

## ACLOUD Flight #22 – Polar 5 – 170623

**Mission PI:** Manfred Wendisch

**Objectives:** Flight over and in the vicinity of Ny Ålesund, dedicated to the columnar comparison over Ny Ålesund . P5 would probe the clouds from above, whereby P6 would collect in situ measurements.

**Crew:**

Polar 5	
PI	Manfred Wendisch
Basis Data Acq.	Lukas Kandora
SMART	Johannes Stapf
Eagle/Hawk	Elena Ruiz
Mirac	Pavel Krobot
Amali	Marek Jacob

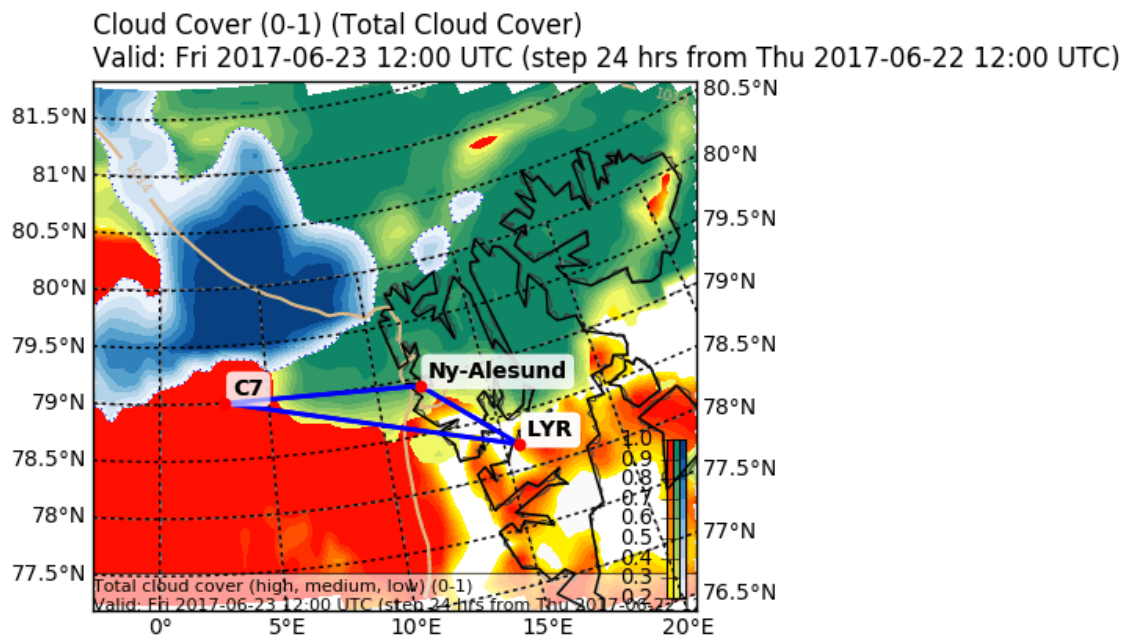
**Flight times:**

Polar 5	
Take off	10:57 UTC
Touch down	14:39 UTC

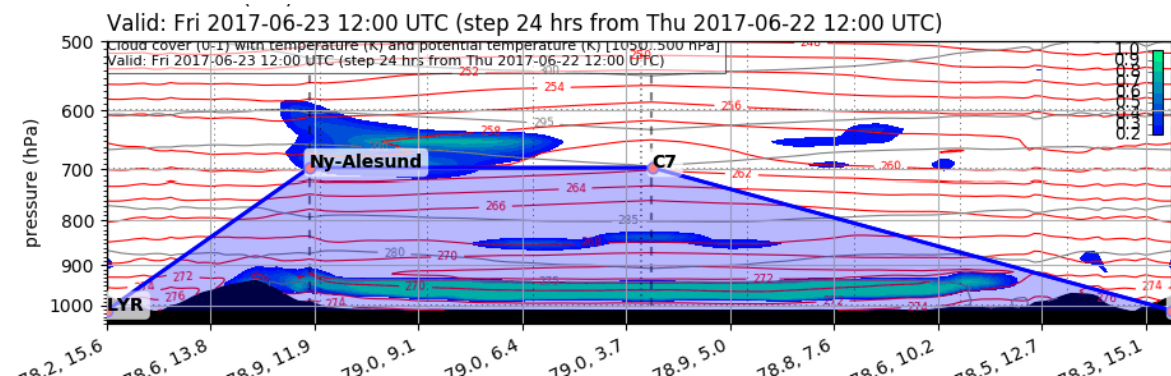
## Weather situation as observed during the flight (compare to forecast)

Mid-level and low-level clouds were encountered during the flight. In the first half of the flight P5 flew in between, then it ascended to 14,500 feet to be above all the clouds (no cirrus above). The observed clouds were almost exactly the same as predicted by ECMWF, see below.

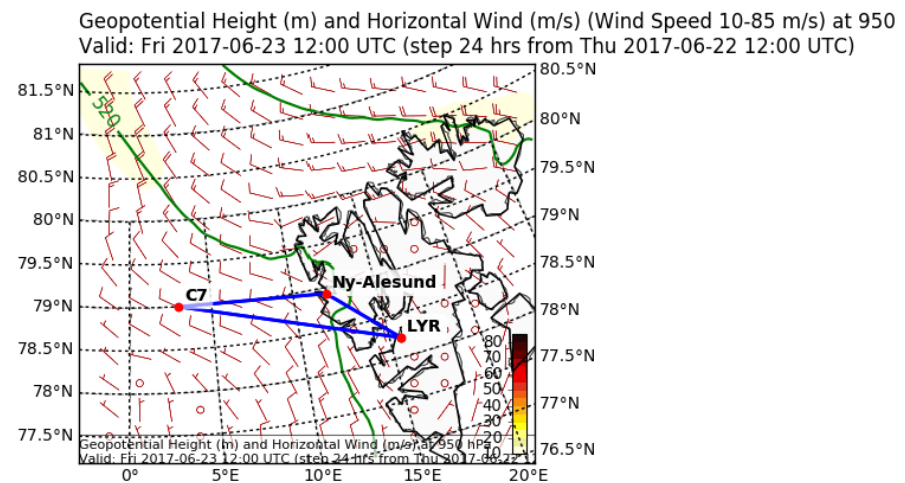
### ECMW prediction of clouds—horizontal



