

# FLIGHT SUMMARY REPORT

**Flight #:** 91-001  
**Date:** 03 October 1990  
**Sensor Package:** Airborne Visible and Infrared Imaging Spectrometer (AVIRIS),  
Thematic Mapper Simulator (TMS)  
Thermal Infrared Multispectral Scanner (TIMS)  
Wild-Heerbrug RC-10  
**Area(s) Covered:** Sequoia, Salton Sea, Imperial Valley,  
Coachilla Valley, Monterey Bay, Jasper Ridge

**Investigator(s):** Green, Kahle, and Davis, JPL      **Aircraft #:** 706  
**Flight Request:** 90L209, 90L220C, 90L210      **Julian Date:** 276

## SENSOR DATA

<b>Accession #:</b>	-----	-----	-----	04136
<b>Sensor ID #:</b>	099	074	086	076
<b>Sensor Type:</b>	AVIRIS	TMS	TIMS	RC-10
<b>Focal Length:</b>	-----	-----	-----	12" 304.89 mm
<b>Film Type:</b>	-----	-----	-----	High Definition Aerochrome IR SO-131
<b>Filtration:</b>	-----	-----	-----	cc.10B
<b>Spectral Band:</b>	-----	-----	-----	510-900 nm
<b>f Stop:</b>	-----	-----	-----	4
<b>Shutter Speed:</b>	-----	-----	-----	1/150
<b># of Frames:</b>	-----	-----	-----	110
<b>% Overlap:</b>	-----	-----	-----	60
<b>Quality:</b>	-----	-----	-----	Excellent
<b>Remarks:</b>				

## 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 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  $\mu\text{m}$ ).

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 $\mu\text{m}$
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 $\mu\text{m}$	31	9.4 nm
2	0.68 - 1.27 $\mu\text{m}$	63	9.4 nm
3	1.25 - 1.86 $\mu\text{m}$	63	9.7 nm
4	1.84 - 2.45 $\mu\text{m}$	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.

### 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  $\mu\text{m}$  to 12.2  $\mu\text{m}$  region.

<u>Channel</u>	<u>Wavelength, <math>\mu\text{m}</math></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)

### Thematic Mapper Simulator

The Daedalus Thematic Mapper Simulator (TMS) is a multispectral scanner flown aboard the ER-2 aircraft which simulates spatial and spectral characteristics of the seven Landsat-D Thematic Mapper bands. The specific bands are as follows:

<u>Daedalus Channel</u>	<u>TM Band</u>	<u>Wavelength, <math>\mu\text{m}</math></u>
1	A	0.42 - 0.45
2	1	0.45 - 0.52
3	2	0.52 - 0.60
4	B	0.60 - 0.62
5	3	0.63 - 0.69
6	C	0.69 - 0.75
7	4	0.76 - 0.90
8	D	0.91 - 1.05
9	5	1.55 - 1.75
10	7	2.08 - 2.35
11	6	8.5 - 14.0 low gain
12	6	8.5 - 14.0 high gain

Sensor/aircraft parameters are as follows:

IFOV:	1.25 mrad
Ground Resolution:	81 feet (25 meters) at 65,000 feet
Total Scan Angle:	43°
Swath Width:	8.4 nmi (15.6 km) at 65,000 feet
Pixels/Scan Line:	716
Scan Rate:	12.5 scans/second
Ground Speed:	400 kts (206 m/second)

**NOTE:** Information on data tape format, logical record format, and scanner calibration data may be obtained from the NASA-Ames Aircraft Data Facility at (415) 604-6252 or FTS 464-6252.

**CAMERA FLIGHT LINE DATA  
FLIGHT NO. 91-001**

Accession # 04136

Sensor # 076

Check Points	Frame Numbers	Time (GMT-hr, min, sec)		Altitude, MSL feet/meters	Cloud Cover/Remarks
		START	END		
A - B	3752-3756	18:02:36	18:04:32	65000/19800	Clear; Sequoia
C - D	3757-3772	18:43:52	18:50:45	"	Clear; Salton Sea/Imperial Valley
E - F	3773-3786	19:02:16	19:08:10	"	Clear; Salton Sea/Imperial Valley
G - H	3787-3803	19:16:41	19:23:52	"	Clear; Salton Sea/Imperial Valley
I - J	3804-3820	19:29:59	19:37:05	"	Clear; Coachilla Valley/Salton Sea/Imperial Valley
E - F	3821-3834	19:48:08	19:54:01	"	Clear; Imperial Valley/Salton Sea
K - L	3835-3844	20:59:14	21:03:10	"	Clear; Monterey Bay
M - N	3845-3854	21:10:11	21:14:07	"	Clear; Monterey Bay
O - P	3855-3861	21:18:53	21:21:22	"	Clear; Jasper Ridge

