

HALO-(AC)³ – 2022/04/07 – Polar5 research flight 12

Objectives:

Intensiv measurements

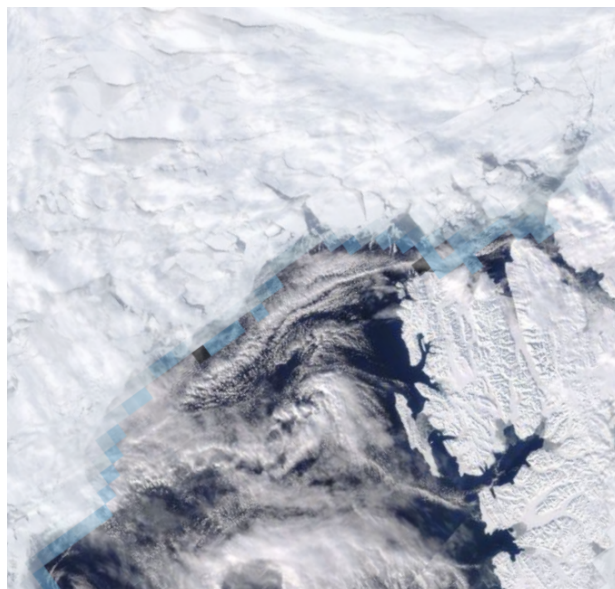
Meet with Polar 6 and HALO on the intensive measurement leg.

Polar 5 Crew	
Mission PI	Mario Mech
Basis Data Acq.	Maximilian Stöhr
SMART/ Eagle/Hawk	Evelyn Jäkel
MiRAC	Nils Risse
AMALi	Johanna Mayer
Dropsondes	Daria Paul
Pilot	James Steward
1st officer	Noah Hladiak

Mission PI P5:

Mario Mech mario.mech@uni-koeln.de

Polar 5	
Take off	09:10 UTC
Touch down	13:33 UTC
Flight time	04:23



MODIS RGB composite satellite image and sea ice fraction observed by the Advanced Microwave Scanning Radiometer (AMSR2) (screenshot from NASA worldview) for the measurements region on 7 April 2022.

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

The weather situation was dominated by a polar low directly west of Svalbard with corresponding precipitation at convergence lines between Svalbard and the coast of Greenland. This constellation resulted in different overlaying cloud structures west of Svalbard and transported cold air from the Arctic ocean into lower latitudes.

Overview:

Target of this research flight was the investigation of the cirrus connected to the Polar low West of Svalbard. HALO should observe the cirrus with WALES from above while the Polar 5 shall fly between the cirrus and the lower cloud layer to perform radiative flux measurements.

The idea was that HALO provides information on the vertical extent of the higher cloud layer so that Polar 5 can adjust its altitude . Due to missing reports from HALO, this has been not possible. Therefore, Polar 5 stayed on 10000 ft for the first legs and decided to go underneath the cloud for the last eastward leg on 200 ft till the low level clouds started over ocean. This decision has been made based on the radar measurements.

Instrument Status:

Polar 5	
Basis data acquisition	
Nose Boom	
MiRAC-A	
HATPRO	
AMALi	
SMART	
Eagle	
Hawh	
Dropsondes	18 (2 with no/bad GPS signal)

Table S5.1: Instrument status as reported after the flight for all instruments on Polar 5.

Comments: For AMALi, the Q-switch hasn't been properly pressed in the beginning so some data is missing. 2 out of 18 dropsondes had a bad GPS signal. Noseboom was only partly working like the days before.

Detailed Flight Logs:

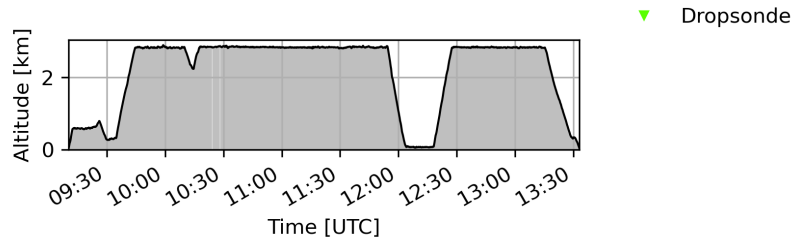
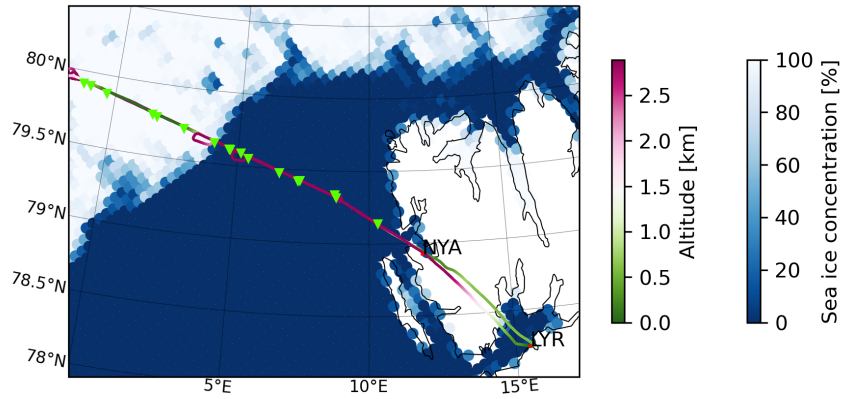
09:10 take off

