CAMEX Data Access

Robbie Hood

NASA / Marshall Space Flight Center

Global Hydrology & Climate Center

National Space Science & Technology Center

6 May 2004

Overview of Experiment

Science Team

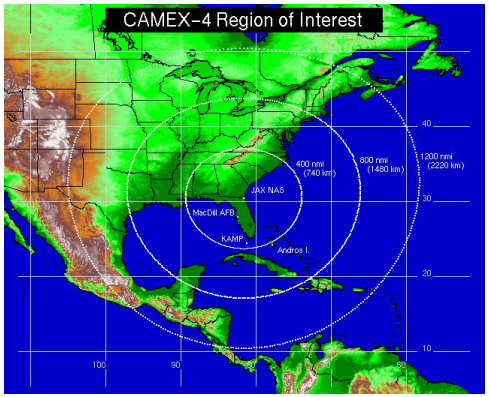
- **20 - 30 Principal Investigators from multiple NASA Centers, universities, and other governmental agencies**
- **Research collaboration with NOAA Hurricane Research Division and USWRP**

Field Operations

- **CAMEX-3**
  - **Based in Melbourne, FL during 6 August – 23 September, 1998**
  - **Sampled Bonnie, Danielle, Earl, and Georges**
- **CAMEX-4**
  - **Based in Jacksonville, FL during 16 August – 24 September, 2001**
  - **Sampled Chantal, Erin, Gabrielle, and Humberto**

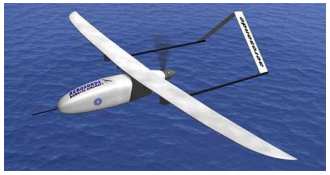
Information

- **All data publicly available at http://camex.msfc.nasa.gov**



NASA ER-2

NASA DC-8



AEROSONDE

Types of Data

- **ER-2 (Remote sensors)**
  - **Doppler radar, passive microwave radiometers and profiler, spectrometer (Vis/IR), lightning, dropsonde,etc**
- **DC-8 (Remote sensors and in-situ instruments)**
  - **Microphysics, microwave radiometers and profiler, lidar, lightning, meteorological measurement system, dropsonde, two frequency scanning radar**
- **Ground-based**
  - **Radars, profiler, radiosonde, etc.**
- **Aerosonde (CAMEX-4 only)**

Overview

CAMEX-4 Data & information system is comprised of:

- Web site
- FTP access
- Data sets
- Archive
- Documentation

CAMEX-4 Web Site

- Provides access to data in several ways:
  - Calendar date
  - Alphabetical list (links to FTP site)
  - Search on instrument, source, date, parameter)
- Data is available for download
- Search and access to Instrument Reports, Weather Summaries, Mission Scientist Reports
- Science Presentations

Data Center Functions

Ingest, archive, catalog, document and distribute datasets

- Ingest – receive data and/or information at GHCC
- Archive – primarily store data on a StorageTek 9314
- Catalog – datasets listed on EOSDIS Data Gateway, Global Change Master Directory, and local GHCC systems
- Document – guides, readmes, metadata for catalogs
- Distribute – ftp, media orders, user services help
  - Web site (http://camex.msfc.nasa.gov)
  - FTP access (ftp://ghrc.msfc.nasa.gov/pub/data/camex4

CAMEX Web Site

The fourth Convection and Moisture Experiment

Data via Calendar | Related Sites | Data Search | Field Reports | Science Presentations

CAMEX-5:
Planning
White Paper

Participants:
Managers
Funded Science Investigators
Other Investigators
Support Personnel
Aircrew

Instruments:
Aerosonde
Andros Island
NASA DC-8
NASA ER-2
KAMP

Hurricane & Flight Tracks
Hurricane Tracks
Flight Tracks
Satellite Tracks
Flight Plans

News & Information:
Aircraft
CAMEX-4 News
CAMEX-4 Gallery
CAMEX-4 Diary
CAMEX-3 Website

Surface Data Sites:
Andros Island
Rawinsondes
TRMM KAMP

The Convection And Moisture EXperiment (CAMEX) is a series of field research investigations sponsored by the Earth Science Enterprise of the National Aeronautics and Space Administration (NASA). The fourth field campaign in the CAMEX series (CAMEX-4) is scheduled for 16 August - 24 September, 2001 and is based out of Jacksonville Naval Air Station, Florida.

CAMEX-4 is focused on the study of tropical cyc nsification, and landfalling impacts using NASA-funded aircraft and surface ry aircraft used during CAMEX-4 are the NASA DC-8 and ER-2 researc rcraft will fly over, through, and around selected hurricanes as they approac and along the east coast of the United States. The NASA aircraft will investig ot normally sampled. Where possible, measurements will be compare s from the QuikSCAT, Terra, and Tropical Rainfall Measuring Mission satellite poral information of hurricane structure, dynamics, and motion. These data, when analyzed within the context of more traditional aircraft, satellite, and ground-based radar observations,should provide additional insight to hurricane modelers and forecasters who continually strive to improve hurricane predictions. More accurate hurricane predictions at landfall will result in decreasing the size of necessary coastal evacuations and increasing the warning time for those areas.

Field Reports

While remote sensing of the hurricane environment is the primary objective of CAMEX-4, there will also be separate flights to study thunderstorm structure, precipitation systems, and atmospheric water vapor profiles. This portion of CAMEX-4 is known as KAMP, Keys Area Microphysics Project. The objective of the KAMP flights is to improve quantitative precipitation estimates from passive and active microwave instruments.

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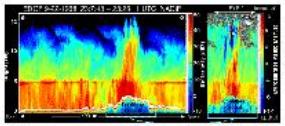
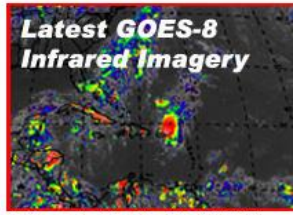
Dr. Ramesh Kakar (Program Manager for Atmospheric Dynamics and Remote Sensing at NASA Headquarters) is the CAMEX-4 sponsor. CAMEX-4 is conducted in collaboration with the National Oceanic and Atmospheric Administration (NOAA) Hurricane Research Division and the United States Weather Research Program (USWRP).

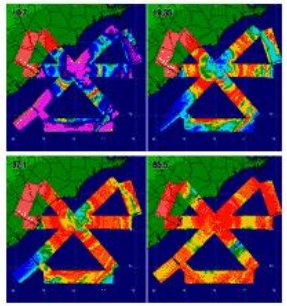


EDOP nadir radar reflectivity (left) and Doppler velocity (right) in an east-west section across the Dominican Republic and its main mountain ridge around 23:15 UTC on 22 September 1998. The Doppler velocity includes both air motion and hydrometeor fallspeed. This image was taken during the CAMEX-3 field experiment.

CAMEX-4 region of interest with range ring centered on Jacksonville Naval Air Station (JAX NAS). The research aircraft will typic fly tropical cyclones in the Atlantic, Caribbe or Gulf of Mexico within 800 nautical miles the Jacksonville base of operations.

