ACLOUD Flight #14 – Polar 5 – 20170608

Mission PI P5: Mario Mech

Objectives: A-Train underflight, ocean-sea ice cross-section, radiation profiles, Ny-Ålesund remote sensing comparison – thin broken clouds over sea ice

Crew:

Polar 5	
PI	**Mario Mech**
Basis Data Acq.	**Christoph Petersen**
SMART	**Johannes Stapf**
Eagle/Hawk	**Elena Ruiz**
MiRAC	**Friedhelm Jansen**
AMALi	**Roland Neuber**

Flight times:

Polar 5	
Take off	**07:36 UTC**
Touch down	**12:51 UTC**

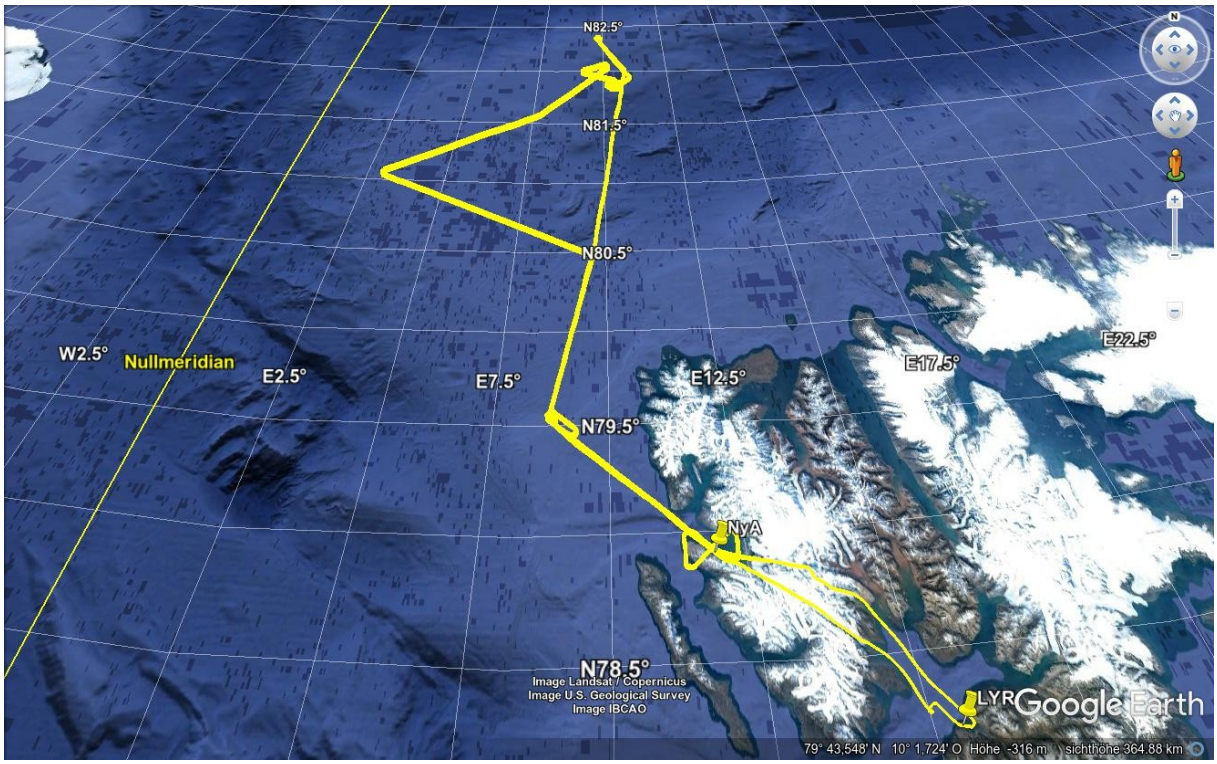
Weather situation as observed during the flight (compare to forecast):

The weather forecast predicted slow wind speeds and a layer of broken low clouds in the west and north of the archipelago. The mid- and high-level clouds were predicted to have cleared from the past days. As predicted, low-level clouds were found from Ny Ålesund to Polarstern with only occasional mid- and high-level clouds. The cloud deck was found to be solid until few tens of nautical miles before Polarstern and near Polarstern only a weak and broken cloud layer were observed. Towards the afternoon, the clouds cleared over the open sea.

Overview:

We took of in Longyearbyen, made a loop because we saw a whale and headed towards Ny ALesund over the Sveabreen glacier in low altitude. At the top of the glacier we climbed to be at 10000 ft over Ny Alesund. Underneath us there were several cloud clayers. Once at C1 we had to perform a race pattern since we were ahead of time to co locate with Polar 6 and to meet the satellite later on. Turned towards North to C2 where we hit the satellite track. From C2 to C3 underneath the Satellit ein 10000 ft. At C3 turn into direction towards Polarstern. Cross pattern over Polarstern were performed before descending and flying legs below and above the clouds. Afterwards back to 10000 ft and direction C1. At C1 turn to NyA and cross pattern over NyA and back to Longyearbyen.

Flight track and pattern:



Instrument Status:

Polar 5	
Basis data acquisition	
Nose Boom	
MiRAC Radar	
MiRAC Radiometer	
AMALi	
SMART	
Eagle/Hawk	
Sun Photometer	
Dropsondes	

Comments:

All instruments run without serious problems.

Detailed Flight Logs (Name of author… more than one is possible):

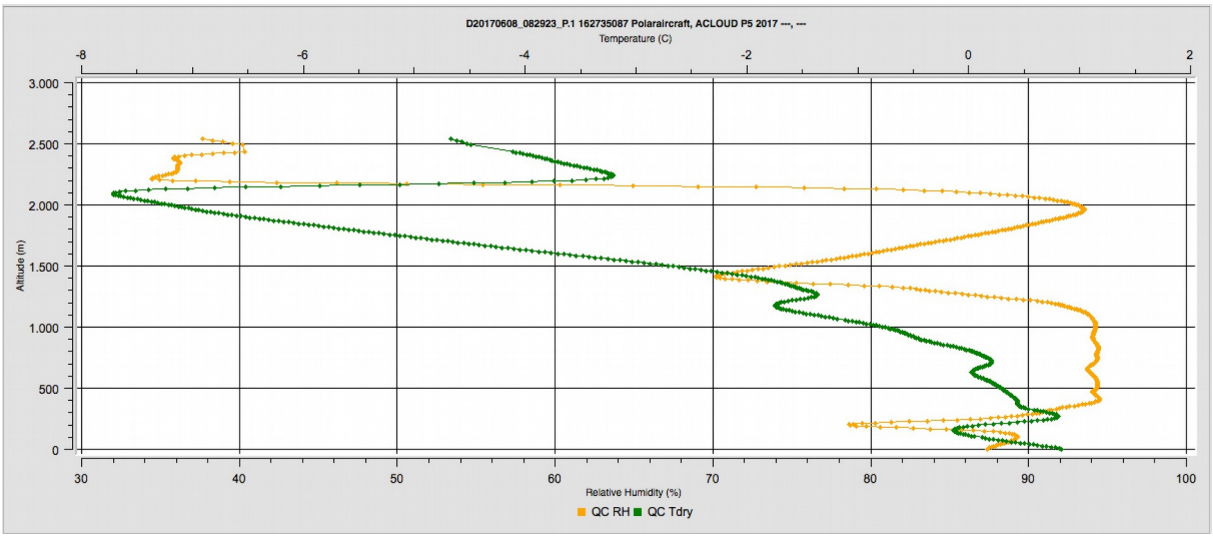
Mario Mech (times UTC)

