

King Air N2UW flight report for January 5, 2005

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General comments: Heavy Ci of the previous day was still evident at first light this morning, though it was more Cc than Cs. Practically no Cu during first hours of the morning. At the beginning of the flight, Cs band was heavier toward the E and nearly absent toward the W. Near Antigua moderate Cu. Further to NE very little

The main story of the day is the intensification of convection over the afternoon hours. Coincidentally heavier cirrus layer moved over the area. With the deepening and intensification of convection the situation changed from one of no rain at all before noon (the few SPol echoes of the morning moved out of the area), to a situation of fairly extensive rain, and even in areas away from the showers to fairly dense fields of Cu. The Cu were interlaced with As near 6000' (debris ??) and the Cs cover extended over the whole area.

Heading to the NNE after takeoff, only Cu were encountered until about 50 nm out. There cloud depth was seen to increase somewhat with a very few rising to about 7,000'. This cloud field was characterized by clouds of diffuse appearance and little rain. The photo



shown here (P1050503 taken at 15:28) gives an idea of the general appearance of the Cu field and the overlying Ci at the beginning of the mission. Of these clouds the tallest were sampled and found to have fairly typical composition. However, in two turrets drop concentrations to 400 cm^{-3} were recorded – these values were found in good but not unusual updrafts (6 m s^{-1}). The data clearly need to be scrutinized.

Even in these clouds, WCR echoes extended to the ocean surface. Still, most clouds seemed ragged, with cloud droplet concentrations were about $40\text{-}70 \text{ cm}^{-3}$, that is typical of most days but perhaps more severely diluted.

By about another half an hour, many more clusters of Cu con developed, still in the zone past 60 nm from ANU. Toward SPol, development was considerably weaker. Clouds did form in rough lines, as seen in the photo taken at 16:21.



Past about 17:00 UTC, spent most of the time sampling *Cu con* and rain. Rain was locally intense, producing reflectivities to 10 dBZ and higher on WCR. Drops to 3 mm max sizes



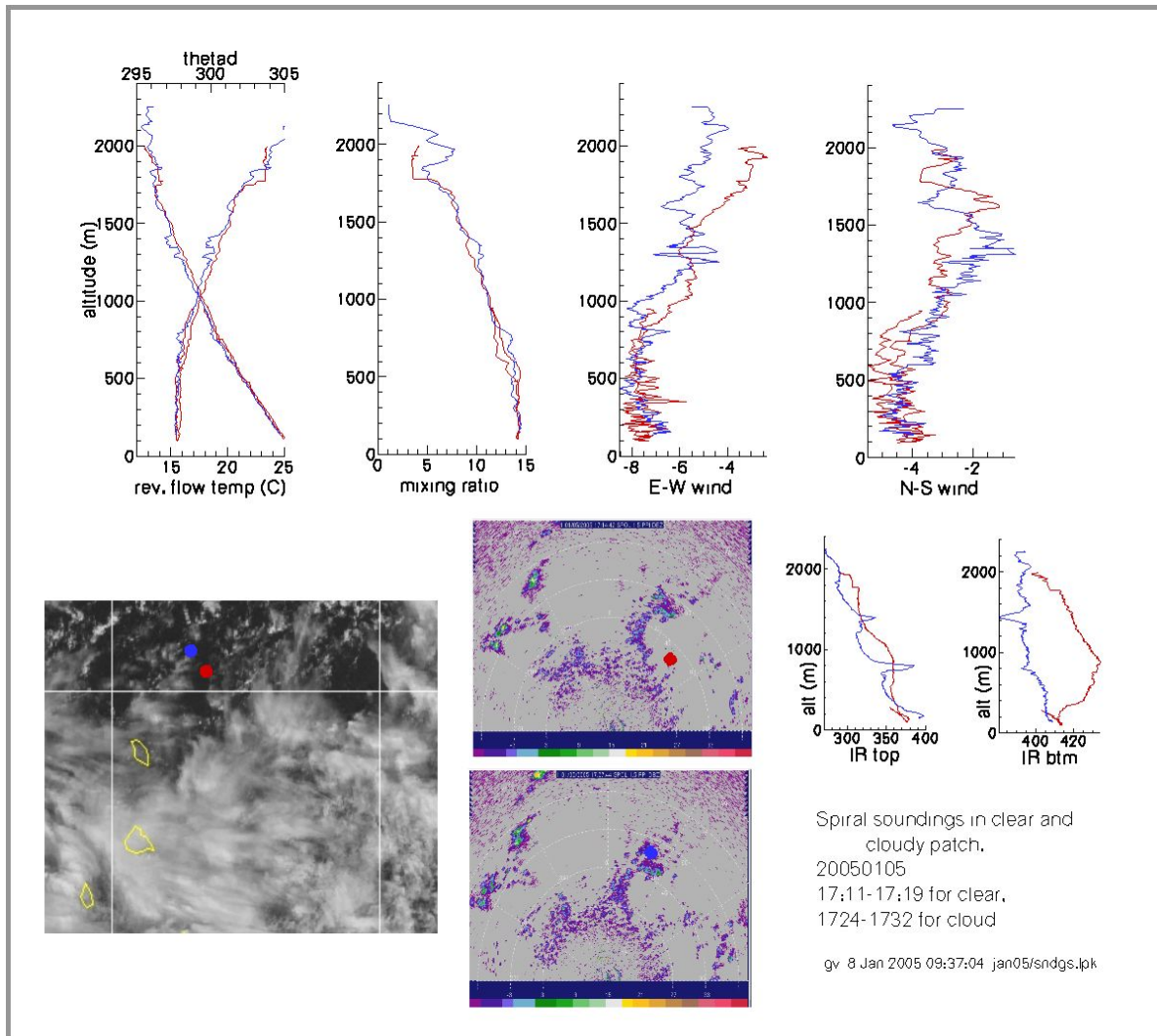
were observed. The photo here (P1050572) was taken at 18:32 from an altitude of 200 m. The flight track was across the line of precipitation to look for evidence of a pool of cold air; the passes extended to about 5 km either side of the rain center.

