FLIGHT SUMMARY REPORT

Flight Number: 99-071

Calendar/Julian Date: 16 May 1999 • 136

Sensor Package: Wild-Heerbrugg RC-10
Modis Airborne Simulator (MAS 50)

Area(s) Covered: Atlanta, GA

Investigator(s): Quattrochi, MSFC **Aircraft #:** 809

SENSOR DATA

Accession #:	05341	-----
Sensor ID #:	034	108
Sensor Type:	RC-10	MAS 50
Focal Length:	12” 304.66 mm	-----
Film Type:	Aerochrome IR SO-134	-----
Filtration:	Wratten 12	-----
Spectral Band:	510-900 nm	-----
f Stop:	11	-----
Shutter Speed:	1/300	-----
# of Frames:	120	-----
% Overlap:	60	-----
Quality:	Excellent	-----
Remarks:	Subtract 8 seconds for correct UTC	

Airborne Science and Applications Program

The Airborne Science Branch at NASA's Dryden Flight Research Center, Edwards, California, operates two ER-2 high altitude aircraft in support of NASA earth science research. 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

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).

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 16-bit channels of multispectral data and is configured as follows:

Spectral Channel	Band center (µm)	Bandwidth (µm)	Spectral Range
1	0.4649	0.0397	0.4451-0.4848
2	0.5494	0.0417	0.5285-0.5703
3	0.6550	0.0511	0.6294-0.6805
4	0.7024	0.0415	0.6816-0.7231
5	0.7431	0.0420	0.7221-0.7641
6	0.8248	0.0427	0.8034-0.8461
7	0.8667	0.0414	0.8460-0.8874
8	0.9072	0.0409	0.8867-0.9276
9	0.9476	0.0397	0.9277-0.9674
10	1.6422	0.0519	1.6163-1.6682
11	1.6975	0.0505	1.6722-1.7228
12	1.7499	0.0506	1.7245-1.7752
13	1.8014	0.0491	1.7768-1.8259
14	1.8548	0.0489	1.8303-1.8792
15	1.9044	0.0487	1.8801-1.9288
16	1.9553	0.0483	1.9312-1.9794
17	2.0048	0.0487	1.9804-2.0291
18	2.0551	0.0484	2.0309-2.0793
19	2.1037	0.0486	2.0794-2.1280
20	2.1532	0.0483	2.1291-2.1774
21	2.2019	0.0481	2.1779-2.2259
22	2.2522	0.0486	2.2278-2.2675
23	2.3021	0.0487	2.2777-2.3265
24	2.3512	0.0476	2.3274-2.3750
25	2.4005	0.0483	2.3764-2.4246

Spectral Channel	Band center (µm)	Bandwidth (µm)	Spectral Range
26	3.1192	0.1616	3.0384-3.2000
27	3.2809	0.1486	3.2066-3.3552
28	3.4330	0.1617	3.3521-3.5138
29	3.5940	0.1539	3.5170-3.6709
30	3.7449	0.1449	3.6724-3.8174
31	3.9069	0.1602	3.8267-3.9870
32	4.0707	0.1554	3.9929-4.1484
33	4.1699	0.0669	4.1365-4.2034
34	4.4029	0.1255	4.3401-4.4656
35	4.5404	0.1512	4.4648-4.6160
36	4.6979	0.1591	4.6184-4.7775
37	4.8536	0.1516	4.7778-4.9294
38	5.0033	0.1468	4.9298-5.0767
39	5.1588	0.1400	5.0888-5.2288
40	5.3075	0.1327	5.2412-5.3738
41	5.3977	0.0755	5.3590-5.4365
42	8.5366	0.3950	8.3391-8.7341
43	9.7224	0.5365	9.4541-9.9906
44	10.5071	0.4579	10.278-10.736
45	11.0119	0.4710	10.776-11.247
46	11.9863	0.4196	11.776-12.196
47	12.9013	0.3763	12.713-13.089
48	13.2702	0.4584	13.041-13.500
49	13.8075	0.5347	13.540-14.075
50	14.2395	0.3775	14.051-14.428

NOTE: Bandpass centers approximate

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^{o}
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.)

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 Airborne Sensor Facility, NASA-Ames Research Center, Mail Stop 240-6, Moffett Field, California 94035-1000 (Telephone: 650-604-6252).

