

ACLOUD Flight #05 – Polar 5 – 170602

Mission PI P5: Susanne Crewell

Objectives: Characterize horizontal and vertical cloud variability - relate remote sensing measurements on P5 to in situ cloud microphysics on P6.

Crew:

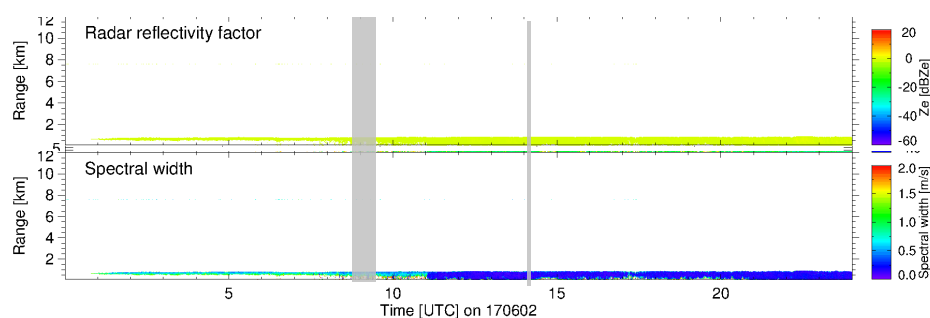
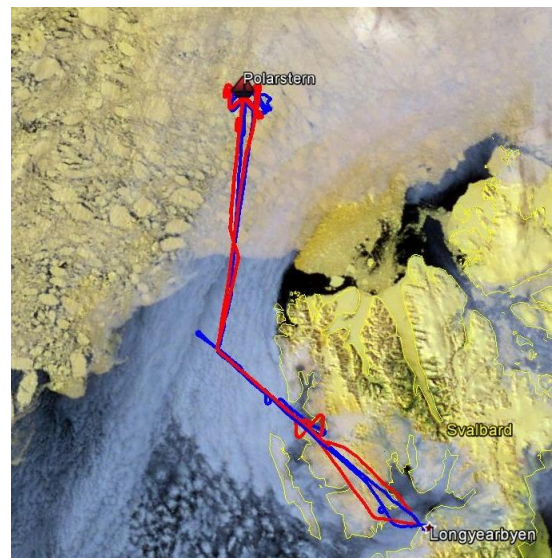
Polar 5	
PI	Susanne Crewell
Basis Data Acq.	Christoph Petersen
SMART	Johannes Stapf
Eagle/Hawk	Elena Ruiz
MiRAC	Mario Mech
AMALi	Friedhelm Jansen

Flight times:

Polar 5	
Take off	8:130 UTC
Touch down	13:55 UTC

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

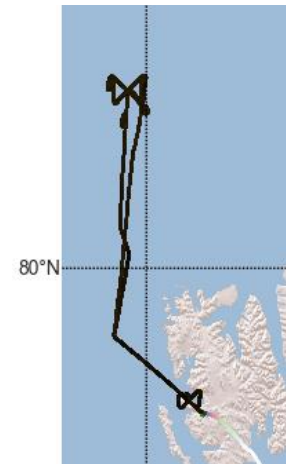
While the last days were dominated by a northeasterly wind flow the circulation changed as predicted to a southwesterly flow associated with a high pressure system south of Spitsbergen. As predicted by IFS but not by GFS low clouds formed in this air mass which persisted during the whole flight and no view on the surface was possible. Cloud top was at about 900 m at Ny Alesund and decreased to roughly only few 400 m in the area of the Polarstern where the mid atmosphere was much drier. Due to the lee effect Longyearbyen was still mainly cloud free and low level clouds only started to appear on top of the glacier when flying toward Ny Alesund. Some thin cirrus above was evident in the on the way to Polarstern.



