

# HALO-0130 (30 January 2020)

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Draft

## 1 Objective

The objectives of the flight were threefold. First we intended to fly race track patterns with HALO above and ATR below to perform a comparison between SpecMACS and the ATR lidar and radar. In addition, the microphysical measurements of ATR together with the one from the Twin Otter can be used to make a measurement forward modelling closure. Second, a direct GPM core underflight was planned. The third objective was to catch a Saharan dust layer moving from South East into the observation area. And in the end after planing, we realized what we gonna fly looks like a snail.

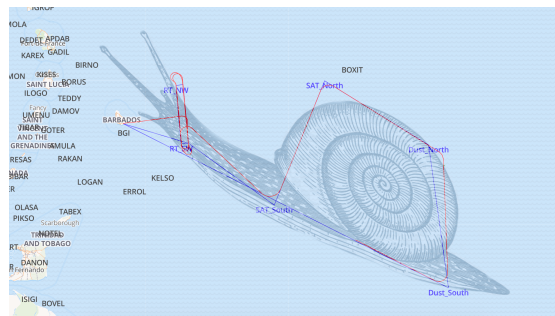


Figure 1: It's a snail.

## 2 Crew

*Mario Mech* (Mission PI), Theresa Lang (Scientist), Theresa Mieslinger (Dropsonde), Hauke Schulz (HAMP), Tobias Kölling (specMACS), Kevin Wolf (Velox & SMART), Manuel Gutleben (WALES), Roland Welser & Mark Puskeiler (Pilots), Thomas Leder (Engineer)

## 3 Synoptic Situation

A ridge dominates over operational area. Area mostly clear with fair weather cumulus and slight increase in dust due to advection of a Saharan dust layer from Southeast. Winds Southeast 5 to

10 kts but may be increasing into tomorrow.

During take off, it was partly cloudy with moderate winds from Southeast. Sugar arranged in streets dominated during the race track pattern. Heading East towards the satellite underflight brought us to the edge where the sugar like clouds changed into a flower kind of style. At the northern end of the satellite underflight it was almost clear. Turning east brought us back in the flower clouds area with connected cold pools increasing in intensity when heading towards South on the dust leg. By the dust layer, a strong inversion could be observed through during the second half of the flight.

## 4 Flight Elements

Table 1: Overview of main elements of flight

Element	(°N, °W)	FL	Time (UTC)	Notes
Takeoff & Ferry to Entry Point (EP) to race track (RT)	GAIA	Ascent to 320	11:19	20 min delay due to problems at the tower with the radar
EP to RT_SE	(13.89,-58.41)	320	11:33	
RT_SE to RT_SW	(12.7,-58.21)	320	11:37	
RT_SW to RT_NW	(12.69,-58.36)	320	11:43	
RT_NW to RT_NE	(13.8,-58.46)	320	11:52	
RT_NE to RT_SE	(13.82,-58.32)	320	11:56	
RT_SE to RT_SW	(12.7,-58.21)	320	12:06	DS1 at 12:06
RT_SW to RT_NW	(12.69,-58.36)	320	12:10	
RT_NW to RT_NE	(13.8,-58.46)	320	12:18	DS2 at 12:09
RT_NE to RT_SE	(13.82,-58.32)	320	12:24	
RT_SE to RT_SW	(12.7,-58.21)	320	12:33	
RT_SW to Sat_start	(12.69,-58.36)	320	12:35	Third RT abandoned due to time issues
Sat_Start to Sat_end	(11.52,-56.53)	320	12:55	DS3 at 13:07
Sat_end to Dust_start	(13.89,-55.54)	320	13:15	
Dust_start to Dust_end	(12.67,-53.5)	320	13:33	DS4 at 13:36
Dust_end to GAIA	(9.93,-55.11)	320	13:53	
Landing	GAIA	n/a	15:09	

**Race track pattern** Coordinated legs with ATR at the race track field to compare the different remote sensing instrument and to make use of the ATR insitu measurements for closure studies with the radar and radiometer. The Twin Otter flew in the vicinity and was hunting clouds to provide more insitu measurements of the observed targets. Planed were three race track laps with the HALO. Due to time delay during take off, the third lap has been skipped to be on time at the satellite meeting point.

