

# Polar 5 and Polar 6 activities in the Arctic within *(AC)*<sup>3</sup>

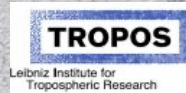
contributions by researchers from  
**Uni Leipzig, Uni Köln, AWI, TROPOS,  
MPI Mainz, DLR, LaMP, and Uni Mainz**  
engineers from AWI  
pilots and technician from Kenn Borek  
presented on behalf of the *(AC)*<sup>3</sup> by  
**Mario Mech**



UNIVERSITY  
OF COLOGNE



UNIVERSITÄT  
LEIPZIG



HALO-AC3 workshop, 1-4 June 2026, Bergen, Norway



Model: Basler BT-67

Year commissioned at the AWI: 2007 || 2011

Length: 20.66 metres

Wingspan: 29 metres

Basic weight: 8.3 t (with ski landing gear 8.9 t)

Max. take-off weight: 13 t

Max. take-off elevation without payload: 4,200 metres

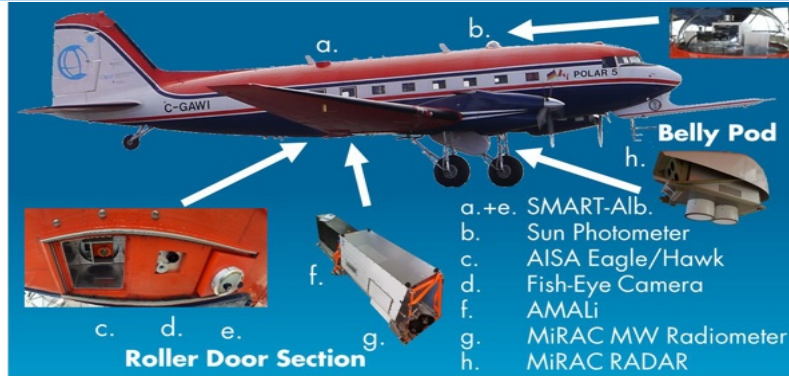
Range without payload: ca. 3,000 kilometres

Range with 1,000 kg payload: 2,300 kilometres

Max. cruising speed: 315 km/h (IAS)  $\approx$  170 kt

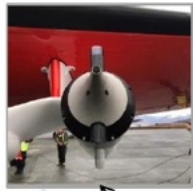
Min. cruising speed: 167 km/h  $\approx$  90 kt

Crew: 2 pilots, 1 engineer, max 8 researchers

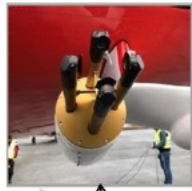


**Polar 5** (typically)  
 Focus on remote sensing  
 but also equipment for  
 in-situ (turbulence, dropsondes, radiation)

POLAR 5			
SMART-Albedometer	Passive Solar	Spectral Irradiance (Upward, Downward)	Uni Leipzig
		Spectral Radiance (Upward, $FOV = 2.1^\circ$ )	
Aisa Eagle/Hawk <b>FOX</b>	Passive Solar	Spectral Radiance ( $FOV = 36^\circ$ , 1028 px / 348 px)	Uni Leipzig
180° Fish-Eye Camera	Passive Solar	Spectral Radiance ( $FOV = 180^\circ \times 180^\circ$ , 3908 px $\times$ 2600 px)	AWI/ Uni Leipzig
AMALi	Active Solar (Lidar)	Particle Backscattering Coefficient, Cloud Top Height, Particle Depolarization	AWI
MiRAC	Passive Microwave	Brightness Temperature	Uni Köln
	Active Microwave (Radar)	Radar Reflectivity Factor, Doppler Velocity, Doppler Spectra Width	Uni Köln
<b>GRaWAC</b>	<b>Active Microwave (Radar)</b>	<b>Differential Absorption Radar (DAR), Ze, Doppler,</b>	<b>Uni Köln</b>
Sun Photometer	Passive Solar (direct Sun)	Spectral Aerosol Optical Depth (AOD)	AWI
Broadb. Radiometer	Broadband radiometer	Solar and terrestrial irradiance (Upward, Downward)	DLR, Uni Leipzig
Nose Boom	Five-hole probe	3D wind vector, temperature and humidity, turbulent fluxes	AWI



LaMP  
Laboratory for Aerosol Measurement and Particle Dynamics  
PN



LaMP  
Laboratory for Aerosol Measurement and Particle Dynamics  
2D-S



DLR  
PIP

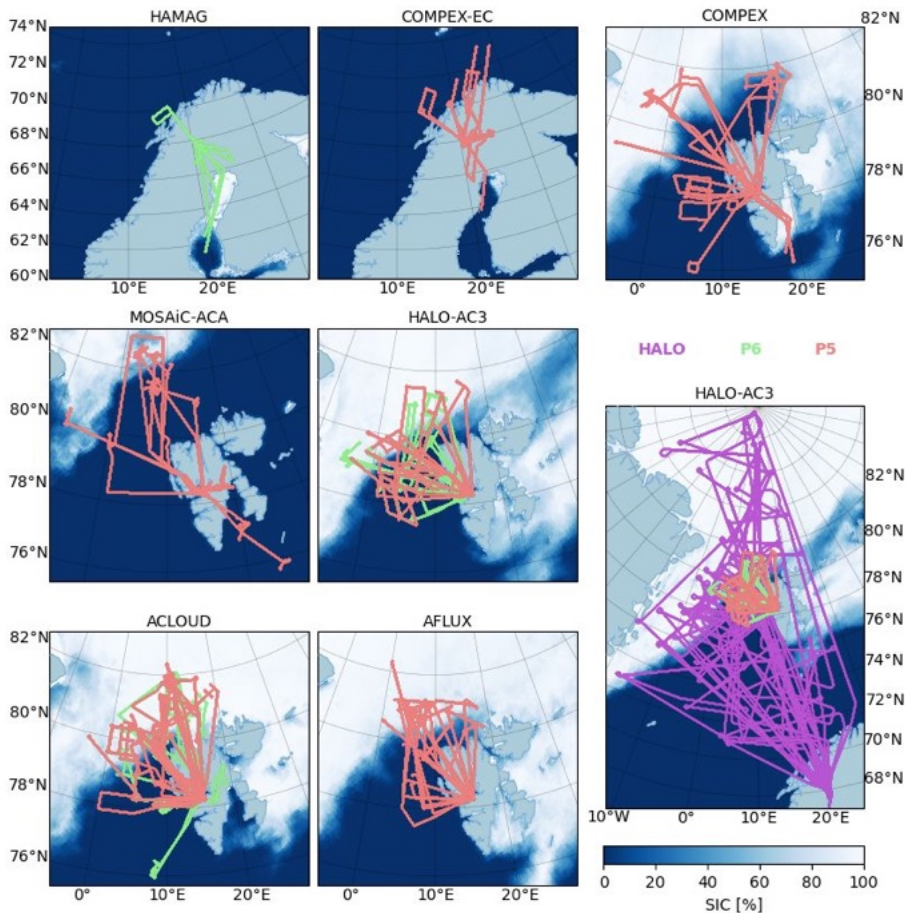


DLR  
CCP  
(CDP + CIP)



**Polar 6 (typically)**  
Focus on in-situ to a big share operated by partners

Names /Acronyms	Technique	Measured/Retrieved Quantities	Institution
<b>Polar 6</b>			
Polar Nephelometer 2	Cloud probe	Cloud particle scattering phase function	LaMP
2D-S	Cloud probe	Cloud particle shape and size, stereo particle images	LaMP
HSI	Cloud probe	Cloud particle shape and size	LaMP
PIP	Cloud probe	Precipitating particle size distribution and shape	DLR
CCP	Cloud probe	Cloud particle shape and size	DLR
BCPD	Cloud probe	Cloud particle shape and size	DLR
Nevzorov Probe	Cloud probe	Liquid and Total Water Content	AWI
CVI	Cloud residual inlet	Cloud particle residual sampling	TROPOS
CPC, UHSAS, OPC, PSAP	Optical particle counter	Particle number and size distribution, soot content	TROPOS
HERA	Aerosol Filter Sampler	Ice nucleating particles, laboratory particle analysis	TROPSO
SP2	Absorption photometer	Soot content	AWI
ALABAMA	Mass spectrometer	Particle chemical composition	MPI-Mainz
CO, CO <sub>2</sub> , H <sub>2</sub> O, O <sub>3</sub> sensors	Trace gas analyser	CO, CO <sub>2</sub> , O <sub>3</sub> concentration and humidity	Uni Mainz
Broadb. Radiometer	Broadband radiometer	Solar and terrestrial irradiance (Upward, Downward)	AWI, Uni Leipzig
Nose Boom	Five-hole probe	3D wind vector, temperature and humidity, turbulent fluxes	AWI