### ECMW prediction of clouds—vertical



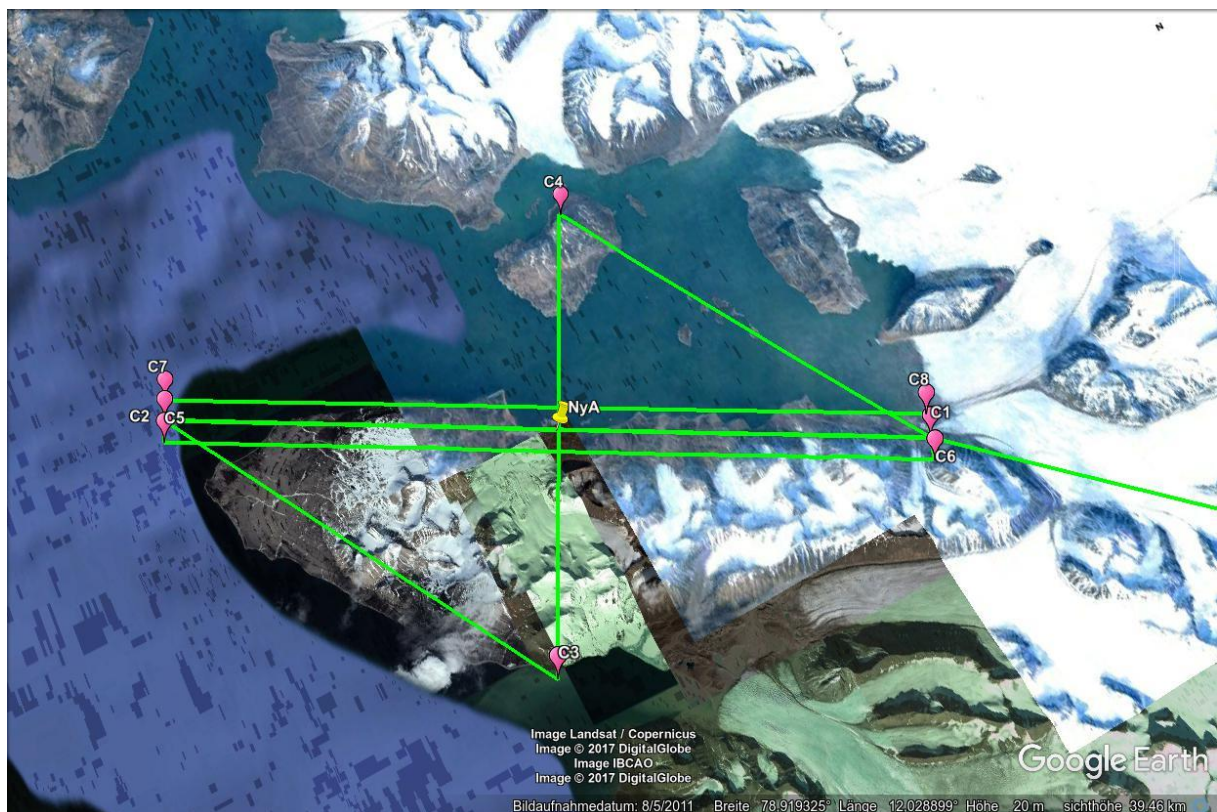
### ECMW prediction of wind 950 hPa



## Overview of flight

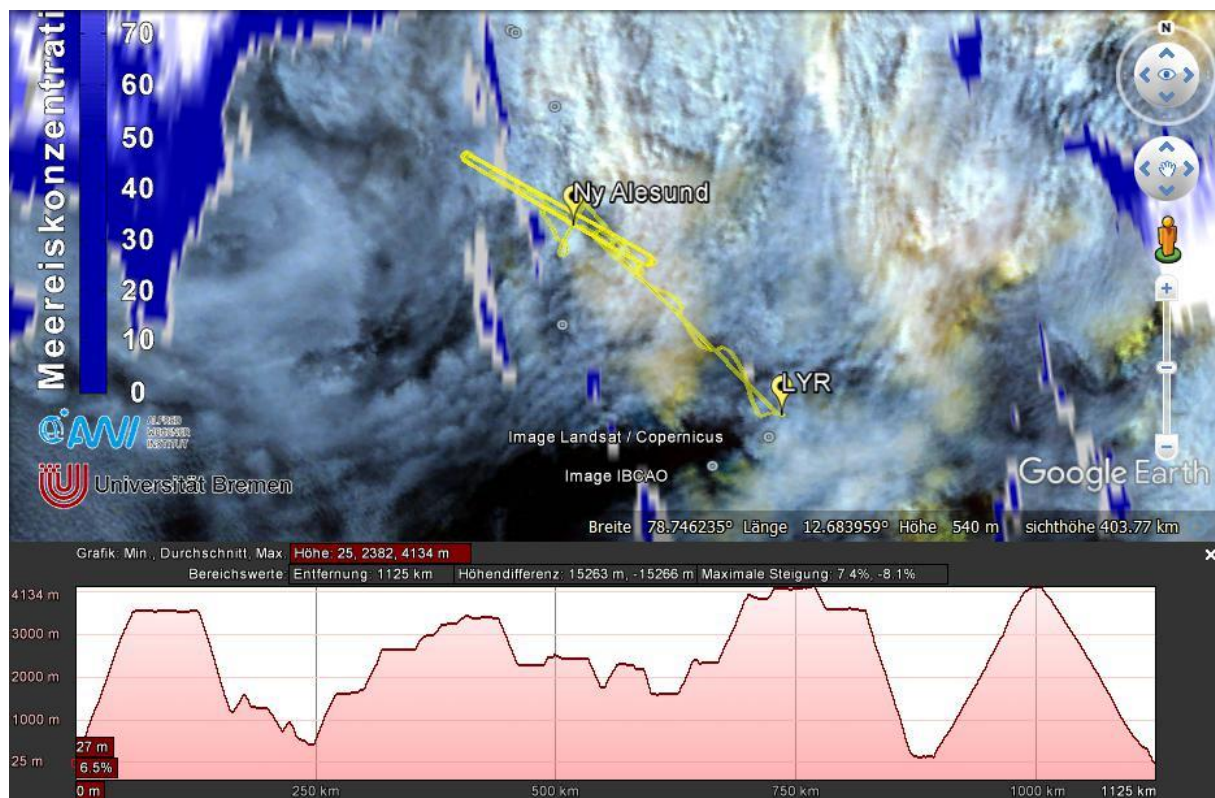
### Waypoints:

C1: 78° 51.463' N, 12° 29.979' E  
C2: 78° 59.624' N, 11° 18.129' E  
C3: 78° 50.973' N, 11° 43.244' E  
C4: 78° 59.708' N, 12° 7.988' E  
C5: 78° 59.180' N, 11° 17.155' E  
C6: 78° 50.999' N, 12° 28.795' E  
C7: 79° 00.023' N, 11° 19.019' E  
C8: 78° 51.919' N, 12° 31.090' E