**Satellite underflight** The idea of this leg is to make a direct comparison of the GPM core instruments with the HALO microwave remote sensing package HAMP. The leg was approx 20 min long and the satellite has been met at the middle of the leg.

**Dust leg** It was predicted that a Saharan dust event approaches Barbados in the course of the flight day. Therefore, it was planned that HALO is used to make WALES measurements across the dust layer. This worked out at the end of the South bound leg.

## **5 Instrument Status**

**Radar** Worked without any anomalies.

**Radiometer** Worked without any anomalies.

**WALES** Problems to activate the lidar in the beginning due to a closed valve.

**Velox** Worked without any anomalies.

**Sondes** All four sondes worked.

**SMART** Worked without any anomalies.

**SpecMacs** Worked without any anomalies.

**BAHAMAS** Worked without any anomalies.

## **6 Figures**

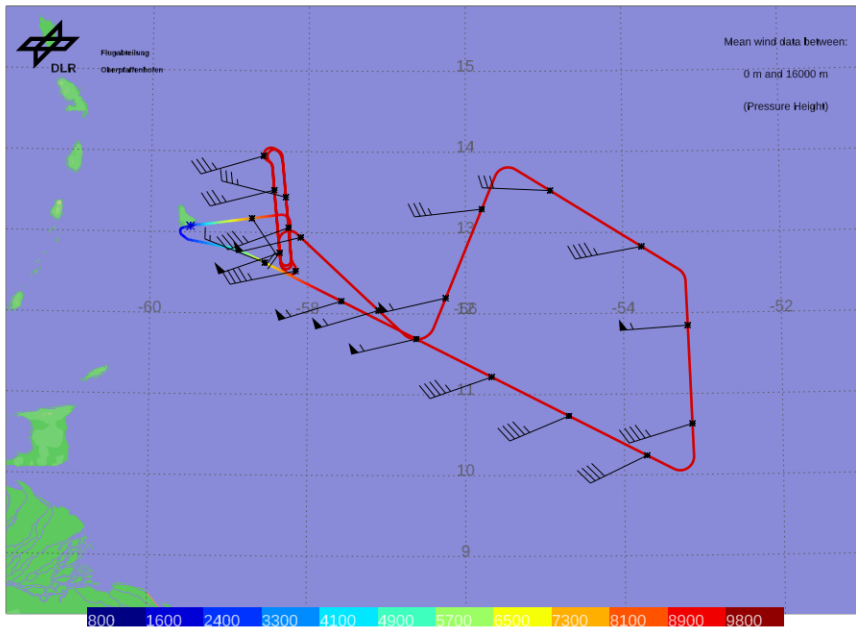


Figure 2: flight path of the flight at 30.1.2020

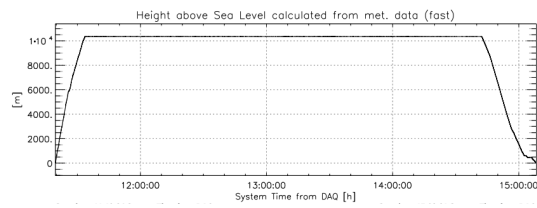


Figure 3: flight altitude as recorded by BAHAMAS.

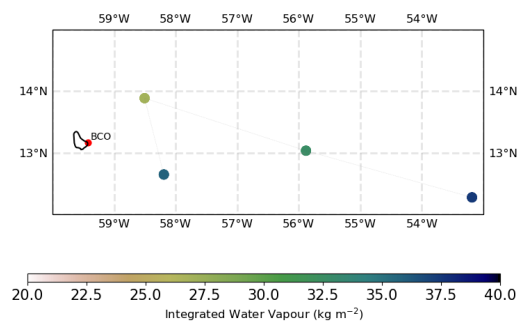


Figure 4: Dropsonde launch locations.

