

RACEPAC Flight #6 – Polar 6 – 140508

Report by Stephan Borrmann

General remark: There was a solid uninterrupted stratus cloud deck with 8/8 coverage at low levels between roughly 1500 ft and 3000 ft throughout the entire flight. We could only perform two experiments: (1.) Sampling the cloud top entrainment zone in a long “linear” flight path for about 43 minutes, and (2.) sampling aerosol profiles in the cloud free, clear air for 100 minutes. Towards the end of (1.) significant icing on aircraft and wing probes occurred (as well as at the sampling inlets) such that the aircraft could not enter the clouds afterwards anymore.



The pictures taken at 12:23 LT and 12:47 LT illustrate the general situation

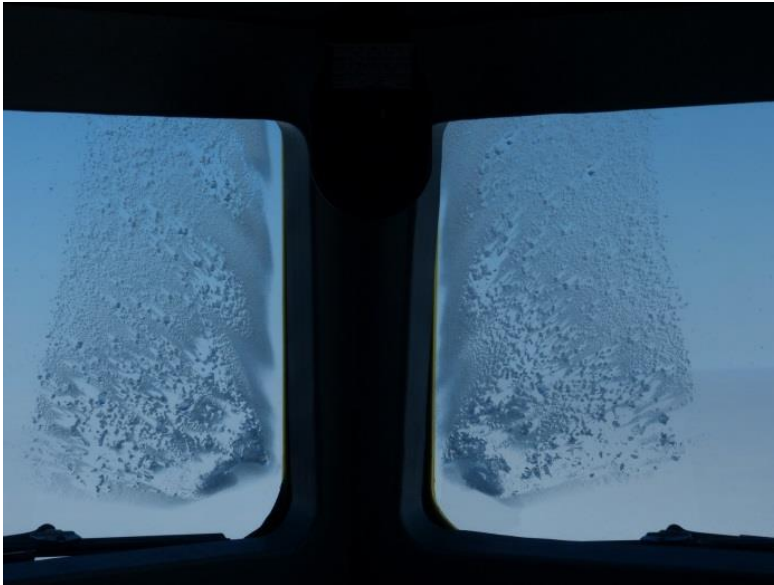
Take off time: 12:15 LT

Situation on the way to C3: Low clouds present and a layer above the airplane. Cruising at 4000 ft, 6000 ft and later 8000 ft. 12:37 LT between 6000 ft and the lower cloud deck below there is a haze/aerosol which we sample during the slow descent towards cloud top zone. The haze was also detected from the P5 Lidar.

Experiment 1: “Sampling along a line at cloud top entrainment zone” from 12:42 LT to 13:25 LT

- * 12:42 LT: Sampling inside cloud layer and at the top of the layer at 3200 ft. Already ice accretion.
- * 12:46 LT: Climb out of cloud (which still has its top at 3200 ft) and sample cloud free air at 3500 ft and later 3700 ft to characterize the “to-be-entrained” clear air.
- * 12:52 LT: Sampling the very top of the cloud layer at 3400 ft, later 3200 ft. Slight turbulence encountered.
- * 12:54 LT: Aircraft more deep inside cloud at 2900 ft, then again scratching along cloud top.
- * 12:56 LT: Climb out of cloud to 2700 ft. Impression: The cloud top seems to “sink away from us” towards lower altitudes the more we fly along. Sampling clear air again.
- * 12:58 LT: Climb to 3000 ft for more clear air measurements at a higher altitude level. But we sample the haze layer above the cloud deck.
- * 13:02 LT: Sinking to 2700 ft, we still are in haze and clear air.
- * 13:06 LT: Sink to 2450 ft, now scratching at upper cloud edge. Also haze present, slight turbulence.

- * 13:11 LT: Enter the cloud top region. Marcus from CCP says there are two droplet size modes. Again turbulence and some ice accumulation.
- * 13:14 LT: Turning towards C4 and climb to 3700 ft for outside cloud de-icing until 13:20 LT.
- * 13:20 LT: Return into cloud top zone at 2300 ft, some turbulence. The haze is not present anymore.
- * 13:22 LT: Still inside the cloud, sampling cloud top zone now at 2250 ft.
- * 13:25 LT: Severe icing, we get out of the cloud. End of Experiment 1. Ice pieces coming off the prop tips. The picture below (taken at 13:25 LT) shows ice on cockpit windows. No more haze above the cloud deck. We continue to fly at 2500 ft.



