FIRE II Cirrus
Mission Summary

Date: December 3, 1991
Julian Day: 337
Experiment Day: 21

Summary | Active Sensors | Passive Sensors | Sonde and Sfcmet

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Mission Objective:

Remote Sensing and Cloud Radiative Properties - LANDSAT Mission

Mission Description:

Coordinated underflight of LANDSAT by ER-2 and Sabreliner over Gulf of Mexico. Good radiative observations were obtained of a thin cirrus band. A nighttime King Air water vapor mission was also flown in coordination with Raman lidar observations.

Weather Synopsis:

Another cold morning in southeast Kansas with temperatures in the 20's. A weak frontal passage overnight (Dec 2-3) brought broken low-level clouds with reinforcing cold air. The low-level cloud cover dissipated and clear skies prevailed during the rest of the day. Temperatures only reached the mid thirties with a stiff north wind. At sunset, a distinct cirrus-appearing wave pattern was observed. Lidar observations indicated that this was an aerosol cloud at 24-26 km attributed to Mt Pinitubo.

Synoptic Situation:

A major upper level trough axis passed over eastern Kansas during the morning.

Winds aloft shifted from SW to NW and intensified. Cirrus activity continued to the west and southwest of Baja and streamed across northern Mexico with dissipation by Texas. The thin cirrus cloud band that was observed is believed to be an extension of the northern boundary of this feature, probably also associated with the strong jet stream extending from Arkansas into the Ohio valley.

Aircraft	Depart	Land	Notes
NASA ER-2			LANDSAT Gulf mission
NCAR Sabreliner	09:46 CST	11:49 CST	LANDSAT Gulf mission
NCAR King Air	18:40 CST	20:50 CST	Night mission coordinating with Raman lidar for water vapor measurements at Hub.
UND Citation			No flight

Satellite	Hub Overpass Time	Zenith Angle	Azimuth Angle	RAOB
NOAA-11	21:31:23	48.37	261.06	yes
	09:55:53	8.15	282.42	yes
NOAA-12	14:17:48	7.93	104.57	yes
	01:37:42	14.27	258.68	no

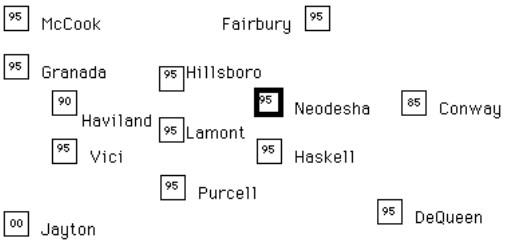
Rawinsonde Operations:

- Inner NWS stations (Type A): Enhanced mode @ 12, 18, and 00 UTC
  - (-18 UTC @ Omaha, Paducah, and Peoria)
- Outer NWS stations (Type B): Routine mode @ 12 and 00 UTC
  - (+18 UTC @ Slidell, Lake Charles, Corpus Christi)
- Hub CLASS station: Enhanced mode @ 12, 18, and 00 UTC, plus
  - satellite overpasses @ 14, 21, and 10 UTC
- Remote CLASS stations: Enhanced mode @ 12, 18, and 00 UTC
- Hub GSFC/WFF station: Launches @ 18, 21, 23, 02, and 05 UTC
- CSU Parsons station: Launch @ 21 UTC

FIRE Profiler Status:

- CSU 405 MHz @ Parsons: Operation from 17 UTC
- PSU 50 MHz @ Coffeyville: Continuous operation (5 hr with RASS)
- NOAA 405 MHz @ Coffeyville: Not operational

NWS Wind Profiler Status:



SPECTRE Operations:

Excellent afternoon and evening operations under clear skies and relatively dry conditions (~1 cm precipitable water). A very good intercomparison was obtained between Raman lidar and airborne (King Air) water vapor observing systems under relatively steady conditions.

Aircrew/Mission Scientist Debrief Notes:

- GULF Mission: The ER-2 and Sabreliner rendezvoused at ~1600 at a central location within the northern LANDSAT scene (27.4N, 95.51W). No clouds were observed at the scene center and the upper troposphere at Sabreliner flight level was found to be quite dry. The planes then worked a NE-SW oriented band of thin cirrus to the northeast of scene-center. This feature was visible on GOES imagery. The Sabreliner flew legs over and below the cloud band. The cloud dissipated during an in-cloud leg. Crystal images were obtained by both the 2-D and video imager probes along the below-cloud and in-cloud legs. The ER-2 sampled the cloud band from above. The cloud was between 26K' and 29K' (~-35deg.C) and had an estimated albedo of only 5The ER-2 pilot noted that he had overflown some clouds enroute to the rendezvous point. The ER-2 returned to Houston along the coast of Louisiana to sample ocean color for the MODIS Airborne Simulator group. Thin cirrus were also encountered during this time. Special rawinsondes were launched at 1700 UTC (1800 nominal time) in support of the Gulf mission including sites on the Texas and Lousiana coasts.

- Water Vapor Mission: A nighttime spiral ascent and descent mission was flow by the King Air in close coordination with Raman lidar observations and SPECTRE operations. Excellent data were obtained by both the Raman system and the aircraft. The King Air sampled to 29K' and found thin aerosol layers at 5.2 and 7.3 km. Unbelievably, the scheduled satellite-overpass CLASS sounding at the exact time of these observations was not taken due to technical difficulties. SPECTRE (WFF) did launch special soundings not too long before and after aircraft operations.