Finally, maneuvers were carried out at 5,000' and 10,000' for checking/calibrating the vertical air velocity measuring system.

Soundings.

As a first attempt to see whether significant differences exist in state parameters, or not, between clear patches and cloudy ones, spiral ascents and descents were made in such areas. First in a clear area, from 17:11 to 17:19 then in the adjacent cloudy area from 17:24 to 17:32.

The results shown here indicate very little difference:



The lack of a strong difference in this case may be due to the choice of locations, the relatively small size of the clear patch, or other factors. Certainly, the cloudy patch was not typical of clusters of active convection. In any event, more of these kinds of comparisons seem worthwhile.

Flight notes:

- 1500 engines started; 1520 back-taxi (after 20-min wait due to airport traffic);
1523 T/O
- 1537 at 13 kft during climb, but will descend momentarily to sample top of Cu
- 1544 photo of cloud target – deepest cloud withing sight
- 1545 pass – cloud collapsed some since first sighted
- 1554 new target on E heading
- 1557 cloud entry starts with a big hole in the cloud ; this is at 4000'

1602 still on ESE heading, near 060/70; turn to reverse and descend
1608 small rainshaft seen, photod, it looks like white ribbon from cloud base to ocean
1611 to NW, 3000'
1618 pointer set in 3 m/s updraft, at 3000', will do butterfly pattern
1620, 1625, ... passes while doing butterfly patterns
1627 photo of what's left of the cloud; back once more to ptr.
1630 in clear patch, heading toward a cluster
1633+ pointer set; passes 1 and 2; 3000', 4 m/s, no rain detected on windshield
1637 pass 3; extended beyond the pointer
1640 long pass, ascend to 4500' ; 90/270 turns
1642 line of shadows shows linear organization
1645 end of run on 240 heading; 90/270, still 4500'
1649 pass on 060 heading; 0.5 km offset; going along E side; SD mode.
1652 level
1654 clear break in the line
1700 reversed direction; with some jogs
1701 end of line; descend
1704 3000' heading back to ptr., UD
1709 went 2 km past the pointer; more growth on SW side, but all weak
1711 will do spiral in cloud-free area
1724 start down in cloudy area; modest clouds, some Ci overhead; cloud base 2300'
1733 end of sounding
1739 pointer set; then continue; 0.5 km offset
1742 heading back, SD mode
1747 up to 5000' to allow C130 lower altitudes; back to offset pointer
1749 turn to NRE (nose radar echo); near 030/80 NRE has some red; solid small patch
1757 back in red NRE; pointer set w/1-km offset; SD radar
1800 offset cancelled for next run, UD mode
1804 270 left turn to traverse NRE in crosswind direction; 8 m/s updraft; reset pointer
1809 at ptr then turn toward weak NRE
1810 90/270
1819 crossed to tall turret, but found no updraft; change course back toward ptr.
1818 across NRE; descend
1822 precip at 1000', hdg 270, then left 270 turn to take up cross direction; extending on
either side of precip by about 3 nm
1830 out on NE side
1832 last pass through precip; then climb to 5000' and up to 10,000 for wind-calib

maneuvers.

- 1839 pileus spotted; 5000', going under it; finding 3 m/s updraft
- 1840 red NRE
- 1846 crossing echoes; waiting for clearance (tower busy with incompetent pilot)
- 1849 radar turned off for maneuvers . Lots of rain everywhere. Dark clouds.
- 1858 end of Rido maneuvers at 5 kft, going up to 10 kft to repeat
- 1902 photo E, S, W
- 1914 end of maneuvers, head to ANU
- 1933 L/D.