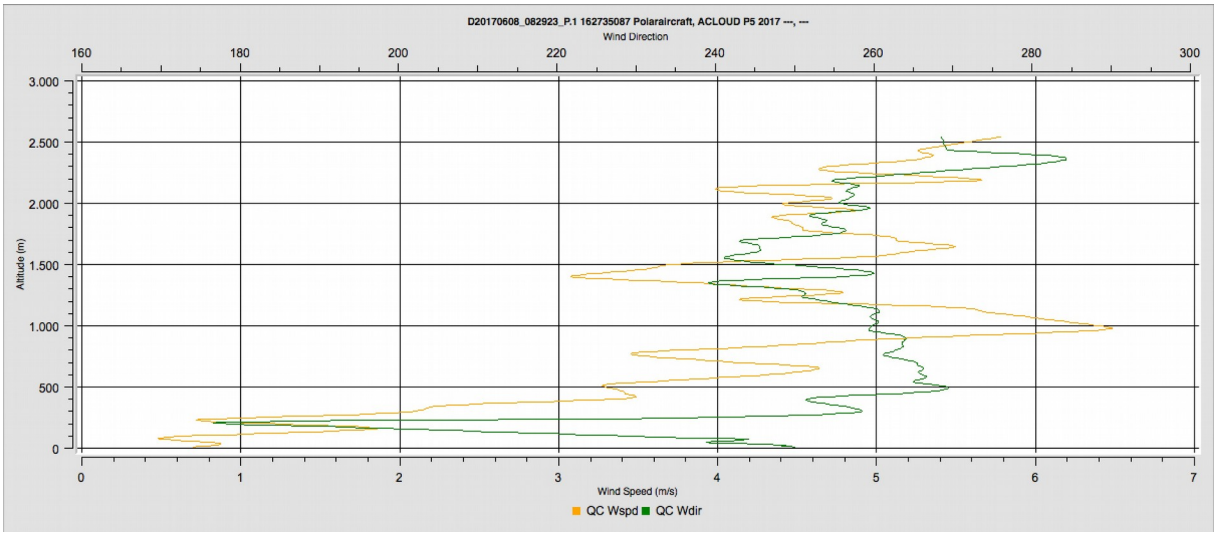
07:36 take off
07:40 whale watching loop
07:46 low clouds just over glacier
07:52 start of climb to 10000 ft
no cirrus above

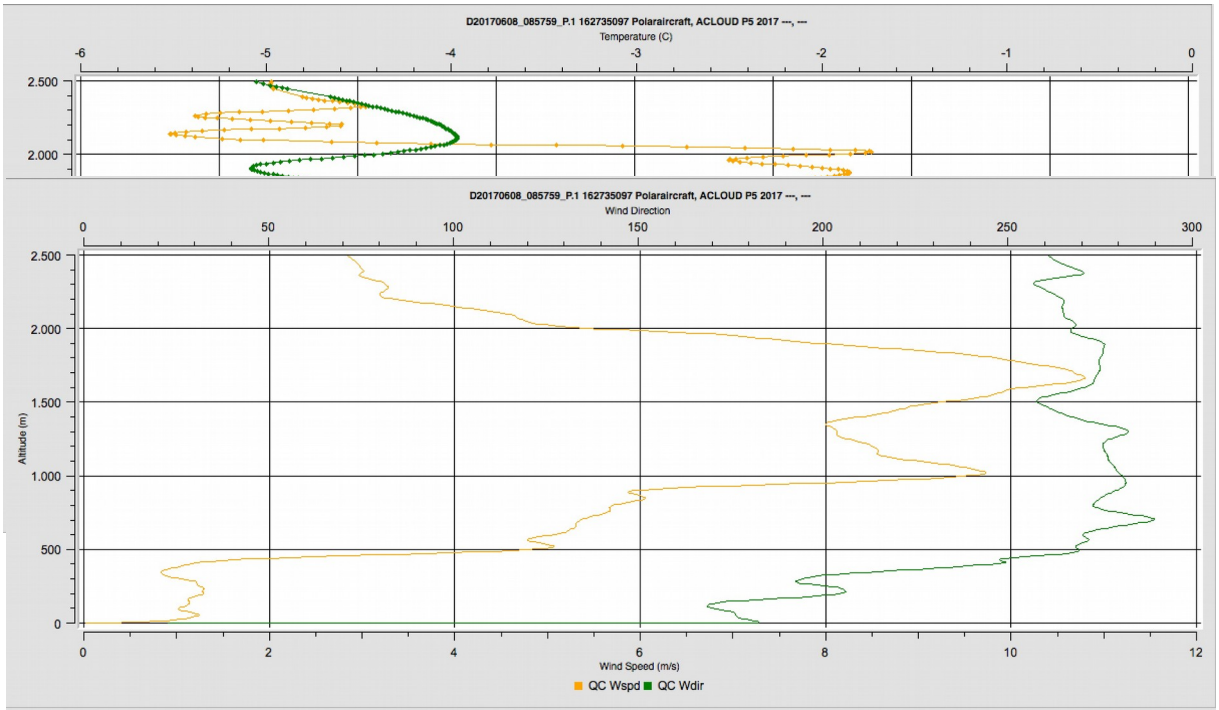
07:53 in clouds between 3300 and 3600 ft
07:56 1500 ft above clouds to gain of the better resolution in the near field of the radar
08:02 further climb to 10000 ft
08:07 lidar on
08:14 two cloud layers
08:19 no broken clouds in radar visible eventhough present
08:26 at C1 race pattern to co-locate
08:28 DS - bad sonde, no GPS
08:29 DS1
08:31 edge of higher clouds the left - no cirrus
08:37 co-locate 2 min behind the schedule
08:40 pitch to 0° for testing purposes; directly back to 2°
08:41 cirrus ahead
08:43 whole in upper cloud layer ahead
08:48 broken clouds
08:49 still over open ocean
08:50 ice edge ahead
08:58 DS2
08:59 on satellite track
09:04 clouds in 2500 ft not visible for the radar
09:13 DS3 launched at satellite overpass
09:20 P6 reports400/800 to 1300 ft (?) clouds
09:23 P6 clouds in 200 to 1200 ft
09:30 cloud free areas to the North
09:32 DS4
09:32 C3
09:37 cloud wholes getteing bigger
09:42 P6 icing
09:42 very thin clouds
10:33 200 ft with clouds at 300 ft
10:27 hazy
10:30 turn to climb out of the clouds
10:32 300 ft in clouds with 200 ft extend
10:41 1600 ft inversion seenn in dropsonde
10:43 2800 ft
11:15 still over sea ice; very thin low clouds
11:25 closed cloud deck
11:35 DS6 - might be bad sonde
11:45 closed cloud deck
11:53 DS7 at C1
12:01 clouds over NyA
12:10 passed NyA and started pattern
12:51 touch down