## **ACLLOUD:** May/June 2017 - Longyearbyen

Polar 5 (remote sensing) - 19 rfs, Polar 6 (in-situ) - 19 rfs

## **PAMARCMiP:** Mar/Apr 2018 - Station North

Polar 6 (remote sensing + in-situ) - 14 rfs

## **AFLUX:** Mar/Apr 2019 - Longyearbyen

Polar 5 (remote sensing + cloud in-situ) - 14 rfs

## **MOSAIC-ACA:** Aug/Sep 2020 - Longyearbyen

Polar 5 (remote sensing + cloud in-situ) - 10 rfs

## **HALO-(AC)<sup>3</sup>:** Mar/Apr 2022 - Longyearbyen (Kiruna)

Polar 5 (remote sensing) - 13 rfs, Polar 6 (in-situ) - 13 rfs, and HALO

## **BACSAM I:** Oct 2022 + **BACSAM II** (Apr 2024) - Longyearbyen

Polar 6 (in-situ) - 10 rfs + 13 rfs

## **HAMAG:** Feb 2024- Kiruna

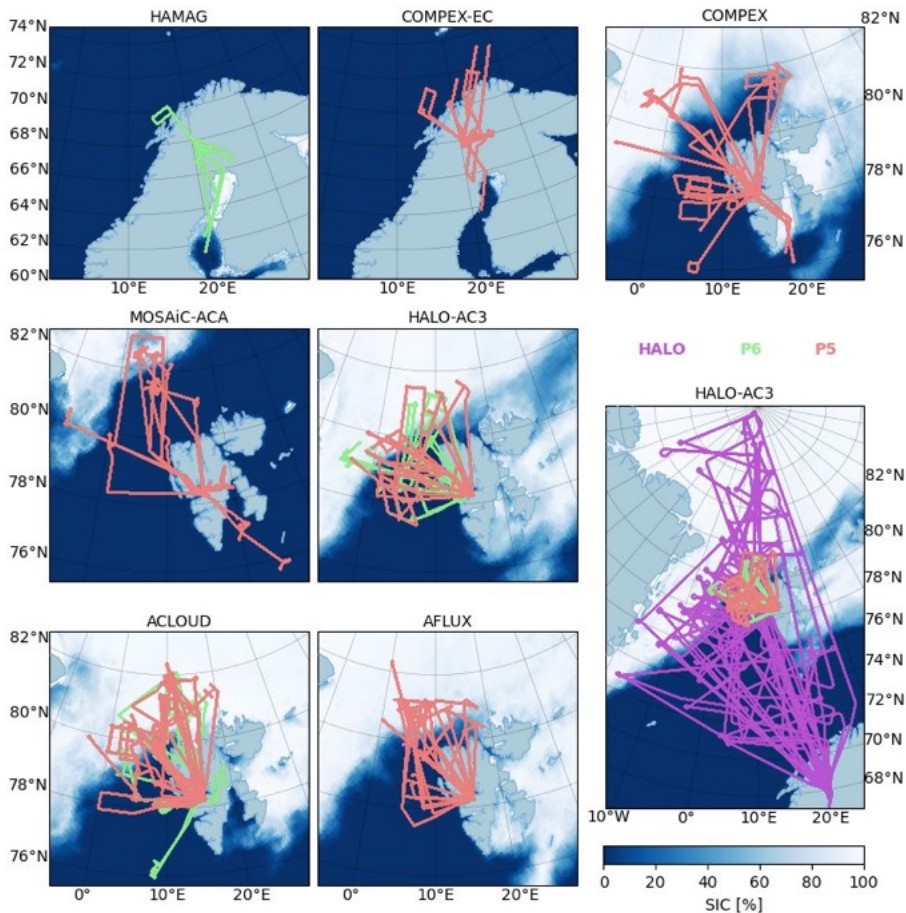
Polar 6 (remote sensing) - 6 rfs

## **COMPEX-EC:** Apr 2025 - Kiruna

Polar 5 (remote sensing) - 7 rfs

## **COMPEX:** Mar/Apr 2026 - Longyearbyen

Polar 5 (remote sensing) - 15 rfs



**ACLOUD:** May/June 2017

Polar 5 (remote sensing) - 19 rfs, Polar 6 (in-situ) - 19 rfs

**PAMARCMiP:** Mar/Apr 2018

Polar 6 (remote sensing + in-situ) - 14 rfs

**AFLUX:** Mar/Apr 2019

Polar 5 (remote sensing + cloud in-situ) - 14 rfs

**MOSAIC-ACA:** Aug/Sep 2020

Polar 5 (remote sensing + cloud in-situ) - 10 rfs

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**HAMAG:** Feb 2024

Polar 6 (remote sensing) - 6 rfs

**COMPEX-EC:** Apr 2025

Polar 5 (remote sensing) - 7 rfs

**COMPEX:** Mar/Apr 2026

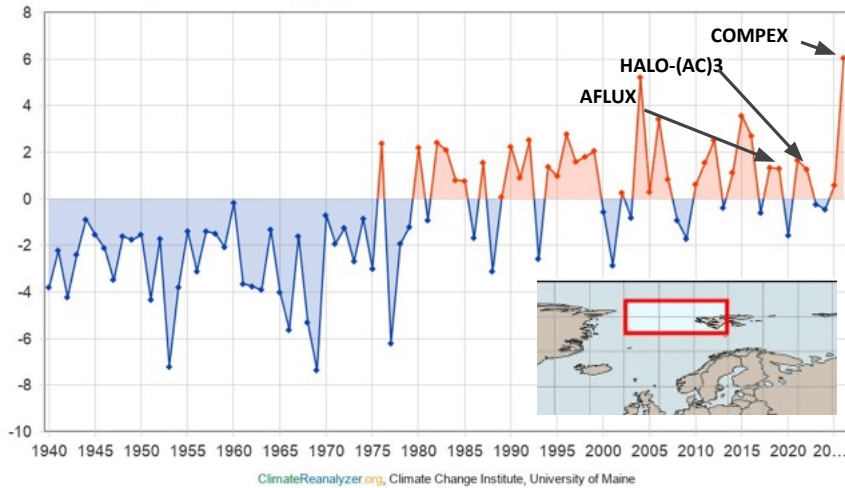
Polar 5 (remote sensing) - 15 rfs

**13 campaigns out of  
Longyearbyen, Station  
North, and Kiruna with  
Polar 5 and Polar 6 (10 with  
focus on clouds):**

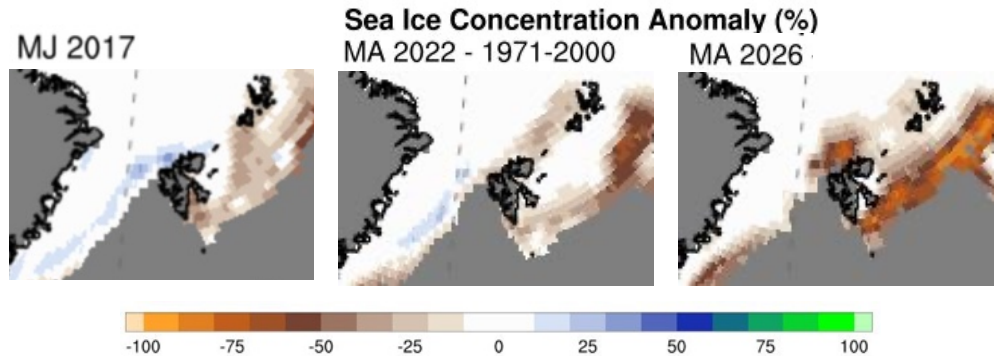
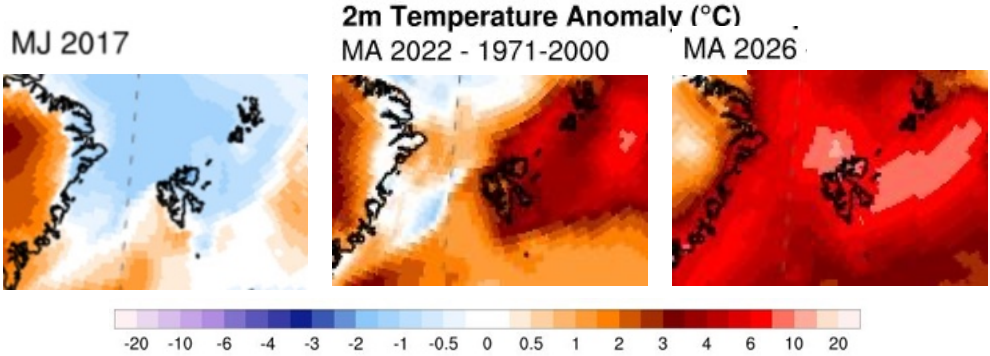
**153 research flights  
497 flight hours**

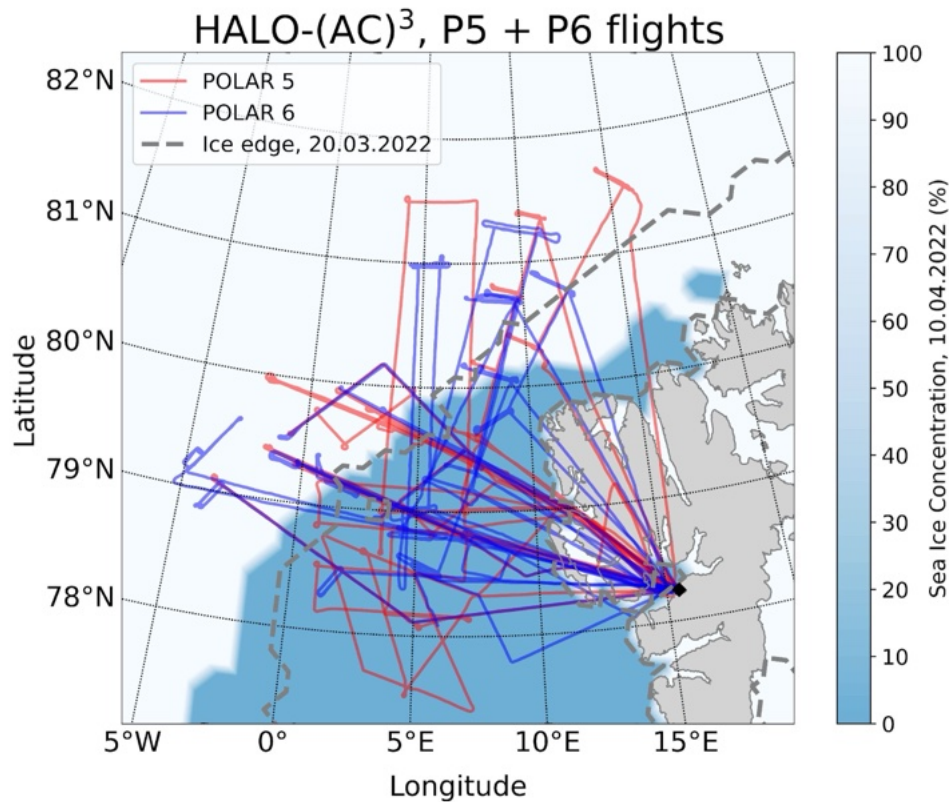
## March/April

ECMWF ERA5 (0.5x0.5 deg) | Location (75°N-85°N, 10°W-20°E)  
MA 2m Temperature Anomaly (°C), 1971-2000 baseline



**ACLOUD May/June 2017** t2m anomaly -0.234K  
**MOSAic-ACA Aug 2020** t2m anomaly -2.053K





All flight tracks from HALO-(AC)<sup>3</sup>. The ice edge is shown at the beginning of the campaign (dashed line) and the end. (courtesy M. Klingebiel)



Photograph of the Polar 5, taken from the Polar 6, during RF11 (courtesy J. Schneider).



Clouds streets during RF09 of Polar 5 (courtesy S. Schnitt)



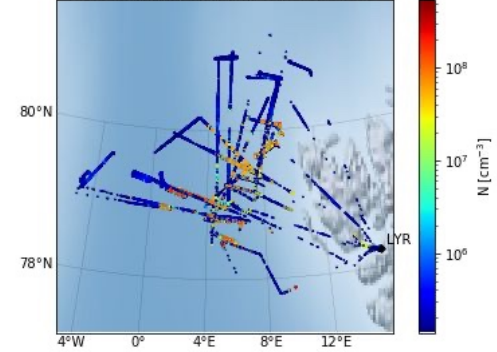
Stratus layer over the arctic ice during RF03 of Polar 5. (courtesy M. Klingebiel)



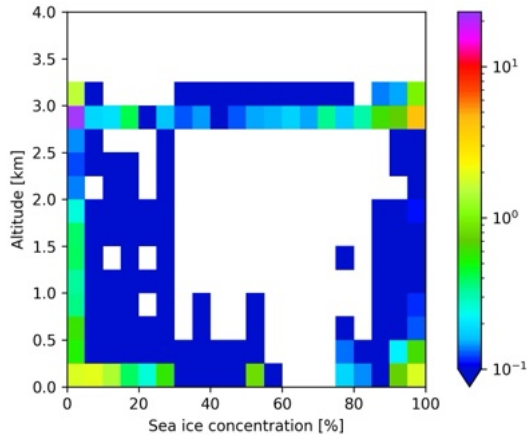
142 dropsondes

Time in clouds **1912 min**  
 (32h)  
 (AFLUX: 1643 min (27h))  
 (M. Moser)

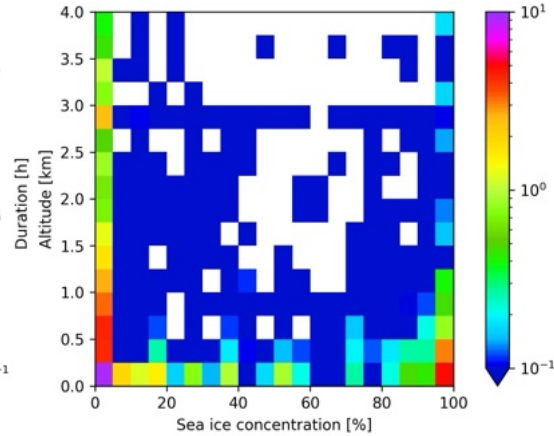
CDP measurements during HALO-AC3



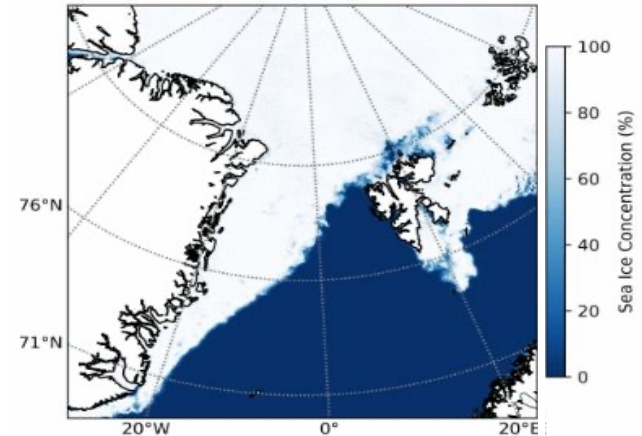
Polar 5



Polar 6



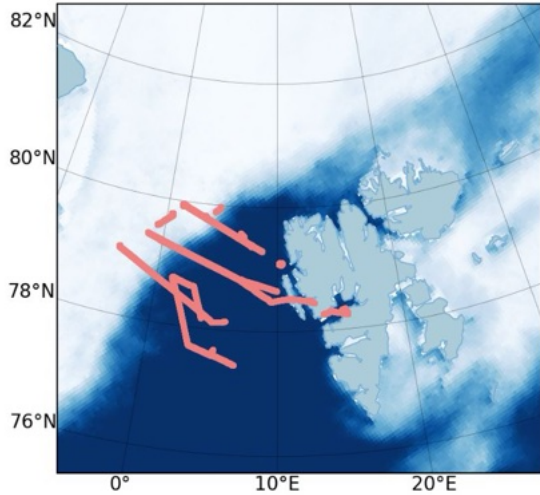
04.03.2022



Polar 5: most of the time in 3000 m for remote sensing  
 Polar 6: low level flights and profiling over ocean and ice  
 (N. Risse)

