

FLIGHT SUMMARY REPORT

Flight Number: 96-004
Calendar/Julian Date: 12 October 1995 • 285
Sensor Package: Modis Airborne Simulator (MAS)
Radiation Measurement System (RAMS)
Cloud Lidar System (CLS)
Video Imaging System (VIS)
Area(s) Covered: Gulf of Mexico

Investigator(s): Valero, Scripps

Aircraft #: 708

SENSOR DATA

Accession #:	----	----	----	----
Sensor ID #:	108	112	113	118
Sensor Type:	MAS	RAMS	CLS	VIS
Focal Length:	----	----	----	----
Film Type:	----	----	----	----
Filtration:	----	----	----	----
Spectral Band:	----	----	----	----
f Stop:	----	----	----	----
Shutter Speed:	----	----	----	----
# of Frames:	----	----	----	----
% Overlap:	----	----	----	----
Quality:	----	----	----	----
Remarks:				

Airborne Science and Applications Program

The Airborne Science and Applications Program (ASAP) is supported by three ER-2 high altitude Earth Resources Survey aircraft. These aircraft are operated by the High Altitude Missions Branch at NASA-Ames Research Center, Moffett Field, California. The ER-2s are used as readily deployable high altitude sensor platforms to collect remote sensing and in situ data on earth resources, celestial phenomena, atmospheric dynamics, and oceanic processes. Additionally, these aircraft are used for electronic sensor research and development and satellite investigative support.

The ER-2s are flown from various deployment sites in support of scientific research sponsored by NASA and other federal, state, university, and industry investigators. Data are collected from deployment sites in Kansas, Texas, Virginia, Florida, and Alaska. Cooperative international scientific projects have deployed the aircraft to sites in Great Britain, Australia, Chile, and Norway

Photographic and digital imaging sensors are flown aboard the ER-2s in support of research objectives defined by the sponsoring investigators. High resolution mapping cameras and digital multispectral imaging sensors are utilized in a variety of configurations in the ER-2s' four pressurized experiment compartments. The following provides a description of the digital multispectral sensor(s) and camera(s) used for data collection during this flight.

Cloud Lidar System

The Cloud Lidar System (CLS) is flown on the ER-2 to conduct cloud radiation and severe storm field experiments. Designed to operate at high altitudes in order to obtain measurements above the highest clouds, the instrument provides the true height of cloud boundaries and the density structure of less dense clouds. The height structure of cirrus, cloud top density and multiple cloud layers may also be profiled. System specifications are as follows:

Transmitter

Laser Type:	Nd:YAG I,II
Wavelength:	1064, 532 nm
Pulse Energy:	90, 30 mJ
PRF:	10 Hz
Beamwidth:	1 mrad
Data Acquisition:	Measurements at 20m intervals at 200 m/sec aircraft speed

Receiver

Diameter:	0.15 m
Beamwidth:	1.4 mrad
Polarization:	v & h

Data System

Range Resolution:	7.5 m
Number of Channels:	4
Samples per Channel:	3310
Record Capacity:	8 hours

For additional information regarding this instrument contact Dr. James Spinhirne, NASA-Goddard Space Flight Center, Code 917, Greenbelt, MD 20771.

Modis Airborne Simulator

The Modis Airborne Simulator (MAS) is a modified Daedalus multispectral scanner configured to replicate the capabilities of the Moderate-Resolution Imaging Spectrometer (MODIS), an instrument to be orbited on an EOS platform. MODIS is designed for the measurement of biological and physical processes and atmospheric temperature. The Modis Airborne Simulator records fifty 12-bit channels of multispectral data and is configured as follows:

Spectral Channel	Band center (μm)	Bandwidth (μm)	Spectral Range
1	0.549	0.044	0.527-0.571
2	0.658	0.053	0.631-0.684
3	0.704	0.042	0.683-0.725
4	0.745	0.041	0.725-0.766
5	0.786	0.041	0.765-0.807
6	0.827	0.042	0.806-0.848
7	0.869	0.042	0.848-0.891
8	0.909	0.033	0.893-0.926
9	0.947	0.046	0.924-0.970
10	1.608	0.053	1.582-1.635
11	1.670	0.052	1.644-1.695
12	1.723	0.05	1.698-1.748
13	1.775	0.05	1.750-1.800
14	1.825	0.046	1.802-1.849
15	1.88	0.045	1.856-1.901
16	1.93	0.45	1.909-1.954
17	1.98	0.048	1.955-2.003
18	2.03	0.048	2.005-2.053
19	2.08	0.047	2.056-2.103
20	2.128	0.047	2.105-2.152
21	2.177	0.047	2.154-2.201
22	2.227	0.047	2.203-2.250
23	2.276	0.047	2.253-2.300
24	2.326	0.047	2.303-2.350
25	2.375	0.047	2.351-2.398

Spectral Channel	Band center (μm)	Bandwidth (μm)	Spectral Range
26	2.958	0.136	2.889-3.026
27	3.119	0.123	3.058-3.181
28	3.265	0.146	3.192-3.338
29	3.437	0.142	3.366-3.509
30	3.565	0.144	3.493-3.637
31	3.747	0.138	3.668-3.816
32	3.893	0.156	3.815-3.971
33	4.064	0.143	3.992-4.135
34	4.156	0.065	4.124-4.189
35	4.389	0.113	4.332-4.446
36	4.514	0.140	4.444-4.584
37	4.647	0.144	4.575-4.720
38	4.823	0.179	4.734-4.913
39	4.992	0.145	4.919-5.064
40	5.139	0.122	5.078-5.120
41	5.275	0.124	5.214-5.337
42	8.557	0.396	8.359-8.755
43	9.711	0.509	9.457-9.966
44	10.473	0.441	10.252-10.693
45	10.976	0.439	10.757-11.196
46	11.929	0.421	11.719-12.140
47	12.822	0.376	12.634-13.010
48	13.190	0.447	12.966-13.413
49	13.661	0.587	13.368-13.954
50	14.155	0.395	13.957-14.352

Sensor/Aircraft Parameters:

Spectral Bands: 50 (digitized to 16-bit resolution)
 IFOV: 2.5 mrad
 Ground Resolution: 163 feet (50 meter at 65,000 feet)
 Swath Width: 22.9 mi/19.9 nmi (36 km)
 Total Scan Angle: 85.92°
 Pixels/Scan Line: 716
 Scan Rate: 6.25 scans/second
 Ground Speed: 400 kts (206 m/second)
 Roll Correction: Plus or minus 3.5 degrees (approx.)

For specific information regarding flight documentation, sensor parameters, and areas of coverage contact the Aircraft Data Facility, NASA-Ames Research Center, Mail Stop 240-6, Moffett Field, California 94035-1000 (Telephone: 415-604-6252). Additional information regarding ER-2 acquired photographic and digital data is also available through the Aircraft Data Facility

Video Imaging System

The Video Imaging System (VIS) is designed as a visual Line-of -Flight tracker, producing a flight record on standard or Super-VHS, with a selection of ground coverage and image recording intervals. The system consists of a Hitachi KP-C551 Color Camera, A Panasonic AG-6750A Time Lapse Video Recorder, DC/AC Inverter, Control Box, Pressure Suitcase, and a Installation Rack. The system may be configured to acquire natural color or black and white imagery IRIG-B navigation data is also recorded in flight. The VIS is designed to be installed in either the Pod or Nose of the ER-2 aircraft, using a modified RC-10 Rack. Control circuitry is designed to operate the system using the same controls as the RC-10 camera.