Thick black: Mean values; Other colours: Individual profiles

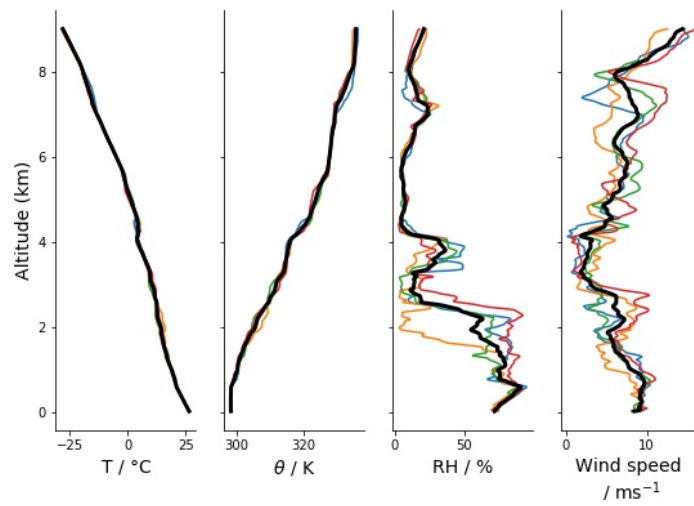


Figure 5: Dropsonde profiles and mean profile.