09:20 Sveabreen

09:34 NYA and BELUGA
09:45 10000ft
09:52 DS01
09:53 DS01 has no temperature and humidity - bad sonde - prepare next one
09:54 cirrus in front of us
09:57 DS02
10:07 DS03
10:08 AMALi was not running so far
10:09 in clouds - going down to 9000ft
10:11 keep descending till we are below the cloud
10:14 climbing up to 10000ft again
10:18 DS04
10:28 DS05
10:38 DS06
10:50 DS07
10:53 low level clouds start over water.
10:57 DS08
11:03 only low level clouds - nothing around the aircraft
11:05 DS09
11:16 DS10
11:29 DS11
11:42 DS12
11:52 DS13
11:54 going down to 1800 ft to be below cloud
12:18 climb back to 10000ft
12:24 turn around to be on 10000ft above the clouds that form over open water and to be able to drop a sonde at exactly the HALO location
12:30 AMALi back on
12:32 DS14
12:41 DS15 at the same location as HALO to investigate BL profile. Bad GPS
12:50 DS16 launched
12:54 lost contact to DS16 cause of no gps signal
12:56 DS17
13:03 DS18 clear sky sonde

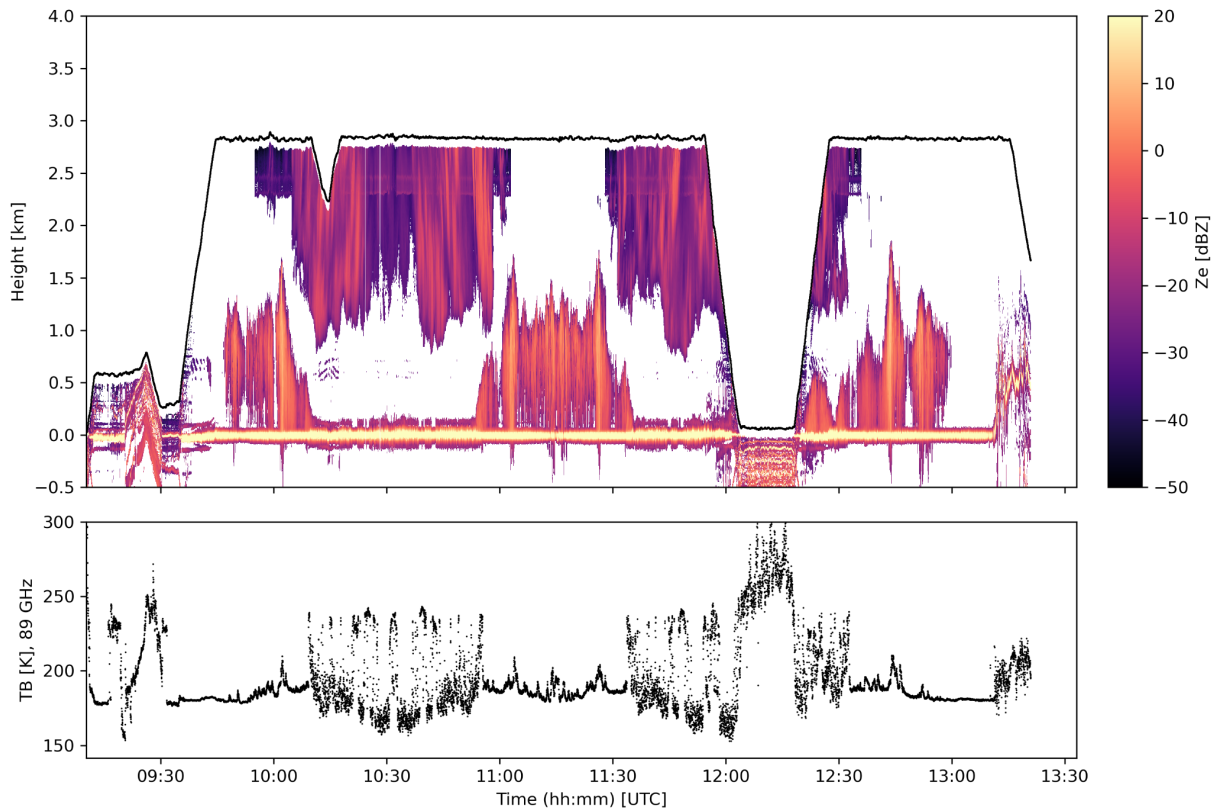
Quicklooks:

Flight track, 2022-04-07, 09:10-13:33 UTC



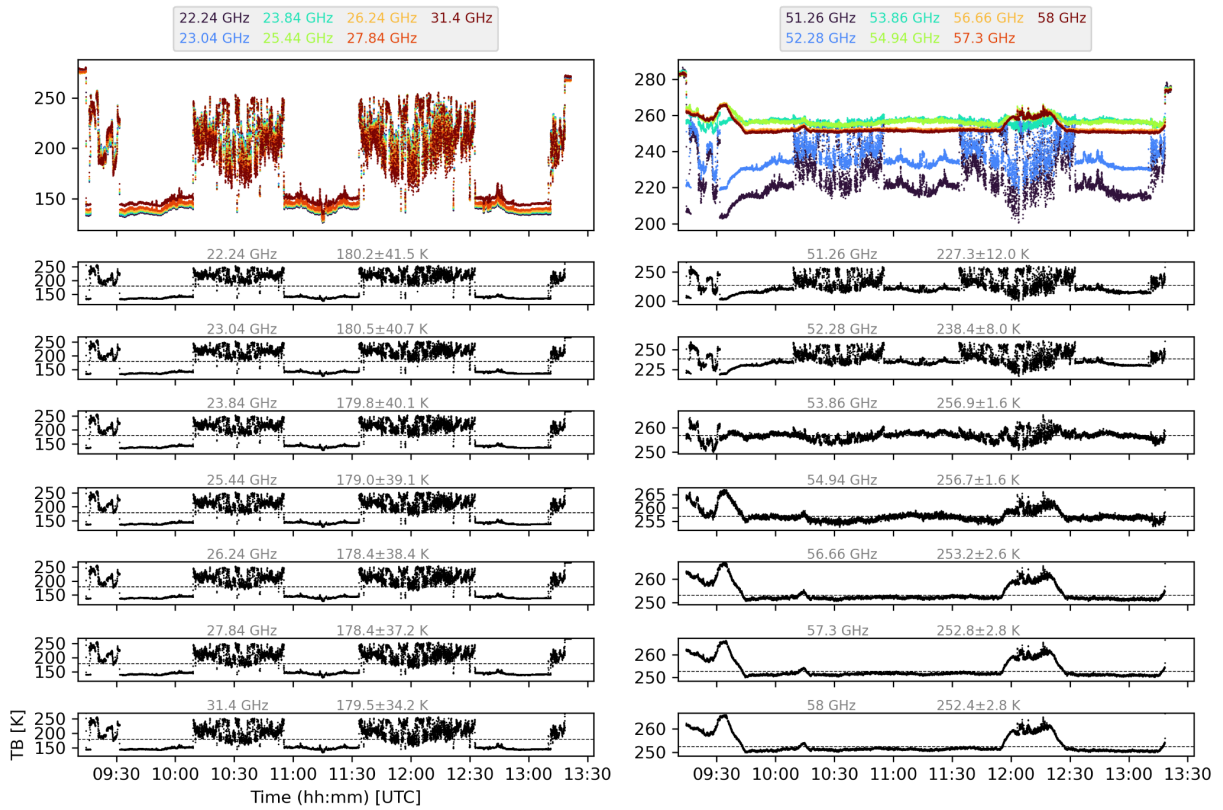
Flight track including sea ice coverage, dropsonde location and flight altitude.