Significant Hardware Problems:

- CLASS sonde failed at Hub site during water vapor mission

Highlights of FIRE Operations:

- The required Gulf LANDSAT overpass mission was successfully flown. Although the target of an isolated band of thin cirrus was not ideal, excellent radiative data were obtained.

- A good intercomparison of water vapor profile observations obtained by Raman lidar and airborne lyman-[[alpha]] and dew point hygrometers was obtained. Comparison to coincident satellite observations from GOES/VAS and NOAA/HIRS-2 should be possible.

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Instrument Logs

Active Sensors

Active Sensor	UTC Hour																								Notes
	12	13	14	15	16	17	18	19	20	21	22	23	00	01	02	03	04	05	06	07	08	09	10	11	
Utah Lidar H															X	X	X								
LaRC Laser Ceilometer H	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Wisc HSR Lidar H																									
Wisc Vol Image Lidar																									
GSFC RAMAN Lidar H										X	X		X	X	X	X	X	X	X						
NOAA CO2 Lidar H		X	X	X	X	X	X	X	X	X	X	X													
NOAA Radar H																									NOT OPERATIONAL
PSU Radar H																									
PSU Laser Ceilometer H																									
PSU 50 MHZ Wind Prof H																									
PSU/NOAA 50 MHz RASS H																									
NOAA 405 MHz RASS H																									NOT OPERATIONAL
LaRC Lidar P		X	X											X	X	X	X								
CSU Wind Prof/RASS P						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	RASS FROM 17 TO 22 UTC
CSU Laser Ceilometer P	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

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Passive Sensors

Passive Sensor	UTC Hour																								Notes
	12	13	14	15	16	17	18	19	20	21	22	23	00	01	02	03	04	05	06	07	08	09	10	11	
NOAA μ-wave Radiometer H	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
NOAA Sun Photometer H				X		X			X																

NOAA H20 Photometer	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
NOAA IR Flux Radiom. H	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
NOAA Dobson Ozone H						X																		
NOAA Surface Ozone H	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
NOAA Trace Gas H							CF																	
PSU μ-wave Radiometer H																								
PSU Sun Photometer H																								
PSU Solar Flux Radiom. H																								
PSU IR Flux Radiometers H																								
PSU Sky Video H																								
Utah IR-Window Radiom. H														X	X	X								
Utah Sky Video H																								NO OBSERVATIONS
LaRC Video H	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
AFGL Sky Imager H	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Ames Radiometer H							X	X	X	X	X	X												CALIBRATION, AEROSOL AND OPTICAL DEPTH MEASUREMENTS
Denver Solar Radiom. H							X				X													
Denver IR-Spectrometers H								X	X	X	X			X	X	X	X	X						
GSFC IR-Spectrometer H								X	X	X	X	X	X		X	X	X	X						
Wisc. IR-Spectrometer H					X	X	X	X	X	X	X	X	X	X	X	X	X	X						
MRI Sun Photometer H				X	X	X	X	X	X	X														
MRI IR Radiometer H	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
MRI Spectro-Radiom. H																								NO OBSERVATIONS
MRI Solar Flux Radiom. H	X	X	X	X	X	X	X	X	X	X	X	X												
GSFC Sun Photometer H																								NO OBSERVATIONS
CSU Sun Photometer P		X	X	X	X	X	X	X	X	X	X													
CSU IR-Window Radiom. P									X	X	X													
CSU Solar Flux Radiom. P		X	X	X	X	X	X	X	X	X	X													
CSU IR Flux Radiometers P	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
CSU IR-Spectrometer P									X	X	X													
CSU Sky Video P																								NO OBSERVATIONS
Ames Spectroradiometer H																								NO OBSERVATIONS
Ames 10 μm narrow fov H																								NO OBSERVATIONS
CISRO/WPL/PSU IR W. Rad																								

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Sonde and Surface Meterology

Sonde + Sfc Met Sensor	UTC Hour																							Notes
	12	13	14	15	16	17	18	19	20	21	22	23	00	01	02	03	04	05	06	07	08	09	10	11	
NOAA Ozone Sonde H																X									
WFF Sonde H							X			X		X			X			X							
NCAR Cloud Ice Sonde H																									NO LAUNCHES
NCAR/CLASS Sonde H	X		X				X			X			X										X		01 UTC MISSING, SOME WIND DATA MISSING
NCAR PAMS H									X	X	X														BATTERY PROBLEMS
NCAR/CLASS (remote)	X						X						X												SOME WIND DATA LOSS
NCAR PAMS (remote)																									ALL STATIONS DOWN, BATTERY PROBLEMS(NO SUN)
CSU Sonde P										X															
CSU Sfc Meteor. P	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Type A NWS Sondes	X												X												

Type B NWS Sondes	X						X**						X											Omaha, Paducah, and Peoria were EXCLUDED at 1800 UTC
PSU Sfc Meteor H							X**																	ONLY Slidel, Lake Charles, Corpus Christie launched at 18 UTC