

## Middle Latitude Cirrus Cloud Properties Experiment (MACPEX) Flight Summary Report (20 April 2011).

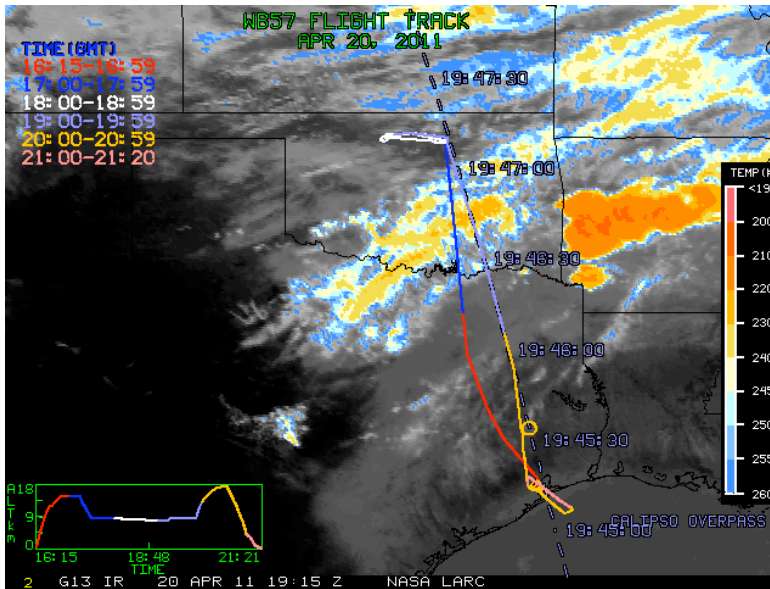


Figure 1. Flight Track overlaid on IR satellite image. Images Courtesy of Minnis Group.

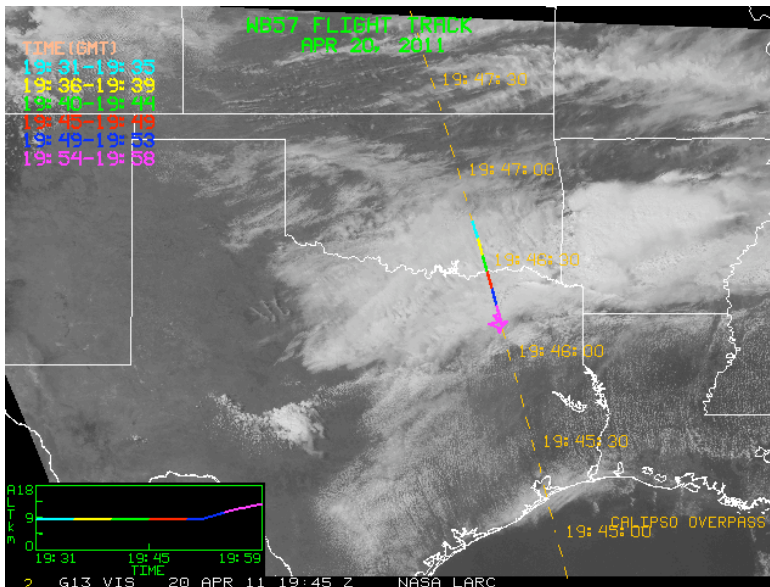


Figure 2. Flight Track overlaid on visible satellite image showing the A-Train coordination. Images Courtesy of Minnis Group.

### 1. Purpose of Mission:

This mission had 3 objectives. First, sample cirrus over the ARM SGP site. Then, collect in situ cirrus data along the A-Train Track. The third objective was to sample stratospheric water vapor in conjunction with the balloon borne frostpoint hygrometer near Houston.

### 2. Flight Summary

The WB57 established an along-wind 60 Nm leg over the SGP site approximately 1.5 hours after takeoff. A total of 6 legs were flown at several altitudes. The A-Train track was followed in cloud on the southbound return. Following the overpass, the WB57 proceeded to max altituded and began a spiral from FL530 to FL390 in vicinity of the Frostpoint instrument.

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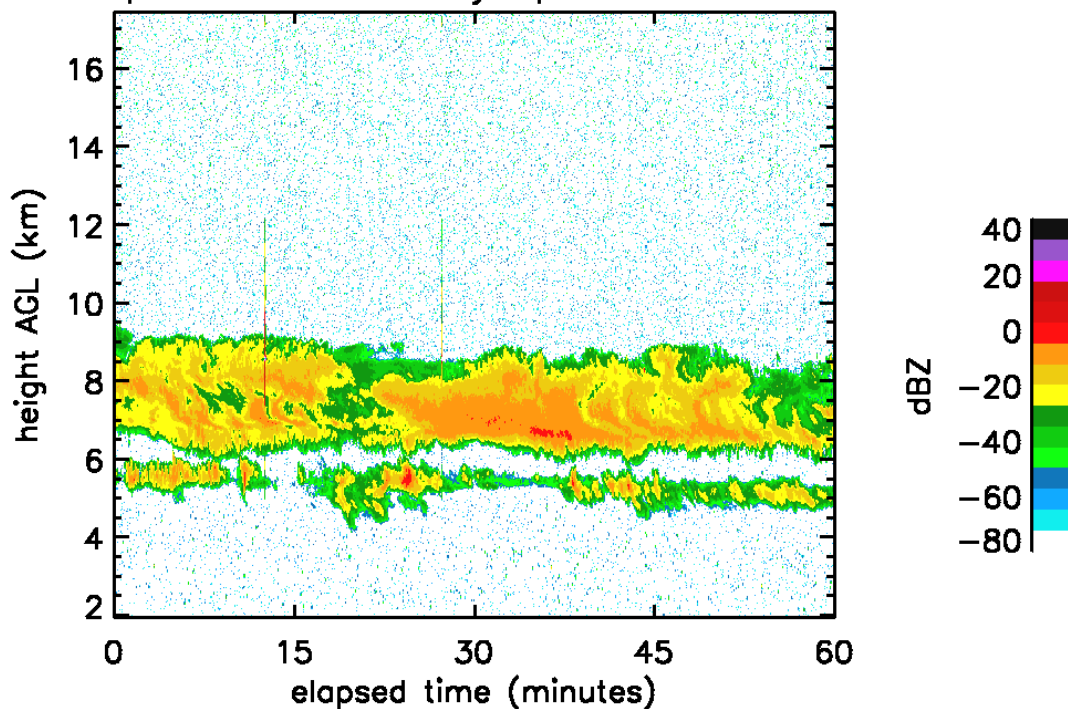


Figure 3. Millimeter radar height-time cross section from vertically point radar at SGP ARM site from 1735-1835 UTC. The vertical lines at approximately 14 and 29 minutes in the time series are due to strong reflection of the radar energy by the WB57.

3. Instrument Operations Officer Report:

**Flight duration** - 5.3 hours

**Crew** – Bill Rieke, 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, CIN

**Flight Log** 10:46am      **Takeoff** 11:13am      **Approach** 16:15 pm

**Engine Start**

**Data Rec On** 10:53am      **Begin Descent** 15:34 pm      **Landing** 16:20 pm

**Gear extension/retractions**

**Gear Up** 11:13am

**Gear Down** 16:11 pm

**Weather Observations** After takeoff climbed through the cumulus layer at 2300 – 3100 ft. Enroute to the ARM site at FL470 we were above a cloud layer with some embedded cumulus tops.

### Flight Profile

At 12:13pm started a descent to the cloud level. Reached FL280 41 nm south of the eastern end point (SGP West). Started the first data leg at 12:39pm. We were in the cloud at the beginning of the run. Near the ARM site we were in thinner cloud possibly near the top of the cloud. 16 nm (12:51pm) from the western end point of the run the cloud became very thin as we were in and out of the wispy cloud top. SID3 particles were showing on the display even when we appeared to be out of the cloud at this time. We reached the western end point at 12:55 and turned back to run the line to the East. Crossed the ARM site at 13:02pm. Reached the eastern end point at 13:09pm.

Descended on the westbound leg reaching FL270 at 13:12pm in thin clouds. Crossed over the ARM site at 13:19pm. Over the site we were in cloud. Reached the western end point at 13:26pm in thin cloud. Turned back east and remained at FL270 for this eastbound leg. Crossed the ARM site at 13:33pm in very thin cloud.

Reached the eastern end point at 13:41pm and began a descent. Reached FL260 at 13:43pm in very thin cloud near the bottom of the cloud. Reached the western end point at 13:57pm. We were apparently out of the cloud at this point. The eastbound leg we flew directly to the eastern end point not passing over the site. The closest approach to the site was at 14:03pm. Reached the eastern end point at 14:08pm. Forest fires were seen below and slightly north as we made the turn at this eastern end point.

At 14:13pm turned toward the Point 1 of the satellite track and began a climb to reach FL280 at 14:17pm. Reached point 1 at 14:36pm. At the satellite over flight time (19:47UTC) we were 110 nm north of Point 2 on the track. We had been mostly in clouds since 14:20pm and popped out just at or after the over flight time. We began a climb 14:49pm and reached point 2 at FL470.

The MMS maneuvers were done at 15:14 at FL540.

Started the spiral descent at 15:34pm over EFD at FL510 down to FL350. Then RTB at 15:48.

### Instrument Notes

Palms fail light never extinguished. On initial power up. Recovered at 11:26 am.

Palms cloud ON at 12:36pm, OFF at 14:17pm, On at 14:20pm, OFF at 14:53.

HARWV fail at 11:20PM recovered at 11:28PM, Fail light again at 15:37pm recovered at 15:43pm.

SID3 lost remote terminal four times. Recovery required cycling the SID3 power switch. The fourth time was too close to landing to recover. Times: 13:46pm recovered 13:53pm, 15:03-15:13pm, 15:35-15:40pm, and 16:15.

HARWV fail light on descent – no action.

### 4. Preliminary Instrument/Data Status for this flight:

SID3	Worked Well, minor problems noted
VIPS	Worked Well
2DS	Worked Well
FCDP	Instruments ran, quality unknown.
HVPS	Worked Well
CPI	Significant Problems
CIN	No Data
NMASS	Worked Well, minor issues noted
FCAS	Worked well
PALMS	Instrument Worked, minor problems noted
MMS	Worked Well
ALIAS	Worked Well
CLH	Worked Well

JLH	Worked, but significant problems noted
ULH	Worked Well
DLH	Worked. Quality improving.
Harvard Water Vapor	Worked, but major 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