MiRAC-A, 2022-04-07, 09:10-13:33 UTC

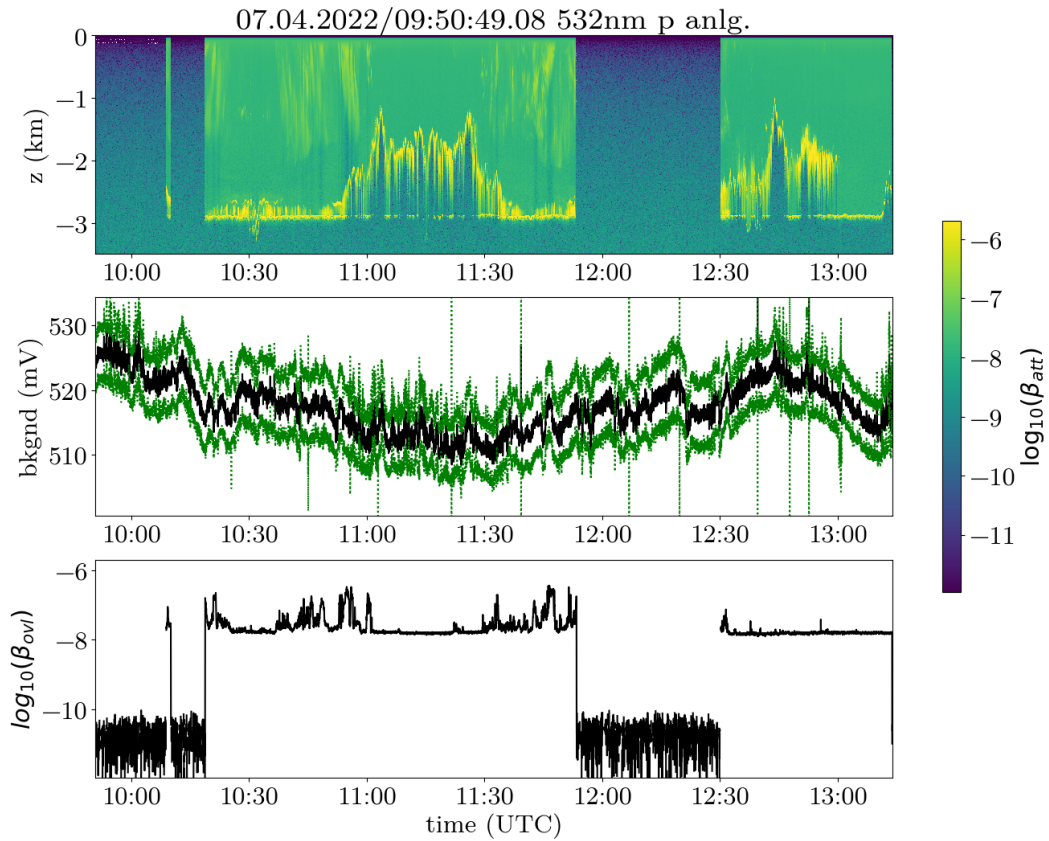


MiRAC radar reflectivity and 89 GHz brightness temperatures.

