

## FLIGHT SUMMARY REPORT

**Flight Number:** 10-942  
**Calendar/Julian Date:** 28 August 2010 (240)  
**Sensor Package:** Cirrus Digital Camera System (DCS)  
Airborne Visible and Infrared Imaging Spectrometer (AVIRIS)  
MODIS/ASTER Airborne Simulator  
**Area(s) Covered:** Gulf of Mexico  
**Investigator(s):** Clark (USGS) **Aircraft:** ER-2 #809

### SENSOR DATA

<b>Accession #:</b>	05965	—	—
<b>Sensor ID #:</b>	167	099	124
<b>Sensor Type:</b>	DCS	AVIRIS	MASTER
<b>Focal Length:</b>	50mm	—	—
<b>Film Type:</b>	—	—	—
<b>Filtration:</b>	Wratten 12	—	—
<b>Spectral Band:</b>	510-990nm	—	—
<b>f-Stop:</b>	11	—	—
<b>Shutter Speed:</b>	1/500	—	—
<b># of Frames:</b>	294	—	—
<b>% Overlap:</b>	40%	—	—
<b>Quality:</b>	Excellent		Good
<b>Remarks:</b>			

## **NASA Airborne Science Program**

The National Aeronautics and Space Administration maintains a variety of aircraft and sensor systems dedicated to the support of remote sensing research. Two Lockheed ER-2s (S-model U-2); two WB-57 high altitude aircraft; a DC-8; a Lockheed Orion P-3B; Global Hawk and the Altair unmanned aerial vehicle (supported by General Atomics) provide multi-level platforms for both NASA and investigator-owned sensors. Data are collected for atmospheric, land, and ocean processes in support of the NASA Earth Science program, as well as for universities and other government agencies.

Additionally contracted aircraft from Department of Energy, and Twin Otter International provide remote sensing platforms for the program.

The NASA aircraft, located at the Dryden Aircraft Operations Facility, Ellington Field and Wallops Flight Facility, are used as test-beds for advanced sensor design and satellite simulation, as well as to support scientific and operational data collection campaigns. Numerous sensor systems are in use and under development by NASA, including multispectral imaging devices, a SAR system, and a suite of medium-format digital cameras. All instruments are spectrally, spatially, and radiometrically calibrated on a routine basis. The aircraft themselves are equipped with navigation systems that continuously record GPS location and platform attitude data.

## **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:	34 <sup>o</sup>
Swath Width:	5.9 nautical mile (11 km) at 65,000 feet
Spectral Coverage:	0.41-2.45 $\mu\text{m}$
Pixels/Scan Line:	677
Number of Spectral Bands:	224
Digitization:	12-bits
Data Rate:	20.4 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 processed and archived at JPL. For further information contact Rob Green at Jet Propulsion Laboratory, 4800 Oak Grove Drive, Mail Stop 183-501, Pasadena, California 91109-8099. <http://aviris.jpl.nasa.gov/>

## **MASTER (MODIS/ASTER Airborne Simulator)**

The MODIS/ASTER Airborne Simulator (MASTER) is designed to closely match NASA's EOS ASTER (Advanced Spaceborne Thermal Emission and Reflection Radiometer). It is intended primarily to study geologic and other Earth surface properties. It has a variable scan speed which allows data to be acquired on both high and low altitude aircraft. Its fifty spectral bands are configured below:

<b>Band</b>	<b>Bandwidth</b>	<b>Resolution</b>	<b>Band</b>	<b>Bandwidth</b>	<b>Resolution</b>
<b>1</b>	0.438-0.482	5-50m	<b>26</b>	3.075-3.231	5-50m
<b>2</b>	0.479-0.522	5-50m	<b>27</b>	3.231-3.377	5-50m
<b>3</b>	0.521-0.564	5-50m	<b>28</b>	3.385-3.535	5-50m
<b>4</b>	0.562-0.603	5-50m	<b>29</b>	3.538-3.694	5-50m
<b>5</b>	0.633-0.692	5-50m	<b>30</b>	3.692-3.826	5-50m
<b>6</b>	0.692-0.734	5-50m	<b>31</b>	3.846-3.999	5-50m
<b>7</b>	0.731-0.773	5-50m	<b>32</b>	3.999-4.154	5-50m
<b>8</b>	0.781-0.823	5-50m	<b>33</b>	4.157-4.310	5-50m
<b>9</b>	0.848-0.889	5-50m	<b>34</b>	4.307-4.460	5-50m
<b>10</b>	0.886-0.927	5-50m	<b>35</b>	4.456-4.603	5-50m
<b>11</b>	0.927-0.966	5-50m	<b>36</b>	4.597-4.760	5-50m
<b>12</b>	1.582-1.636	5-50m	<b>37</b>	4.753-4.911	5-50m
<b>13</b>	1.638-1.691	5-50m	<b>38</b>	4.906-5.054	5-50m
<b>14</b>	1.694-1.745	5-50m	<b>39</b>	5.044-5.205	5-50m
<b>15</b>	1.749-1.801	5-50m	<b>40</b>	5.203-5.342	5-50m
<b>16</b>	1.803-1.853	5-50m	<b>41</b>	7.587-7.943	5-50m
<b>17</b>	1.852-1.898	5-50m	<b>42</b>	7.950-8.398	5-50m
<b>18</b>	1.896-1.953	5-50m	<b>43</b>	8.447-8.806	5-50m
<b>19</b>	1.956-2.006	5-50m	<b>44</b>	8.882-9.307	5-50m
<b>20</b>	2.057-2.105	5-50m	<b>45</b>	9.503-9.902	5-50m
<b>21</b>	2.134-2.185	5-50m	<b>46</b>	9.912-10.327	5-50m
<b>22</b>	2.185-2.236	5-50m	<b>47</b>	10.338-10.922	5-50m
<b>23</b>	2.233-2.284	5-50m	<b>48</b>	10.977-11.652	5-50m
<b>24</b>	2.294-2.363	5-50m	<b>49</b>	11.864-12.364	5-50m
<b>25</b>	2.362-2.426	5-50m	<b>50</b>	12.638-13.119	5-50m

### Sensor/Aircraft Parameters:

Spectral Bands: 50 (16-bit resolution)  
IFOV: 2.5mrad  
Swath width: 19.9nm (36km) at 65,000ft  
Ground Resolution 5-50m (variable w/ altitude)  
Total FOV: 85.92 degrees  
Pixels/Scanline: 716  
Scan Rate: 6.25 – 25 Hz  
URL Reference: <http://masterweb.jpl.nasa.gov>

### **Cirrus Digital Camera System (DCS)**

Cirrus Digital Systems provides the digital camera. It consists of a Hasselblad camera body with a Kodak camera back and CCD array. It can be configured to acquire either false color infrared or natural color imagery.

<b>Lens</b>	<b>Array Size</b>	<b>Array Width</b>	<b>Field of View (FOV)</b>	<b>Altitude (feet)</b>	<b>Ground Coverage</b>	<b>Nominal Resolution</b>
50mm	4072 x 4072 (pixels)	36.72mm	40.3°	65000	7.9nm	3.5m
50mm	4072 x 4072 (pixels)	36.72mm	40.3°	45000	5.4nm	2.5m
50mm	4072 x 4072 (pixels)	36.72mm	40.3°	28000	3.4nm	1.5m
50mm	4072 x 4072 (pixels)	36.72mm	40.3°	13000	1.6nm	0.7m

Note: Nominal resolution references the smallest target that can be imaged.

### **Airborne Sensor Facility**

The Airborne Sensor Facility at NASA Ames Research Center web site:

<http://asapdata.arc.nasa.gov/>

Additional information regarding flight documentation to include archive searches may be obtained from the following:

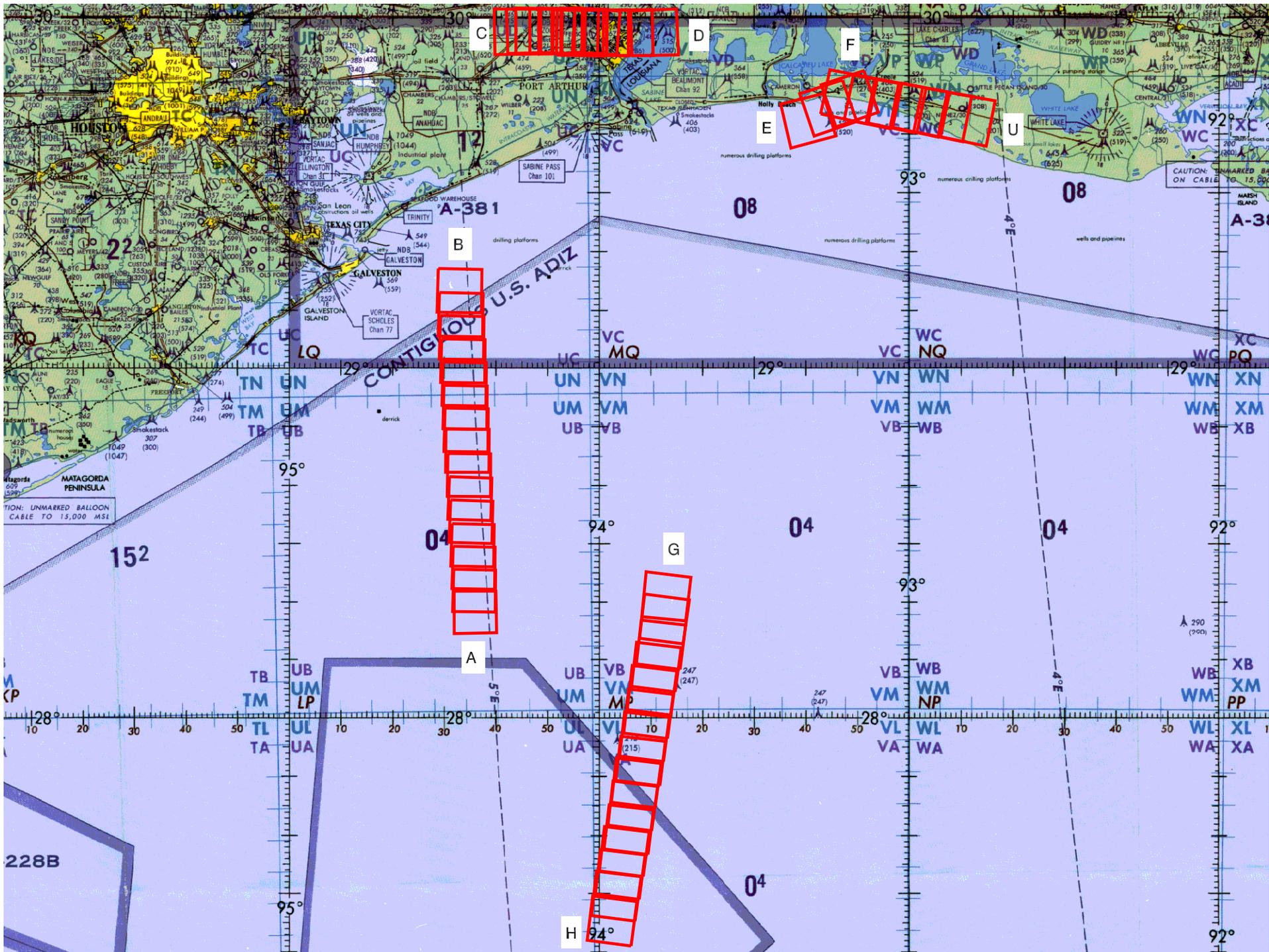
Airborne Sensor Facility  
MS 244-15  
NASA Ames Research Center  
Moffett Field, CA 94035  
Telephone: (650)604-6252 (FAX 4987)

