FLIGHT SUMMARY REPORT

Flight #: 90-058
Date: 09 March 1990

Sensor Package: Wild-Heerbrug RC-10
Airborne Visible and Infrared Imaging
Spectrometer (AVIRIS)
Thermal Infrared Multispectral Scanner (TIMS)

Area(s) Covered: Mexico

Investigator(s): P. Sebesta, NASA-Ames
B. Wood, TGS Technology, Inc.

Flight Request: 90B202D

Aircraft #: 709
Julian Date: 068

SENSOR DATA

Accession #: 04001
Sensor ID #: 076 099 086
Sensor Type: RC-10 AVIRIS TIMS
Focal Length: 12" 304.89 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: 59
% Overlap: 60
Quality: Excellent
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 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 a four-line arrays of detectors to image a 614 pixel swath simultaneously in 224 contiguous spectral bands (0.4-2.4 μm).

AVIRIS parameters are as follows:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>IFOV:</td>
<td>1 mrad</td>
</tr>
<tr>
<td>GIFOV (at 20 km):</td>
<td>20 μm</td>
</tr>
<tr>
<td>FOV:</td>
<td>30°</td>
</tr>
<tr>
<td>GFOV (at 20 km):</td>
<td>11 km</td>
</tr>
<tr>
<td>Spectral Coverage:</td>
<td>0.41 - 2.45 μm</td>
</tr>
<tr>
<td>Number of Spectral Bands:</td>
<td>224</td>
</tr>
<tr>
<td>Digitization:</td>
<td>10 Bits</td>
</tr>
<tr>
<td>Data Rate:</td>
<td>17 MBPS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spectrometer</th>
<th>Wavelength Range</th>
<th>Number of Bands</th>
<th>Sampling Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.41 - 0.70 μm</td>
<td>31</td>
<td>9.4 nm</td>
</tr>
<tr>
<td>2</td>
<td>0.68 - 1.27 μm</td>
<td>63</td>
<td>9.4 nm</td>
</tr>
<tr>
<td>3</td>
<td>1.25 - 1.86 μm</td>
<td>63</td>
<td>9.7 nm</td>
</tr>
<tr>
<td>4</td>
<td>1.84 - 2.45 μm</td>
<td>63</td>
<td>9.7 nm</td>
</tr>
</tbody>
</table>

All AVIRIS data is decommutated and archived at JPL and not currently available for public distribution. For further information contact Rob Greene at Jet Propulsion Laboratory, 4800 Oak Grove Drive, Mail Stop 11-116, 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 $\mu$m to 12.2 $\mu$m region.

<table>
<thead>
<tr>
<th>Channel</th>
<th>Wavelength, $\mu$m</th>
<th>NET</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8.2 - 8.6</td>
<td>&lt; 0.3$^\circ$ C</td>
</tr>
<tr>
<td>2</td>
<td>8.6 - 9.0</td>
<td>&lt; 0.3$^\circ$ C</td>
</tr>
<tr>
<td>3</td>
<td>9.0 - 9.4</td>
<td>&lt; 0.3$^\circ$ C</td>
</tr>
<tr>
<td>4</td>
<td>9.4 - 10.2</td>
<td>&lt; 0.3$^\circ$ C</td>
</tr>
<tr>
<td>5</td>
<td>10.2 - 11.2</td>
<td>&lt; 0.3$^\circ$ C</td>
</tr>
<tr>
<td>6</td>
<td>11.2 - 12.2</td>
<td>&lt; 0.3$^\circ$ C</td>
</tr>
</tbody>
</table>

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$^\circ$
- Swath Width: 16.9 nmi (31.3 km)
- Pixels/Scan Line: 638
- Scan Rate: 7.3 (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. 90-058**

<table>
<thead>
<tr>
<th>Accession #</th>
<th>04001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor #</td>
<td>076</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Check Points</th>
<th>Frame Numbers</th>
<th>Time (GMT-hr, min, sec)</th>
<th>Altitude, MSL feet/meters</th>
<th>Cloud Cover/Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>START</strong></td>
<td><strong>END</strong></td>
<td></td>
</tr>
<tr>
<td>A - B</td>
<td>0503-0512</td>
<td>20:08:37</td>
<td>20:12:05</td>
<td>65000/19800</td>
</tr>
<tr>
<td>C - D</td>
<td>0513-0521</td>
<td>20:17:31</td>
<td>20:20:46</td>
<td>10-40% cumulus (frames 0503-0505)</td>
</tr>
<tr>
<td>E - F</td>
<td>0522-0533</td>
<td>20:26:09</td>
<td>20:30:18</td>
<td>10-60% cumulus (frames 0513-0521)</td>
</tr>
<tr>
<td>I - J</td>
<td>0545-0552</td>
<td>20:47:31</td>
<td>20:50:18</td>
<td>10% cumulus (frames 0534-0539)</td>
</tr>
<tr>
<td>K - L</td>
<td>0553-0561</td>
<td>20:56:12</td>
<td>20:59:04</td>
<td>20-30% cumulus (frames 0541-0544)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10-40% cumulus (frames 0545-0548)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10-40% cumulus (frames 0557-0561)</td>
</tr>
<tr>
<td>Check Points</td>
<td>Actual time (GMT) begin</td>
<td>Actual scanline begin</td>
<td>Altitude feet/meter</td>
<td>Scan Speed (rps)</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------------------</td>
<td>-------------------------</td>
<td>---------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>A-B</td>
<td>20:07:28.0 20:10:59.0</td>
<td>68631 70175</td>
<td>65000/19812</td>
<td>7.30</td>
</tr>
<tr>
<td>C-D</td>
<td>20:16:28.0 20:19:41.0</td>
<td>72515 73985</td>
<td>65000/19812</td>
<td>7.30</td>
</tr>
<tr>
<td>E-F</td>
<td>20:24:57.0 20:29:9.0</td>
<td>76298 78137</td>
<td>65000/19812</td>
<td>7.30</td>
</tr>
</tbody>
</table>