

## FLIGHT SUMMARY REPORT

**Flight Number:** 11-002-02  
**Calendar/Julian Date:** 9 October 2010 (282)  
**Sensor Package:** Cirrus Digital Camera System (DCS)  
MODIS/ASTER Airborne Simulator (MASTER)  
**Area(s) Covered:** Ranch, Buckweed and Magic Fire Scars CA  
**Investigator(s):** Hook (JPL) **Aircraft:** DoE B200 #796

### SENSOR DATA

<b>Accession #:</b>	05982	—
<b>Sensor ID #:</b>	167	124
<b>Sensor Type:</b>	DCS	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>	731	—
<b>% Overlap:</b>	60%	—
<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 the 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 Dryden Flight Research Center and Johnson Space Center, 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 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)

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

The MODIS/ASTER Airborne Simulator (MASTER) is similar to MAS, with the thermal bands modified to more closely match the NASA 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>MASTER AIRBORNE SIMULATOR</b>			<b>ASTER</b>			
<b>Band</b>	<b>Bandwidth</b>	<b>Resolution</b>	<b>Band</b>	<b>Bandwidth</b>	<b>Resolution</b>	
1	0.438-0.482	5-50m				
2	0.479-0.522	5-50m				
3	0.521-0.564	5-50m	1	0.520-0.600	15m	
4	0.562-0.603	5-50m				
5	0.633-0.692	5-50m	2	0.630-0.690	15m	
6	0.692-0.734	5-50m				
7	0.731-0.773	5-50m	3	0.760-0.860	15m	
8	0.781-0.823	5-50m				
9	0.848-0.889	5-50m				
10	0.886-0.927	5-50m				
11	0.927-0.966	5-50m				
12	1.582-1.636	5-50m	4	1.600-1.700	30m	
13	1.638-1.691	5-50m				
14	1.694-1.745	5-50m				
15	1.749-1.801	5-50m				
16	1.803-1.853	5-50m				
17	1.852-1.898	5-50m				
18	1.896-1.953	5-50m				
19	1.956-2.006	5-50m				
20	2.057-2.105	5-50m				
21	2.134-2.185	5-50m	5	2.145-2.185	30m	
22	2.185-2.236	5-50m	6	2.185-2.225	30m	
23	2.233-2.284	5-50m	7	2.235-2.285	30m	
24	2.294-2.363	5-50m	8	2.295-2.365	30m	
25	2.362-2.426	5-50m	9	2.360-2.430	30m	
26	3.075-3.231	5-50m				
27	3.231-3.377	5-50m				
28	3.385-3.535	5-50m				
29	3.538-3.694	5-50m				
30	3.692-3.826	5-50m				
31	3.846-3.999	5-50m				
32	3.999-4.154	5-50m				
33	4.157-4.310	5-50m				
34	4.307-4.460	5-50m				
35	4.456-4.603	5-50m				
36	4.597-4.760	5-50m				
37	4.753-4.911	5-50m				
38	4.906-5.054	5-50m				
39	5.044-5.205	5-50m				
40	5.203-5.342	5-50m				

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MASTER AIRBORNE SIMULATOR			ASTER		
Band	Bandwidth	Resolution	Band	Bandwidth	Resolution
41	7.587-7.943	5-50m			
42	7.950-8.398	5-50m	10	8.125-8.475	90m
43	8.447-8.806	5-50m	11	8.475-8.825	90m
44	8.882-9.307	5-50m	12	8.925-9.275	90m
45	9.503-9.902	5-50m			
46	9.912-10.327	5-50m			
47	10.338-10.922	5-50m	13	10.25-10.95	90m
48	10.977-11.652	5-50m	14	10.95-11.65	90m
49	11.864-12.364	5-50m			
50	12.638-13.119	5-50m			

MASTER/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.