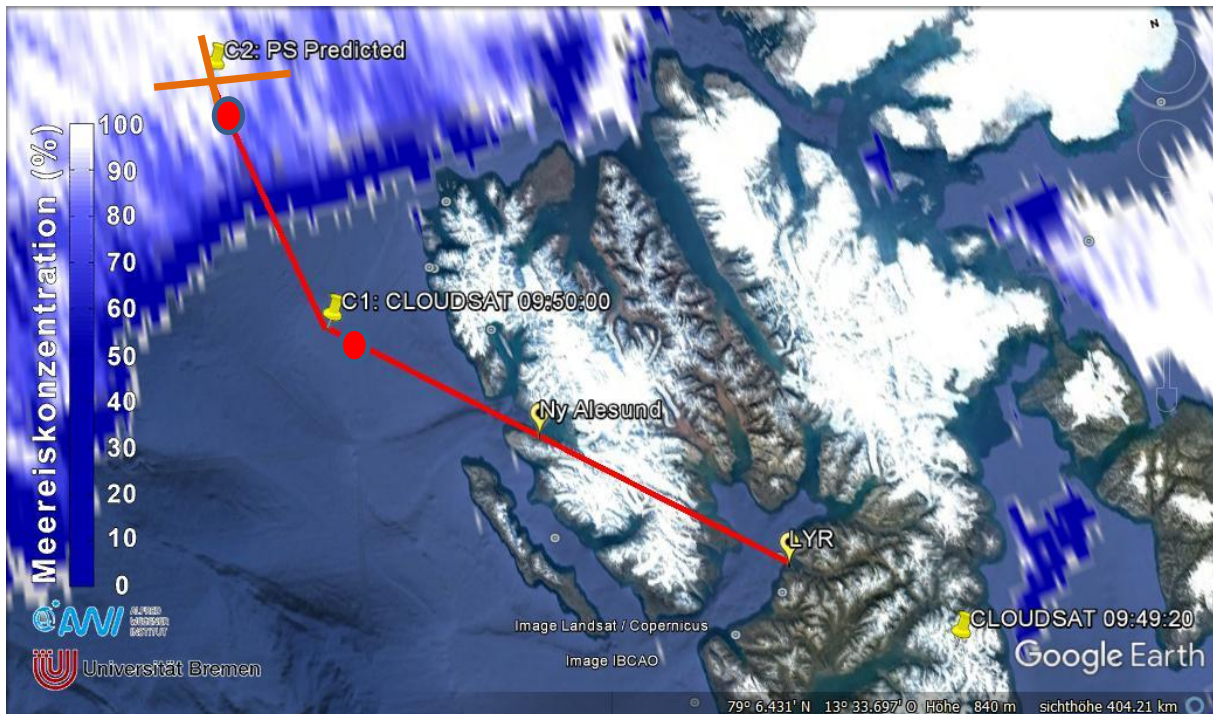
Radar reflectivity (top) & spectral width (bottom) at Ny Alesund and P5 overflight times (grey)

Overview:

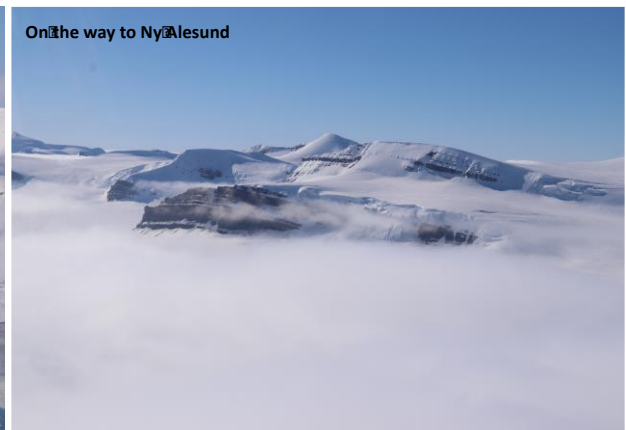
As usual Polar 5 did fly a first leg in low altitude, 1000 ft above ground, over the glacier Sveabreen. for surface albedo characterization and when ascended to 10.00ft which was the flight altitude over the whole flight. At Ny Alesund a loop similar as an 8 was flown 2.5 times while P6 ascended through the cloud from below above the runway to get a microphysical profile. Afterwards P5 continued along track to C1 for a Cloudsat underflight. We met the satellite at 9:49 roughly between Ny Alesund and C1 while P6 flew in a saw tooth pattern for microphysical profiles. About five minutes later we encountered 3 short power interruptions in a row - after 10:40 all instruments were back in operation. At that time we had reached the Polarstern (C2) area and dropped a sonde. A coordinated double-triangular pattern with P6 below was flown for about 2 hours. The clouds were quite homogeneous and not optically thick. The lidar saw some enhanced backscatter in a coherent spatial structure confined to a region below 1800 m which coincided with a small inversion (see dropsondes). After dropping a sonde we headed back to Longyearbyen via C1 and Ny Alesund. Cloud topped boundary layer increased on the way towards the Island and we could sense the clouds over Ny Alesund which showed a rapid change around 11 UT with a transition from a more liquid dominated type to very light snowfall.



