First ISCCP Regional Experiment (FIRE) Atlantic Stratocumulus Transition Experiment (ASTEX) Surface of the Ocean, Fluxes and Interaction with the Atmosphere (SOFIA) Langley DAAC Data Set Document

Summary:

The First ISCCP Regional Experiments have been designed to improve data products and cloud/radiation parameterizations used in general circulation models (GCMs). Specifically, the goals of FIRE are (1) to improve basic understanding of the interaction of physical processes in determining life cycles of cirrus and marine stratocumulus systems and the radiative properties of these clouds during their life cycles and (2) to investigate the interrelationships between the ISCCP data, GCM parameterizations, and higher space and time resolution cloud data.

To-date, four intensive field-observation periods were planned and executed: a cirrus IFO (October 13-November 2, 1986); a marine stratocumulus IFO off the southwestern coast of California (June 29-July 20, 1987); a second cirrus IFO in southeastern Kansas (November 13-December 7, 1991); and a second marine stratocumulus IFO in the eastern North Atlantic Ocean (June 1-June 28, 1992). Each mission combined coordinated satellite, airborne, and surface observations with modeling studies to investigate the cloud properties and physical processes of the cloud systems.

SOFIA (Surface of the Ocean, Fluxes and Interaction with the Atmosphere) is a research program carried out by French groups from the Centre de Recherches en Physique de l'Environnement (CRPE), Laboratoire l'Aerologie (LA)-Toulouse, Centre de Meteorologie Marine (CMM)-Brest, Institut Francais de Rechercher sur la Mer (IFREMER)-Brest, Service d'Aeronomie-Paris, and Laboratoire de Meteorologie Dynamique (LMD)-Palaiseau with cooperation from Centre National de Recherche Meteorologique (CNRM)-Toulouse.

The scientific objective of SOFIA during ASTEX was the study of energy transfer (heat, humidity and momentum fluxes) between the sea surface and the atmospheric boundary layer at scales ranging from the local scale to the mesoscale (50 km). The general concept of the program was to develop a measurement strategy based on nested boxes in which instrumentation would be used to estimate and quantify fluxes. These instruments, from which flux estimates at different scales would be measured, were used in connection with satellite measurements to understand and, hence, to validate the "satellite integration" of fluxes, particularly in the presence of mesoscale oceanic and atmospheric structures responsible for spatial inhomogeneity of fluxes.

All data sets discussed in this document were produced by Surface of the Ocean, Fluxes and Interaction with the Atmosphere (SOFIA). These data sets are:

- FIRE_AX_SOF_ARAT_FLT
- FIRE_AX_SOF_ARAT_TRB
- FIRE_AX_SOF_BUOY_DFT
- FIRE_AX_SOF_BUOY_SPR
- FIRE_AX_SOF_PTU
- FIRE_AX_SOF_SUR_BUCK
- FIRE_AX_SOF_SUR_DRAK
- FIRE_AX_SOF_SUR_HYD
- FIRE_AX_SOF_SUR_MET
- FIRE_AX_SOF_SUR_RAD
- FIRE_AX_SOF_SUR_TBAL

Table of Contents:

1. Data Set Overview:

Data Set Identification:

FIRE_AX_SOF_ARAT_FLT	First ISCCP Regional Experiment (FIRE) Atlantic Stratocumulus Transition Experiment (ASTEX) Surface of the Ocean, Fluxes and Interaction with the Atmosphere (SOFIA) ARAT Fokker F27 Aircraft Flight Data (FIRE_AX_SOF_ARAT_FLT)
FIRE_AX_SOF_ARAT_TRB	First ISCCP Regional Experiment (FIRE) Atlantic Stratocumulus Transition Experiment (ASTEX) Surface of the Ocean, Fluxes and Interaction with the Atmosphere (SOFIA) ARAT Fokker F27 Aircraft Turbulence (FIRE_AX_SOF_ARAT_TRB)
FIRE_AX_SOF_BUOY_DFT	First ISCCP Regional Experiment (FIRE) Atlantic Stratocumulus Transition Experiment (ASTEX) Surface of the Ocean, Fluxes and Interaction with the Atmosphere (SOFIA) Drifting Buoy Data (FIRE_AX_SOF_BUOY_DFT)
FIRE_AX_SOF_BUOY_SPR	First ISCCP Regional Experiment (FIRE) Atlantic Stratocumulus Transition Experiment (ASTEX) Surface of the Ocean, Fluxes and Interaction with the Atmosphere (SOFIA) Spear Buoy Data (FIRE_AX_SOF_BUOY_SPR)
FIRE_AX_SOF_PTU	First ISCCP Regional Experiment (FIRE) Atlantic Stratocumulus Transition Experiment (ASTEX) Surface of the Ocean, Fluxes and Interaction with the Atmosphere (SOFIA) Radiosonde Data (FIRE_AX_SOF_PTU)
FIRE_AX_SOF_SUR_BUCK	First ISCCP Regional Experiment (FIRE) Atlantic Stratocumulus Transition Experiment (ASTEX) Surface of the Ocean, Fluxes and Interaction with the Atmosphere (SOFIA) Le Suroit Bucket Data (FIRE_AX_SOF_SUR_BUCK)
FIRE_AX_SOF_SUR_DRAK	First ISCCP Regional Experiment (FIRE) Atlantic Stratocumulus Transition Experiment (ASTEX) Surface of the Ocean, Fluxes and Interaction with the Atmosphere (SOFIA) Le Suroit Microwave Data (FIRE_AX_SOF_SUR_DRAK)
FIRE_AX_SOF_SUR_HYD	First ISCCP Regional Experiment (FIRE) Atlantic Stratocumulus Transition Experiment (ASTEX) Surface of the Ocean, Fluxes and Interaction with the Atmosphere (SOFIA) Le Suroit Hydrophone Data (FIRE_AX_SOF_SUR_HYD)
FIRE_AX_SOF_SUR_MET	First ISCCP Regional Experiment (FIRE) Atlantic Stratocumulus Transition Experiment (ASTEX) Surface of the Ocean, Fluxes and Interaction with the Atmosphere (SOFIA) Le Suroit Meteoro- logical Data (FIRE_AX_SOF_SUR_MET)
FIRE_AX_SOF_SUR_RAD	First ISCCP Regional Experiment (FIRE) Atlantic Stratocumulus Transition Experiment (ASTEX) Surface of the Ocean, Fluxes and Interaction with the Atmosphere (SOFIA) Le Suroit Radiation Pressure Data (FIRE_AX_SOF_SUR_RAD)
FIRE_AX_SOF_SUR_TBAL	First ISCCP Regional Experiment (FIRE) Atlantic Stratocumulus Transition Experiment (ASTEX) Surface of the Ocean, Fluxes and

Data Set Introduction:

FIRE_AX_SOF_ARAT_FLT
The FOKKER F27 aircraft with flux measurement package and the airborne Lidar Leandre was used during ASTEX. The FOKKER 27 ARAT capabilities were as follows:

- Turbulence measurements of wind, temperature and moisture. Fast response sensors located on a nose boom 5m long, which measured:
  - attack and sideslip angles by mobile vanes and by a five hole probe (Rosemound 858).
  - true airspeed by a Pitot probe
  - temperature by a fast response "INSU" probe
  - humidity by a Lyman-alpha humidity meter
- Mean state sensors:
  - Rosemount temperature probe
  - Reverse-flow temperature probe
  - General Eastern dew point sensor
- Aerosols and cloud microphysics:
  - 1-D drop size measurements from 0-6000 microns by four Knollenberg sensors
  - 2-D sensor OAP 2DC for drop sizes between 25 and 800 microns
- Liquid water content:
  - Johnson-Williams sensors
- Radiative measurements, up- and downward:
  - Longwave (14-40 microns) Eppley radiometers
  - Shortwave (0.2-2.8 microns) Eppley radiometers
  - Radiances (7.8-14 microns) Barnes PRT5 radiometers
- Chemical measurements(isokinetic veins)
- Pointint backscatter lidar (Leandre)
- Directional reflectances meausrements (POLDER- Polarized Direct Reflectance)

