

ACLOUD Flight #13 – Polar 5 – 170605

Mission PI: Manfred Wendisch

Objectives: Collect data for remote sensing of different clouds above sea ice. Collocate flight jointly with P6 (in-cloud profile measurements) and the balloon at the ice camp near PS. Perform measurements over PS.

Crew:

| Polar 5 | |
|-----------------|--------------------|
| PI | Manfred Wendisch |
| Basis Data Acq. | Christoph Petersen |
| SMART | Michael Schäfer |
| Eagle/Hawk | Elena Ruiz |
| MiRAC | Mario Mech |
| AMALi | Tobias Doktorowski |
| | |

Flight times:

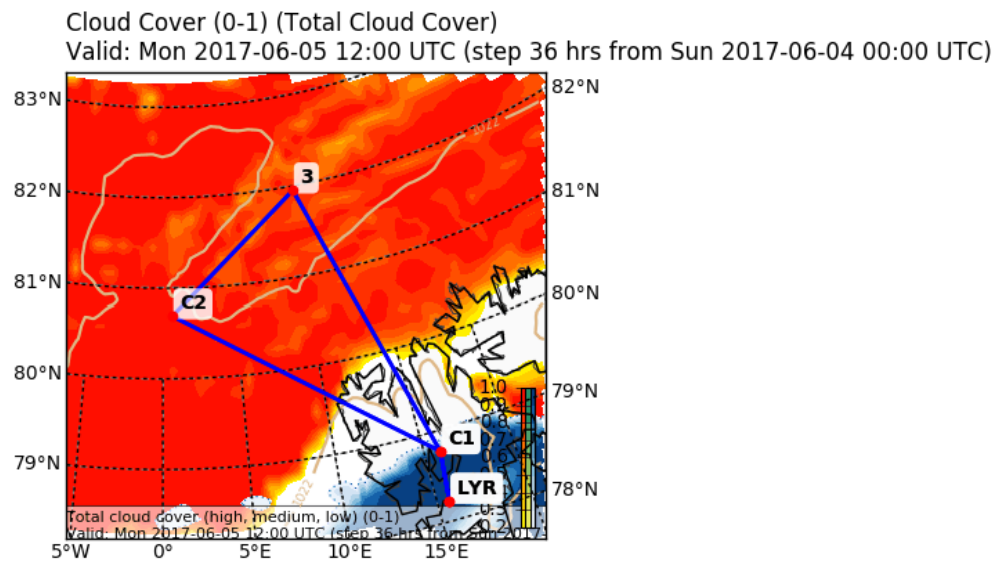
| Polar 5 | |
|------------|-----------|
| Take off | 10:48 UTC |
| Touch down | 14:59 UTC |

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

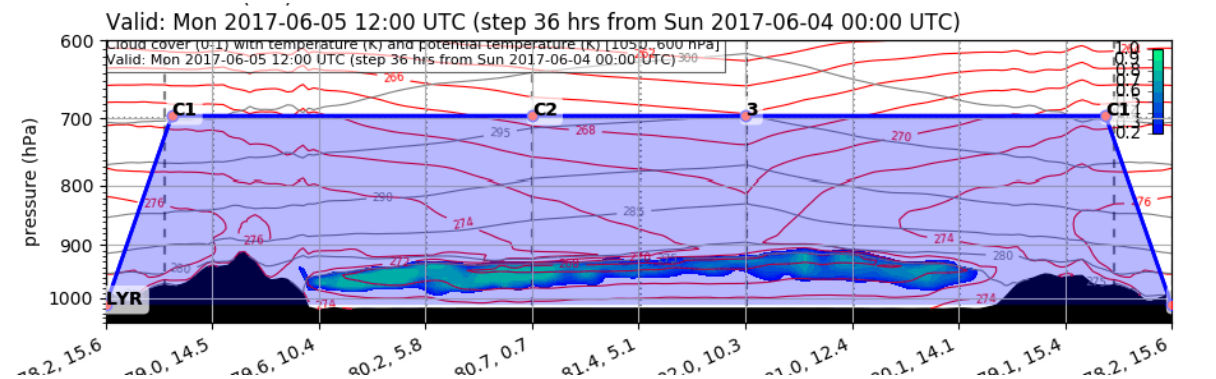
The original plan was to meet CLOUDSAT and to perform a coordinated flight jointly with P6 and the tethered balloon close to Polarstern. However, the cloud base in LYR was way too low to take off on time. Therefore, we had to postpone the take-off several times and missed the satellite overpass. As a consequence, we have shortened the flight path. We basically flew north to Polarstern, sampled there, and returned to LYR.

