

# HALO-0205 (05 February 2020)

Bernhard Mayer  
Draft, February 10, 2020

## 1. Objective

Eighth Research Flight, with two times 3.5 Standard Circles, separated by an NTAS Buoy Excursion and a satellite overpass. Takeoff at 5:15 local time. Excursion was planned in conjunction with Ron Brown and P3 which didn't work out since the Ron Brown had to return to port and the P3 flew South.

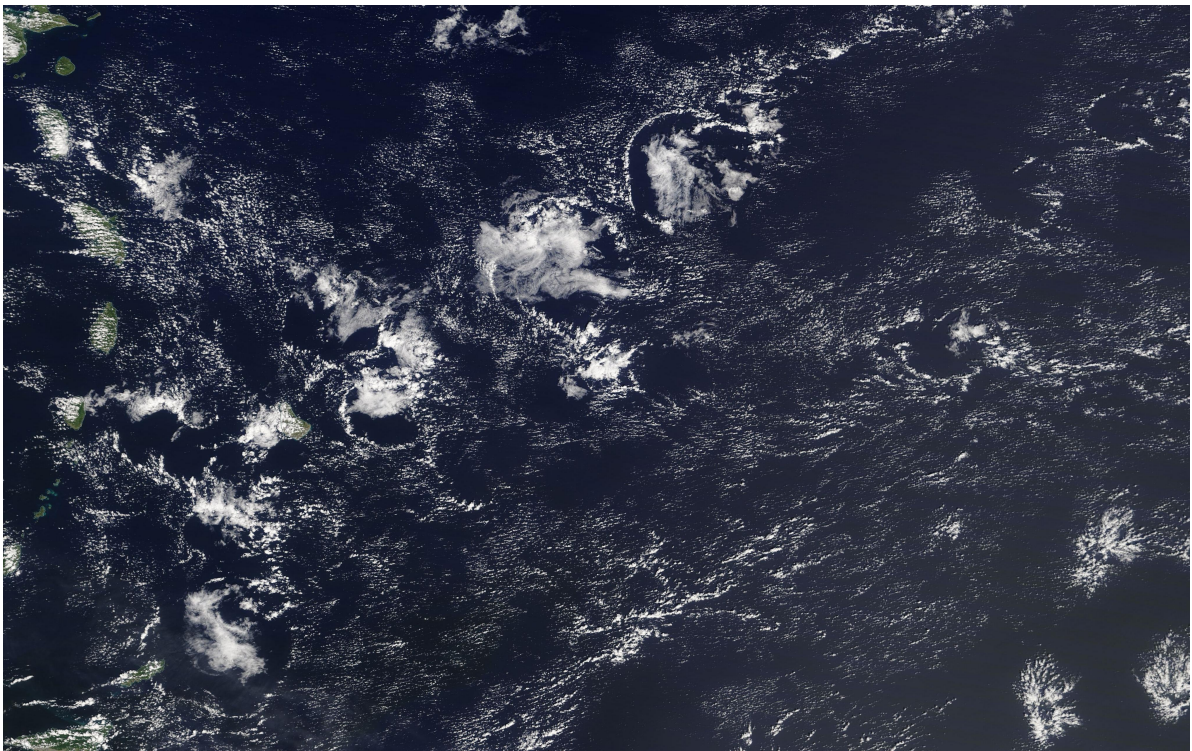
## 1. Crew

Bernhard Mayer (Mission PI), Silke Groß (WALES), Hauke Schulz (HAMP, Dropsondes), Linda Forster (specMACS, SMART/VELOX), Bjorn Stevens (Flight Scientist), Jule Radke (Dropsondes, HAMP), Jonas Sichert (Flight Scientist),

Geet George (Ground Contact)

## 2. Synoptic Situation

A ridge dominated the observation area, with increased wind of about 10m/s. At the beginning the cloud pattern was a succession of Flower patterns which changed to Gravel/Sugar later. The cloud fraction was larger than on previous days. The clouds were generally more developed, with showers for some of them. Satellite overpass at 10:25 local time over cold pool North of the Circle. No cirrus was observed, neither above nor below HALO.



