

Flight Report

HALO-AC3_HALO_20220225_RF00

Objectives:

- Test the instrumentation
- Perform specific calibration flight patterns to check
 - o the radiation sensors,
 - o the nose boom high-frequency turbulence data, and
 - o the radar.
- Furthermore, one or two dropsondes were planned to be released to check the respective data transmission.
- Several well-equipped ground based measurement stations (Leipzig, Lindenberg, Jülich) were intended to be overflown to compare with the remote sensing measurements onboard HALO.

Mission PI HALO:

HALO Crew	
Mission PI	Manfred Wendisch
HAMP	Florian Ewald
WALES	Georgies Dekoutsidis
SMART/VELOX	Johannes Röttenbacher
specMACS	Lea Solveig Volkmer
Dropsondes	Geet George
Optional	
Pilots	Roland Welser Marc Puskeiler
Engineer	Thomas Leder

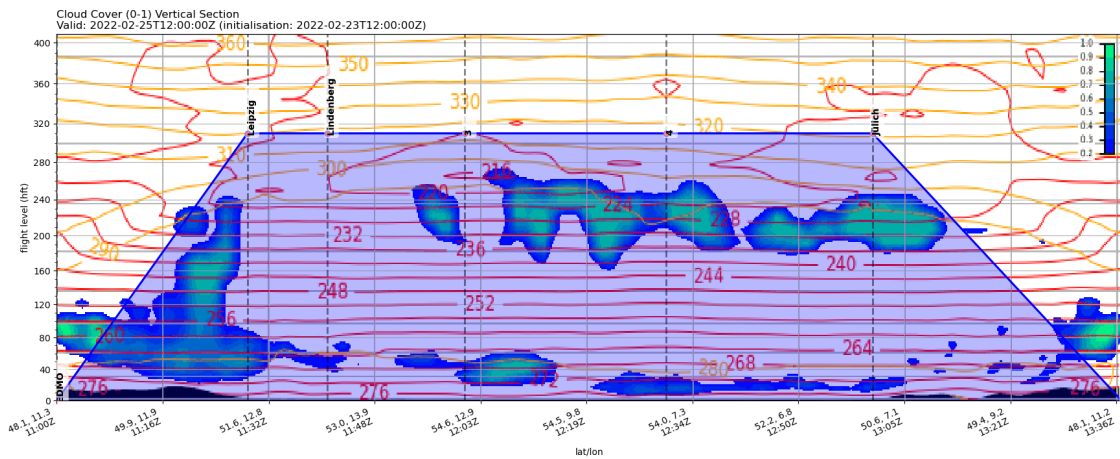
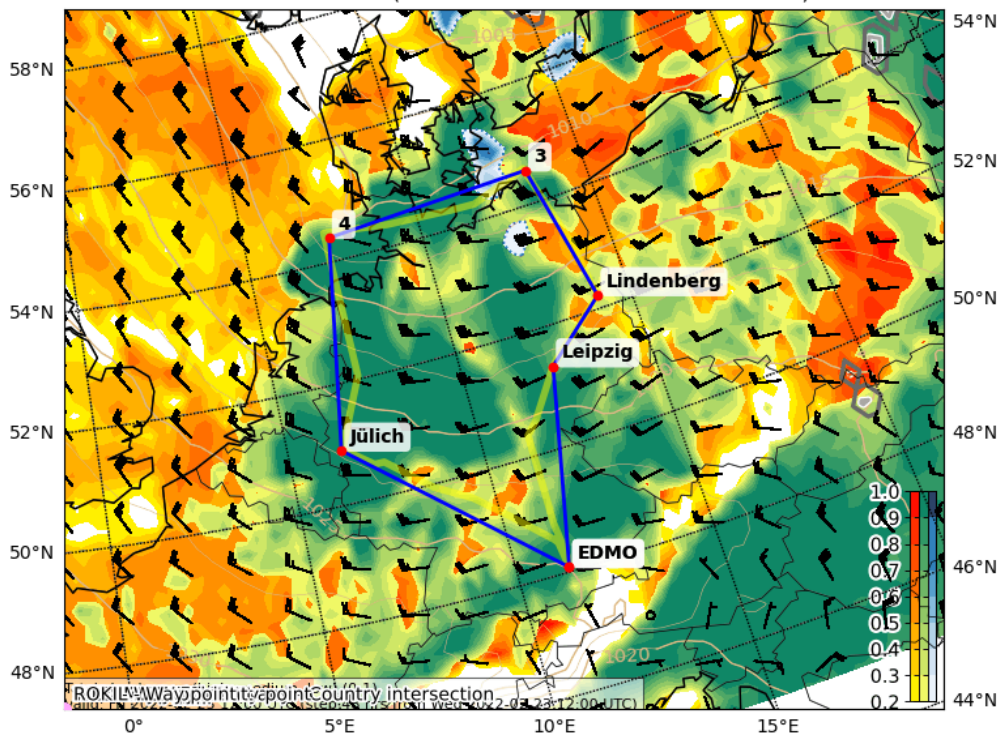
Flight times:

HALO	
Take off	07:31 UTC
Touch down	12:12 UTC

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

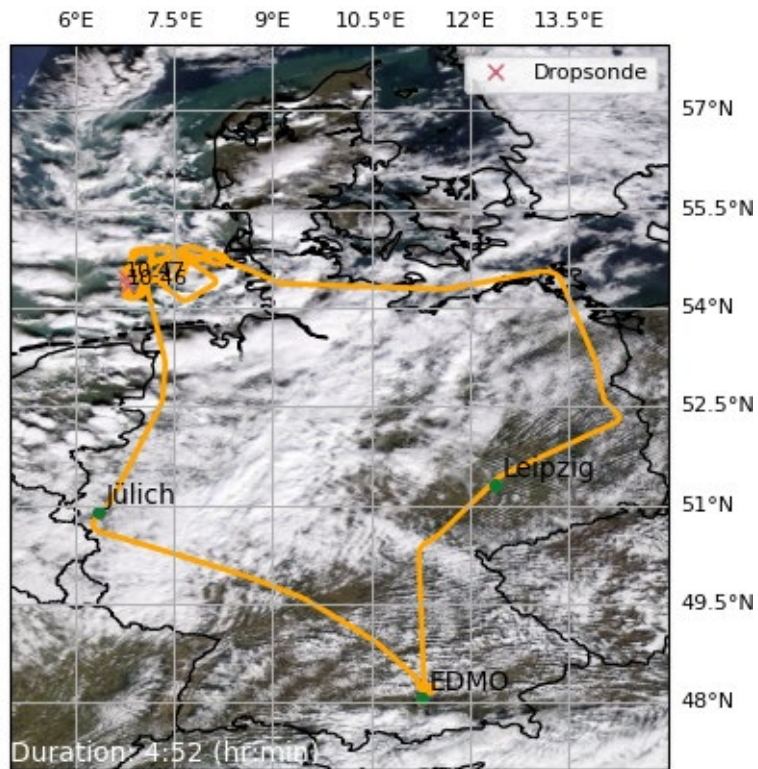
During the flight we experienced mostly cloudy conditions with low to mid-level clouds in southern Germany and increasing cloud tops in the north. In particular, over the North Sea we observed thick clouds including heavy precipitation. These weather conditions were caused by a trough with its horizontal axis crossing the area over the North Sea where the calibration maneuvers for radiation, nose boom and radar have been carried out. However, we could manage to stay atop of the clouds during the entire flight. The forecast based on model initialization two days before the flight took place (see two figures below) met the actual conditions during the flight amazingly well.

Cloud Cover (0-1) and Mean Sea Level Pressure (hPa) (TOT) at 850.0 (hPa)
 Valid: 2022-02-25T12:00:00Z (initialisation: 2022-02-23T12:00:00Z)



Overview:

We took off into the direction of Leipzig to overfly the remote sensing instrumentation of TROPOS and LIM, afterwards we headed to Lindenberg (please see the flight track illustrated in the figure below). Both overflights worked well, why shouldn't they. Afterwards we went to the Baltic Sea and then to the restricted area established over the North Sea where we performed all the calibration maneuvers we had planned. No problems were reported. On our way back we overflew the Jülich observatory to collect some more data to compare ground-based and HALO remote sensing measurements. Also on our way to EDMO nor problems appeared. Altogether all objectives of the test flight have been reached.



