

Flight Report

HALO-AC3_HALO_20220315_RF05

Atmospheric River 1—Day 1

Objectives:

- Sampling the vertical structure and the humidity transport of an Atmospheric River (AR) occurring between Svalbard and Greenland
- Calculating the moisture budget within the AR
- Measuring the temporal evolution - by flying twice similar crosssections

Mission PI HALO:

HALO Crew	
Mission PI	Vera Schemann
HAMP	Martin Hagen
WALES	Manuel Gutleben
SMART/ VELOX	Michael Schäfer
specMACS	Benjamin Kirbus
Dropsondes	Henning Dorff
Camera	Melanie Lauer
Pilots	Marc Puskeiler Michael Grossrubatscher
Engineer	Thomas Leder

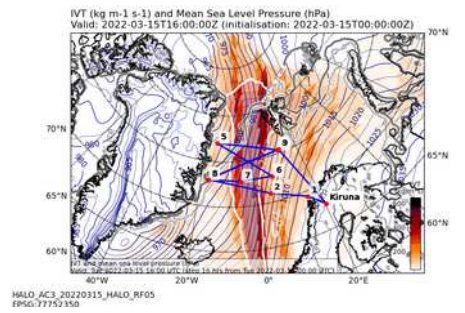
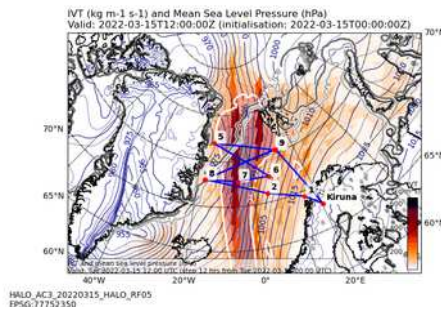
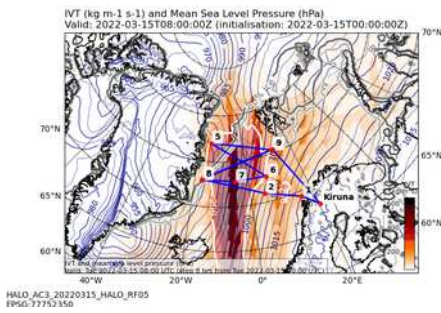
Flight times:

HALO	
Take off	09:05 UTC
Touch down	17:50 UTC

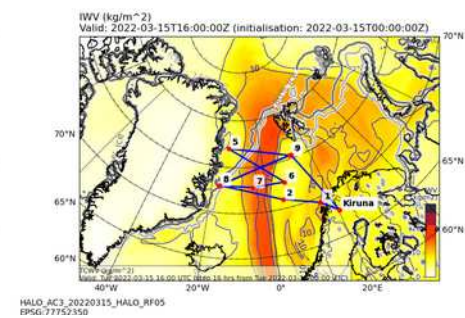
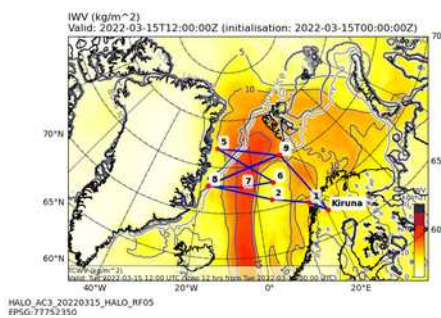
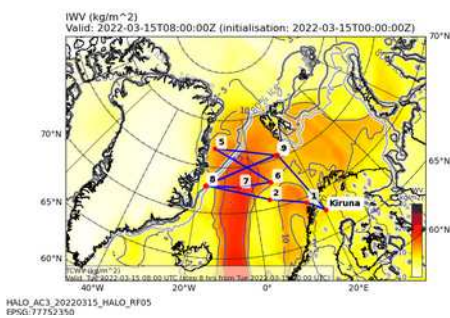
Weather situation during the flight:

The weather situation was dominated by an Atmospheric River transporting moist and warm air towards the arctic. In contrast to the Warm Air Intrusion - analyzed by RF02/03/04 - the AR is drifting eastwards and will be covered again by RF06.