# SCANNER FLIGHT LINE DATA

## FLIGHT NO. 91-001

DAEDALUS FLIGHT DATA  
FLIGHT NUMBER: 91-001

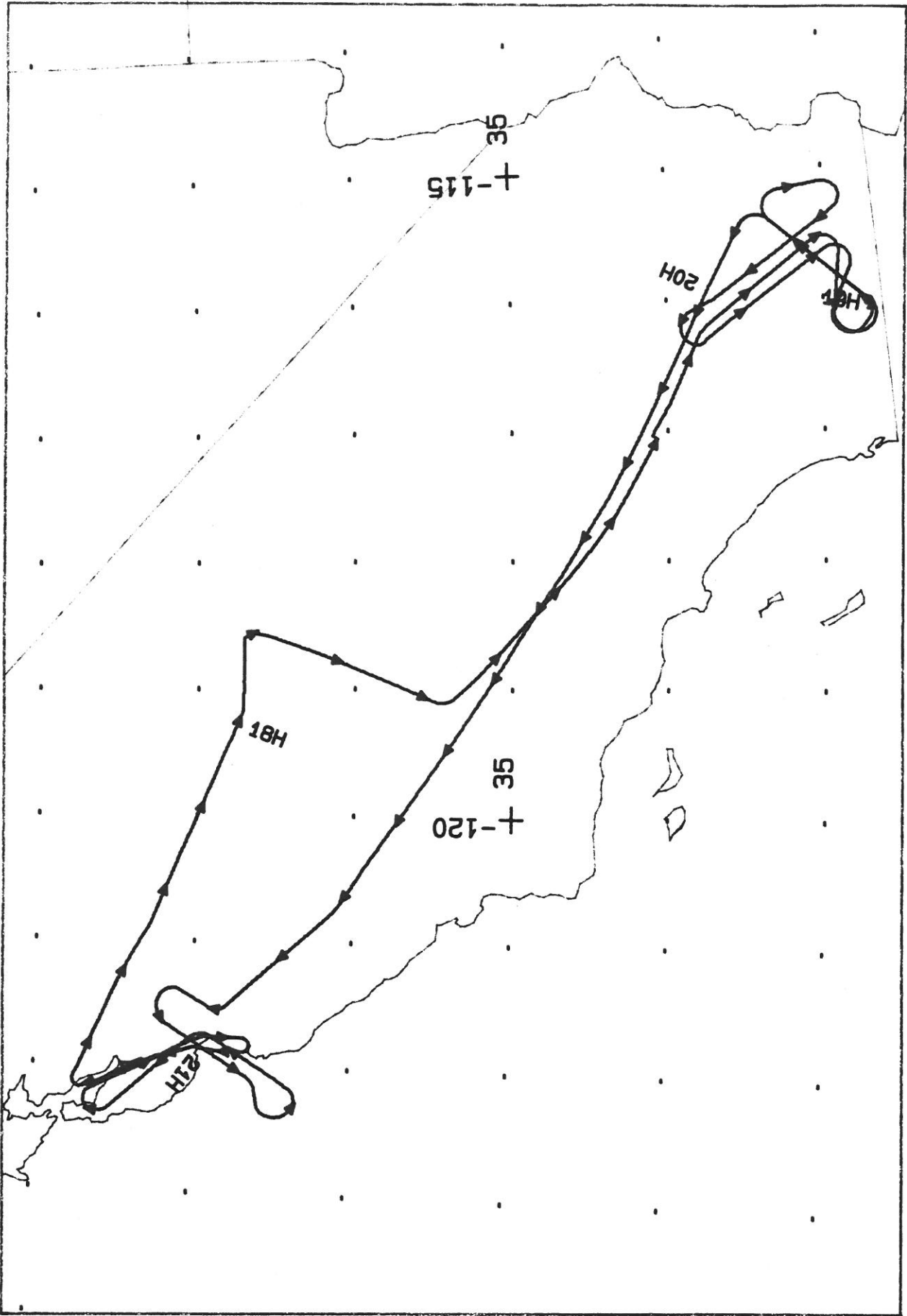
Check Points	Actual Time (GMT)		Actual Scanline		End	Altitude feet/meter	Scan Speed (rps)	Total Good Scanlines	Total Interpolated Scanlines	Total Repeated Scanlines
	Begin	End	Begin	End						
A-B	18:02:25.0	18:04:44.0	31403	33142	65000/19812	12.50	1738	0	2	
C-D	18:43:47.0	18:50:48.0	62421	67693	65000/19812	12.50	5256	0	17	
E-F	19:02:04.0	19:08:16.0	76144	80783	65000/19812	12.50	4625	0	15	
G-H	19:16:30.0	19:23:59.0	86969	92575	65000/19812	12.50	5601	0	6	
I-J	19:29:48.0	19:37:16.0	96940	102542	65000/19812	12.50	5587	0	16	
E-F	19:48:04.0	19:54:10.0	110633	115217	65000/19812	12.50	4572	0	13	
K-L	20:59:04.0	21:03:15.0	163883	167020	65000/19812	12.50	3016	0	122	
M-N	21:10:00.0	21:14:10.0	172092	175207	65000/19812	12.50	2993	0	123	
O-P	21:18:49.0	21:21:29.0	178693	180693	65000/19812	12.50	1971	0	30	

# SCANNER FLIGHT LINE DATA

## FLIGHT NO. 91-001

TIMS FLIGHT DATA  
FLIGHT NUMBER: 91-001

Check Points	Actual Time (GMT)		Actual Scanline		Altitude feet/meter	Scan Speed (rps)	Total Good Scanlines	Total Interpolated Scanlines	Total Repeated Scanlines
	Begin	End	Begin	End					
A-B	00:00:00.0	00:00:00.0	18342	19353	65000/19812	7.30	1010	0	2
C-D	00:00:00.0	00:00:00.0	36485	39556	65000/19812	7.30	3066	0	6
E-F	00:00:00.0	00:00:00.0	44511	47208	65000/19812	7.30	2698	0	0
G-H	00:00:00.0	00:00:00.0	50824	54110	65000/19812	7.30	3277	0	10
I-J	00:00:00.0	00:00:00.0	56667	59932	65000/19812	7.30	3260	0	6
K-L	00:00:00.0	00:00:00.0	64665	67337	65000/19812	7.30	2673	0	0
M-N	00:00:00.0	00:00:00.0	95818	97646	65000/19812	7.30	1827	0	2



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