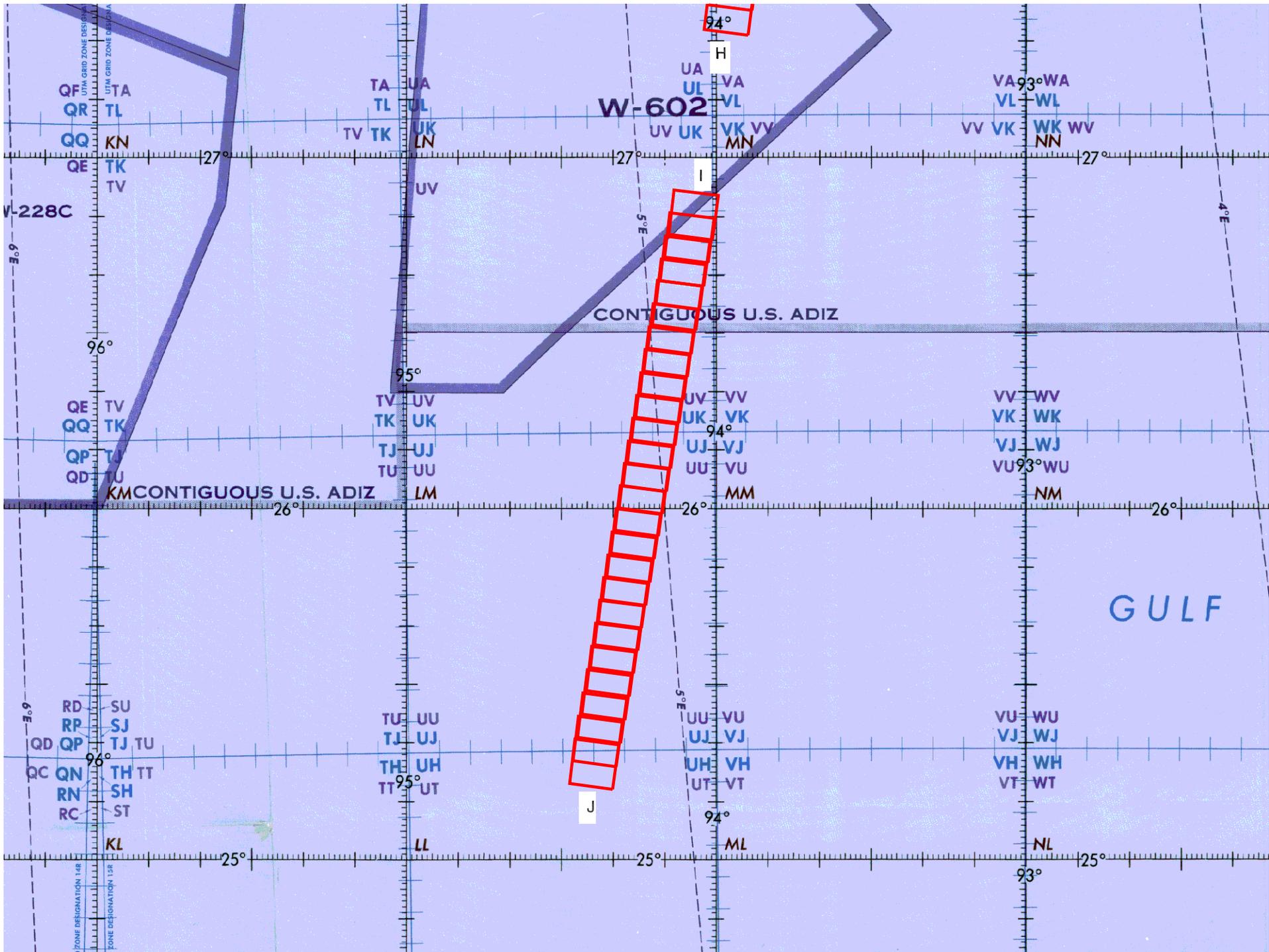
**CAMERA FLIGHT LINE DATA**  
**FLIGHT NO. 10-942**

