

Flight Report

HALO-AC3_HALO_20220407_RF14

Ice clouds over sea ice

Objectives:

- Ice clouds over open water and sea ice west of Svalbard
- Coordinating with upward radiation measurements by the P5 on the northern leg of the first pattern west of Svalbard
- Water vapor and ice cloud measurements in high latitudes
- Second rectangle west of Svalbard to investigate temporal evolution in this area with respect to the development of a polar low

Mission PI HALO:

| HALO Crew | |
|-------------|--------------------------------|
| Mission PI | Silke Groß |
| HAMP | Davide Ori |
| WALES | Manuel Gutleben |
| SMART/VELOX | Johannes Röttenbacher |
| specMACS | Lea Volkmer |
| Dropsondes | Bjorn Stevens |
| Camera | Clémantyne Aubry |
| Pilots | Roland Welser Thomas Kalfas |
| Engineer | Thomas Leder |

Flight times:

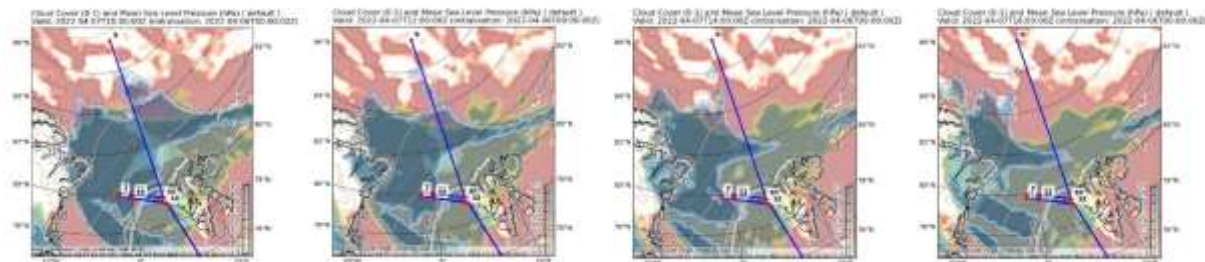
| HALO | |
|------------|-----------|
| Take off | 08:33 UTC |
| Touch down | 16:14 UTC |

Weather situation during the flight:

Moist airmasses wind connected with an ice cloud shield were transported from easterly directions through the observation area west of Svalbard. Further to the north thin ice clouds were located over the sea ice without the presence of lower clouds.