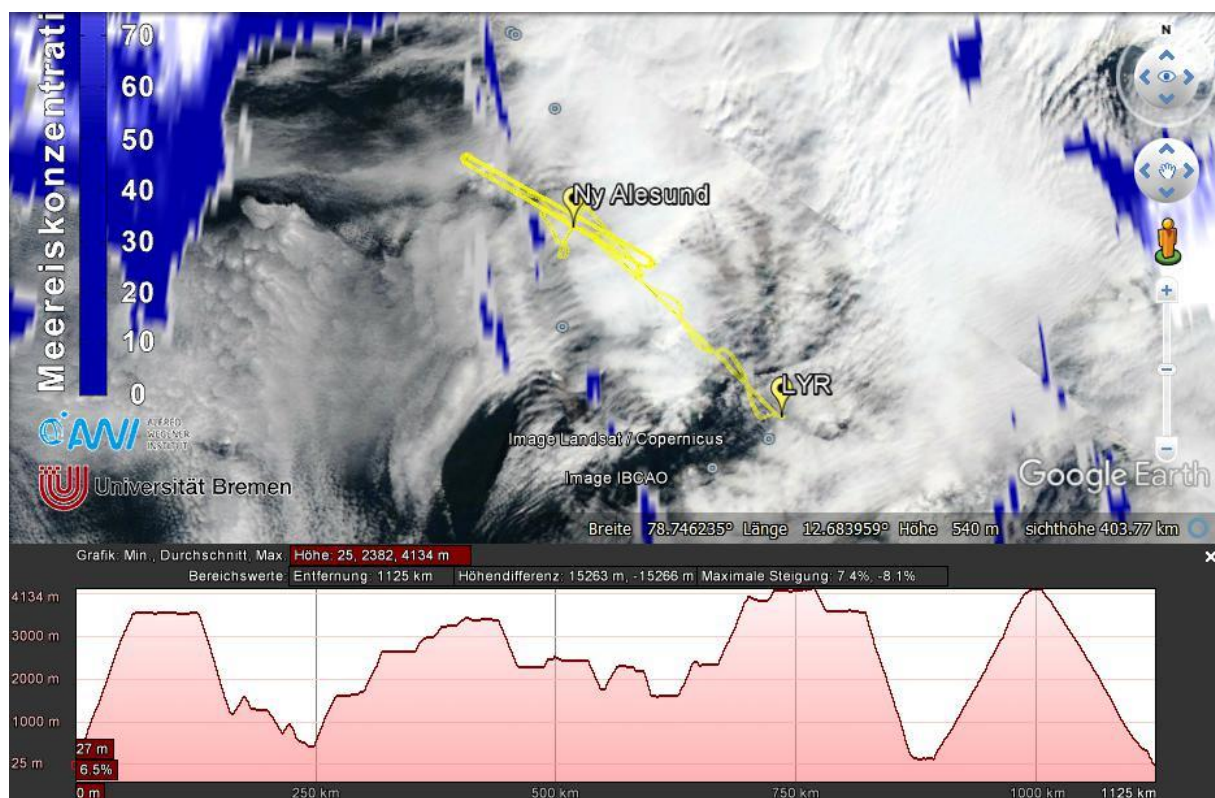


Clouds were very thin, barely visible on the high resolution Modis picture.





Modis, RGB



Aqua, 250 m resolution

## Detailed Flight Log (all times in UTC)

LYR—C1

51 NM @FS 30 min

10:35 Motor on

Some issues with SMART level stabilization, solved

10:54 Taxi

10:57 Take off

Scattered clouds, we climb to 10,000 ft in the direction of C1, low- and mid-level clouds all over the place