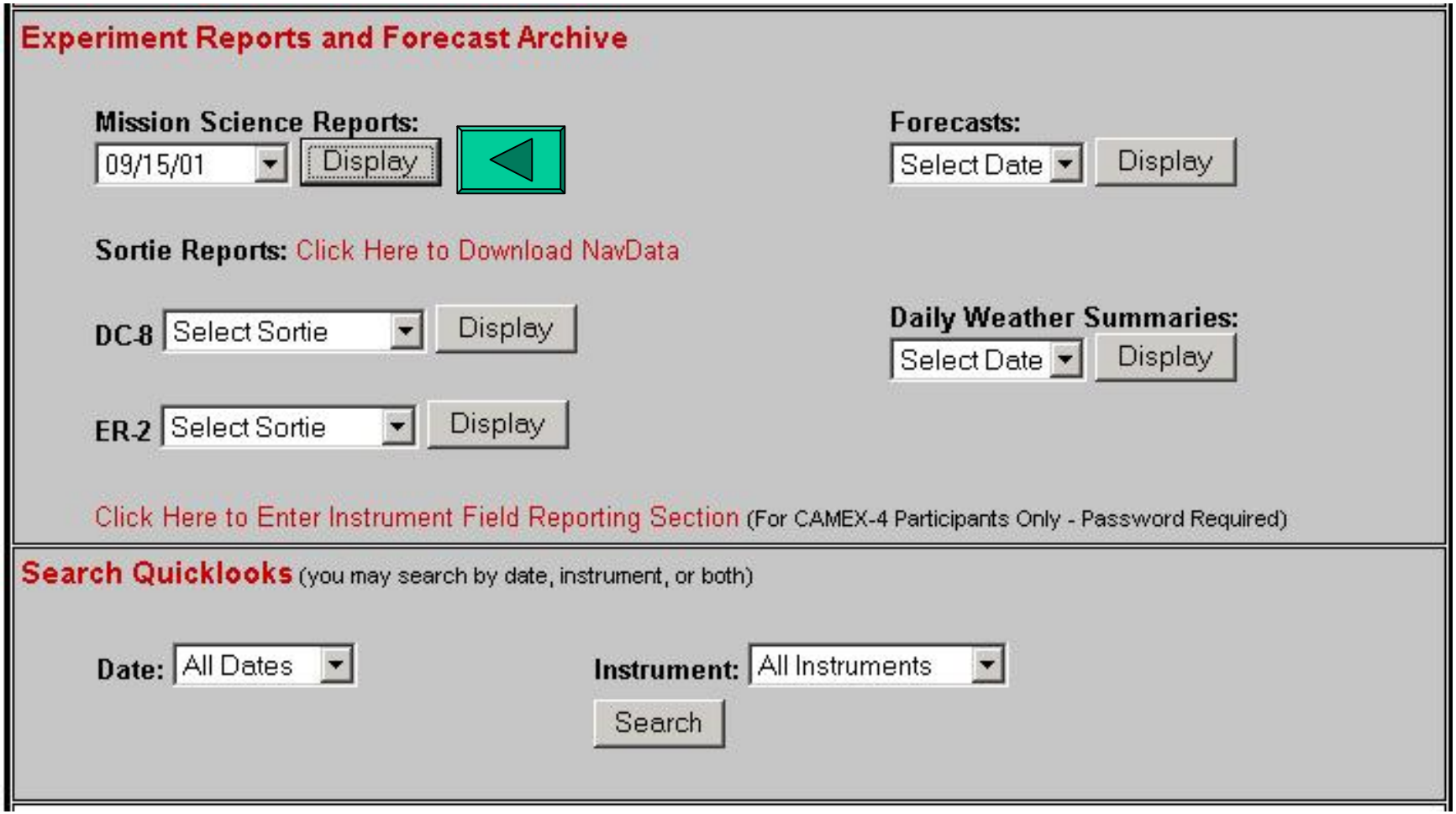


Click Image to View the Latest GOES-8 Infrared Satellite Imagery



Search

Search database for reports, forecasts, weather summaries, and quicklooks



Mission Scientist Reports

Mission Science Report Archive

Mission Date: 09/15/2001 **Mission Scientist:** Zipser, Edward	**Sortie Number:** **DC-8** 010414 **ER-2** None **Aerosonde** None

Mission Description:

2 a/c mission in TC Gabrielle, located near 30 N 79 W. (The ER-2 was desired but could not consider operating with the string crosswinds at JAX.) The mission can best be characterized as "extratropical transition", but it should prove to be an excellent data assimilation mission. It does not fit neatly into any category. The storm has just emerged off the Florida coast over the Gulf Stream, and the major issue was whether it would reorganize and intensify.

Mission Objective:

The principal objective was to map the somewhat unconventional flow fields and thermodynamic fields in a rotated figure-4 pattern, extended as far from the cyclone center as possible. The location on our doorstep permitted legs for the DC8 between 150-250 nm in radius in most quadrants, and mostly accomplished with close coordination with the NOAA P-3 on center crossings.

Mission Notes:

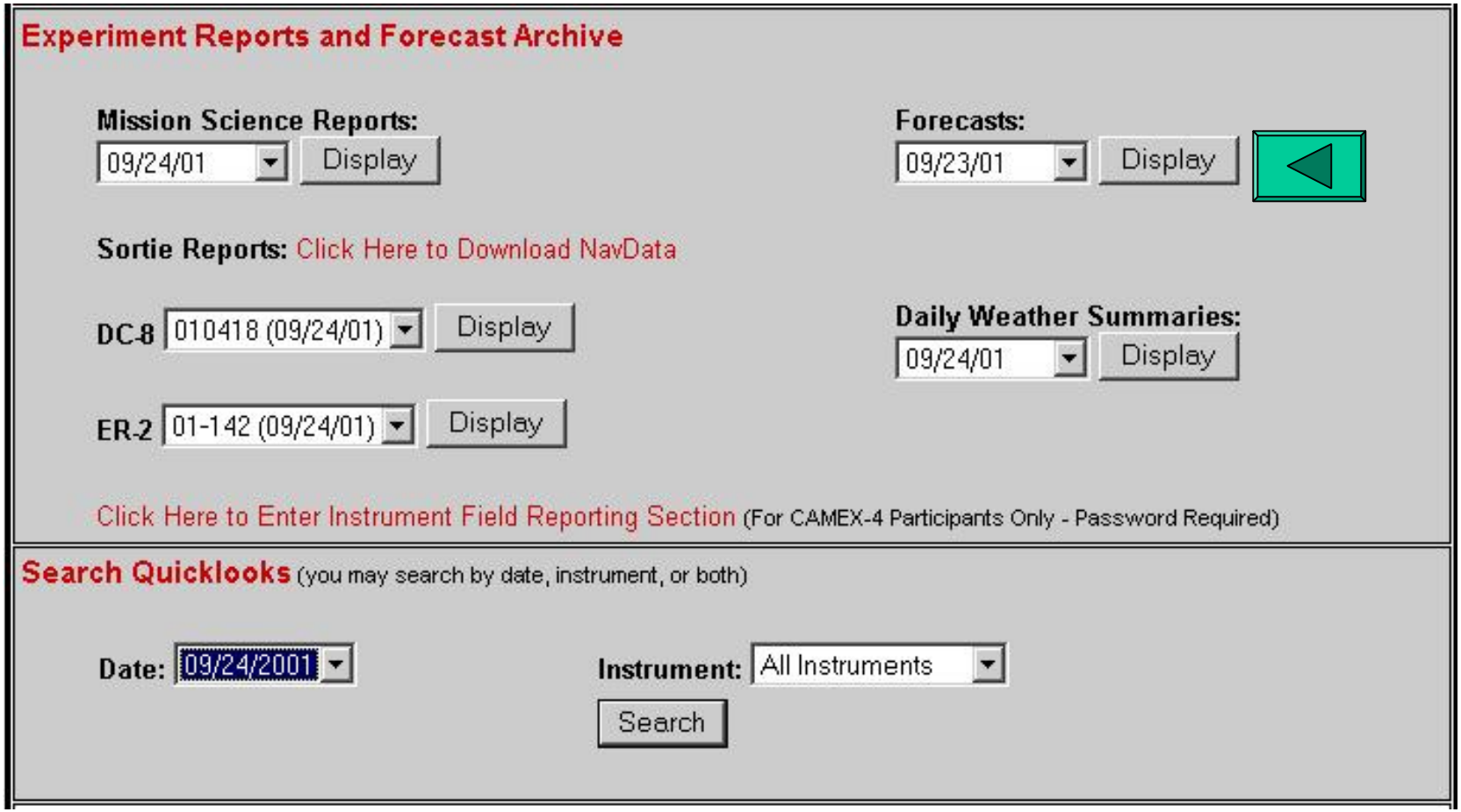
This storm defied the forecast models. It refused to reintensify as advertised over the Gulf Stream on this flight day. (The next day's mission was flown by the P3 and ER-2 only because DC8 had a mechanical problem. That day featured a storm approaching hurricane strength, again not well handled by the models.) The structure was unusual, with a dry southwest flow over and south of the center, and strong convection only to the N and NE of the center. Periodic outbreaks of intense convection persisted in these quadrants (and these quadrants only) for 48 hours, apparently being enough to deepen the storm. The DC8 patterns included several crossings of the dry slot on the SE side of the storm, with extremely low water vapor content measured by LASE and the JPL hygrometer. There were about 9 dropsondes launched, and the first 6 were transmitted to NHC before some unknown failure prevented the remainder from following. The total data coverage from the P3 and its drops, the DC8 and its drops, and the NOAA Gulfstream and its drops, should guarantee one of the most comprehensive data sets on any storm and its environment ever obtained. Modelers take note.