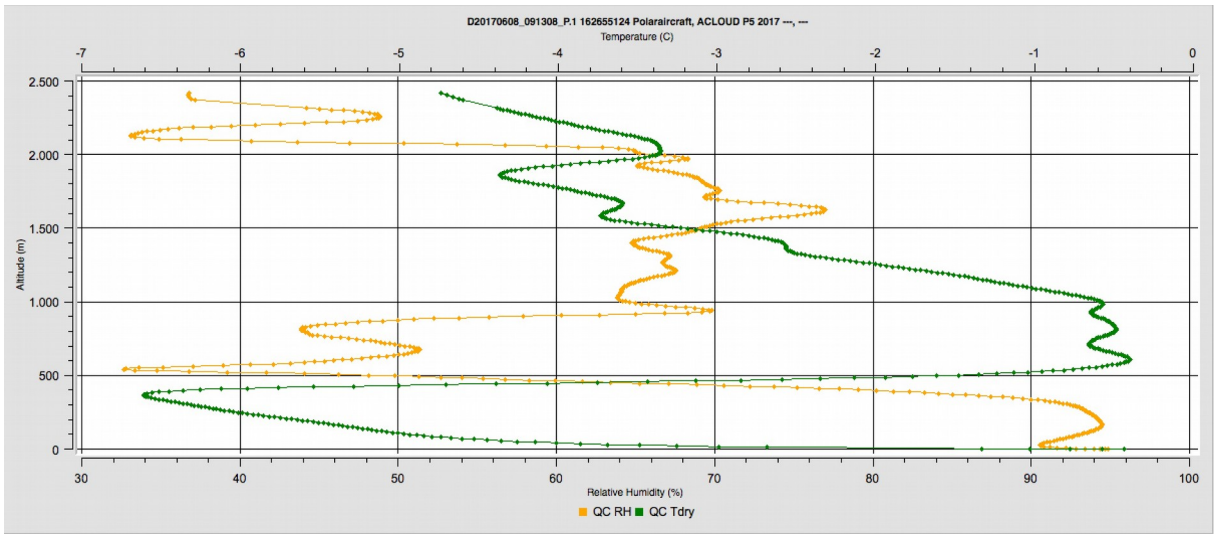
Quicklooks:

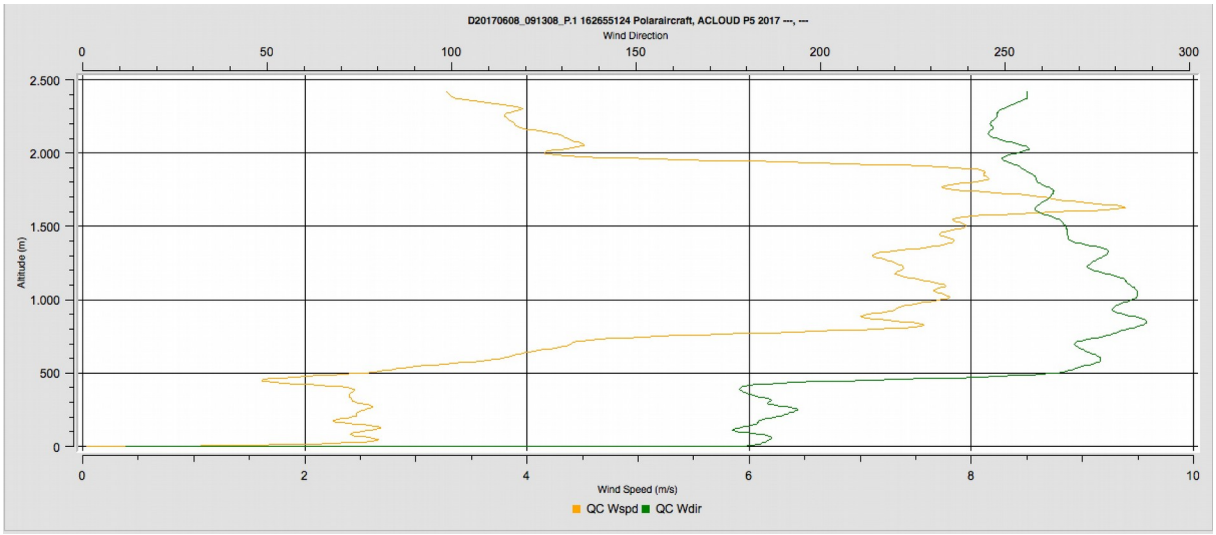
Drop Sondes

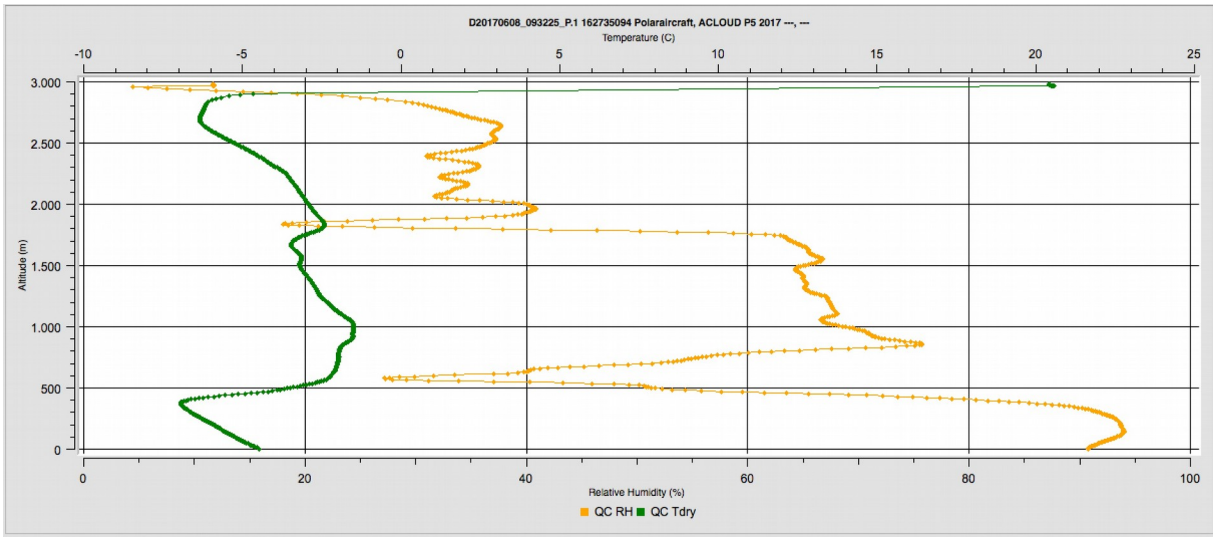

D20170608_082923_P.1 162735087 Polaraircraft, ACLOUD P5 2017 ---, ---
Temperature (C)
-8
-6
-4
-2
0
2
3.000
2.500
2.000
1.500
1.000
500
0
Altitude (m)
30
40
50
60
70
80
90
100
Relative Humidity (%)
QC RH
QC Tdry

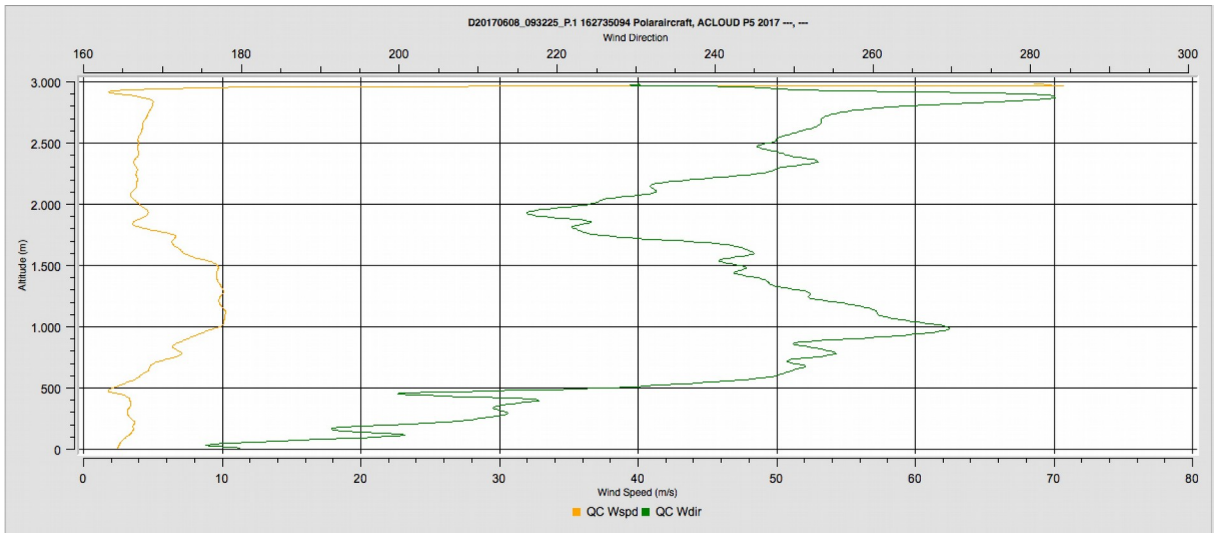

D20170608_082923_P.1 162735087 Polaraircraft, ACLOUD P5 2017 ---, ---
Wind Direction
160
180
200
220
240
260
280
300
3.000
2.500
2.000
1.500
1.000
500
0
Altitude (m)
0
1
2
3
4
5
6
7
Wind Speed (m/s)
QC Wspd
QC Wdir

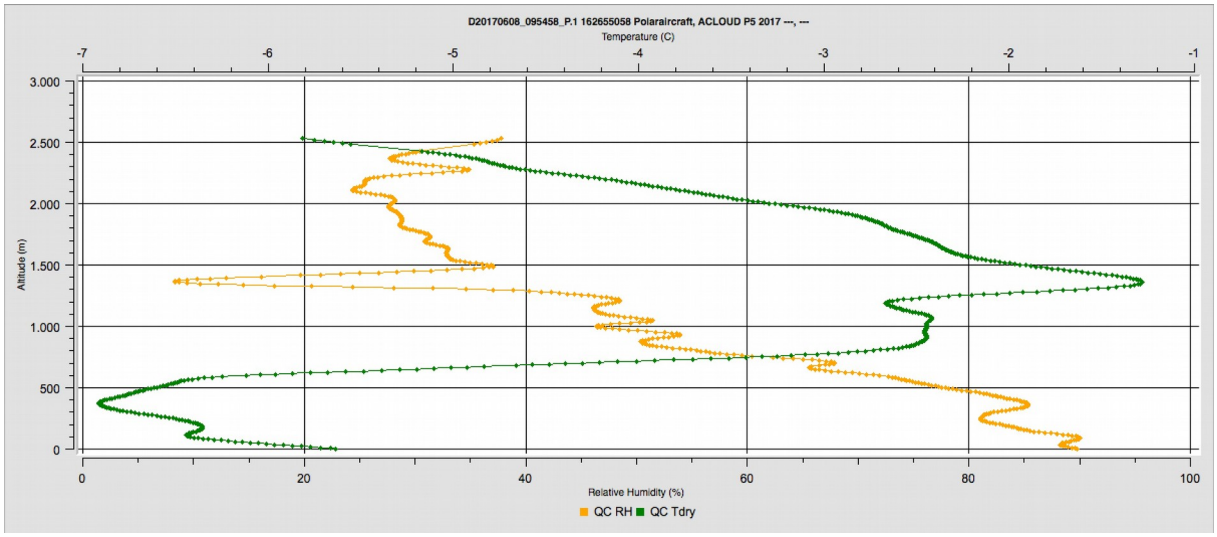

D20170608_085759_P.1 162735097 Polaraircraft, ACLOUD P5 2017 ---, ---
Temperature (C)
-6
-5
-4
-3
-2
-1
0
2.500
2.000
D20170608_085759_P.1 162735097 Polaraircraft, ACLOUD P5 2017 ---, ---
Wind Direction
0
50
100
150
200
250
300
2.500
2.000
1.500
1.000
500
0
Altitude (m)
0
2
4
6
8
10
12
Wind Speed (m/s)
QC Wspd
QC Wdir