Over the island, scattered clouds in lower levels and some cirrus (not much) were observed. Over the sea ice a persistent low-level cloud deck was detected with different levels of horizontal heterogeneity. Only few cirrus was observed over most of the flight. Both features were well predicted by the ECMWF cloud forecast, see figures below.

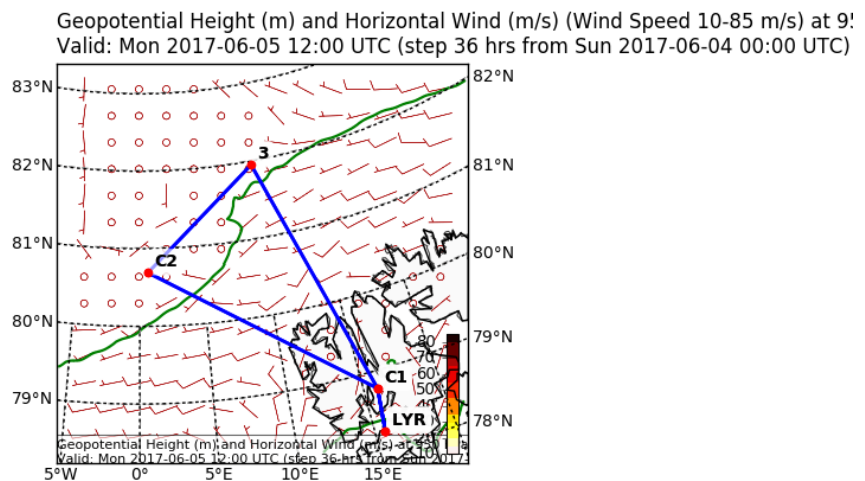
ECMW prediction of clouds—horizontal



ECMW prediction of clouds—vertical



ECMW prediction of wind 950 hPa

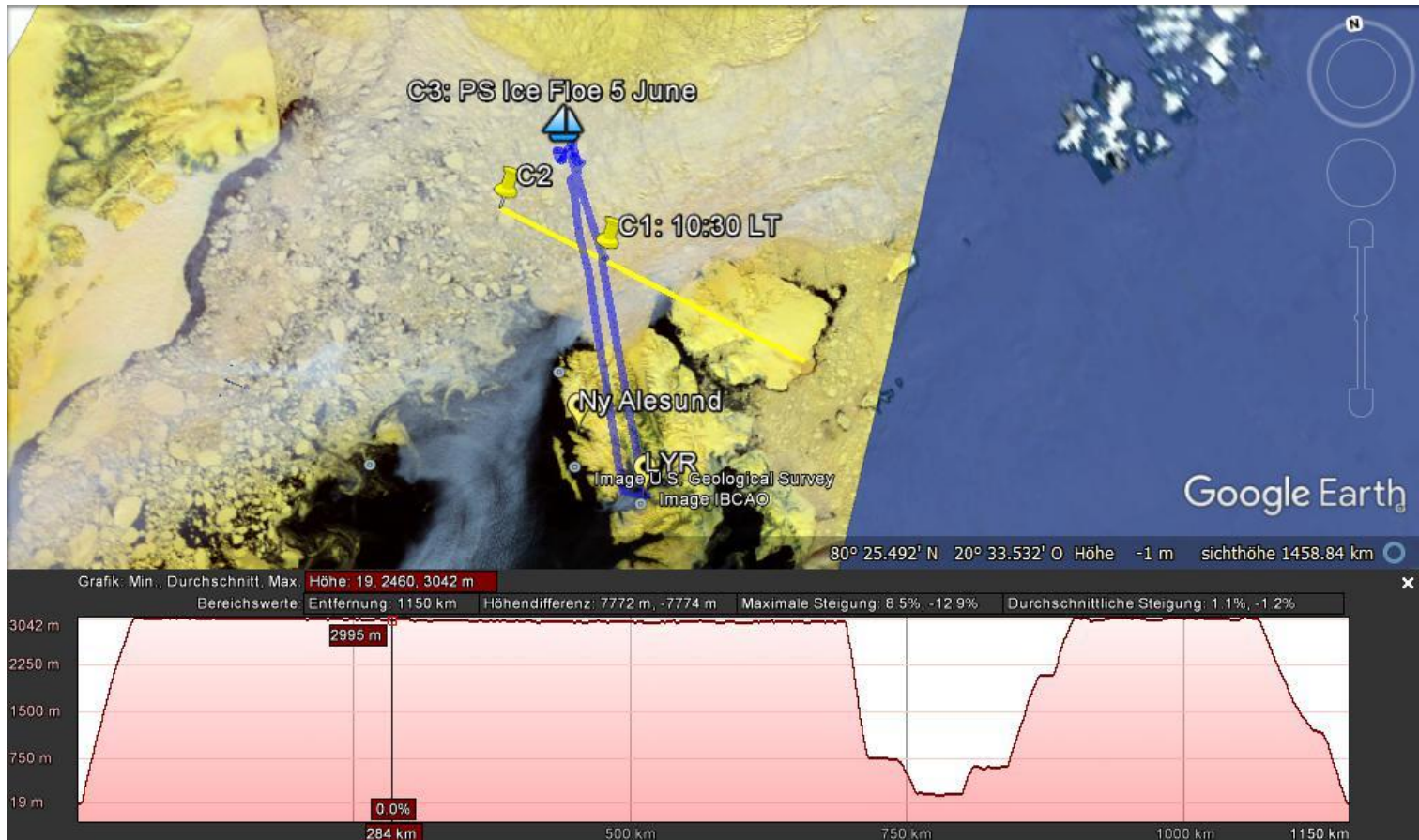


Overview of flight

Horizontal flight pattern and profile for P5

LYR: 78° 14.816' N, 15° 27.545' E
C1: 80° 48.900' N, 13° 20.202' E
C3 (PS): 82° 0.000' N, 10° 30.000' E
LYR: 78° 14.816' N, 15° 27.545' E

Between C1 and C2, the satellite overpass was planned (yellow line below). We had to skip this because of the weather (fog at LYR), which caused a delay in the take-off time.



Detailed Flight Log (all times in UTC)

LYR – C1 **158 NM @ 140 kn** **68 min**

- 10:00 Start motors
- 10:05 Problems with MIRAC, no data connection between data acquisition and the instrument, P6 also had a computer issue.
- 10:38 Taxi
- 10:48 Take-off into eastern direction, we turn West and then North after take-off, ascending to 10,000 ft

- 10:48 Thin, scattered cloud deck over the fjord, little cirrus above, see photo below.