Flight track and pattern:



Red circles mark the launched drop sondes - they were released both on the way to Polarstern and back.



Left (LYR-NyA): Sveabreen Glacier. Right (LYR.NyA, 8:48): Start of low level clouds.



Left (NyA-loopC2): Clouds over Ny Alesund 9:31. Right (C1- C2): Low clouds with few cirrus sea11:30.



Left (C2): Coordination with P6 around Polarstern. Right (C1): Heading back to Longyearbyen.

Instrument Status:

Polar 5	
Basis data acquisition	
Nose Boom	
MiRAC	
HATPRO	
AMALi	
SMART	
Eagle/Hawk	
Sun Photometer	
Drop Sondes	5 launched 1 failed

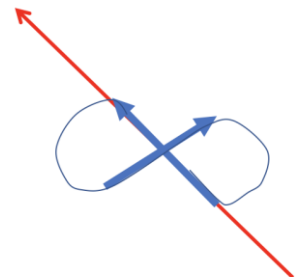
Comments:

Due to three short power breaks between 9:55 and 10:35 some data losses occurred for those instruments needing 230 V. Gaps are a few minutes for cloud radar around more than 10 min for lidar and about 1,5 hours for MiRAC passive. In addition the first dropsonde launched at 9:49 only transmitted data down to about 1800 m.

Detailed Flight Logs (Name of author... more than one is possible):**Johannes Stapf (times UTC)**

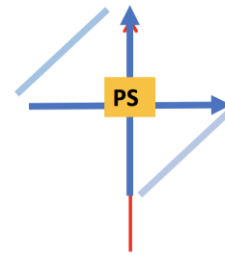
08 31 04 in the air
 08 31 50 water, closed cloudeck above
 08 36 25 albedometer down
 08 41 46 hazy but clear above
 08 41 53 glacier below
 08 46 28 cus in front of us
 08 47 58 overcast cloud
 08 49 54 only mountain tops look out
 08 50 30 starting to climb
 08 55 15 starting loop for the pattern over Ny Alesund see right
 09 07 49 glory
 09 10 33 some ci near horizon
 09 29 25 after second loop we had for a half loop before starting off on the satellite track at 9:39
 09 52 21 dropsonde is out
 09 55 crash of the 230 V system - MiRAC, dropsonde and lidar
 10 12 46 polar 6 down on the left side
 10 13 02 we are a few km off track, turn and about 20 min to C2
 10 17 38 power is down everything restarted
 10 29 02 power is off again
 10 29 51 some roll structures foto
 10 32 15 15 miles to polarstern
 10 33 32 clouds get thinner, could see some ice flows below
 10 34 46 P6 can be seen over clouds
 10 36 16 some ci above and nice clouds below

