

# HALO-(AC)<sup>3</sup> – 2022/03/22 – Polar6 research flight #02

## Objectives:

Perform profiling for the in-situ cloud measurements in the southern part of the flight track, and for the aerosols in the northern part. The third objective was to sample aerosols on filters for a posteriori INP measurements.

## Mission PI P6:

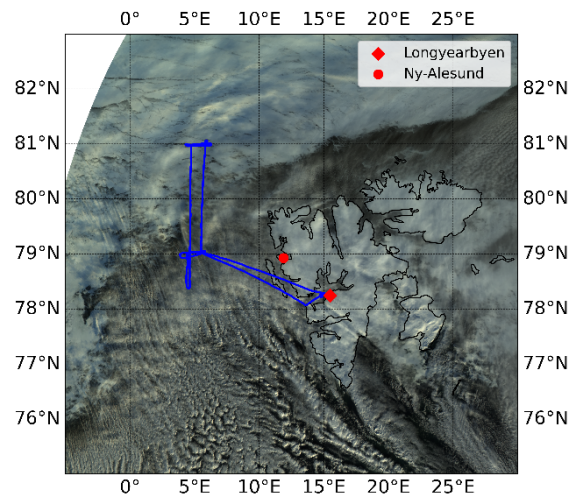
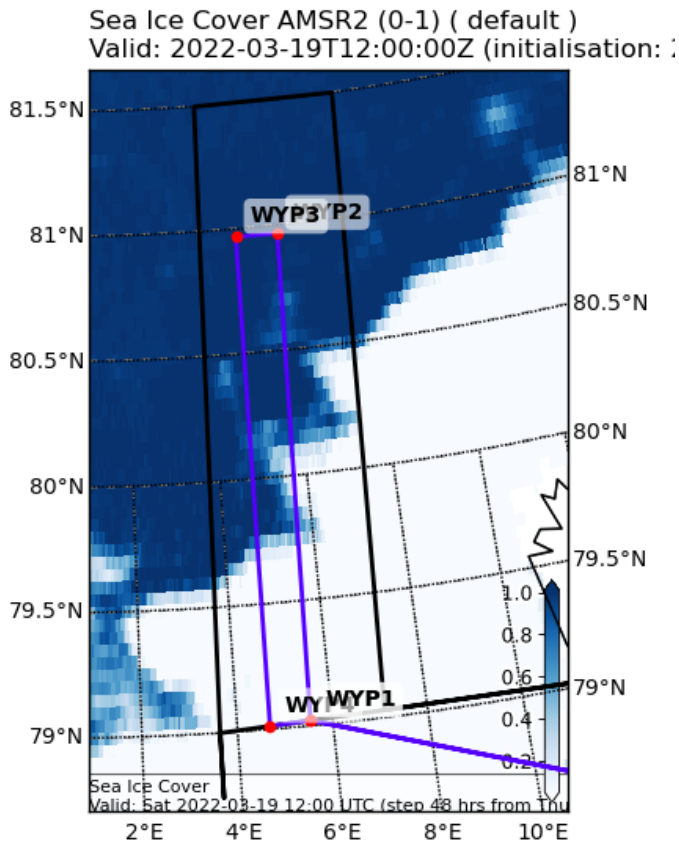
Stephan Borrmann

Polar 6 Crew	
Mission PI	Stephan Borrmann
AWI 1	Martin Gehrman
AWI 2	Dennis Ludwig
CVI/Aerosol/HERA	Sarah Grawe
ALABAMA/trace gas	Hans-Christian Clemen
PMS	Guillaume Mioche

## Flight times:

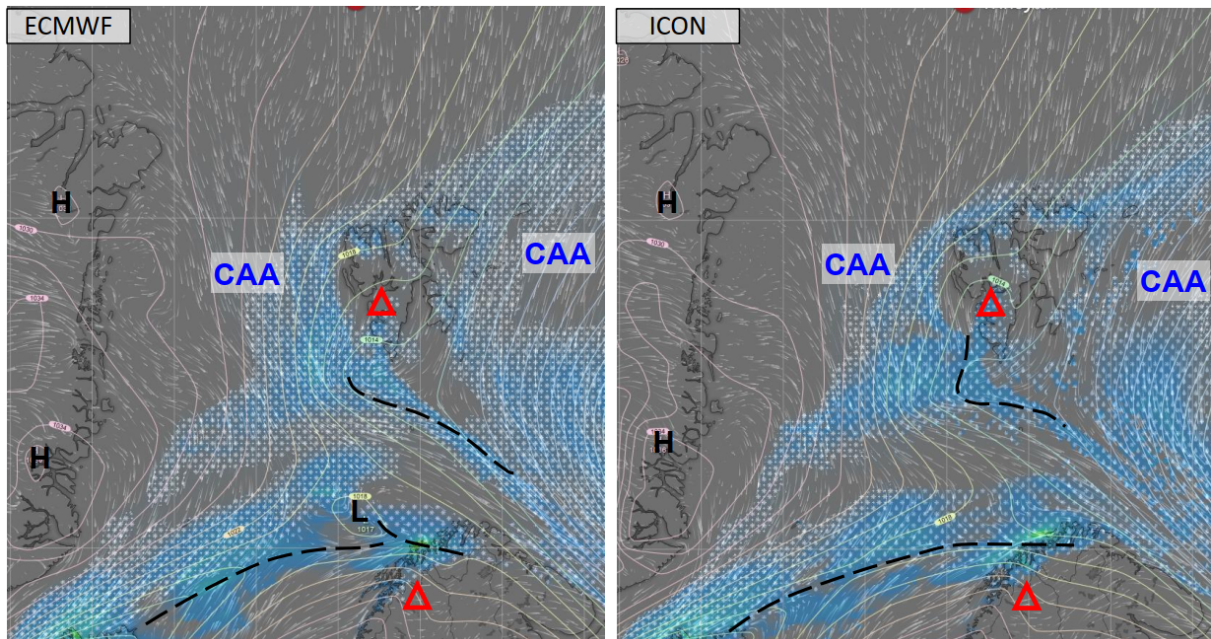
Polar 6	
Take off	11:00 UTC
Touch down	16:30 UTC