- 10:56 Flight over land: Only scattered clouds below, cirrus above, low clouds and cirrus decreasing (becoming almost cloudless) towards the coastline.



- 11:28 After passing the coastline, a thick low-level cloud layer was observed beneath of us, No cirrus above, over sea ice

- 11:37 Clouds below get even thicker



- 11:42 We reach C1
- 11:43 *Dropsonde #1*

C1 – PS

73 NM @ 140 kn

31 min

- 11:46 Northward, on our way to Polarstern, helicopter and balloon are in the air
- 12:06 Much more homogeneous clouds below



- 12:07 *Dropsonde #2*
- 12:10 Still 10 miles to PS
- 12:14 We reach Polarstern

- 12:20 **First** horizontal double triangle at 10,000 ft: 12:20-12:37
- 12:40 **Second** horizontal double triangle at 10,000 ft: 12:40-12:57
- 12:55 Balloon can be seen from Polar 5, it operates at 3000 ft, the pilots can see it on their instruments, I can see the balloon by eye (just a small black spot)
- 13:00 **Third** horizontal double triangle at 10,000 ft: 13:00-13:17

PS – LYR

240 NM @ 140 kn

103 min

- 13:20 Start descending
- 13:30 Cloud penetration through the cloud from atop, stay horizontal below the cloud for 10 minutes at 500 ft altitude, photo below was taken below the cloud



- 13:40 Go through the cloud again from below, stay just above the cloud top for 10 minutes, photo below was taken just above cloud