FIRE_AX_SOF_ARAT_TRB
The FOKKER F27 aircraft with flux measurement package and the airborne Lidar Leandre was used during ASTEX. The FOKKER 27 ARAT capabilities were as follows:

- Turbulence measurements of wind, temperature and moisture. Fast response sensors located on a nose boom 5m long, which measured:
  - attack and sideslip angles by mobile vanes and by a five hole probe (Rosemound 858).
  - true airspeed by a Pitot probe
  - temperature by a fast response "INSU" probe
  - humidity by a Lyman-alpha humidity meter
- Mean state sensors:
  - Rosemount temperature probe
  - Reverse-flow temperature probe
  - General Eastern dew point sensor
- Aerosols and cloud microphysics:
  - 1-D drop size measurements from 0-6000 microns by four Knollenberg sensors
  - 2-D sensor OAP 2DC for drop sizes between 25 and 800 microns
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  - Longwave (14-40 microns) Eppley radiometers
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- Pointint backscatter lidar (Leandre)
- Directional reflectances meausrements (POLDER- Polarized Direct Reflectance)

FIRE_AX_SOF_BUOY_DFT
Five drifting buoys (CMM) with bathymetric chains (100 m) provided surface measurements of sea surface temperature, pressure and wind.

FIRE_AX_SOF_BUOY_SPR
A wave buoy (IFREMER) was used to obtain the wave spectrum (not directional measurements). This buoy was drogued to have a slow speed displacement.

FIRE_AX_SOF_PTU
This data set contains radiosounding measurements of pressure, temperature and humidity at selected points (B) and radiosounding measurements of wind at selected points (C).

FIRE_AX_SOF_SUR_BUCK
The data provided were collected via a trailing thermistor with bucket measurements. The thermistor data have been calibrated but not quality controlled.

FIRE_AX_SOF_SUR_DRAK
Data were collected using a DRAKKAR, an upward pointing, two channel microwave radiometer. Its channels are 23.8 and 36.5 GHz, and the antenna aperture is about 15 degrees. It was developed at CRPE based upon the the ATSR/M (ERS-1/MWR) design. Its basic sampling was 0.5 seconds during ASTEX. Calibration was performed prior to the campaign and verified using a cold load on June 12, 1995, and verified again after return to France.

FIRE_AX_SOF_SUR_HYD
The parameters of this dataset were derived from spectral ambient noise at 19 kHz. Underwater sound was measured by a hydrophone hanging to a small buoy, at a few kilometers from the ship Le Suroit during June 1992.

FIRE_AX_SOF_SUR_MET
See Summary above.

FIRE_AX_SOF_SUR_RAD
This data set contains the radiation and pressure measurements collected on Le Suroit during Astex.

FIRE_AX_SOF_SUR_TBAL
See Summary above.

Objective/Purpose:

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Summary of Parameters:

FIRE_AX_SOF_ARAT_FLT	Absolute Humidity Aerosol Concentration Deiced Temperature Dew/Frost Point Temperature Doppler Speed Himidity Ice Infrared Flux Liquid Water Content Mixing Ratio Particle Number Concentration Potential Temperature Radiance Reverse Flow Temperature Static Pressure Static Temperature Visible Flux Wind Direction Wind Speed
FIRE_AX_SOF_ARAT_TRB	Mixing Ratio Pressure Temperature Wind Direction Wind Speed
FIRE_AX_SOF_BUOY_DFT	Hydrostatic Pressure

	Pressure Sea Surface Temperature Temperature Wind Direction Wind Speed
FIRE_AX_SOF_BUOY_SPR	Wave Height Wave Period
FIRE_AX_SOF_PTU	Altitude Humidity Pressure Temperature Wind Direction Wind Speed
FIRE_AX_SOF_SUR_BUCK	Sea Surface Temperature
FIRE_AX_SOF_SUR_DRAK	Brightness Temperature Water Vapor
FIRE_AX_SOF_SUR_HYD	Wave Length Wind Speed
FIRE_AX_SOF_SUR_MET	Dry Bulb Temperature Pressure Sea Surface Temperature Wet Bulb Temperature Wind Direction Wind Speed
FIRE_AX_SOF_SUR_RAD	Infrared Radiation Net Radiation Pressure Solar Radiation
FIRE_AX_SOF_SUR_TBAL	Height Humidity Pressure Specific Humidity Temperature Wind Direction Wind Speed

