

First ISCCP Regional Experiment (FIRE) Atlantic Stratocumulus Transition Experiment (ASTEX) University of Washington (UW) 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 the 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.

All data sets discussed in this document were produced by University of Washington (UW). These data sets are:

- FIRE_AX_UW_C131A
- FIRE_AX_UW_DSCRT
- FIRE_AX_UW_GERB_10HZ
- FIRE_AX_UW_GERB_1HZ

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1. Data Set Overview:

Data Set Identification:



FIRE_AX_UW_C131A:	First ISCCP Regional Experiment (FIRE) Atlantic Stratocumulus Transition Experiment (ASTEX) University of Washington C-131A Aircraft Data (FIRE_AX_UW_C131A)
FIRE_AX_UW_DSCRT:	First ISCCP Regional Experiment (FIRE) Atlantic Stratocumulus Transition Experiment (ASTEX) University of Washington C-131A Discrete Data (FIRE_AX_UW_DSCRT)
FIRE_AX_UW_GERB_10HZ:	First ISCCP Regional Experiment (FIRE) Atlantic Stratocumulus Transition Experiment (ASTEX) University of Washington C-131A Cloud 10 Hertz (FIRE_AX_UW_GERB_10HZ)
FIRE_AX_UW_GERB_1HZ:	First ISCCP Regional Experiment (FIRE) Atlantic Stratocumulus Transition Experiment (ASTEX) University of Washington C-131A Cloud 1 Hertz (FIRE_AX_UW_GERB_1HZ)

Data Set Introduction:

FIRE_AX_UW_C131A

The development of parameterizations requires an understanding of the processes that generate, maintain, and dissipate boundary layer clouds. This development is currently impeded by lack of understanding of the transition from stratocumulus clouds to trade cumulus clouds and the factors that control cloud type and amount in the boundary layer. The Atlantic Stratocumulus Transition EXperiment (ASTEX) was designed to address key issues related to stratocumulus to trade cumulus transition and mode selection. ASTEX involved intensive measurements from several platforms operating from 1-28 June 1992 in the area of the Azores and Madeira Islands. The purpose was to study how the transition and mode selection are effected by 1) cloud-top entrainment instability, 2) diurnal decoupling and clearing due to solar absorption, 3) patchy drizzle and a transition to horizontally inhomogeneous clouds through decoupling, 4) mesoscale variability in cloud thickness and associated mesoscale circulations, and 5) episodic strong subsidence lowering the inversion below the LCL. Detailed descriptions of the scientific goals of ASTEX are in the FIRE Phase II: Research plan (1989) and in the ASTEX Operations Plan (1992).

The University of Washington Convair data are best considered raw at this point and should be validated by comparing with data collected from other platforms where possible if high accuracy is desired.

Of the three measures of liquid water content available from the Convair, the Johnson-Williams (JW) hot-wire probe is considered the most readily usable, although there is a significant drift in the output that should be accounted for. The Forward Scattering Spectrometer Probe (FSSP) measured the liquid water content using optical scattering principles.

FIRE_AX_UW_DSCRT

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This ASCII formatted data set includes data collected aboard the University of Washington's Corsair 131A airplane. Several different probes were used to gather data on the liquid water content of clouds, the droplet radius/diameter, and condensation nuclei measurements. All sulfur parameter measurements were made using filter methods.

FIRE_AX_UW_GERB_10HZ

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This ASCII formatted data set includes data collected aboard the University of Washington's Corsair 131A airplane. The cloud microphysics probe (PVM-100A) was used to gather data on cloud liquid water content, particle surface area, and effective droplet radius. Please refer to the reference authored by H. Gerber to obtain information on how the raw data were reduced to produce this data set.

FIRE_AX_UW_GERB_1HZ

The development of parameterizations requires an understanding of the processes that generate, maintain, and dissipate boundary layer clouds. This development is currently impeded by lack of understanding of the transition from stratocumulus clouds to trade cumulus clouds and the factors that control cloud type and amount in the boundary layer. The Atlantic Stratocumulus Transition EXperiment (ASTEX) was designed to address key issues related to stratocumulus to trade cumulus transition and mode selection. ASTEX involved intensive measurements from several platforms operating from 1-28 June 1992 in the area of the Azores and Madeira Islands. The purpose was to study how the transition and mode selection are effected by 1) cloud-top entrainment instability, 2) diurnal decoupling and clearing due to solar absorption, 3) patchy drizzle and a transition to horizontally inhomogeneous clouds through decoupling, 4) mesoscale variability in cloud thickness and associated mesoscale circulations, and 5) episodic strong subsidence lowering the inversion below the LCL. Detailed descriptions of the scientific goals of ASTEX are in the FIRE Phase II: Research plan (1989) and in the ASTEX Operations Plan (1992).

