

## ACLOUD Flight #24 – Polar 5 – 170626

Mission PI P5: Christof Lüpkes

### Objectives:

The main goal of the flight was a study of the boundary layer structure and energy fluxes north from Svalbard during warm air advection. The focus was on the profiles of vertical fluxes of heat, humidity, momentum.

### Crew:

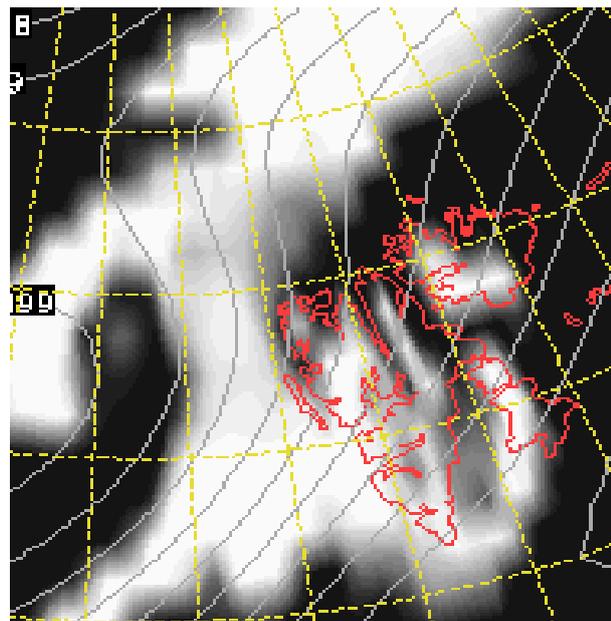
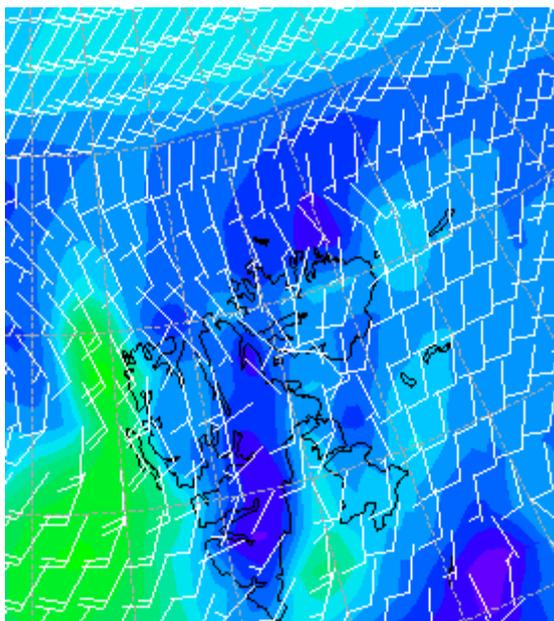
Polar 5	
PI	Christof Lüpkes
Basis Data Acq.	Lukas Kandora
SMART	Elena Ruiz Donoso
Eagle/Hawk	Tobias Donth
MiRAC	Ana Radovan
AMALi	Pavel Krobot

### Flight times:

Polar 5	
Take off	12:34 GMT
Touch down	15:17 GMT

### Predicted Weather Situation:

GFS predicted winds from south to southeast in the measurement region north of Svalbard. Low clouds were predicted over, west and north of Svalbard with a small, almost cloud free part in the measurement region. This situation agreed very well with the situation observed.