*Figure 1: Terra MODIS image from NASA Worldview, 10:20 local time (at time of satellite overpass), 14:20 UTC*

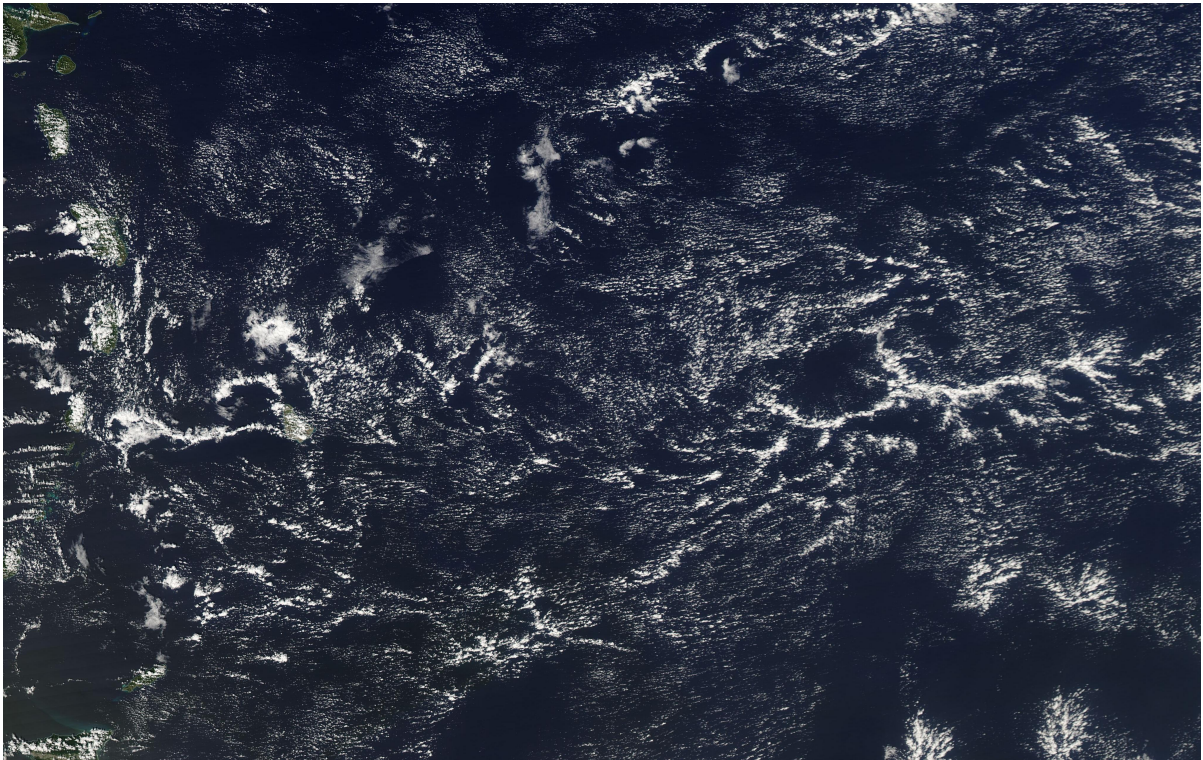


Figure 2: Aqua MODIS image, 13:20 local time (during last circle), 17:20 UTC

### 3. Flight Elements

Element	(°N, °W)	Flight Level (FL)	Time (UTC)	Notes
<b>Takeoff</b>	GAIA	Ascent to 320	9:15	
<b>Note</b>	n/e	320	9:33 – 12:51	3.5 circles, FL 320, CW
<b>Note</b>	n/e	320	12:51	Leaving Circle towards NTAS Buoy
<b>Note</b>	n/e	320	13:19 – 13:26	180° turn
<b>Note</b>	n/e	320	13:55	Back at circle; turn into Terra satellite track
<b>Note</b>	n/e	320	14:13 – 14:20	180° turn
<b>Note</b>	n/e	320	14:20 - 14:31	Terra/MISR Overpass
<b>Note</b>	n/e	320	14:37	In Circle again, East
<b>Note</b>	n/e	320	14:37 – 17:53	3.5 Circles, FL 320, CW
<b>Note</b>	n/e	Descent to 160	17:53	Left FL 320, start descent
<b>Note</b>	n/e	160	n/e	Lidar leg
<b>Landing</b>	GAIA	Descent to 0	18:20	Landing