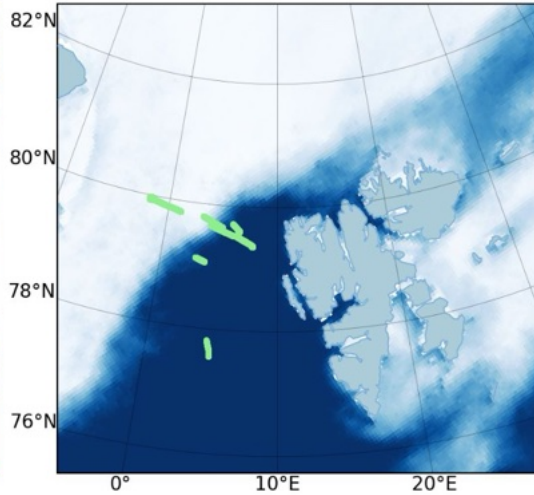
# Collocations of Polar 5/6 and HALO during HALO-(AC)3

Polar 5 vs Polar 6



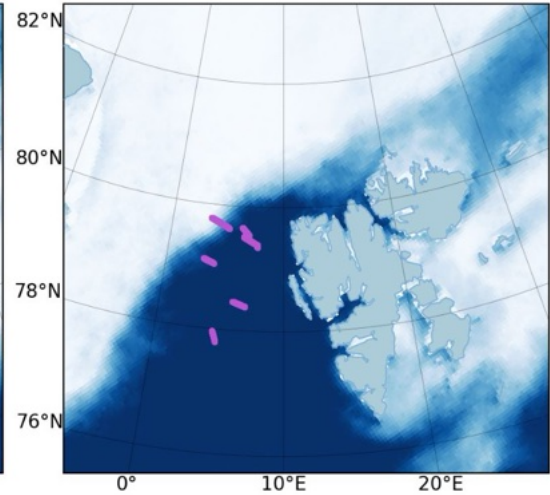
~800 mins during 7 rf

Polar 5 vs HALO

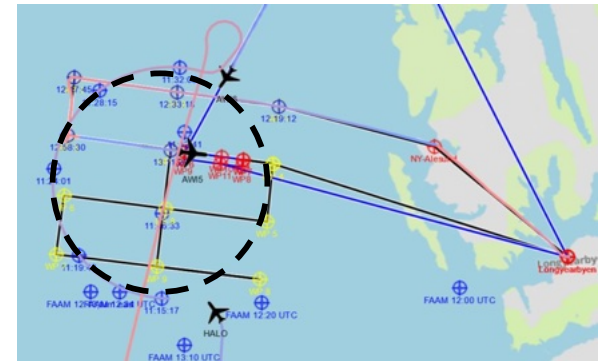
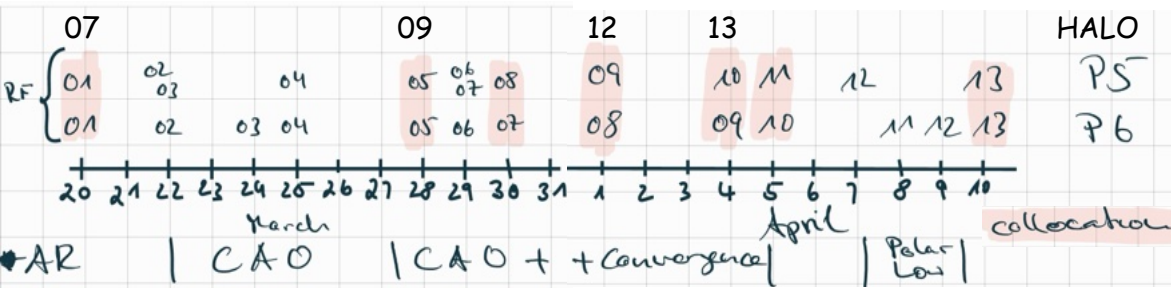


68 mins during 5 rf

Polar 6 vs HALO



45 mins during 4 rf

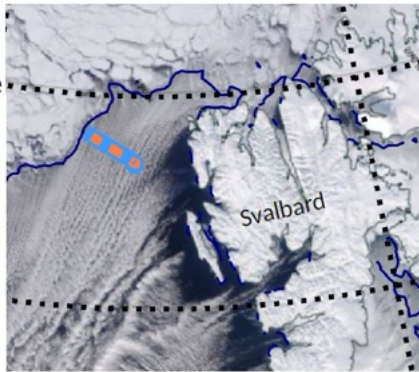
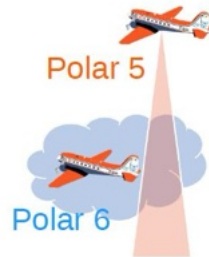




Two methods to **quantify** normalized rime mass  $M$  using

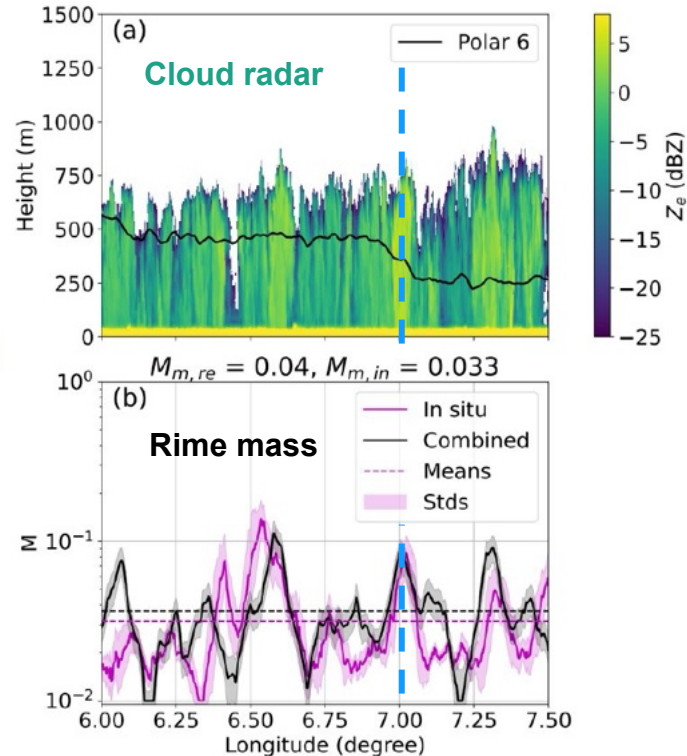
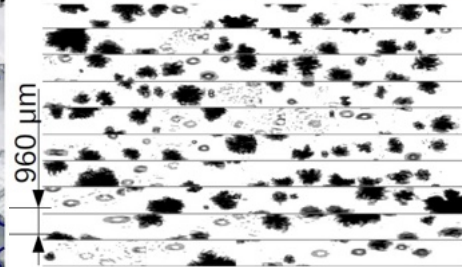
1. **Combined** cloud radar and in-situ retrieval (OEM)
2. **In-situ** observed particle shapes

- Polar 5
- Polar 6
- Sea ice edge



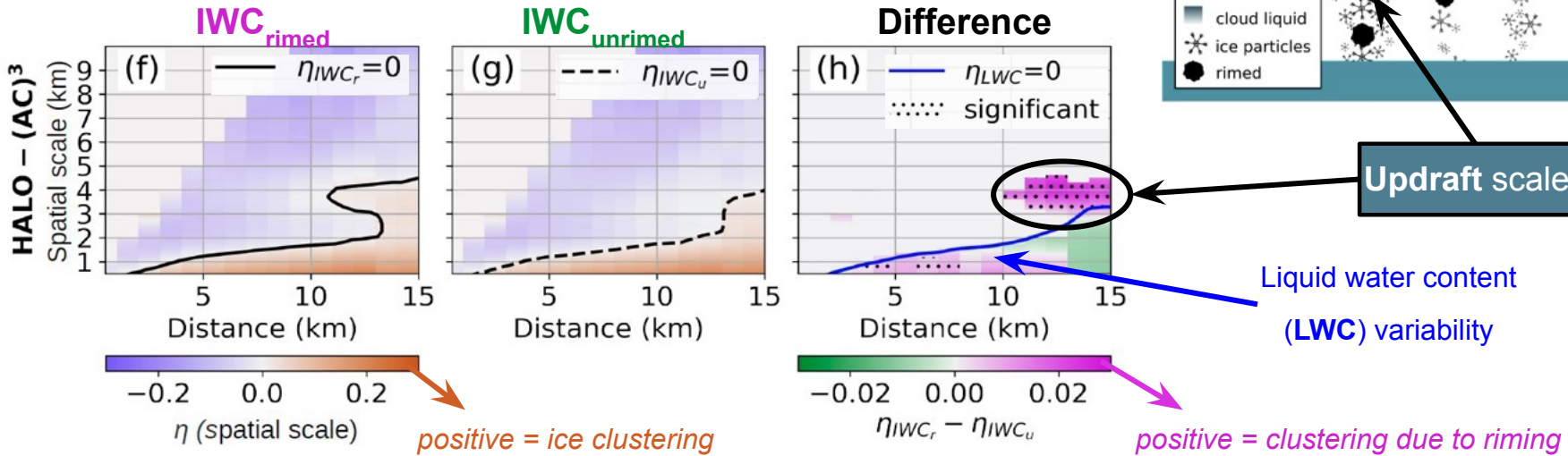
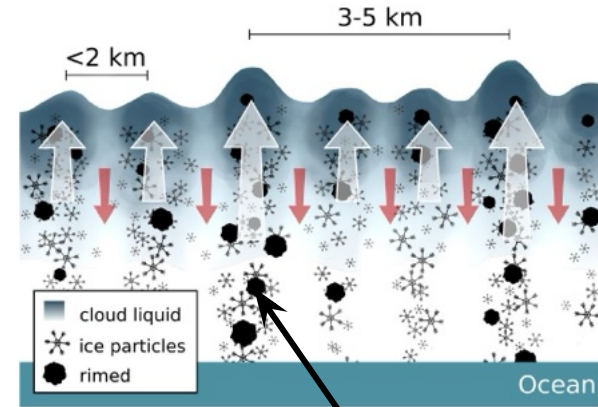
MODIS Terra (NASA worldview)

Example cloud particle images



**Maherndl, N., Moser, M., Lucke, J., Mech, M., Risse, N., Schirmacher, I., and Maahn, M.:** Quantifying riming from airborne data during the HALO-(AC)<sup>3</sup> campaign, *Atmospheric Measurement Techniques*, 17, 1475–1495, <https://doi.org/10.5194/amt-17-1475-2024>, 2024.

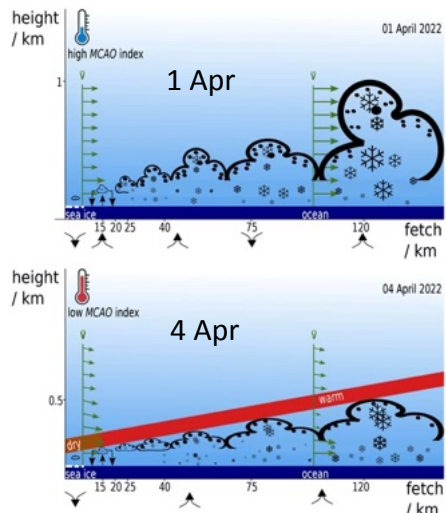
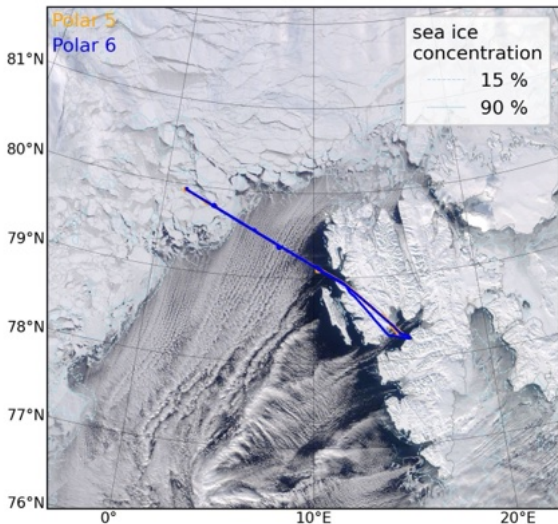
Observed ice water content (IWC) **clustering** due to riming in strong updrafts every 3-5 km in cold air outbreak clouds.



**Maherndl, N., Moser, M., Schirmacher, I., Bansemer, A., Lucke, J., Voigt, C., and Maahn, M.:** How does riming influence the observed spatial variability of ice water in mixed-phase clouds?, *Atmos. Chem. Phys.*, 24, 13935–13960, <https://doi.org/10.5194/acp-24-13935-2024>, 2024.