Radiation Measurement System

The Radiation Measurement System (RAMS) is an integrated system of several radiometers. The system provides airborne measurements to support analysis and theoretical calculations of cloud properties and radiation fields and to provide validation of satellite radiance measurements. The airborne instruments consist of the following:

- 1 an electrically calibrated pyroelectric radiometer for hemispherical, broad spectral bandpass, radiative flux measurements in the solar spectral region (0.26 to 2.6 μm). This radiometer has two detectors;
2. an IR net flux radiometer (rotating) radiometer covering the spectral range from 5 to 40 μm ;
- 3 a narrow field-of-view, narrow spectral bandpass IR radiometer (2 channels in the 5 to 40 μm region). This radiometer uses a liquid nitrogen cooled black body reference. This instrument provides upwelling infrared intensities above cloud; and
- 4 a total-direct-diffuse multichannel narrow spectral bandpass (about 5 to 10 μm) flux radiometer. This radiometer is used for optical depth determinations and direct/diffuse ratios.

Additional information regarding ER-2 acquired photographic and digital data is available through the Aircraft Data Facility at Ames Research Center. For specific information regarding flight documentation, sensor parameters, and areas of coverage contact the Aircraft Data Facility, NASA-Ames Research Center, Mail Stop 240-6, Moffett Field, California 94035-1000 (Telephone: 415-604-6252).

FY-1995
ARM (Atmospheric Radiation Measurements)
Enhanced Shortwave Experiment
ARESE
NASA ER-2 DEPLOYMENT

MISSION SUMMARIES
25 SEPTEMBER TO 22 OCTOBER 1995

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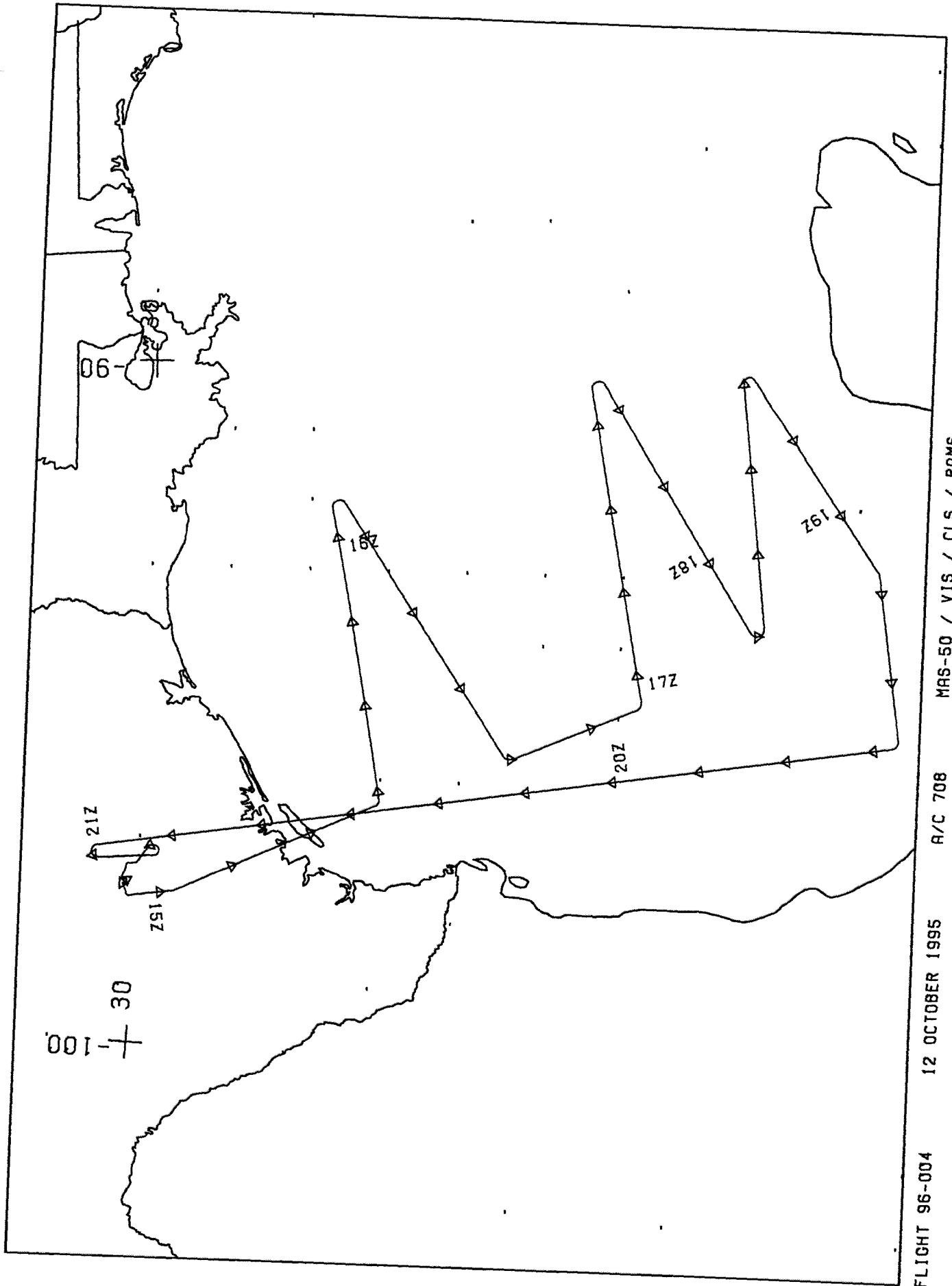
95-175	25 September	Oklahoma
95-176	26 September	Oklahoma
95-198	27 September	Gulf of Mexico
95-199	28 September	Oklahoma
95-197	29 September	Oklahoma
96-001	03 October	Oklahoma
96-003	11 October	Oklahoma
96-004	12 October	Gulf of Mexico
96-005	13 October	Flight aborted
96-006	14 October	New Mexico, Arkansas, Texas
96-007	17 October	Oklahoma
96-008	19 October	Oklahoma
96-009	21 October	Arkansas, Texas
96-010	22 October	Oklahoma