5 min straight leg



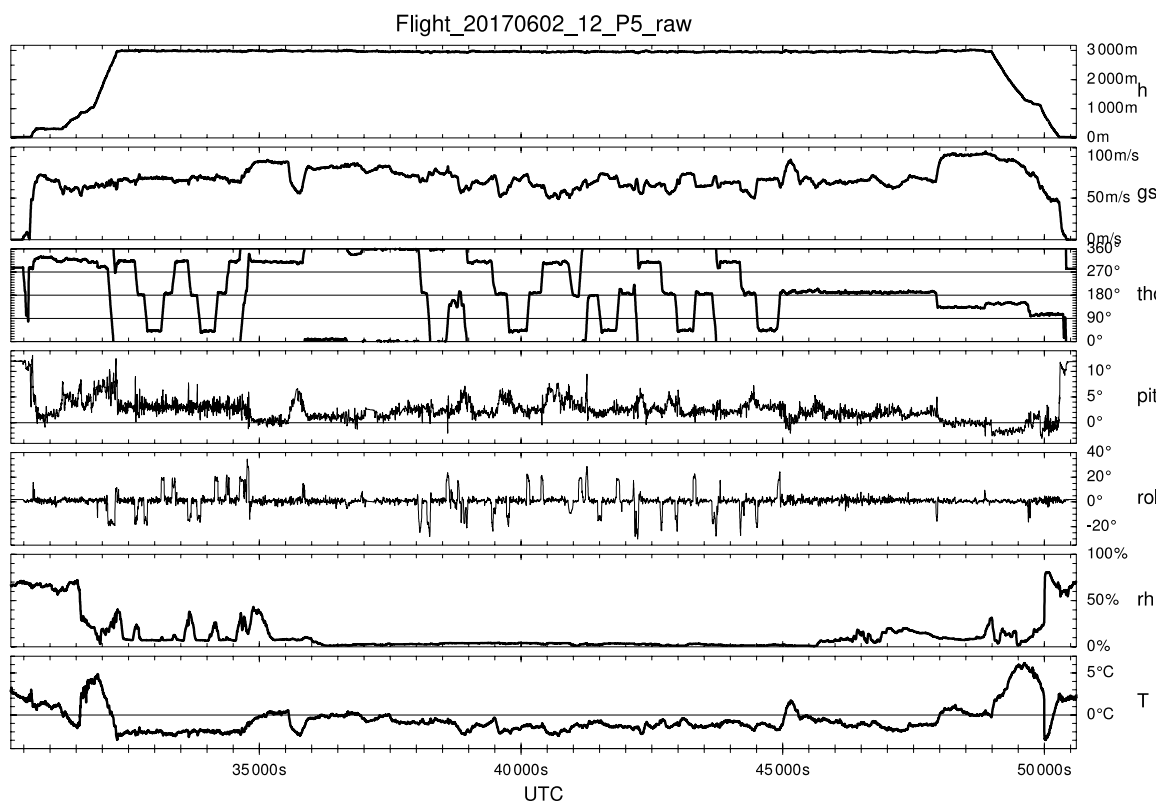
10 47 30 starting double triangular pattern for first time
 10 56 23 clouds have still some roll structures
 11 13 04 20 min ago the heating started to work again
 11 31 14 restarted smart spec
 11 27 48 finishing pattern to go back to c1
 12 34 37 dropsonde died at 1000m and prepare new one
 12 55 19 approaching again the ice edge probably
 13 22 17 reaching C1
 13 37 40 descending
 13 40 32 glacier full with clouds
 13 55 30 landing

15 mile straight leg, parallel to wind



Quicklooks:

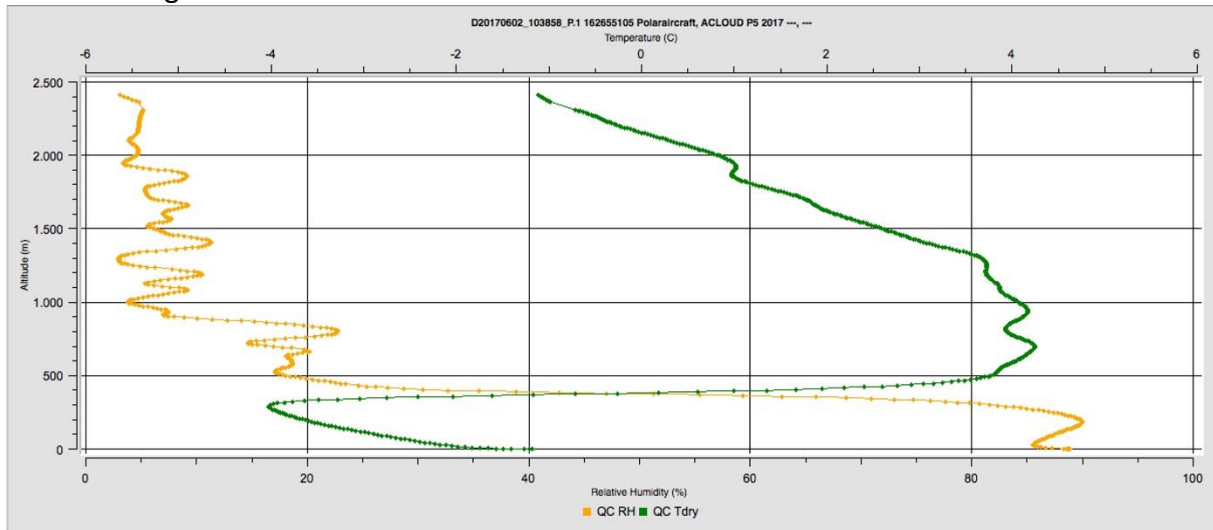
Except firts albedo measurements above the glacier all measurements were taken at 10.000 ft.



