

ACLOUD Flight #04 – Polar 6 – 170530

Mission PI P6: Heiko Bozem

Objectives: Cloud probing, measurements in the exhaust plume of Polarstern and Aerosol and trace gas vertical profile near Polarstern for intercomparison.

Crew:

| Polar 6 | |
|-----------------|--|
| PI | Heiko Bozem |
| Basis Data Acq. | Daniel Damaske |
| PMS | Emma Järvinen, Christophe Gourbeyre |
| Alabama | Hans Clemen |
| CVI | Stephan Mertes |
| A + TG | Johannes Schneider |
| | |

Flight times:

| Polar 6 | |
|------------|----------|
| Take off | 09:17:54 |
| Touch down | 13:29:39 |

Weather situation as observed during the flight (compare to forecast):

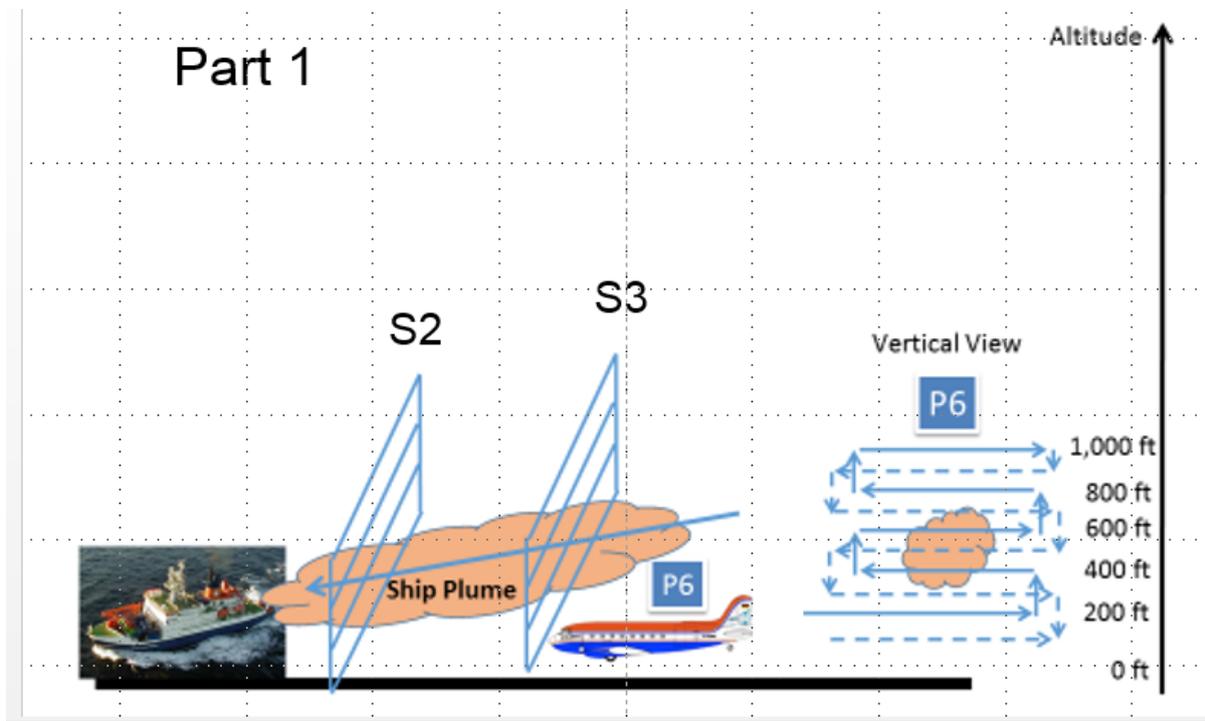
A mix of mid and high level clouds observed as forecasted. Cloud situation on the way to Polarstern: very patchy clouds, thin in vertical and horizontal extend. Cloud layer above 10000 ft. On the way back from Polarstern “haze layer” at 10000 ft. and again patchy clouds below. Mostly cloud free over Longyearbyen.

Overview:

