

FLIGHT SUMMARY REPORT

Flight Number: 95-193
Calendar/Julian Date: 20 September 1995 • 263
Sensor Package: Wild Heerbrugg RC-10
Modis Airborne Simulator (MAS)
Lidar Atmospheric Sensing Experiment (LASE)
Millimeter-Wave Imaging Radiometer (MIR)
Area(s) Covered: Atlantic Coast

Investigator(s): Browell, NASA-GSFC
Spencer, NASA-MSFC

Aircraft #: 706

SENSOR DATA

Accession #:	05008	----	----	----
Sensor ID #:	034	102	119	114
Sensor Type:	RC-10	MAMS	LASE	MIR
Focal Length:	12" 304.66 mm	----	----	----
Film Type:	Panatomic X Acrographic II 2412	----	----	----
Filtration:	Wratten 12	----	----	----
Spectral Band:	510-700 nm	----	----	----
f Stop:	11	----	----	----
Shutter Speed:	1/150	----	----	----
# of Frames:	457	----	----	----
% Overlap:	60%	----	----	----
Quality:	Excellent	----	----	----
Remarks:	See spread sheet			

**CAMERA FLIGHT LINE DATA
FLIGHT NO. 95-193**

Accession # 05008

Sensor # 034

Check Points	Frame Numbers	Time (GMT-hr, min, sec)		Altitude, MSL feet/meters	Cloud Cover/Remarks
		START	END		
A - B	8506-8551	15:06:55	15:28:20	63874/19469	20-90% cumulus (frames 8506-8527); 10-60% cumulus (frames 8530-8538); minor-30% cumulus (frames 8548-8551)
B - C	8552-8582	15:33:14	15:47:27	62294/18987	Minor-30% cumulus (frames 8552-8559); thin cirrus (frames 8563-8566); 10-30% cumulus (frames 8569-8575); 20-40% cumulus (frames 8581-8582)
C - D	8583-8614	15:53:02	16:07:40	62197/18958	10-90% cumulus (frames 8583-8588); minor-10% cumulus (frames 8595-8598 and 8612-8614)
D - A	8615-8673	16:12:46	16:40:05	62224/18966	Minor-40% cumulus (frames 8615-8620); 10-30% cumulus (frames 8635-8639); 10-100% cumulus (frames 8647-8673)
A - B	8674-8726	16:45:49	17:10:15	63143/19246	20-100% cumulus (frames 8674-8701); minor-30% cumulus (frames 8702-8711); 10-20% cumulus (frames 8725-8726)

**CAMERA FLIGHT LINE DATA
FLIGHT NO. 95-193**

Accession # 05008

Sensor # 034

Check Points	Frame Numbers	Time (GMT-hr, min, sec)		Altitude, MSL feet/meters	Cloud Cover/Remarks
		START	END		
B - C	8727-8757	17:16:30	17:30:34	62542/19063	10-30% cumulus (frames 8727-8731); minor-40% cumulus (frames 8744-8748); minor-80% cirro-cumulus (frames 8749- 8757)
C - E	8758-8791	17:36:54	17:52:20	61847/18851	30-80% cirro-cumulus (frames 8758-8766); minor-70% cumulus (frames 8771-8775); minor cumulus (frames 8789-8791)
D - A	8792-8847	17:59:53	18:25:36	62075/18920	Thin cirrus (frames 8795 and 8805-8807); 20-70% cumulus (frames 8808-8813); 10% cirrus (frames 8814-8817); 20-100% cumulus (frames 8818-8847)
A - B	8848-8899	18:32:05	18:55:57	61819/18842	30-100% cirro-cumulus (frames 8848- 8877); 30-70% cumulus (frames 8880- 8884); minor-20% cirrus (frames 8885- 8895)