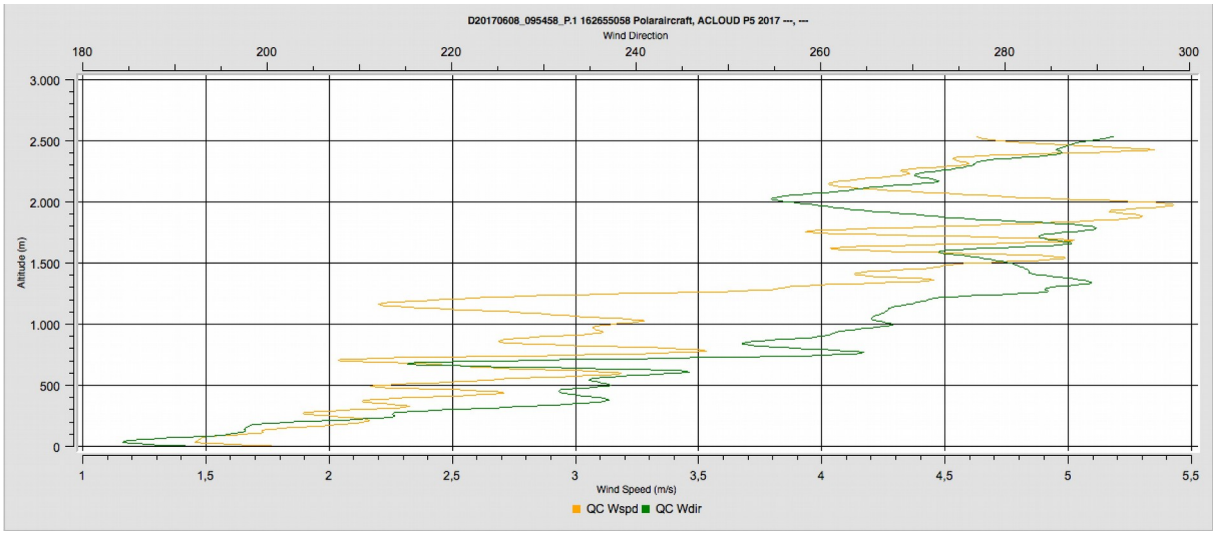

D20170608_091308_P.1 162655124 Polaraircraft, ACLOUD P5 2017 ---, ---
Temperature (C)
-7
-6
-5
-4
-3
-2
-1
0
2.500
2.000
1.500
1.000
500
0
Altitude (m)
30
40
50
60
70
80
90
100
Relative Humidity (%)
QC RH
QC Tdry

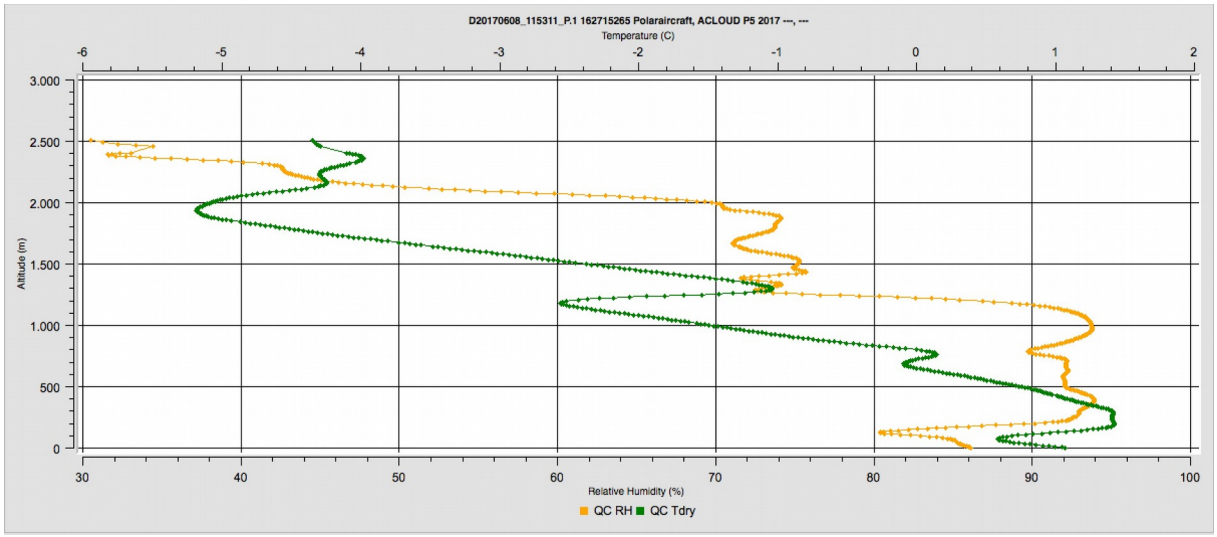

D20170608_091308_P.1 162655124 Polaraircraft, ACLOUD P5 2017 ---, ---
Wind Direction
0
50
100
150
200
250
300
2.500
2.000
1.500
1.000
500
0
Altitude (m)
0
2
4
6
8
10
Wind Speed (m/s)
QC Wspd
QC Wdir

