

## Middle Latitude Cirrus Cloud Properties Experiment (MACPEX) Flight Summary Report (25 April 2011).

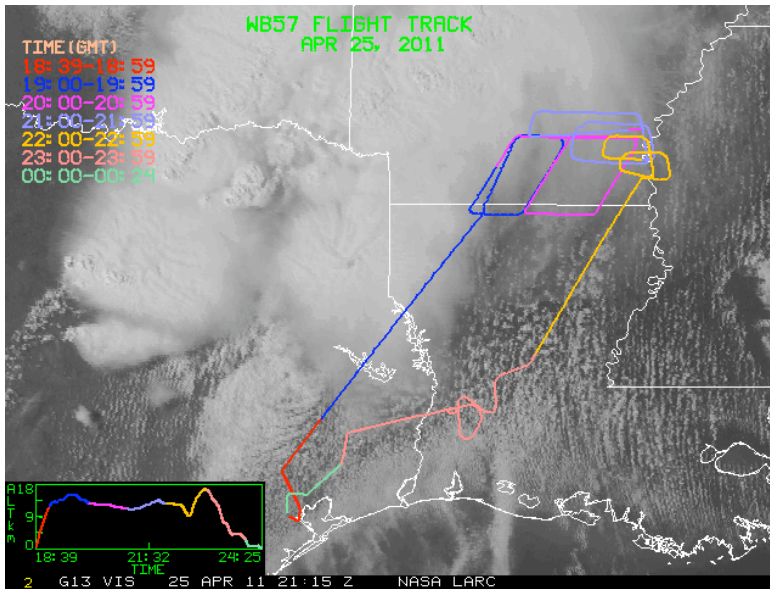


Figure 1. Flight Track overlaid on Visible satellite image. Images Courtesy of Minnis Group.

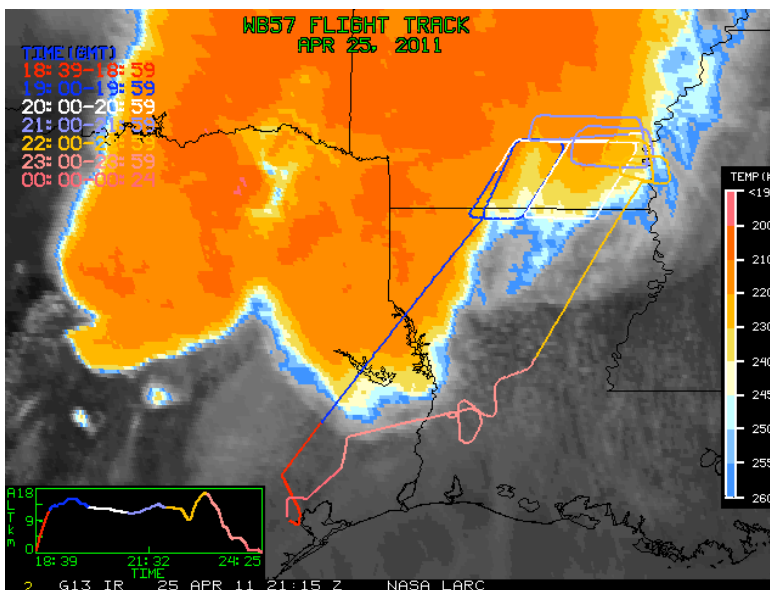


Figure 2. Flight Track overlaid on IR satellite image. Images Courtesy of Minnis Group.

### 1. Purpose of Mission:

This mission was to sample cirrus anvils of various ages over southern Missouri associated with ongoing convection.

### 2. Flight Summary

The WB57 conducted a series of racetracks in fresh anvil cirrus. The race tracks, initially at FL 400, were oriented with their long axis roughly along the flow and short axis across the flow. These racetracks were gradually stepped eastward. The flight levels were also stepped downward. Later in the flight air traffic control directed the WB57 to reorient the racetracks. Stratospheric water vapor was sampled on the return to Houston.