- 13:45 We receive a call from the weather station at LYR, conditions becoming poor at LYR, we climb to 6000 ft and head home as fast as possible

- 13:45 Thick and homogeneous clouds below the aircraft
- 14:02 *Dropsonde #3*
- 14:14 We reach the coastline again



- 14:15 Almost cloud-free over land



- 14:59 Landing in very hazy/foggy conditions at LYR, fog just in the fjord

Instrument Status

| Polar 5 | |
|------------------------|------------|
| Basis data acquisition | |
| Nose Boom | |
| MiRAC | |
| HATPRO | |
| AMALi | |
| SMART | |
| Eagle/Hawk | |
| Sun Photometer | |
| Drop Sondes | 3 launched |

Comments

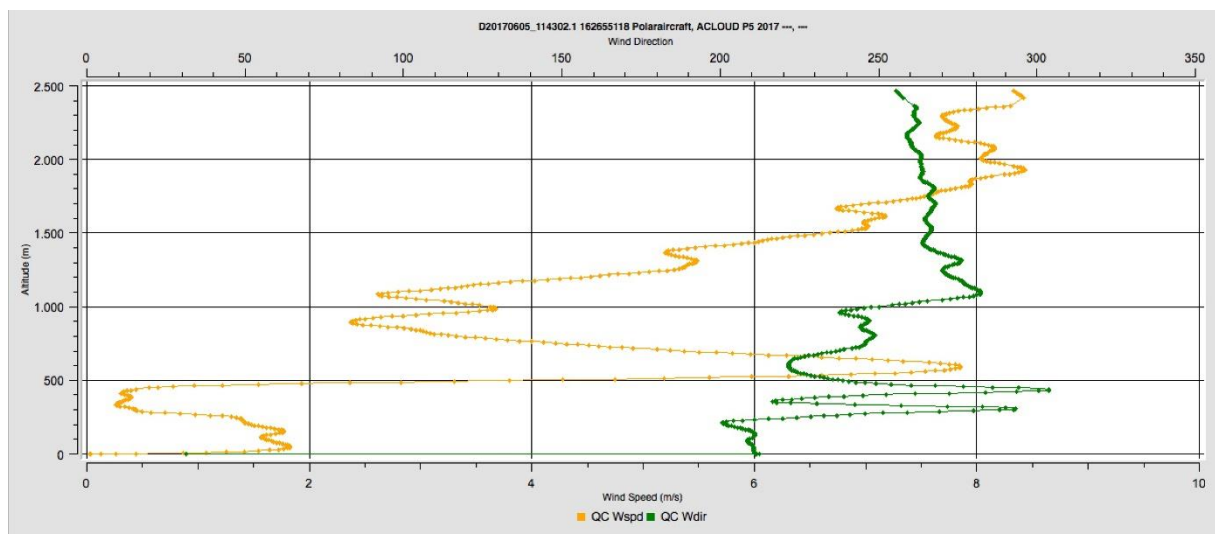
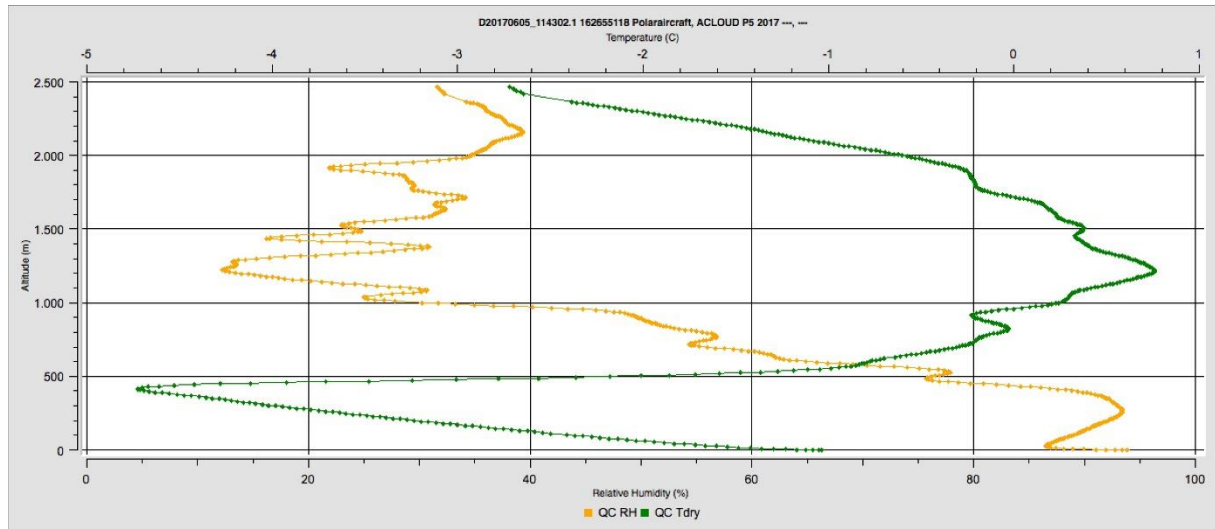
- The cloud radar had a software problem and could not measure during this flight.
- Thanks to the crew!