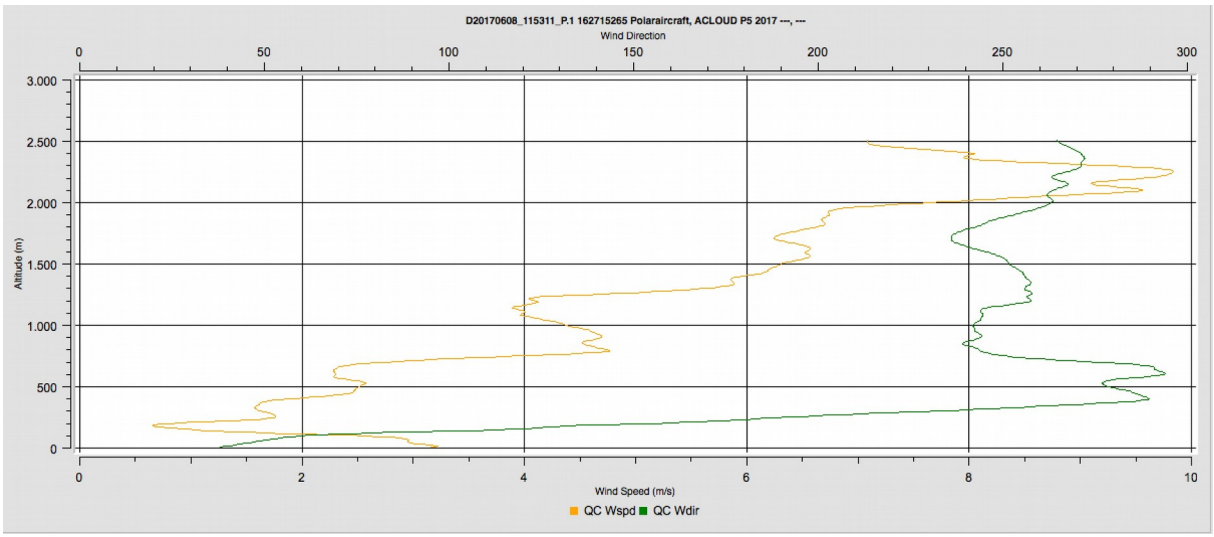

D20170608_093225_P.1 162735094 Polaraircraft, ACLOUD P5 2017 ---, ---
Temperature (C)
-10
-5
0
5
10
15
20
25
3.000
2.500
2.000
1.500
1.000
500
0
Altitude (m)
0
20
40
60
80
100
Relative Humidity (%)
QC RH
QC Tdry

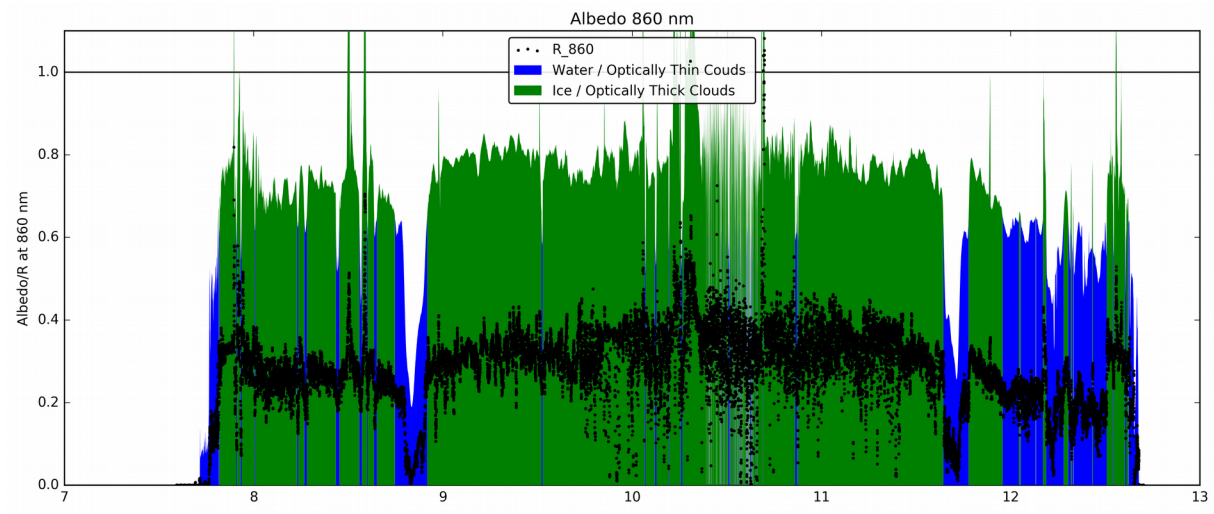

D20170608_093225_P.1 162735094 Polaraircraft, ACLOUD P5 2017 ---, ---
Wind Direction
160
180
200
220
240
260
280
300
3.000
2.500
2.000
1.500
1.000
500
0
Altitude (m)
0
10
20
30
40
50
60
70
80
Wind Speed (m/s)
QC Wspd
QC Wdir