MODIS AIRBORNE SIMULATOR (MAS) FLIGHT LINE INFORMATION FOR 16-MAY-1999 FLIGHT 99-071

	START OF FLIGHT LINE						END OF FLIGHT LINE					
LINE	TIME HH:MM:SS	LAT DEG	LON DEG	SOLAR ZEN	SOLAR AZIM	START HEADING	TIME HH:MM:SS	LAT DEG	LON DEG	SOLAR ZEN	SOLAR AZIM	SCAN LINES
1	14:01:46	29.732	-80.832	45.8	91.9	323.73	14:11:14	30.572	-81.601	44.4	93.6	3523
2	14:12:20	30.642	-81.715	44.4	93.7	287.62	14:14:24	30.707	-81.980	44.2	94.0	773
3	14:15:26	30.780	-82.087	44.0	94.1	325.71	14:24:47	31.641	-82.807	42.7	96.0	3492
4	14:24:51	31.645	-82.812	42.7	96.0	325.01	14:28:33	31.980	-83.094	42.2	96.8	1383
5	14:28:36	31.982	-83.094	42.1	96.8	325.76	14:41:08	33.112	-84.075	40.5	99.5	4681
6	14:42:46	33.223	-84.249	40.4	99.8	298.68	14:44:19	33.301	-84.436	40.2	100.0	580
7	14:51:15	33.463	-84.520	38.8	101.4	2.09	14:56:22	34.041	-84.516	37.9	103.1	1917
8	14:58:42	34.048	-84.335	37.6	103.4	180.24	15:03:56	33.459	-84.335	36.4	103.7	1955
9	15:06:17	33.461	-84.519	35.8	104.4	1.41	15:08:40	33.734	-84.518	35.3	105.2	896
10	15:08:44	33.739	-84.517	35.3	105.3	1.05	15:11:21	34.036	-84.517	34.9	106.2	978
11	15:13:36	34.029	-84.335	34.6	106.6	180.18	15:18:33	33.468	-84.334	33.4	106.9	1850
12	15:20:54	33.479	-84.151	32.5	108.0	2.56	15:25:50	34.035	-84.149	31.7	110.0	1843
13	15:29:01	34.033	-84.433	31.6	110.2	181.21	15:34:00	33.465	-84.434	30.5	110.6	1862
14	15:37:07	33.482	-84.147	29.4	112.1	1.57	15:41:49	34.011	-84.149	28.7	114.4	1756
15	15:45:03	34.007	-84.433	28.5	114.6	180.10	15:49:50	33.467	-84.433	27.4	115.1	1787
16	15:52:24	33.488	-84.231	26.5	116.6	1.82	15:56:59	34.007	-84.232	25.9	119.1	1712
17	15:59:59	33.923	-84.436	25.7	119.2	178.91	16:04:05	33.458	-84.433	24.8	119.8	1532
18	16:06:29	33.463	-84.233	23.9	121.6	2.53	16:11:16	34.003	-84.233	23.4	124.5	1787
19	16:12:40	34.023	-84.109	23.3	124.7	149.45	16:15:38	33.738	-83.900	22.5	125.7	1109
20	16:15:41	33.737	-83.896	22.4	125.7	149.07	16:31:23	32.209	-82.798	18.2	132.4	5863
21	16:31:38	32.176	-82.780	18.1	132.5	152.00	16:47:38	30.552	-81.805	14.1	142.2	5976
22	16:47:47	30.537	-81.798	14.0	142.3	148.95	16:49:01	30.415	-81.718	13.7	143.2	462
23	16:49:07	30.403	-81.710	13.7	143.3	148.97	16:54:49	29.866	-81.313	12.3	148.6	2119