Ground/Other Assets Summary:

NOAA 49 track west and far NE of storm; many dropsondes

Search For Forecasts

Search database for field forecasts made by forecasters from Florida State University



Forecasts

CAMEX-4 Forecast Archive

Forecaster: Axe, Liza
Date: 09/23/2001
Initial Forecast Time: 1200 UTC

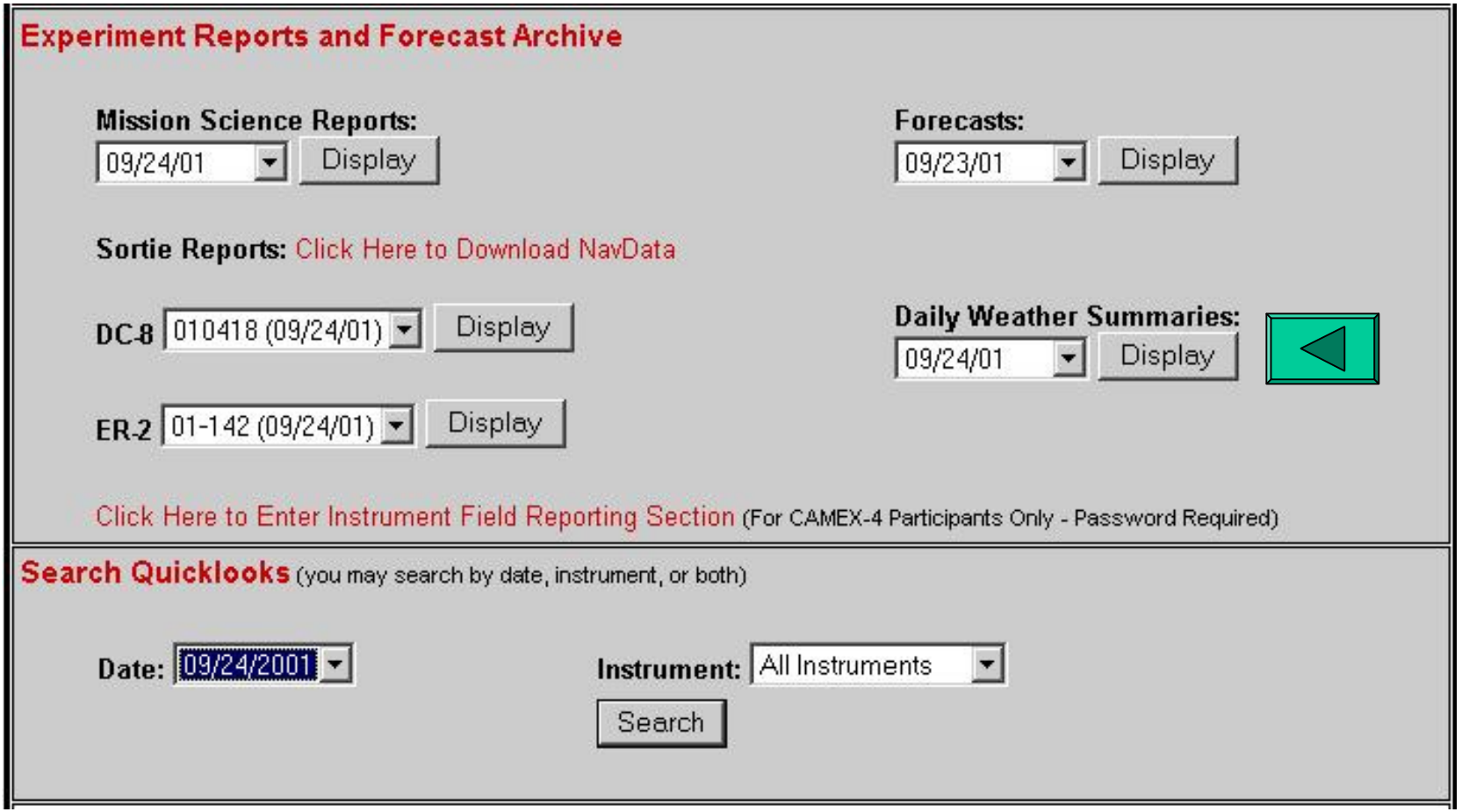
Initial Forecast
Tropical--Humberto is located at 30.5N 67.5W with 55 kt winds and central pressure of 994 mb. Satellite imagery shows good outflow to the north and the upper level low to its SW. The trough in the US continues to move E which will effect the storm in about 24-36 hrs. The shear is relaxing a bit which will allow for some further intensification and the SST's are high. But movement to the north the shear will increase and the SST's will become cooler. Elsewhere, no development is expected.
JAX--partly cloudy with patching fog. Winds NNE at 3 kt and a temp of 77.
EYW--mostly cloudy with heavy rain. Winds ESE at 10 mph and a temp of 81.

6 Hour Forecast
Tropical--Slight intensification of Humberto and moving to the NW.
JAX--PATCHY EARLY MORNING DENSE FOG. LOCAL VISIBILITIES NEAR ONE- QUARTER MILE AT TIMES. OTHERWISE...MOSTLY CLOUDY WITH A 60 PERCENT CHANCE OF AFTERNOON SHOWERS AND THUNDERSTORMS. HIGHS IN THE MID TO UPPER 80S. LIGHT AND VARIABLE WINDS...BECOMING EAST AROUND 10 MPH THIS AFTERNOON.
EYW--PARTLY CLOUDY WITH ISOLATED SHOWERS AND THUNDERSTORMS. HIGHS IN THE UPPER 80S. EAST WINDS 10 MPH. CHANCE OF RAIN 20 PERCENT.

12 Hour Forecast
Tropical--Humberto will intensify slightly according to the NHC with winds just about cat 1 level. The storm will pass to the west of Bermuda with no problem. It will continue moving NNW around 10 kt.
JAX--MOSTLY CLOUDY WITH A 40 PERCENT CHANCE OF EVENING SHOWERS AND THUNDERSTORMS. PATCHY LATE NIGHT FOG. LOWS NEAR 70. LIGHT SOUTHEAST TO SOUTH WINDS.
EYW--PARTLY CLOUDY WITH ISOLATED SHOWERS AND THUNDERSTORMS. LOWS IN THE UPPER 70S. EAST WINDS 10 MPH. CHANCE OF RAIN 20 PERCENT.