## Intended flight plan (left) and executed (right):

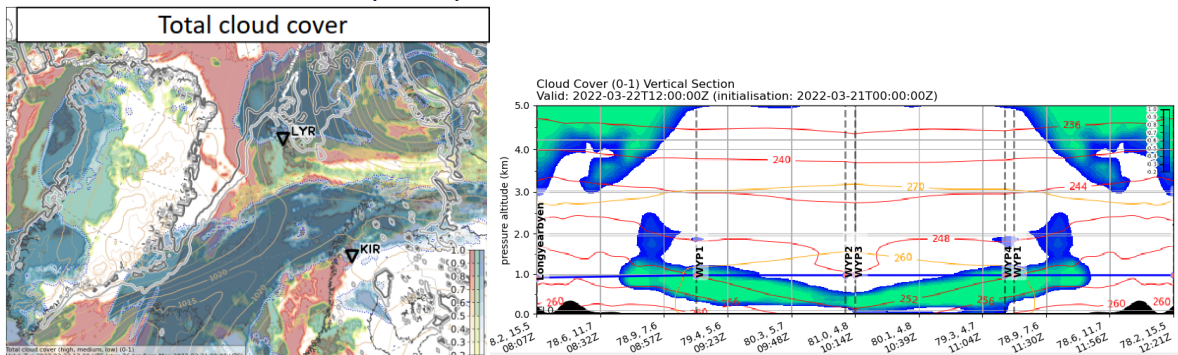


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**Weather situation as observed during the flight (compare to forecast):**



The ICON (right panel) and ECMWF (left panel) forecasts show that the cold air outbreak persists, as well as the general northerly flow situation.



The forecasted cloud situation is shown in the two pictures above. During the flight, however no, or next to no clouds were observed in the Northern part above the ice.

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**Overview:**

Clouds were encountered mostly in the southern part of the flight over the sea. During the approach of WP1 the estimated cloud top level was at 10000ft and the cloud base near 3800ft. Later, between WP1 and WP2 the base extended down to 200ft. These clouds were sampled. Also, two five minute legs were performed for the nose boom calibration at 250ft altitude. Between WP1 and WP2 one 25 minute leg was performed for the INP sampling at 200ft and one more 25 minute leg at 1000ft. The same sampling of twice 25 minutes was done between WP3 and WP4. However, in order to be able to have two complete 25 minute periods the

flight leg needed to be extended somewhat past WP4 towards the South. In the Northern part of the flight above the ice there were no clouds. Here a step ladder with steps at 250 ft, 600ft, 800ft, 1200ft was flown for the SMPS aerosol sampling, as well as for the aerosol chemical composition measurements (ALABAMA). Each step was of five minute duration such that at least one measurement cycle was completed by the SMPS. Based on this timing experience it is suggested to extend the ladder steps to 7 minutes and allow for additional 5 minutes to perform the turn and the ascent/descent to the next step. On the return to LYR from WP1 an ascent to 10000ft was performed for having five minutes trace gas instrument sampling time.

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#### **Instrument Status:**

**CVI** was working and used inside the clouds.

**Trace gas** operating continuously.

**Polar nephelometer** was not operating all the time.

**ALABAMA** delivered useful data. However, a noise interference problem occurred during the flight, which corrupted a few measurement periods. This problem was later solved on the ground.

**PMS** instruments were working.

**HERA sampler** was sampling throughout all four 25 min legs.

**Aerosol** was working well and continuously. The timing of the steps for the ladders and stair cases were coordinated between mission PI and instrument PI such that each step contained at least one cycle of 5 minutes. This led to the extension of the flight path South of WP4.

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