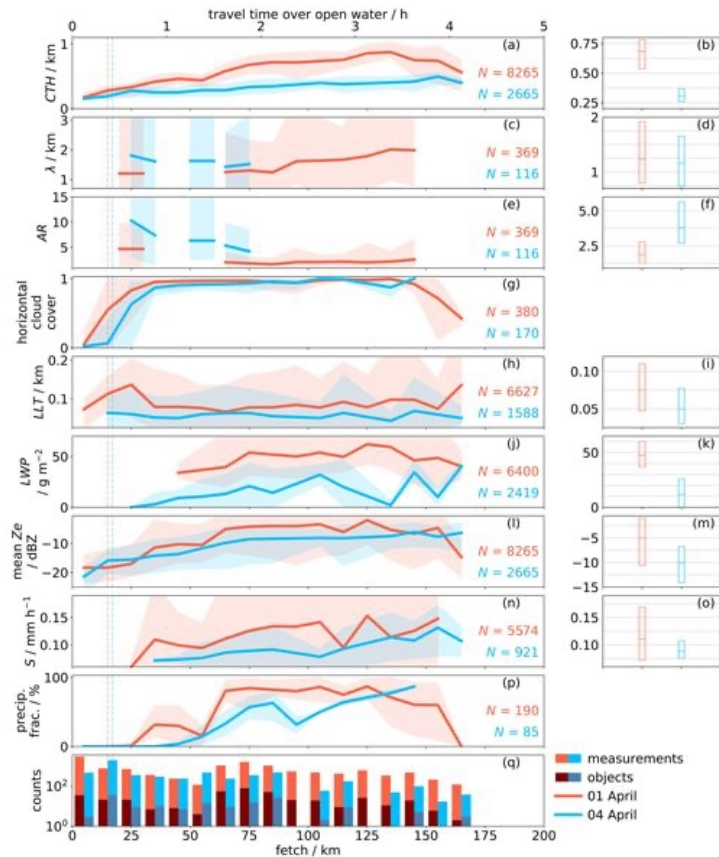
Polar 5 (MiRAC, HATPRO, AMALi) and Polar 6 (in-site) used during 1. and 4. April's mCAO over Fram Strait during HALO-(AC)<sup>3</sup>.

HALO-AC3, 2022-04-01



**Mixed-phase clouds and precipitation develop extremely rapidly after Arctic air leaves the sea ice, demonstrating the strong control of ocean surface fluxes on early cold-air-outbreak cloud evolution.**

Schirmacher et al. (2024, ACP)



fetch = distance from sea ice



Polar 5 (radar, lidar, dropsondes, fisheye, radiation) and Polar 6 (cloud microphysics)  
mCAO over the Fram Strait on 4 April 2022

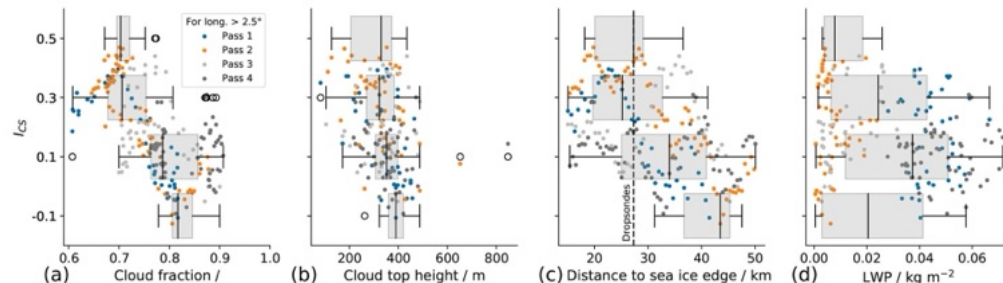
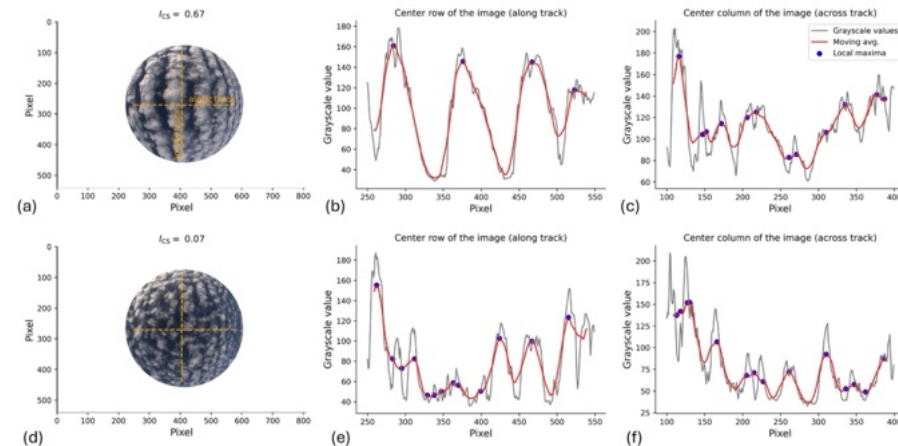
(Klingebiel et al., 2025, ACP)

cloud streets index

$$I_{CS} = 1 - \frac{n_{lt}}{n_{ct}}$$

- Cloud streets transitioned to isotropic cloud fields as wind speeds decreased below  $\sim 12 \text{ m s}^{-1}$ .
- During the transition:
  - Cloud fraction increased from **0.73**  $\rightarrow$  **0.84**
  - Cloud-top height increased from **330**  $\rightarrow$  **390 m**
  - Liquid water path increased.
- Cloud organization strongly influenced cloud radiative properties and surface albedo.

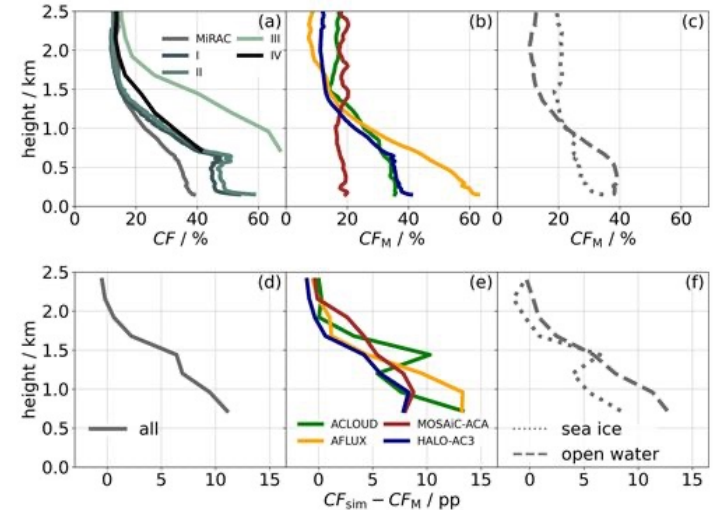
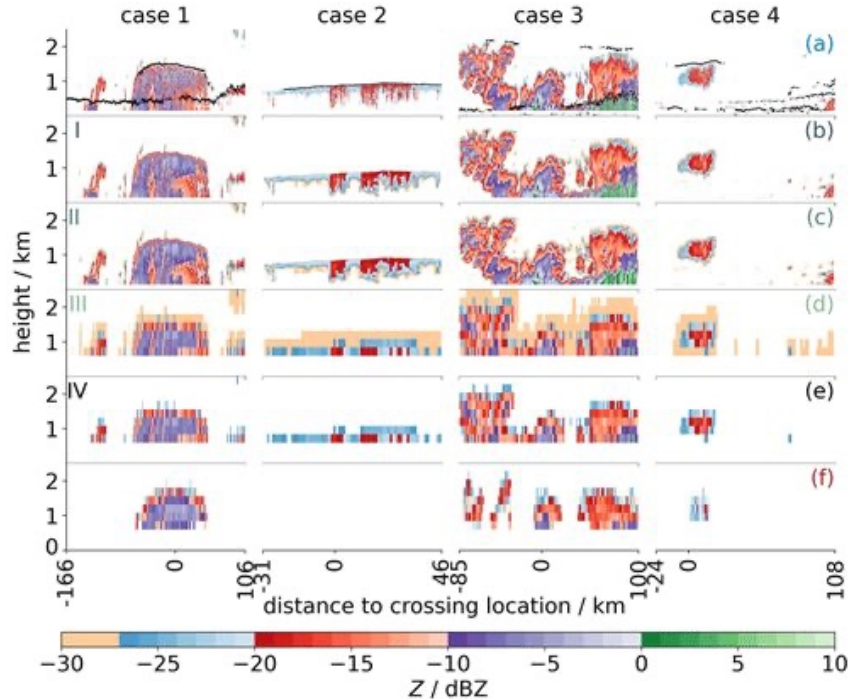
**Boundary-layer wind shear controls Arctic cloud organization, which in turn affects cloud microphysics and radiative forcing during CAOs.**



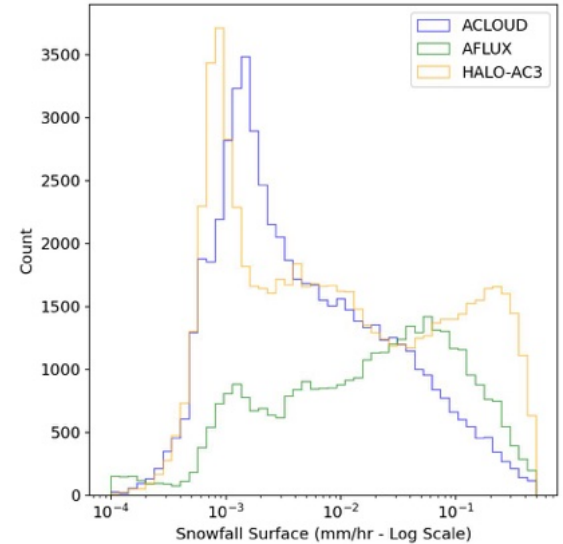
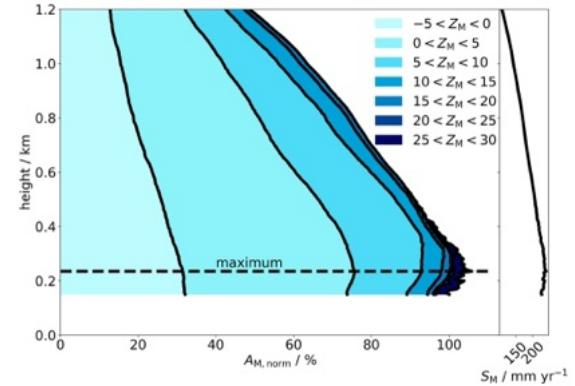
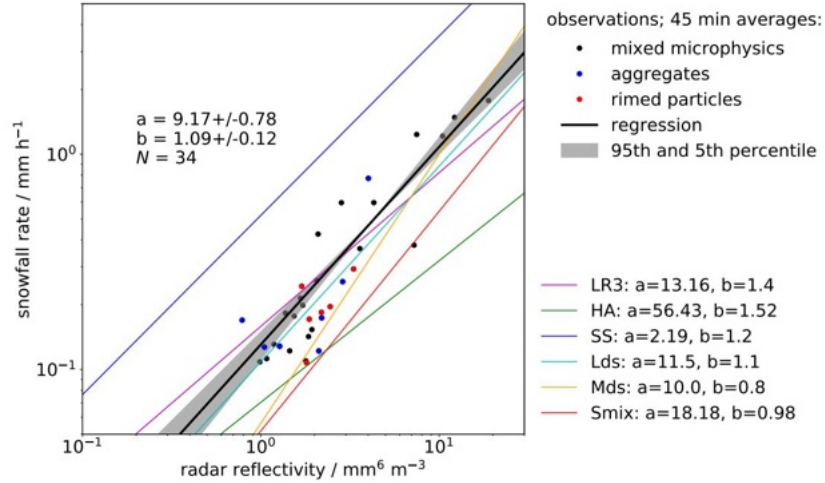
**MiRAC 94 GHz cloud radar aboard Polar 5** used to evaluate how well the **CloudSat** satellite radar detects Arctic low-level clouds and precipitation.

*Schirmacher et al. (2023, AMT)*

More than **25 000 km** of airborne observations from multiple Arctic campaigns (ACLOUD, AFLUX, MOSAIC-ACA, and HALO(AC)<sup>3</sup>) were analyzed.

