

RACEPAC Flight #11 – Polar 6 – 140516

Report by Stephan Borrmann

General remark: A mixture of mid and high level clouds as stratus deck/stratocumulus was probed between 4500 ft and 10500 ft in staircase pattern with 23 steps. Then the below cloud fall-streak and precipitation zone was sampled between 4500 ft and 1500 ft in 7 altitude steps. Altogether the cloud square of 110 km by 130 km (by ≈ 3 km in the vertical) and its below cloud precipitation zone was “scanned” with the Polar 6 at a fairly high spatial resolution.



Upper left from 13:10 LT, upper right from 13:02 LT, lower photo from 13:19 LT.

The pictures illustrate the general cloud situation: Upper left diffuse hazy stratus, upper right stratus overhead with cumuliform clouds interspersed, lower photo fall-streak.

Take off time: 11:52 LT

Situation on the way to C1 and during the box pattern C1-C2-C3-C4:

- * Stratus deck, stratocumulus often of diffuse, haze-like appearance with extended below cloud precipitation and fall-streak zone. Field of inhomogeneous clouds, sometimes optically thick without sun or ground clearly visible, sometimes ground visible through haze/fog. Cloud base at varying altitudes, initially around 6500 ft, later at 1500 ft to 5000 ft.
- * 12:00 LT: P6 enters lower end of the cloud layer and below cloud zone at 7500 ft.
- * 12:06 LT: Arriving at C1.

Experiment 1: Square pattern between C1 and C4. Staircase flight path to probe cloud interior.

- * 12:06 LT – 12:11 LT: Scratching along lower cloud edge at **7500 ft**.
- * 12:11 LT – 12:13 LT: Inside cloud at **8000 ft**.
- * 12:13 LT – 12:16 LT: Inside cloud at **8500 ft**.
- * 12:16 LT – 12:20 LT: Inside cloud at **9000 ft**, ground visible like through fog.
- * 12:20 LT – 12:24 LT: Inside cloud at **9500 ft**, ground not visible anymore, but bright above, i.e. we are close to the cloud upper edge.
- * 12:24 LT – 12:27 LT: Flying at **10000 ft** above cloud top and in entrainment zone.
- * 12:28 LT – 12:31 LT: Climbing to **10500 ft**, upper cloud edge, icing starts, turbulence.
- * 12:31 LT: Descent to **10000 ft** because of icing; also turning at C2 for C3. Cloud base is reported from YEV airport to be at 3000 ft now.
- * 12:34 LT: Drop down to **9500 ft**. Crossing into and out of cloud several times.
- * 12:37 LT – 12:40 LT: Flight leg at **9000 ft**. Inside the cloud at all times.
- * 12:40 LT – 12:43 LT: Inside cloud at **8500 ft**. Ground visible through “fog”.
- * 12:43 LT – 12:46 LT: Inside cloud at **8000 ft**. Now no ground sighting or seeing sky above the cloud.
- * 12:46 LT – 12:49 LT: Inside cloud mostly at **7500 ft**. Towards the end ground visible.
- * 12:49 LT – 12:52 LT: At and below cloud base level at **7000 ft**.
- * 12:52 LT – 12:55 LT: Fully inside cloud at **6500 ft**.
- * 12:55 LT – 12:59 LT: Down to **6000 ft**. Turbulence, ground visible as well as large fall-streak areas.
- * 12:59 LT – 13:04 LT: At **5500 ft**; inside fall streak region, snowfall in immediate aircraft vicinity visible from cockpit.
- * 13:04 LT – 13:10 LT: Down to **5000 ft**. Now we are below cloud base.
- * 13:10 LT – 13:14 LT: At **4500 ft** in clear air, sometimes haze.
- * 13:14 LT – 13:20 LT: As we were in clear air long enough we do not descend further but climb back into the fall-streak zone below the cloud at **5000 ft**. This leg inside fall-streak zone, snowfall visible from cockpit, ground well visible, turbulence.
- * 13:21 LT – 13:24 LT: Leg at **5500 ft**, first still in fall-streak zone, later fully inside cloud.
- * 13:25 LT – 13:29 LT: Inside cloud at **6000 ft**, ground visible, sometimes turbulence.
- * 13:29 LT – 13:33 LT: Inside cloud and at lower cloud edge at **6500 ft**. Ground visible through haze.
- * 13:33 LT: Arrive at C4 and turn towards C1.
- * 13:34 LT – ca. 13:36 LT: Climb to **7000 ft**, then exit the cloud to below cloud area because (1) we are too close to YEV, where there is much traffic, (2) the cloud base is too low, and (3) the pilots need enough visibility. End of experiment. Some data at 7000 ft level should have been recorded.