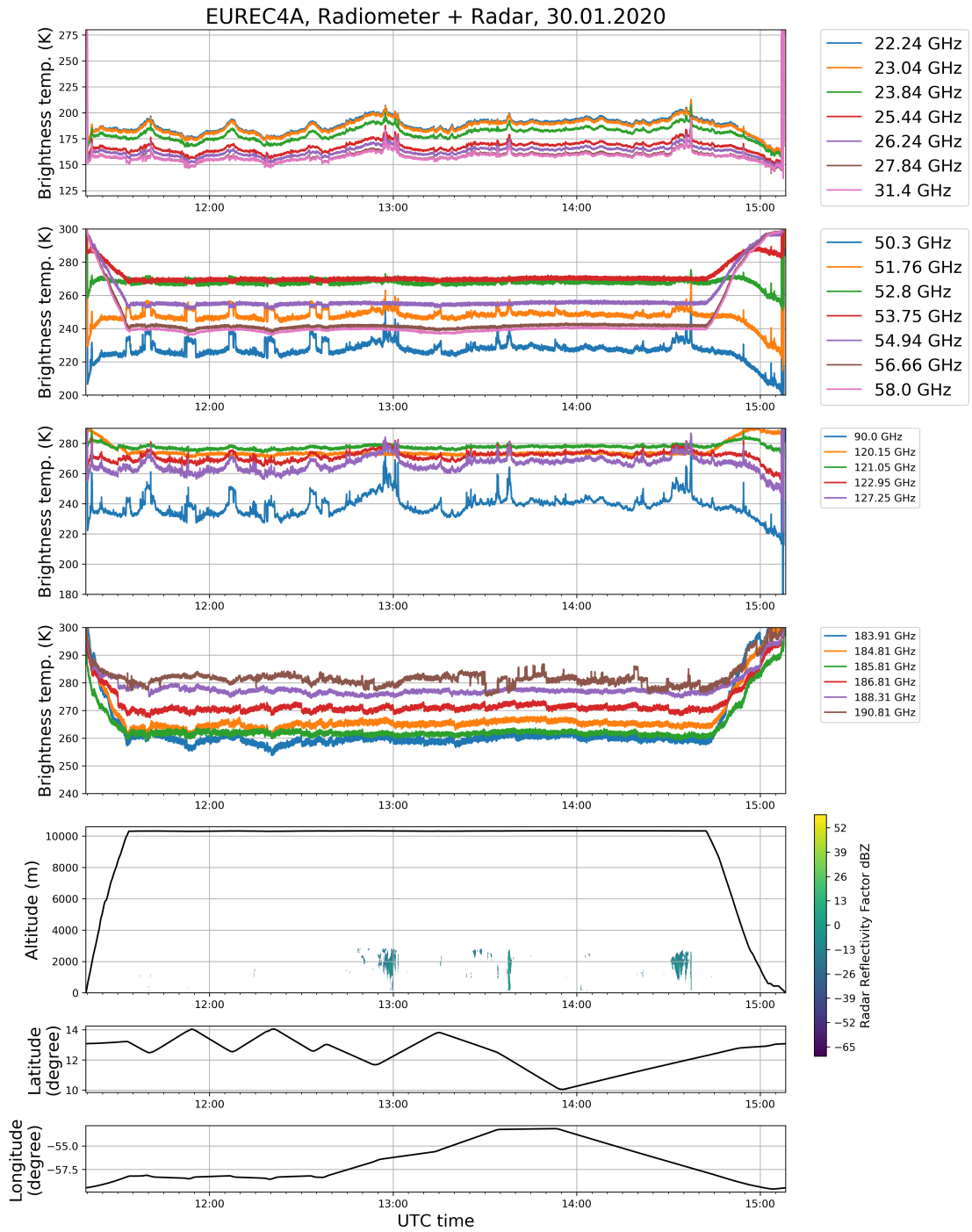
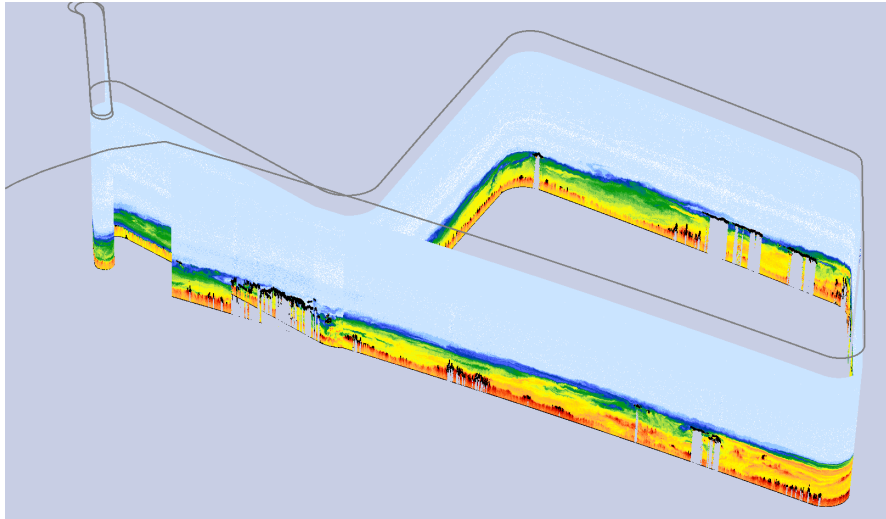


