

FLIGHT SUMMARY REPORT

Flight Number: 93-141
Calendar/Julian Date: 22 July 1993 • 203
Sensor Package: Wild-Heerbrug RC-10
Modis Airborne Simulator (MAS)
Airborne Visible and Infrared Imaging
Spectrometer (AVIRIS)
Area(s) Covered: Mid-Atlantic Coast

Investigator(s): Kaufman, NASA-Goddard

Aircraft #: 708

SENSOR DATA

Accession #:	04598	----	----
Sensor ID #:	034	108	099
Sensor Type:	RC-10	MAS	AVIRIS
Focal Length:	12" 304.66 mm	----	----
Film Type:	High Definition Aerochrome IR SO-131	----	----
Filtration:	cc.10B	----	----
Spectral Band:	510-900 nm	----	----
f Stop:	4	----	----
Shutter Speed:	1/125	----	----
# of Frames:	33	----	----
% Overlap:	60	----	----
Quality:	Excellent	Fair	----
Remarks:	Camera clock offset 5.1 seconds from navigation data	Data offset 1 hour from navigation data	

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.

Airborne Visible and Infrared Imaging Spectrometer

The Airborne Visible and Infrared Imaging Spectrometer (AVIRIS) is the second in the series of imaging spectrometer instruments developed at the Jet Propulsion Laboratory (JPL) for earth remote sensing. This instrument uses scanning optics and four spectrometers to image a 614 pixel swath simultaneously in 224 contiguous spectral bands (0.4-2.4 μm).

AVIRIS parameters are as follows:

IFOV:	1 mrad
Ground Resolution:	66 feet (20 meters) at 65,000 feet
Total Scan Angle:	30°
Swath Width:	5.7 nmi (10.6 km) at 65,000 feet
Spectral Coverage:	0.41-2.45 μm
Pixels/Scan Line:	614
Number of Spectral Bands:	224
Digitization:	10-bits
Data Rate:	17 MBPS

<u>Spectrometer</u>	<u>Wavelength Range</u>	<u>Number of Bands</u>	<u>Sampling Interval</u>
1	0.41 - 0.70 μm	31	9.4 nm
2	0.68 - 1.27 μm	63	9.4 nm
3	1.25 - 1.86 μm	63	9.7 nm
4	1.84 - 2.45 μm	63	9.7 nm

All AVIRIS data is decommutated and archived at JPL and not currently available for public distribution. For further information contact Rob Green at Jet Propulsion Laboratory, 4800 Oak Grove Drive, Mail Stop 183-501, Pasadena, California 91109-8099.

Modis Airborne Simulator

The Modis Airborne Simulator (MAS) is a modified Daedalus multispectral scanner. It records up to twelve 8-bit channels, which can be selected from an array of fifty available spectral bands. The band selection is made prior to flight and the instrument is hard-wired to that configuration. Channel 1 is used to store additional bits which provide 10-bit resolution for channels 9 through 12. The following MAS band combination (configuration SCARP1) was used on this flight for Smoke, Cloud, and Radiation (SCAR) experiments:

<u>Data System Channel</u>	<u>MAS Channel</u>	<u>Band edges μm</u>
1	--	-----
2	1	0.529 - 0.572
3	2	0.635 - 0.688
4	7	0.852 - 0.893
5	9	0.926 - 0.969
6	15	1.855 - 1.905
7	20	2.126 - 2.173
8	31	3.659 - 3.810
9*	42	8.342 - 8.738
10*	45	10.791 - 11.239
11*	48	13.023 - 13.375
12*	46	11.799 - 12.246

* 10-bit resolution

Sensor/Aircraft Parameters:

Spectral Channels:	50
Output Channels:	Seven 8-bit and four 10-bit
IFOV:	2.5 mrad
Ground Resolution:	163 feet (50 meters at 65,000 feet)
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.)

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-Heerbrug 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).