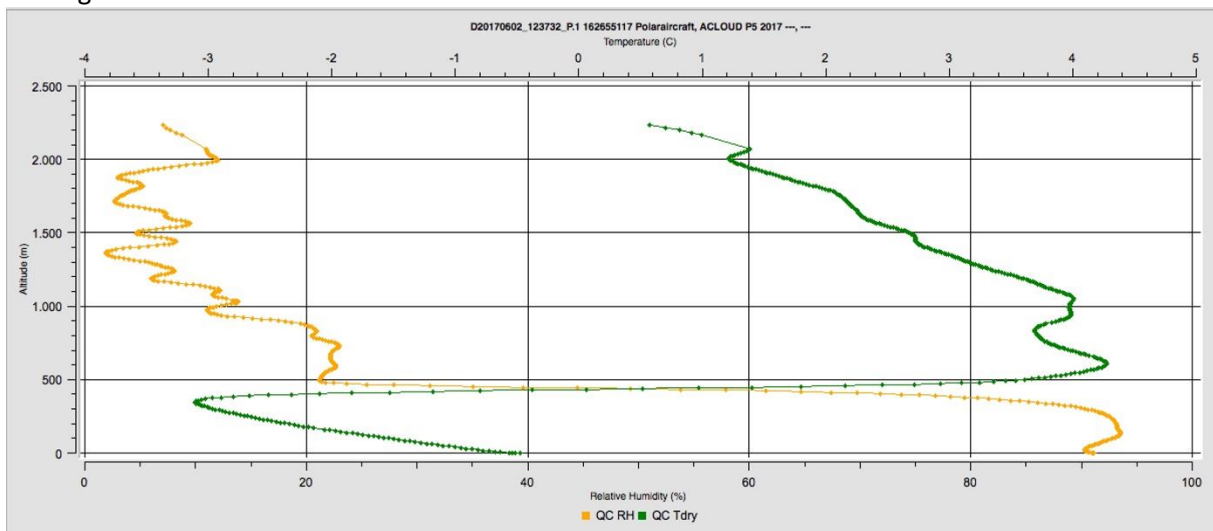
Drop Sondes

9:49 1st sonde at satellite overpass only down to about 1700 m due to power outage