Instrument Status:

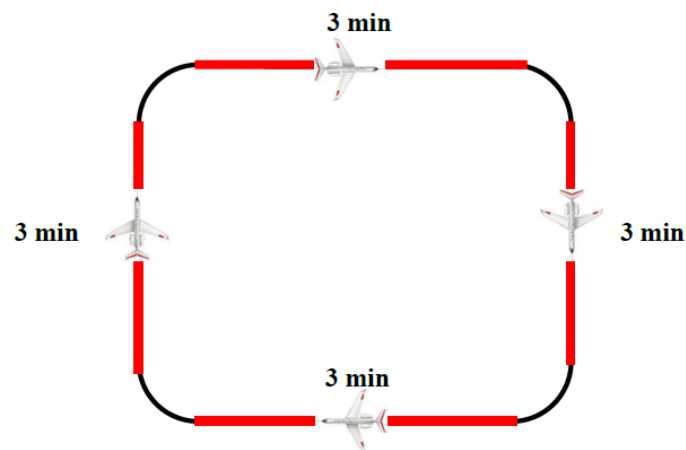
HALO	
BAHAMAS	
BACARDI	
HAMP Radar	
HAMP Radiometer	
WALES	
SMART	
VELOX	
specMACS	
Dropsondes	

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

Detailed Flight Logs (all times in UTC)

- 7:26 Taxi
- 7:31 Take off
 - Surface partly covered with snow
 - Mostly mid-level clouds, cloud-free above
- 7:42 We reach FL310 and stay there at constant flight level
- 7:47 Some leakage in the WALES cooling system appears
- 7:46 More extended SC below us
- 8:07 We overfly Leipzig
- 8:18 We pass Lindenberg and head in northern direction

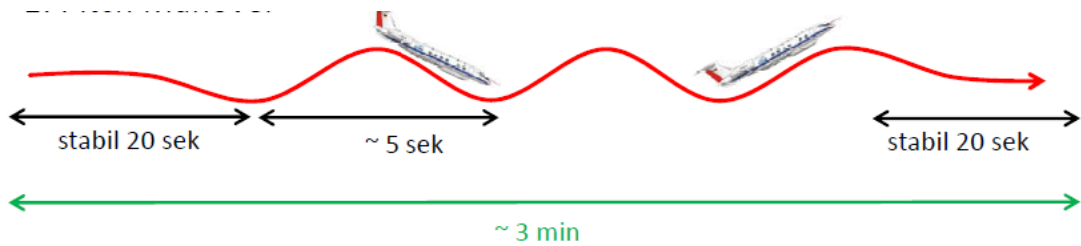
- 8:37 More clouds appear on our way to the Baltic Sea
- 8:40 We reach the Baltic Sea
- 8:42 We turn west into the direction of the North Sea, clouds below become thick and thicker
- 8:51 We climb to FL340 and stay there
- 8:56 Heavy clouds below us, radar indicates heavy precipitation
- 9:14 We start with radiation pattern (quadrangle), ideal conditions, no clouds above at all
- 9:17—9:20 141° (Southeast direction)
- 9:21—9:23 231°
- 9:25—9:27 321°
- Dodge traffic
- 9:31—9:34 51°



- 9:35 We get prepared for the noseboom calibration (mostly at Mach = 0.68)

