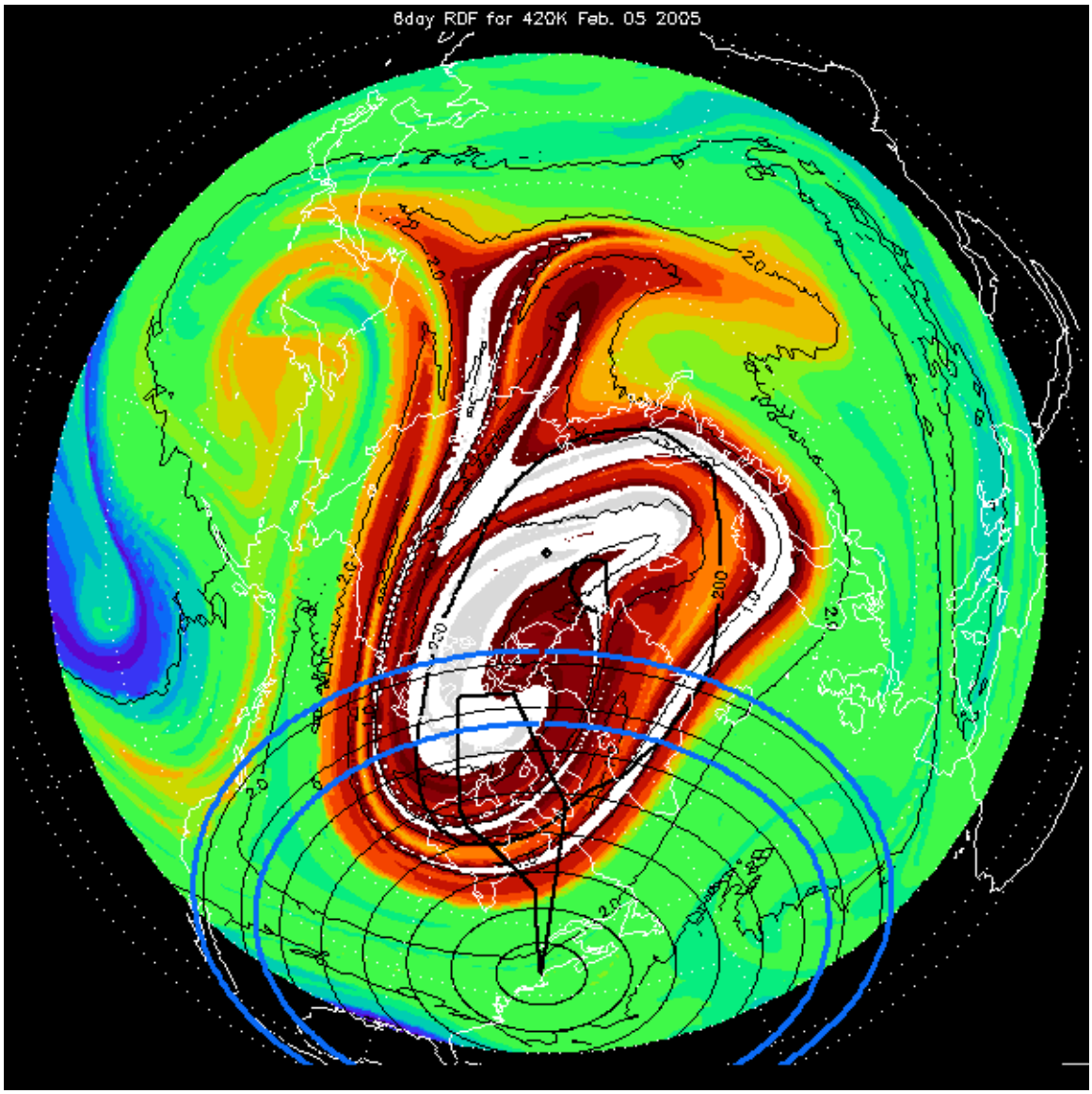
PAVE Science Flight Report
5 February 2005

Flight Plan

Fly northeast to pick up the Aura MLS track. Proceed northwest along the track until roughly 75º N. Travel southwest past Resolute (74ºN, 94ºW), coincident with a sonde launch and a SAGE III occultation. Turn back south along the Aura track. Fly southeast to the middle of Hudson Bay to do a sun run. HIRDLS will make a pass at this time. There might be gravity-wave-generated PSCs between waypoints 7 and 9 on the flight track.