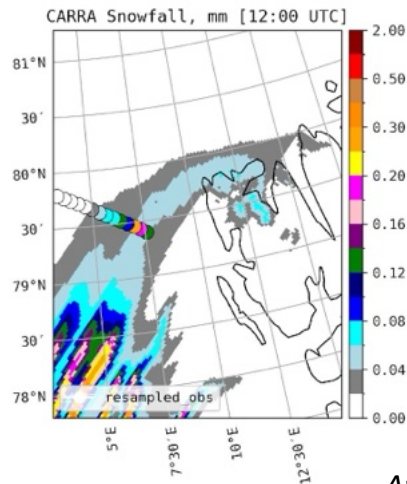
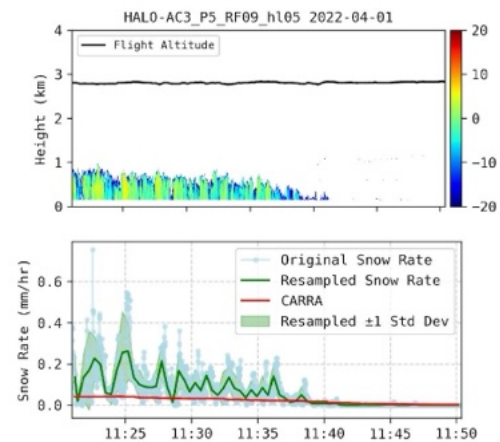
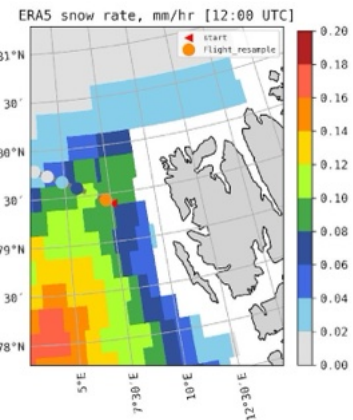
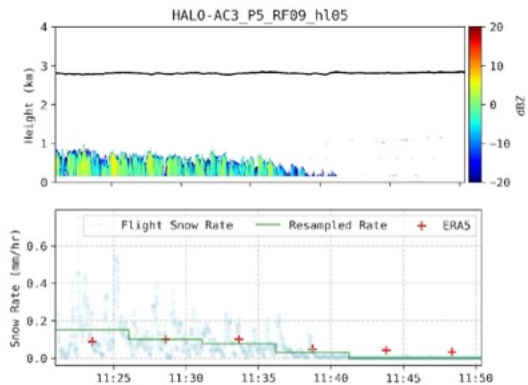


**Satellite radars substantially underestimate Arctic low-level cloudiness and precipitation, highlighting the importance of aircraft measurements for Arctic cloud climatology and model evaluation.**

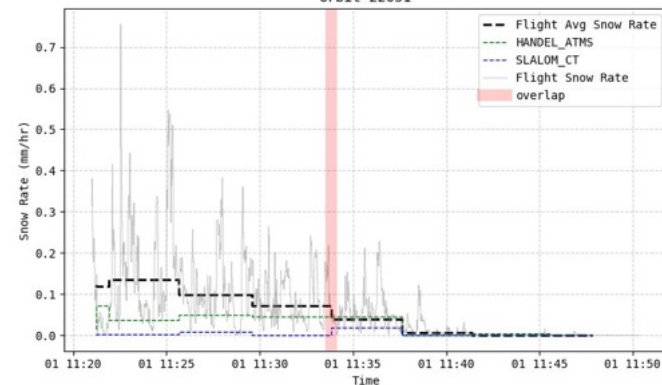
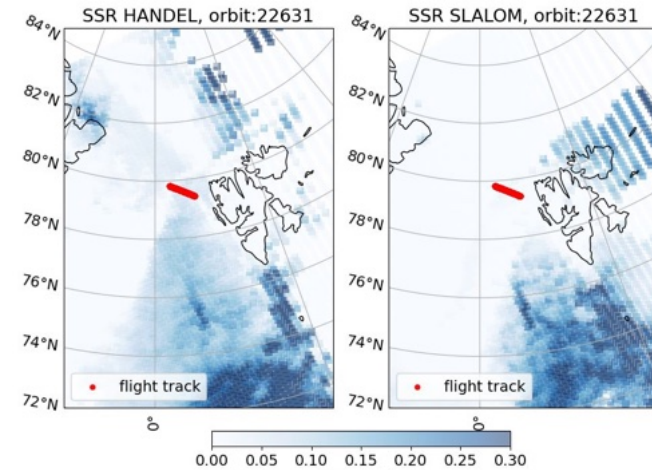


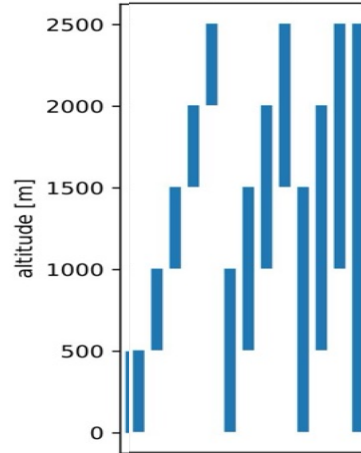
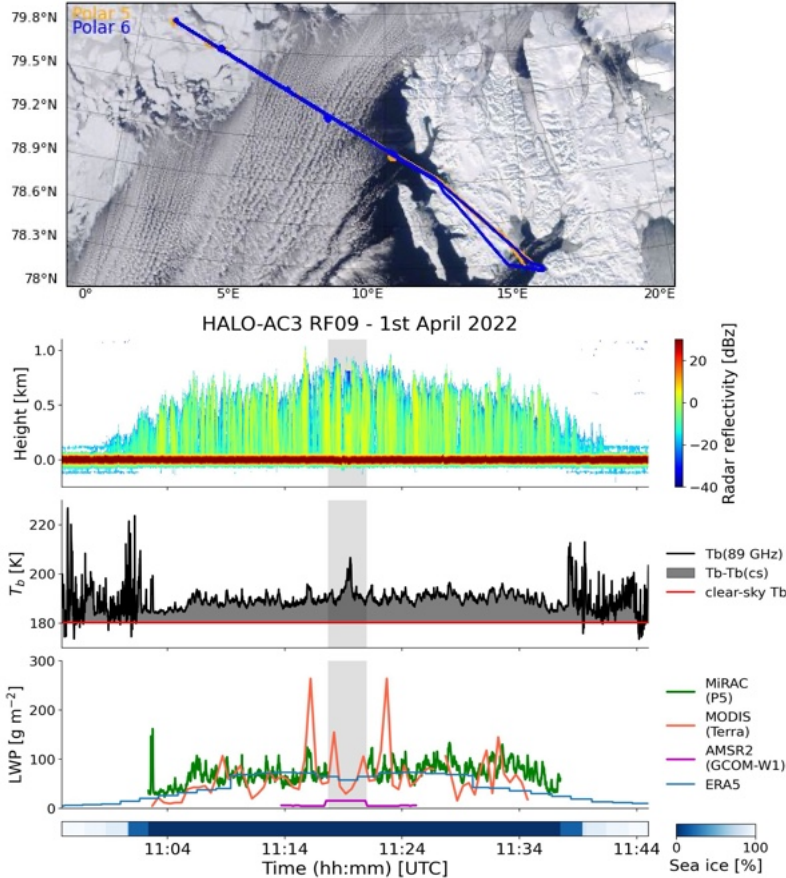
Snowfall rates ( $S$ ) derived from Z-S relation  
 $Z_e = 9.2 \cdot S^{1.1}$  with Z@150 m

*(Dissertation Imke Schirmacher, 2024)*



## HANDEL and SLALOM check *Camplani et al., 2023*





dropsonde (+ERA5)  
over ocean  
artificial clouds

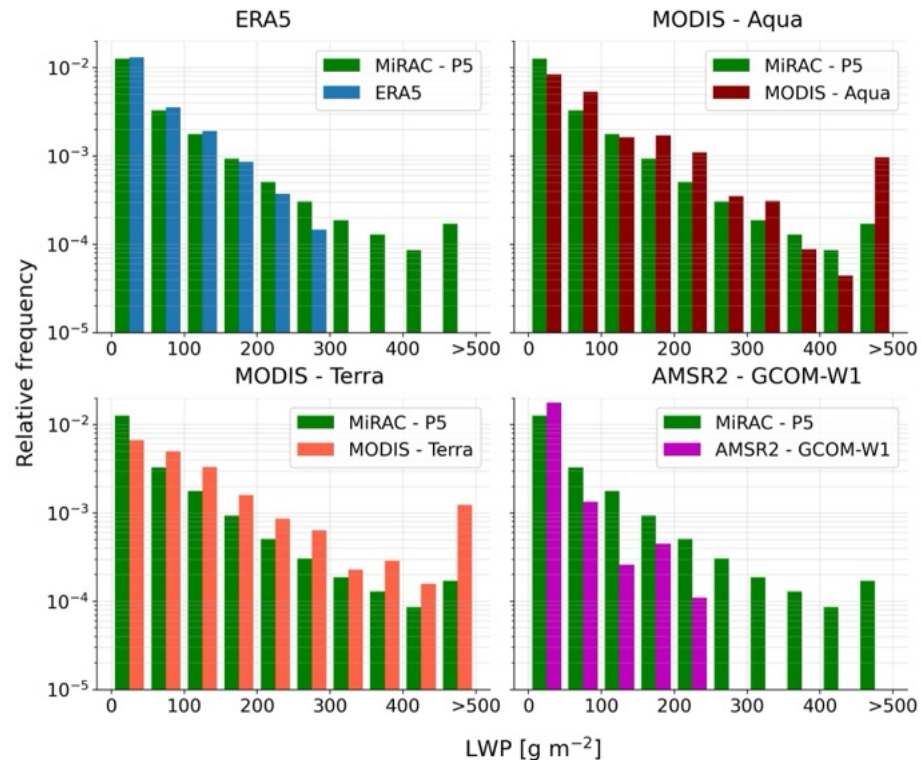
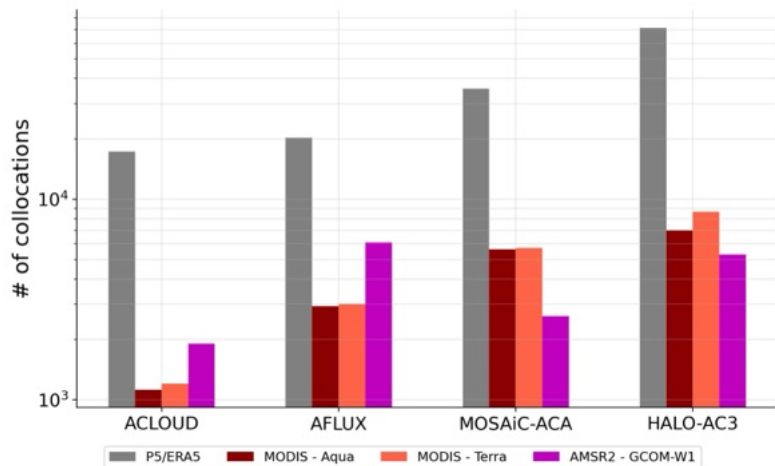
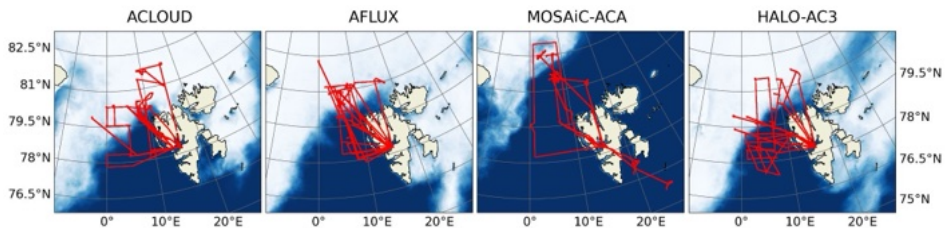