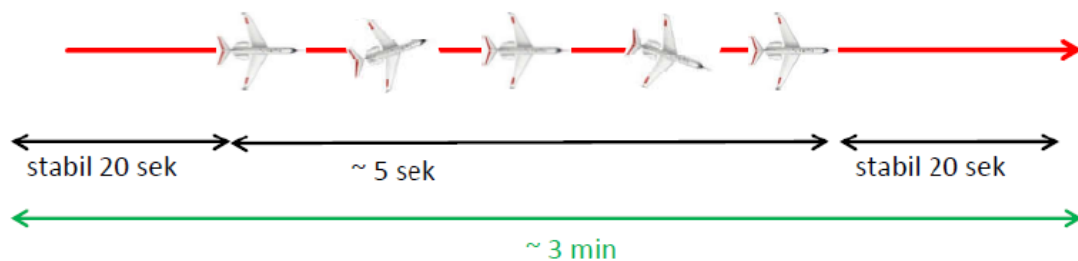
Pitch maneuver

- 9:42—9:47 3x10 waves
- 9:49—9:52 1x10 waves



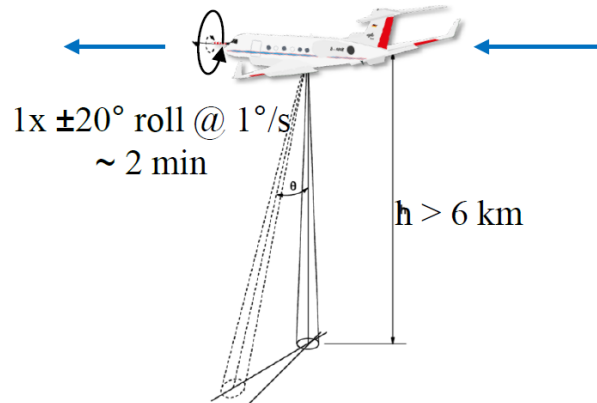
Yaw maneuver

- 9:58—10:01 2x10 waves
- 10:04—10:06 1x10 waves



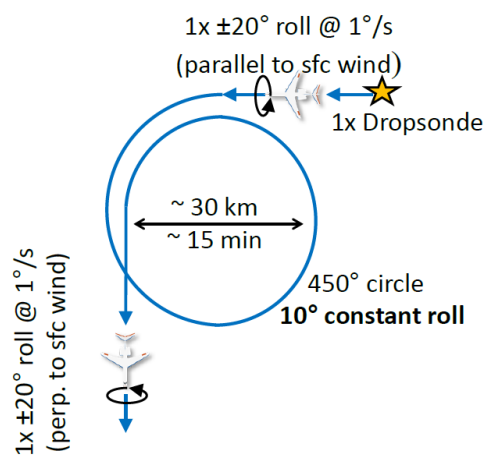
10:10 We begin with radar calibration

10:13—10:15 Roll maneuver with $\pm 20^\circ$ roll with $1^\circ/\text{sec}$



10:25—10:41 Circle maneuver with 10.4° constant roll angle

Afterwards another roll maneuver with $\pm 20^\circ$ roll with $1^\circ/\text{sec}$