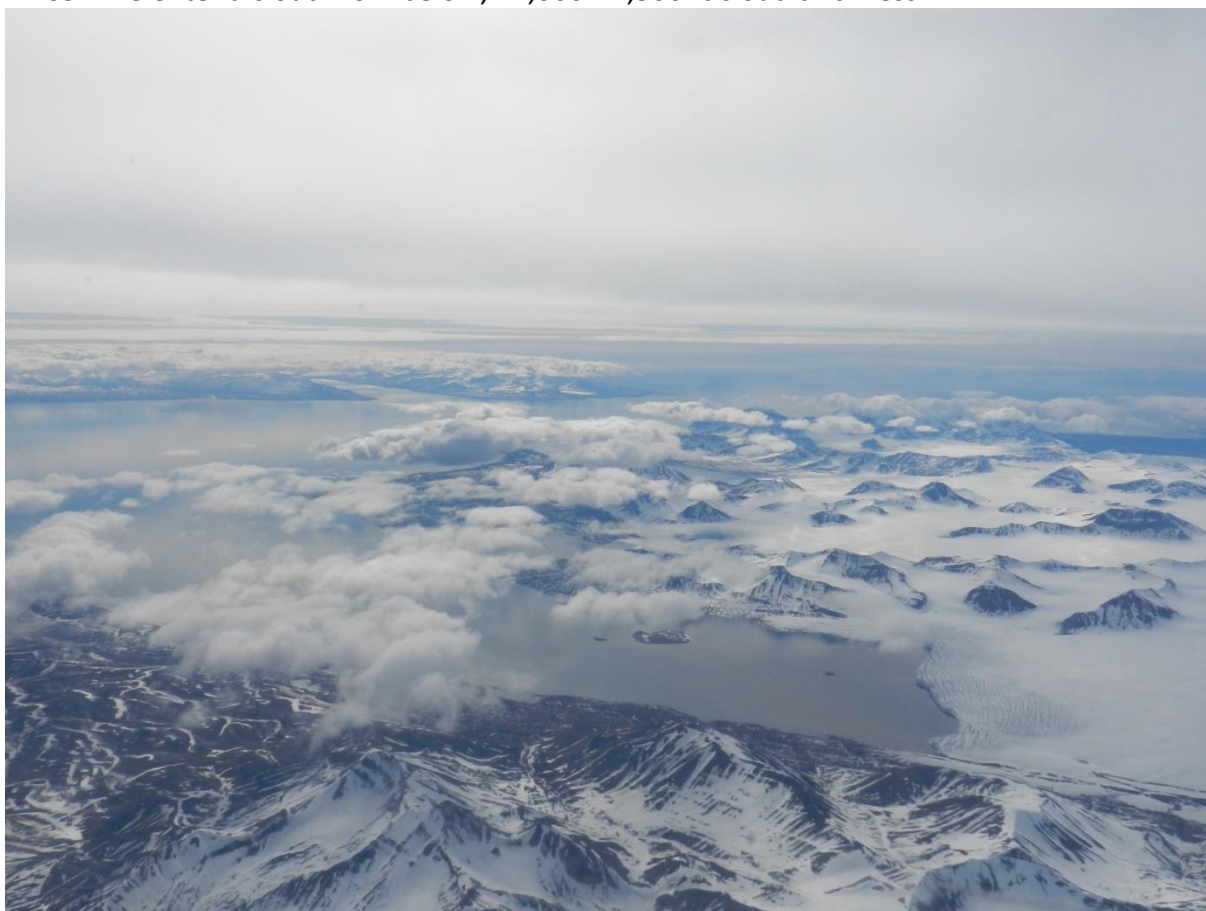
11:03 5300 ft

11:04 7000 ft

11:08 9500 ft, lidar switched on

11:09 11,000 ft

11:09 We enter a cloud from below, 11,000-12,500 ft cloud thickness



11:11 Arrival at 12,000 ft, above cloud top, nearly no cloud above, just patches of cirrus



11:19 We reach C1

**Cross pattern over Ny Ålesund:**

<u>C1-C2</u>	<u>16 NM</u>	<u>8 min</u>
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11:19 We climb to 12,300 ft for the radar, to reach sufficient distance to cloud top, nice cloud below

11:22 We are just above Ny Ålesund

11:26 We reach C2, nice cloud below, almost nothing above, just some ci patches





C2-C3 10 NM 5 min

11:28 Only little patches of ci above

11:31 We go a little higher to 12,500 ft for the radar, we start taking oxygen

11:32 Arrive at C3

C3-C4 10 NM 5 min

11:32-11:37 C3 → C4 12,500 ft no clouds above, nice clouds below

C4-C5 10 NM 8 min

11:38-11:44 C4 → C5 12,500 ft no clouds above, nice clouds below

11:40 We drop a sonde **DS1** (over land, accidentally)

## Long legs pattern (three times)

---1<sup>st</sup> time

C5-C6 **40 NM** **20 min**

11:48-14:07 C5 → C6 12,500 ft no clouds above, nice clouds below



12:00 clouds above us

12:01 DS2 just before we reach C6

C6-C7 **1.5 NM** **2 min**

Curve

C7-C8 **40 NM** **20 min**

12:07-12:27 C7 → C8 12,500 ft partly clouds above, nice clouds below,  
Most of the track is below a cloud, some parts (12:21) nothing above, perfect  
conditions (cloudless above) between 12:21-12:25.

C8-C5 **1.5 NM** **2 min**

12:27 turn to next leg (slightly shifted to the sea)



---2<sup>nd</sup> time

C5-C6

40 NM

20 min

12:28-12:48 C5 → C6 12,500 ft

First part ideal, nothing above, nice cloud below

Second part (starting 12:33) high-level cloud above, nice cloud below, we are in the middle of the two



Turbulent in between the two clouds, lower clouds partly just patchy

We decide, for the next leg to go above cloud

12:41 Just before C6 we drop dropsonde **DS3**

C6-C7

1.5 NM

2 min

We climb to 14,300 ft (all take oxygen), before we switch off the lidar, we are now above all clouds, nothing above

12:49-12:51 We are inside the cloud, 3700-4000 m base and top of cloud

C7-C8

40 NM

20 min

12:51-13:06 C7 → C8 14,300 ft

We are above all clouds now.



P6 suggest by radio to have a third pair of long legs, we happily agree!  
 The radar people summarize the two clouds layers below us as:  
     1<sup>st</sup> cloud: 1500-3000 m  
     2<sup>nd</sup> cloud: 3500-4200 m above ground

<u>C8-C5</u>	<b>1.5 NM</b>	<b>2 min</b>
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Turn, at 14,400 ft

---**3<sup>rd</sup> time**

<u>C5-C6</u>	<b>40 NM</b>	<b>20 min</b>
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13:08-13:27    C5 → C6        14,400 ft  
                   No clouds above, all clouds below



13:25      Radar works great, we are always 200 m above the cloud for the radar  
**DS4** released  
 It is incredible how ECMWF has predicted the actually observed mid-level and low-level clouds

<u>C6-C7</u>	<u>1.5 NM</u>	<u>2 min</u>
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13:28-13:29    C6 → C7      14,500 ft

<u>C7-C8</u>	<u>40 NM</u>	<u>20 min</u>
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13:29-13:44    C7 → C8      14,500 ft  
 Impressive glory, almost all of the leg, two rings



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**C8-C7** **40 NM** **20 min**

13:46-14:03 C8 → C7 descend from 14,500 ft → 200 ft  
First cloud from 4100 m to 3650 m  
Below this cloud it is kind of hazy, patchy clouds  
Second cloud from 4900 ft to 3500 ft, very thin, similar to haze  
Lowest level at 200 ft  
We stay at 200-300 ft for a couple of minutes

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**C7—LYR** **45 NM @fs** **30 min**

14:10 Overflight Ny Ålesund at 500 ft  
14:15-14:30 Several glaciers





14:39	Landing
14:42	End taxi
14:55	Motors off

## Instrument Status

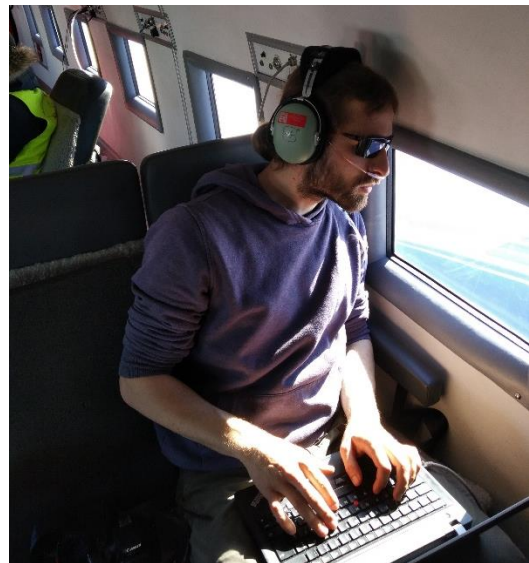
Polar 5	
Basis data acquisition	
Nose Boom	
MiRAC	
HATPRO	
AMALi	
SMART	
Eagle/Hawk	
Sun Photometer	
Drop Sondes	4 launched

## Comments

- Thanks to the whole crew!