**PAMTRA**

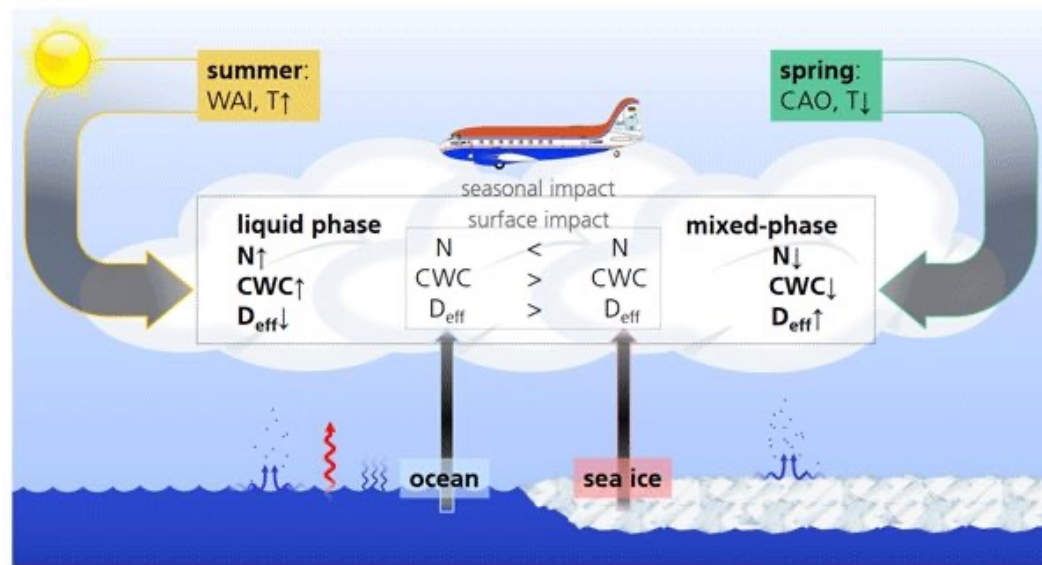
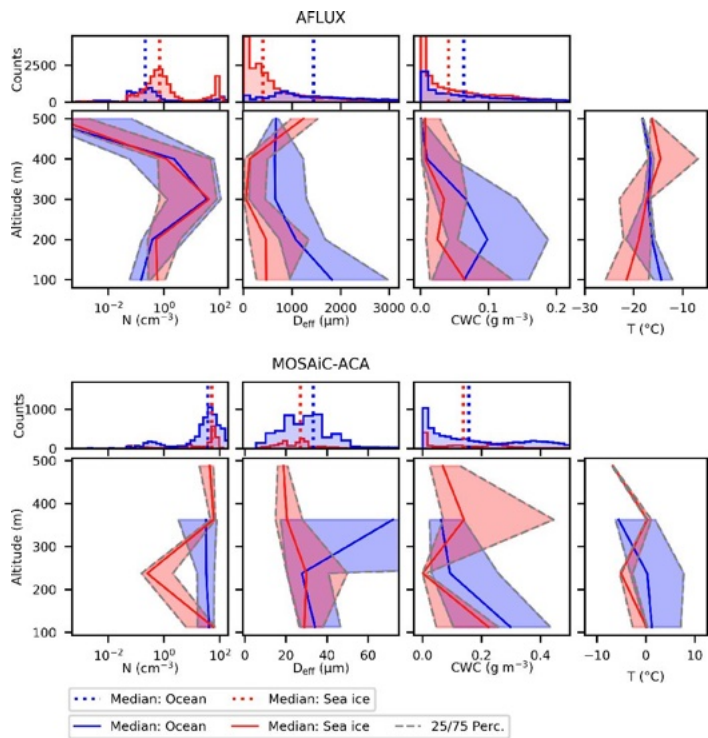


$$LWP = c_0 + \sum_{i=1}^3 c_i \cdot T_B^i$$

Open ocean only very difficult over (broken) ice due to unknown sea ice emissivity  
=> Risse et al. (2024, 2026)



**Airborne in-situ measurements with Polar 5** from AFLUX 2019 and MOSAiC-ACA 2020 were used to compare Arctic low-level cloud microphysics below 500 m over sea ice and open ocean in spring and summer.



**Arctic low-level cloud phase and microphysics depend strongly on season and surface type, with mixed-phase clouds dominating spring and liquid clouds dominating summer.**

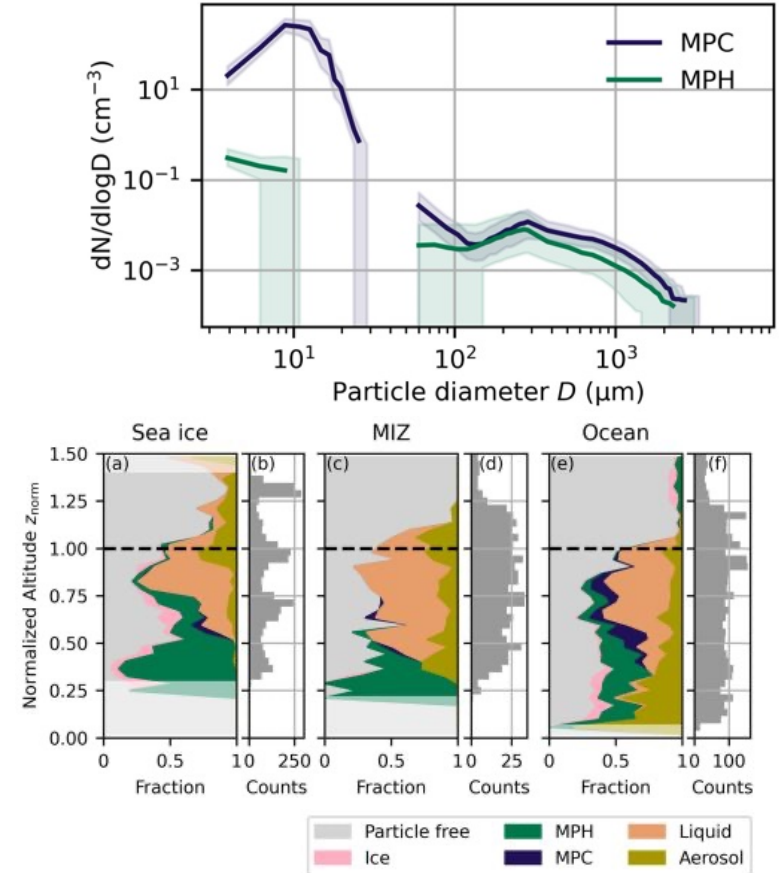
**Polar 6 in-situ cloud microphysics measurements** over the Fram Strait during HALO-(AC)<sup>3</sup>

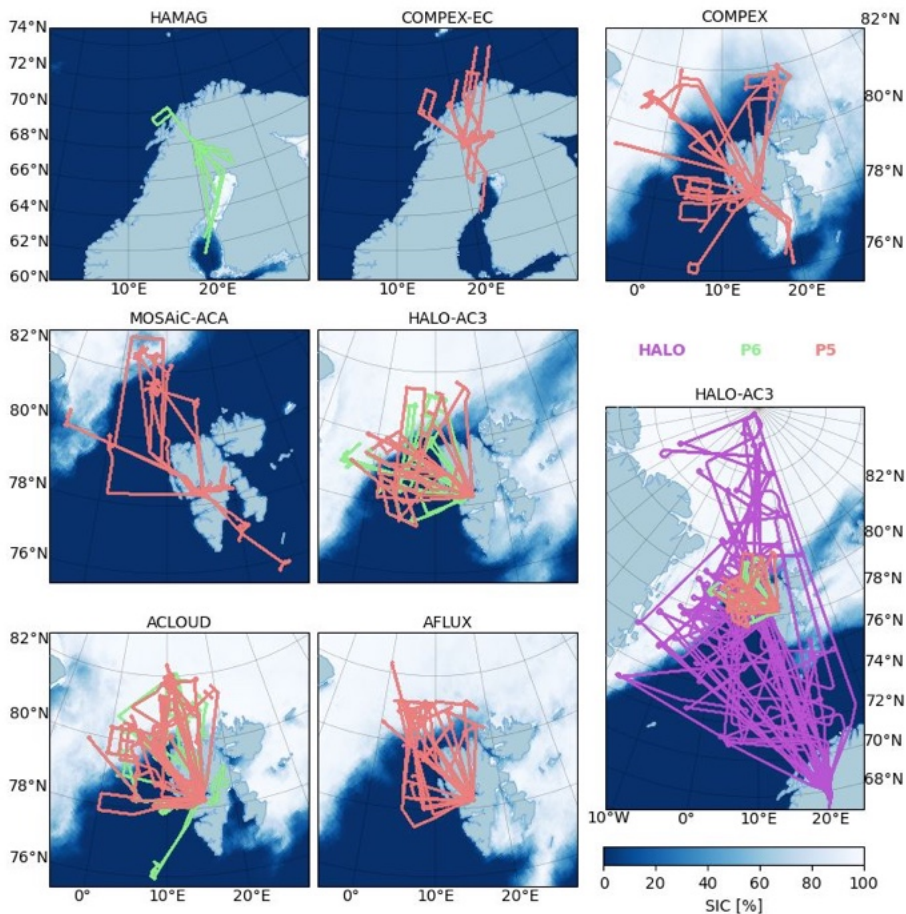
Study identified a previously unclassified Arctic cloud regime:  
**Mixed-Phase Haze (MPH).**

- MPH occurred about **8× more frequently** than classic mixed-phase clouds (MPCs) and contains **large wet aerosol particles (> 3 μm)** instead of supercooled cloud droplets and .
- Particle concentrations were approximately **3 orders of magnitude lower** than in MPCs.
- MPH formed in **subsaturated conditions**, suggesting equilibrium haze droplets below cloud activation thresholds.
- Chemical analysis indicated an important contribution from **sea-salt aerosol particles**.

**Arctic low-level mixed-phase layers often exist as a “haze” state rather than a classical cloud state, implying fundamentally different aerosol–cloud interactions and radiative behavior.**

*Moser et al. (2026, ACP)*





**ACLOUD**: May/June 2017

Polar 5 (remote sensing), Polar 6 (in-situ)

**PAMARCMiP**: Mar/Apr 2018

Polar 6 (remote sensing + in-situ)

**AFLUX**: Mar/Apr 2019

Polar 5 (remote sensing + cloud in-situ)

**MOSAIC-ACA**: Aug/Sep 2020

Polar 5 (remote sensing + cloud in-situ)

**HALO-(AC)<sup>3</sup>**: Mar/Apr 2022

Polar 5 (remote sensing), Polar 6 (in-situ), and HALO (remote sensing)

**BACSAM I**: Oct 2022 + **BACSAM II** (Apr 2024)

Polar 6 (in-situ)

**HAMAG**: Feb 2024

Polar 6 (remote sensing)

**COMPEX-EC**: Apr 2025

Polar 5 (remote sensing)

**COMPEX**: Mar/Apr 2026

Polar 5 (remote sensing)

**10 campaigns with focus on clouds out of Longyearbyen, Station North, and Kiruna with Polar 5 and Polar 6:**

**153 research flights  
497 flight hours**

python package to simplify the work with (AC)<sup>3</sup> airborne data

provides access to **ACLOUD**, **AFLUX**, **MOSAic-ACA**, **HALO-(AC)<sup>3</sup>**, **HAMAG**, **COMPEX-EC**, and **COMPEX** datasets by intake catalogues

How to ac3airborne having examples as jupyter notebooks for various data sets on all platforms (**Polar 5 & 6**, **HALO**)

hosted on github



[https://igmk.github.io/how\\_to\\_ac3airborne/](https://igmk.github.io/how_to_ac3airborne/)



```
import ac3airborne
cat = ac3airborne.get_intake_catalog()

list(cat)

['ACLOUD', 'PAMARCMiP', 'AFLUX', 'MOSAic-ACA', 'HALO-AC3']

list(cat['HALO-AC3'])

['P5', 'P6', 'HALO']

list(cat['HALO-AC3']['P5'])

['GPS_INS', 'MiRAC-A', 'DROPSONDES', 'HATPRO', 'BROADBAND_IRRADIANCE']

list(cat['HALO-AC3']['P5']['MiRAC-A'])

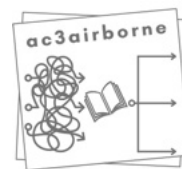
HALO-AC3_P5_RF01, HALO-AC3_P5_RF03, HALO-AC3_P5_RF04, HALO-AC3_P5_RF05,
HALO-AC3_P5_RF07, HALO-AC3_P5_RF08, HALO-AC3_P5_RF09, HALO-AC3_P5_RF10,
HALO-AC3_P5_RF11, HALO-AC3_P5_RF12, HALO-AC3_P5_RF13

ds_miraca = cat['ACLOUD']['P5']['MiRAC-A']['ACLOUD_P5_RF04'].to_dask()

ds_miraca

xarray.Dataset

Dimensions:      (time: 13152, height: 1400)
Coordinates:
  time           (time)      datetime64[ns]  2017-05-23T09:13:49 ... 2017-05-...
  height         (height)    float32        -1e+03 -995.0 ... 5.995e+03
Data variables:
  Ze_unfiltered (time, height) float32 ...
  Ze            (time, height) float32 ...
  tb            (time)        float32 ...
  Ze_flag       (time, height) uint8 ...
  lon           (time)        float32 ...
  lat           (time)        float32 ...
  alt           (time)        float32 ...
```