**CAMERA FLIGHT LINE DATA
FLIGHT NO. 93-141**

Accession # 04598

Sensor # 034

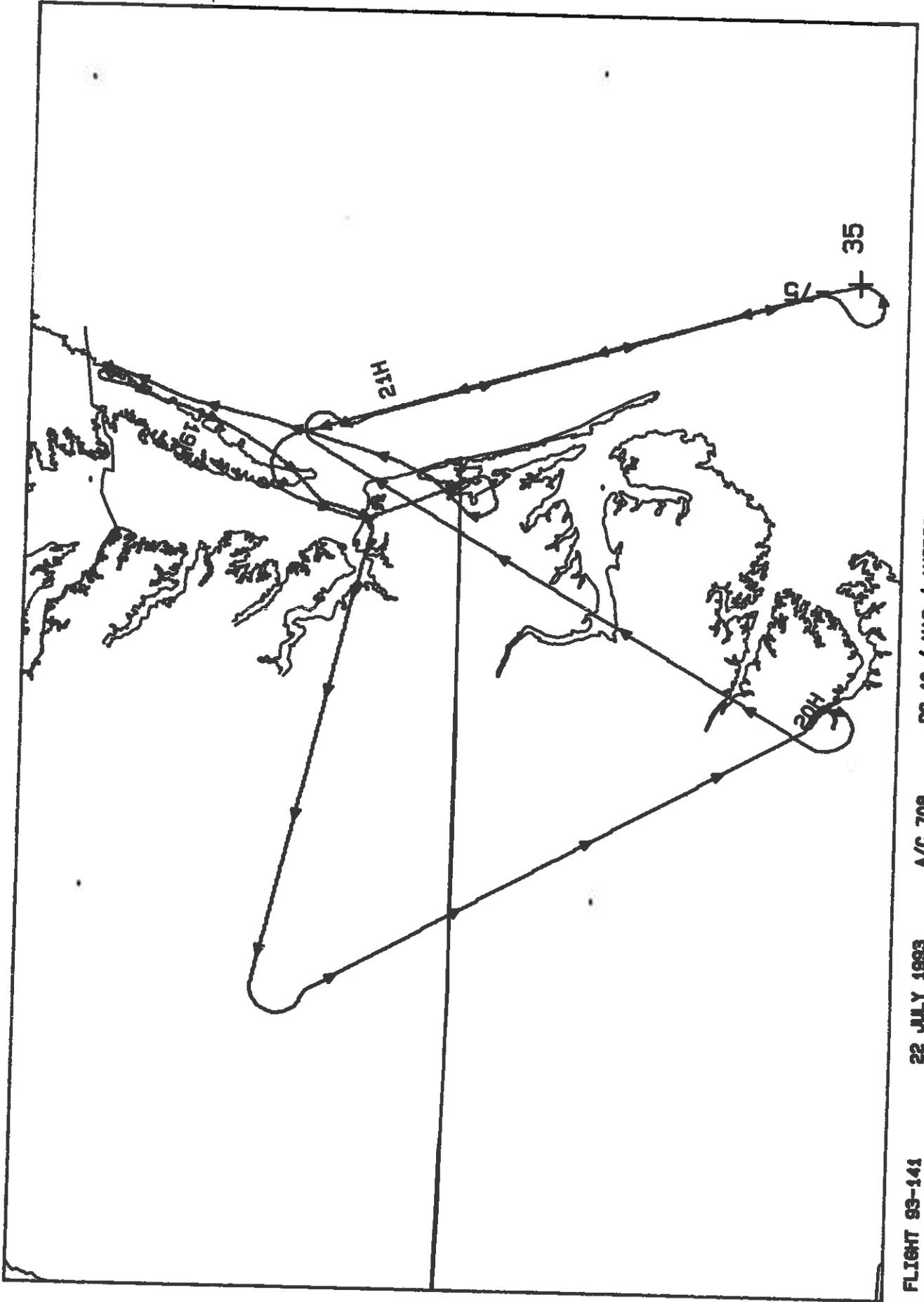
Check Points	Frame Numbers	Time (GMT-hr, min, sec)		Altitude, MSL feet/meters	Cloud Cover/Remarks
		START	END		
A - B	9523-9534	19:43:43	19:48:04	65000/19800	10-40% cirrus and cumulus (frames 9523-9528); 70-100% cumulus (frames 9529-9534)
C - D	9535-9550	20:07:23	20:15:10	"	30-40% cirrus and cumulus (frames 9535-9537); 50-100% cirrus and cumulus (frames 9538-9546); 10-30% cirrus and scattered cumulus (frames 9547-9550)
E - F	9551-9555	20:28:33	20:29:32	"	30-80% cumulus; stepwedge overprint (frames 9553 and 9555)