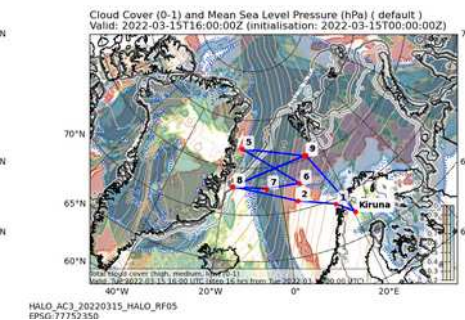
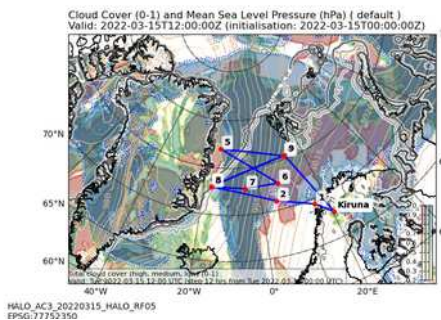
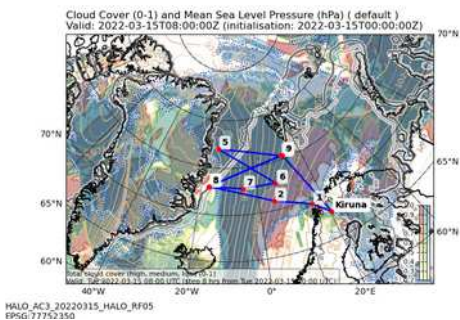
IVT - 8:00, 12:00 and 16:00 UTC



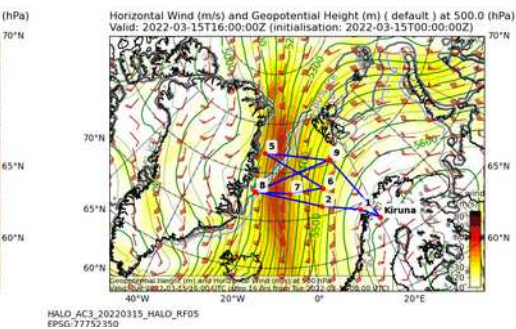
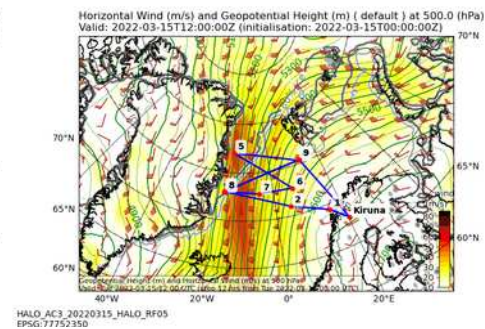
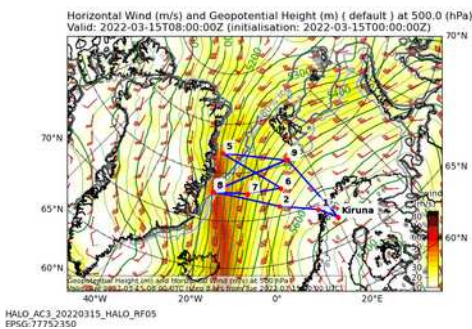
IWV - 8:00, 12:00 and 16:00 UTC