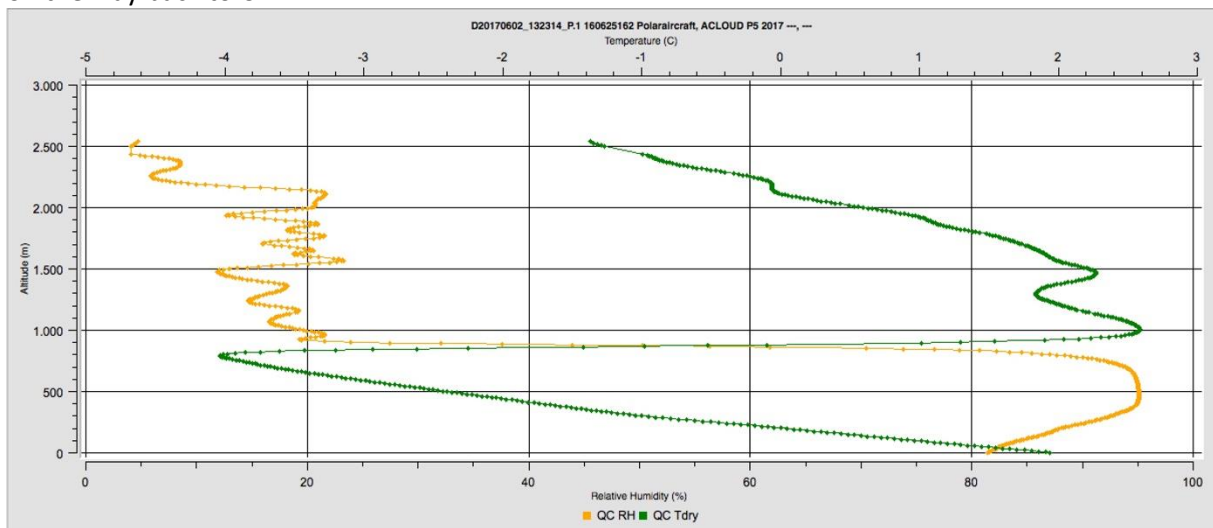
10:39 arriving in Polarstern area

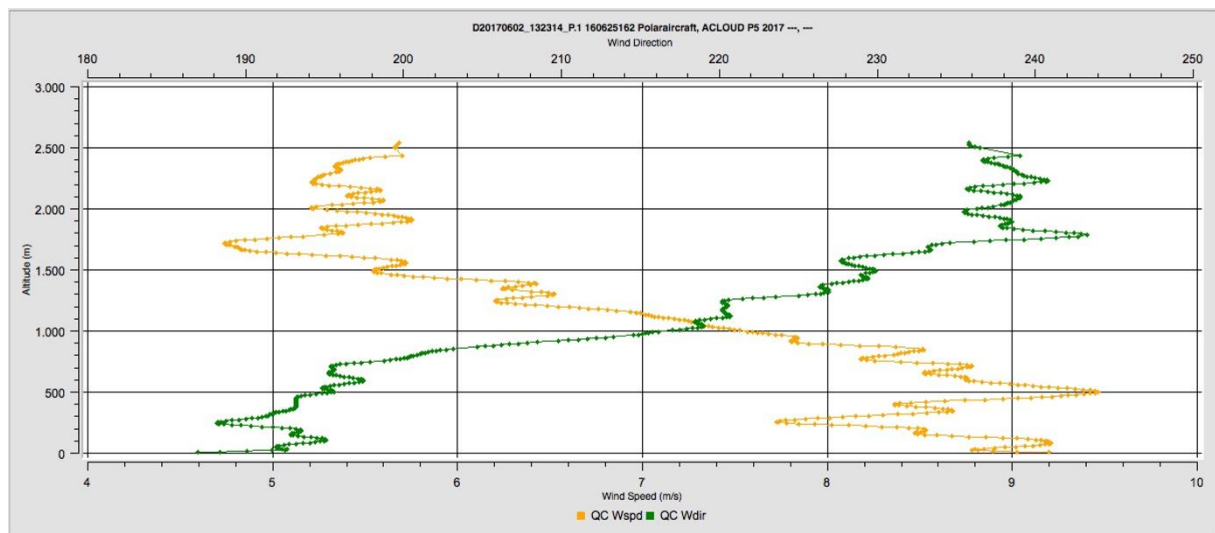


leaving the Polarstern area



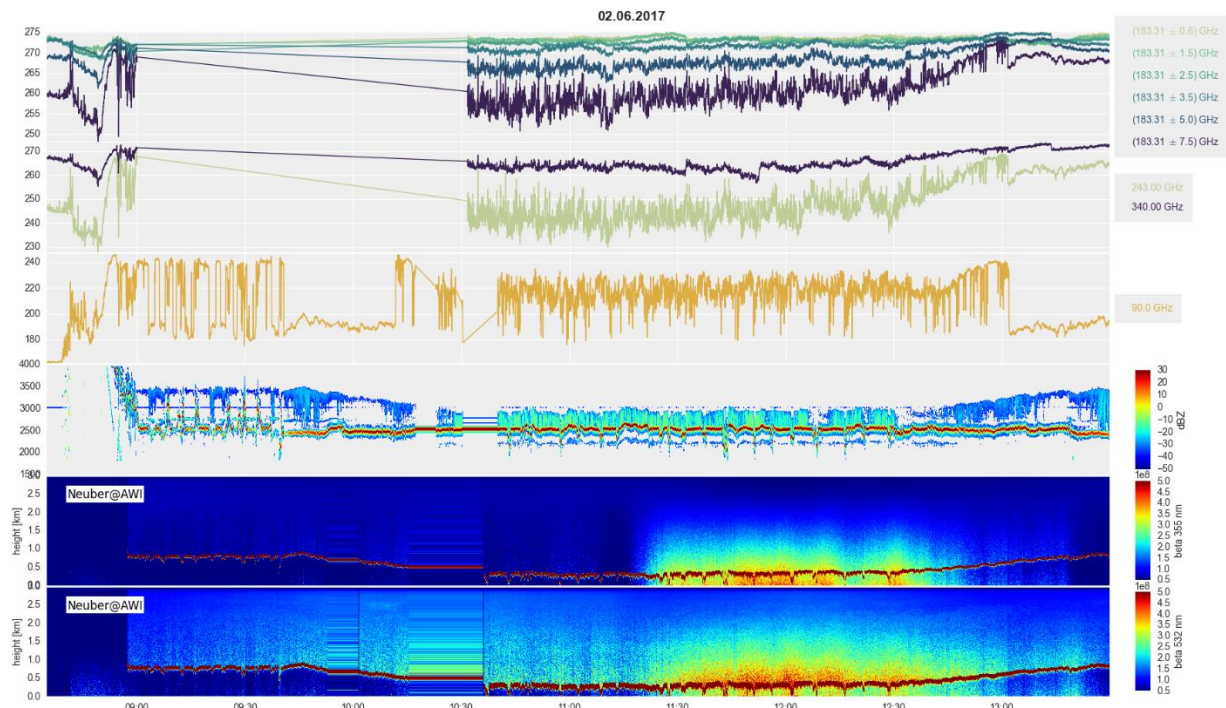
on the way back to C1