Experiment 2: “Aerosol and trace gas experiment in ≈10 minute flight legs” from 13:25 LT to 15:05 LT

- * 13:25 LT: Starting experiment with level flight at **2500 ft**.
- * 13:35 LT: climb to **3000 ft**, arrive at 13:36 LT
- * 13:46 LT: Climb to **3500 ft**, arrive 13:48 LT.
- * 13:50 LT: Turn towards YEV.
- * 13:57 LT: Climb to **4000 ft**, arrive at 13:58 LT.
- * 14:08 LT: Climb to **5000 ft**, arrive at 14:10 LT.
- * 14:20 LT: Climb to **6000 ft**, arrive at 14:21 LT.
- * 14:30 LT: Flying through haze patches.
- * 14:31 LT: Climb to **7000 ft**, arrive 14:32 LT.
- * 14:42 LT: Climb to **8500 ft**, arrive 14:45 LT.
- * 14:55 LT: Climb to **10000 ft**, arrive 14:56 LT.
- * 15:05 LT: End of experiment, start approach to YEV. In Inuvik area altostratus perlucidus translucidus visible above the low level cloud deck.

Landing in Inuvik at 15:44 LT

Polar 6 UserEvents 8. May 2014

0	2014-05-08 17:56:51.339	Lat= 68° 18,342' N Lon=133° 30,007' W Taxi
1	2014-05-08 18:15:31.567	Lat= 68° 18,234' N Lon=133° 28,733' W Takeoff
2	2014-05-08 18:19:47.900	Lat= 68° 22,459' N Lon=133° 26,934' W Rollerdoors and KT19 open
3	2014-05-08 18:25:22.294	Lat= 68° 30,957' N Lon=132° 58,254' W LD90 running
4	2014-05-08 18:36:55.968	Lat= 68° 57,577' N Lon=131° 52,131' W BMet deicing on
5	2014-05-08 19:14:58.373	Lat= 70° 2,915' N Lon=128° 59,933' W C1, turn towards the north
6	2014-05-08 19:31:53.299	Lat= 70° 42,010' N Lon=128° 59,881' W no more flights in clouds due to icing
7	2014-05-08 19:40:36.878	Lat= 71° 2,022' N Lon=129° 0,005' W Time Sync Error
8	2014-05-08 19:50:07.290	Lat= 71° 24,274' N Lon=129° 0,072' W Time Sync Error
9	2014-05-08 19:51:35.007	Lat= 71° 26,978' N Lon=129° 4,028' W C2 turn towards the south
10	2014-05-08 20:07:42.021	Lat= 70° 53,079' N Lon=129° 59,532' W Time Sync Error
11	2014-05-08 20:16:59.348	Lat= 70° 33,635' N Lon=130° 28,928' W Time Sync Error
12	2014-05-08 20:21:12.436	Lat= 70° 24,911' N Lon=130° 41,676' W Time Sync Error
13	2014-05-08 21:30:19.544	Lat= 68° 31,587' N Lon=133° 41,781' W Rollerdoors and KT19 closed
14	2014-05-08 21:43:13.833	Lat= 68° 18,195' N Lon=133° 30,142' W Touchdown
15	2014-05-08 21:48:25.169	Lat= 68° 18,342' N Lon=133° 30,008' W Park Position

P5 Tim ... Flug-Nr.: 08.05.2014

Datum: 08.05.2014, Zeiten sind LT

Take-off: 12:02

Messbeginn SMART: 12:12

Keine Homes am Boden → SW Limit Switch kam, nach Start Problem behoben

→ Homes in ruhiger Fluglage gefunden → Messbeginn mit Lagestabilisierung

12:16: blauer Himmel, einzelne Cirrus über uns, teilweise aufgebrochene tiefe Wolken unter uns, leicht dunstig über uns

12:31: Eagle Start, AOD=0,07, dunstig über uns, homogen, 8ms, unter uns geschlossene Wolkendecke, bei 900m Oberkante, Cloudbow+Glorie, vermutlich Messung über Eis

12:37: Stop Eagle, AOD war konstant

12:38: Start Eagle, blauer Himmel über uns, 8ms, Cirren am Horizont, Cloudbow+Glorie, geschlossene Wolken unter uns, Wolkenobergrenze ca. 1100m, AOD konstant bei 0,07

12:43: Wolkenobergrenze auf 900m gesunken, aber tiefe Wolken homogen

12:44: Stopp Eagle

12:46: Start Eagle, Cloudbow+Glorie noch leicht da, AOD konstant, etwas diesig, aber homogen, 8ms, Messbedingungen konstant, 1 Schicht: Wolkenobergrenze 500m

12:51: Stop Eagle und wieder Start, 8ms, AOD=0,06, Cloudbow+Glorie

12:58: Stop, Start Eagle, AOD=0,07, sehr homogene Wolken unter uns, 8ms, Cloudbow+Glorie, blau über uns, diesig (homogen), vermutlich immer noch Eis unter uns, WOG=700m

13:02: Stop Eagle, Start Eagle, kurz vor Wegpunkt C4, Micha will Kurve messen, 8ms

13:03: Linkskurve, Cloudbow+Glorie, AOD=0,06

13:08: Stop Eagle, Start Eagle, 8ms, wahrscheinlich über Meereis, Cloudbow+Glorie, AOD=0,04 → weniger diesig, WOG=600m, AOD schwankt zwischen 0,04 und 0,06