### 3. Instrument Operations Officer Report:

#### **General Information**

**Flight date-** 25 Apr 2011

**Flight duration** - 5.8 hours

**Crew** – Ray Heineman, John Bain

**Instruments flown:** 2DS, ALIAS, CIMS, CLH, CPI, DLH, FCAS, FCDP, FISH, HARHAL, HARWV, HVPS, JLH, MMS, NMASS, O3, O3LITE, PALMS, SID3, SP2, ULH, VIPS

#### **Flight Log**

<b>Engine Start</b>	13:24pm	<b>Takeoff</b>	13:38pm	<b>Approach</b>	19:00pm
<b>Data Rec On</b>	13:28pm	<b>Begin Descent</b>	18:04pm	<b>Landing</b>	19:25pm

#### **Gear extension/retractions**

<b>Gear Up</b>	13:38pm					
<b>Gear Down</b>	19:19pm					

#### **Weather Observations**

Weather at take off was broken clouds at 2400ft. On climb out penetrated the cumulus layer 2400 to 5000ft. At 13:56pm we passed just under a large (old) contrail. When we descended into the cirrus layer at the area of interest the cloud was entered at FL430. We were continuously in the cirrus while in the area at all altitudes. The cirrus was very thick except when near the very top or bottom of the layer. On the climb out back to EFD we exited the layer at approximately FL430. In the approach we passed through a stratus layer from 7800-7400ft at 19:00pm. We entered the cumulus layer at 19:02 at 4600ft and did not exit until near the field on final approach.

#### **Flight Profile**

After takeoff we were enroute Northeast bound leveling at FL430, FL450 and FL490. We received new points of interest near the line between DEBII and CANOK on the IFR map. After one circuit of the racetrack between these points with a 30nmile offset east we got a clearance to descend into the cirrus layer at FL410. Cirrus was entered at FL430 at 14:57pm. We were ask to move this line east 40nm and descend to FL400. Due to traffic considerations we were unable to fly the race track pattern in this area. We were vectored by ATC on a random walk in this general area for the remainder of the data take. ATC was very accommodating giving us the altitude profiles as desired and we were in thick cirrus the entire period.

Altitudes and times were:

FL400 at 15:12pm, FL390 at 15:35pm, FL380 at 15:39pm, FL370 at 15:51pm, FL360 at 16:01pm, FL370 at 16:10pm, FL380 at 16:20pm, FL390 at 16:22pm, FL400 at 16:26pm, FL410 at 16:32pm, FL420 at 16:36pm, FL430 at 16:39pm, FL440 at 16:43pm, FL450 at 16:45pm, FL440 at 16:48pm, FL430 at 16:51pm, FL420 at 16:53pm, FL410 at 16:59pm, FL400 at 17:12pm.

At 17:17 we requested a spiral descent to FL300; ATC cleared us down in steps and turns which resulted in one big turning descent. Reached FL300 at 17:32pm. We were still in thin cirrus at this altitude and it appeared that the cirrus layer was down to maybe FL280.

We then turned back to EFD and began a climb to FL550. On the descent leveled for about one minute at FL530 at 17:59pm 178 nmiles north of EFD. Leveled FL450 at 18:09pm , and FL430 at 18:13pm.

The MMS Box maneuver was done at FL240 at 18:26pm. The MMS pitch and Yaw maneuvers were done at FL220 at 18:31pm.

**Instrument Notes**

- HARWV fail light at 13:48 recovered first try.
- Lost the SID3 remote terminal at 14:21pm, recovered after two power cycles at 14:40pm, buttons remained black until 14:45pm.
- Lost SID3 remote terminal again at 15:05pm, Recovered with power cycle at 15:11pm.
- HARWV fail light at 15:18 recovered first try.
- Lost SID3 again at 15:22. after two power cycles no connection could be established. Powered SID3 down at 15:34 for the remainder of the flight.
- Palms Cloud switch –ON at 14:57pm FL430.
- Palms fail light at 16:28pm. Cloud, run, power, -OFF. Recovered at 16:35pm Cloud switch – ON.
- Palms cloud switch –OFF at 17:42 FL430.
- Palms priority switch –ON at 18:04pm, OFF at 19:03 (5000ft).
- HARHAL fail light in descent at 9000ft on action taken.
- HARWV fail light at 3000ft in descent on action taken.

4. Preliminary Instrument/Data Status for this flight:

SID3	Major problems
VIPS	Data collected but problems noted.
2DS	Worked Well
FCDP	Instruments ran, quality unknown.
HVPS	Worked Well
CPI	Significant Problems
CIN	No Data
NMASS	Worked intermittently, issues noted
FCAS	Worked well
PALMS	Worked Well
MMS	Worked Well
ALIAS	Worked Well
CLH	Worked Well
JLH	Worked, minor problems noted
ULH	Worked Well
DLH	Worked Well
Harvard Water Vapor	Worked, but minor problems noted.
Harvard TDL	Unknown
Harvard Total Water	Not Ready For flight

Harvard Halogen	Worked but Issues Noted
FISH	Worked Well
CIMS	Worked Well
O3	Worked Well
O3Lite	Worked Well