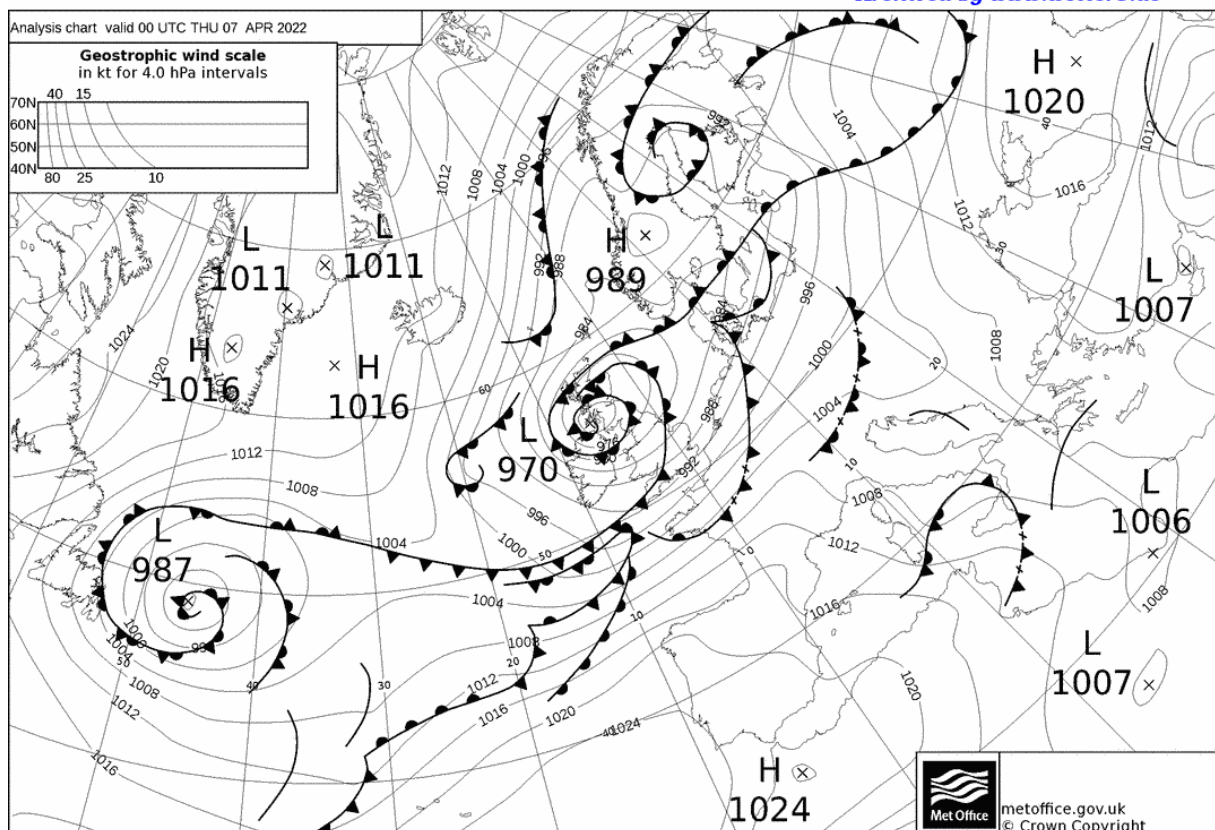
In the course of the day the development of a polar low was predicted in the observation area west of Svalbard.

Cloud forecast, ECMWF analysis, 6 April 2022 (0 UTC)



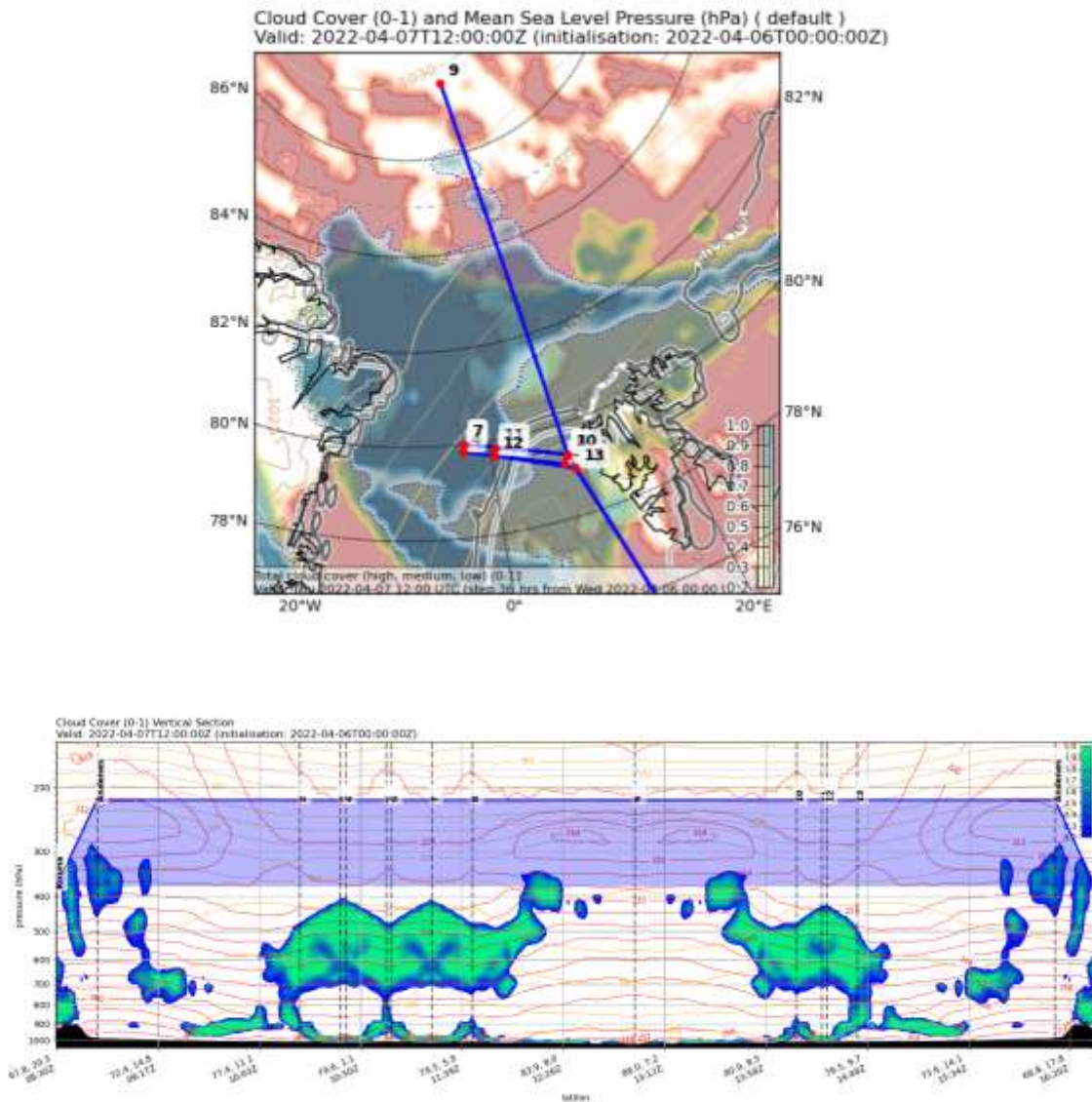
UK Met – Surface Analysis: 7 April 2022, 12 UTC