CAMERA FLIGHT LINE DATA
FLIGHT NO. 95-193

Accession # 05008

Sensor # 034

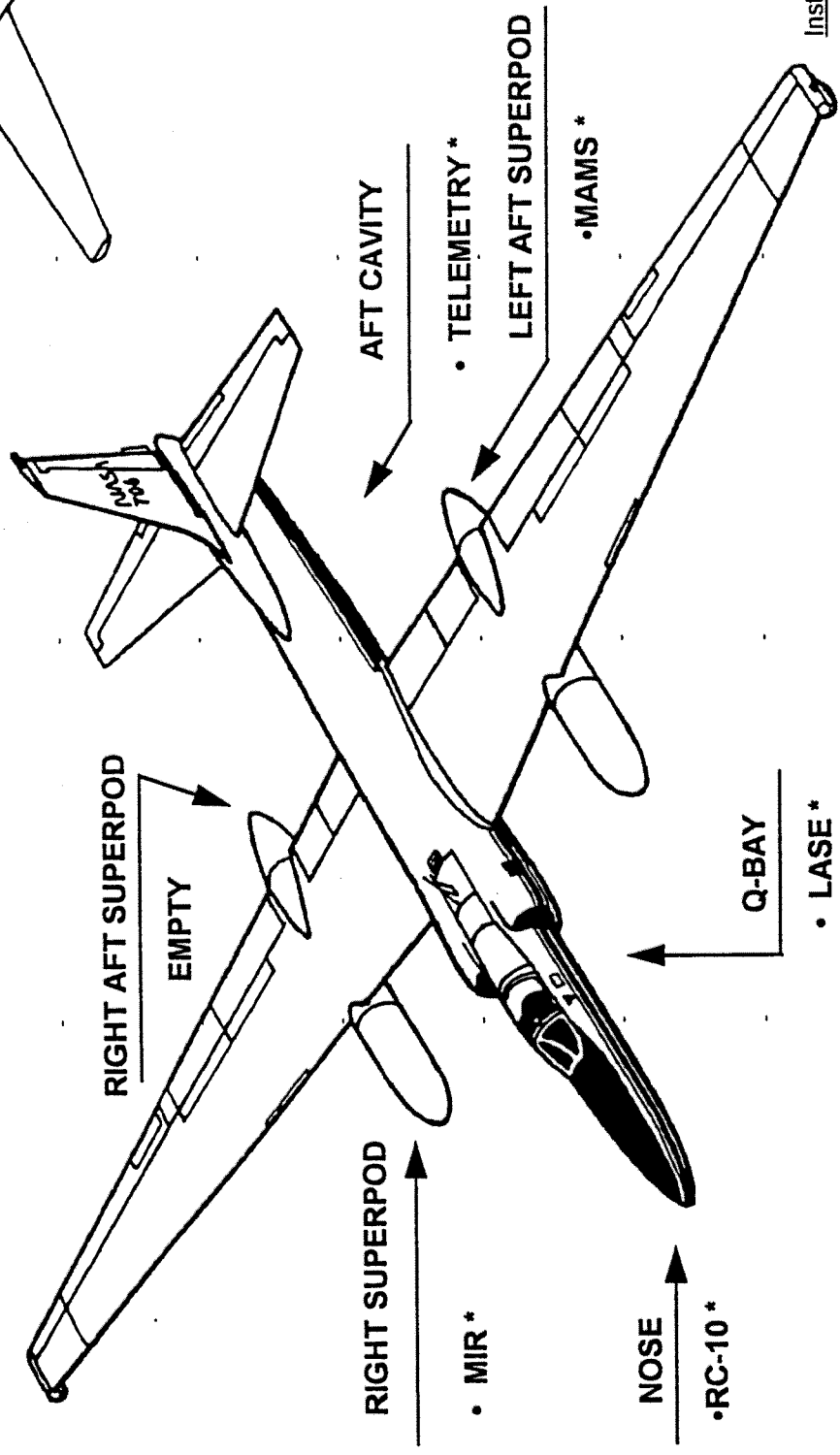
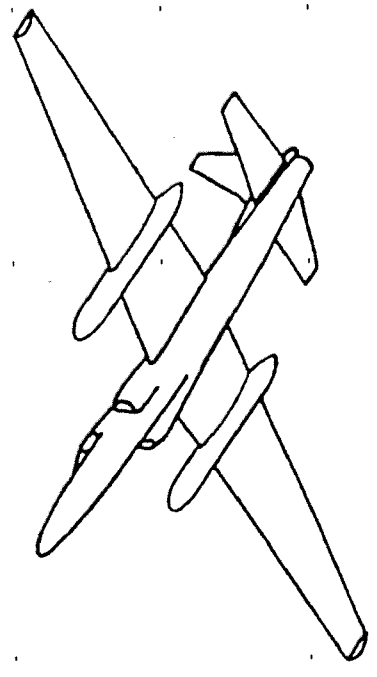
Page 3/3

Check Points	Frame Numbers	Time (GMT-hr, min, sec)		Altitude, MSL feet/meters	Cloud Cover/Remarks
		START	END		
B - C	8900-8931	19:01:12	19:15:40	62097/18927	Minor-20% cirrus (frames 8906-8916); 10-20% cumulus (frames 8917-8922); 20-30% cirrus and cumulus (frames 8923-8931)
C - D	8932-8962	19:21:12	19:35:12	61665/18795	20-80% cirrus and cumulus (frames 8932-8952); thin cirrus (frames 8953-8956 and 8961-8962)

GVEX

PROJECT MANAGER: JOHN ARVESEN

AIRCRAFT 706



Instrument Status

- †† New Instrument (FRR)
- † Repackage Instrument (FRR)
- ** Recertify Instrument
- * Current Instrument

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.