Elena und Lukas



Johannes



Pavel and Marek

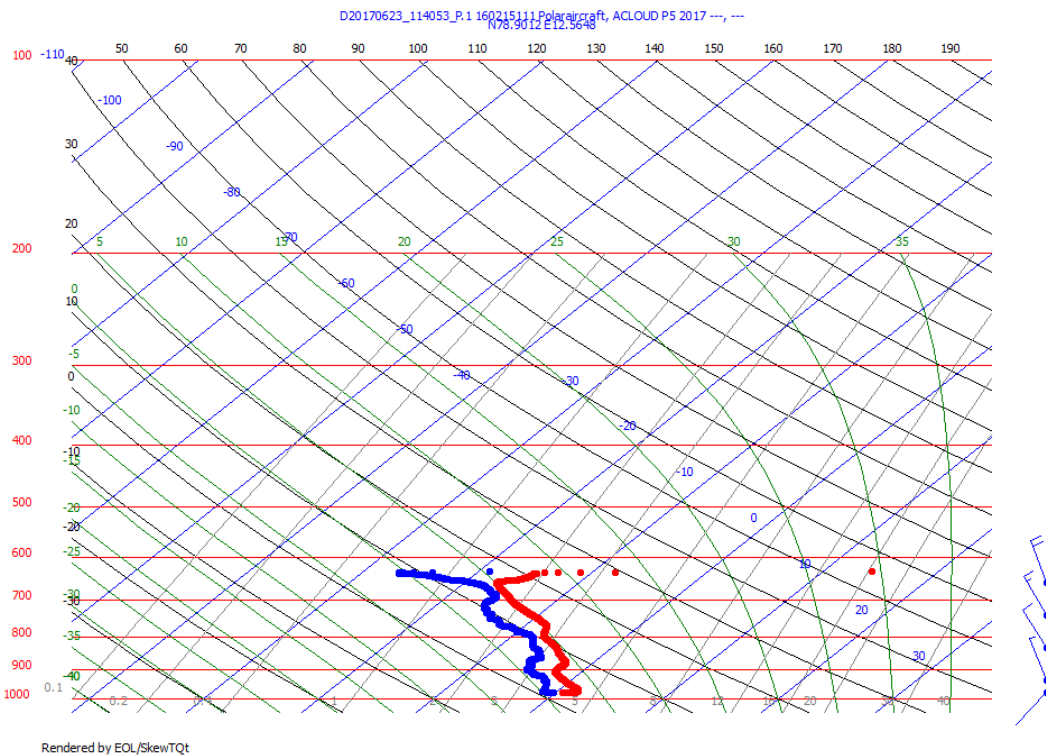


Our awesome pilots: Wil and Aaron

## Quicklooks

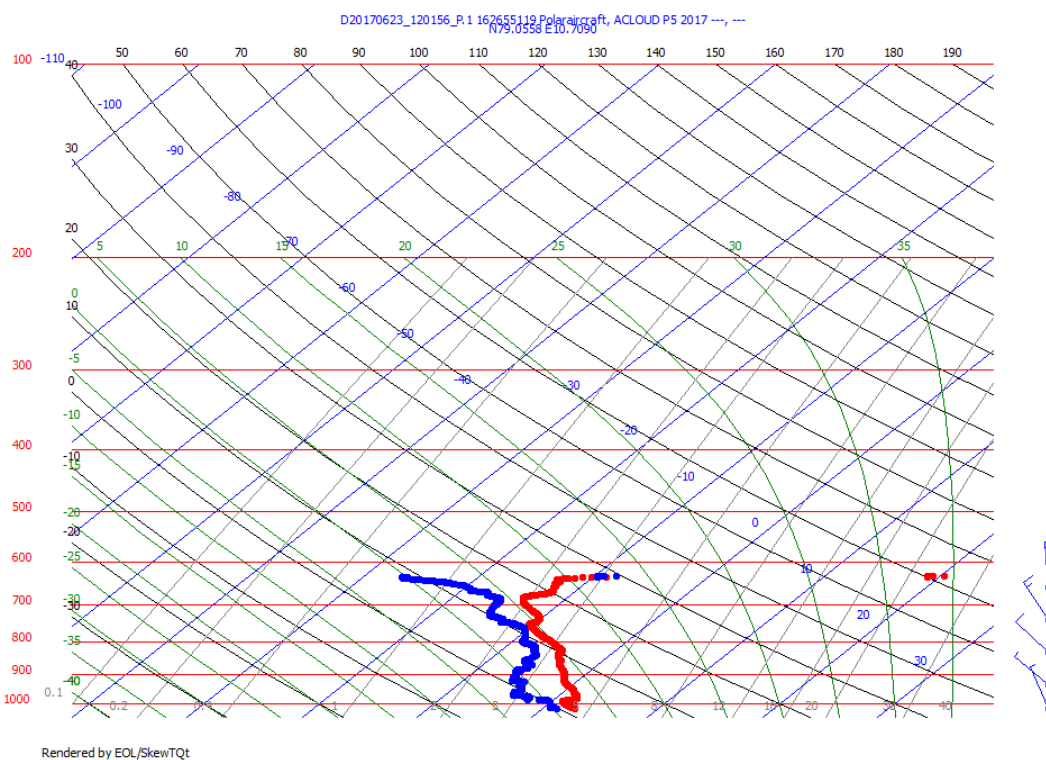