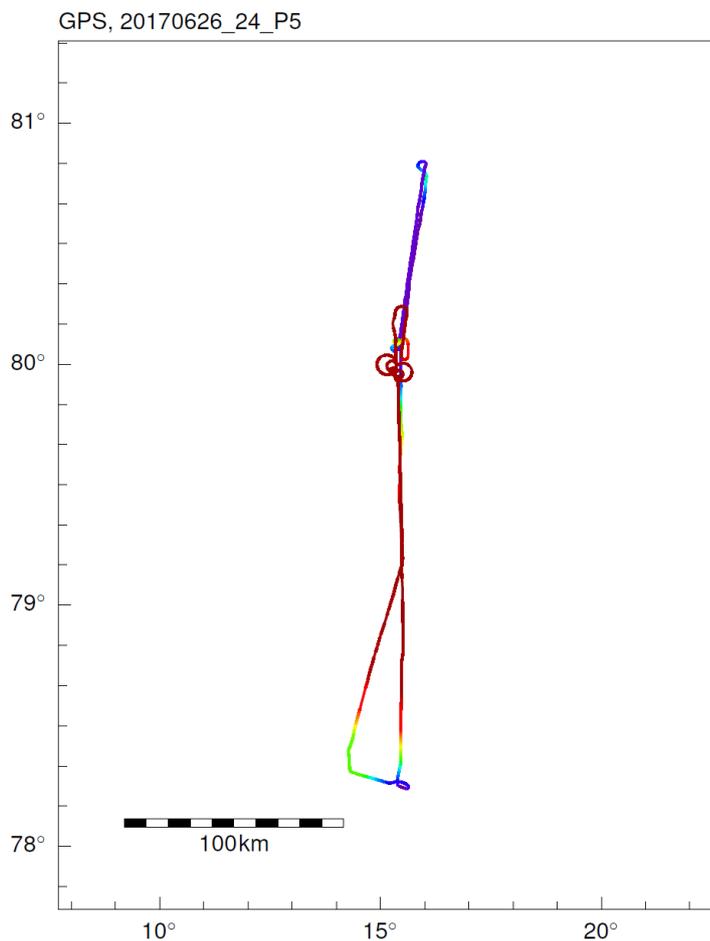


## Overview:

The main idea of this flight was to go once more in the same region as on the day before (25<sup>th</sup> June) to investigate the change in boundary layer properties. Due to restricted remaining flight time another flight pattern was performed. This time, only two legs were flown by Polar 5 and 5 and also closely collocated with a horizontal distance of 2000 ft and a vertical distance of 100 ft.

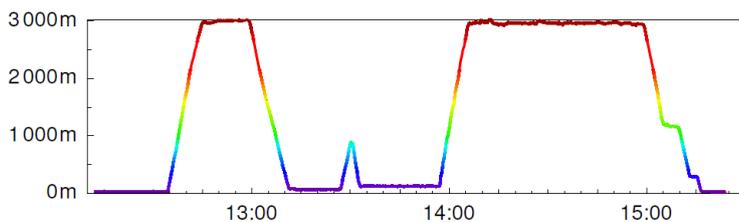
It was found that the boundary layer was indeed higher on this day reaching about 120 m in a region where it seemed to be surface based on the day before. Still +7°C was found in 400 m height, so that the elevated ABL was probably due to an increase in wind speed.

## Flight track and pattern:



Flight track flown with Polar 5 and Polar 6. The ABL measurements were obtained in the region north of 80° flying with Polar 5 in the levels 200 ft on the way towards north and in 400 ft on the way back to south. Polar 6 did the same tracks, but in 300 ft and 500 ft.

At the end of this pattern Polar 5 flew a calibration for the AIMMS20 at a height of 10.000 ft (circles at about 80°N).



## Detailed Flight Logs:

### Clouds

As the day before, over the southern part of Svalbard, there was a closed layer with low clouds leading to slight precipitation in Longyearbyen and in Ny Alesund. The cloud cover reached further north than on the day before and during descend we found the clouds between about 1700 and 2100 ft.



Also Cirrus clouds and high stratus was present as shown here on a photo taken during descend after crossing the northern coast of Svalbard.



However, on the further way north these clouds disappeared.



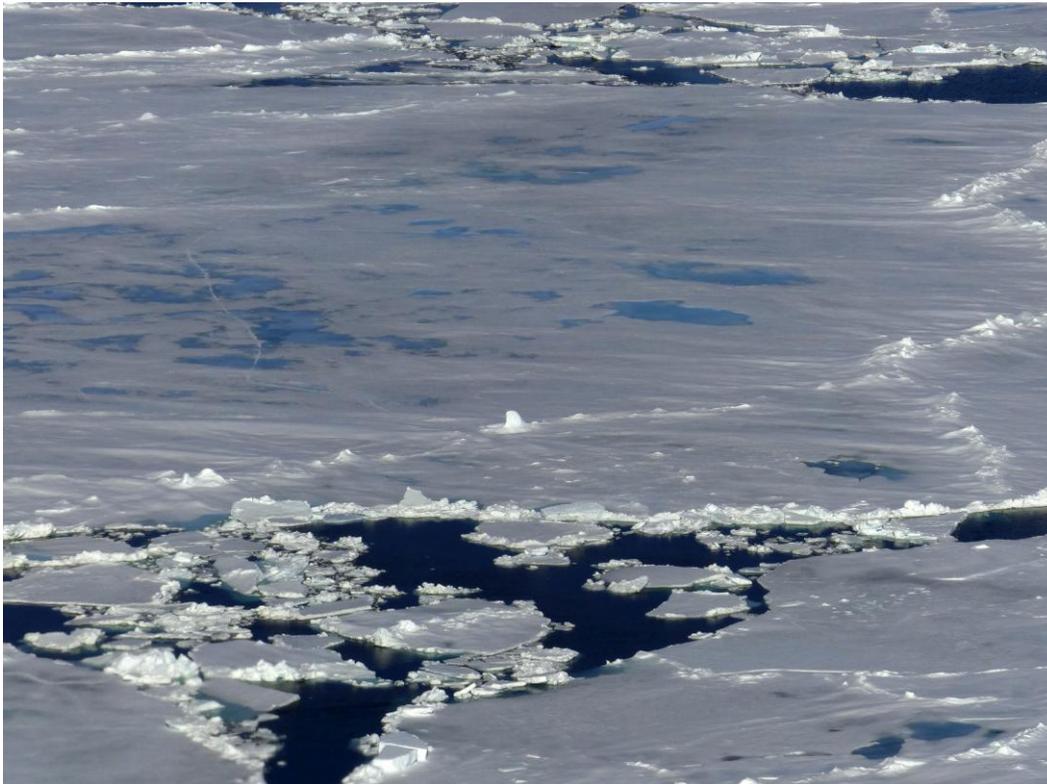
Later- while approaching the end of the northbound leg - the cloud cover (mid level clouds) increased. We did not reach them in 3000 ft (top of the temp).