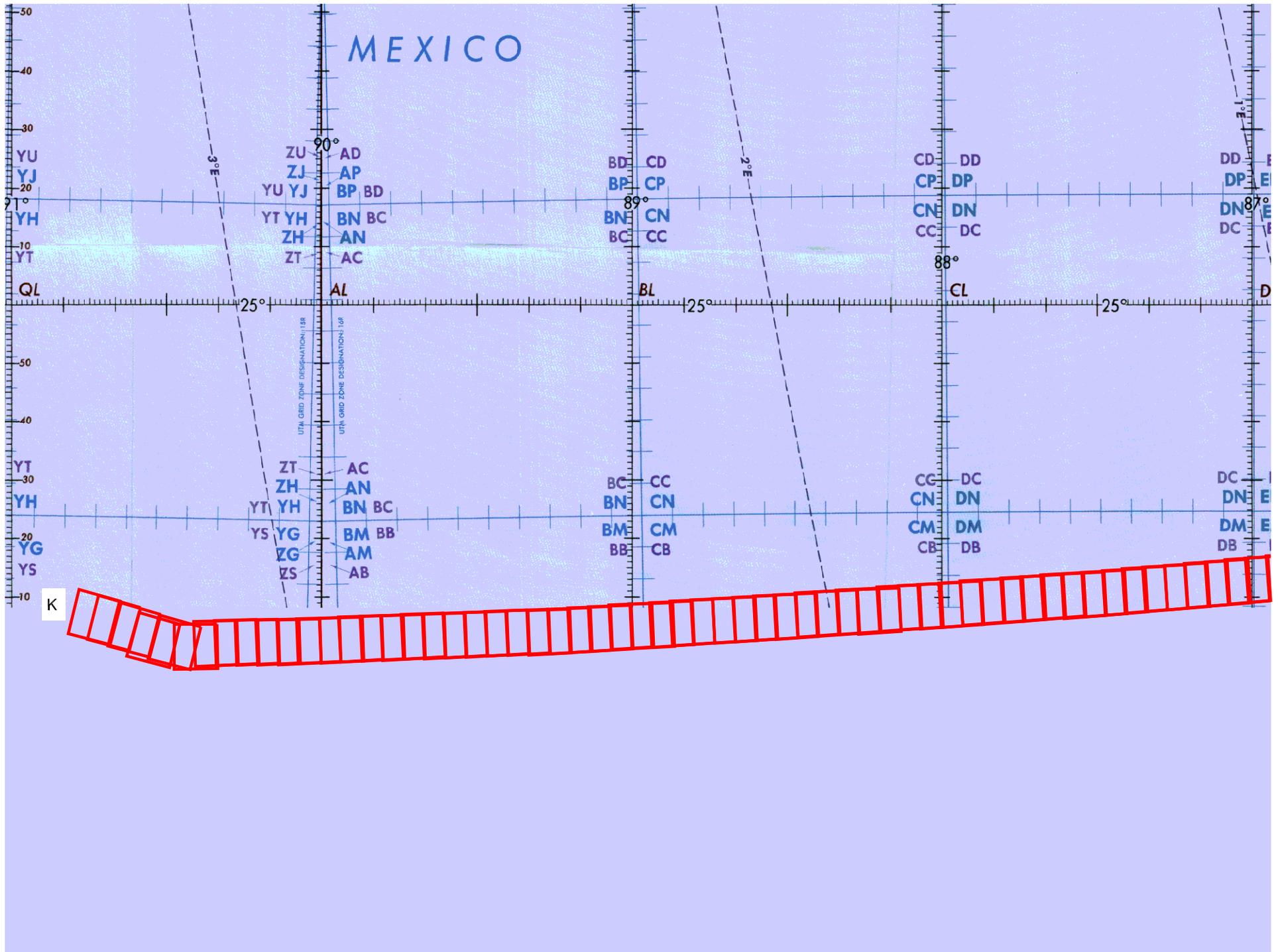
Accession # 05965

Sensor # 167

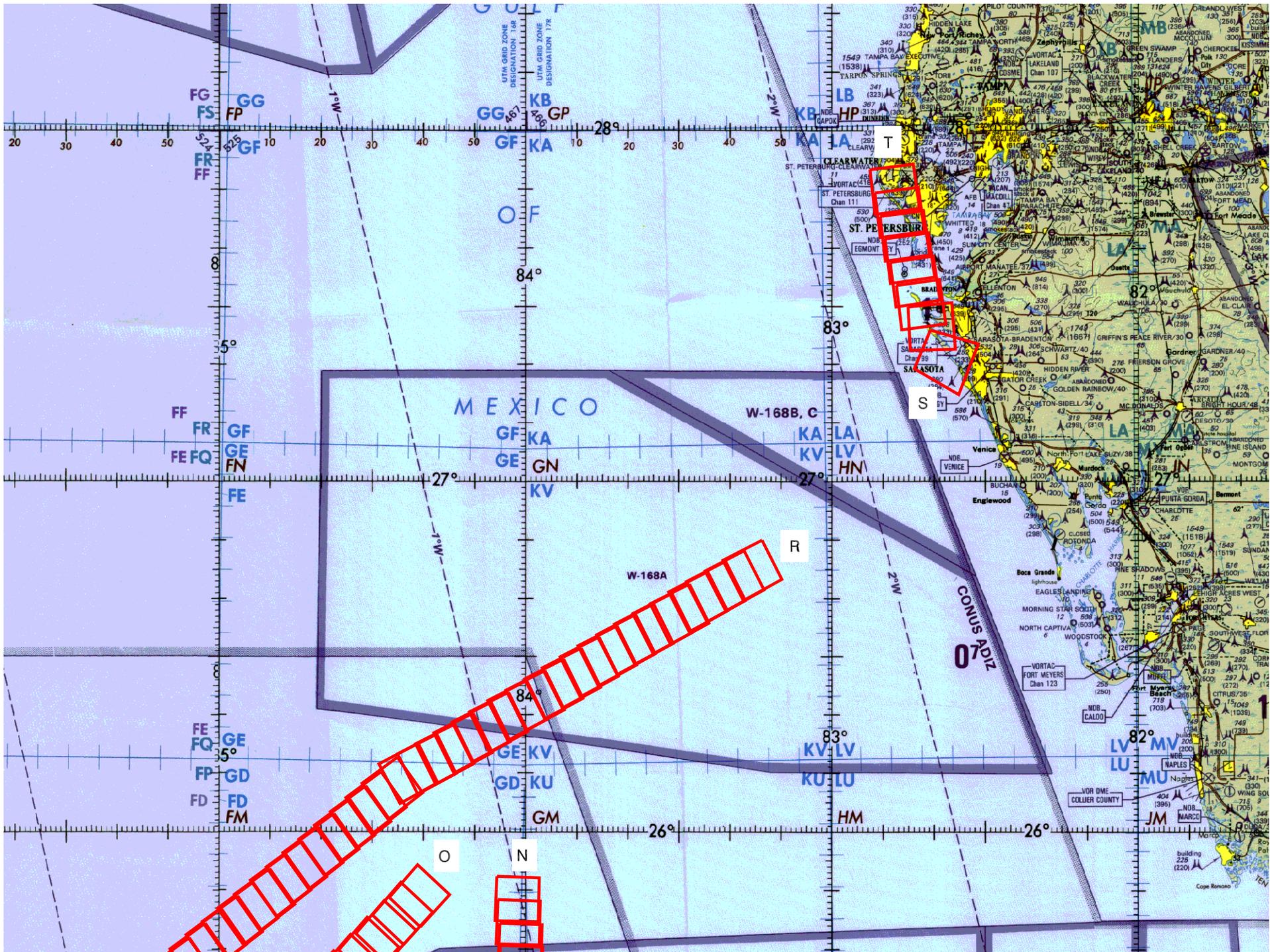
Check Points	Frame Numbers	Time (GMT-hr, min, sec)		Altitude, MSL feet/meters	True Heading / Line ID
		START	END		
A - B	7238-7252	15:27:14	15:35:36	61100/18630	2° / Gulf of Mexico
C - D	7253-7256	15:43:44	15:45:33	62600/19090	90° / Jefferson County Airport TX
E - F	7257-7259	15:51:44	15:52:57	63100/19240	72° / Rutherford Beach LA
G - H	7260-7274	16:10:03	16:18:30	63500/19360	187° / Gulf of Mexico
I - J	7275-7299	16:23:55	16:38:23	63900/19480	187° / Gulf of Mexico
K - L	7300-7401	17:14:24	18:15:17	62900/19180	85° / Gulf of Mexico
M - N	7402-7418	18:18:41	18:28:21	62900/19180	2° / Gulf of Mexico
O - P	7419-7450	18:31:57	18:50:39	63000/19210	223° / Gulf of Mexico
Q - R	7451-7509	18:56:46	19:31:44	63400/19330	55° / Gulf of Mexico
S - T	7510-7517	19:39:31	19:43:45	63800/19450	352° / Tampa Fl
U - F	7518-7523	21:02:07	21:05:08	64900/19790	281° / Rutherford Beach LA
D - C	7524-7527	21:10:20	21:12:09	64700/19730	269° / Jefferson County Airport TX
C - D	7528-7531	21:21:33	21:23:22	64500/19660	90° / Jefferson County Airport TX

