

FLIGHT SUMMARY REPORT

Flight Number: 95-078
Calendar/Julian Date: 24-25 April 1995 • 114-115
Sensor Package: Dual Wild-Heerbrugg RC-10
 Modis Airborne Simulator (MAS)
 Millimeter-Wave Imaging
 Radiometer (MIR)
 Aerosol Particulate Sampler (APS)
Area(s) Covered: Alaska -- Bering Sea II

Investigator(s): Hall, GSFC

Aircraft #: 708

SENSOR DATA

Accession #:	04917	04918	----	----	----
Sensor ID #:	031	035	108	114	024
Sensor Type:	RC-10	RC-10	MAS-50	MIR	APS
Focal Length:	6" 153.05 mm	6" 153.46 mm	----	----	----
Film Type:	Panatomic X Aerographic II 2412	Panatomic X Aerographic II 2412	----	----	----
Filtration:	Wratten 12 + 2.2 AV	Wratten 12 + 2.2 AV	----	----	----
Spectral Band:	510-700 nm	510-700 nm	----	----	----
f Stop:	5.6	5.6	----	----	----
Shutter Speed:	1/200	1/200	----	----	----
# of Frames:	334	334	----	----	----
% Overlap:	60	60	----	----	----
Quality:	Good	Good	----	----	----
Remarks:	Camera clock offset 5 seconds from navigation data	Annotation block failed after first data line			

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.

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

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.

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.)

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)

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.

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. 95-078

Accession # 04917

Sensor # 031

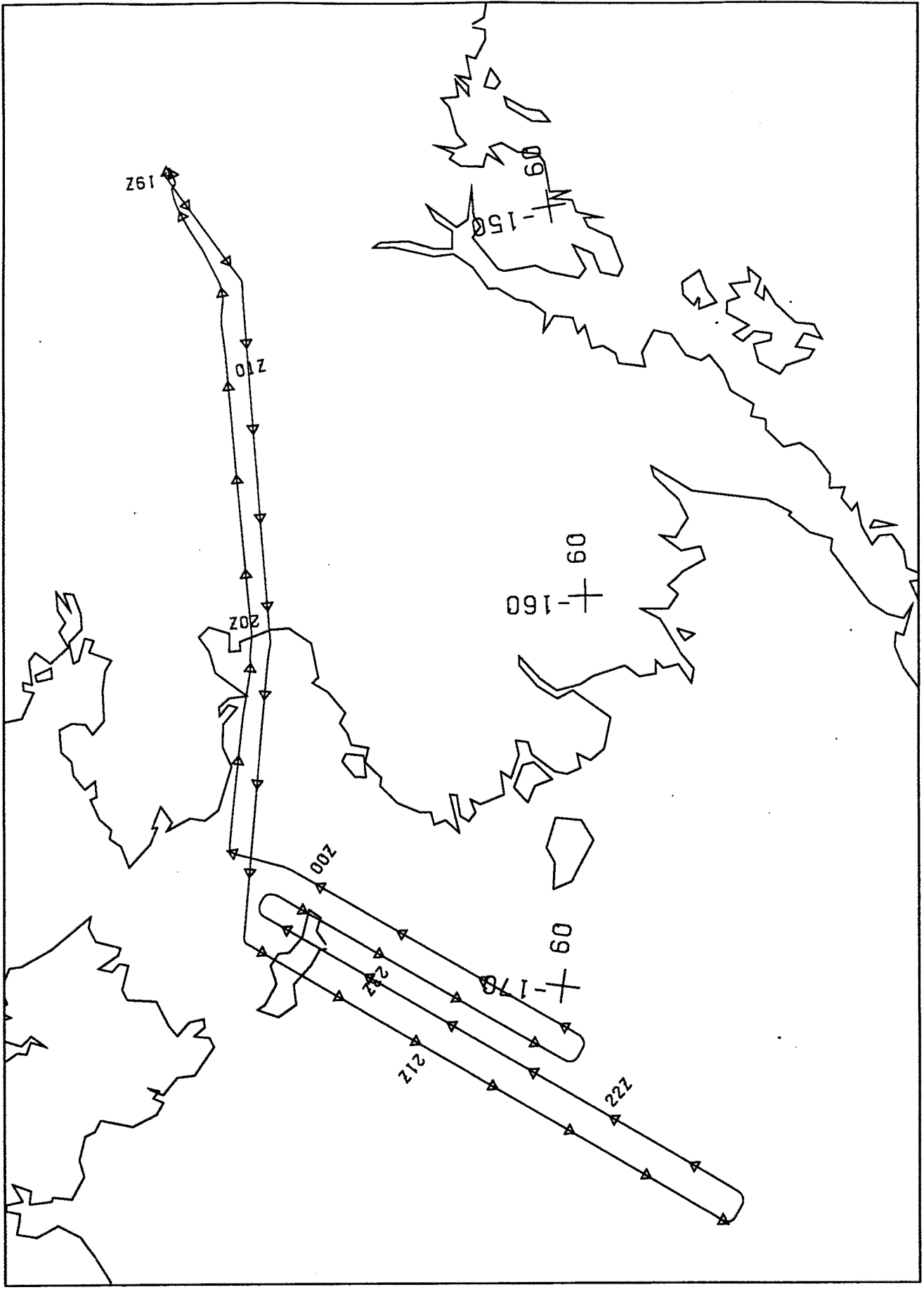
Check Points	Frame Numbers	Time (GMT-hr, min, sec)		Altitude, MSL feet/meters	Cloud Cover/Remarks
		START	END		
A - B	4172-4245	19:23:54	20:35:41	59450/18120	30-100% cumulus; oblique (frame 4212)
B - C	4246-4308	20:37:39	21:38:37	61457/18732	80-100% cumulus
D - E	4309-4367	21:44:31	22:41:33	62775/19134	90-100% cumulus
F - G	4368-4405	22:46:28	23:22:51	63374/19316	100% cumulus
H - I	4406-4447	23:27:46	0:08:05	64231/19578	90-100% cumulus
I - J	4448-4505	0:11:02	1:07:05	64669/19711	50-100% cumulus; radical shift in exposure (frames 4454-4455)
APS ON/OFF 19:49:00/01:03:00					

**CAMERA FLIGHT LINE DATA
FLIGHT NO. 95-078**

Accession # 04918

Sensor # 035

Check Points	Frame Numbers	Time (GMT-hr, min, sec)		Altitude, MSL feet/meters	Cloud Cover/Remarks
		START	END		
A - B	9723-9796	19:23:48	20:35:35	59450/18120	30-100% cumulus; oblique (frame 9763)
B - C	9797-9859	20:37:33	21:38:31	61457/18732	80-100% cumulus
D - E	9860-9918	21:44:25	22:41:27	62775/19134	90-100% cumulus
F - G	9919-9956	22:46:22	23:22:45	63374/19316	100% cumulus
H - I	9957-9998	23:27:40	0:07:59	64231/19578	90-100% cumulus
I - J	9999-0056	0:10:56	1:06:59	64669/19711	50-100% cumulus



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