Lens	Array Size	Array Width	Field of View (FOV)	Altitude	Ground Coverage	Nominal Resolution
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
50mm	4072 x 4072 (pixels)	36.72mm	40.3°	6500'	0.8nm	0.4m

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

**CAMERA FLIGHT LINE DATA**  
**FLIGHT NO. 11-002-02**

Accession # 05982

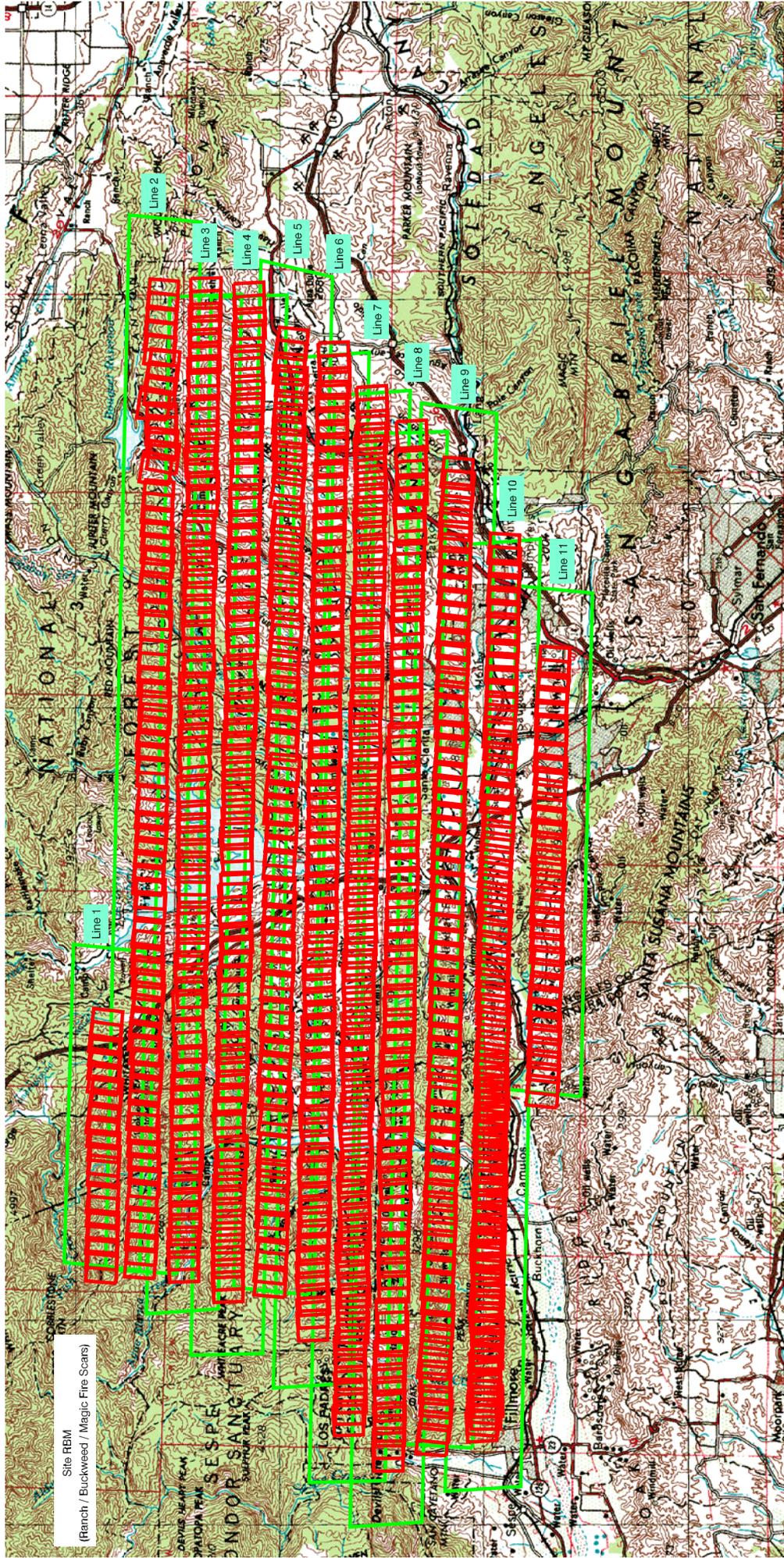
Sensor # 167

Site	Line #	Run #	Frame #	Time (GMT-hr, min, sec)		Altitude, GPS feet/meters	Cloud Cover/Remarks
				START	END		
RBM	2	1	2057-2124	17:48:30	17:57:00	9700/2960	Clear
RBM	4	1	2125-2196	18:01:29	18:10:25	9800/2990	Clear
RBM	1	1	2197-2214	18:19:04	18:21:09	9800/2990	Clear
RBM	3	1	2215-2284	18:25:17	18:34:06	9800/2990	Clear
RBM	5	1	2285-2350	18:37:47	18:46:08	9800/2990	Clear
RBM	8	1	2351-2419	18:51:41	19:00:44	9800/2990	Clear
RBM	11	1	2420-2453	19:05:12	19:09:02	9800/2990	Clear
RBM	6	1	2454-2528	19:16:32	19:25:07	9800/2990	Clear
RBM	9	1	2529-2602	19:28:28	19:36:57	9800/2990	Clear
RBM	7	1	2603-2687	19:40:52	19:50:37	9800/2990	Clear
RBM	10	1	2688-2757	19:54:56	20:02:57	9800/2990	Clear
RBM	10	2	2758-2787	20:11:28	20:14:50	9800/2990	Clear

MODIS/ASTER AIRBORNE SIMULATOR (MASTER) FLIGHT LINE INFORMATION FOR 9 Oct 2010  
 NASA FLIGHT NUMBER 11-002-02

FLTL	SITE	LINE	RUN	START OF FLIGHT LINE			END OF FLIGHT LINE			FLIGHT DATA				
