

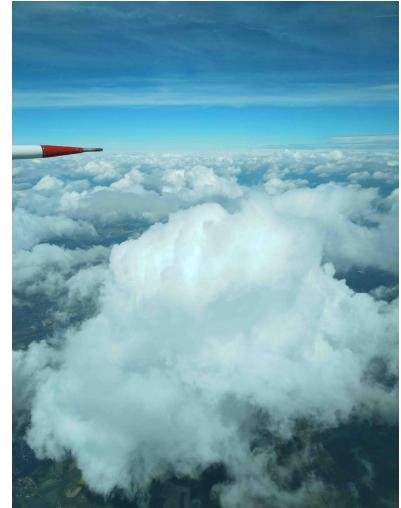
CloudBrake Flight 2 (CBRF2), Sachsen, May 27, 2019 (12-14 CEST)

D-FDLR (Cessna):

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Christian Mallaun, Klaus Dietl, Marc Puskeiler (DLR)

D-CMET (Falcon):

Figure 1: Cloud conditions encountered approaching Sachsen at 11:25 CEST (right), cumulus deck at eastern leg at 1.4 km taken at 12:44 CEST (bottom left), and thick cloud deck flying at 2.4 km near cloud tops at 13:42 CEST (bottom right).



Weather conditions and clouds:

This flight measured an interesting and dynamic mixture of shallow cumulus- and stratocumulus-topped boundary layers, just ahead of a cold front located SW-NE across eastern Germany. Above the shallow clouds, which were about 1 km thick, mid-level altocumulus and altostratus layers were present. Moderate (south)westerly winds prevailed throughout the lower atmosphere, and surface temperatures were still warm near 20 degrees C. The front itself was associated with overcast conditions, with plenty of mid- and upper levels cloud, which progressed eastward faster than expected, so that we encountered overcast conditions at the end of the first flight leg towards the north. Later, the front seemed to break up and skies were clearer, especially towards the southeast. But eventually, also in the southeastern area of our operations, shallow cumulus made way for stratocumulus layers, with only rare sights of clear sky and sunshine.

Flight pattern:

During the transfer towards Sachsen we encountered abundant developing shallow cumuli and occasional altostratus/altocumulus layers. Two South-North oriented flight legs were requested in the Tra-Sachsen. We flew the western leg first, but quickly encountered overcast conditions on the northern part of the leg. Although convective clouds prevailed underneath the abundant mid-and high-level cloud, producing interesting Cessna turbulence measurements, the Falcon wind lidars would have difficulty probing winds at low levels under such cloudy conditions. After the first return leg we thus proceeded towards the eastern leg, but also here, cloud cover quickly increased. A third new leg was requested, oriented SW-to-NE at the southeast corner of the Tra Sachsen area where mid-and high level cloud was (still) largely absent. This leg was flown four times at different height levels, after which we returned to the N-S oriented eastern leg as mid- and high level clouds seemed to cleared up. Cloud cover steadily increased towards the end of the flight leg, during the landing in Hof-Plauen while getting gas, and during the transfer back south to Oberpfaffenhofen.

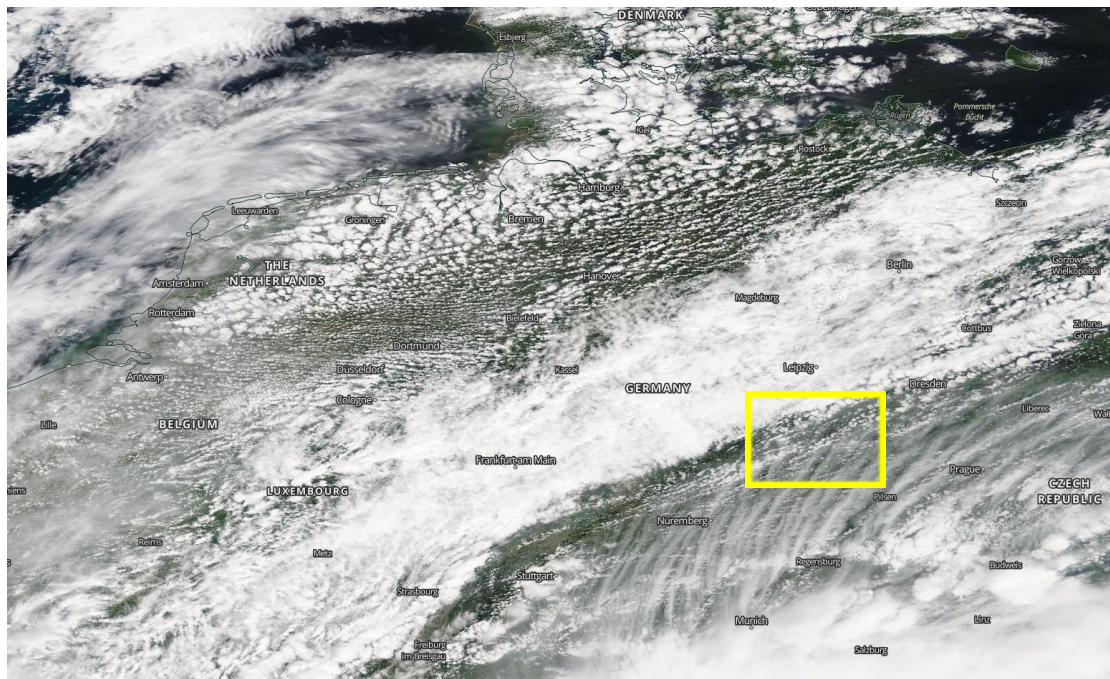


Figure 2: Visible image over Germany from Terra overpass (10:30 local time) and area of operations.

