FLIGHT SUMMARY REPORT

Flight Number: 93-143

Calendar/Julian Date: 28 July 1993 • 209

Sensor Package: Wild-Heerbrug RC-10
Modis Airborne Simulator (MAS)

Area(s) Covered: Maryland, Virginia, North Carolina

Investigator(s): Kaufman, NASA-Goddard **Aircraft #:** 708

SENSOR DATA

Accession #:	04600	-----
Sensor ID #:	034	108
Sensor Type:	RC-10	MAS
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:	1/150	-----
# of Frames:	93	-----
% Overlap:	60	-----
Quality:	Excellent	-----
Remarks:	Camera clock offset 1 second 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.

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:

Data System Channel	MAS Channel	Band edges µm
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. 93-143

Accession # 04600

Sensor # 034

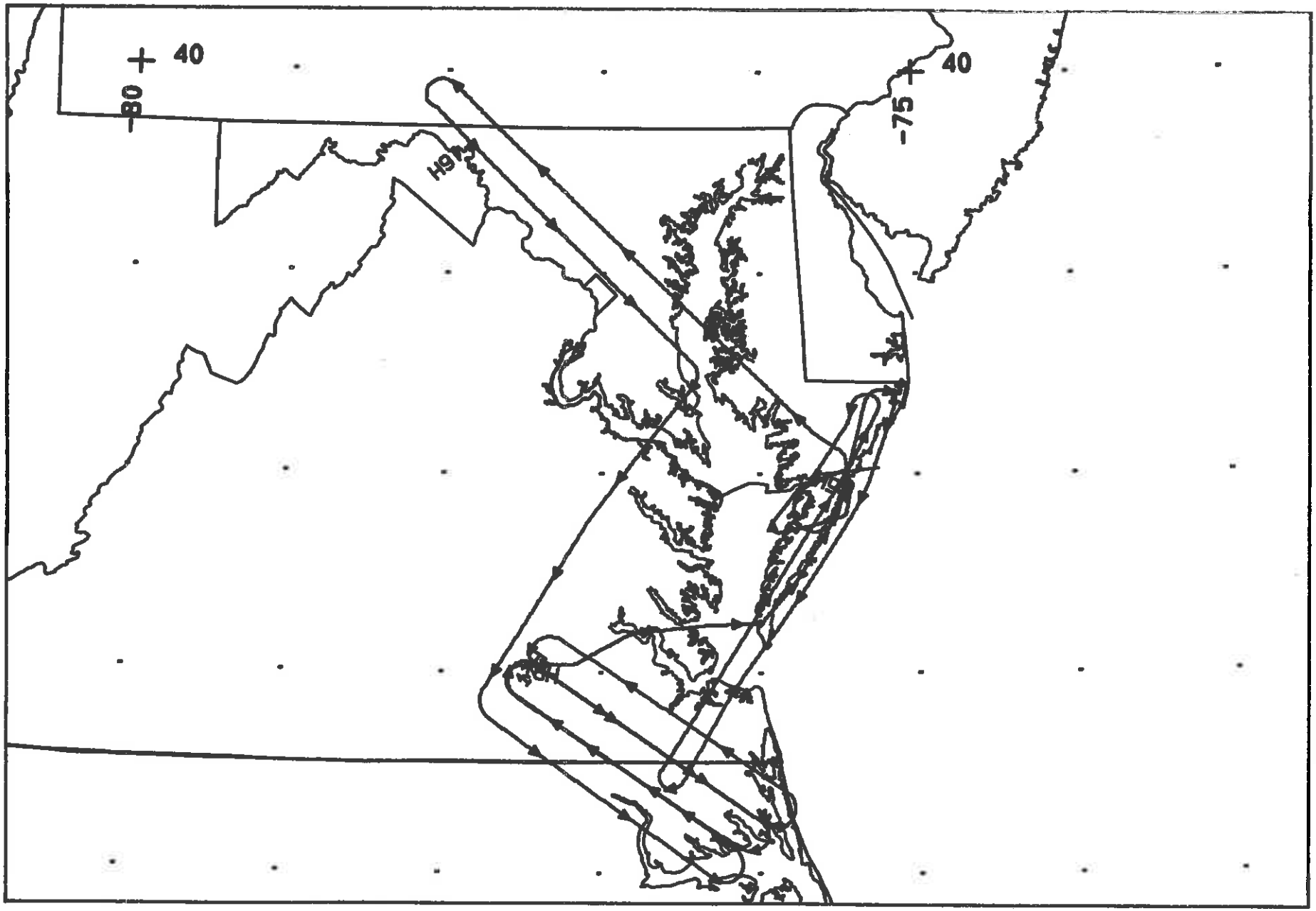
Check Points	Frame Numbers	Time (GMT-hr, min, sec)		Altitude, MSL feet/meters	Cloud Cover/Remarks
		START	END		
A - B	1675-1691	15:00:27	15:08:16	65000/19800	Clear
C - D	1692-1707	15:24:32	15:31:42	"	Clear
E - F	1708-1718	15:42:37	15:47:29	"	Clear
G - H	1719-1734	16:05:32	16:12:50	"	Clear
I - J	1735-1745	16:40:05	16:44:57	"	10-30% cirrus (frames (1735-1737); 10-20% cumulus (frames 1739-1745)
K - L	1746-1756	16:49:03	16:53:54	"	10-40% cirrus and cumulus (frames 1746-1753); 10% cumulus (frame 1756)
M - N	1757-1767	17:08:58	17:13:50	"	Minor-30% cumulus; stepwedge overprint (frames 1766-7167)