**Excursion to NTAS Buoy:** No coordinated observations with Ron Brown and P3, since Ron Brown had to return to port.

**Satellite Overpass:** Perfect coordination with Terra/MISR; MISR takes 7 minutes to scan a ground pixel with all 9 cameras; HALO was directly below MISR track for 11 minutes

#### 4. Instrument Status

**Bahamas:** operational, no issues

**Radar:** operational, no issues.

**Microwave Radiometer:** operational, except 183 GHz channels from 11:00 to 13:00 UTC.

**Lidar:** operational; 30 minutes missing during last circle

**specMACS:** operational, no issues

**SMART:** operational, no issues.

**VELOX:** some small artifacts shortly after the climb which disappeared soon; KT-19 worked stable and reliable from 13 UTC.

**Dropsondes:** ...

#### 5. Figures

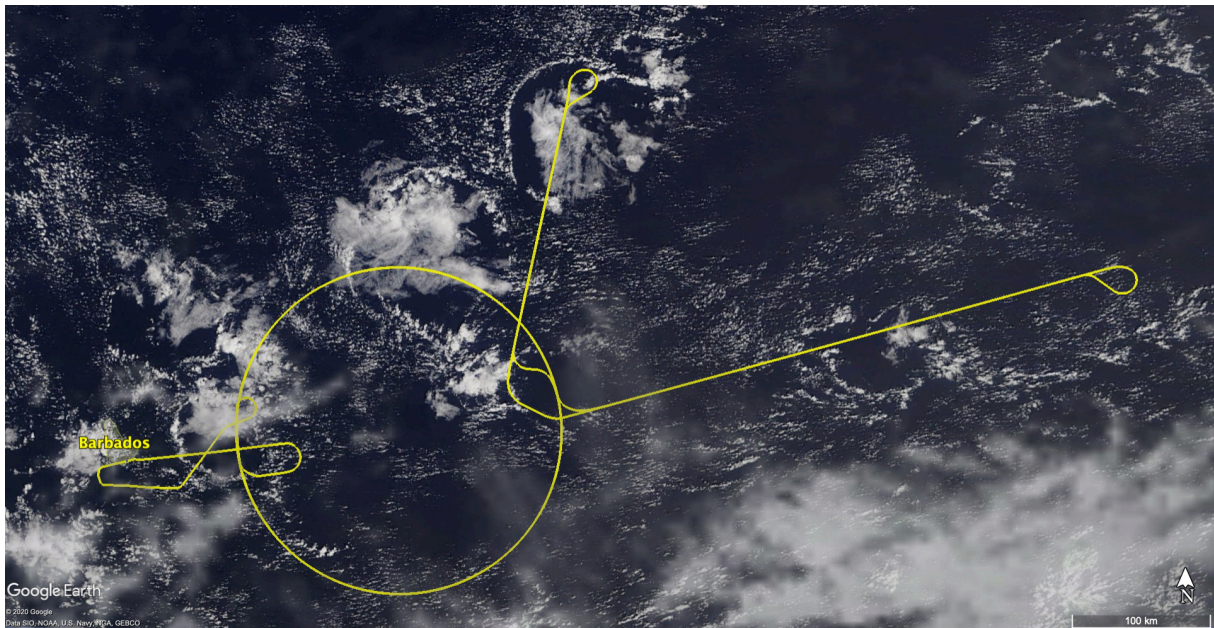
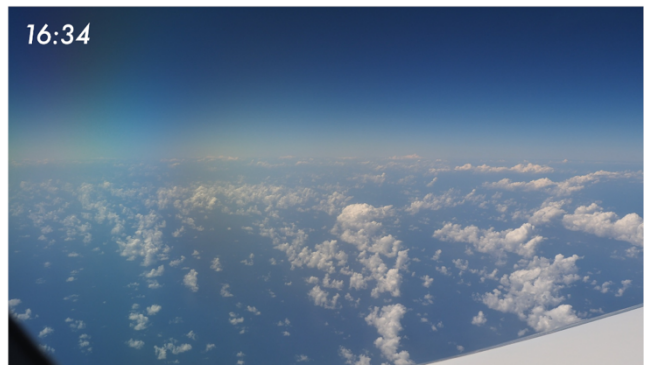


Figure 3: HALO flight path, with NTAS excursion to the East and Terra/MISR overpass to the North.