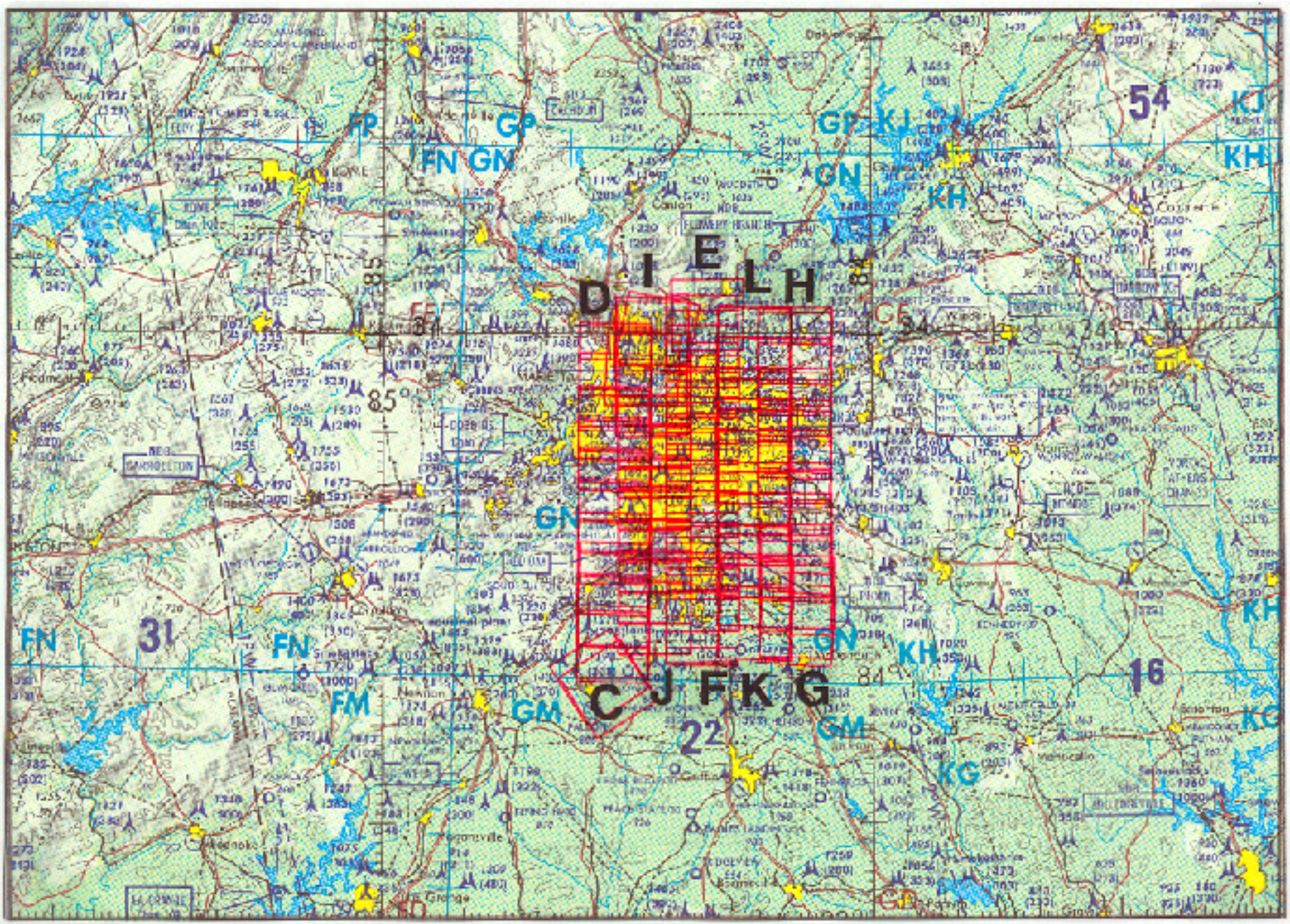
NUMBER OF FILES FOR THIS FLIGHT = 23
TOTAL NUMBER OF SCAN LINES = 49836
DATE THESE FILES WERE PROCESSED = 07-Jun-99
DATE THIS LIST WAS CREATED = 07-Jun-99
GRANULE VERSION = 9