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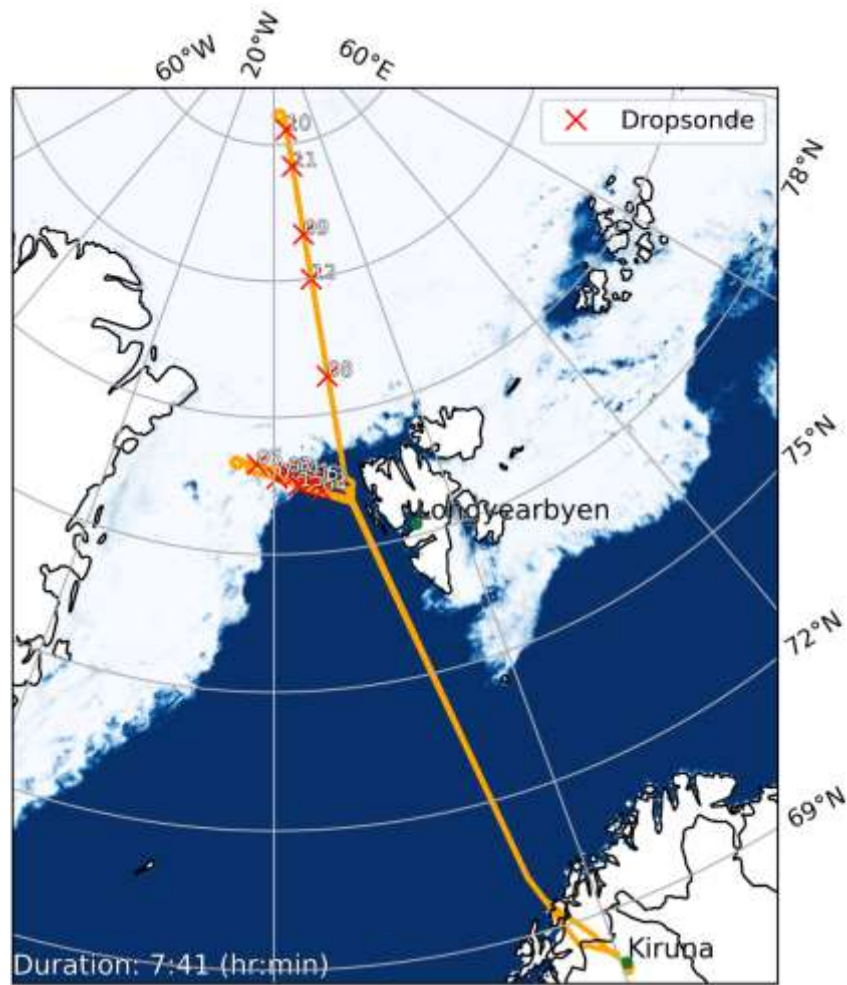