13:14: Stop Eagle, Start Eagle, blauer Himmel, sehr konstante Messbedingungen

13:18: Signal sinkt etwas → evtl. Wasser unter uns, WOG=500m

13:21: Stop Eagle, Start Eagle, Cloudbow+Glorie, AOD=0,05

13:26: Stop Eagle

13:28: Start Eagle, über uns nichts, am Horizont hohe Wolken

13:32: wieder über Eis, Cloudbow+Glorie, Eiskante überflogen

13:33: Stop Eagle, Start Eagle, WOG=400m, über uns weiter blau, AOD=0,06

13:39: Stop Eagle, Start Eagle, AOD=0,05, vor uns kommen Cirren

13:42: Stop Eagle, Start Eagle

13:43: C3 passiert, direkt unter uns Wolken etwas aufgebrochen, WOG=300m

13:45: Rechtskurve, mittelhohe Wolken über uns (AOD ging bis auf 0,18 hoch)

13:48: Stop Eagle, Start Eagle

13:49: Linkskurve (AOD auf 1,1 kurz gestiegen), aber auch mittelhohe Wolken über uns

13:50: AOD=1,0

13:52: Linkskurve, kein Cloudbow, keine Glorie

13:54: Stop Eagle, Start Eagle, immer noch unverändert 8ms

13:55: C3 passiert, aufgebrochene Wolken unter uns, kein Cloudbow, keine Glorie, tiefe Wolken durchgehend, AOD schwankt sehr stark

13:59: Stop Eagle

14:07: Start Eagle, AOD=0,06

Dropsonde #1

14:20: Stop Eagle, AOD=0,06, sehr homogene Wolken unter uns, Cloudbow+Glorie

14:25: WOG=500m, AOD=0,06

14:27: Stop Eagle, Start Eagle, Cloudbow+Glorie, AOD=0,06, hohe Wolken am Horizont, über uns blau, unter uns sehr homogene Wolkendecke, vermutlich Eis unter uns, 8ms

14:33: Stop Eagle, Start Eagle

14:36: C4 passiert, Rechtskurve, AOD=0,06

14:38: Stop Eagle, Start Eagle

14:50: AOD langsam auf 0,08 gestiegen, über uns blau, unter uns sehr homogen, Cloudbow+Glorie, Dropsonde #2

14:55: AOD=0,07

14:56: Stop Eagle, Start Eagle

15:04: Stop Eagle, AOD=0,08, gleich kommen Cirrus, deshalb Stop

15:05: Dropsonde #3 (Kappe noch drauf), CANON hat einige Minuten nicht gemessen (kein Speicherplatz mehr)

15:19: Stop der Messungen

Landung Inuvik

Polar 5 UserEvents 8. May 2014

0	2014-05-08 17:52:16.733	Lat= 68° 18,317' N Lon=133° 29,898' W taxi
1	2014-05-08 18:02:11.878	Lat= 68° 18,250' N Lon=133° 28,190' W rolling
2	2014-05-08 18:02:43.720	Lat= 68° 18,214' N Lon=133° 29,480' W takeoff
3	2014-05-08 18:07:00.293	Lat= 68° 17,591' N Lon=133° 53,826' W start canon
4	2014-05-08 18:07:31.329	Lat= 68° 17,561' N Lon=133° 56,646' W open cover kt19
5	2014-05-08 18:11:00.931	Lat= 68° 21,319' N Lon=133° 57,433' W q switch on
6	2014-05-08 19:02:50.615	Lat= 69° 59,985' N Lon=129° 0,249' W Waypoint C4
7	2014-05-08 19:43:09.508	Lat= 71° 30,022' N Lon=128° 59,915' W Waypoint C3
8	2014-05-08 20:11:49.288	Lat= 70° 55,309' N Lon=128° 59,985' W Drop Sonde
9	2014-05-08 20:36:27.519	Lat= 69° 59,972' N Lon=128° 59,730' W Waypoint C4
10	2014-05-08 20:42:56.524	Lat= 69° 47,495' N Lon=129° 37,346' W
	Dropsonde_13_20140508	
11	2014-05-08 21:05:34.523	Lat= 69° 5,773' N Lon=131° 53,871' W
	Dropsonde_14_20140508	
12	2014-05-08 21:21:27.840	Lat= 68° 34,307' N Lon=133° 24,219' W Rollerdoors closed
13	2014-05-08 21:22:27.150	Lat= 68° 32,407' N Lon=133° 30,064' W KT19 off
14	2014-05-08 21:29:05.267	Lat= 68° 19,928' N Lon=134° 0,907' W Video and Canon off
15	2014-05-08 21:35:37.830	Lat= 68° 18,214' N Lon=133° 29,497' W Touchdown
16	2014-05-08 21:40:51.653	Lat= 68° 18,319' N Lon=133° 30,011' W Park Position