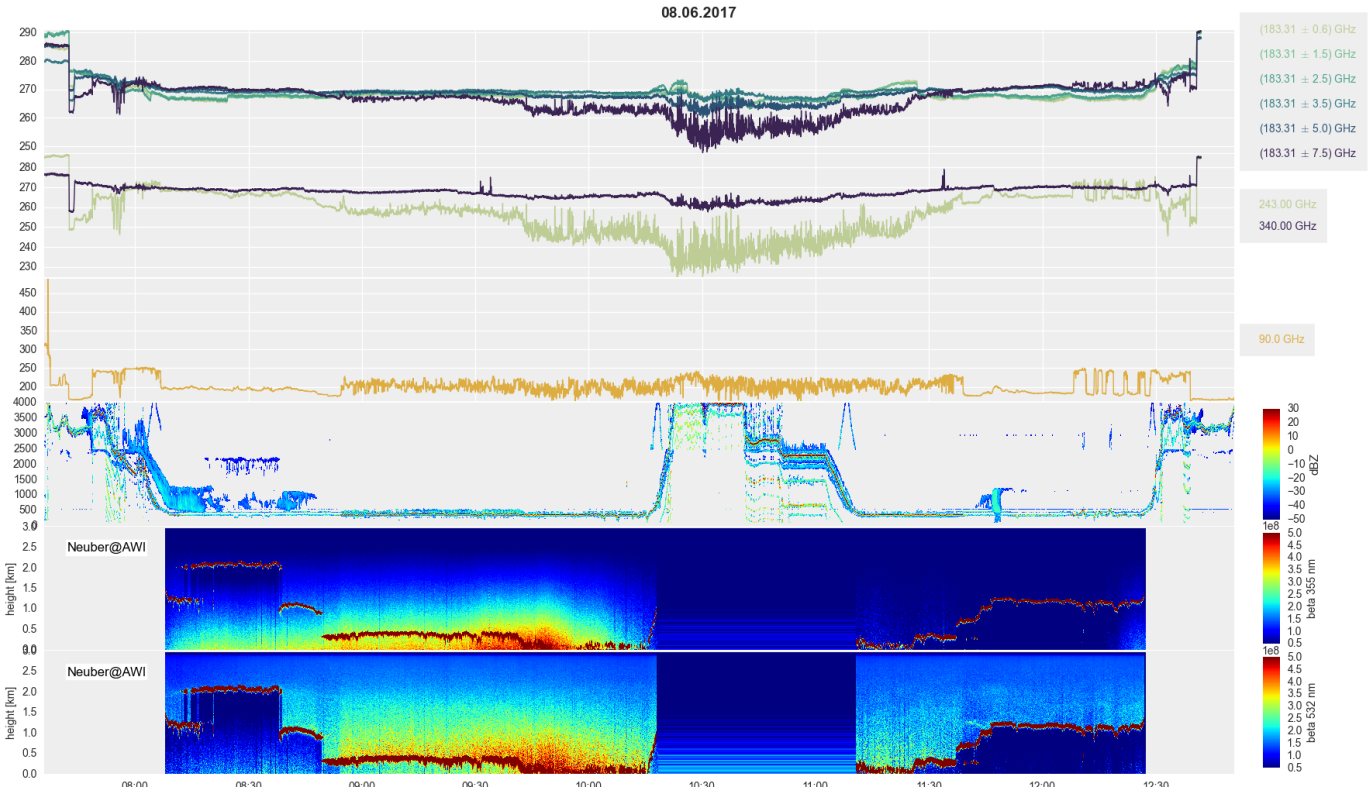

D20170608_095458_P.1 162655058 Polaraircraft, ACLOUD P5 2017 ---, ---
Temperature (C)
-7
-6
-5
-4
-3
-2
-1
3.000
2.500
2.000
1.500
1.000
500
0
Altitude (m)
0
20
40
60
80
100
Relative Humidity (%)
QC RH
QC Tdry

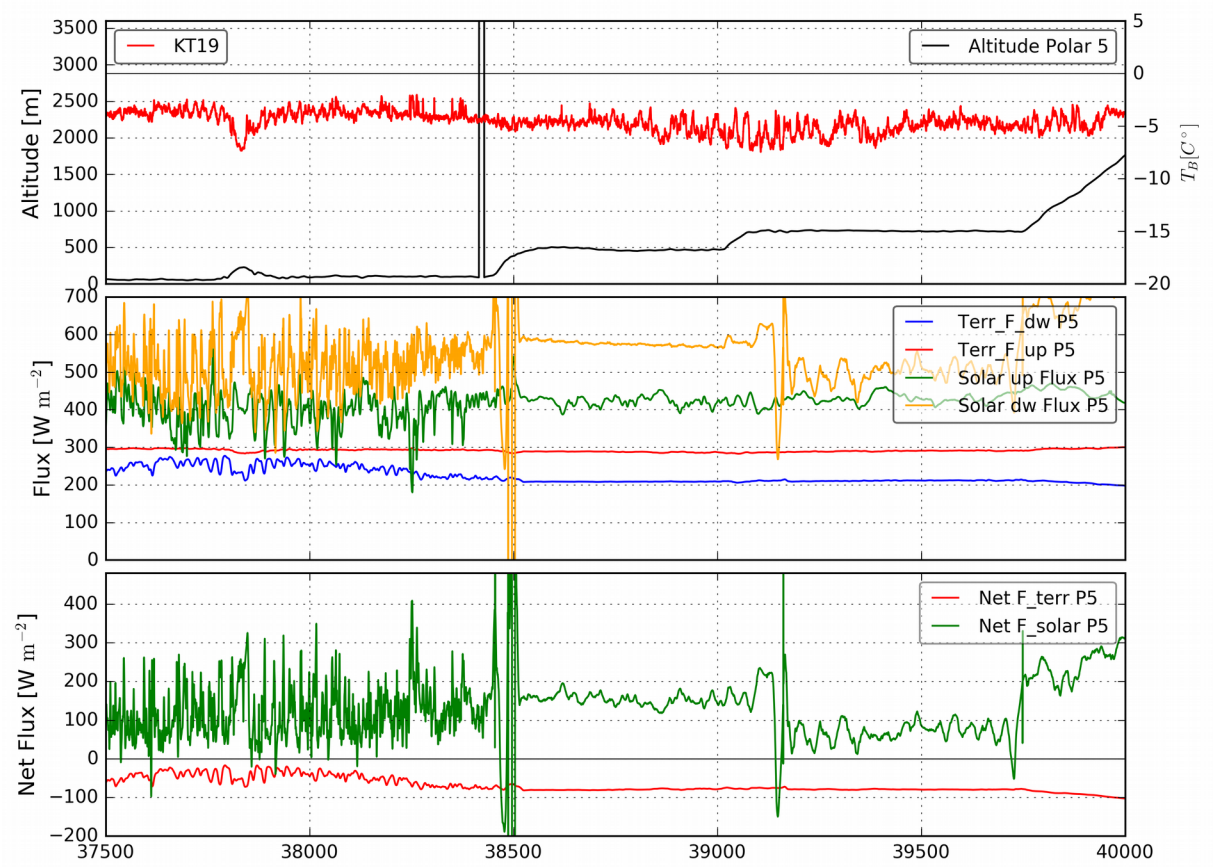

D20170608_095458_P.1 162655058 Polaraircraft, ACLOUD P5 2017 ---, ---
Wind Direction
180
200
220
240
260
280
300
3.000
2.500
2.000
1.500
1.000
500
0
Altitude (m)
1
1,5
2
2,5
3
3,5
4
4,5
5
5,5
Wind Speed (m/s)
QC Wspd
QC Wdir

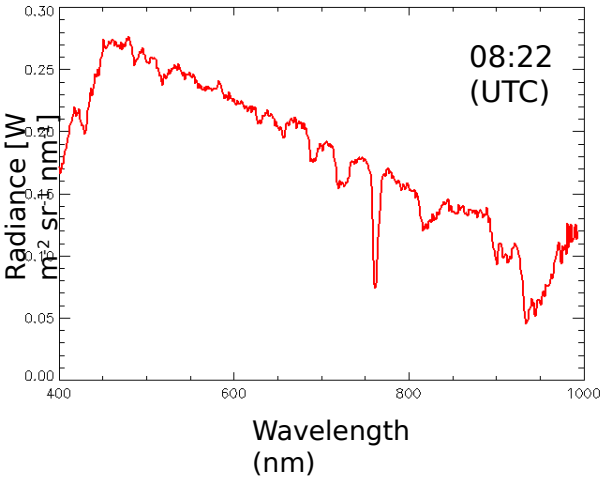

D20170608_115311_P.1 162715265 Polaraircraft, ACLOUD P5 2017 ---, ---
Temperature (C)
-6 -5 -4 -3 -2 -1 0 1 2
Altitude (m)
3.000 2.500 2.000 1.500 1.000 500 0
30 40 50 60 70 80 90 100
Relative Humidity (%)
QC RH
QC Tdry