Figure 4: Flight profile. Except for start, landing, and the Lidar leg HALO stayed at FL 320.



*Figure 5: 10,887 pictures were taken with an OLYMPUS OM-D E-M1 in order to create a time lapse movie (available from the author); here one image from each full circle is shown, looking into the circle. The time lapse clearly illustrates that the other side of the circle is visible from HALO.*

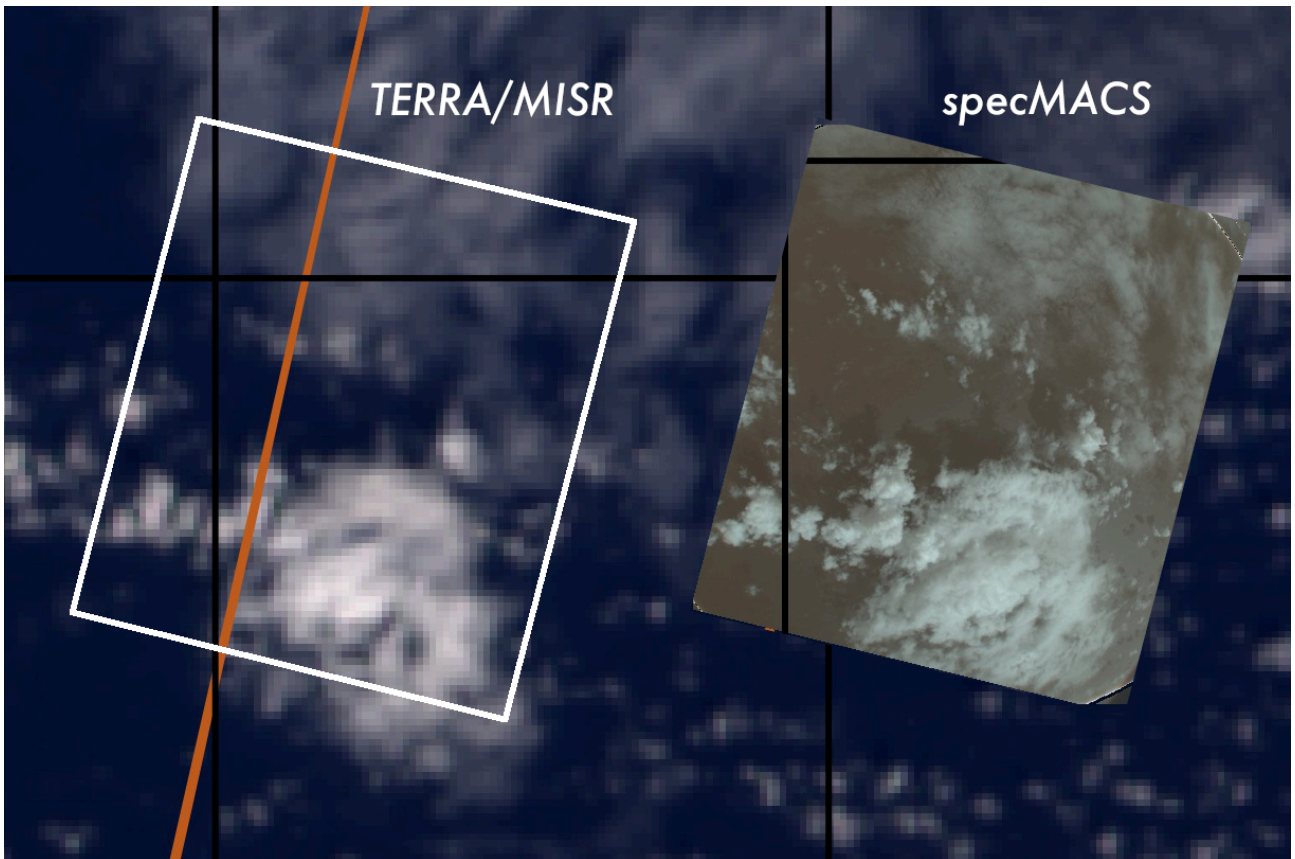


Figure 6: Comparison between Terra/MISR and specMACS (shifted to the right) during the satellite overpass. Red line indicates the satellite track; 10:25 local, 14:25 UTC.