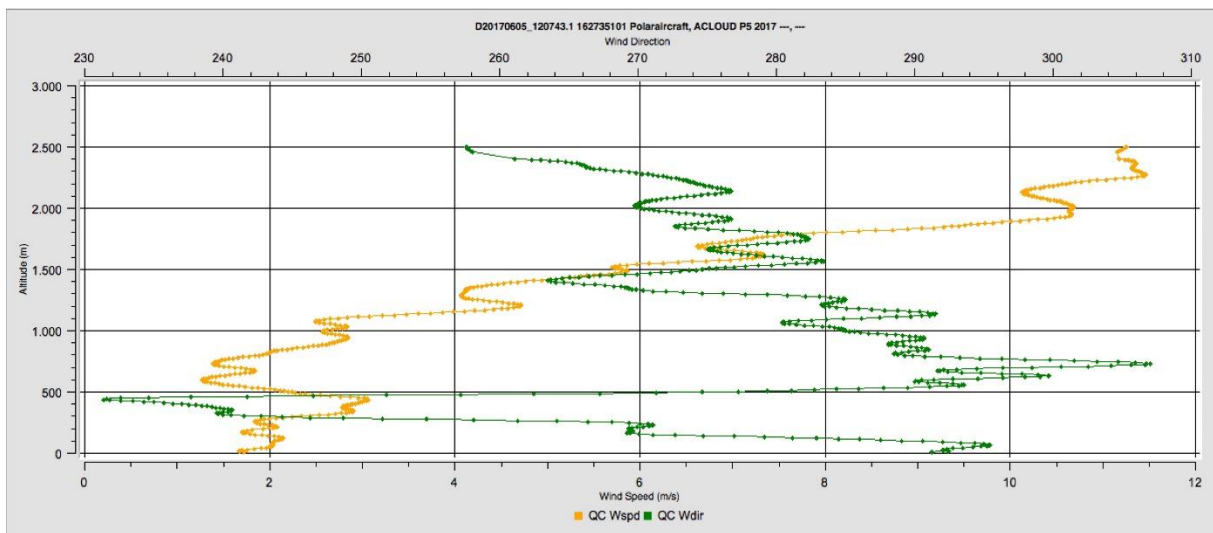
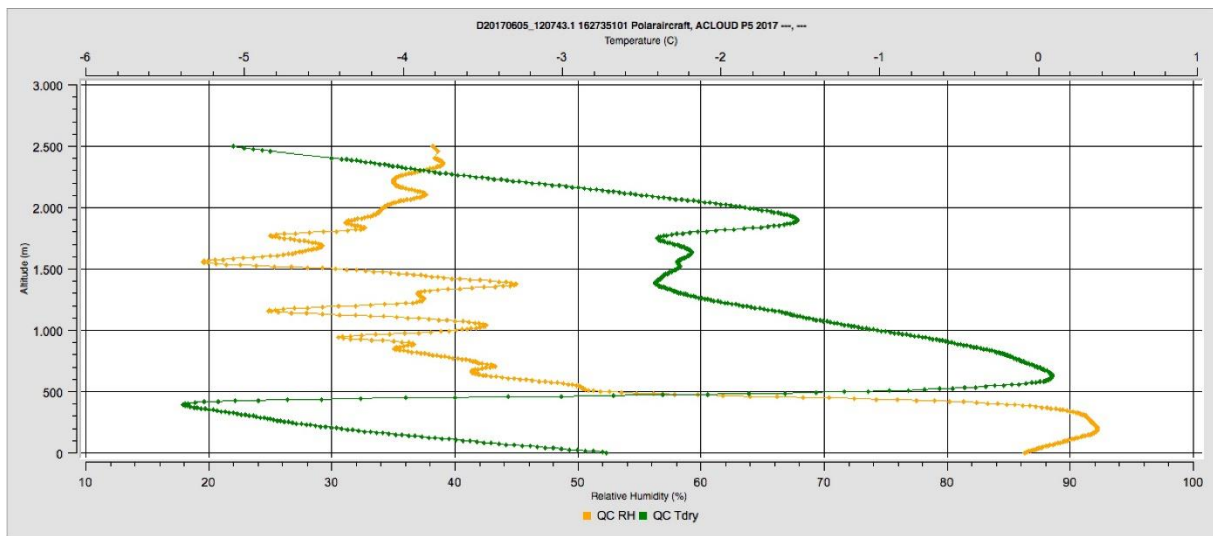
Quicklooks