CAMERA FLIGHT LINE DATA
FLIGHT NO. 99-071

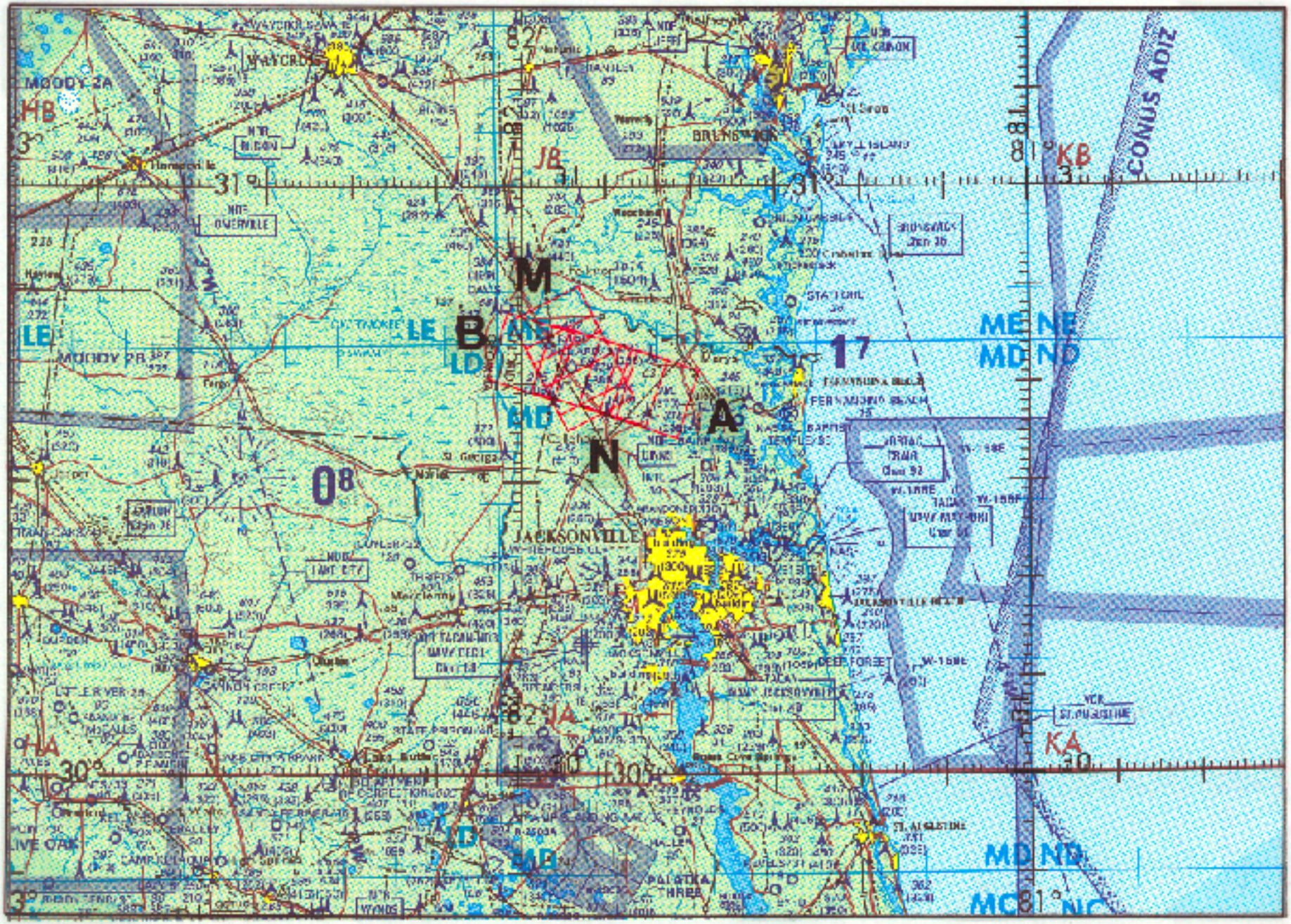
Accession # 05341

Sensor # 034

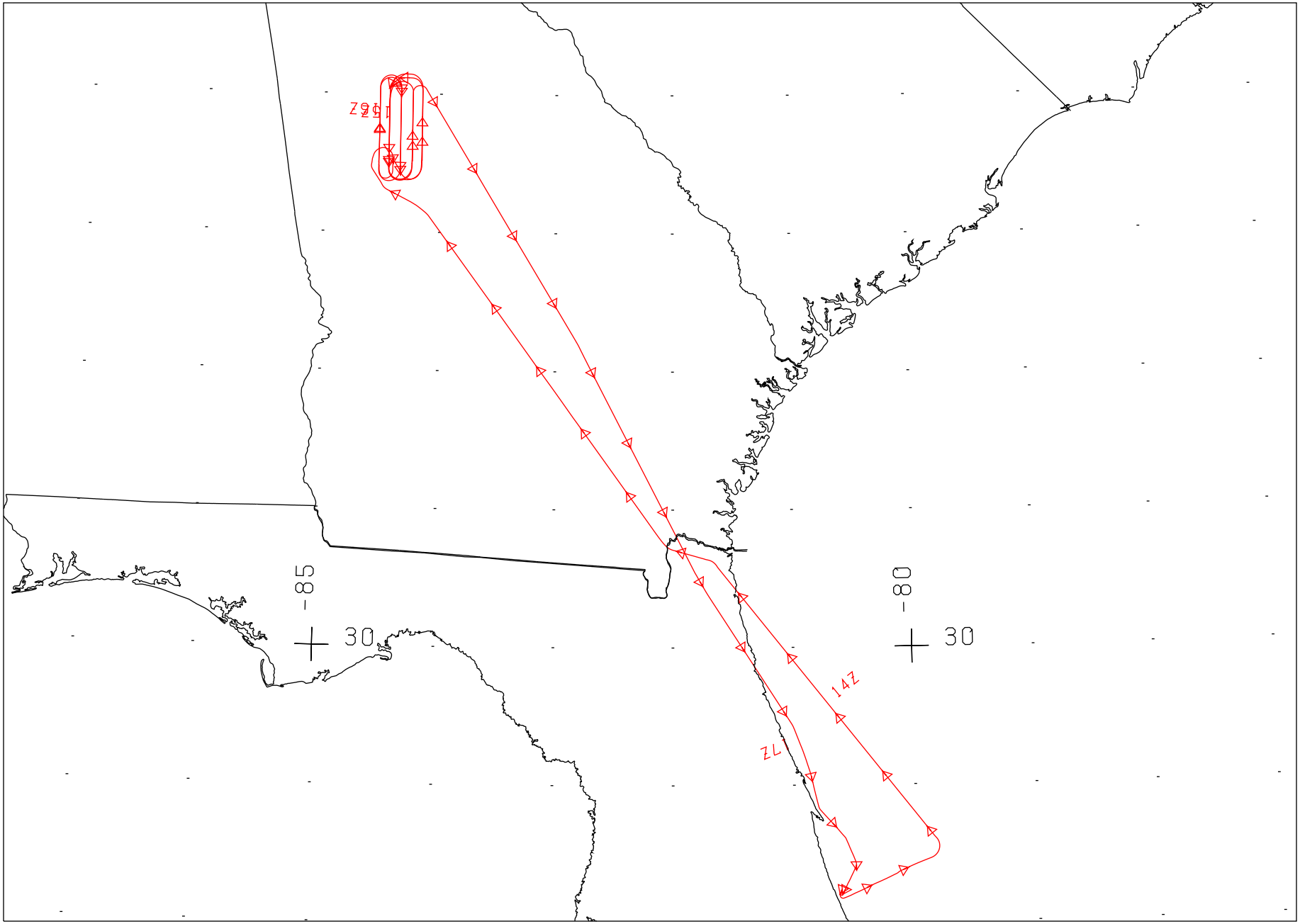
Check Points	Frame Numbers	Time (GMT-hr, min, sec) START	Time (GMT-hr, min, sec) END	Altitude, MSL feet/meters	Cloud Cover/Remarks
A - B	9009 -9013	14:12:37	14:14:31	64000 / 19510	Clear
C	9014 - 9015	14:45:35	14:45:48	65000 / 19810	Clear
C - D	9016 - 9025	14:51:30	14:55:44	65500 / 19970	10% cumulus frames 9016 -9018
E - F	9026 - 9036	14:58:57	15:03:40	65500 / 19970	Clear
C - D	9037 -9046	15:06:34	15:10:48	65500 / 19970	10 - 30% cumulus frames 9037 - 9039; 10 - 20% cumulus frames 9044 - 9046
E - F	9047 - 9057	15:13:55	15:18:24	65500 / 19970	20 - 30% cumulus frames 9048 - 9050
G - H	9058 - 9067	15:21:13	15:25:26	65500 / 19970	10% cirrus frames 9064 - 9065
I - J	9068 - 9077	15:29:27	15:29:27	65500 / 19970	10% cumulus frames 9069 30 - 80% cumulus frames 9070 - 9072
G - H	9078 - 9087	15:37:30	15:37:30	65500 / 19970	10 - 30% cumulus frames 9082 - 9084



FLIGHT 99-071 16 MAY 1999 A/C 809 RC-10 ONC G-21



FLIGHT 99-071 16 MAY 1999 A/C 809 RC-10 ONC H-25



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