Search Weather Summaries

Search database for weather summaries that provide a recap of the tropical weather at JAX, KAMP, and storm locations



Weather Summaries

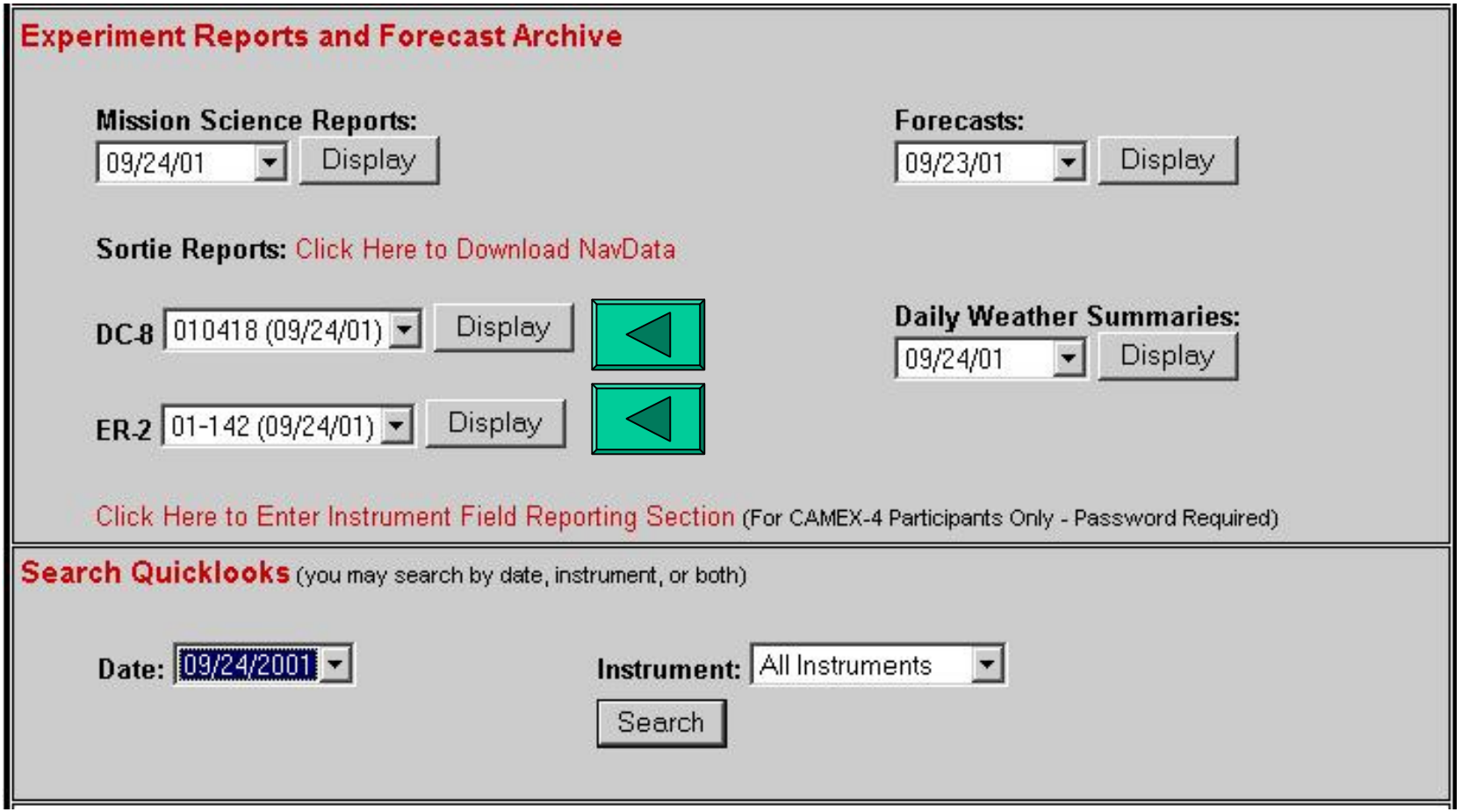
Daily Weather Summary		
Name: Liza Axe	**Date:** 09/24/01	0000 **to** 0000
Weather Summary Tropical--Humberto has and will continue weakening as it moves NE. Most of the deep convection has been on the north and west side of the storm today. Currently it is located at 37.2N 63.9W with winds of 65 kt. JAX--partly cloudy with showers and thunderstorms due to the cold front passing through the area. On behalf of Krish's lab, thank you and good luck. It was a pleasure to work with all of you.		

Missing a few summaries on:

- 17 & 27 August
- 4, 7, 10, 18-19 September

Search Flight Reports

Search database for information on the takeoff & landing, mission objectives, etc for the ER-2 and DC-8



Sortie Reports

Sortie Report Archive		
Report Filed By: Michael Craig		
Sortie ID 010418	**Platform** DC-8	**Sortie Date** 09/24/01
Launch Time 1842	**Landing Time** 0313	**Flight Hours Used** 8.5
Platform Status DC-8 Ready		
Next Flight Plan Transit to Dryden		
Flight Path		
Flight Objective Hurricane Humberto Coves Miss		
Pilot Name Ed Lewis, Jr		
Co-Pilot Name Bill Brockett		
Mission Manager Walter Klein		

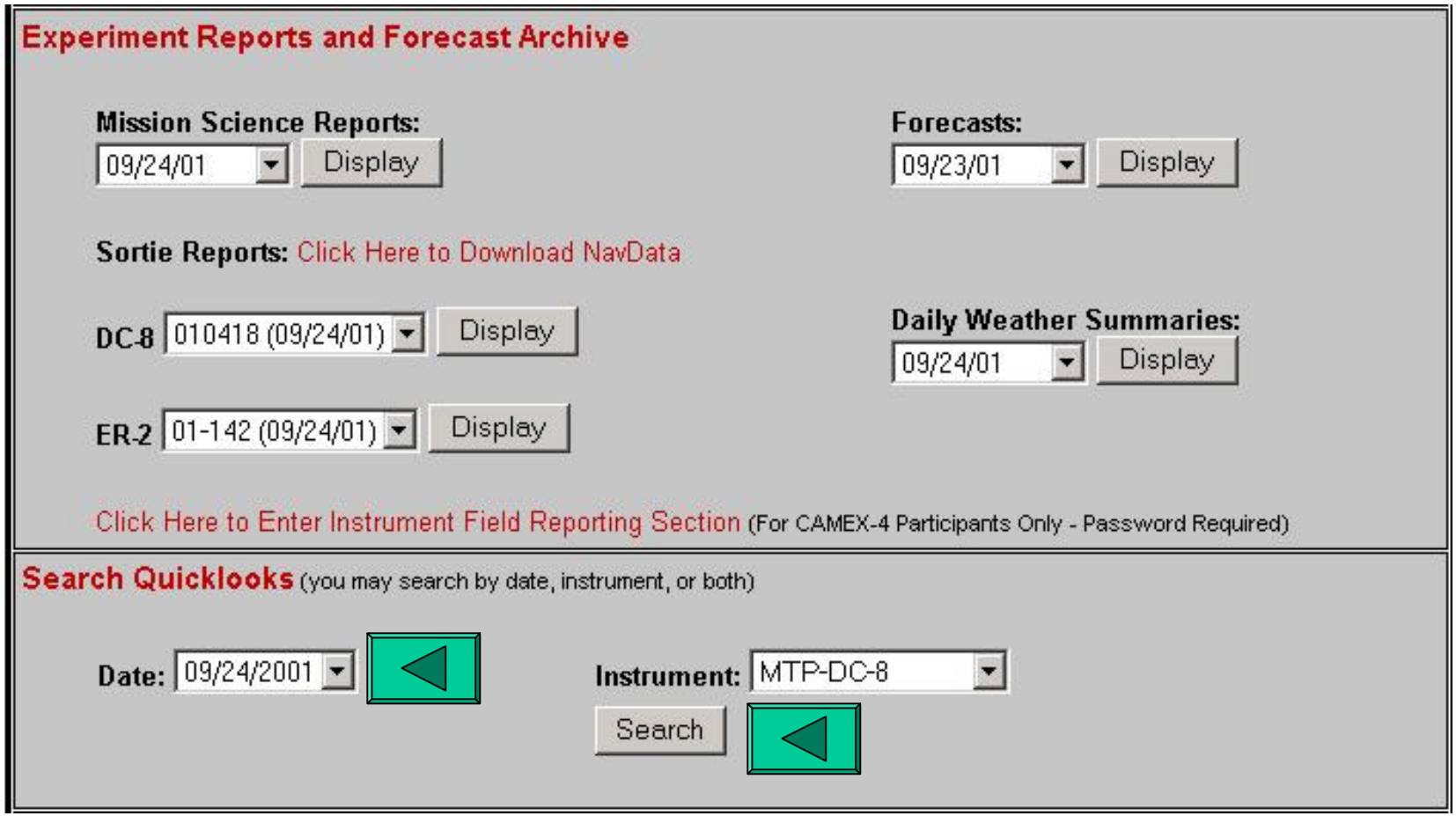
DC-8

ER-2

Sortie Report Archive		
Report Filed By: Michael Craig		
Sortie ID 01-142	**Platform** ER-2	**Sortie Date** 09/24/01
Launch Time 1830	**Landing Time** 0115	**Flight Hours Used** 6.7
Platform Status ER-2 Ready		
Next Flight Plan Transit to Dryden		
Flight Path		
Flight Objective Hurricane Humberto Coves Mission		
Pilot Name Ken Broda		
Co-Pilot Name none		
Mission Manager Mike Kapitzke		

Search Quicklooks

Specify a specific instrument and/or a date to get a listing of quicklooks online.