Cloud cover - 8:00, 12:00 and 16:00 UTC

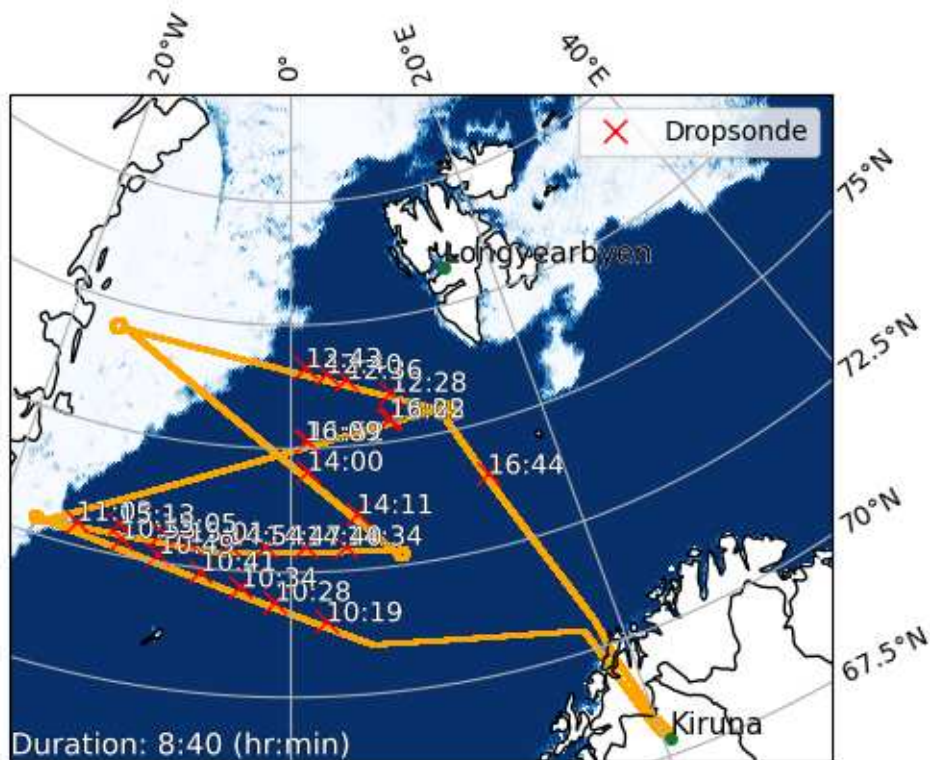


Winds at 500 hPa - 8:00, 12:00 and 16:00 UTC



Overview of flight:

To characterize the AR, we choose a pattern combining crosssections orthogonal to the AR (to measure the vertical structure and estimate the moisture going in a certain area and out) and across the AR to investigate the moisture within a certain area. To capture the temporal evolution, two crosssection at similar places (1-2 and 5-6-7) were performed as well as the crosssection 2-3 and 7-8 twice. Dropsondes were focused on the sections orthogonal to the AR in order to estimate the transport.



Instrument Status:

HALO	
BAHAMAS	
BACARDI	
HAMP Radar	
HAMP Radiometer	
WALES	
SMART	
VELOX	
specMACS	
Drosondes	

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

Flight Logs (all times in UTC)

09:05 Take off (slight delay due to air traffic)
 09:09 flight level 300 in clouds, cirrus above
 09:13 we have to adjust the flight path due to military exercise - going north and later westwards
 09:25 cloud cover increasing, still northwards
 09:33 reached FL410
 09:41 turning towards wp2, cirrus clouds
 10:06 low level clouds (visible by eye), thin cirrus clouds
 10:11 reaching wp2, back on original flight plan
 10:19 DS01 uniform clouds, some cirrus

 10:28 DS02 cirrus and clouds
 10:34 DS03 still cirrus clouds
 10:42 DS04 thicker clouds
 10:49 DS05, still thick clouds
 10:55 DS06, still thick, but becoming more variable and less clouds
 11:03 DS07, thinner clouds
 11:08 wp4, curve flying. Greenland is visible, fog over sea ice
 11:17 entered danish airspace again - no drosondes (performed some small rolls for SMART - up to 5° with the aircraft, didn't help this time)

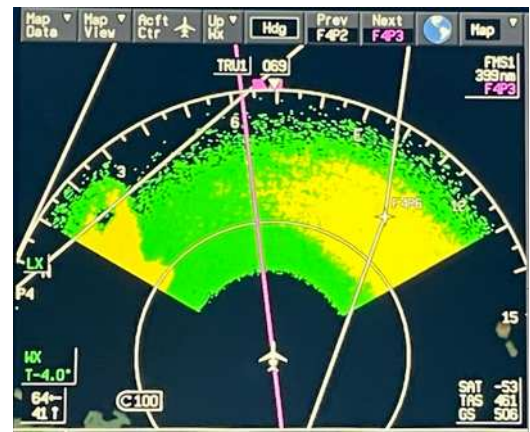


10:06 UTC



11:07 UTC

11:24 Bordradar picture from 11:24 UTC.
Distance circles are showing 100 and 200 NM