Discussion:

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Related Data Sets:

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2. Investigator(s):

Investigator(s) Name and Title:

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Title of Investigation:

First ISCCP Regional Experiment (FIRE)

Contact Information:

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Email: INTERNET Alain.Weill@cetp.ipsl.fr

3. Theory of Measurements:

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4. Equipment:

Sensor/Instrument Description:

Collection Environment:

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Source/Platform:

FIRE_AX_SOF_ARAT_FLT	ARAT FOKKER F-27
FIRE_AX_SOF_ARAT_TRB	ARAT FOKKER F-27
FIRE_AX_SOF_BUOY_DFT	DRIFTING BUOY
FIRE_AX_SOF_BUOY_SPR	SPEAR BUOY
FIRE_AX_SOF_PTU	GROUND STATION
FIRE_AX_SOF_SUR_BUCK	SHIP
FIRE_AX_SOF_SUR_DRAK	SHIP
FIRE_AX_SOF_SUR_HYD	BUOY
FIRE_AX_SOF_SUR_MET	SHIP
FIRE_AX_SOF_SUR_RAD	SHIP
FIRE_AX_SOF_SUR_TBAL	SHIP

Source/Platform Mission Objectives:

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Key Variables:

FIRE_AX_SOF_ARAT_FLT	Absolute Humidity Aerosol Concentration Deiced Temperature Dew/Frost Point Temperature Doppler Speed Humidity Ice Infrared Flux Liquid Water Content Mixing Ratio Particle Number Concentration Potential Temperature Radiance Reverse Flow Temperature Static Pressure Static Temperature Surface Temperature Visible Flux Wind Direction Wind Speed
FIRE_AX_SOF_ARAT_TRB	Mixing Ratio Pressure Temperature Wind Direction Wind Speed
FIRE_AX_SOF_BUOY_DFT	Hydrostatic Pressure

	Pressure Sea Surface Temperature Temperature Wind Direction Wind Speed
FIRE_AX_SOF_BUOY_SPR	Wave Height Wave Period
FIRE_AX_SOF_PTU	Altitude Humidity Pressure Temperature Wind Direction Wind Speed
FIRE_AX_SOF_SUR_BUCK	Sea Surface Temperature
FIRE_AX_SOF_SUR_DRAK	Brightness Temperature Water Vapor
FIRE_AX_SOF_SUR_HYD	Wave Length Wind Speed
FIRE_AX_SOF_SUR_MET	Dry Bulb Temperature Pressure Sea Surface Temperature Wet Bulb Temperature Wind Direction Wind Speed
FIRE_AX_SOF_SUR_RAD	Infrared Radiation Net Radiation Pressure Solar Radiation
FIRE_AX_SOF_SUR_TBAL	Height Humidity Pressure Specific Humidity Temperature Wind Direction Wind Speed

Principles of Operation:

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Sensor/Instrument Measurement Geometry:

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Manufacturer of Sensor/Instrument:

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Sensor/Instrument:

FIRE_AX_SOF_ARAT_FLT	ACC.CLOUD DROPLETS CARBON PLATE DOPPLER RADAR FLOW ANGLE SENSORS FSSP HOT-WIRE HYGROMETER INT. NEPHELOMETER OPTICAL COUNTER PLANTINUM RESISTANCE PYRANOMETER PYRGEOMETER RADIOMETER SPECTROMETER