ARM (Atmospheric Radiation Measurements) Enhanced Shortwave Experiment ARESE

MODIS Airborne Simulator (MAS) Data Collection Summary

Flt. Num.	Date	Take-Off	Landing	MAS On	MAS Off	Location	Comments
95-175	9/25/95	15.00	21.50	15.22	21.05	Oklahoma	CART Site
95-176	9/26/95	15.00	21.41	15.30	19.19	Oklahoma	CART Site
95-198	9/27/95	15.45	21.55	16.05	21.21	Gulf of Mexico	
95-199	9/28/95	15.04	21.50	15.34	21.18	Oklahoma	CART Site
95-197	9/29/95	15.19	21.12	15.43	20.44	Oklahoma	CART Site
96-001	10/3/95	15.03	20.44	15.27	20.13	Oklahoma	CART Site
96-003	10/11/95	15.51	21.53	16.20	21.07	Oklahoma	CART Site
96-004	10/12/95	14.51	21.24	No data	No data	Gulf of Mexico	
96-005	10/13/95	15.06	16.20	No data	No data	Abort	Q-bay pressure failure
96-006	10/14/95	16.19	22.23	16.45	21.58	New Mexico, Arkansas, Texas	Satellite underpass
96-007	10/17/95	15.07	21.46	15.29	21.25	Oklahoma	CART Site
96-008	10/19/95	15.57	21.39	16.26	21.12	Oklahoma	CART Site
96-009	10/21/95	15.16	20.04	15.43	19.38	Arkansas, Texas	Satellite underpass
96-010	10/22/95	14.56	21.16	15.25	20.35	Oklahoma	CART Site

All times are in GMT



FLIGHT 96-004

12 OCTOBER 1995

A/C 708

MRS-50 / VIS / CLS / RAMS