### Drop Sondes

First dropsonde (DS1): 11:40 UTC



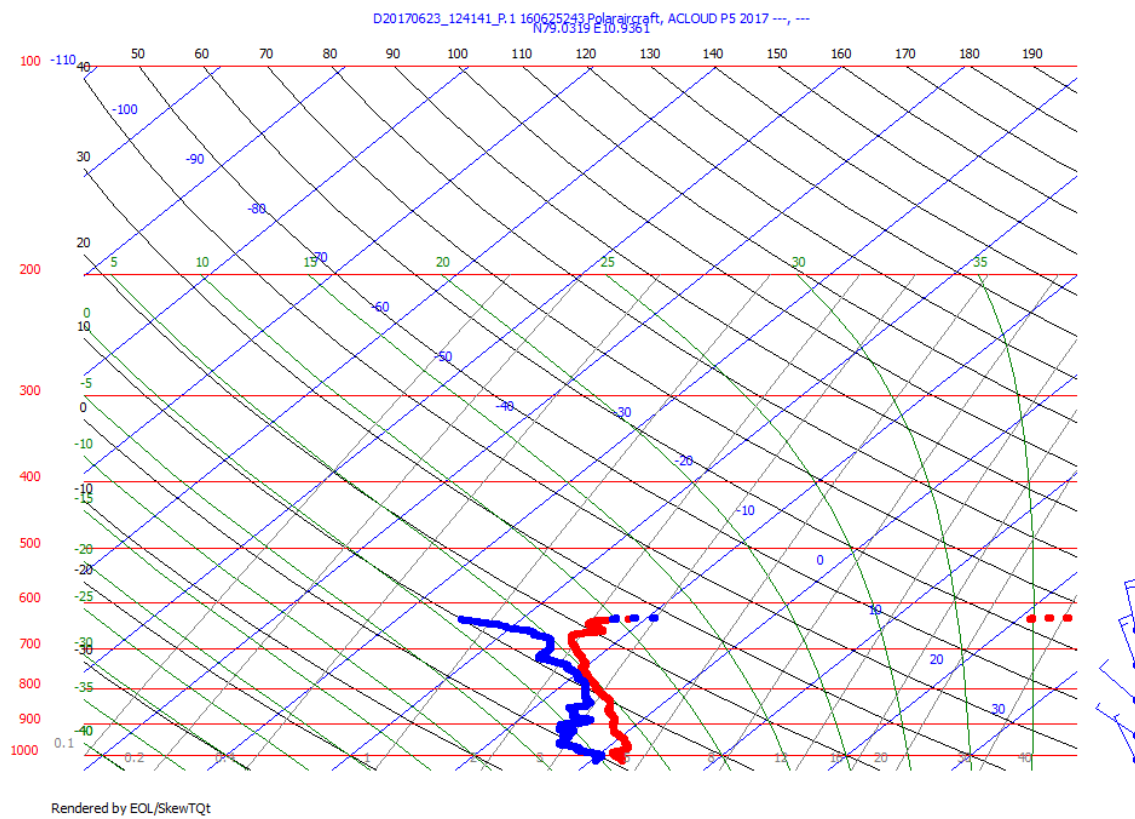
Second

dropsonde (DS2): 12:01 UTC

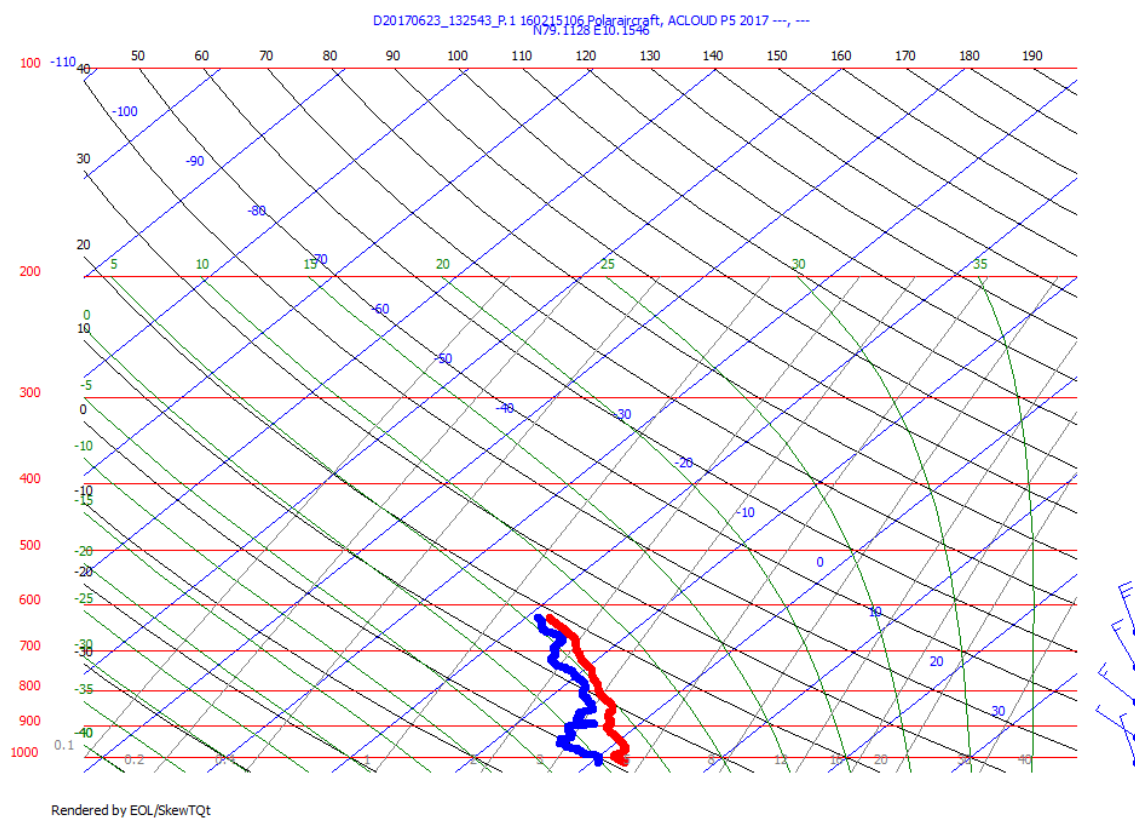