Drop Sondes

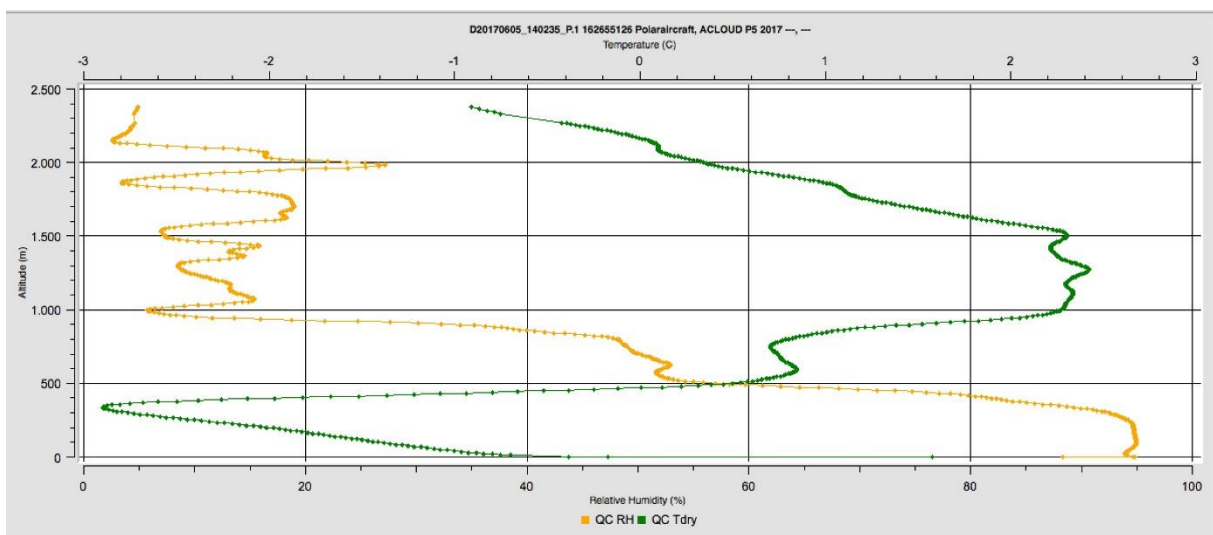
First dropsonde #1: 11:43



Second dropsonde #2: 12:07

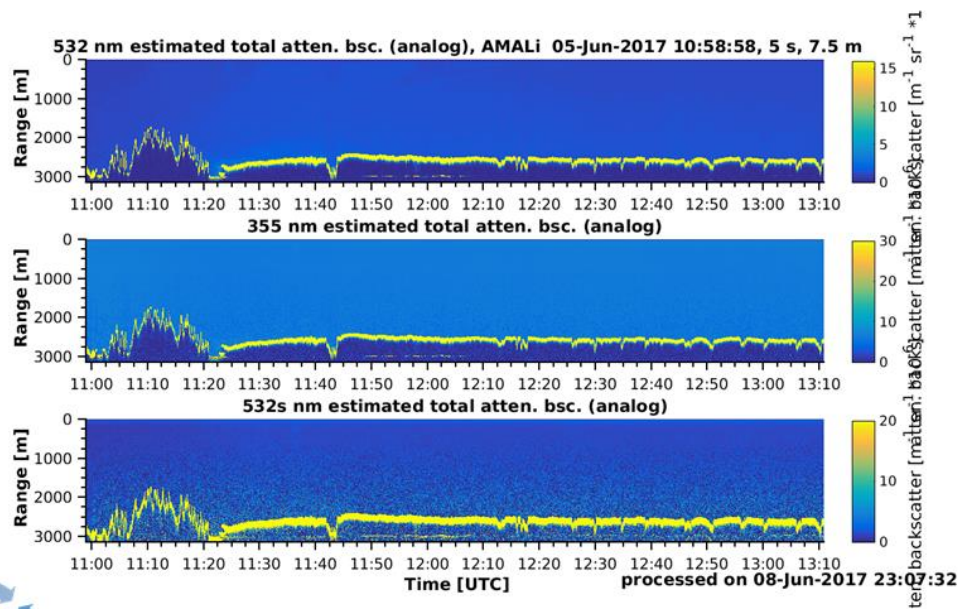


Third dropsonde #3: 14:02 (no wind info)