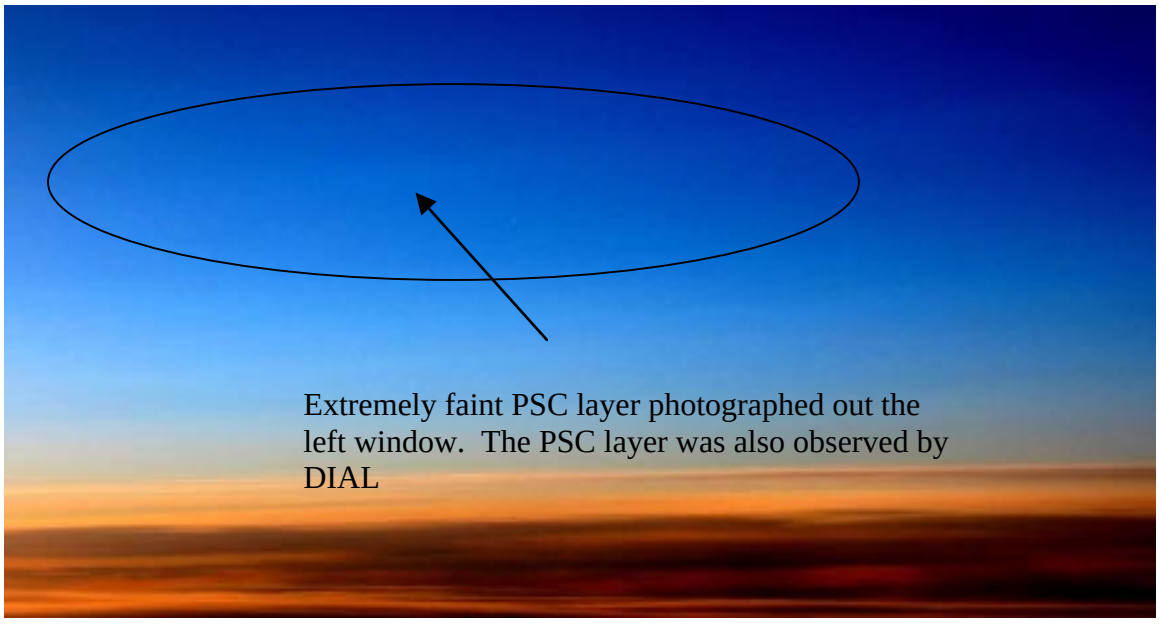
RDF for the flight is shown below (PV at 460K) – not the filaments of younger air in the vortex. We will be crossing those on our flight north.



Report:

Takeoff was 2 minutes early (12:21 UT). The tropopause was near 9 km. Takeoff conditions were clear skies and brown haze. There were problems with the ICATS ozone display. We saw very low ozone (10 ppb) at takeoff; this is apparently due to strong deposition during the morning inversion. We continued to see very low ozone (75 ppb) at 30 kft as we continued northeastward. Although we did not plan for a sun run at this time, FTS was able to operate. We encountered thin cirrus near waypoint 4, and stratospheric ozone intrusion just beyond waypoint 4. Ozone increased above us as we entered the vortex near waypoint 5, and then ozone began to decrease above us as we approached waypoint 6 (the turn to the satellite track). There were low clouds below the aircraft. As we turned north to follow the satellite track. AROTAL showed less than 2 ppm at 20 km, which is lower than previous measurements inside the vortex. By looking at the contrast between the various filaments, I estimate about a 0.7-ppm ozone loss (~25%). A faint PSC was reported by DIAL at 15:50 UT. There was no visual evidence of PSCs along this track. AROTAL showed sub-2-ppm ozone at 20 km and below, with considerable structure.