Experiment 2: Sampling of the precipitation zone below the clouds in 7 steps between 1500 ft and 4500 ft.

- * 13:40 LT – 13:42 LT: Arrive at **4500 ft** and sample about 2 minutes.
- * 13:42 LT – 13:45 LT: Inside snow fall zone at **4000 ft**.
- * 13:45 LT – 13:50 LT: Below cloud at **3500 ft**. Rain precipitates on cockpit windows.
- * 13:50 LT – 13:54 LT: Sampling rain at **3000 ft**.
- * 13:54 LT – 13:59 LT: Sampling rain at **2500 ft**.
- * 13:59 LT – 14:04 LT: Sampling rain at **2000 ft**, turn at C1 headed for C3.
- * 14:04 LT – 14:10 LT: Sampling rain at **1500 ft**, turbulence. Because of the terrain we cannot go to lower levels.
- * 14:10 LT: End of experiment, return to Yev.

Landing in Inuvik at 14:33 LT.

Polar 6 UserEvents 16. May 2014

0	2014-05-16 17:47:57.493	Lat= 68° 18,340' N Lon=133° 30,006' W Taxi
1	2014-05-16 17:51:27.363	Lat= 68° 18,217' N Lon=133° 29,354' W Takeoff
2	2014-05-16 17:58:49.677	Lat= 68° 10,922' N Lon=132° 52,699' W Rollerdoors and KT19 open
3	2014-05-16 18:08:04.810	Lat= 67° 55,633' N Lon=132° 0,230' W C1
4	2014-05-16 18:35:52.299	Lat= 67° 0,202' N Lon=132° 20,763' W C2
5	2014-05-16 18:53:14.640	Lat= 67° 0,310' N Lon=133° 51,766' W time sync error
6	2014-05-16 19:06:20.679	Lat= 67° 0,194' N Lon=134° 58,497' W C3
7	2014-05-16 19:33:29.435	Lat= 68° 0,063' N Lon=134° 54,294' W C4
8	2014-05-16 20:00:19.533	Lat= 67° 59,484' N Lon=132° 5,456' W C1
9	2014-05-16 20:11:01.323	Lat= 67° 47,616' N Lon=132° 49,971' W fligh back to Inuvik
10	2014-05-16 20:12:52.480	Lat= 67° 52,357' N Lon=132° 56,047' W rollerdoors and KT 19 closed
11	2014-05-16 20:32:53.067	Lat= 68° 18,203' N Lon=133° 29,868' W Touchdown
12	2014-05-16 20:39:00.932	Lat= 68° 18,323' N Lon=133° 30,002' W Park Position

Polar 5 - 16. May 2014

1800 UTC Messung unter Wolken. Aber Messung von Land. Ueber uns homogene Mittelhohe Wolke.
Unter uns keine Wolke. Viel Wald, aber auch Schneeflaechen unter uns. Recht turrbulent.

1802 UTC Waypoint C1

1831 UTC Waypoint C2

1900 UTC Waypoint C3

1932 UTC Waypoint C4

2004 UTC Waypoint C1

Messbedingungen ganzzeitig unveraendert

P5 Tim ... Flug-Nr.: 16.05.2014

Datum: 16.05.2014, Zeiten sind LT

Take-off: 11:46

Start der Messungen: 11:50

Sensor unten bereits vor Start festgestellt und mit Alu-Klebeband fixiert, da Problem mit Feder gestern festgestellt und erst heute nach Flug behoben werden soll, aber oberer Sensor korrigiert normal

Flugplan: fliegen nach Süden über Land (kaum bis teilweise schneebedeckt), unter mittelhohen Wolken über uns, P6 über uns, 600m, 67m/s

Da nicht über Schnee: Einstellungen CANON angepasst: F5.0 (Blende)

11:57: über uns geschlossene Wolkendecke

12:02: C1 passiert, Rechtskurve

12:11: NIR-Spektrometer kurz nicht erkannt (Fehlermeldung LabView)

12:12: USB-Kabel kurz ab und wieder dran + Neustart LabView → Fortsetzung der Messung, letzte Messung vor Ausfall war 12:09

12:17: 400m Höhe, 63m/s, sehr holpriger Flug tief über Land

12:20-12:25: Messunterbrechung NIR (gleiches Problem)