Overview of flight:

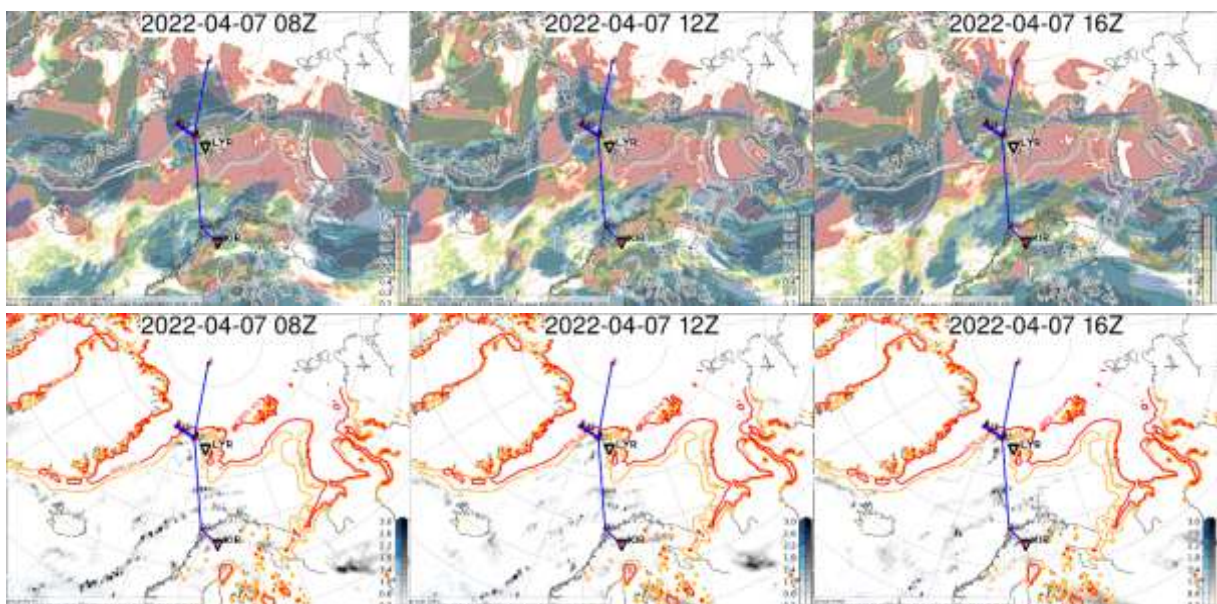
The flight pattern first intended to characterize the ice cloud west of Svalbard. On the northern leg the flight was coordinated with the P5 flying below the ice cloud. As the gap between the top of the lower boundary layer clouds and the base of the ice cloud was quite small, the P5 was mainly within clouds. 7 dropsonds were launched during this pattern; 5 on the northern leg and 2 on the southern leg. After this coordinated leg the HALO went straight north to measure water vapor and clouds in the high latitudes. 5 dropsonds were launched on the way (3 in northern direction and 2 in southern direction). On the way back home, another rectangle west of Svalbard was flown to characterize the temporal evolution in this area with respect to the development of a polar low to bridge the gap towards a second flight in this area on the next day.