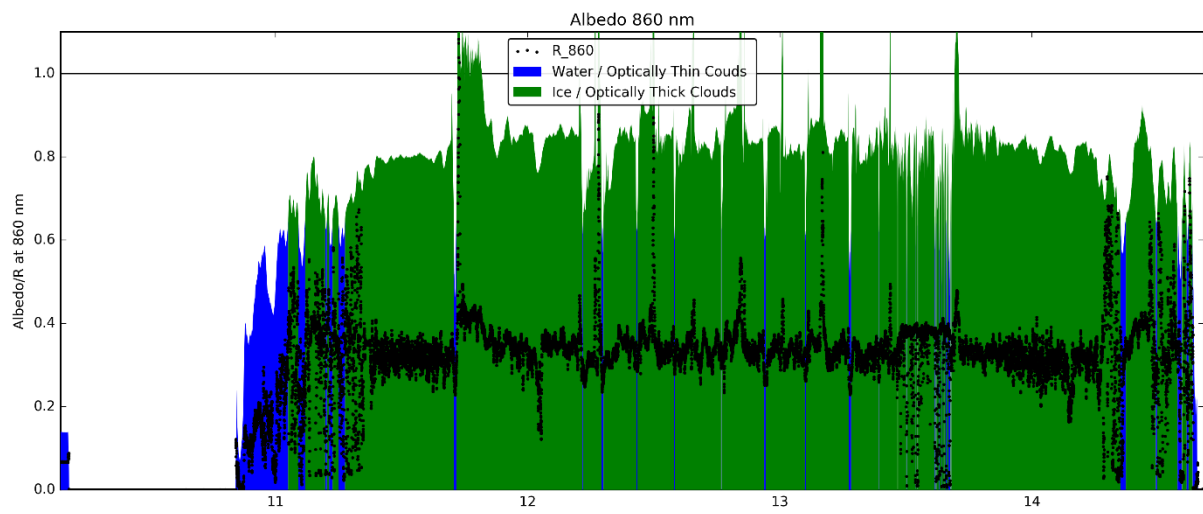


AMALI

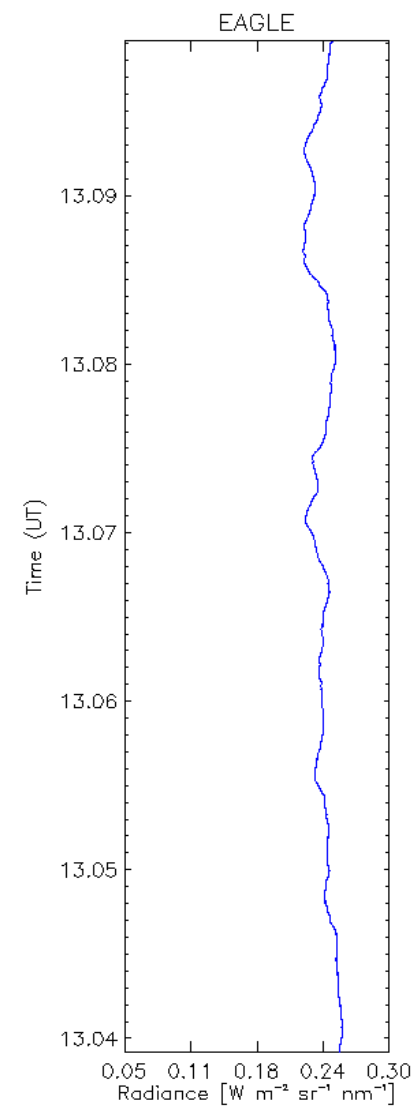
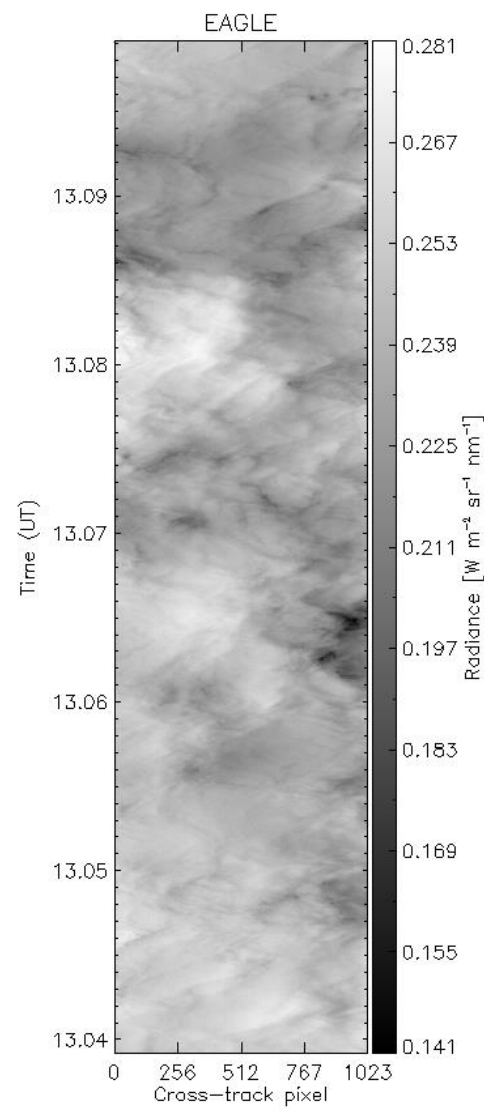
