

# FLIGHT SUMMARY REPORT

**Flight Number:** 95-047  
**Calendar/Julian Date:** 15 January 1995 • 015  
**Sensor Package:** Modis Airborne Simulator (MAS)  
Aerosol Particulate Sampler (APS)  
ER-2 Doppler Radar (EDOP)  
**Area(s) Covered:** Gulf of Mexico

**Investigator(s):** Menzel, University of Wisconsin;  
Spencer, NASA-MSFC

**Aircraft #:** 706

## SENSOR DATA

<b>Accession #:</b>	----	----	----
<b>Sensor ID #:</b>	108	024	116
<b>Sensor Type:</b>	MAS	APS	EDOP
<b>Focal Length:</b>	----	----	----
<b>Film Type:</b>	----	----	----
<b>Filtration:</b>	----	----	----
<b>Spectral Band:</b>	----	----	----
<b>f Stop:</b>	----	----	----
<b>Shutter Speed:</b>	----	----	----
<b># of Frames:</b>	----	----	----
<b>% Overlap:</b>	----	----	----
<b>Quality:</b>	----	----	----
<b>Remarks:</b>			

## 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.

### ER-2 Doppler Radar

The ER-2 Doppler Radar (EDOP) is an X-band (9.6 GHz) Doppler radar located in the nose of the aircraft. EDOP has two 0.76 meter diameter antennas. One antenna is nadir pointing with pitch stabilization and the other is forward pointing. EDOP will map high resolution time-height sections of reflectivity, vertical hydrometeor velocity, and vertical air motion (when the hydrometeor fallspeed and aircraft motions are removed). The forward beam will measure the linear depolarization ratio (LDR) which provides useful information on orientation of the hydrometeors, hydrometeor phase, and size. For additional information regarding EDOP contact Gerald Heymsfield, NASA Goddard Space Flight Center, Code 912, Goddard Space Flight Center, Greenbelt, MD 21077 (Telephone 301-286-4661). EDOP system specifications are as follows:

Center Frequency	9.6 GHz
Peak Power	20 kW
Duty Cycle	.01 max.
Pulse Length	.25, 1.0 ms
Antenna Diameter	.76 m
Antenna Beamwidth	2.9°
First Side-lobe Level	<-30 dB
Cross Polarization Level	<-38 dB
Receiver Dynamic Range	110 dB
Number of Doppler Channels	2
Number of Log Reflectivity Channels	3
Nadir Beam:	
Transmit Polarization	Horizontal
Received Polarization	Copolarized
Forward Beam:	
Transmit Polarization	Vertical
Received Polarization	Copolarized and Cross-polarized

## 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 sounding. 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:

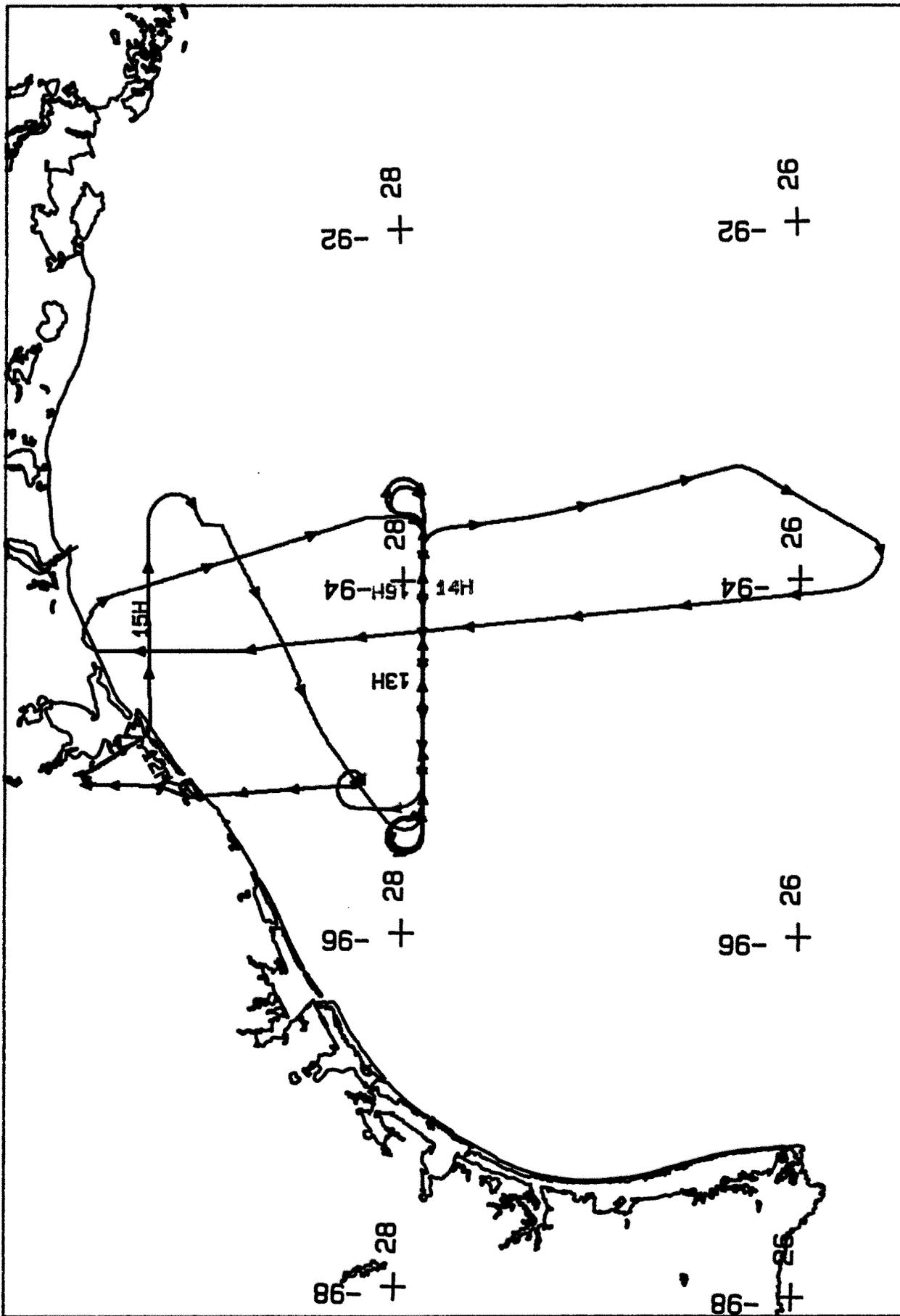
Spectral Bands: 50 (digitized to 16-bit resolution)  
 IFOV: 2.5 mrad  
 Ground Resolution: 163 feet (50 meter at 65,000 feet)  
 Swath Width: 22.9 mi/19.9 nmi (36 km)  
 Total Scan Angle: 85.92°  
 Pixels/Scan Line: 716  
 Scan Rate: 6.25 scans/second  
 Ground Speed: 400 kts (206 m/second)  
 Roll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

## **Aerosol Particulate Sampler**

The Aerosol Particulate Sampler (APS) has been developed and is operated by Dr. Guy Ferry of the NASA-Ames Research Experiments Branch. The sampler is a non-imaging sensor designed to gather high altitude dust particles for laboratory research.

The U.S. Geological Survey's EROS Data Center at Sioux Falls, South Dakota serves as the archive and product distribution facility for NASA-Ames aircraft acquired photographic and digital imagery. For information regarding photography and digital data (including areas of coverage, products, and product costs) contact EROS Data Center, Customer Services, Sioux Falls, South Dakota 57198 (Telephone: 605-594-6151).

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).



MAS

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15 JANUARY 1995

FLIGHT 95-047