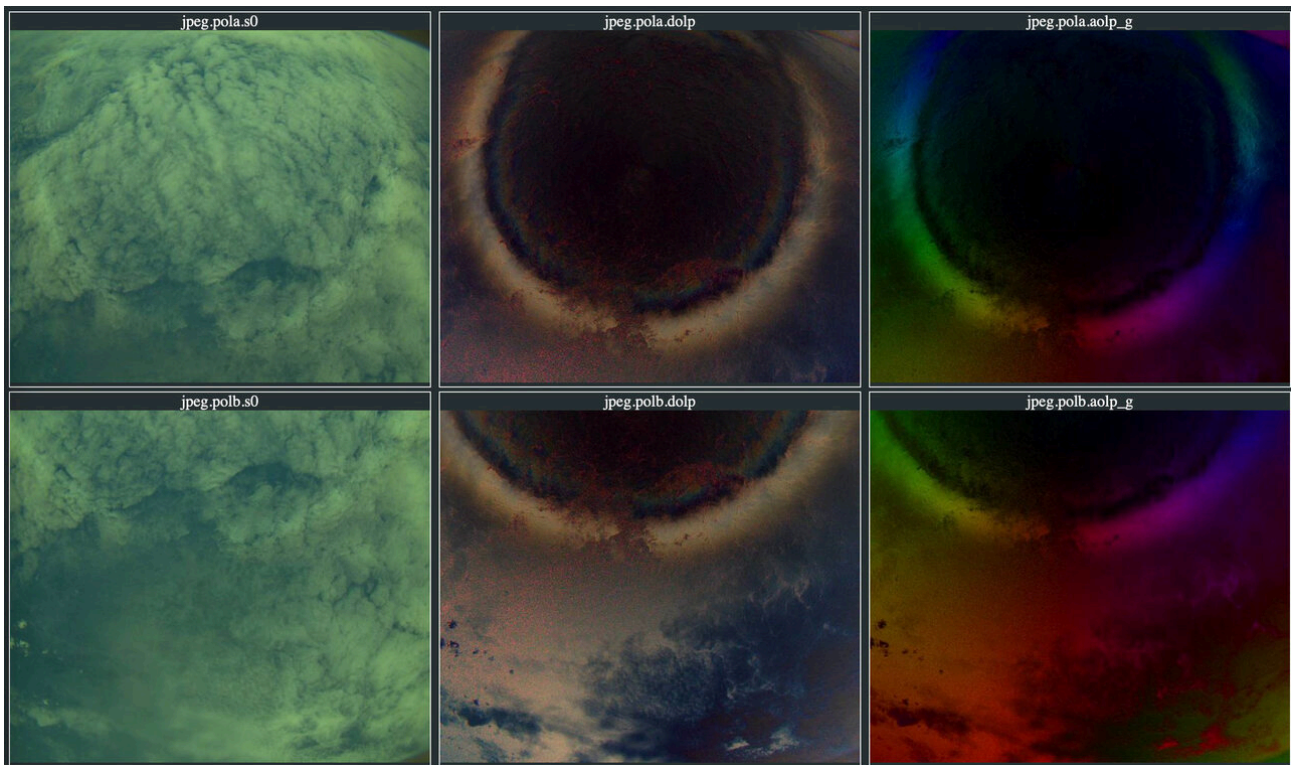


Figure 7: specMACS observation of a cloudbow; radiance (left), degree of linear polarization (center), angle of linear polarization (right); cloud droplet sizes will be calculated from the shape of the cloudbow.