12:29: unter uns kein Schnee, viel Wald und immer wieder kleinere Seen (mal Wasser, mal gefroren)

12:34-12:37: Messunterbrechung NIR (gleiches Problem)

Anmerkung VIS Radianz oben: ab und zu übersteuert es kurz (wir fliegen unter Wolken), am höchsten Peak → evtl. für Retrieval der optischen Dicke der Wolken andere Wellenlänge nehmen (eine die nicht übersteuert) → André meinte er hätte AMALI-Wellenlänge genommen

12:48: neue Einstellung CANON: 1/250 s, F8.0, ISO100

12:40-12:45: Messunterbrechung NIR (gleiches Problem)

13:22-13:28: Messunterbrechung NIR (gleiches Problem)

Zwischen diesen beiden Unterbrechungen auch immer wieder Unterbrechungen

13:30: unter uns viele Seen + Flüsse + Wald, im Westen: Mackenzie Mountains, über uns geschlossene Wolkendecke

13:31:50: C4 passiert, Rechtskurve

14:13: Stop der Messungen

14:30: Landung Inuvik, Flugdauer: 2h45min

Polar 5 UserEvents 16. May 2014

0	2014-05-16 17:42:41.288	Lat= 68° 18,319' N Lon=133° 30,008' W TAXI
1	2014-05-16 17:44:58.324	Lat= 68° 18,196' N Lon=133° 30,135' W rolling
2	2014-05-16 17:45:30.450	Lat= 68° 18,223' N Lon=133° 29,127' W Takeoff
3	2014-05-16 17:45:46.150	Lat= 68° 18,253' N Lon=133° 27,975' W Deicing on
4	2014-05-16 17:46:34.181	Lat= 68° 18,351' N Lon=133° 24,168' W Viedo start
5	2014-05-16 17:47:29.462	Lat= 68° 17,344' N Lon=133° 19,909' W Q Switch ON
6	2014-05-16 17:48:41.662	Lat= 68° 15,060' N Lon=133° 14,782' W Rollerdoors open
7	2014-05-16 17:48:48.660	Lat= 68° 14,882' N Lon=133° 14,143' W Canon Start
8	2014-05-16 17:59:41.428	Lat= 68° 3,263' N Lon=132° 15,801' W AMALI Start
9	2014-05-16 18:02:51.704	Lat= 67° 59,960' N Lon=132° 0,399' W Waypoint C1
10	2014-05-16 18:16:05.710	Lat= 67° 32,484' N Lon=132° 0,443' W Sun Photometer start
11	2014-05-16 18:30:45.802	Lat= 67° 0,710' N Lon=131° 59,984' W Waypoint C2
12	2014-05-16 18:45:41.740	Lat= 67° 0,360' N Lon=133° 21,317' W Canon stop
13	2014-05-16 18:45:58.972	Lat= 67° 0,393' N Lon=133° 22,883' W Canon Start
14	2014-05-16 19:03:54.030	Lat= 67° 0,028' N Lon=134° 58,369' W Waypoint C3
15	2014-05-16 19:17:49.333	Lat= 67° 29,458' N Lon=134° 59,921' W Sun Photometer stop
16	2014-05-16 19:32:00.194	Lat= 67° 59,516' N Lon=134° 59,759' W Waypoint C4
17	2014-05-16 19:47:38.419	Lat= 68° 0,444' N Lon=133° 33,359' W AMALI Stop
18	2014-05-16 20:04:24.106	Lat= 67° 59,987' N Lon=131° 59,578' W Waypoint C1
19	2014-05-16 20:07:22.276	Lat= 68° 2,518' N Lon=132° 10,710' W Canon stop
20	2014-05-16 20:11:02.041	Lat= 68° 4,929' N Lon=132° 37,384' W Eagle Off
21	2014-05-16 20:15:18.055	Lat= 68° 7,716' N Lon=133° 7,496' W Rollerdoors closed
22	2014-05-16 20:24:43.237	Lat= 68° 17,474' N Lon=133° 51,899' W AMALI Off
23	2014-05-16 20:28:51.852	Lat= 68° 18,199' N Lon=133° 30,066' W Touchdown
24	2014-05-16 20:32:06.826	Lat= 68° 18,340' N Lon=133° 30,016' W Park Position
25	2014-05-16 20:34:50.898	Lat= 68° 18,340' N Lon=133° 30,015' W Deicing off