Quicklooks

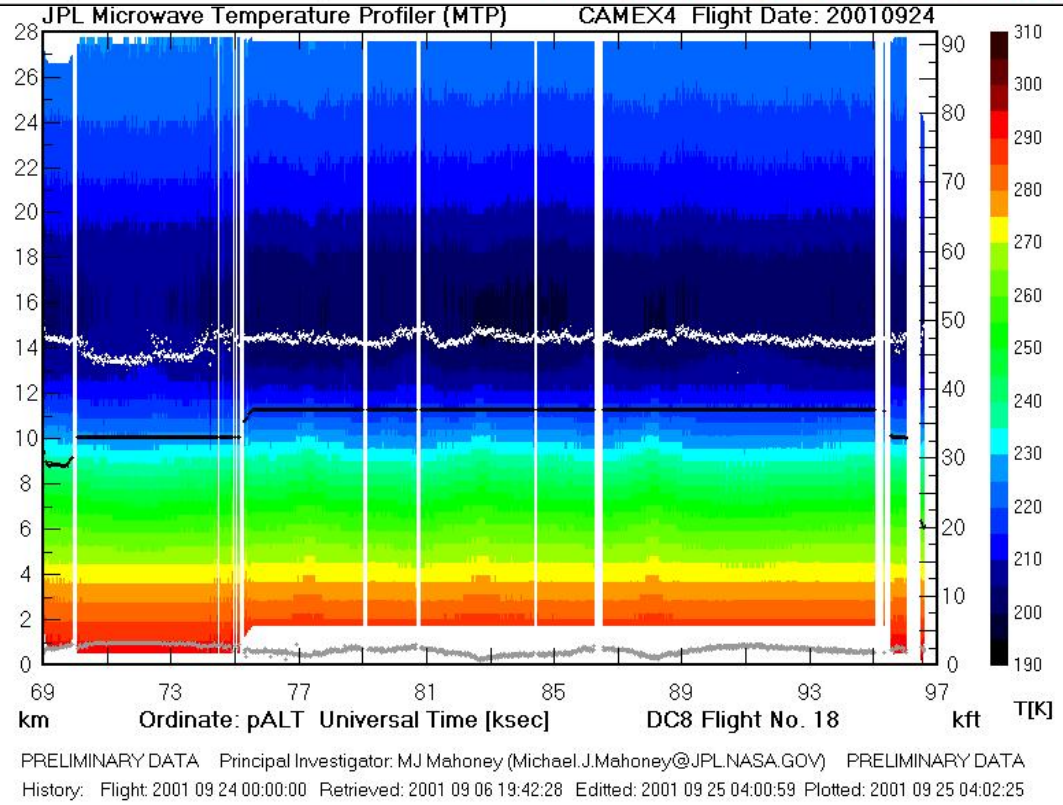
Search Quicklooks (you may search by date, instrument, or both)

Date: 09/24/2001 **Instrument:** MTP-DC-8

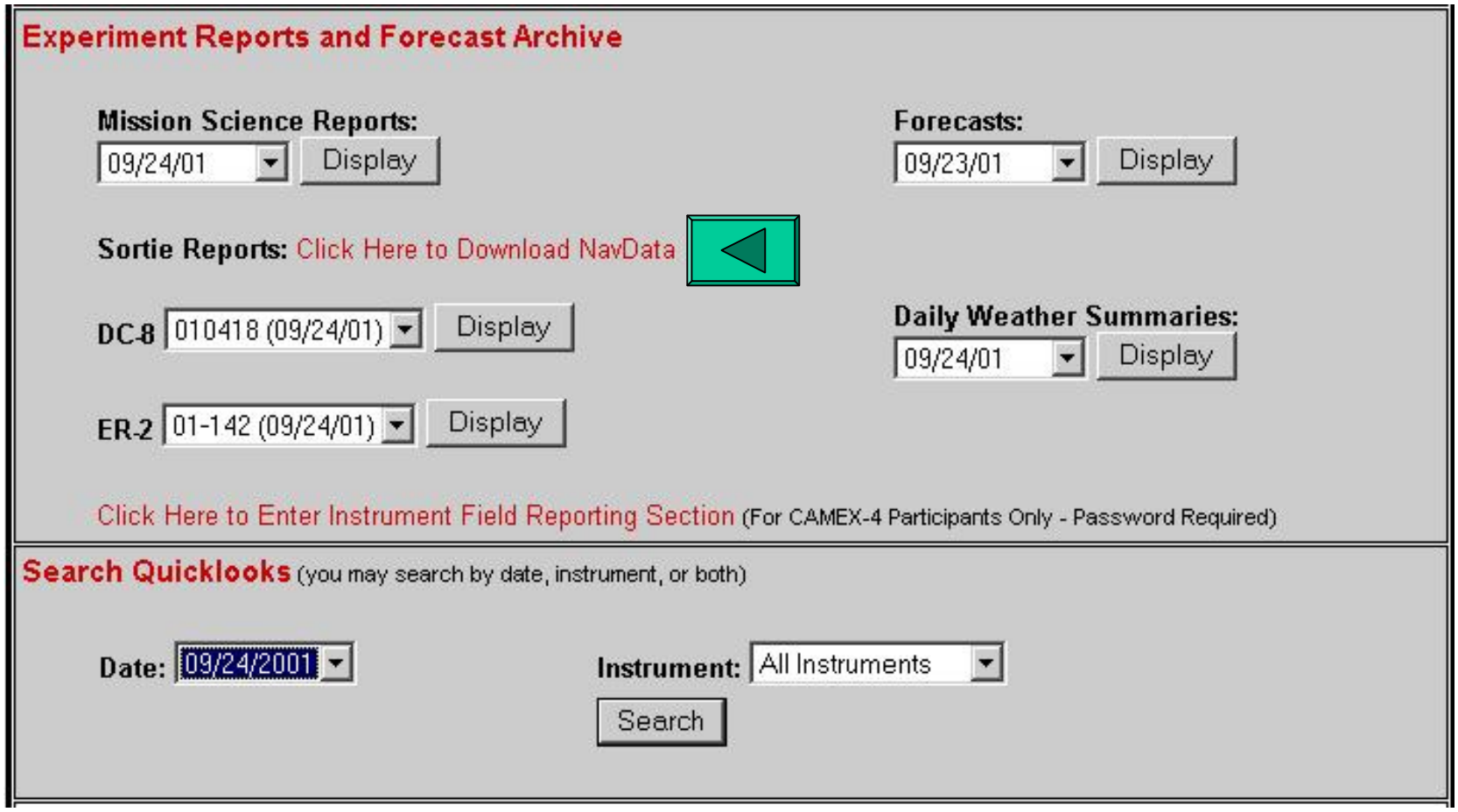
Search

Quicklooks

Date	Instrument	Quicklook
09/24/2001	MTP-DC-8	c4d8MTP_2001.0924_010418_prelim-CTC.png