				TIME HH:MM:SS	LAT DEG	LON DEG	TIME HH:MM:SS	LAT DEG	LON DEG	SCAN LINES	SOLAR ZEN AZIM		HEAD DEG	ALT M (MSL)
1	RBM	02	1	17:47:52	34.567	-118.265	17:57:06	34.571	-118.828	13801	48.2	142.5	274.29	2943
2	RBM	04	1	18:00:52	34.533	-118.872	18:10:28	34.530	-118.305	14355	46.6	146.4	87.46	2983
3	RBM	01	1	18:18:25	34.588	-118.655	18:21:11	34.588	-118.826	4130	45.2	150.6	274.89	2985
4	RBM	03	1	18:24:51	34.552	-118.851	18:34:06	34.549	-118.306	13814	44.2	154.0	87.06	2985
5	RBM	05	1	18:37:09	34.509	-118.291	18:46:16	34.514	-118.838	13608	43.1	158.1	278.83	2983
6	RBM	08	1	18:51:04	34.460	-118.961	19:00:47	34.457	-118.377	14530	42.1	163.0	87.49	2983
7	RBM	11	1	19:04:35	34.393	-118.460	19:09:04	34.395	-118.728	6713	41.5	167.0	275.24	2984
8	RBM	06	1	19:16:00	34.495	-118.887	19:25:10	34.492	-118.336	13695	41.1	172.2	87.17	2985
9	RBM	09	1	19:27:55	34.437	-118.364	19:37:02	34.440	-118.919	13636	40.8	176.6	275.30	2983
10	RBM	07	1	19:40:16	34.478	-118.939	19:50:43	34.475	-118.356	15612	40.8	181.5	88.16	2979
11	RBM	10	2	20:10:50	34.418	-118.940	20:19:53	34.416	-118.434	13509	41.5	192.7	87.72	2982

NUMBER OF FILES FOR THIS FLIGHT = 11  
 TOTAL NUMBER OF SCAN LINES = 137403  
 DATE THESE FILES WERE PROCESSED = 18-Nov-2010  
 DATE THIS LIST WAS CREATED = Thu Nov 18 13:17:33 PST 2010  
 GRANULE VERSION = 1