	STRENGTH BALANCE VARIABLE CAPACITANCE
FIRE_AX_SOF_ARAT_TRB	FLOW ANGLE SENSORS HYGROMETER PLATINUM RESISTANCE VARIABLE CAPACITANCE
FIRE_AX_SOF_BUOY_DFT	ANEMOMETER BATHYMETRIC CHAIN THERMISTOR VARIABLE CAPACITANCE
FIRE_AX_SOF_BUOY_SPR	ACCELEROMETER
FIRE_AX_SOF_PTU	RADIOSONDE
FIRE_AX_SOF_SUR_BUCK	THERMISTOR
FIRE_AX_SOF_SUR_DRAK	MICROWAVE RADIOMETER
FIRE_AX_SOF_SUR_HYD	HYDROPHONE
FIRE_AX_SOF_SUR_MET	BAROMETER PSYCHROMETER SONIC ANEMOMETER THERMISTOR
FIRE_AX_SOF_SUR_RAD	BAROMETER PYRANOMETER PYRGEOMETER RADIOMETER
FIRE_AX_SOF_SUR_TBAL	TETHERED BALLOON

Calibration:

Specifications:

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Tolerance:

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Frequency of Calibration:

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Other Calibration Information:

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5. Data Acquisition Methods:

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6. Observations:

Data Notes:

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Field Notes:

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7. Data Description:

Spatial Characteristics:

Spatial Coverage:

Data Set	Min Lat	Max Lat	Min Lon	Max Lon
FIRE_AX_SOF_ARAT_FLT	34.73	37.92	-26.25	-22.80
FIRE_AX_SOF_ARAT_TRB	35.69	37.37	-24.11	110.25
FIRE_AX_SOF_BUOY_DFT	32.66	35.98	-24.11	-19.46
FIRE_AX_SOF_BUOY_SPR	32.82	35.94	-23.98	-21.93
FIRE_AX_SOF_PTU	34.50	37.70	-26.30	-23.08
FIRE_AX_SOF_SUR_BUCK	34.60	37.80	-26.80	-23.20
FIRE_AX_SOF_SUR_DRAK	34.60	37.80	-26.80	-23.20
FIRE_AX_SOF_SUR_HYD	34.60	37.80	-26.80	-23.20
FIRE_AX_SOF_SUR_MET	34.60	37.80	-26.80	-23.20
FIRE_AX_SOF_SUR_RAD	34.60	37.80	-26.80	-23.20
FIRE_AX_SOF_SUR_TBAL	35.00	37.80	-26.80	-24.00

Spatial Coverage Map:

There are no maps available for these data sets.

Spatial Resolution:

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Projection:

...

Grid Description:

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Temporal Characteristics:

Temporal Coverage:

Data Set	Begin Date	End Date
FIRE_AX_SOF_ARAT_FLT	06-08-1992	06-27-1992
FIRE_AX_SOF_ARAT_TRB	06-01-1992	06-20-1992
FIRE_AX_SOF_BUOY_DFT	05-30-1992	06-30-1992
FIRE_AX_SOF_BUOY_SPR	06-01-1992	06-30-1992
FIRE_AX_SOF_PTU	05-31-1992	06-20-1992
FIRE_AX_SOF_SUR_BUCK	05-29-1992	06-19-1992
FIRE_AX_SOF_SUR_DRAK	06-02-1992	06-19-1992
FIRE_AX_SOF_SUR_HYD	06-02-1992	06-19-1992

FIRE_AX_SOF_SUR_MET	05-27-1992	06-23-1992
FIRE_AX_SOF_SUR_RAD	06-02-1992	06-19-1992
FIRE_AX_SOF_SUR_TBAL	06-02-1992	06-19-1992

Temporal Coverage Map:

There are no maps available for these data sets.

Temporal Resolution:

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Data Characteristics:

Parameter/Variable:

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Variable Description/Definition:

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Unit of Measurement:

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Data Source:

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Data Range:

...

Sample Data Record:

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8. Data Organization:

Data Granularity:

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

Data Format:

FIRE_AX_SOF_ARAT_FLT	Native Binary Format
FIRE_AX_SOF_ARAT_TRB	ASCII
FIRE_AX_SOF_BUOY_DFT	ASCII
FIRE_AX_SOF_BUOY_SPR	ASCII
FIRE_AX_SOF_PTU	ASCII
FIRE_AX_SOF_SUR_BUCK	ASCII
FIRE_AX_SOF_SUR_DRAK	ASCII
FIRE_AX_SOF_SUR_HYD	ASCII
FIRE_AX_SOF_SUR_MET	ASCII
FIRE_AX_SOF_SUR_RAD	ASCII
FIRE_AX_SOF_SUR_TBAL	ASCII

9. Data Manipulations:

Formulae:

Derivation Techniques and Algorithms:

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Data Processing Sequence:

Processing Steps:

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Processing Changes:

...