Multispectral Atmospheric Mapping Sensor

The Multispectral Atmospheric Mapping Sensor (MAMS) is a modified Daedalus Scanner flown aboard the ER-2 aircraft. It is designed to study weather related phenomena including storm system structure, cloud-top temperatures, and upper atmosphere water vapor. The scanner retains the eight silicon-detector channels in the visible/near-infrared region found on the Daedalus Thematic Mapper Simulator, with the addition of four channels in the thermal infrared relating to specific water vapor features. The specific bands are as follows:

<u>Daedalus Channel</u>	<u>Wavelength, μm</u>
1	LSBs for Channels 9-12
2	0.45 - 0.52
3	0.52 - 0.60
4	0.57 - 0.67
5	0.60 - 0.73
6	0.65 - 0.83
7	0.72 - 0.99
8	0.83 - 1.05
9	3.55 - 3.93 low range
10	3.55 - 3.93 high range
11	10.3 - 12.1
12	12.5 - 12.8

Sensor specifications are as follows:

IFOV:	5.0 mrad
Ground Resolution:	325 feet (99 meters) at 65,000 feet
Total Scan Angle:	86°
Swath Width:	20 nmi (37 km) at 65,000 feet
Pixels/Scan Line:	716
Scan Rate:	6.25 scans/second

Ground Speed:	400 kts (206 m/second)
Digitization:	8-bit channels 2-8
	10-bit channels 9-12

The data will not be archived at EROS Data Center because this is an experimental system with low spatial resolution and unique spectral characteristics. As all scenes will be primarily cloud-covered there would be little terrestrial application for the data. Further information concerning the data can be obtained from principal investigator, Gregory S. Wilson, Atmospheric Effects Branch, George C. Marshall Space Flight Center, National Aeronautics and Space Administration, Marshall Space Flight Center, Alabama 35812-5001.

LIDAR Atmospheric Sensing Experiment

The Lidar Atmospheric Sensing Experiment (LASE) program is based on tunable Ti:Sapphire laser transmitter. LASE is part of an overall NASA effort to develop and demonstrate an autonomous tunable Differential Absorption Lidar (DIAL) laser instrument for airborne and spaceborne experiments. Performance criteria of a DIAL instrument to measure water vapor and aerosol vertical profiles in the atmosphere have been defined through extensive development of mathematical simulations. One of the objectives of the LASE program is to verify and validate these mathematical simulations and conduct scientific investigations of tropospheric water vapor and aerosols on a broad spatial scale.

The LASE system will permit the measurement of tropospheric water vapor profiles and column content in many important areas of the atmospheric sciences, including studies of mesoscale meteorology, the atmospheric radiation budget, climate change and the hydrologic cycle. The simultaneous measurement of aerosol and cloud distributions can provide important information on atmospheric structure and transport, and many meteorological parameters also can be inferred from these data. In addition the impact of subvisible and visible aerosol /cloud layers on passive satellite measurements and radiation budgets can be assessed.

For additional information regarding the LASE Program contact E.V. Browell, NASA Langley Research Center, LASE Project Office, MS 486, Hampton, VA 23681. Telephone: (804)864-1731.

Millimeter-Wave Imaging Radiometer

The Millimeter-Wave Imaging Radiometer (MIR) is a nine channel radiometer developed for atmospheric research. Three dual pass band channels are centered about the strongly opaque 183 GHz water absorption line and a fourth channel is located at 150 GHz. These four channels have varying degrees of opacity from which the water vapor profile can be inferred. There are two additional channels located at 89 GHz and 220 GHz. The design includes three additional channels centered about 325 GHz which are supplied by the Georgia Institute of Technology.

Frequencies and polarization were chosen to match those of the Advanced Microwave Sounding Unit-B (AMSU-B) planned for NOAA operational polar weather satellites and the Earth Observing System (EOS). Frequencies also match closely with those of the Special Sensor Microwave Temperature Sounder-2 (SSM/T-2) now aboard the DMSP satellite.

Information regarding this instrument may be obtained from Paul Racette, NASA-Goddard Space Flight Center, Code 975, Greenbelt, MD 20771.