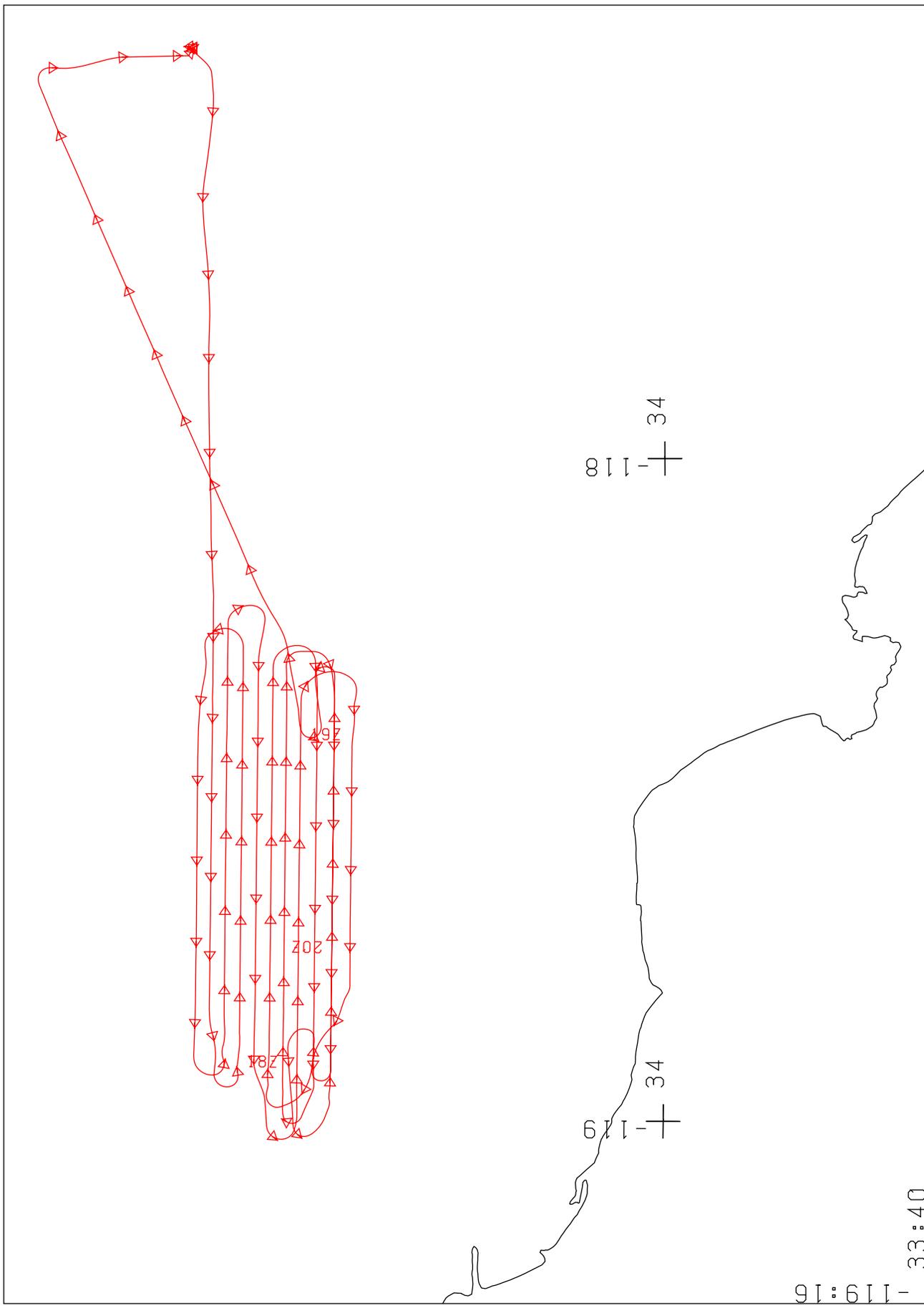
Site RBM  
 (Ranch / Buckweed / Magic Fire Scars)

DCS MASTER

DOE B200

09 October 2010

Figure 11-002-02



FLIGHT 11-002-02      9 OCTOBER 2010      A/C 796 (DOE B200 ROME0)      MASTER / DCS  
 LAMBERT CONFORMAL PROJECTION: SP1 = 34.3 SP2 = 34.7 CM = -118.2 ROTATED BY 0.0  
 17:32:03 TO 20:54:59 UT      SCALE 1:7.50E+05      TIME TICK EVERY 2.00 MINUTES