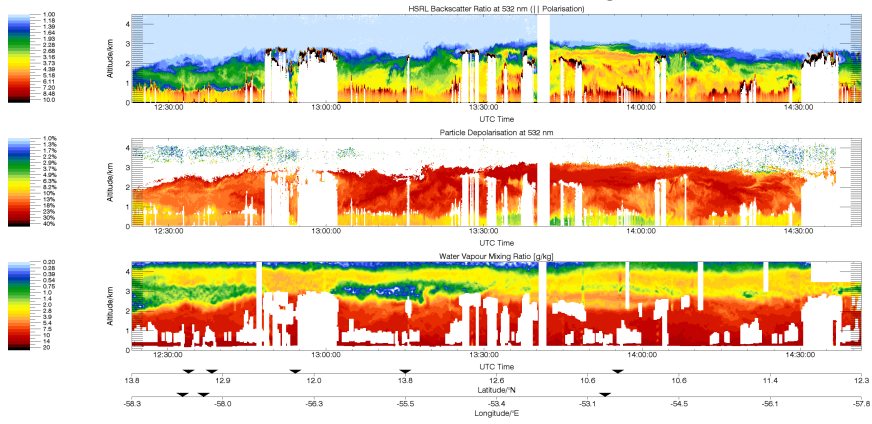
Figure 6: HAMP



**WALES**

**EUREC4A 30-01-2020**

**5th Local HALO Flight**



Preliminary quick-look data. Processed on 31-01-2020. Contact DLR Institute of Atmospheric Physics: Martin.Wirth@dlr.de

Figure 7: WALES measurements.

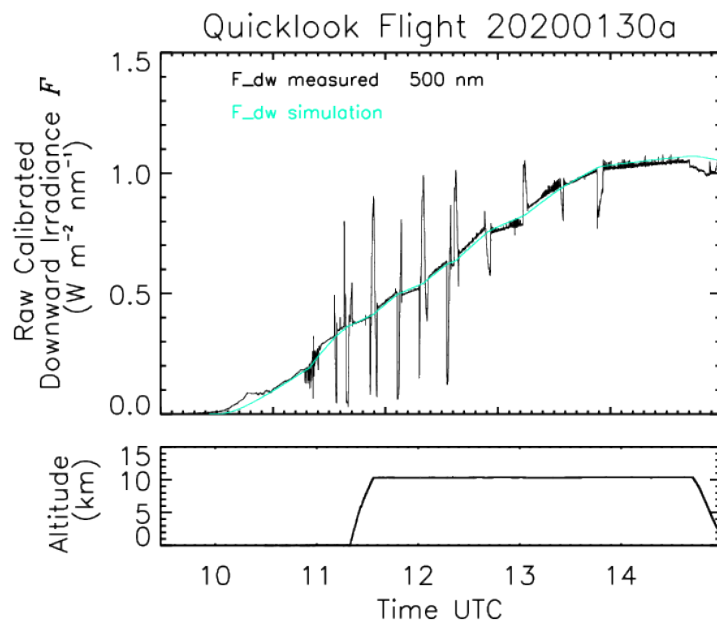


Figure 8: SMART.

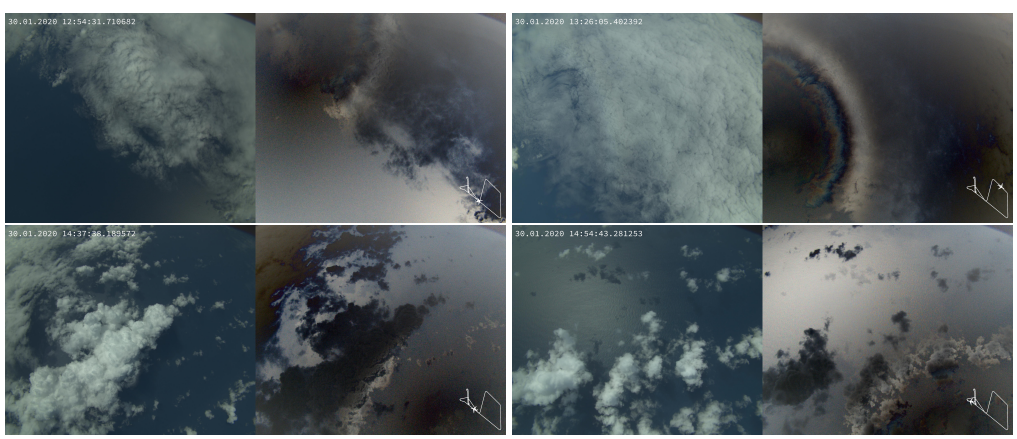


Figure 9: specMACS measurement examples.