

FLIGHT SUMMARY REPORT

Flight Number: 94-020
Calendar/Julian Date: 16 December 1993 • 350
Sensor Package: Dual Wild-Heerbrug RC-10
Dual Hycon HR-732
Airborne Ocean Color Imager (AOCI)
Thermal Infrared Multispectral Scanner
(TIMS)
Area(s) Covered: Florida Coast/Louisiana Gulf Coast

Investigator(s): Ferry Flight

Aircraft #: 708

SENSOR DATA

Accession #:	04675	04676	04677	04678
Sensor ID #:	076	034	020	039
Sensor Type:	RC-10	RC-10	HR-732	HR-732
Focal Length:	12" 304.89 mm	12" 304.66 mm	24" 609.6 mm	24" 609.6 mm
Film Type:	High Definition Aerochrome IR SO-131	Aerochrome IR SO-193	High Definition Aerochrome IR SO-131	Aerial Color SO-242
Filtration:	None	Wratten 12	None	None
Spectral Band:	510-900 nm	510-900 nm	510-900 nm	400-700 nm
f Stop:	4	11	8	8
Shutter Speed:	1/200	1/300	1/75	1/75
# of Frames:	12	10	20	19
% Overlap:	60	60	60	60
Quality:	Excellent	Excellent	Excellent	Excellent
Remarks:				

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SENSOR DATA continued

Accession #:	-----	-----
Sensor ID #:	090	086
Sensor Type:	AOCI	TIMS
Focal Length:	-----	-----
Film Type:	-----	-----
Filtration:	-----	-----
Spectral Band:	-----	-----
f Stop:	-----	-----
Shutter Speed:	-----	-----
# of Frames:	-----	-----
% Overlap:	-----	-----
Quality:	Excellent	Good
Remarks:		

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 Ocean Color Imager

The Airborne Ocean Color Imager (AOCI) is a high altitude multispectral scanner designed for oceanographic remote sensing. It provides 10-bit digitization of eight bands in the visible/near-infrared region of the spectrum, plus two 8-bit bands in the near and thermal infrared. The bandwidths are as follows:

<u>Channel</u>	<u>Wavelength, μm</u>
1	0.436 - 0.455
2	0.481 - 0.501
3	0.511 - 0.531
4	0.554 - 0.575
5	0.610 - 0.631
6	0.655 - 0.676
7	0.741 - 0.800
8	0.831 - 0.897
9	0.989 - 1.054
10	8.423 - 12.279

Sensor/aircraft parameters are as follows:

IFOV:	2.5 mrad
Ground Resolution:	163 feet (50 meters) at 65,000 feet
Total Scan Angle:	85°
Swath Width:	19.6 nmi (36.3 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 9-10 10-bit channels 1-8

Thermal Infrared Multispectral Scanner

The Thermal Infrared Multispectral Scanner (TIMS) is a multispectral scanning system using a dispersive grating and a six element mercury cadmium telluride detector array to produce six discrete channels in the 8.2 μm to 12.2 μm region.

<u>Channel</u>	<u>Wavelength, μm</u>	<u>NET</u>
1	8.2 - 8.6	< 0.3° C
2	8.6 - 9.0	< 0.3° C
3	9.0 - 9.4	< 0.3° C
4	9.4 - 10.2	< 0.3° C
5	10.2 - 11.2	< 0.3° C
6	11.2 - 12.2	< 0.3° C

Sensor/aircraft parameters are as follows:

IFOV:	2.5 mrad
Ground Resolution:	163 feet (50 meters) at 65,000 feet
Total Scan Angle:	76.56°
Swath Width:	16.9 nmi (31.3 km) at 65,000 feet
Pixels/Scan Line:	638
Scan Rate:	7.3 (scans/second)
Ground Speed:	400 kts. (206 m/second)

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).

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). Additional information regarding ER-2 acquired photographic and digital data is also available through the Aircraft Data Facility.

**CAMERA FLIGHT LINE DATA
FLIGHT NO. 94-020**

Check Points	Frame Numbers	Time (GMT-hr, min, sec)		Altitude, MSL feet/meters	Cloud Cover/Remarks
		START	END		
Accession # 04675 Sensor # 076 A - C	0109-0120	16:09:33	16:14:40	65000/19800	Clear
Accession # 04676 Sensor # 034 A - C	1288-1297	16:10:17	16:14:40	65000/19800	Clear
Accession # 04677 Sensor # 020 A - C	0001-0020	16:09:57	16:14:31	65000/19800	Clear
Accession # 04678 Sensor # 039 A - C	0002-0020	16:10:05	16:14:39	65000/19800	Clear

TIMS SCANNER FLIGHT LINE DATA

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TIMS FLIGHT DATA
FLIGHT NUMBER: 94-020