Search Aircraft Navigation



Aircraft Navigation

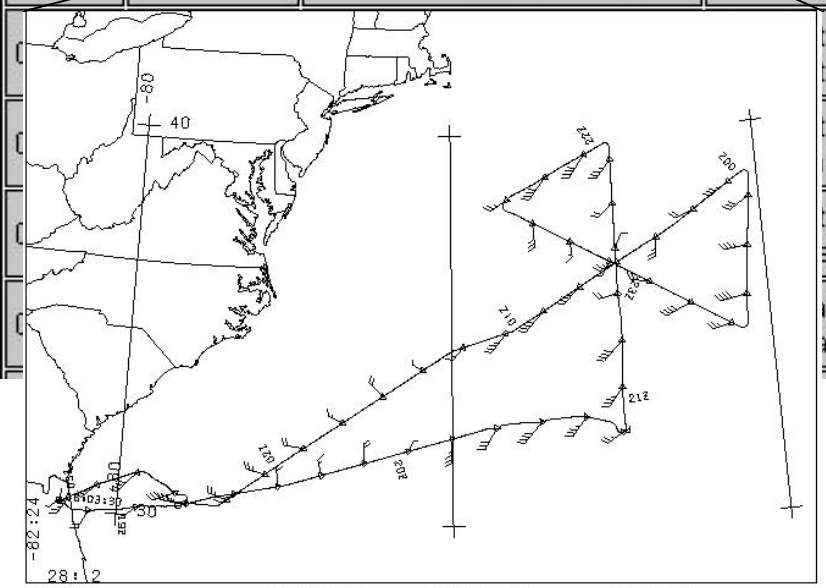
Navdata Archive

ER-2 | DC-8

ICATS Format Documentation
MS Excel | **ASCII**

DC-8

Sortie #	Sortie Date	Data Files	Description
010418	09/24/2001	Navdata | Track | Log	DC-8 Nav. Data for flight #010418 on 9/24/2001 into Hurricane Humberto.
010417	09/23/2001	Navdata | Track | Log	DC-8 Nav. Data from flight #010417 on 9/23/2001 into Hurricane Humberto.

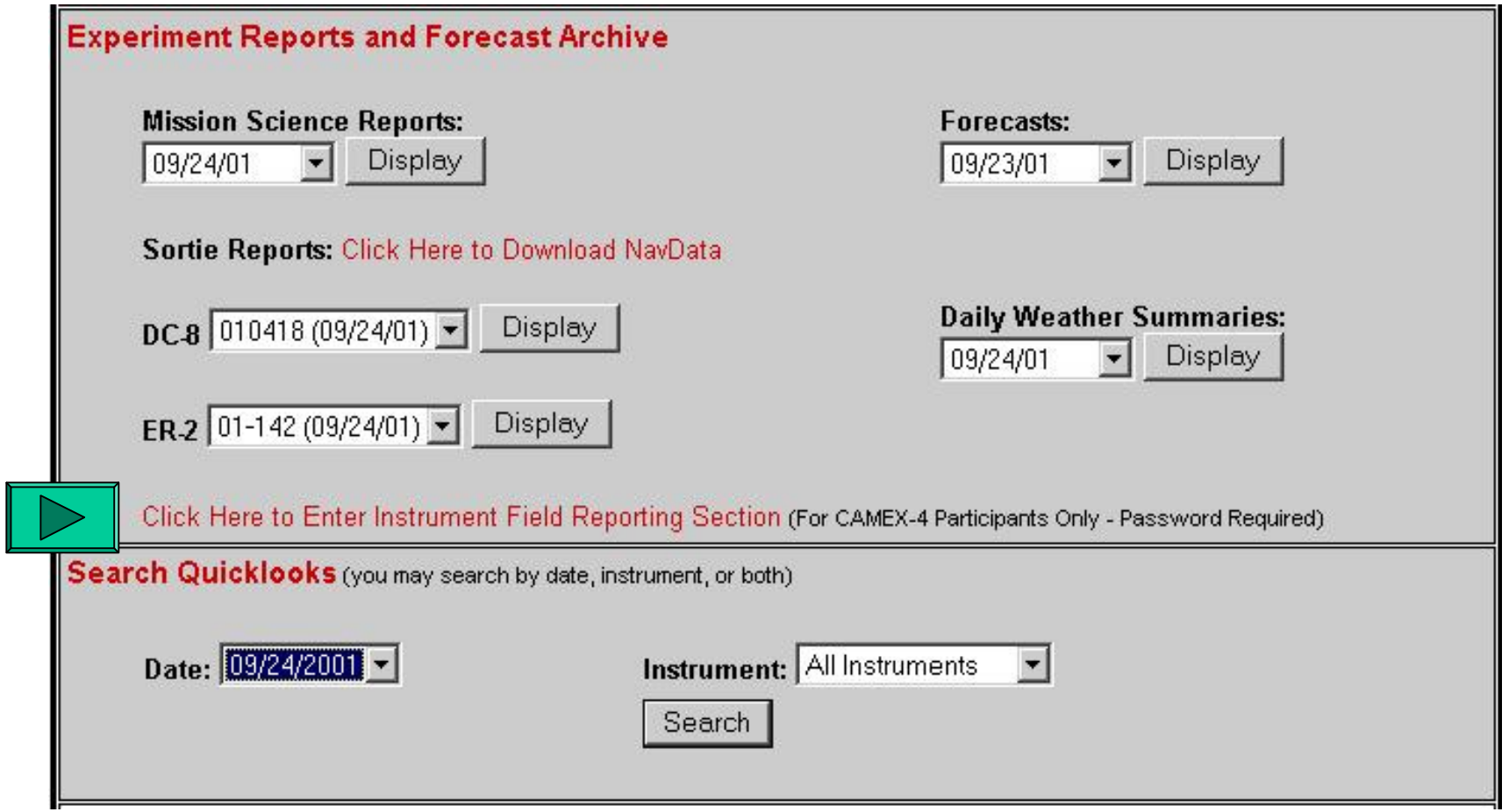



```
DC-8 Mission Director Log

                                    Mission  Name: CAMEXIV
                                    Flight Number: 010418
                                          Day : 267
                                       Date(PCT): Sep 24, 2001
-------------------------------------------------------------------------
18:52:24 | Taxi-18:35:18, B/R-18:41:52, T/O-18:42:32
--------------
18:53:05 | Pilot-Lewis, CP-Brockett, FE-Trout, Nav-Hall
--------------
18:53:24 | Hurricane Humberto Day 3
--------------
19:04:59 | Climb to FL330
         |
         | Next waypoint:    TROUT              NMS:              1
         | Pressure alt:     30746              Latitude:   +30 14.9
         | Radar alt:        32478              Longitude: +079 12.2
--------------

--------------
19:08:17 | Level at FL310
         |
         | Next waypoint:    TROUT              NMS:              1
         | Pressure alt:     31005              Latitude:   +30 16.8
         | Radar alt:        32518              Longitude: +078 42.7
```

Instrument Field Reports



Daily Instrument Status

Determine disposition of daily in-field instrument reports

Instrument Debrief	
Instrument: LASE **Instrument Status:** Green **Sortie Number:** 010418 **Sortie Date:** 09/24/2001 **Launch Time:** 1842 **Landing Time:** 0313 **Flight Hours Used:** 8.5 **Instrument Scientist:** Ferrare , Richard	**Instrument Performance** LASE performed well during this flight. No problems. **Science Observations** LASE acquired water vapor, aerosol, and cloud measurements both to and from Hurricane Humberto as well around the periphery of the storm. LASE measurements showed generally dry conditions existed, except in the immediate vicinity of the storm. The southern part of the storm was especially dry and cloud free, and LASE was able to measure water vapor within about 60-100 n. miles of the eye. The southeastern quadrant was also mostly cloud-free and LASE was able to measure water vapor in this location. LASE zenith measurements showed cirrus cloud tops were nearly always at or below 14 km.