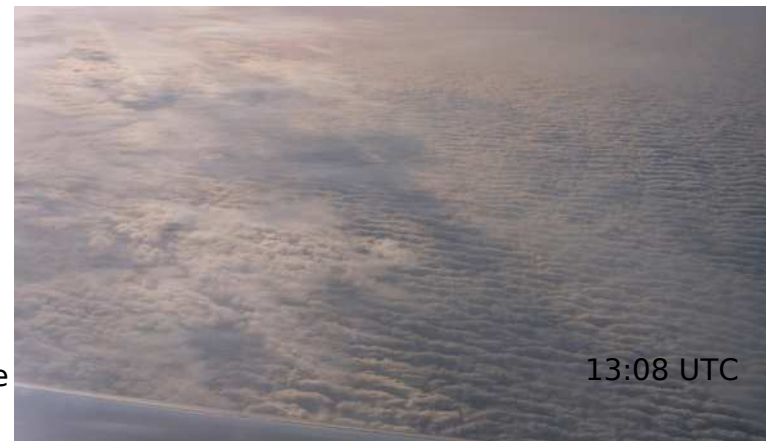


11:30 thicker cloud layer starts again
11:53 DS8 again within the AR
12:07 DS9 low level clouds and cirrus
12:28 DS10 low clouds, some cirrus
12:37 DS11 thicker clouds again
12:40 DS12 (additional dropsonde)
12:44 DS13 again thick clouds, part of
the AR
getting close to danish airspace again....



11:52 UTC

12:48 going higher to FL430
12:51 reached FL430
13:00 above the clouds, still thick clouds
13:10 still a few cirrus, but more
structured low level clouds again
(some waves)
13:19 turn over sea ice
13:29 low level and cirrus clouds
13:31 some turbulence (bisschen
ruckelig)
13:36 cloud depth is slowly increasing
again...approaching our favorite river one
more time.



13:08 UTC

13:47 - thick clouds again, staying at
FL430
14:00 DS14 - thick low clouds (not that
high anymore...some cirrus above)
14:08 some turbulence (bisschen
ruckelig)
14:11 DS15 low level clouds some thin
cirrus



13:55 UTC

14:19 turn over ocean
14:28 low level clouds visible by eye (not
radar)
14:34 DS16 low level clouds, cloud changes
(to high) visible in flight direction
14:41 DS17 more cloud structure
again..some higher, cloud depth increasing
again
14:48 DS18 low structured clouds
14:54 DS19 cloud gets thicker, convection in
the cloud (visible in radar)



14:36 UTC

14:57 slight turbulence (bisschen ruckelig)

15:01 DS20 (extra dropsonde ..aiming at the center of the AR)

15:04 slight turbulence (bisschen ruckelig)

15:05 DS21 - AR is decreasing again, clouds get thinner

15:13 DS22 AR continues to decrease...still low level cloud, we see open water for the first time today

15:27 turn at the sea ice border - sea ice covered by a bit of fog

15:30 wave structures in the clouds

15:35 no clouds on the radar, but looks foggy

15:51 increasing cloud cover again

16:10 DS23 close to the location of DS08. still thick clouds

16:16 slight turbulence (ruckelt bisschen)

16:19 clouds start to get less

16:22 DS24 after AR, close to location of DS09, low level clouds and cirrus

16:33 flying somehow in the cirrus, probably low level clouds below

16:33 some turbulence (ruckelt bisschen)

16:39 still cirrus and low level...no change since a while...we decided to skip the last dropsonde

16:44 DS25, still cirrus and propably low level clouds below

16:54 sunset is comming..

17:11 some turbulence (ruckelt bisschen)

17:16 starting descending

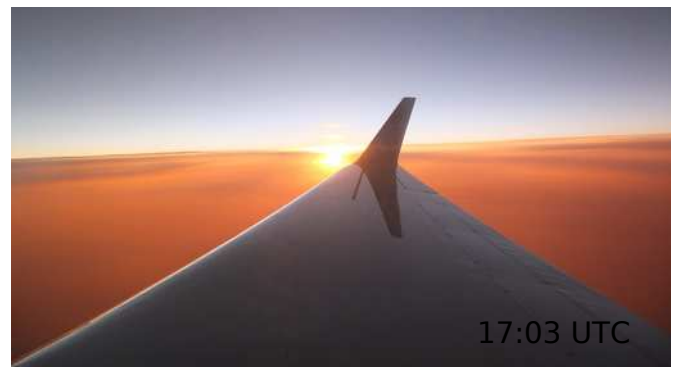
all dropsondes worked, no failure

17:28 starting to shutoff instruments

17:50 landing



Tack till alla för flyget!



Additional Graphics (Quicklooks):
More on the cloud...