### Sea ice conditions



The typical sea ice cover is shown in the foto above taken on the southbound leg.

Our impression was that the melt pond cover has now increased. Examples of melt ponds are shown in the foto below.



**Detailed notes during the flight, heights of flight legs:**

In the cloud layer we noticed turbulence. The turbulence was also clearly felt in the lowest levels approaching the starting point of the low-level leg at 80° 3’N and 15° 24’E. Going further to the north the turbulence decreased but was still more dominant than during all flight legs on 25<sup>th</sup> June.

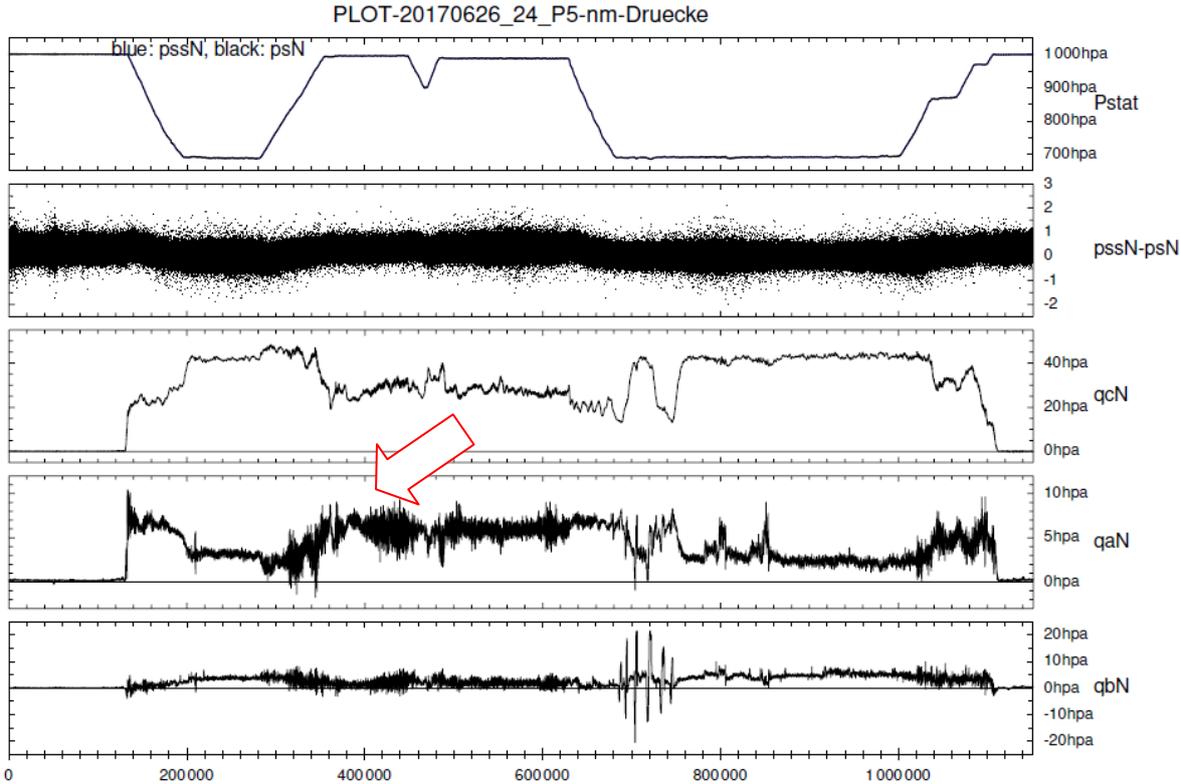
**Maneuvers**

A detailed pattern has been flown for the AIMMS20 calibration.

**Instrument Status:**

<b>Polar 5</b>	
Basis data acquisition	
Nose Boom	
MiRAC	
HATPRO	
AMALi	
SMART	
Eagle/Hawk	
Drop Sondes	

**Quicklooks:**



The above Figure shows dynamic and static pressure measured by the noseboom. The measurements confirm the inhomogeneity of turbulence on the first northbound low-level leg (marked by red arrow).