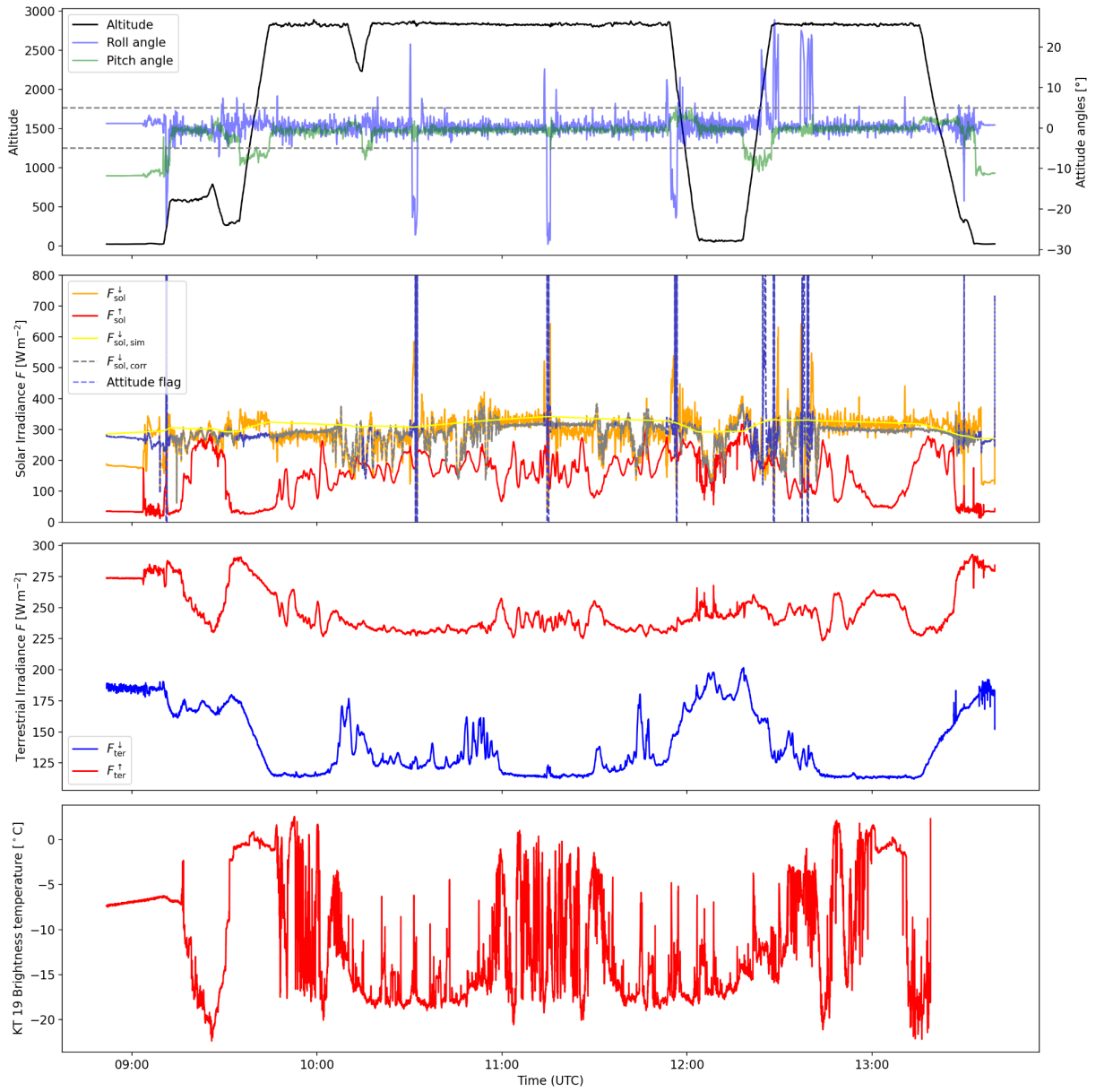
HATPRO, 2022-04-07, 09:10-13:33 UTC



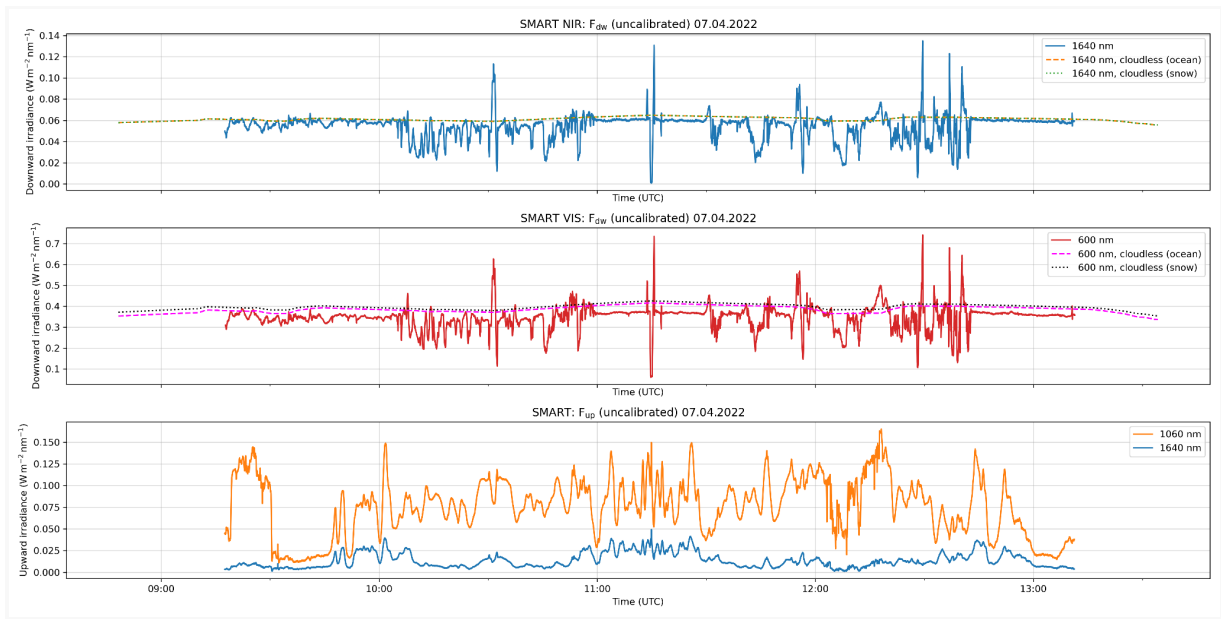
HATPRO brightness temperature observations at 22GHz water vapor channels (left) and oxygen band at 58 GHz (right).



AMALI backscattering at 532 nm.



Broadband radiation measurements and KT19.



SMART spectral radiances.

Nikon camera can be found on the [wiki](#).