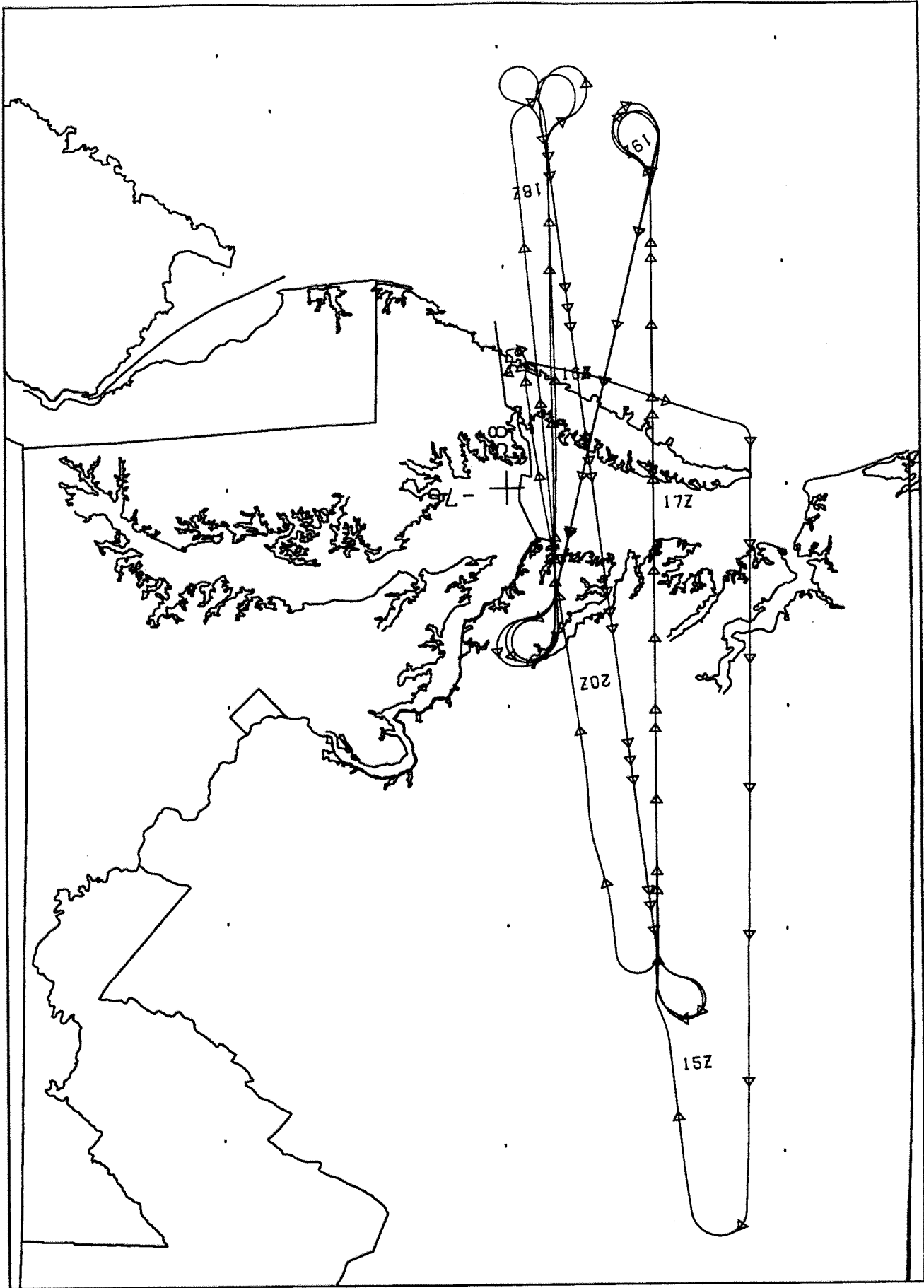
Camera Systems

Various camera systems and films are used for photographic data collection. Film types include high definition color infrared, natural color, and black and white emulsions. Available photographic systems are as follows:

- Wild-Heerbrugg RC-10 metric mapping camera
 - 9 x 9 inch film format
 - 6 inch focal length lens provides area coverage of 16 x 16 nautical miles from 65,000 feet
 - 12 inch focal length lens provides area coverage of 8 x 8 nautical miles from 65,000 feet
- Hycon HR-732 large scale mapping camera
 - 9 x 18 inch film format
 - 24 inch focal length lens provides area coverage of 4 x 8 nautical miles from 65,000 feet
- IRIS II Panoramic camera
 - 4.5 x 34.7 inch film format
 - 24 inch focal length lens
 - 90 degree field of view provides area coverage of 2 x 21.4 nautical miles from 65,000 feet

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).



FLIGHT 95-193 20 SEPTEMBER 1995 A/C 706