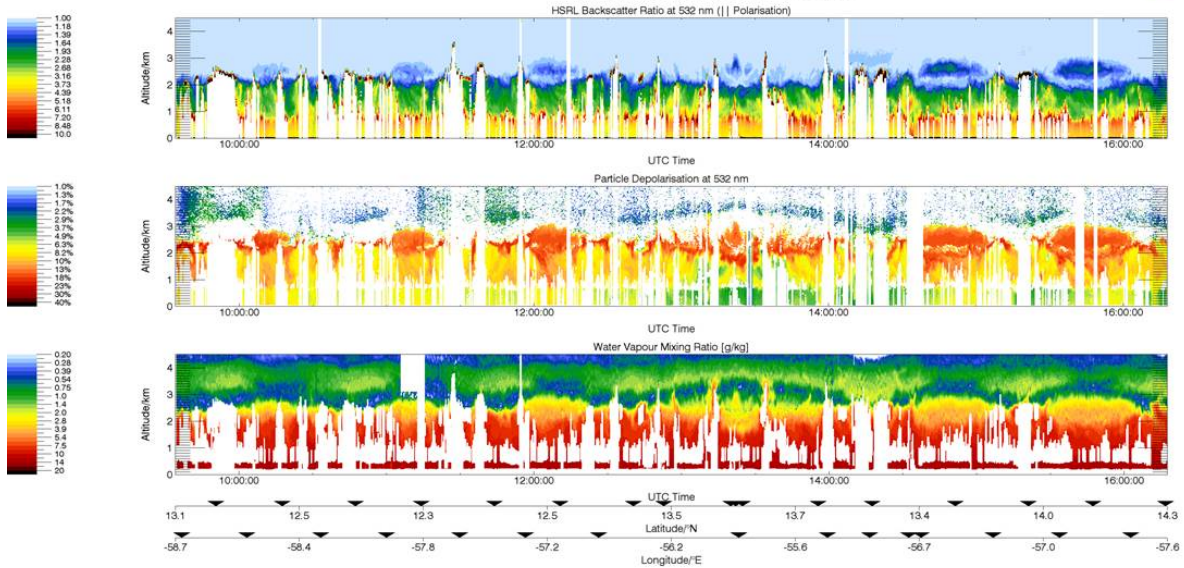


WALES

EUREC4A 05-02-2020



8th Local HALO Flight



Preliminary quick-look data. Processed on 06-02-2020 Contact: DLR Institute of Atmospheric Physics Martin.Wirth@dlr.de

Figure 8: WALES overview of complete flight. Backscatter ratio, particle depolarization, and water vapor mixing ratio. High depolarization ratios indicate some leftover desert dust.

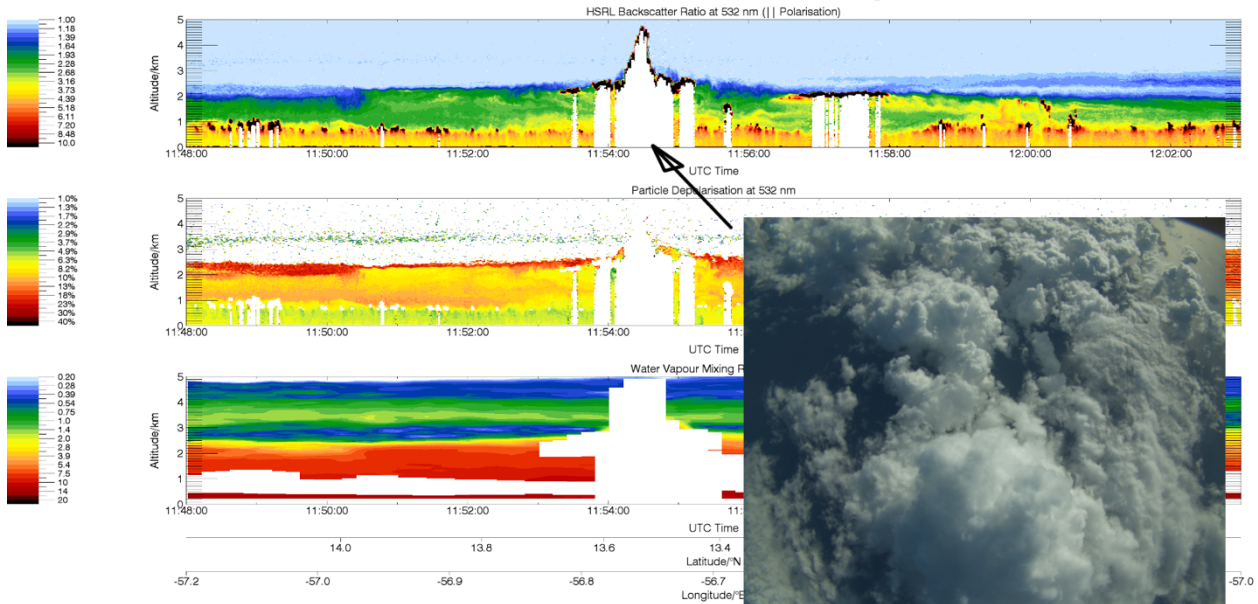


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Figure 9: First synergy product: Overshooting cloud observed by WALES and specMACS.