### Third dropsonde (DS3): 12:41 UTC



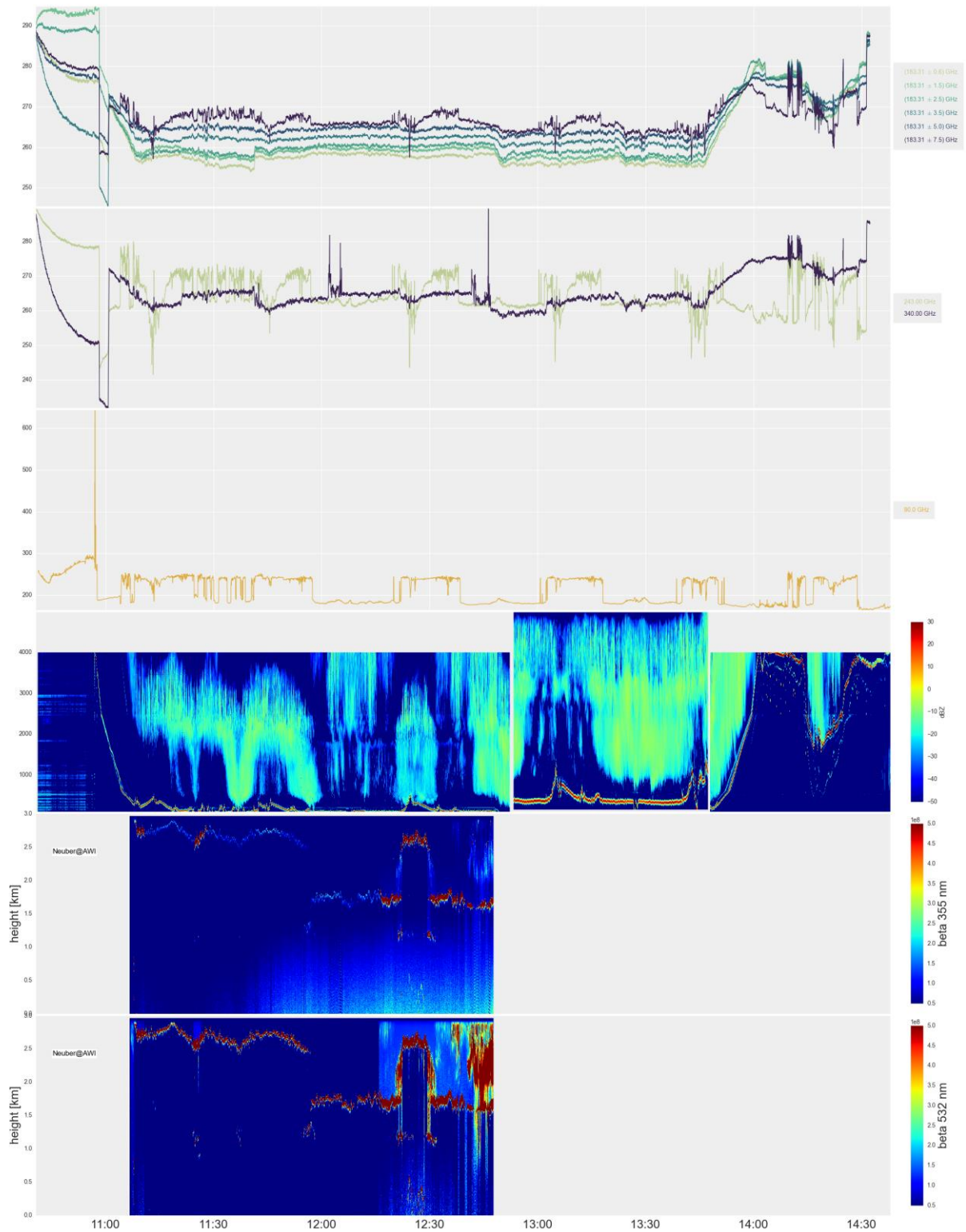
### Fourth dropsonde (DS4): 13:25 UTC



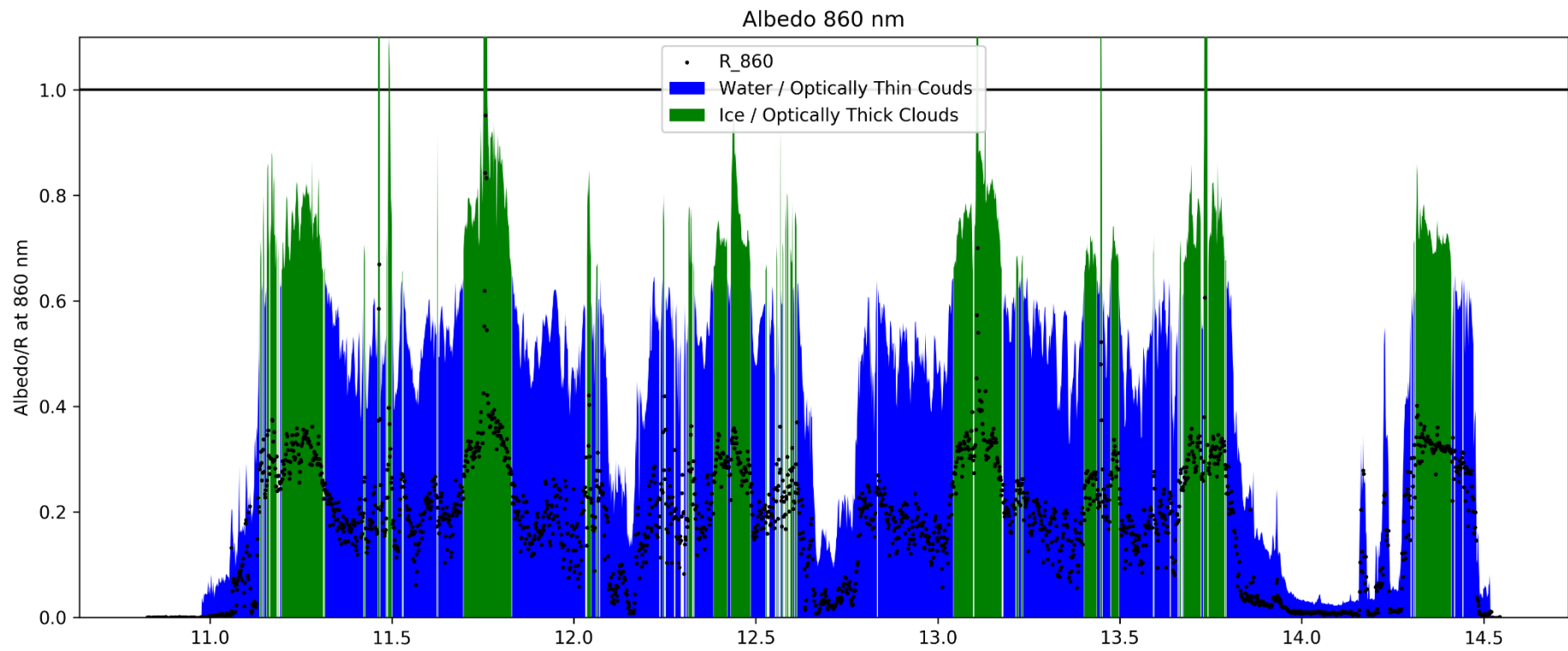


# MIRAC & AMALI

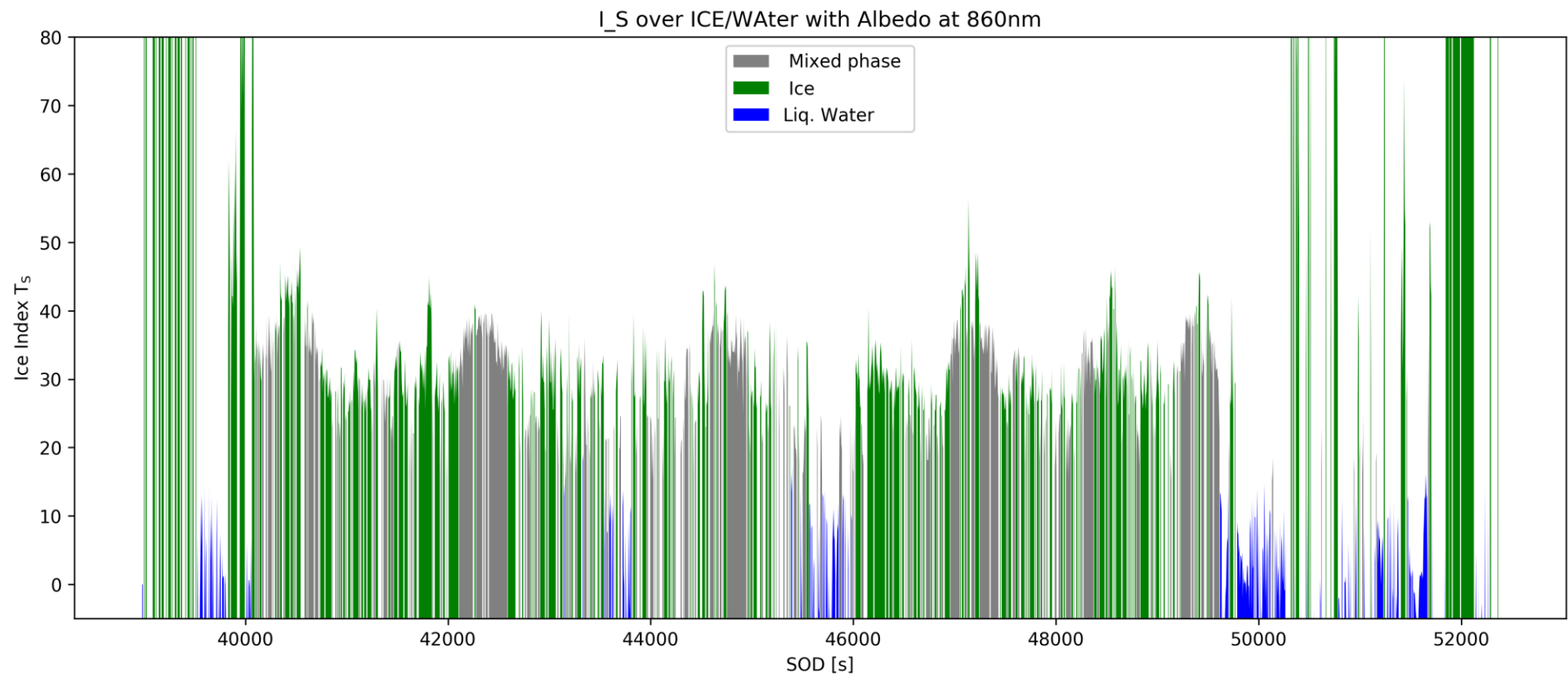