SMART

MiRAC & AMALI



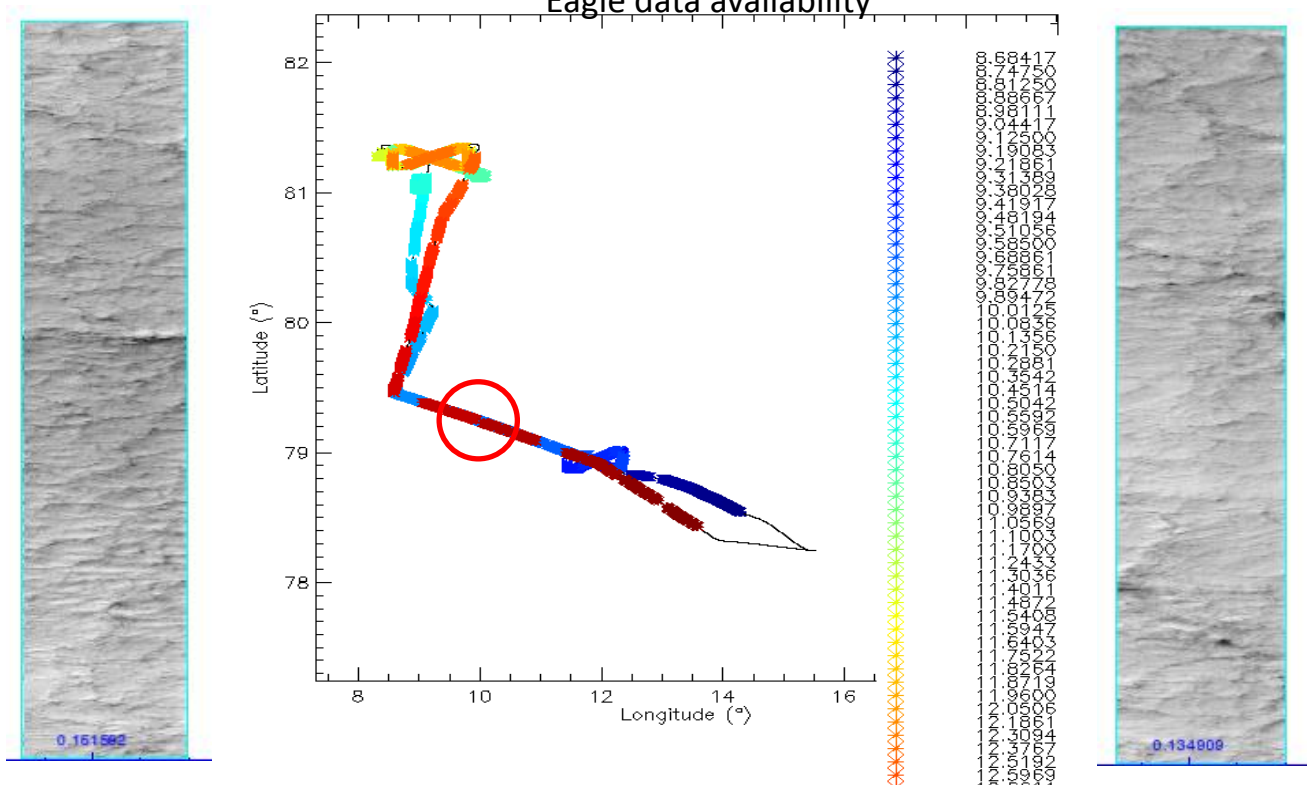
Eagle/Hawk

during satellite underpass

GPS Start Time = UTC TIME: 09:45:31.0574

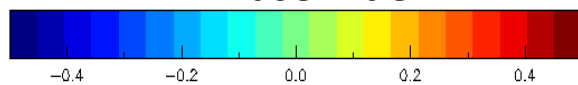
GPS Stop Time = UTC TIME: 09:53:32.0809