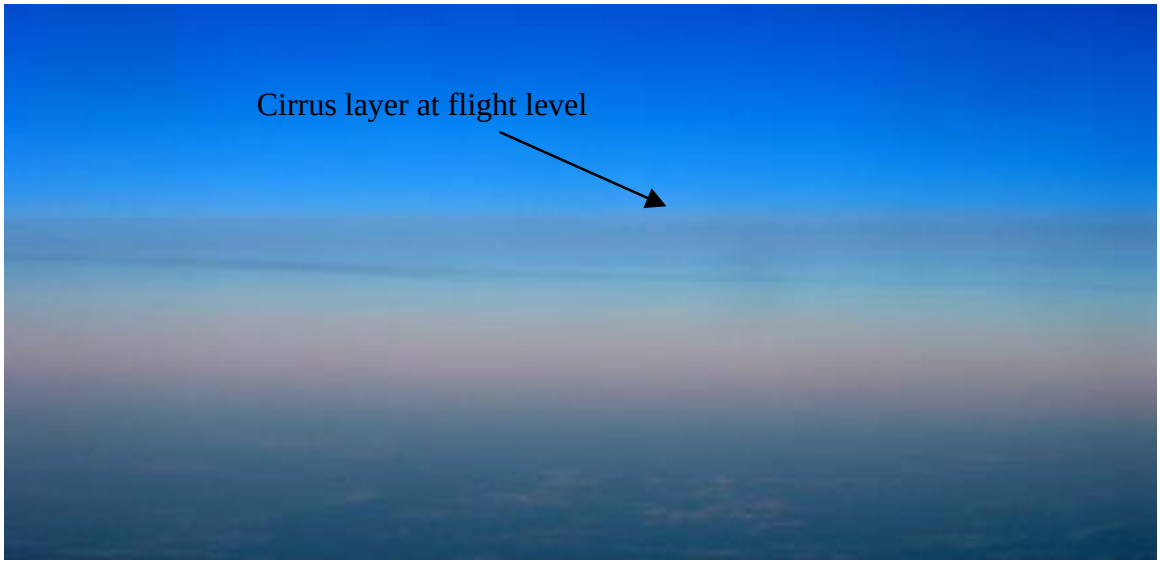
Faint PSCs were visible again along the horizon as we flew along the track toward Resolute, which we passed at 17:44 UT. DIAL detected a PSC layer at 16 km near the SAGE III occultation point (74.27˚N, 96.94˚W) at 17:52:32. AROTAL temperatures were 197º in the layer– a layer this low may be due to falling NAT from above. The PSC layer disappeared as we turned south toward the sun run, and then reappeared again.



Extremely faint PSC layer photographed out the left window. The PSC layer was also observed by DIAL

AROTAL showed considerable structure in ozone above 26 km. At about 69ºN, another thin PSC layer was observed. Just north of Hudson Bay, a thin aerosol layer appeared at 16 km – thin PSCs are continuous in this whole region – probably NAT “rocks.” We began to come out of the vortex near waypoint 16 (56ºN); AROTAL and DIAL ozone

began to increase at 20 km. We then descended to 40 kft and entered the troposphere. Ozone fell to 50 ppb, relative humidity was 91%, and the outside temperature was -73C with less than 10 ppm water vapor (occasionally the instruments recorded supersaturation). A cirrus layer was visible outside the aircraft.