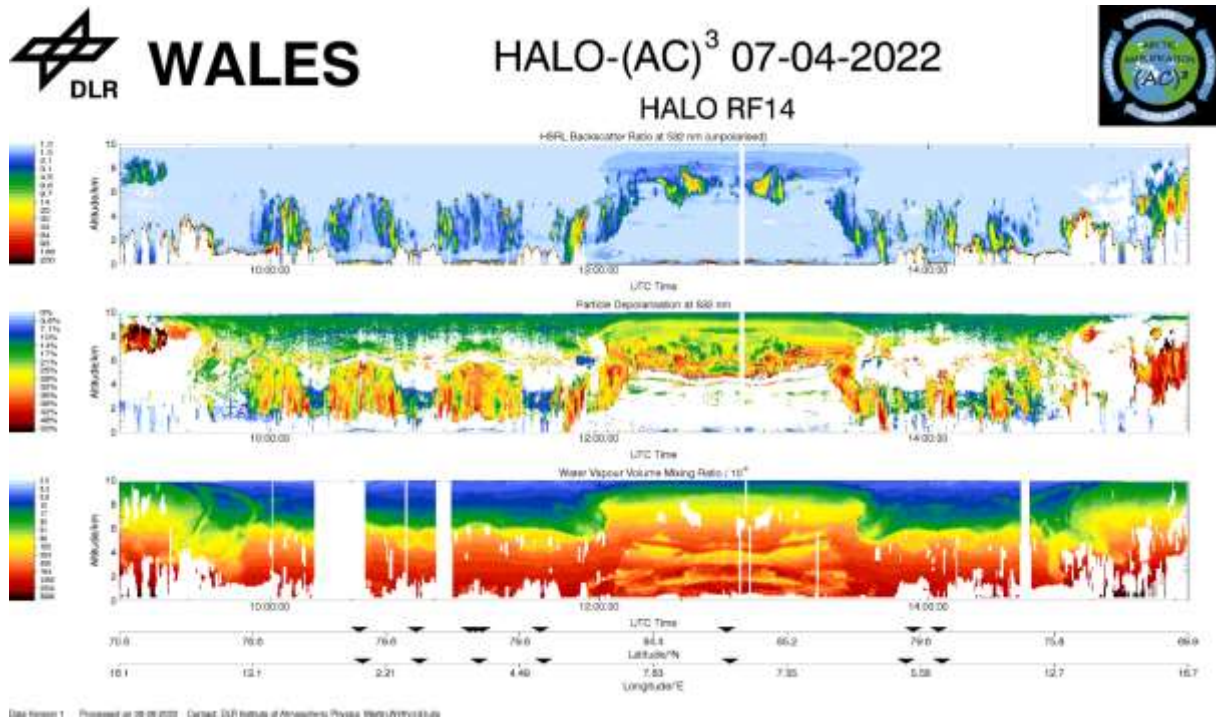
During the flight legs west of Svalbard we were able to measure cirrus clouds above open water as well as above sea ice as we crossed the ice edge several times.



During the northern leg we flew over closed sea ice shield.



Ice clouds were present almost during the whole southern flight pattern with only little space between lower level clouds and ice clouds. The ice cloud's tops were as high as 6 km. In the northern part the ice clouds were located in higher altitudes (6-8 km). Additionally, lofted aerosols could be observed in heights of 7-9 km. This aerosol layer was connected to enhanced water vapor mixing ratio.



Instrument status Table 1: Instrument status as reported after the flight for all instruments on HALO.

| HALO | |
|-----------------|--|
| BAHAMAS | |
| BACARDI | |
| HAMP Radar | |
| HAMP Radiometer | |
| WALES | |
| SMART | |
| VELOX | |
| specMACS | |
| Dropsondes | |

8:52 reached flight level 370

Flight Impressions



8:16 de-icing before flight



10:49 Broken low-level clouds west of Svalbard



11:13 thin cirrus above low clouds



11:17 clouds above broken sea ice

Thanks to the team!