Data via Calendar

The fourth Convection and Moisture Experiment

Data via Calendar | Related Sites | Data Search | Field Reports | Science Presentations

CAMEX-5:
Planning
White Paper

Participants:
Managers
Funded Science Investigators
Other Investigators
Support Personnel
Aircrew

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Aerosonde
Andros Island
NASA DC-8
NASA ER-2
KAMP

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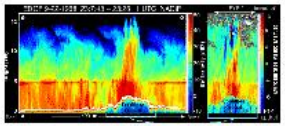

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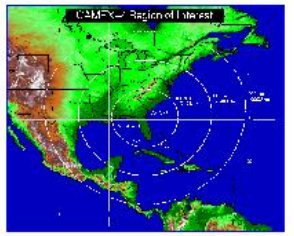

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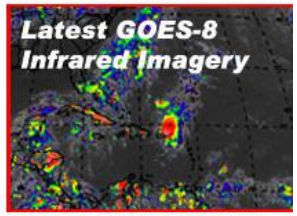

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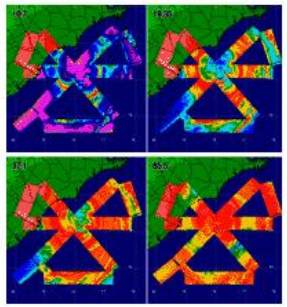
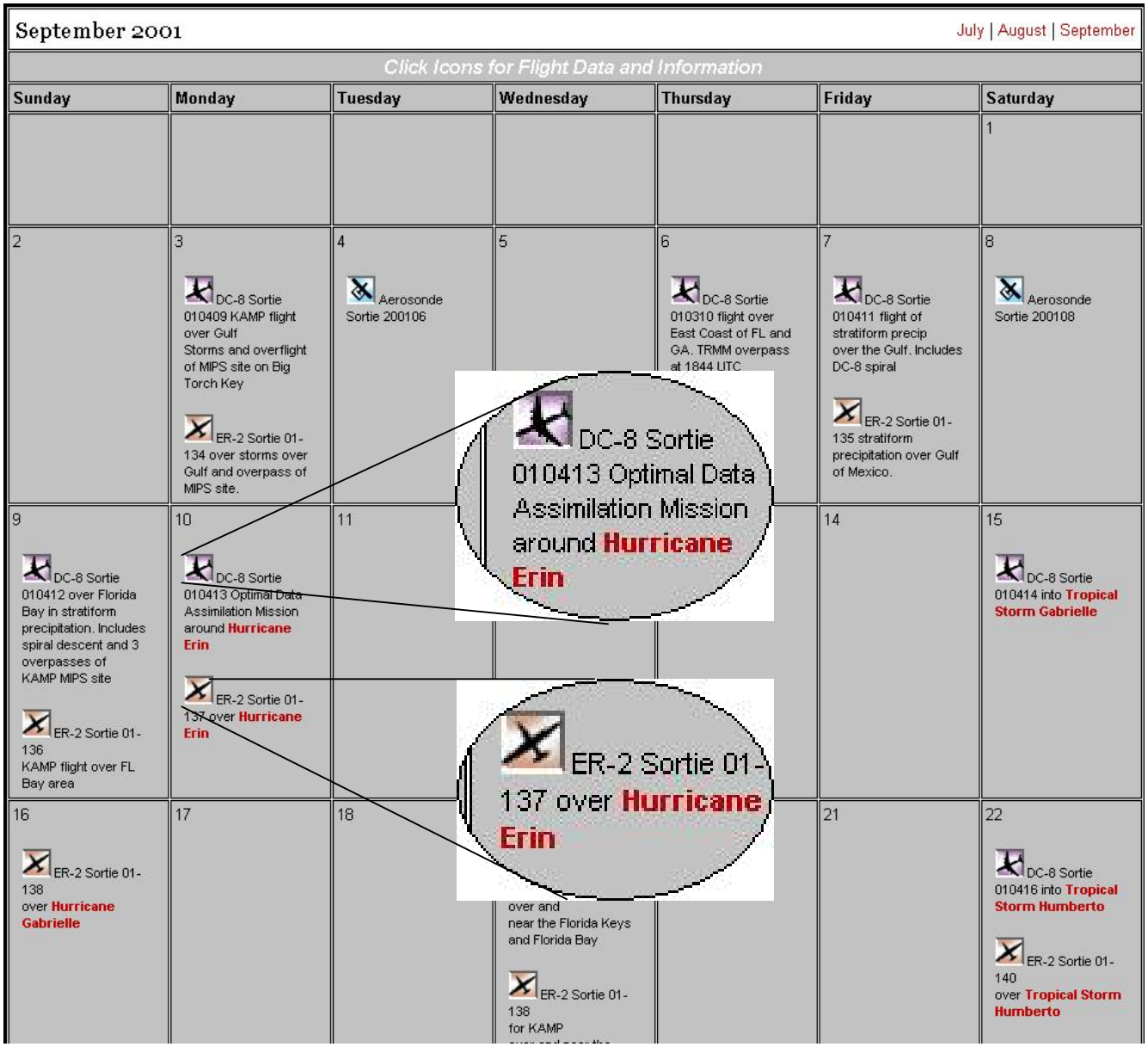


Select Mission of Interest



September 2001 — July | August | September

Click Icons for Flight Data and Information

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
2	3 DC-8 Sortie 010409 KAMP flight over Gulf Storms and overflight of MIPS site on Big Torch Key ER-2 Sortie 01-134 over storms over Gulf and overpass of MIPS site.	4 Aerosonde Sortie 200106	5	6 DC-8 Sortie 010310 flight over East Coast of FL and GA. TRMM overpass at 1844 UTC	7 DC-8 Sortie 010411 flight of stratiform precip over the Gulf. Includes DC-8 spiral ER-2 Sortie 01-135 stratiform precipitation over Gulf of Mexico.	8 Aerosonde Sortie 200108
9 DC-8 Sortie 010412 over Florida Bay in stratiform precipitation. Includes spiral descent and 3 overpasses of KAMP MIPS site ER-2 Sortie 01-136 KAMP flight over FL Bay area	10 DC-8 Sortie 010413 Optimal Data Assimilation Mission around **Hurricane Erin** ER-2 Sortie 01-137 over **Hurricane Erin**	11			14	15 DC-8 Sortie 010414 into **Tropical Storm Gabrielle**
16 ER-2 Sortie 01-138 over **Hurricane Gabrielle**	17	18	over and near the Florida Keys and Florida Bay ER-2 Sortie 01-138 for KAMP		21	22 DC-8 Sortie 010416 into **Tropical Storm Humberto** ER-2 Sortie 01-140 over **Tropical Storm Humberto**

DC-8 Sortie 010413 Optimal Data Assimilation Mission around **Hurricane Erin**

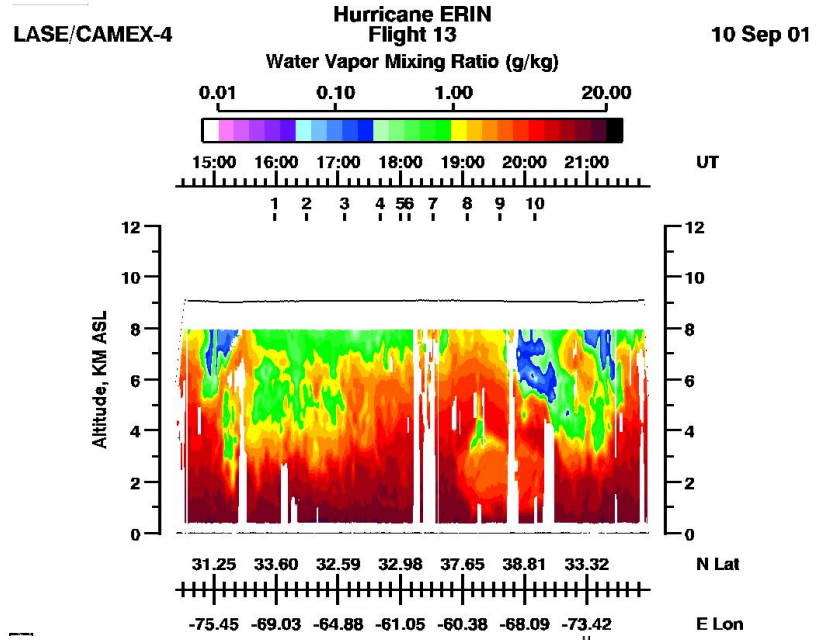
ER-2 Sortie 01-137 over **Hurricane Erin**