MAS SCANNER FLIGHT LINE DATA

FLIGHT NO. 93-141

DAEDALUS FLIGHT DATA
FLIGHT NUMBER: 93-141

Check Points	A c t u a l		A c t u a l scanline begin end	Altitude feet/meter	Scan Speed (rps)	total		total	
	t i m e b e g i n	e n d t i m e				C o d scanlines	Interpolated scanlines	Repeated scanlines	0
A-B	18:41:48.0	18:50:18.0	21829	24977	6.20	65000/19812	3169	0	0
C-D	19:05:09.0	19:17:53.0	30541	35293	6.20	65000/19812	4752	1	0
E-F	19:26:58.0	19:31:41.0	39360	40441	6.20	65000/19812	1882	0	0

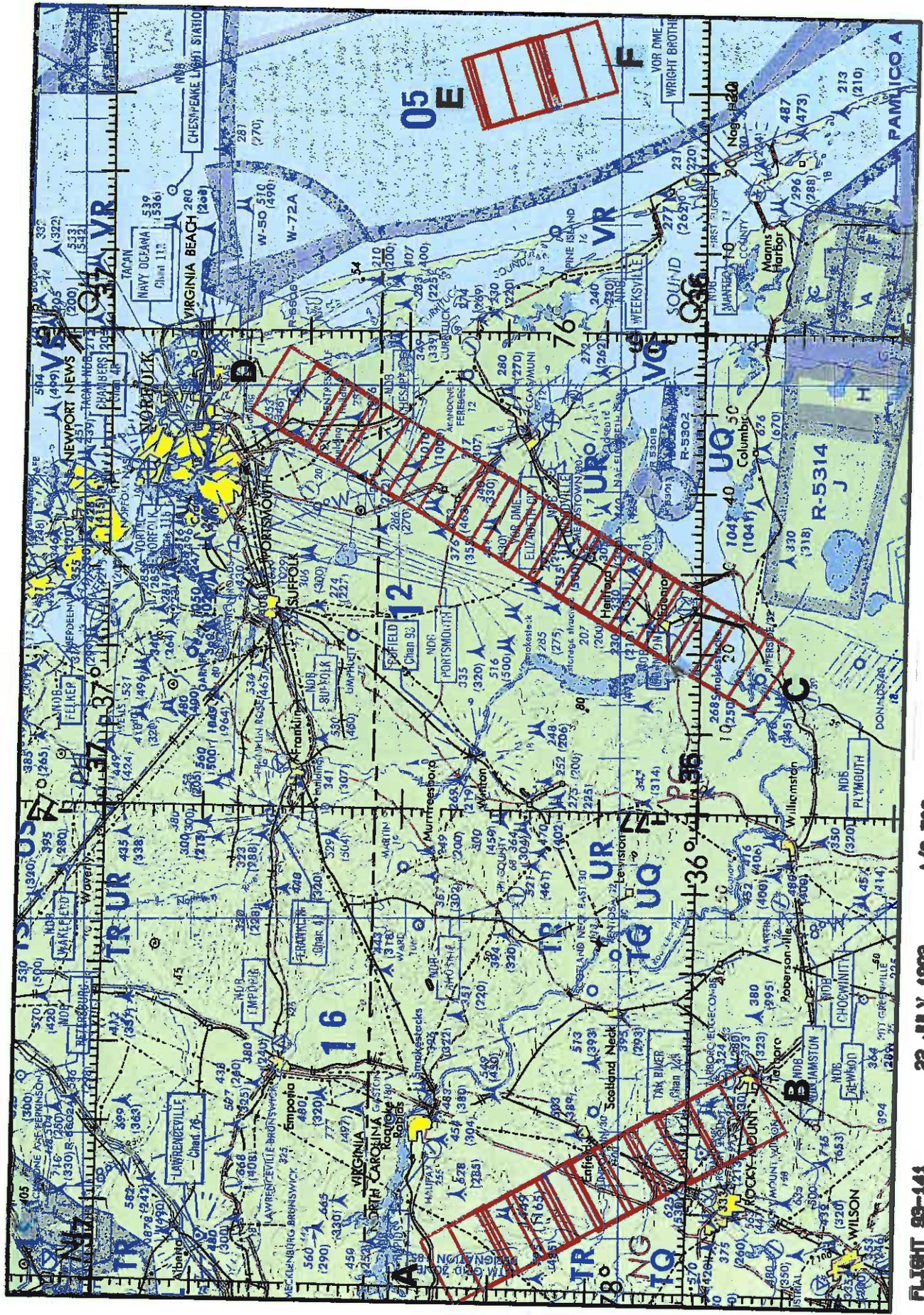


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ONC 9-21