Eagle data availability

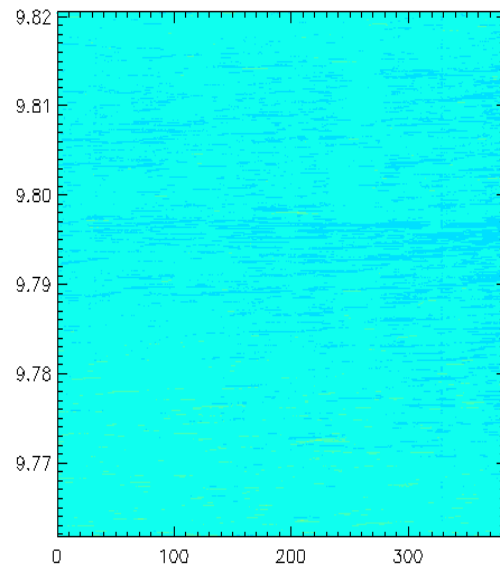
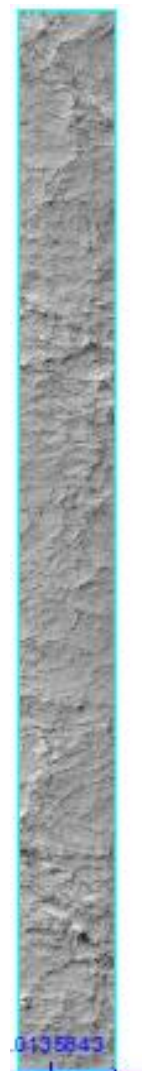
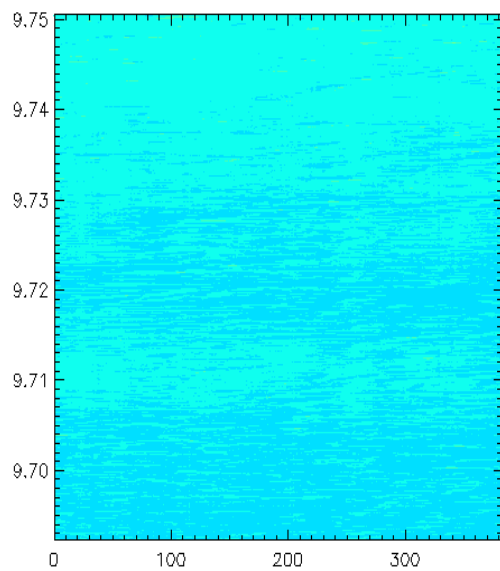


Phase index

Liquid



Ice



0.148003

0.135843

CANON Fish-Eye