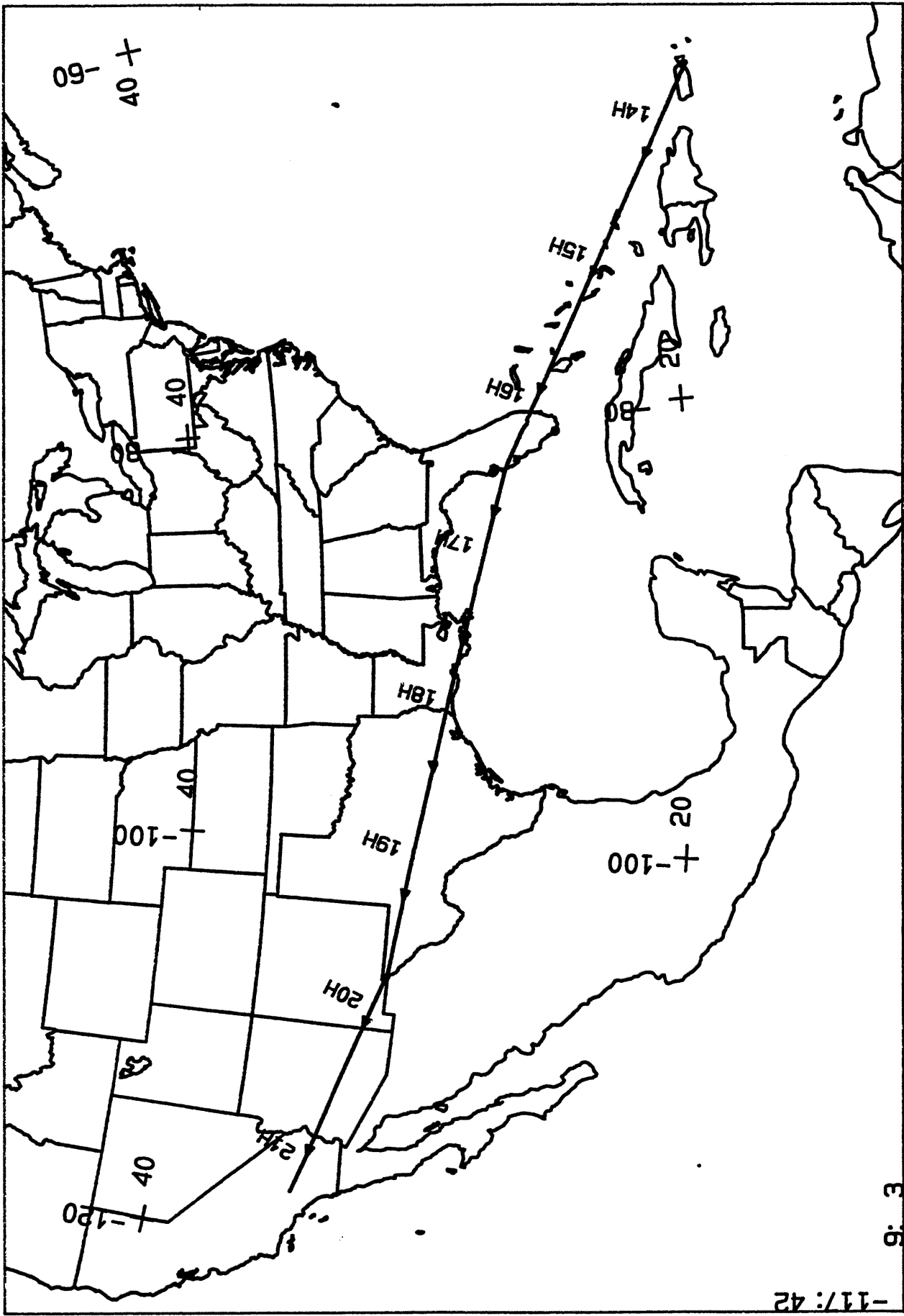
Check Points	A c t u a l t i m e b e g i n	(GMT)	A c t u a l s c a n l i n e b e g i n	e n d	A l t i t u d e f e e t / m e t e r	Scan S p e e d (rps)	t o t a l G o o d s c a n l i n e s	t o t a l I n t e r p o l a t e d s c a n l i n e s	t o t a l R e p e a t e d s c a n l i n e s
A-B	16:05:55.0	16:11:12.0	69135	71452	65000/19812	7.30	2318	0	0
BC	16:12:16.0	16:13:51.0	71920	72614	65000/19812	7.30	695	0	0