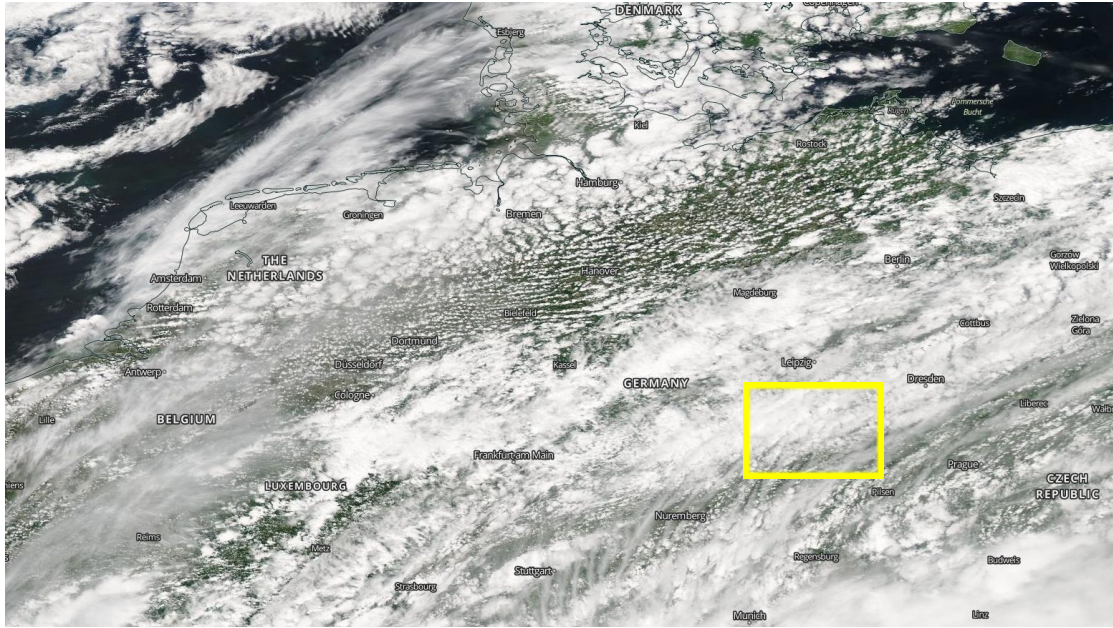


Figure 3: Visible image over Germany from Aqua overpass (13:30 local time) and area of operations.

Figure 4: Flight track in Google Maps.

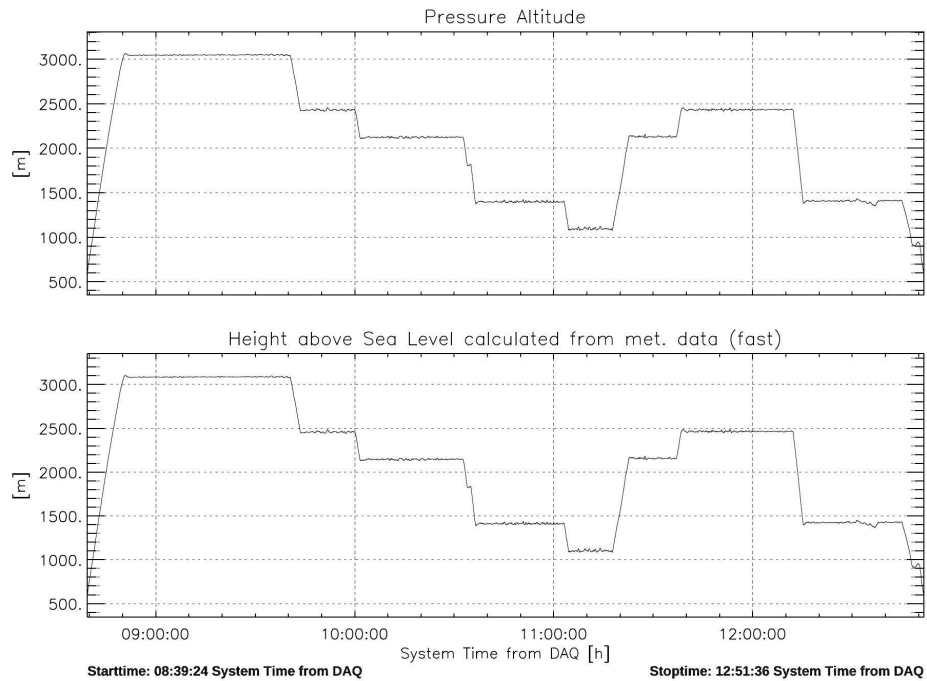


Figure 5: Vertical flight levels in pressure and height during the flight.