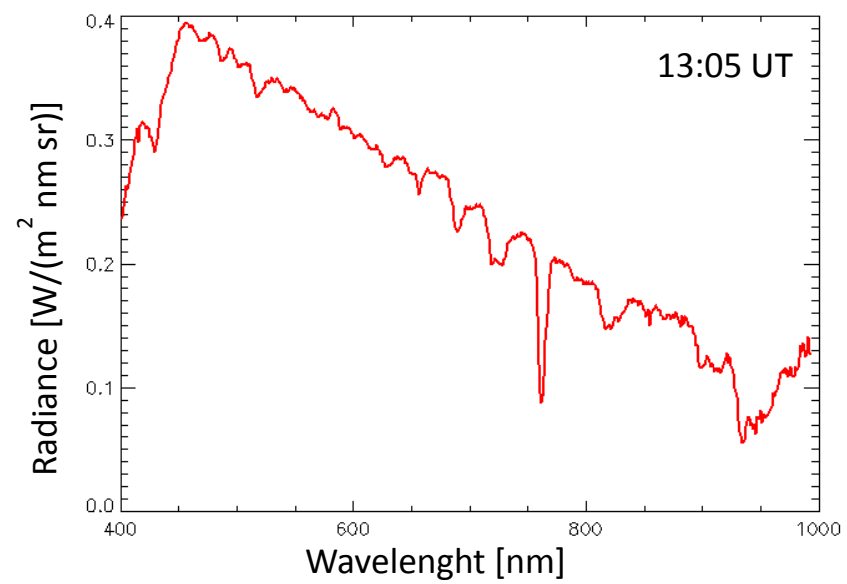
AMALi Quicklook 170605



SMART



EAGLE



HAWK