## data sets included for HALO-(AC)3 via intake

HALO	P5	P6
amsr2_sic.yaml	amali.yaml	amsr2_sic.yaml
bacardi.yaml	amali_cm.yaml	bcpd.yaml
bahamas.yaml	amali_cth.yaml	cdp.yaml
dropsondes.yaml	amsr2_sic.yaml	cip.yaml
dropsondes_gridded.yaml	broadband_irradiance.yaml	gps_ins.yaml
gps_ins.yaml	dropsondes.yaml	main.yaml
hamp_11990.yaml	esa_cci_sst.yaml	pip.yaml
hamp_183.yaml	fish_eye.yaml	
hamp_kv.yaml	gps_ins.yaml	
hamp_mira.yaml	hatpro.yaml	
main.yaml	main.yaml	
smart.yaml	mirac-a.yaml	

## example scripts on ac3airborne

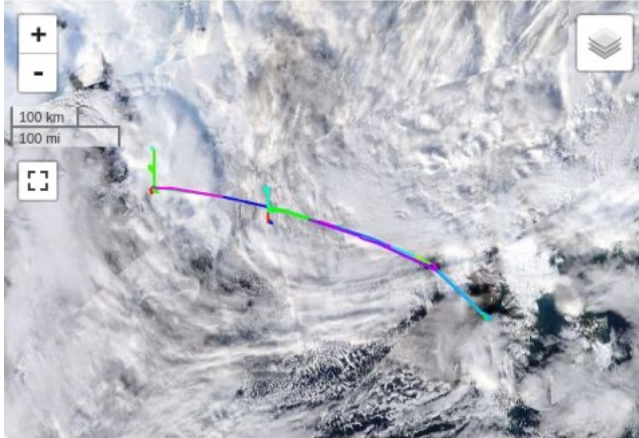
HALO	Polar 5/6
plot a flight	Nose boom
Position and attitude	MiRAC-A
BAHAMAS	MiRAC-P
BACARDI	HATPRO
Dropsondes	AMALi
HAMP radiometer	Fish-eye camera
HAMP radar	PMS and Nevzorov
SMART	CMP22, CGR4 and KT-19
	Dropsondes
	<a href="#">Position and attitude</a>
	HAWK
	EAGLE
	2D Spec
	ALABAMA
	Gases
	CVI
	OPC

each research flight from all (AC)<sup>3</sup> airborne campaigns has been split into logical components  
+information on events (collocations, overflights,...)



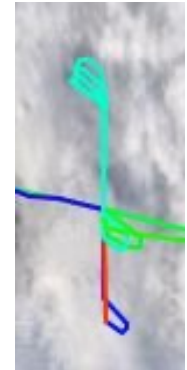
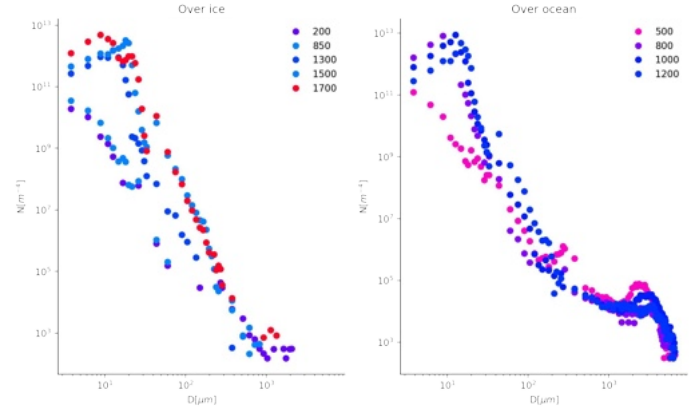
catalog of flights with meta information and start and end of segments

MOSAiC-ACA\_P5\_RF11



ipyleaflet | Imagery provided by services from the Global Imagery Browse Services (GIBS), operated by the NASA/GSFC/Earth Science Data and Information System (ESDIS) with funding provided by NASA/HQ.

select segments for race track pattern



MOSAiC-ACA\_P5\_RF11\_rt01

MOSAiC-ACA\_P5\_RF11\_rt02



# EX MPIEX nt



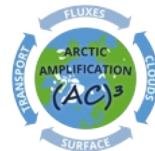
Longyearbyen (Svalbard/Norway)  
13.3.-15.4.2026



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LEIPZIG



# Identified remaining gaps

**Gap 1:** Long-term activities like the cloud observatory (*Ebell et al., 2020; Nomokonova et al., 2020; Gierens et al., 2020*) at the AWIPEV research base show dependence of clouds on large and local-scale phenomena. ICON modelling (*Schemann and Ebell, 2020*) show strong variability in Kongsfjorden.

**Airborne observations over Ny-Ålesund and the Kongsfjorden with improved instrumentation**

**Gap 2:** Due to blind zone effects (*Maahn et al., 2014; Schirmacher et al., 2023*), space- and airborne instruments fail to observe low-level clouds over the MIZ and ice marking the initial state of CAOs. Low-level clouds over ice visible in in-situ and by eye and are present in forecast model runs.

**Observations dedicated to low-level clouds in MIZ and over ice with improved instrumentation**

**Gap 3:** Reanalysis products show relatively large differences for IWW in the Arctic (*Rinke et al., 2019*). This is related to missing assimilated all-sky microwave observations in the underlying models (*Lawrence et al., 2019*), which is difficult due to unknown surface contribution to the observed signals over MIZ and ice.

**Perform more observations over sea ice to increase understanding of sea ice emissivity in MW**



## Differential absorption radar (GRaWAC; UoC)

G-band Radar for Water vapor and Arctic clouds

167.3 / 174.7 ± 0.1 GHz, FMCW: Ze, Doppler vel., higher moments, differential absorption, IWV, in-cloud wv profiles

## Cloud radar (MiRAC-A; UoC)

Microwave Radar/radiometer for Arctic Clouds

94 GHz, FMCW, 89 GHz passive: Ze, Doppler vel., higher moments, brightness temperature, liquid/ice water content, precip rate, liquid water path, vertical distribution

## MiRAC-P radiometer (UoC)

6\*183.31, 243, and 340 GHz, 1Hz

Sea ice emissivity, ice cloud properties, water vapor profiles

**Polar 5** - Alfred Wegener Institute  
operated by Kenn Borek Air (CDN)  
Basler BT-67 (former DC-3 build in 1943)  
one-way range ~900 km, height < 5 km  
2 pilots, max. 6 scientists/engineers

## Airborne Mobile Aerosol Lidar (AMALi; AWI/UoC)

Attenuated backscatter signal at 355 and 532 nm  
Profiles of aerosol, cloud layers, mask, and top height

## Hyperspectral imaging radiometer (LIM)

Imaging spectrometers, push broom sensor, 2D field of upward radiance, FOX (400-1000 nm), HAWK (930-2550 nm)

## Broadband and spectral radiation (LIM)

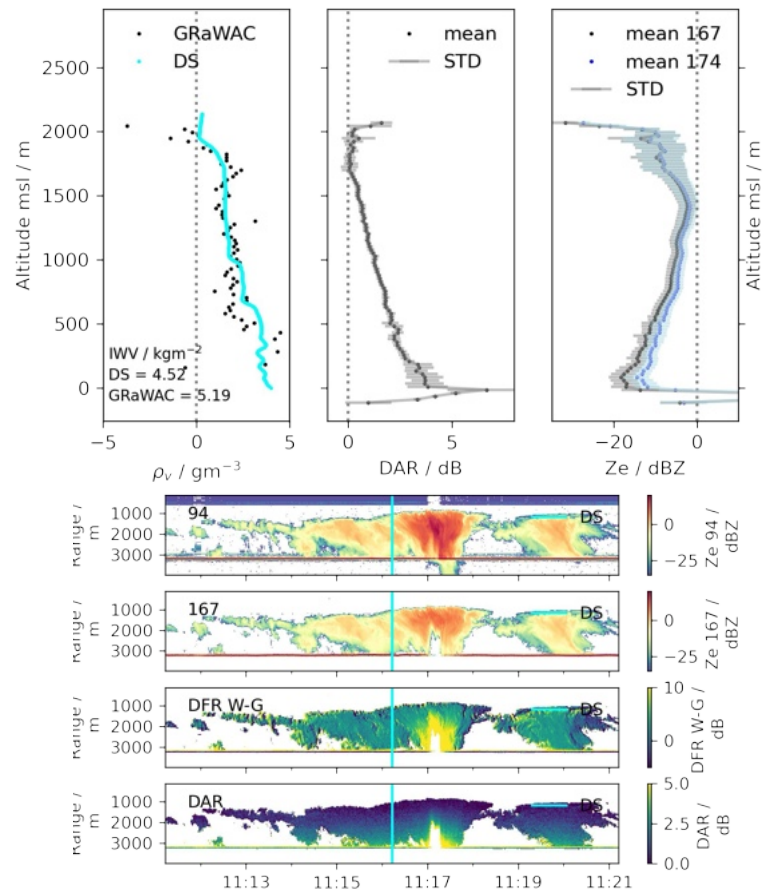
Pyranometer (0.2-3.6 μm), Pyrgeometer (4.5-42 μm),  
SMART-Albedometer (300-2300 nm @ 2 Hz)

**Nikon fisheye camera, 83 dropsondes (MPI AVAPS system - 8 sondes in parallel , KT-19**

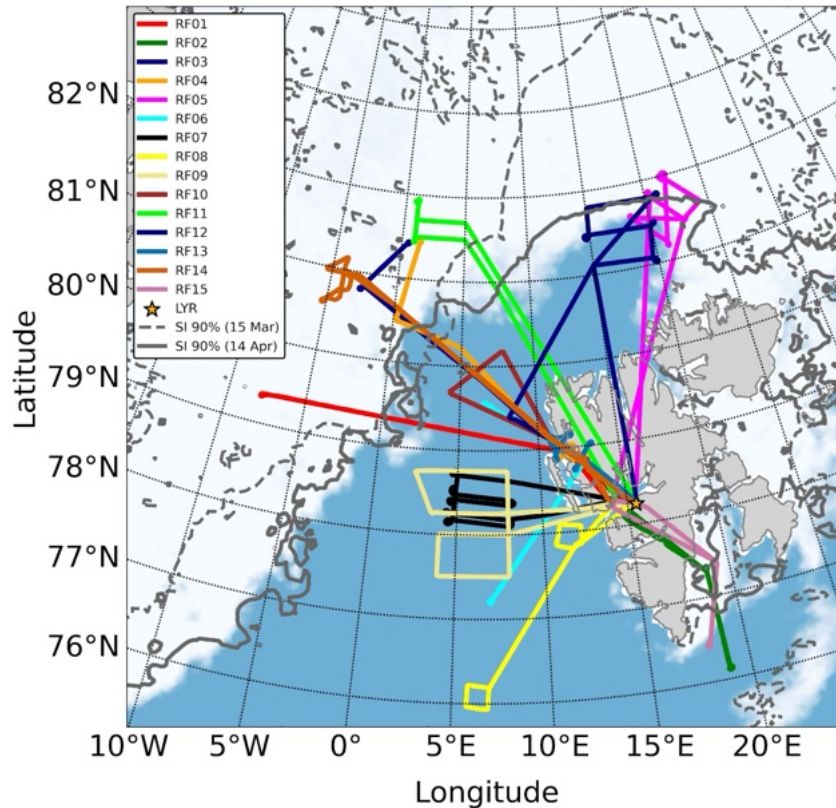
- continuous transmit and receive at 167.3 and 174.7 GHz
- typical resolution: 2 s, 20-30 m
- sensitivity: -43 dBZ at 1 km, 1 s
- full Doppler spectra

## Differential Absorption Radar:

- differential water vapor attenuation along absorption at 183 GHz (*Lebsock et al., 2015; Roy et al., 2021*)
- water vapor profiles in cloudy and precipitating conditions and IWV in all-sky for airborne
- microphysical properties by dual-frequency ratio (G-W)