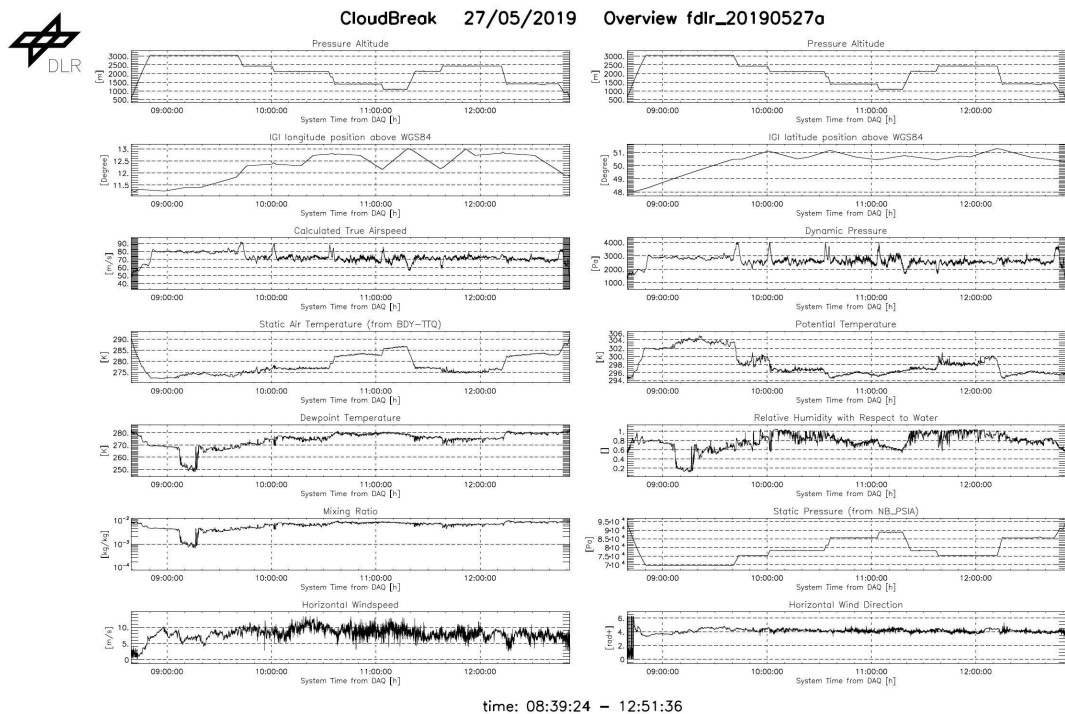


Figure 5: Quicklook of MetPod measurements of temperature, humidity and winds.

Flight notes:

(CEST)

10:45 Take off. Clear skies, and high-level cloud in Bavaria.
10:50 Abundant cumuli developing on our way north to Sachsen, along with local altocumulus layers and more widespread cirrus.
11:40 Arrival in Tra-Sachsen, requesting permission for starting the western leg
11:50 Starting first leg northward at 2.4 km (FL80), which is near the tops or just above the shallow cumuli.
11:53 Front and overcast skies are nearing us, lots of altostratus.
11:56 First passage through cloud, liquid/rain on the windshield
12:03 Return leg southward at 2.1 km (FL70). Shallow cumulus deck is developing into stratocumulus with a 100% cloud cover.
12:09 Cloud deck opening up a bit, cloud base is near 1.5 km
12:12 Altostratus disappearing, skies opening up and looking better (for the Falcon).
12:15 Decision to stop flying the western leg and fly the eastern leg instead. Depart to eastern leg at FL70.
12:24 Start northward along eastern leg. Decide to continue here until we hit too much overcast conditions.
12:37 Return leg southward at 1.375 km (FL60)
12:42 Sky clearing up, we still see sun spots at the surface
12:51 Decision and request to fly a new third leg oriented southwest-northeast along the southern boundary of the Tra-Sachsen area. Starting this leg towards the south at 1.375 km. Wind is parallel to the leg.
13:03 Descend to ~ 1 km and head towards northeast
13:18 Ascend to 2.1 km (FL70), roughly cloud base, and return towards southwest.
13:22 We are flying through cloud bases.
13:39 Ascend to 2.4 km (FL 80) and head to northeast. This is about cloud tops. Flying through a thick cloud street with 100% RH.
13:51 We turn back to the north-south oriented leg located furthest east and head north at 2.4 km.
14:12 Descend to 1.35 km and return towards the south.
14:30 Leave the measurement leg, and head to Hof-Plauen along the southwest-northeast oriented leg. Low cloud cover has been steadily increasing, and along with lots of high cloud, there is no more direct sunlight seen at the surface.