Calculations:

Special Corrections/Adjustments:

...

Calculated Variables:

...

Graphs and Plots:

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10. Errors:

Sources of Error:

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Quality Assessment:

Data Validation by Source:

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Confidence Level/Accuracy Judgement:

...

Measurement Error for Parameters:

...

Additional Quality Assessments:

...

Data Verification by Data Center:

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11. Notes:

Limitations of the Data:

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Known Problems with the Data:

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Usage Guidance:

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Any Other Relevant Information about the Study:

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12. Application of the Data Set:

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13. Future Modifications and Plans:

There are no plans for future modifications of these data sets.

14. Software:

Software Description:

There are sample read software available for these data sets. The codes are written in C. A makefile and readme file are also available. These files allow the users to compile and work with the data easily.

FIRE_AX_SOF_ARAT_FLT	Sample Read Software is available
FIRE_AX_SOF_ARAT_TRB	Sample Read Software is NOT available
FIRE_AX_SOF_BUOY_DFT	Sample Read Software is available
FIRE_AX_SOF_BUOY_SPR	Sample Read Software is available
FIRE_AX_SOF_PTU	Sample Read Software is available
FIRE_AX_SOF_SUR_BUCK	Sample Read Software is available
FIRE_AX_SOF_SUR_DRAK	Sample Read Software is available
FIRE_AX_SOF_SUR_HYD	Sample Read Software is available
FIRE_AX_SOF_SUR_MET	Sample Read Software is available
FIRE_AX_SOF_SUR_RAD	Sample Read Software is available
FIRE_AX_SOF_SUR_TBAL	Sample Read Software is available

Software Access:

The software can be obtained through the Langley DAAC. Please refer to the contact information below. The software can also be obtained at the same time the user is ordering these data sets.

15. Data Access:

Contact Information:

Langley DAAC User and Data Services Office
NASA Langley Research Center
Mail Stop 157D
Hampton, Virginia 23681-2199
USA
Telephone: (757) 864-8656
FAX: (757) 864-8807
E-mail: support-asdc@earthdata.nasa.gov

Data Center Identification:

Langley DAAC User and Data Services Office
NASA Langley Research Center
Mail Stop 157D

Hampton, Virginia 23681-2199
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Telephone: (757) 864-8656
FAX: (757) 864-8807
E-mail: support-asdc@earthdata.nasa.gov

Procedures for Obtaining Data:

The Langley DAAC Information Management System (IMS) is an on-line system that features a graphical user interface (GUI) that allows to query the Langley DAAC data set holdings, to view pre-generated browse products, and to order specific data products. Users may also request data by letter, telephone, electronic mail (INTERNET), or personal visit.

The Langley DAAC User and Data Services (UDS) staff provides technical and operational support for users ordering data. The Langley DAAC Handbook is available in a postscript file through the IMS for users who want detailed information about the Langley DAAC holdings. Users may also obtain a copy by contacting:

Langley DAAC User and Data Services Office
NASA Langley Research Center
Mail Stop 157D
Hampton, Virginia 23681-2199
USA
Telephone: (757) 864-8656
FAX: (757) 864-8807
E-mail: support-asdc@earthdata.nasa.gov
URL: http://eosweb.larc.nasa.gov

Data Center Status/Plans:

The Langley DAAC will continue to archive this data. There are no plans to reprocess.

16. Output Products and Availability:

There are no output products available at this time.

17. References:

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18. Glossary of Terms:

EOSDIS Glossary.

19. List of Acronyms:

NASA - National Aeronautics Space Administration
URL - Uniform Resource Locator

EOSDIS Acronyms.

20. Document Information:

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Citation:
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Document Curator:
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