MAS SCANNER FLIGHT LINE DATA

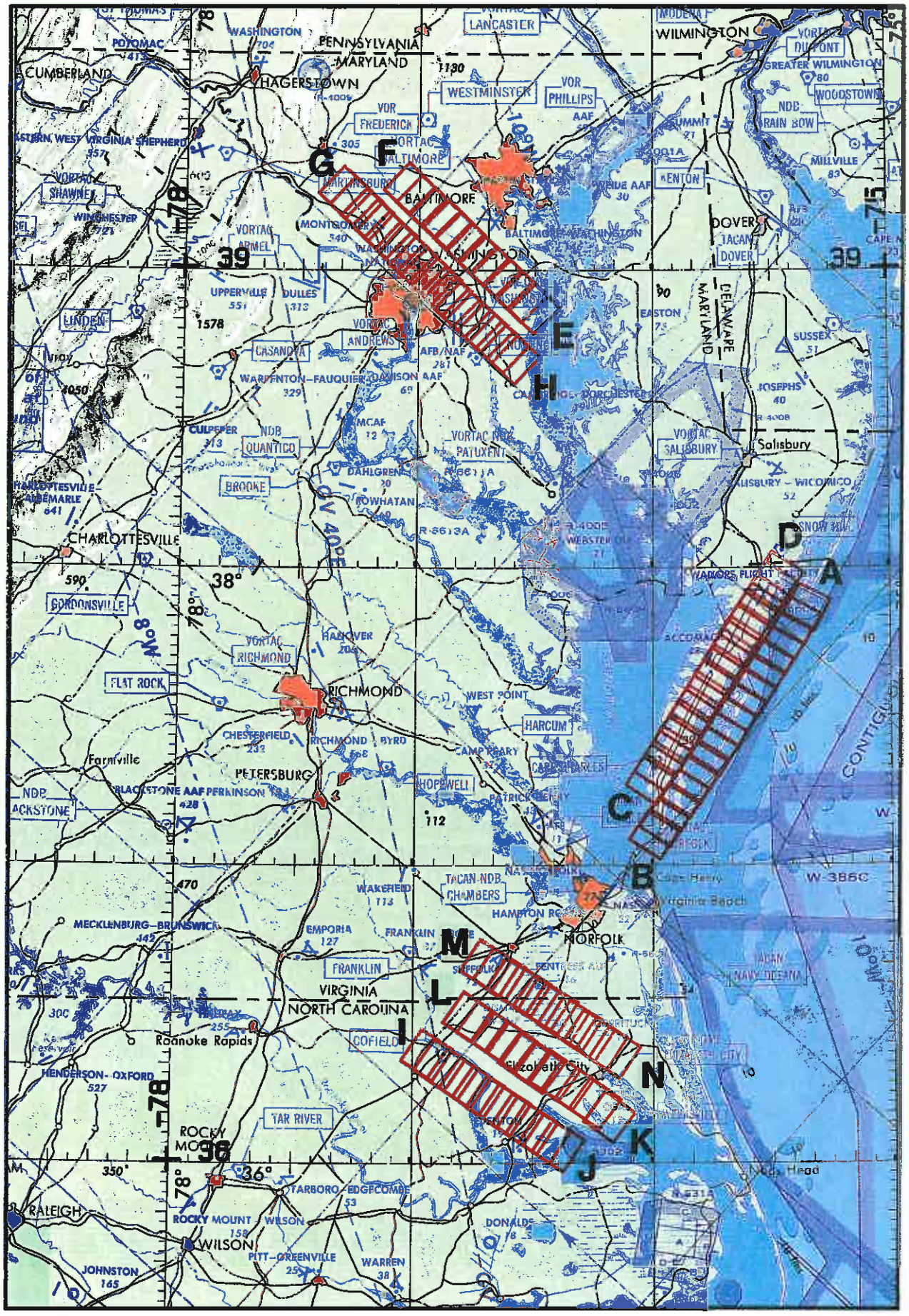
FLIGHT NO. 93-143

DAEDALUS FLIGHT DATA
FLIGHT NUMBER: 93-143

Check Points	Actual time (GMT) begin	end	Actual scanline begin	end	Altitude feet/meter	Scan Speed (rps)	total Good scanlines	total Interpolated scanlines	total Repeated scanlines
A-B	15:00:25.0	15:07:27.0	17522	20888	65000/19812	6.20	3367	0	0
C-D	15:23:15.0	15:31:44.0	26036	29204	65000/19812	6.20	3169	0	0
E-F	15:41:33.0	15:48:27.0	32867	35441	65000/19812	6.20	2575	0	0
G-H	16:04:22.0	16:14:27.0	41381	45143	65000/19812	6.20	3763	0	0
I-J	16:39: 7.0	16:45: 1.0	54850	56724	65000/19812	6.20	2575	0	0
K-L	16:49:12.0	16:54:46.0	58112	60191	65000/19812	6.20	2080	0	0
M-N	17:07:46.0	17:14:40.0	65042	67616	65000/19812	6.20	2575	0	0



FLIGHT 93-143 28 JULY 1993 A/C 708 RC-18 / NAS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WASHINGTON