10:45 First dropsonde release

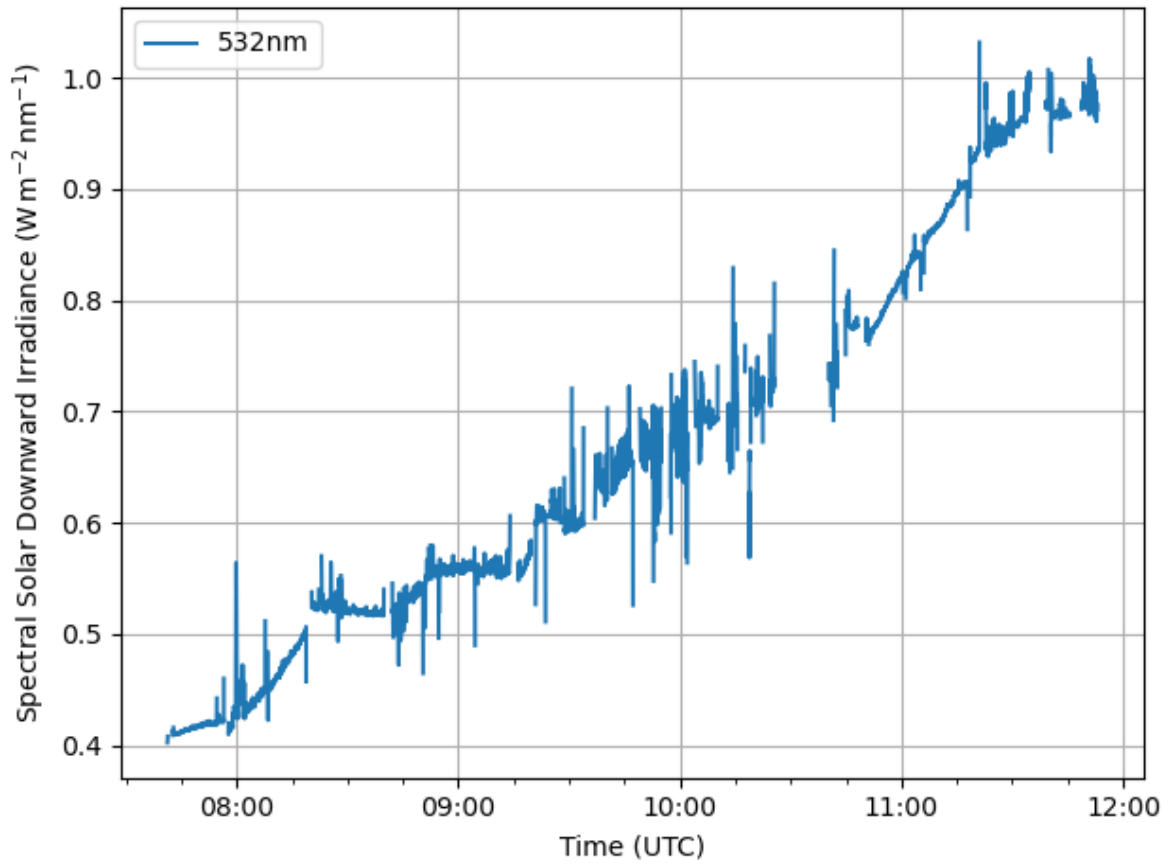
10:47 Second dropsonde release

11:18 Overflight Jülich (thick Cu below us)

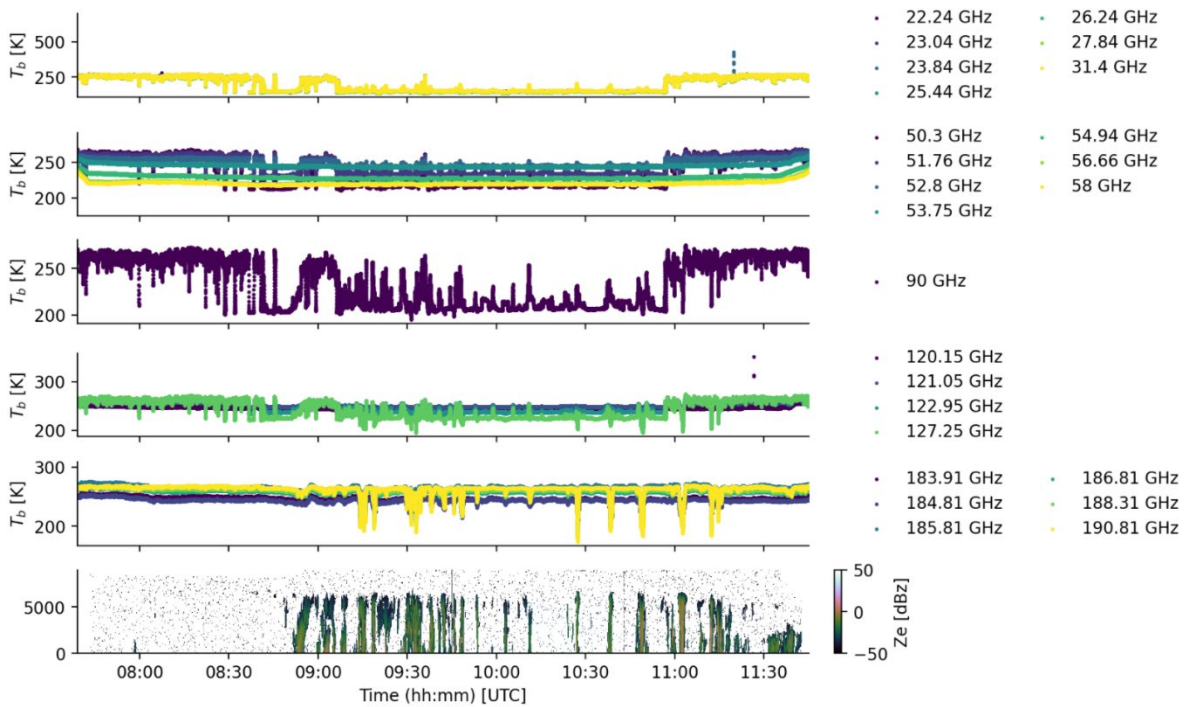
12:12 Landing

Quicklooks:

SMART— spectral time series:



HAMP—Passive:



Dropsondes:

