

King Air N2UW flight report for January 9, 2005

Crew: Drew, Vali, Gordon, Lukens

General – a most curious day: deep cloud and wide echo coverage led to belief in precipitation from extensive Ns-like system. Instead, found the upper cloud deck to have had little influence on the general character of the convection below it. Cu developed pretty much like on other days and produced significant WCR echoes and rain to the ground. Vertical sections of WCR echo show clearly the two cloud types, and the precipitation from them, to be present but working separately. Precipitation from the Ci deck was initially ice that melted at 4000 m, and then produced such a light rain, that at flight altitudes the in situ probes detected none of it, essentially through the whole flight (a few drops on the windshield were noted at 3300 m flight altitude). So, detection by the radar but not by the in situ probes indicates the sparsity of the hydrometeors from the Ci. The deeper Cu did penetrate the upper clouds and some drops from the upper cloud may have influenced the microphysics of the cumuli, but that effect may be hard to isolate



Photo (P1090609) taken at 18:22, at the beginning of the flight, from 3.6 km altitude gives a good general impression of the variety of clouds found in the wstudy area. This photo is looking toward the N.

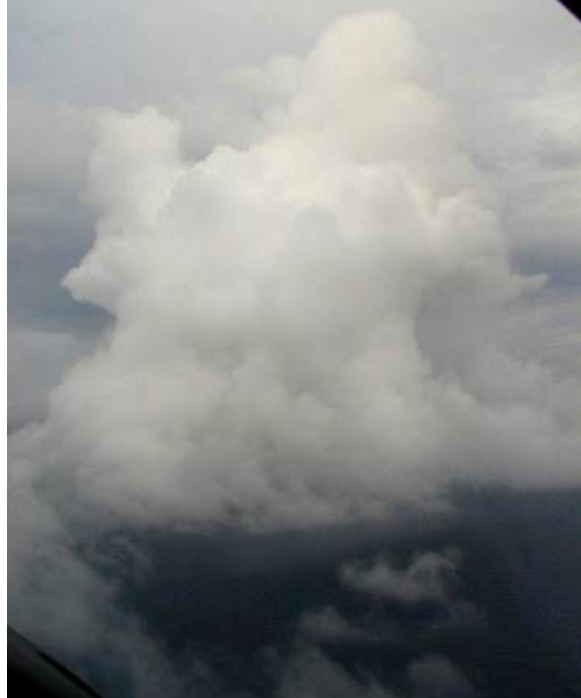


Photo on left is from 19:48 (P1090634), 1200 m altitude; photo on left (P1090650) is from 20:36 and 800 m altitude. Both show clouds that rose to about 3 km and were producing rain to the surface. As is evident from these photos, this day was visually quite different from days with sunshine. The milliard tones of gray present under the overcast were very beautiful indeed.

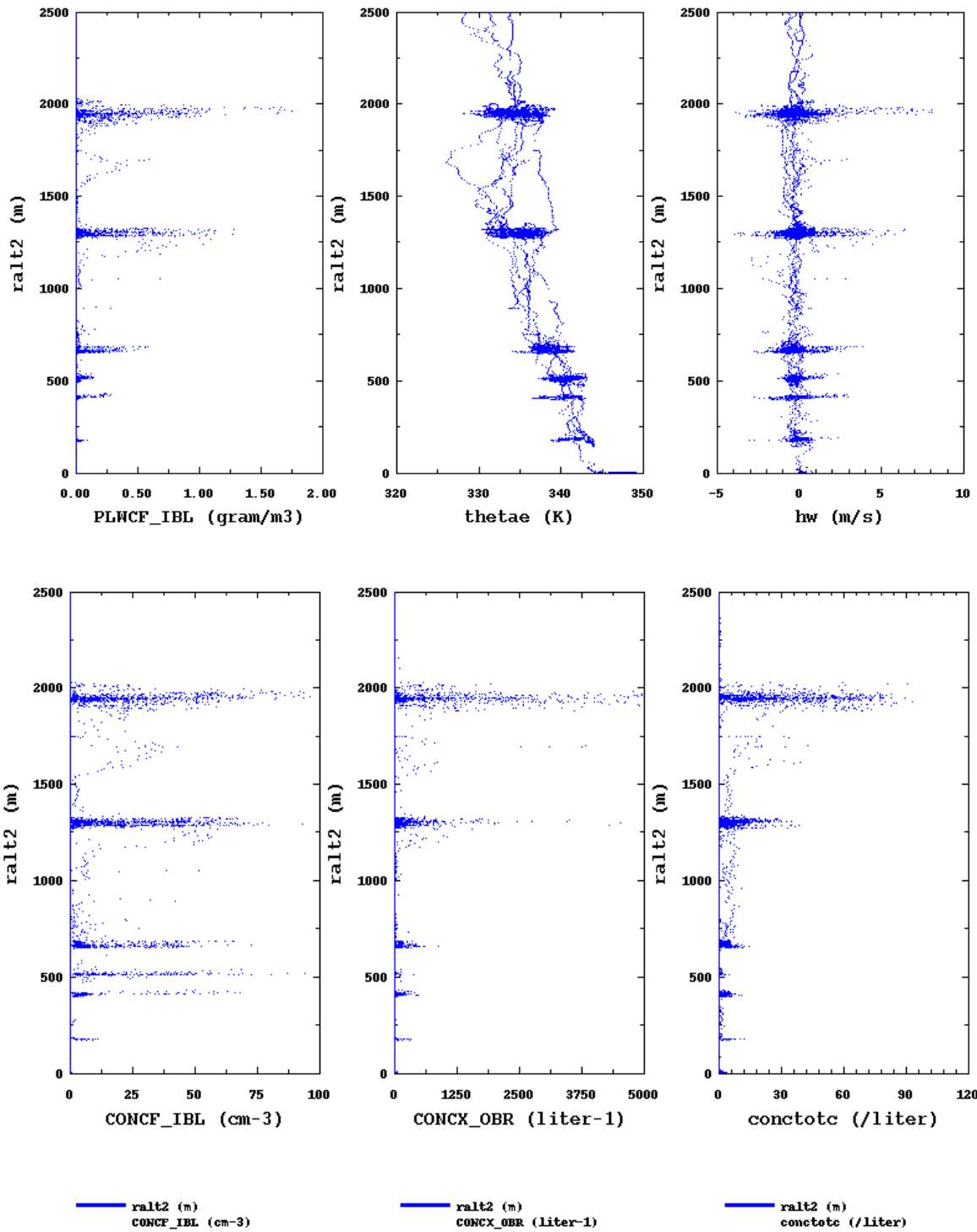
History: Overcast sky of high clouds and heavy rain started the evening before, and was evident throughout the night. SPol echoes filled the screen and there was a report of strong melting band signatures. All this evidencing precipitation from the thick mid-to-high level cloudiness. Neither Ns nor Cb – not sure what to call it. Rain in Antigua tapered off by about 8 am local. Yet, nearly continuous echo. Embedded in that were small cells (up to 40 dBZ) moving E, while the weak pattern moved toward the NE. By 11 am, only a few small echoes in the E-SE segment.

According to Dr. Knight's visual observations at 11 am from Barbuda (gotten via phone conversations), good *Cu*, of perhaps 1-2 km depth were present. This, and the continued presence of small echoes moving with the low level winds were the basis for deciding on a 2 pm flight.

Observations: Droplet concentrations, LWC, updraft velocities were in the typical range seen on other days as well. Droplet concentrations mostly around 50 cm^{-3} , a few strong updrafts with up to 100 cm^{-3} ; LWC max at any level up to about 80% of the adiabatic value LWC; peak updrafts of 8 m s^{-1} . Both updraft dimensions an regions of narrow drop spectra restricted to 500-700 m maximum horizontal extent.

The vertical profiles shown on the next page summarize the observations quite well.

RICO, Flight #KingAir
1/9/2005, 18:00:00-21:00:00



Starting from top left, the panels are: LWC (from FSSP), thetae, vertical velocity, and then concentrations from FSSP, from 1D-C and 2D-C probes.

Flight notes:

1806 T/O ; no chat available. Dark *Cu+* w/ rain to E. Heading to 030/80 at 11 k.
1811 at 11,000' under thick overcast
1827 015 heading pass through *Cu con* rising to flight level, 4 m/s on entry, pointer set, DD mode, getting good signals. Will descend to 6000'
1831 90/270, UD mode, lost CPAS
1834 at pointer, still good updraft, radar not recording; restarting it, 90/270
1837 reset pointer; heading 045
1841 descend to 4,000, re-orient path for 230 heading
1843 pointer – going past it
1846 down to 2000'; talking with RVSI
1849 at pointer in precip and cloud; cloud base at 1400'; going to 1200'
1853 back toward pointer at 1200'
1855 at point; good precip; one more cell ahead on 210 heading
1857 90 left turn to be followed by additional 90 lefts in order to traverse echo at cross direction; will do that at 500'
1901 additional jog in track to stretch the distance to the return leg
1904 will move up to 6000' to look for less clutter further E
1907 will pass over some cloud; DD mode - then discover that radar data was not being recorded.
1917 crossed on E hdg; 4-7 m/s updrafts
1919 060 hdg ; good updraft, UD mode, will do butterfly patterns
1921 pass, UD; 1924 pass DD 250 heading; 1927 pass DD 060 heading
1931 pass DD at 4000'; 1933 pass UD at 4000'; not sure about pointer on this one
1941 tried ptr, not good, will target NRE instead
1950 back to side of previous pass, into new turret, reset pointer
1952 90/270 then back to ptr, yellow NRE
1956 pass UD
1958 1-km offset for SD
195915 at offset point, cancelling offset for return to in-cloud point
2002 on pass for UD finding little at the point, no NRE
2004 continue on toward large NRE with yellow level
2022 will try another target, near Cb
2028 tall target, 310 heading to new turret
270 left turn back to target to gain it on 060 orientation
2031 nothing much left at the pointer
203340 90/270; 220 heading; not much there

- 2037 lining up with visual tilt of cloud
 - 204114 at pointer; new updraft on SW side; will go to 6000' f or DD pass
 - 204535 at point, DD, OK
 - 2049 3 mi from point, small spot of yellow NRE
 - 205107 at point, good DD data, weaker, less attenuation of ocean sfc
 - 2052 going to 11000' f or sounding
 - 2058 drizzle from high cloud; the first time it is evident on the windshield
 - 2114 L/D
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Just before landing the view also seemed to say good bye, so long!