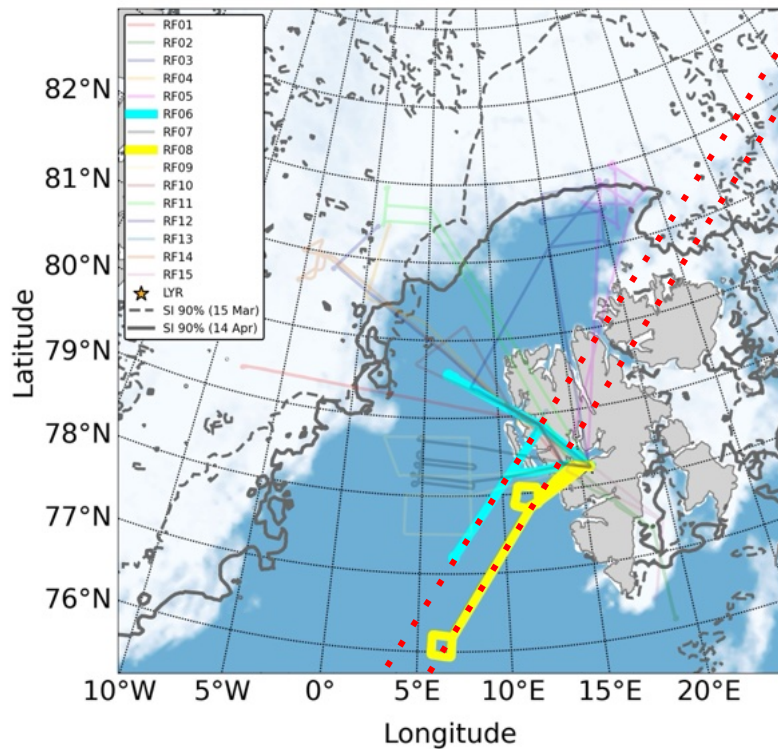


*Schnitt et al., 2025 in prep for AMT*



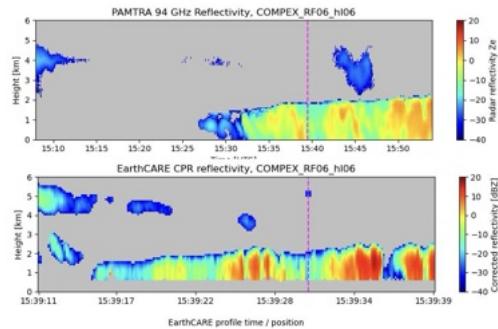
15 RFs  
almost 60 flight hours  
75 dropsondes

- 6 clouds over sea ice
- 2 EarthCARE collocations
- 4 CAOs (2 origin and 2 mature)
- 2 lead experiments
- 5 Ny-Alesund/Kongfjorden for column and model validation

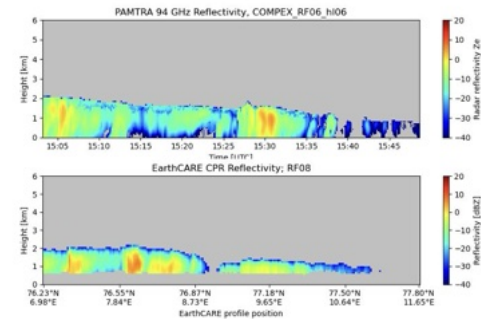


## EarthCARE

### RF06



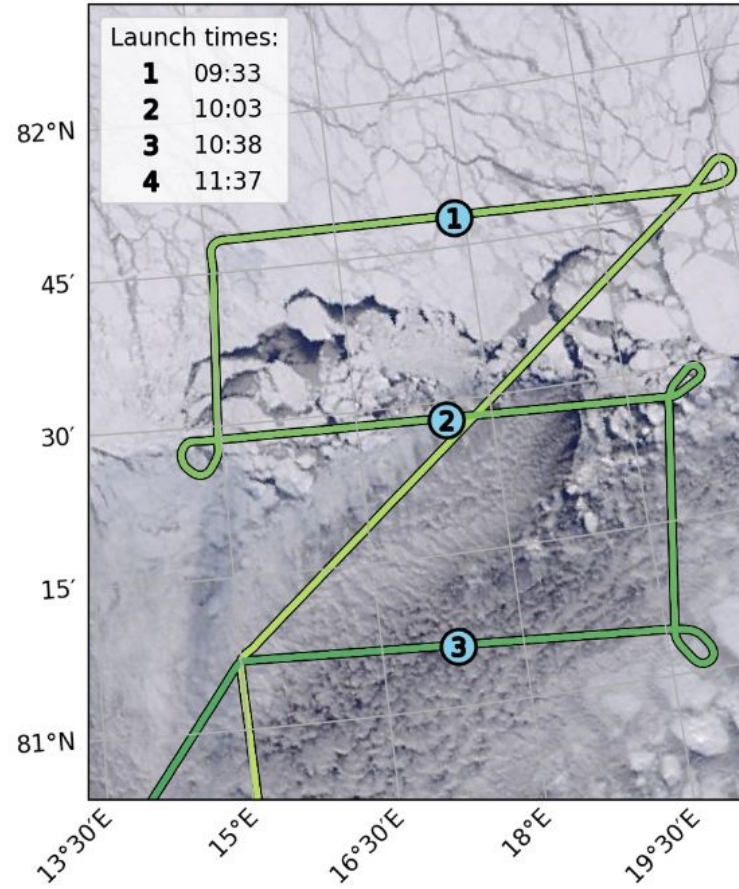
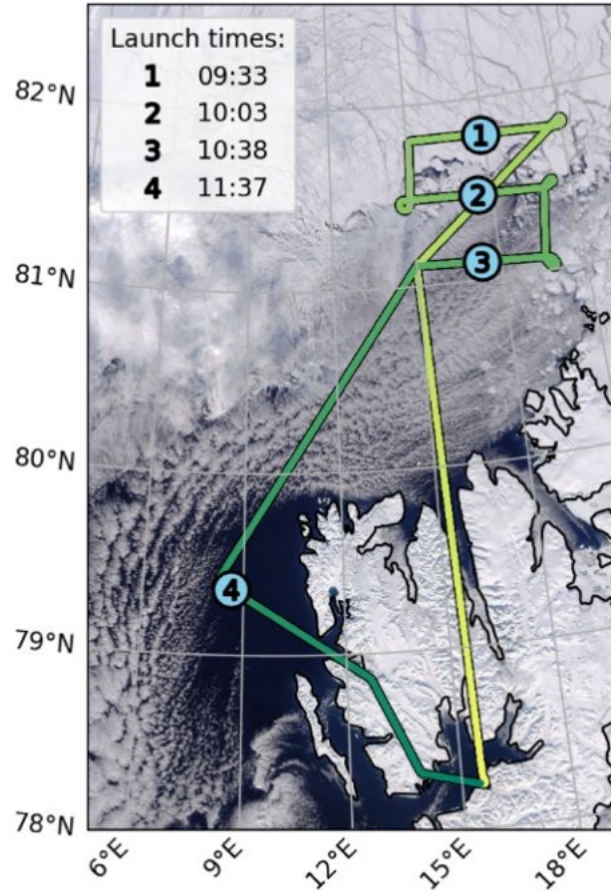
### RF08



COMPEX P5 RF12

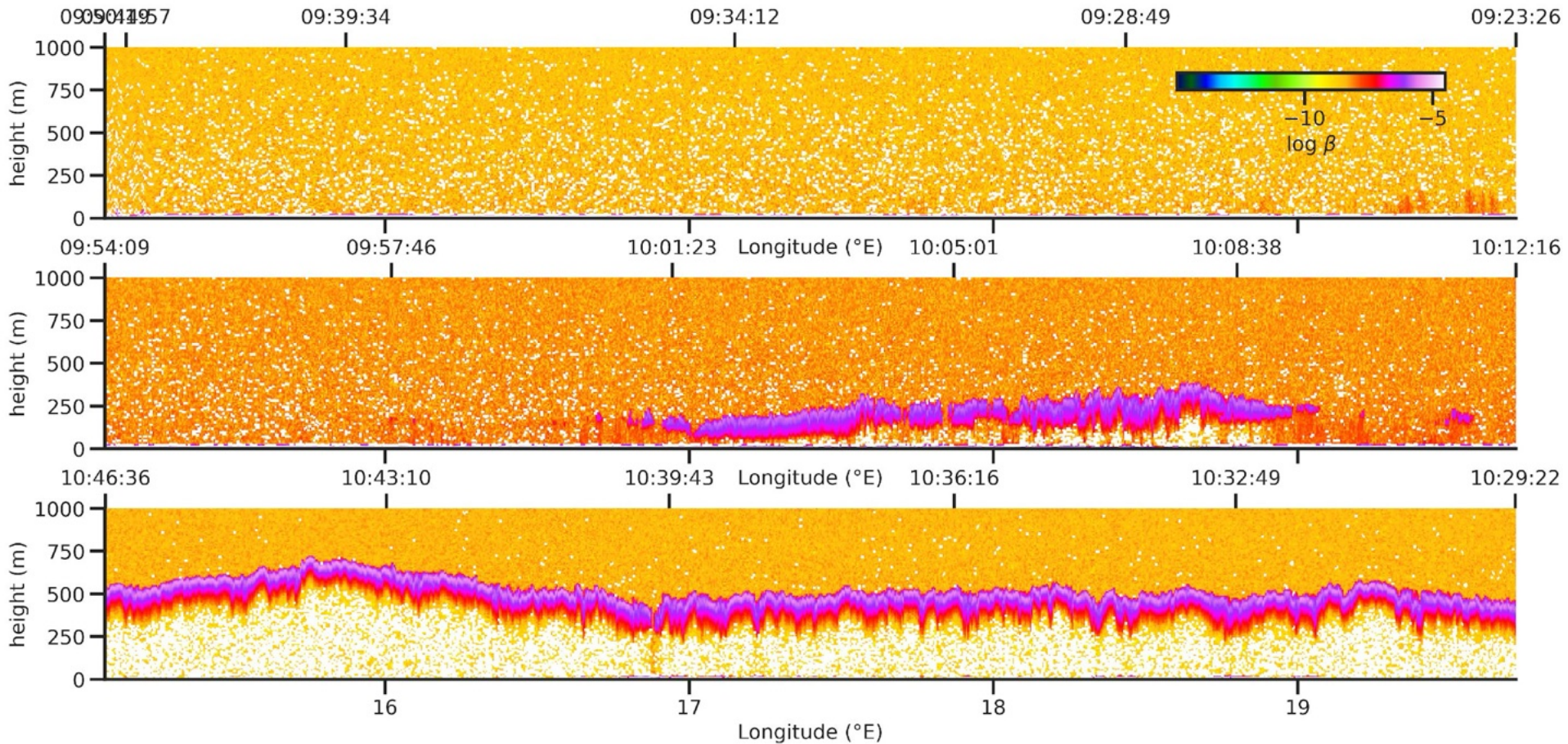
04 April 2026

COMPEX P5 RF12





# AMALi lidar during RF12



**ACLOUD:** May/June 2017

Polar 5 (remote sensing) - 19 rfs, Polar 6 (in-situ) - 19 rfs

**PAMARCMiP:** Mar/Apr 2018

Polar 6 (remote sensing + in-situ) - 14 rfs

**AFLUX:** Mar/Apr 2019

Polar 5 (remote sensing + cloud in-situ) - 14 rfs

**MOSAIC-ACA:** Aug/Sep 2020

Polar 5 (remote sensing + cloud in-situ) - 10 rfs

**HALO-(AC)<sup>3</sup>:** Mar/Apr 2022

Polar 5 (remote sensing) - 13 rfs, Polar 6 (in-situ) - 13 rfs, and HALO

**BACSAM I:** Oct 2022 + **BACSAM II** (Apr 2024)

Polar 6 (in-situ) - 10 rfs + 13 rfs

**HAMAG:** Feb 2024

Polar 6 (remote sensing) - 6 rfs

**COMPEX-EC:** Apr 2025

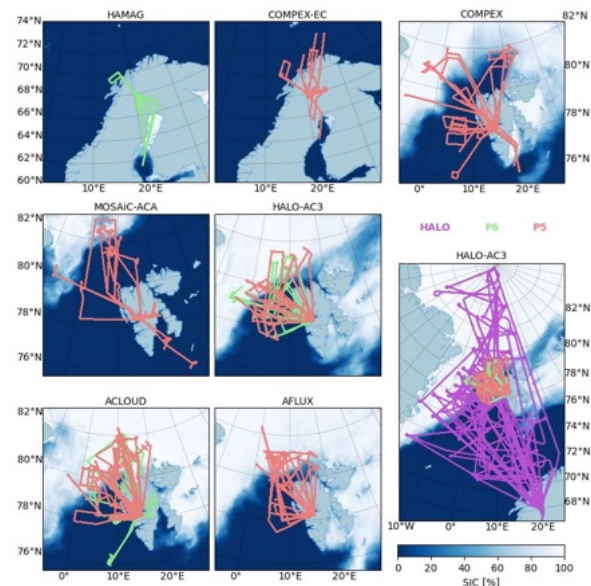
Polar 5 (remote sensing) - 7 rfs

**COMPEX:** Mar/Apr 2026

Polar 5 (remote sensing) - 15 rfs

**13 campaigns out of  
Longyearbyen, Station North, and  
Kiruna with Polar 5 and Polar 6 (10  
with focus on clouds):**

**153 research flights  
497 flight hours**



Collocation of multiple aircraft

Satellite collocations

Huge amount of data

Easy data access by ac3airborne