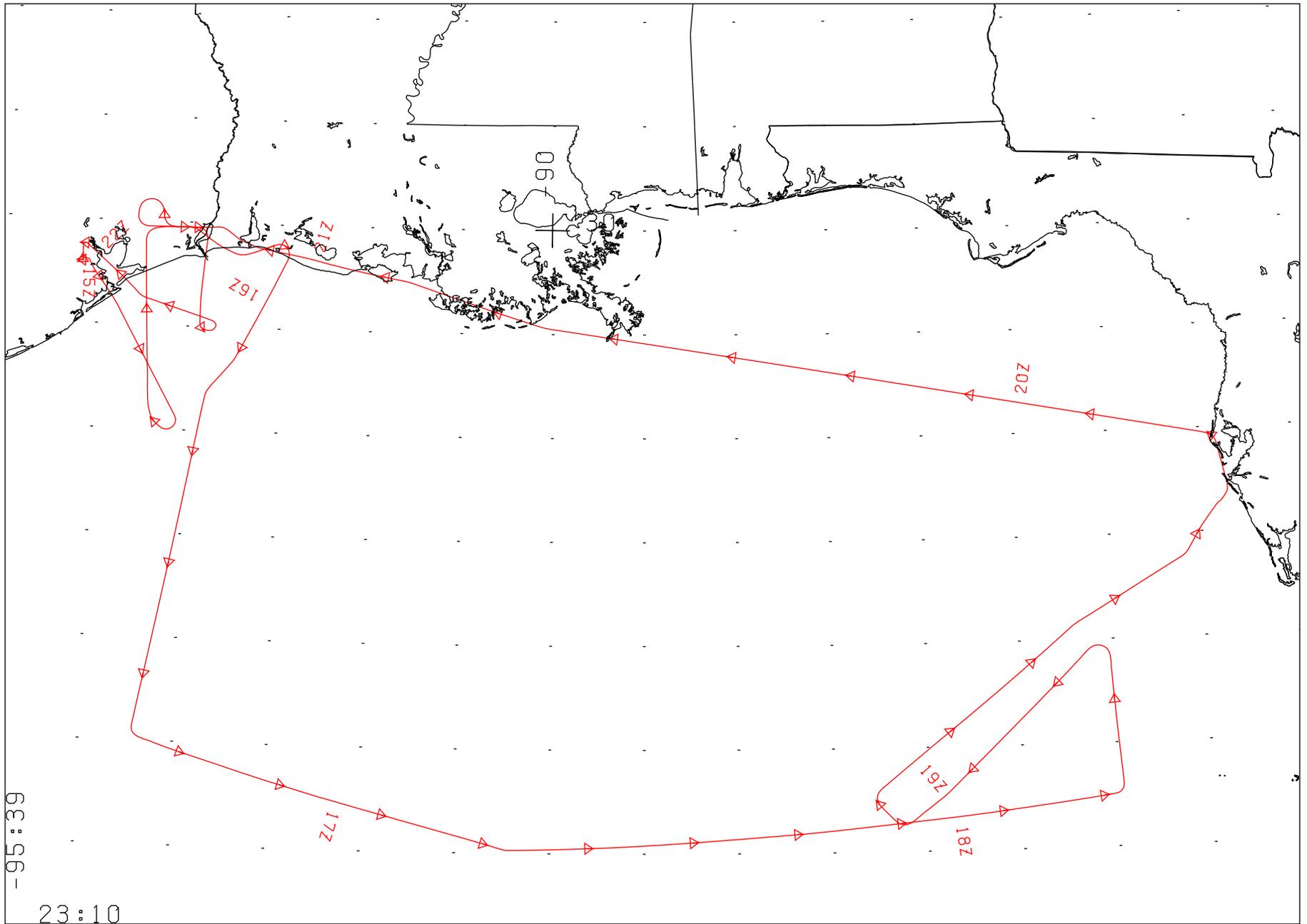












FLIGHT 10-942      28 AUGUST 2010      A/C 809      AVIRIS / MASTER / DCS  
 LAMBERT CONFORMAL PROJECTION: SP1 = 23.0 SP2 = 29.2 CM = -88.9 ROTATED BY 0.0  
 14:55:00 TO 22:15:00 UT      SCALE 1:5.72E+06      TIME TICK EVERY 10.00 MINUTES