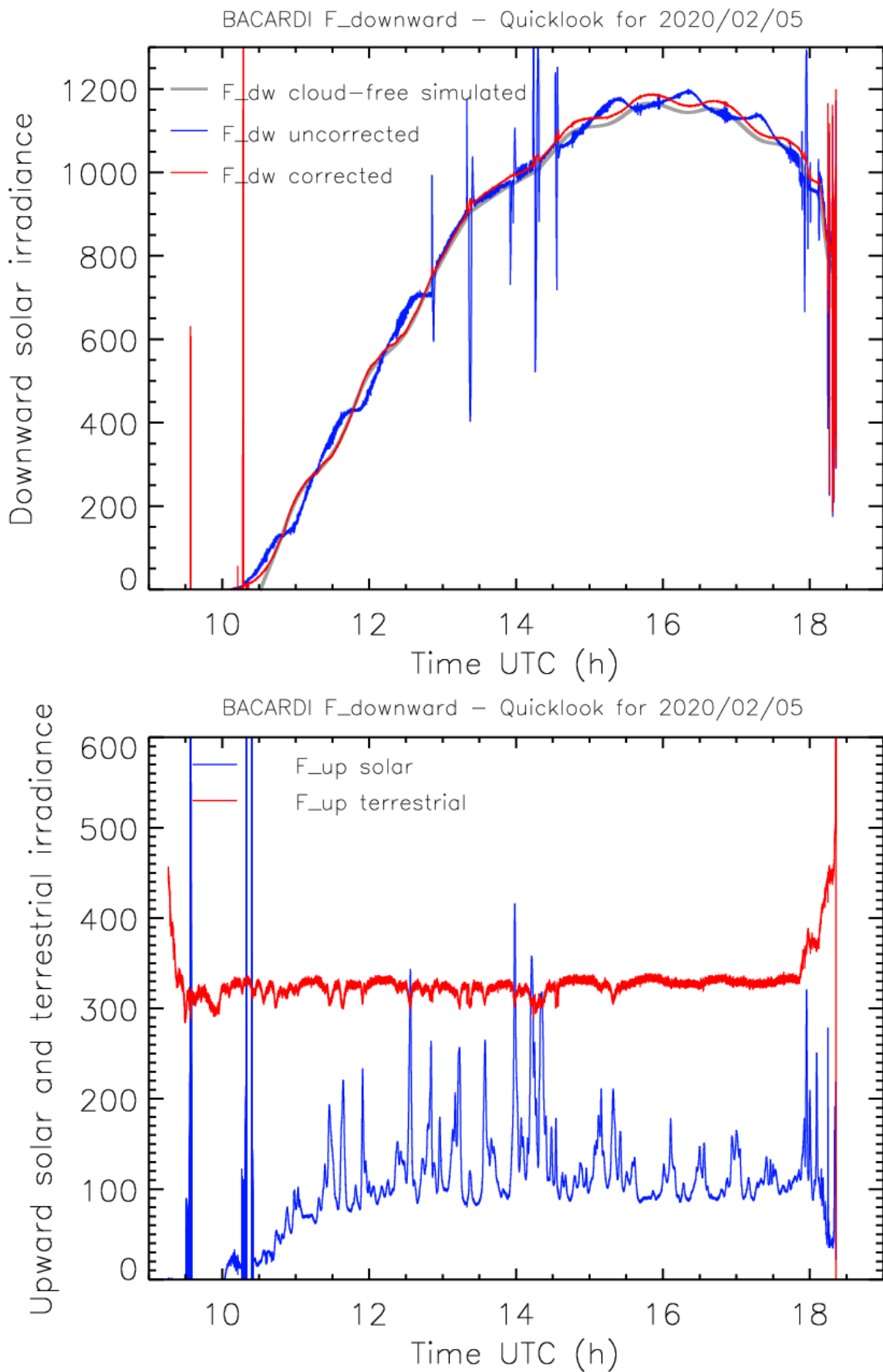


Figure 10: Up- and downward Fluxes from BACARDI. Structures in downward irradiance stems from flight maneuvers; smoothness of the downward irradiance indicates no cirrus above HALO.