This ASCII formatted data set includes data collected aboard the University of Washington's Corsair 131A airplane. The cloud microphysics probe (PVM-100A) was used to gather data on cloud liquid water content, particle surface area, and effective droplet radius. Please refer to the reference authored by H. Gerber to obtain information on how the raw data were reduced to produce this data set.

Objective/Purpose:

...

Summary of Parameters:

...

Discussion:

...

Related Data Sets:

...

2. Investigator(s):

Investigator(s) Name and Title:

...

Title of Investigation:

First ISCCP Regional Experiment (FIRE)

Contact Information:

for FIRE_AX_UW_C131A and FIRE_AX_UW_DSCRT:

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3. Theory of Measurements:

...

4. Equipment:

Sensor/Instrument Description:

Collection Environment:

...

Source/Platform:

FIRE_AX_UW_C131A UW C131
FIRE_AX_UW_DSCRT UW C131
FIRE_AX_UW_GERB_10HZ UW C131
Z
FIRE_AX_UW_GERB_1HZ UW C131

Source/Platform Mission Objectives:

...

Key Variables:

FIRE_AX_UW_C131A	Condensation Nuclei Dew/Front Point Temperature Droplet Concentration Humidity Irradiance Liquid Water Content Ozone Pressure Surface Temperature Temperature Turbulence
FIRE_AX_UW_DSCRT	Carbon Dioxide Carbon Monoxide Condensation Nuclei Dimethylsulfide Droplet Concentration Effective Droplet Diameter Effective Droplet Radius Liquid Water Content Ozone Particle Diameter Particle Number Concentration Potential Temperature Sulfate Sulfur Dioxide Temperature
FIRE_AX_UW_GERB_10HZ	Effective Droplet Radius Liquid Water Content Particle Surface Area
FIRE_AX_UW_GERB_1HZ	Effective Droplet Radius Liquid Water Content Particle Surface Area

Principles of Operation:



...

Sensor/Instrument Measurement Geometry:

...

Manufacturer of Sensor/Instrument:

...

Sensor/Instrument:

FIRE_AX_UW_C131A	C2H4 CHEMILUMINESCEN CAPACITIVE SENSOR CHILLED MIRROR CLOUD CHAMBER FSSP HOT-WIRE HYGROMETER PLATINUM RESISTANCE PYRANOMETER RADIOMETER REVERSE FLOW RMS PRESSURE VAR
FIRE_AX_UW_DSCRT	C2H4 CHEMILUMINESCEN CLOUD CHAMBER FILTER/FLUORESCENCE FILTER/IC FSSP GC-FID HOT-WIRE IR CO ANALYZER IR CO2 ANALYZER OPTICAL COUNTER PLATINUM RESISTANCE SPECTROMETER
FIRE_AX_UW_GERB_10HZ	OPTICAL COUNTER
FIRE_AX_UW_GERB_1HZ	OPTICAL COUNTER

Calibration:

Specifications:

...

Tolerance:

...

Frequency of Calibration:

...

Other Calibration Information:

...

5. Data Acquisition Methods:

...

6. Observations:



Data Notes:

...

Field Notes:

...

7. Data Description:

Spatial Characteristics:

Spatial Coverage:

Data Set	Min Lat	Max Lat	Min Lon	Max Lon
FIRE_AX_UW_C 131A	32.34	38.94	-27.21	-21.23
FIRE_AX_UW_D SCRT	32.34	38.04	-26.75	-21.23
FIRE_AX_UW_G ERB_10HZ	32.34	37.33	-26.65	-22.22
FIRE_AX_UW_G ERB_1HZ	32.34	37.33	-26.65	-22.22

Spatial Coverage Map:

There are no maps available for these data sets.

Spatial Resolution:

...

Projection:

...

Grid Description:

...

Temporal Characteristics:

Temporal Coverage:

Data Set	Begin Date	End Date
FIRE_AX_UW_C131A	06-02-1992	06-27-1992
FIRE_AX_UW_DSCRT	06-02-1992	06-27-1992
FIRE_AX_UW_GERB_1 0HZ	06-02-1992	06-26-1992
FIRE_AX_UW_GERB_1 HZ	06-02-1992	06-26-1992

Temporal Coverage Map:

There are no maps available for these data sets.

Temporal Resolution:



...

