

Squawk List for flight 1855
Flown on Sunday, 28-29 January 2001 (UTC dates)
2258-0445 UTC

(This was delayed because I forgot to take the data disks and the like on Sunday after the flight so that I could take them in to the UW yesterday)

Project IMPROVE test flight 9

(Instruments not mentioned as having a problem are believed to have worked satisfactorily)

The flight was over the coastal waters of Washington State west of Westport in two rainbands ahead of a surface cold front. Legs were flown in a west to east to orientation perpendicular to the first rainband whilst a spiral down with a drift with the wind was performed in the 2nd rainband due time constraints. The coastal flow was south-southeasterly ahead of the front, which was more southerly than in past flights. The first rainband, while mostly steady-state, had the interesting structure of having at least 11 droplet layers in the region between the surface (about 800 feet AGL) and 21 kft. It appeared that yet another altocumulus layer was still above the aircraft at this last, highest sampling level due to the appearance (briefly) of some of the cloud elements passing before the new moon in a region of thinner clouds. Because this first rainband was sampled upstream and fairly close to the Olympic massif at its south side, it is thought that these droplet layers were due to orographic lift of the rainband in the sample area. This first rainband had a warm-frontal like inversion-stable layer within it at around 5-7 kft.

The 2nd rainband had fewer layers, but liquid water was nevertheless very prominent in the mid and lower levels. However, it too, was sampled in a locale where an orographic enhancement of the flow should have been taking place.

OVERALL ASSESSMENT OF MEASUREMENTS

- Generally a good measurement day with the exception of a lot of poor images from the CPI. An investigation of the source of these problems is underway (that is, when the aircraft is available for ground power.)
- The 35 GHz radar continues to work very well.
- Electrical noise continues to impact some key instruments.

1. GPS /WINDS/TURBULENCE/AIRSPEED

GPS tans-vector: No change; data OK; apparently a characteristic of this system is to only find a new lat-long every 3-15 seconds. Thus for intervals of the same time period, winds cannot be updated, nor do we

show a location change. Winds and ground speed are thus necessarily constant, and are derived from the last last lat-long position, which may have been as much as 10 or more seconds earlier. This also appears true for the Shadin static temperature measurement.

Rosemount TAS: No change. LOTS of noise due to dropouts. Appears accurate otherwise; in essence, the trace looks like a bar diagram whose peaks are at the correct true airspeed.

BAT: Not working yet.

2. STATE PARAMETERS

Rosemount temperature sensor: No change. The Rosemount-derived static temperature continues 5-12° C higher than both the reverse flow temperature (tstatr) and the Shadin Air Computer static temperature. However, the Shadin temperature also has a long reset time and so often lags the real temperature by a deg or more. Hence, we really only have a single reliable temperature measurement in real time.

It has also been noticed that the temperature difference between the accurate reverse flow temperature and the Rosemount probe changes while flying straight legs at constant elevation. It is now being hypothesized that these may be related to pressurization/cabin temperature changes. More documentation of these changes will be made on the next flight to test this hypothesis.

More effort should be put into fixing our venerable Rosemount temperature probe.

Cambridge and Ophir Dewpoint Systems: Have degraded, probably due to salt or other contamination on their surfaces or somewhere. Both are routinely higher than the static temperature. Should at least be cleaned.

3. CLOUD PHYSICS

FSSP-100: Working fine but should be calibrated at this time for a mid-project calibration point.

PVM-100: Noise spikes in the LWC, effective radius and surface area channels were more numerous than on previous flights for some reason. Also should be checked with the HG calibration disk since we are past the mid-project calibration stage. The results should be written down.

DMT hot wire: No change. Still impacted by too much drift type noise rather than spikes of the kind that impact the other LWC probes. LWCs are pretty close to that of other probes when the noise is absent and the LWC appreciable.

J-W: Generally worked well with the exception of noise spikes. Grant believes that he has determined the source of the noise and is working to eliminate it though it has not yet been eliminated.

2-D cloud probe: Need concentration calculations in real time. Should also be calibrated with a disk.

1-D cloud probe: Should be calibrated with beads and calibration documented. Otherwise appears to be working well.

HVPS: Occasional noise problems/data dropouts, but in general worked with less noise than previous flights.

Radar: Worked well, and data is being recorded. Some lost data due to hard drive filling up again.

CPI: As with the last flight, camera images had a mottled appearance when the probe finally did fire up in the leg at 11 kft. The images improved as the flight progressed with more normal operation of the CPI by the end of the flight. This suggests a temperature/heater problem inside the probe that may allow the lenses to become too cold. Don has been asked to check the CPI today (Tuesday) for its performance qualities in the hangar at room temperatures. (However, some test flying for aircraft mechanical problems may not allow this to happen today.)