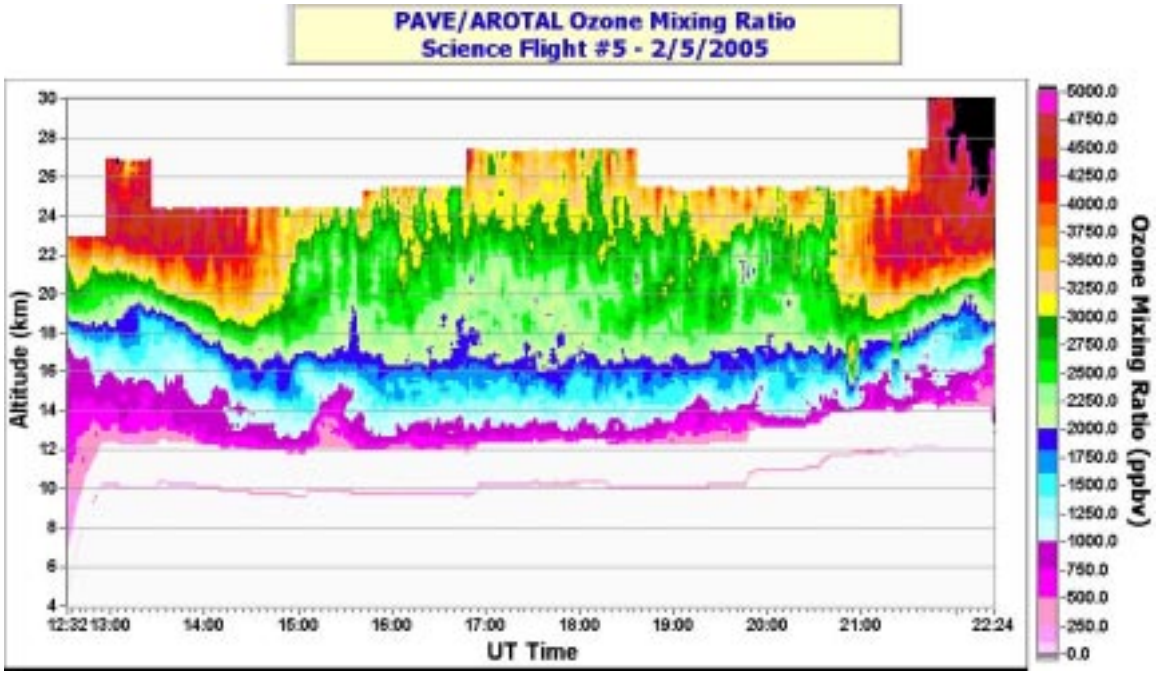
We stayed just below the tropopause (level at 41 kft), transiting out of Canada toward Pease.

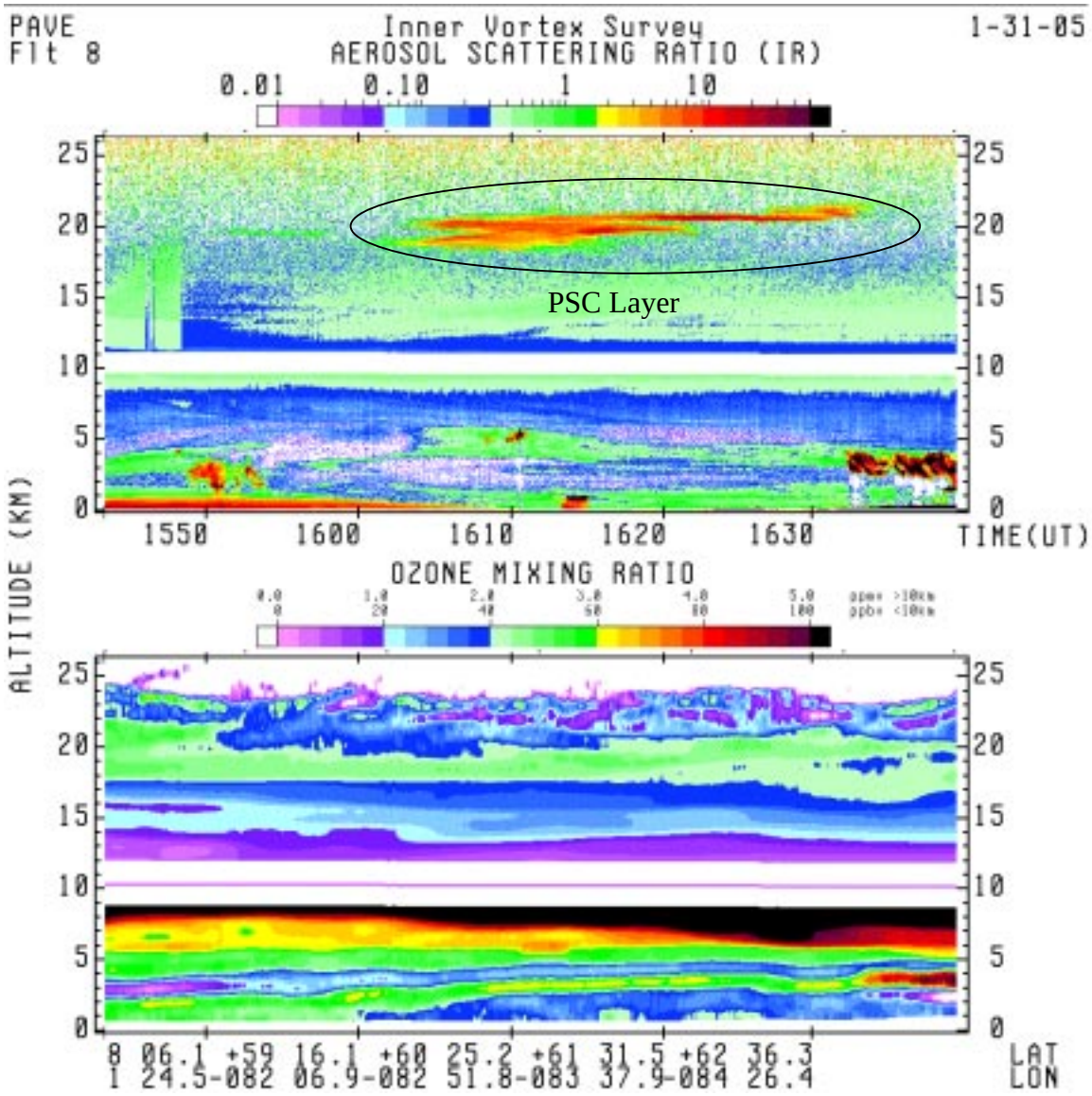
Instrument Status

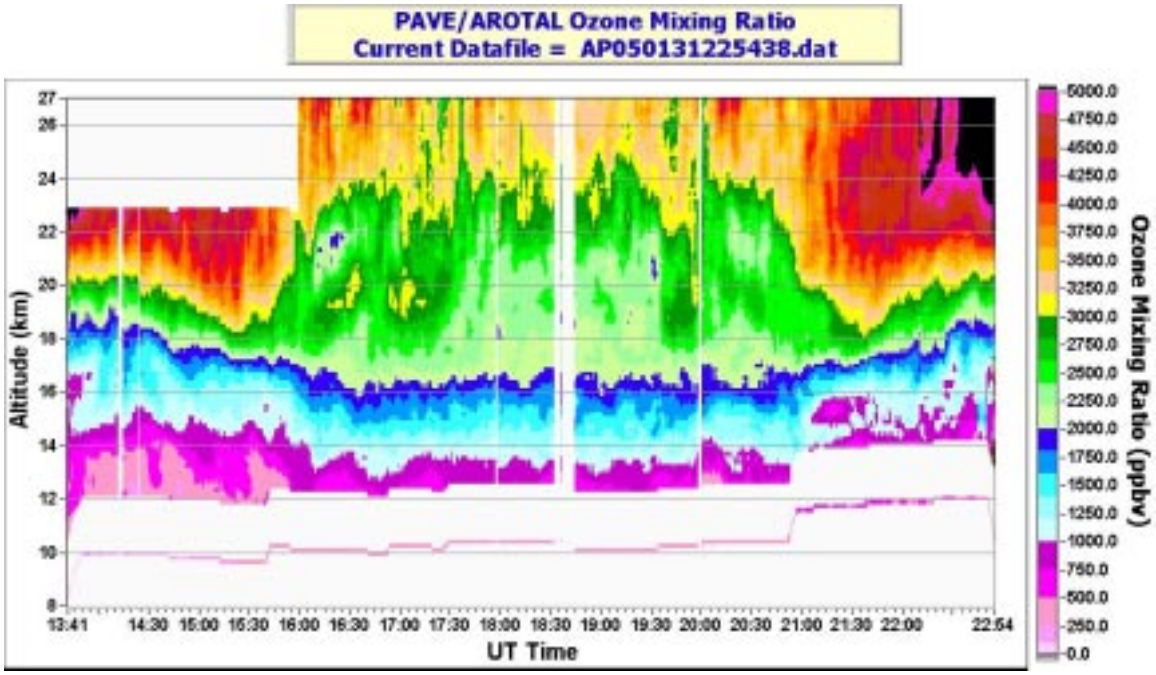
All instruments operated normally

AROTAL	McGee	Good flight – nice data as we entered into the vortex. Saw lots of structure. It was a fairly symmetric run. Made some temperature measurements as we came in toward Pease – 197K where we saw PSCs.
DIAL	Browell	Good flight – saw ozone structure as well. Saw Type 1a (solid) PSCs throughout the vortex. There were very tenuous strong intrusions below the aircraft
FTS	Coffey	Worked well on sun run – got an additional 40 minutes of sun just after takeoff
CAFS	Shetter	Running fine
MTP	Mahoney	Worked well – need to work on retrieval coefficients
ASUR	Notholt	Good flight – high ClO. Looked at HCl, HNO_3, and N_2O on the way back. The Dewar lasted until 20 minutes before descent.
FPICC	Heaps	Working fine – took data on most of the flight. Looked at glints off frozen lakes.
FastOz	Avery	Good flight – lots of structure. Correlated well with DIAL and AROTAL. Only got up to 450 ppb.

DACOM	Diskin	Good flight – worked well
DLH	Diskin	Good flight – saw down to 5.8 ppm
SAGA	Dibb	Working fine. Did not see the high levels we have seen on previous missions.
BNOD	Cohen	Worked well – some problems with inputs
ICATS	Hang	Worked fine
COBALT	Podolske	Some problems on takeoff, but worked after 20 minutes




PAVE
Flt 8
Inner Vortex Survey
AEROSOL SCATTERING RATIO (IR)
1-31-05
0.01
0.10
1
10
PSC Layer
ALTITUDE (KM)
TIME(UT)
1550
1600
1610
1620
1630
OZONE MIXING RATIO
8 06.1 +59 16.1 +60 25.2 +61 31.5 +62 36.3
I 24.5-082 06.9-082 51.8-083 37.9-084 26.4
LAT
LON


PAVE/AROTAL Ozone Mixing Ratio
Current Datafile = AP050131225438.dat
Altitude (km)
27
26
24
22
20
18
16
14
12
10
8
13:41
14:30
15:00
15:30
16:00
16:30
17:00
17:30
18:00
18:30
19:00
19:30
20:00
20:30
21:00
21:30
22:00
22:54
UT Time
Ozone Mixing Ratio (ppbv)
5000.0
4750.0
4500.0
4250.0
4000.0
3750.0
3500.0
3250.0
3000.0
2750.0
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.0
500.0
250.0
0.0