assessment Applied Section*).
- Negative heights (-24 m to 0 m) occur in the height above ground level field. These appear to be associated with the pre-ascent data records.
- The wet-bulb temperature field has an unreasonably low minimum value (-272.09). Since this is close to absolute zero, it may be a calibration or default value built into the data recording system.
- The azimuth angles include values as high as 421 degrees and as low as 303 degrees. These could occur if the recording system tracks only the (+ or -) change in angle from a fixed starting azimuth.
- There are elevation angles (which should be between 0 and 90 degrees) as low as -24 degrees. Some of these occur during the pre-ascent phase, but some appear to occur at altitude. Profiles in which these occur should be examined carefully to see if there is an obvious instrument problem or loss of tracking.
- The wind speed field includes a number of very high values (e.g., 19 entries are above 1000 m/s). Some of these appear to occur in conjunction with negative elevation positional information, and therefore may magnify errors or glitches in the data for those fields.
- The wind direction field has 168 entries with a value of 10000. These all appear to occur on the same flight (on 7/31/89) and to be associated with a missing azimuth angle field. This is a derived field subject to errors in the input parameters.
- The wind height field (derived) contains a maximum value of 8899. The maximum of the balloon height was 6533, therefore this wind height value is suspicious. It is possible that it is an improperly converted missing value indicator (the instrumentation recorded strings of 8's for some missing values; FIS converted these to 9's using an automatic procedure).
- The relative humidity values (derived from wet-bulb and dry-bulb information) included over 600 entries above 100 and also a number of negative entries. These usually indicate problems with the temperature sensors (see the *Sources of Error Section*).

Usage Guidance:

The variables pressure, dry-bulb temperature, wet-bulb temperature, azimuth angle of balloon and elevation angle of balloon are the so-called raw data. The variables height above ground-level, mixing ratio, potential temperature, wind velocity, wind direction, wind height and relative humidity are variables derived from the raw data.

Any Other Relevant Information about the Study:

Not available at this revision.

12. Application of the Data Set:

This data set can be used to determine the regional surface heat flux.

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:

EOSDIS 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:

FIFE Radiosonde Data are available on FIFE CD-ROM Volume 1. The CD-ROM filename is as follows:

\DATA\ATMOS\BRUT_SON\YyyMmm\ydddNnnn.WBR

Where *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: *ydddNnnn.sfx*, where *Nnnn* is the flight number (ranges from 002 - 450), *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 .WBR for this data set.

17. References:

Satellite/Instrument/Data Processing Documentation.

ADAS Operating Manual, AIR, Inc. Boulder CO.

Journal Articles and Study Reports.

Brutsaert, W., M. Sugita and L.J. Fritschen. 1990. Inner region humidity characteristics of the neutral boundary layer over prairie terrain. Water Resour. Res. 26:2931-21936.

Brutsaert, W. and M. Sugita. 1990. The extent of the unstable Monin-Obukhov layer for temperature and humidity above complex hilly grassland. Boundary-Layer Meteor. 51:383-400.

Brutsaert, W. and M. Sugita. 1991. A bulk similarity approach in the atmospheric boundary layer using radiometric skin temperature to determine regional surface fluxes. Boundary-Layer Meteor. 55:1-23.

Brutsaert, W. and M. Sugita. 1992. Self-preservation in the diurnal evolution of the surface energy budget to determine daily evaporation. J. Geophys. Res. 97:18,377-18,382.

Brutsaert, W. and M. Sugita. 1992. Regional surface fluxes under non-uniform and patchy soil moisture conditions during drying, Water Resour. Res. 28:1669-1674.

Sugita, M. and W. Brutsaert. 1990. Wind velocity measurements in the neutral boundary layer above hilly prairie. J. Geophys. Res. (Atmos.). 95(D6):7617-7624.

Sugita, M. and W. Brutsaert. 1990. How similar are temperature and humidity profiles in the unstable boundary layer? J. Appl. Meteor. 29:489-497.

Sugita, M. and W. Brutsaert. 1990. Regional surface fluxes from remotely sensed skin temperature and lower boundary layer measurements. Water Resour. Res. 26:2937-2944.

Sugita, M. and W. Brutsaert. 1991. Daily evaporation over a region from lower boundary layer profiles measured with radiosonde. Water Resour. Res. 27:747-752.

Sugita, M. and W. Brutsaert. 1992. Landsat surface temperatures and radiosoundings to obtain regional surface fluxes of heat and water vapor. Water Resour. Res. 28:1675-1679.

Sugita, M. and W. Brutsaert. 1992. The stability functions in the bulk similarity formulation for the unstable boundary layer. Boundary-Layer Meteor. 61:65-80.

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:

ABL Atmospheric Boundary Layer ASL Above Sea Level AGL Above Ground-level BPI Byte per inch CCT Computer Compatible Tape CD-ROM Compact Disk (optical), Read-Only Memory DAAC Distributed Active Archive Center EOS Earth Observing System EOSDIS EOS Data and Information System. FIFE First ISLSCP Field Experiment FIS FIFE Information System GMT Greenwich Mean Time IFC Intensive Field Campaign IFOV Instantaneous Field of View ISLSCP International Satellite Land Surface Climatology Project Mbps Megabyte per second NESDIS National Environmental Satellite Data and Information Service NOAA National Oceanic and Atmospheric Administration ORNL Oak Ridge National Laboratory TDF Table Definition File URL Uniform Resource Locator UTM Universal Transverse Mercator

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

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