AOCI SCANNER FLIGHT LINE DATA

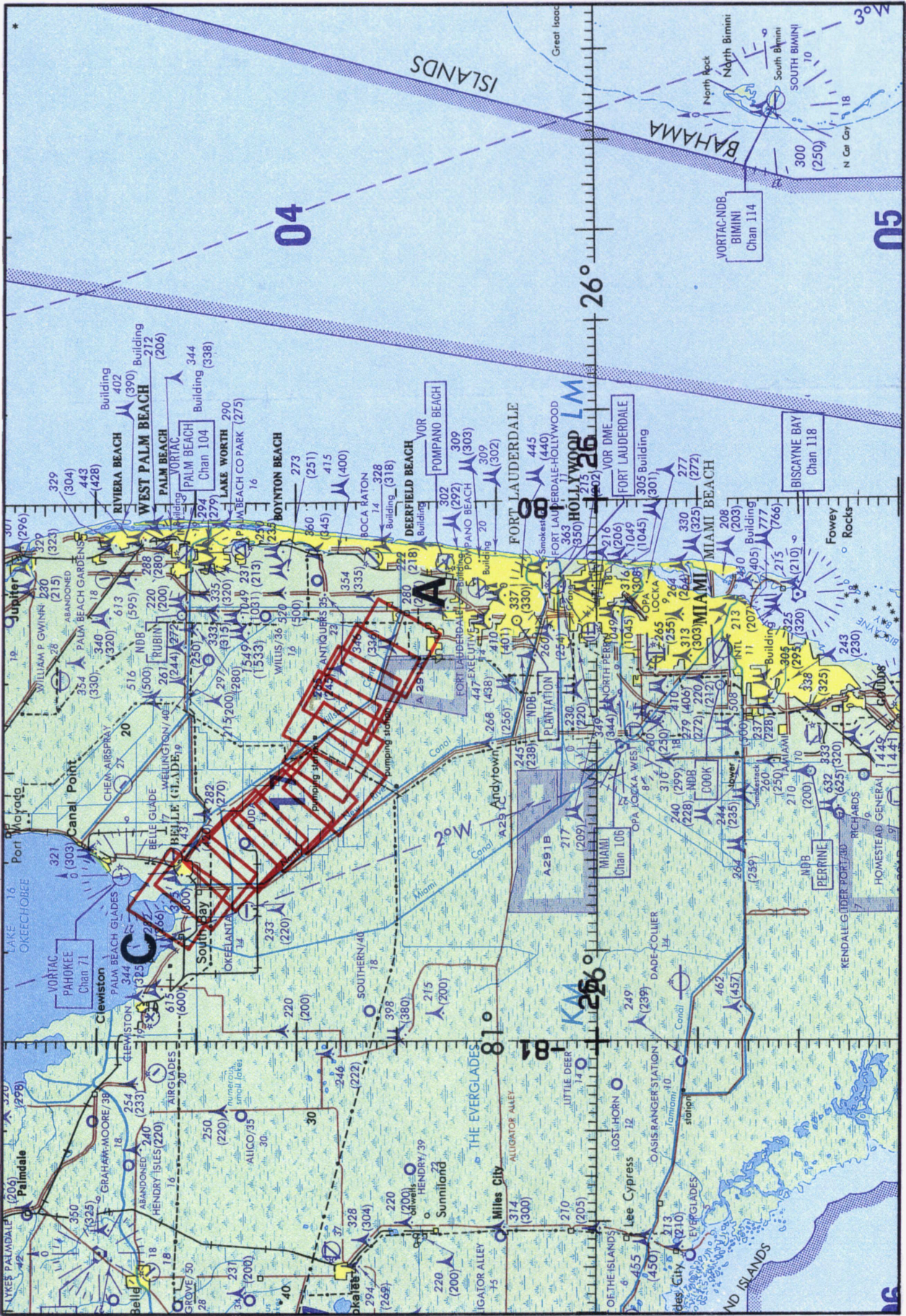
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VALUES FLIGHT DATA
FLIGHT NUMBER: 94-020

Check Points	Actual time begin	Actual scanline begin	Altitude feet/meter	Scan speed (fps)	Total ground scanlines	Total interpolated scanlines	Total Repeated scanlines
A-B	16:05:55.0	16:11:12.0	65000/19812	6.25	1982	0	0
B-C	16:12:16.0	16:13:51.0	65000/19812	6.25	595	0	0
D-E	17:21:37.0	17:37:47.0	65000/19812	6.25	1376	0	0



FLIGHT 94-020 16 December 1993 A/C 708 Due1 RC-10/Due1 HR-732 AOCI TMS
 OVERLAY FOR XGNOAM LAMBERT CONFORMAL PROJECTION: SP1 = 15.3 SP2 = 31.7 CM = -91.5 ROTATED BY 0.0
 13: 27: 45 TO 21: 14: 05 UT SCALE = 1: 2.44E+07 TIME TICS EVERY 50.00 MINUTES



FLIGHT 94-020 16 DECEMBER 1993 A/C 708 DUAL RC-10 / DUAL HF-732 ONC H-25