23.06.2017



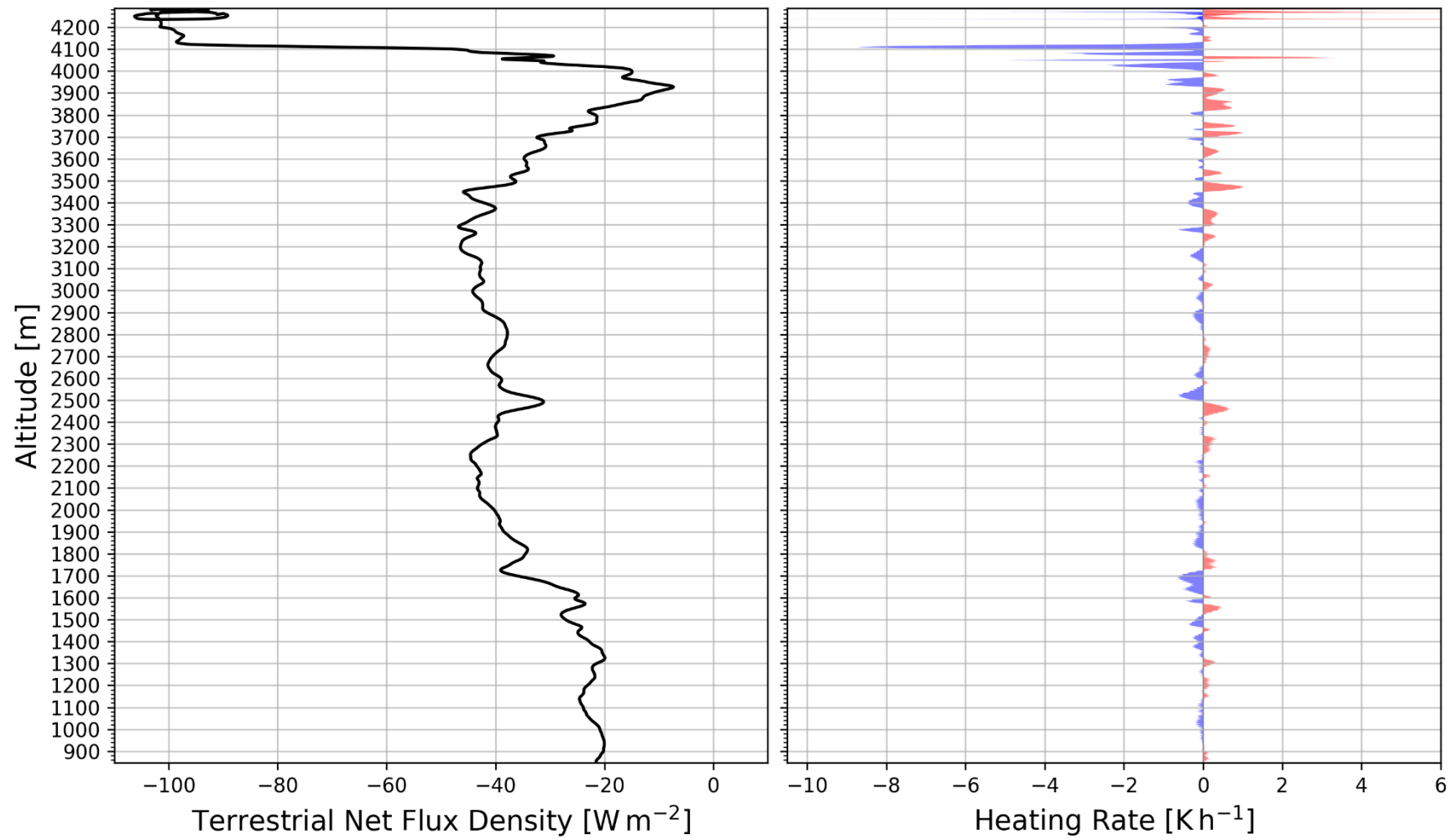
SMART



SMART



**SMART** (descend from 14,500 ft to 200 ft through cloud at 13:46-14:03)





EAGLE