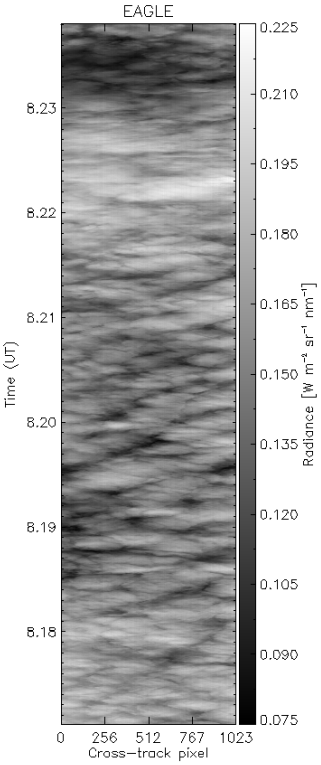

D20170608_115311_P.1 162715265 Polaraircraft, ACLOUD P5 2017 ---, ---
Wind Direction
0 50 100 150 200 250 300
Altitude (m)
3.000 2.500 2.000 1.500 1.000 500 0
0 2 4 6 8 10
Wind Speed (m/s)
QC Wspd
QC Wdir

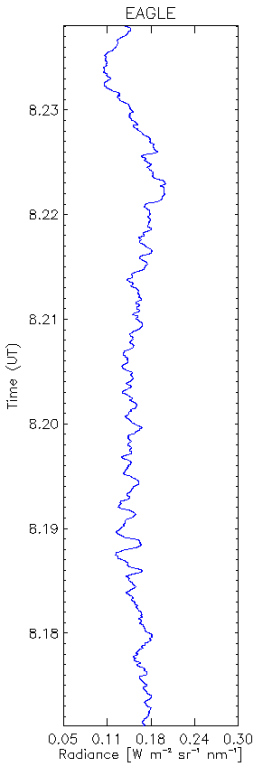

Albedo 860 nm
R_860
Water / Optically Thin Couds
Ice / Optically Thick Clouds
Albedo/R at 860 nm
1.0 0.8 0.6 0.4 0.2 0.0
7 8 9 10 11 12 13

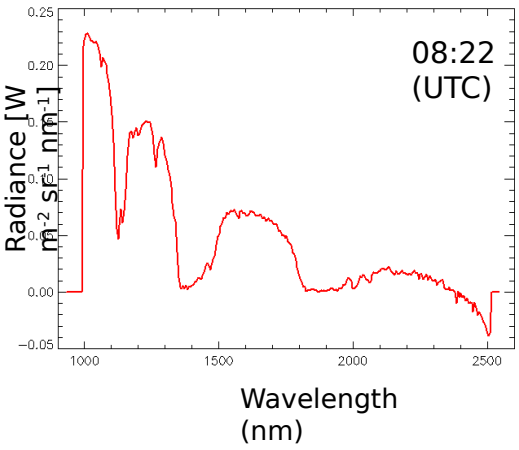

08.06.2017
(183.31 ± 0.6) GHz
(183.31 ± 1.5) GHz
(183.31 ± 2.5) GHz
(183.31 ± 3.5) GHz
(183.31 ± 5.0) GHz
(183.31 ± 7.5) GHz
243.00 GHz
340.00 GHz
90.0 GHz
Neuber@AWI
Neuber@AWI
height [km]
dBZ
beta 355 nm
beta 532 nm

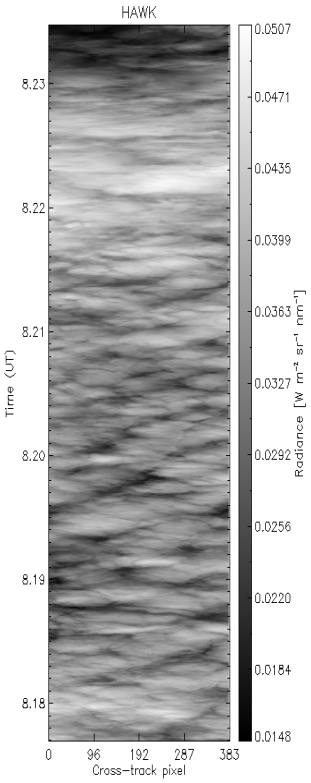

KT19
Altitude Polar 5
Altitude [m]
$T_B [C^\circ]$
Terr_F_dw P5
Terr_F_up P5
Solar up Flux P5
Solar dw Flux P5
Flux [W m^{-2}]
Net F_terr P5
Net F_solar P5
Net Flux [W m^{-2}]

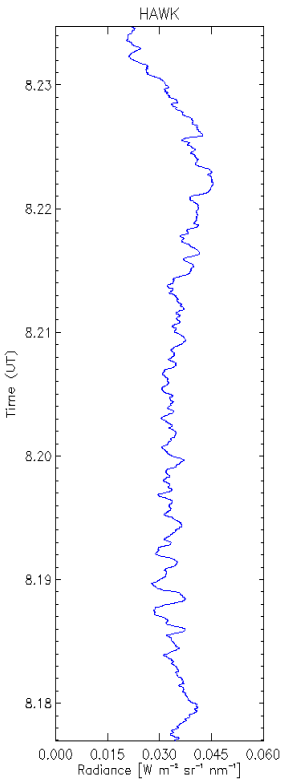

08:22
(UTC)
Radiance [W m⁻² sr⁻¹ nm⁻¹]
Wavelength (nm)

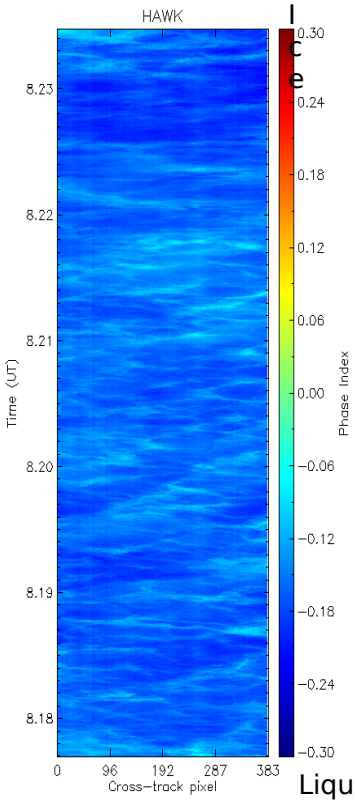

EAGLE
Time (UT)
Cross-track pixel
Radiance [W m⁻² sr⁻¹ nm⁻¹]


EAGLE
Time (UT)
Radiance [W m⁻² sr⁻¹ nm⁻¹]


08:22
(UTC)
Radiance [W m⁻² sr⁻¹ nm⁻¹]
Wavelength (nm)


HAWK
Time (UT)
Cross-track pixel
Radiance [W m⁻² sr⁻¹ nm⁻¹]


HAWK
Time (UT)
Radiance [W m⁻² sr⁻¹ nm⁻¹]


HAWK
Time (UT)
Cross-track pixel
Phase Index
Liquid water