Data Characteristics:

Parameter/Variable:

FIRE_AX_UW_C131A

Variable	Units
time	hhmmss (Z)
lat (gps)	deg N
lon (gps)	deg E
lat (omega)	deg N
lon (omega)	deg E
heading (omega)	deg
true airspeed	m/sec
pressure altitude	km
pressure	mb
temperature (reverse-flow)	C
temperature (Rosemount)	C
dewpoint (EG&G)	C
dewpoint (Ophir)	C
absolute humidity (Ophir)	g/m ³
turbulence	cm ^(2/3) /sec
condensation nuclei	#/cm ³
droplet concentration (FSSP)	#/cm ³
liquid water (FSSP)	g/m ³
liquid water (Johnson-Williams probe)	g/m ³
liquid water (King probe)	g/m ³
sst	C
visible radiation (upward)	W/m ²
visible radiation (downward)	W/m ²
uv radiation	W/m ²
ozone	ppb

FIRE_AX_UW_DSCRT

1. time: the time of sample collection; units are hh:mm LST.
2. altitude: pressure-altitude of aircraft; units are kilometers.
3. temperature: environmental temperature; units are degrees C.
4. temperature (humidity-corrected): units are degrees C.
5. potential temperature: units are degrees C.
6. moist static energy: the sum of the sample's enthalpy, gravitational potential energy and latent heat content; analogous to equivalent potential temperature; units are joules per gram of air.
7. liquid water content: measured with the Johnson-Williams probe; units are grams of water per cubic meter of air.
8. droplet concentration: atmospheric concentration of water droplets measured with the Forward Scattering Spectrometer Probe; units are number of droplets per cubic centimeter of air.
9. liquid water content: measured with the Forward Scattering Spectrometer Probe; units are grams per cubic meter.
10. effective droplet radius: measured with the Forward Scattering Spectrometer Probe; units are microns.
11. liquid water content: measured with the Gerber probe; units are grams per cubic meter.
12. effective droplet diameter: measured with the Gerber probe; units are microns.
13. carbon dioxide concentration: units are ppm.
14. carbon monoxide concentration: detection limit is 0.25 ppm.
15. ozone concentration: units are ppb
16. sulfur dioxide concentration: units are ppt; detection limit is 5 ppt.
17. dimethylsulfide concentration: units are ppt; detection limit is 2 ppt.
18. particulate sulfate concentration: units are micrograms of sulfate per cubic meter of air; detection limit is 0.005 micrograms per cubic meter.
19. condensation nuclei (particle) concentration: units are number of particles per cubic centimeter of air; particle size limit for detection is ~0.005 microns.
20. particle diameter: for particle spectra plots; measured with Differential Mobility Particle Spectrometer; units are microns.



21. dn/dlogd: particle number concentration per size increment for particle spectra plots; measured with Differential Mobility Particle Spectrometer; units are number per cubic centimeter. *****(Please refer to the readme file which accompanies this data set. There is important information pertaining to the collected validity of the data.)*****

FIRE_AX_UW_GERB_10HZ

Please refer to the Sample Data Record below for variables and units contained within these data sets.

FIRE_AX_UW_GERB_1HZ

Please refer to the Sample Data Record below for variables and units contained within these data sets.

Variable Description/Definition:

...

Unit of Measurement:

...

Data Source:

...

Data Range:

...

Sample Data Record:

FIRE_AX_UW_C131A

```
flight 1557 06/02/92 25
timeh latgps longps latomg lonomg thdgo tas
hhmmss deg deg deg deg deg m/s km
085900 36.888 -25.199 36.91 -25.20 136. 80.9
```

```
palt pstat tstatr tstat dp dp_o
deg m/s deg C deg C deg C deg C
0.875 908. 5.2 5.5 4.8 6.0
```

```
rhovo turb cnc1 fsprt lwfsp
gm/m^3 cm^(2/3)/s #/cm^3 #/cm^3 gm/m^3 gm/m^3 gm/m^3
7.28 0.8 1552. 148 0.062
```

```
lwjw lwkg irtemp pyrup pyrdn uv o3
deg C W/m^2 W/m^2 w/m^2 ppb
0.107 ***** 13.66 246. 18. 11. 29.2
```

FIRE_AX_UW_DSCRT

-- Temperatures --					
time	alt	t	thum	tpot	mse
LST	km	C	C	C	j/g
1	2	3	4	5	6
9:27	1.164	9.0	8.9	19.9	309.
	0.001	0.1	0.1	0.1	1.

```
----- Liquid Water -----
| J-W |----- FSSP -----|-- Gerber --|
```



lwc	drpc	lwc	efra	lwc	efdi
gm/ m^3	#/ cm^3	gm/ m^3	um	gm/ m^3	um
7	8	9	10	11	12

0.000 0 0.000 ND 0.025 ND
0.000 0 0.000 0.003

Gases					Particles				
					Sulfur		DMPS		
co2	co	o3	so2	dms	slft	cn	d	dndld	
ppm	ppm	ppb	ppt	ppt	ug/ m^3	#/ cm^3	um	#/ cm^3	
13	14	15	16	17	18	19	20	21	