PENNSYLVANIA
MARYLAND
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CUMBERLAND
WESTMINSTER
FREDERICK
BALTIMORE
WILMINGTON
DOVER
EASTON
Salisbury
CHARLOTTESVILLE
RICHMOND
PETERSBURG
FARMVILLE
HOPEWELL
NORFOLK
VIRGINIA BEACH
FRANKLIN
VIRGINIA
NORTH CAROLINA
Roanoke Rapids
Elizabeth City
RALEIGH
ROCKY MOUNT
WILSON
FARMBORO-EDGECOMBE
TAR RIVER
JOHNSTON
WARREN
DONALDS
Nags Head
MECKLENBURG-BRUNSWICK
HENDERSON-OXFORD
GORDONSVILLE
FLAT ROCK
CULPEPER
WARRENTON-FAUQUIER
CASANOVA
LINDEN
SHANNEL
WINCHESTER
MONTGOMERY
BROOKE
QUANTICO
DAHLGREN
PATUXENT
HARCUM
WAKEFIELD
COFIELD
SUSSEX
MILLVILLE
LANCASTER
WOODSTOWN
DUPONT
GREATER WILMINGTON
KENTON
DELAWARE
MARYLAND
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W-386C
FLIGHT 98-143
28 JULY 1998
A/C 708
RC-10 / MAS
JNC 48