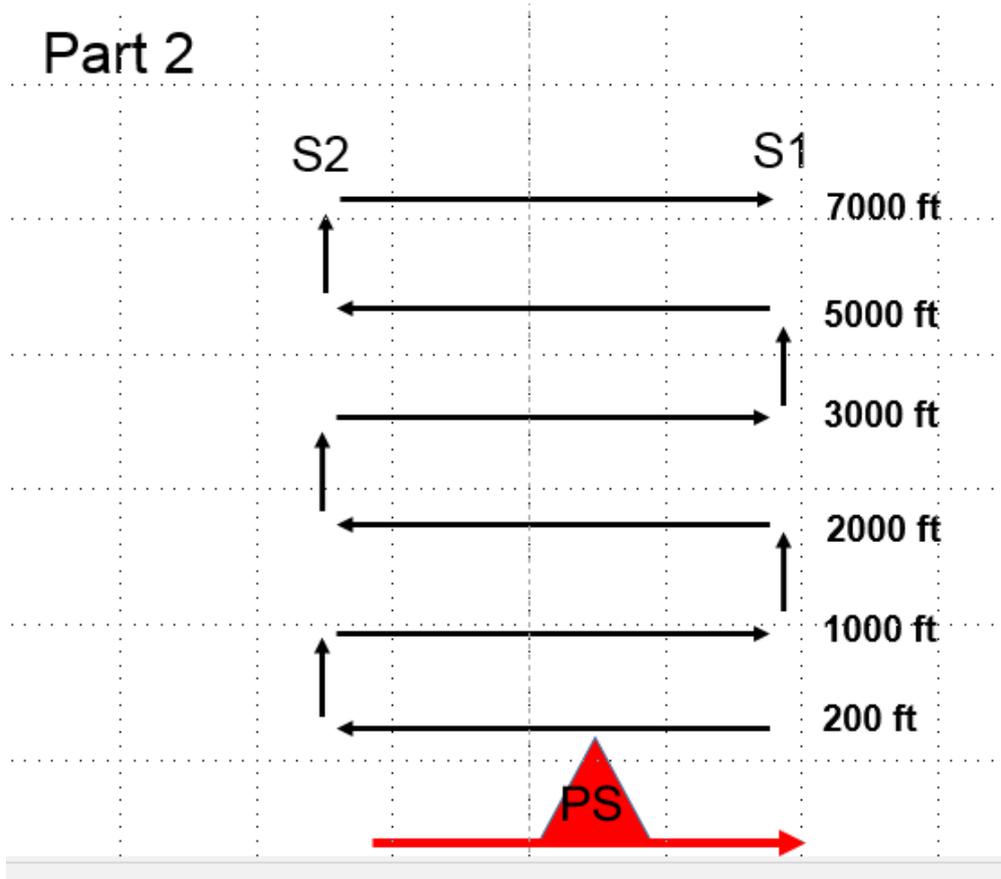
The main objectives of the flight were to probe clouds on the way to Polarstern, then sample the exhaust plume of Polarstern at different horizontal distances behind the ship and afterwards to perform a vertical profile with different levels between 200 and 10000 ft behind the ship (levels: 2000 ft, 3000 ft, 5000 ft, 7000 ft, 10000 ft). The idea for plume sampling was to do a vertical “slice” behind the ship at a distance of ~10 nm for sampling the exhaust. With levels of 200 to 1400 ft with 200 ft altitude steps the vertical extent of the plume should be characterized. A second slice at a distance of 2-3nm behind the ship should help to identify the dispersion of the plume.

The flight pattern worked quite well for the plume and the plume could be identified with the most intensive signals between 400 and 800 ft in altitude. Also the vertical profile nearby Polarstern up to 10000 ft worked well. On the way to Polarstern only midlevel patchy clouds could be observed. With probing the cloud for only a few seconds no proper cloud measurements were possible. On the way back from Polarstern a haze layer containing large ice particles could be probed for 15 min at an altitude of 10000 ft.

Flight track and pattern:



Part 2



Detailed Flight Logs (Heiko Bozem):

9:17:54 Takeoff and ascent to 5000 ft

9:34 fly through fields of patchy clouds at 5000 ft, very thin in horizontal and vertical extent.
Cloud layer above at an altitude > 12000 ft



9:41 29 min to Polarstern. Weather at Polarstern: good visibility and wind from 030°, 10 kt.

9:54 still flight at 5000 ft through thin patchy cloud field not well suited for probing.

10:04 start descent to to Polarstern
10:11 cloud crossing at 2500 ft
10:16 start of "slice" pattern 5nm behind the ship at 200 ft
10:18 CPC signal of ship plume
10:21 next level at 400 ft
10:22 CPC signal of ship plume
10:25 next level 600 ft
10:27 CPC and SP2 plume signal
10:29 next level 800 ft
10:31 CPC peak
10:32 second CPC peak
10:35 next level 1000 ft
10:37 CPC peak
10:39 CPC peak
10:40 next level 1200 ft
10:43 CPC peak
10:44 CPC peak
10:46 next level 1400 ft
10:49 CPC peak
10:51 CPC peak
10:58 circles to wait for radio sonde on Polarstern to be launched
11:05 next slice 3nm behind ship starting at 200 ft
11:07 CPC peak
11:12 CPC peak at 400 ft
11:13 second CPC peak but not as large as first one
11:17 CPC peak at 600 ft
11:20 CPC peak at 800 ft
11:26 CPC peak at 1000 ft
11:32 CPC peak at 1200 ft
11:40 approach of Polarstern from behind within the plume
11:57 start of vertical profile at different layers behind the ship
12:01 start first leg at 2000 ft
12:06 turn and ascent for next leg at 3000 ft
12:10 turn and ascent for next for leg at 5000 ft
12:16 turn and ascent for next for leg at 7000 ft
12:23 turn and ascent for next for leg at 10000 ft
12:28 finished vertical profile and heading back to LYR
12:36 entering haze layer at 10000 ft, large ice particles within cloud