371.6 BDL 40.3 ND ND ND 532 ND ND
0.6 0.5 8

FIRE_AX_UW_GERB_10HZ

FLT 1563 June 15 Interval No. 21
U.W. Time frl61100 tol65000

time (S)	LWC (g/m^3)	PSA (cm^2/m^3)	r(eff) (um)
0.000	-0.008	-38.500	0.000
0.102	-0.008	-38.497	0.000
0.203	-0.008	-38.494	0.000
0.305	-0.008	-15.391	0.000
0.406	-0.008	-15.388	0.000
0.508	-0.008	-15.385	0.000
0.609	-0.008	-38.482	0.000
0.711	-0.008	-38.479	0.000
0.813	-0.008	-38.476	0.000
0.914	-0.008	-15.373	0.000
1.016	-0.008	-38.470	0.000
1.117	-0.008	-15.367	0.000
1.219	-0.008	-15.364	0.000
1.320	-0.008	-15.361	0.000
1.422	-0.013	-15.358	0.000
1.524	-0.008	-15.355	0.000
1.625	-0.008	-15.352	0.000
1.727	-0.008	-15.349	0.000
1.828	-0.008	-38.446	0.000
1.930	-0.008	-15.343	0.000
2.031	-0.008	-38.440	0.000

SAMPLE DATA: "ASTEX21.1HZ"

FLT 1563 June 15 Interval No.21
U.W. Time frl61100 tol65000 --

time (s)	LWC (g/m^3)	PSA (cm^2/m^3)	r(eff) (um)	WITH	WITH	WITH
				DRIZZLE LWC (g/m^3)	DRIZZLE PSA (cm^2/m^3)	DRIZZLE r(eff) (um)
0.000	0.000	0.000	0.000	0.000	0.000	0.000

1.016	-0.008	-29.243	0.000	-0.008	-29.243	0.000
2.031	-0.009	-19.973	0.000	-0.009	-19.973	0.000
3.047	-0.008	-24.564	0.000	-0.008	-24.564	0.000
4.063	0.009	26.286	0.000	0.009	26.286	0.000
5.078	0.003	10.147	0.000	0.003	10.147	0.000
6.094	0.000	-1.373	0.000	0.000	-1.373	0.000
7.008	0.000	-2.886	0.000	0.000	-2.886	0.000
8.024	-0.001	0.224	0.000	-0.001	0.224	0.000
9.039	-0.002	0.255	0.000	-0.002	0.255	0.000
10.055	0.000	-1.256	0.000	0.000	-1.256	0.000

FIRE_AX_UW_GERB_1HZ

Same as FIRE_AX_UW_GERB_10HZ

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_UW_C131A ASCII
 FIRE_AX_UW_DSCRT ASCII
 FIRE_AX_UW_GERB_10H ASCII
 Z
 FIRE_AX_UW_GERB_1HZ ASCII

9. Data Manipulations:

Formulae:

Derivation Techniques and Algorithms:

...

Data Processing Sequence:

Processing Steps:

...

Processing Changes:

...

Calculations:

Special Corrections/Adjustments:

...

Calculated Variables:

...

Graphs and Plots:

...



10. Errors:

Sources of Error:

...

Quality Assessment:

Data Validation by Source:

...

Confidence Level/Accuracy Judgement:

...

Measurement Error for Parameters:

...

Additional Quality Assessments:

...

Data Verification by Data Center:

...

11. Notes:

Limitations of the Data:

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Known Problems with the Data:

...

Usage Guidance:

...

Any Other Relevant Information about the Study:

...

12. Application of the Data Set:

...

13. Future Modifications and Plans:

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

14. Software:

Software Description:

There isn't any read software for these data sets.

Software Access:

Readme files and other types of files to assist in working with the data will be provided when users order these data sets through the Langley DAAC.

15. Data Access:



Contact Information:

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Data Center Identification:

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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:

...

18. Glossary of Terms:

[EOSDIS Glossary.](#)

19. List of Acronyms:

NASA - National Aeronautics Space Administration

URL - Uniform Resource Locator

[EOSDIS Acronyms.](#)



20. Document Information:

Document Revision Date:

October 07, 1996; May 28, 1997; November 24, 1997

Document Review Date:

October 07, 1996

Document ID:

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Citation:

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Document Curator:

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