Download Data Set or View Browse

CAMEX-4 Data and Reports

Mission Science Report Flight Track

Instrument: C-STAR	
Dataset: c4dcstar_2001.253_010413.tar (10936320bytes)	
Instrument: CVI	
Dataset: c4dcvi_2001.253_010413.asc (1024270bytes)	
Instrument: Cloud Microphysics	
Dataset: c4dcm_2001.253_010413.tar (24381440bytes)	
Instrument: Dropsonde DC-8	
Dataset: c4dd8d_2001.253_010413.tar (3768320bytes)	
Instrument: LASE	**Date:** 09/10/2001
Dataset: c4dlase_2001.253_010413.tar (23664640bytes)	VIEW SAMPLE
Instrument: LIP DC-8	**Date:** 09/10/2001
Dataset: c4dlip_2001.253_010413.tar (63047680bytes)	VIEW SAMPLE

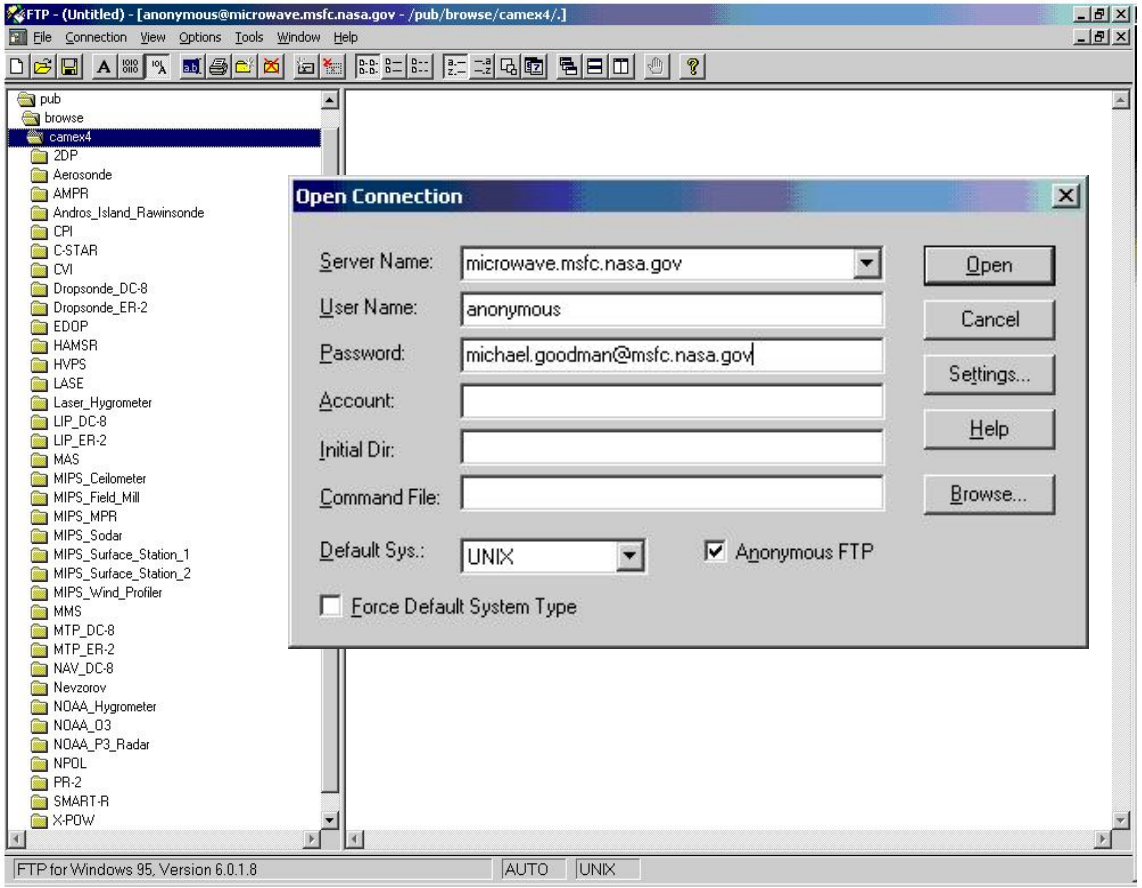


Anonymous FTP Access

Most data sets are accessible via anonymous FTP at:

microwave.msfc.nasa.gov

- ***–/pub/browse/camex4***
- ***–/pub/data/camex4***
- ***–/pub/doc/camex4***



Data Set Availability

CAMEX-4 Dataset Availability		
Data Set Name	**Browse Status**	**Data Status**
CAMEX-4 2nd Generation Precipitation Radar (PR-2)	Download Now	Download Now
CAMEX-4 Aerosonde Data	Not Applicable	Download Now
CAMEX-4 AMPR Brightness Temperature (Tb)	Download Now	Download Now
CAMEX-4 Andros Island Rawinsonde and Radiosondes	Not Applicable	Download Now
CAMEX-4 Cloud Microphysics Data	Download Now	Download Now
CAMEX-4 Conically-Scanning Two-look Airborne Radiometer (C-STAR)	Download Now	Download Now
CAMEX-4 CVI Cloud Condensed Water Content	Not Applicable	Download Now
CAMEX-4 DC-8 Dropsonde	Download Now	Download Now
CAMEX-4 DC-8 Forward and Nadir Video	Order Now	Not Applicable
CAMEX-4 Dual-Beam UV-Absorption Ozone Photometer	Not Applicable	Download Now
CAMEX-4 DC-8 Information Collection and Transmission System	Download Now	Download Now
CAMEX-4 DC-8 Lightning Instrument Package (LIP)	Not Applicable	Download Now
CAMEX-4 DC-8 Microwave Temperature Profiler (MTP)	Download Now	Download Now
CAMEX-4 ER-2 Doppler Radar (EDOP)	Download Now	Download Now
CAMEX-4 ER-2 High Altitude Dropsonde	Download Now	Download Now
CAMEX-4 ER-2 Lightning Instrument Package (LIP)	Download Now	Download Now
CAMEX-4 ER-2 Microwave Temperature Profiler (MTP)	Download Now	Download Now
CAMEX-4 ER-2 Navigation Data	Download Now	Download Now
CAMEX-4 GOES Data	Download Now	Download Now
CAMEX-4 High Altitude MMIC Sounding Radiometer (HAMSR)	Download Now	Download Now
CAMEX-4 JPL Laser Hygrometer	Not Applicable	Download Now
CAMEX-4 Lidar Atmospheric Sensing Experiment (LASE)	Download Now	Download Now
CAMEX-4 Meteorological Measurement System (MMS)	Not Applicable	Download Now
CAMEX-4 MIPS 915 MHz Wind Profiler	Not Yet Received	Download Now
CAMEX-4 MIPS CT25K Laser Ceilometer	Not Yet Received	Download Now
CAMEX-4 MIPS Electric Field Mill	Not Applicable	Download Now
CAMEX-4 MIPS Microwave Profiling Radiometer	Not Applicable	Order Now
CAMEX-4 MIPS Surface Station 1	Not Yet Received	Download Now
CAMEX-4 MIPS Surface Station 2	Not Yet Received	Download Now
CAMEX-4 MIPS Sodar	Not Yet Received	Download Now
CAMEX-4 Mission Reports	Not Applicable	Download Now

Surface and Radar Database

Surface Data Sets

- Andros Island sondes – download online
- NOAA P3 – order copies of tapes; delivered offline
- XPOW – received via FTP 250,000+ files; repacked into daily data sets; available for download
- SMART-R – data and browse available for download
- MIPS – received data; available for download
- NPOL – only one day online 8/22/01
- TOGA – only one day online 8/28/01

Aircraft Database

Aircraft data sets received in various forms:

- DC8 Navigation – data and flight tracks
- ER2 Navigation – data and flight tracks
- DC-8 Forward & Nadir camera – VCR tapes
- DC8 Dropsondes – data and skew-T
- ER2 Dropsondes – data and skew-T
- AMPR
- EDOP
- C-STAR
- NOAA Hygrometer
- NOAA Ozone

Documentation

The data center needs to be able to support user requests for data and information. Integral part of the data archive.

- 'ReadMe' provides basic information about the instrument and data set . Documentation jointly developed by PI and GHRC
  - General information
  - Instrument information
  - CAMEX-4 flight operations summary
  - File format with file name descriptions
  - References
- Software in form of subroutine or program that enables a user to read the data (commercial or PI-developed)
- Online catalog – brief description of the data/instrument and a date range of data availability.

Point of Contact

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