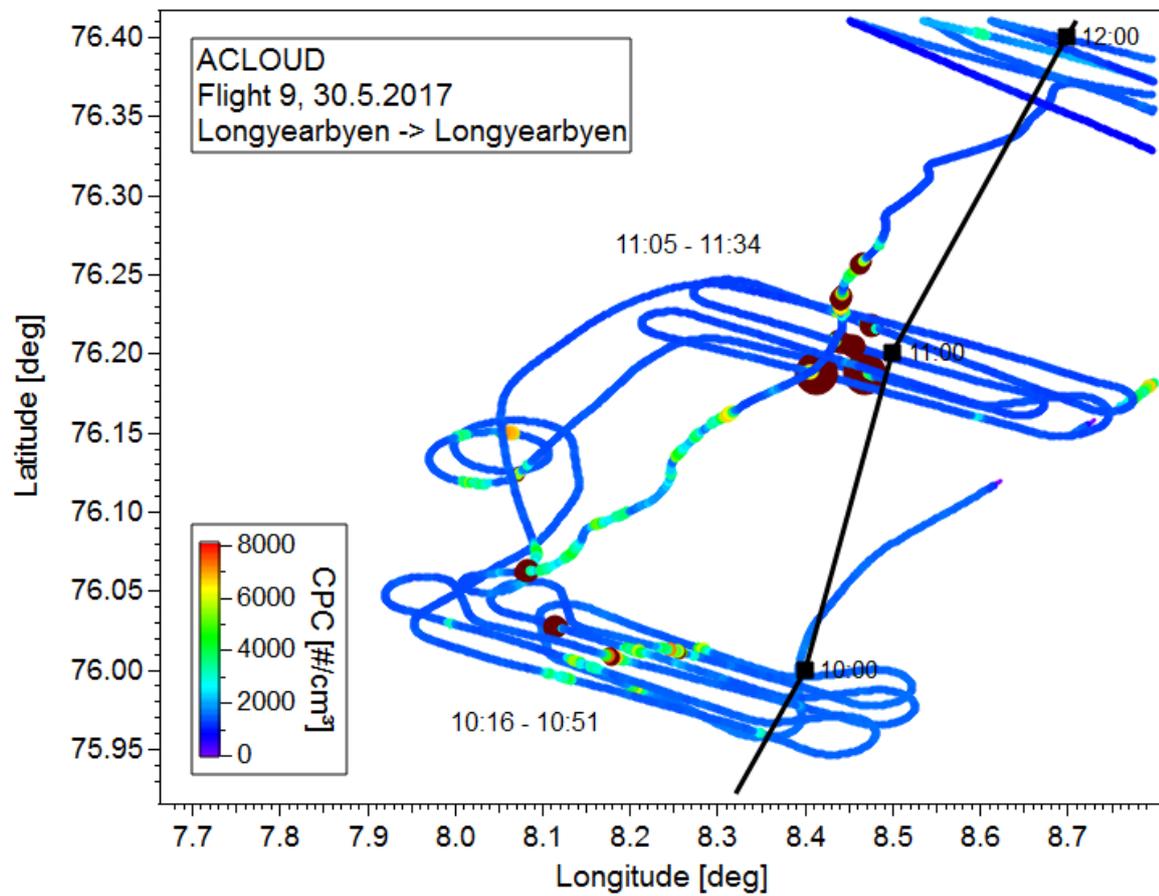


- 12:44 41 min to LYR haze layer gets thinner and flight in and out of layer
- 12:58 exiting cloud layer
- 13:01 thin cloud for 1 min
- 13:10 descent for final approach
- 13:29:39 Tuchdown

Instrument Status:

| Polar 6 | |
|------------------------|---------------|
| Basis data acquisition | |
| Nose Boom | |
| PHIPS | |
| SID-3 | |
| CIP | |
| PIP | |
| CDP | Not installed |
| ALABAMA | |
| CVI | |
| CVI UHSAS | |
| CVI ??? | |
| AWI SP2 | |
| AWI UHSAS | |
| CO/CO2/O3 | |

Quicklooks:



Plot with the Polarstern plume encounters. Colour code overlaying the flight track shows CPC data.

