Flight Scientist Report
Wednesday 6/02/2021 ACTIVATE RF76

Flight Type: Statistical Survey Flight
Flight Route: ECG-OXANA-3245N07545W-OXANA-ECG-LFI
Special Notes:

King Air
Pilot report (Sandeen):
Start: 06/02/21 08:30 Z Finish: 06/02/21 11:56 Z

Flight Time: 3.4 hours

Science flights for the UC-12 in support of ACTIVATE, conducted cooperatively with the HU-25. Two flight day. Departed Rwy 08, VFR departure direct to ECG at FL270. Planned route ECG-OXANA-3445N07100W-OXANA-ECG-LFI. Lat/Lon point changed to 3245N07545W in route to OXANA. Stayed at FL270 due to high cirrus and weather between ECG and OXANA. Winds were out of the southwest at ~20-30kts at altitude. Aircraft geolocation with HU-25 was generally within ~13 NM throughout the flight. Started descent out of FL270 60 NM east of ECG due to weather. Four dropsondes were released (OXANA, 3245N07545W, midpoint, and 12 NM from coastline. All objectives were achieved with no aircraft discrepancies noted. Crew was Coldsnow, Sandeen, and Harper. Clouds and convective buildup from ECG to OXANA caused minor excursions into clouds and the HSRL to be shuttered to avoid moisture, but otherwise appeared to be a good flight for data collection, especially beyond OXANA.

Flight scientist report (Harper):

UC12 Takeoff: 12:13:25utc

HU25 takeoff approx 5min after UC12.

Flight plan changed after takeoff. New plan to go southwest after OXANA to 32 45'N 75 45'W.

Aircraft coordination: HU25 trailing less than 2min after TOMMZ. HU25 running slightly south of our path for cloud sampling. Less than 1min separation for southwest leg.

Thin cirrus above UC12 from near TOMMZ.

Very thin cirrus above from TOMMZ to OXANA. Not visible in FWD camera.

Sonde 1: 13:34utc at OXANA.

Sonde 2: 14:13utc at southwest turn point.

Sonde 3: ~14:32utc at midway point between OXANA and southwest turn point.

Sonde 4: 15:18utc at 12mi coastal boundary

No issues with AVAPS, RSP, or HSRL

Falcon

Pilot report (Delaney):
Takeoff: 0835 / Land: 1150 EDT

Science flight for the HU-25 in support of ACTIVATE Campaign #4 (first flight of the day), conducted cooperatively with the UC-12. Departed Rwy8 with vectors to the southwest over ORF airspace/corridors before direct to ECG, climbing to 5k ft MSL for initial transit. Winds were light (<10 kts) out of the southeast with a complex layer overland from ~1000 – 5000 ft MSL. Research profiles were conducted to ECG within the scattered layer. the clouds were more defined with some convective elements, bottoms at ~1500 ft MSL and tops extended to around 5000 ft MSL. From OXANA to N3245/W07545 the layered thinned to scattered at ~1000 - 3500 ft MSL. Mostly cloud modules were executed throughout flight from 500 – 5500 ft MSL as conditions warranted. During RTB, an IFR pickup was required to penetrate complex layers overland (1000-6000 ft MSL), but gave way to VFR conditions after ECG with some limited data collection from 1500 – 3500 ft MSL. Aircraft geolocation was within 10 nmi and under ~5 nmi throughout most of the flight. All objectives were achieved. A power transient occurred during startup when cycling from aircraft external DC power to battery power for APU

start, kicking research power offline momentarily. This was operator induced and is not a system discrepancy.

Pilots: Thorson/Delaney

QNCs: Crosbie/Winstead

Flight scientist report (Crsobie):
Convection/showers over land on the outbound and inbound legs limited the ability to conduct sampling onshore. We commenced the standard pattern as soon as we were clear of the weather. The shallow cumulus clouds were really good for the standard cloudy module on this flight. SO4 was reasonably high (~2-4ug/m3) over the whole area although scattering was not all that significant (~10Mm-1). During module 1 we passed through a region of convective growth that included precipitation. We observed the same cluster on the return leg and sampled the BCB environment although we were east of the core and sub-cloud precip. There was some evidence of some variability in the density of the ShCu and also cloud top height was quite variable.

Eddie:
On morning flight, during engine startup, lost all power to instruments. All equipment had to be restarted. AMS filament OK, but software corrupted and had to be repaired. After powering back up, wet neph went to 100% humidity. Breaker on scroll pump #1 popped.

12:41:15 Nephs zeroed

12:53 Turned on analog out for AMS CPC. Analog out was lost because of power issue.

12:57 In cloud that is raining

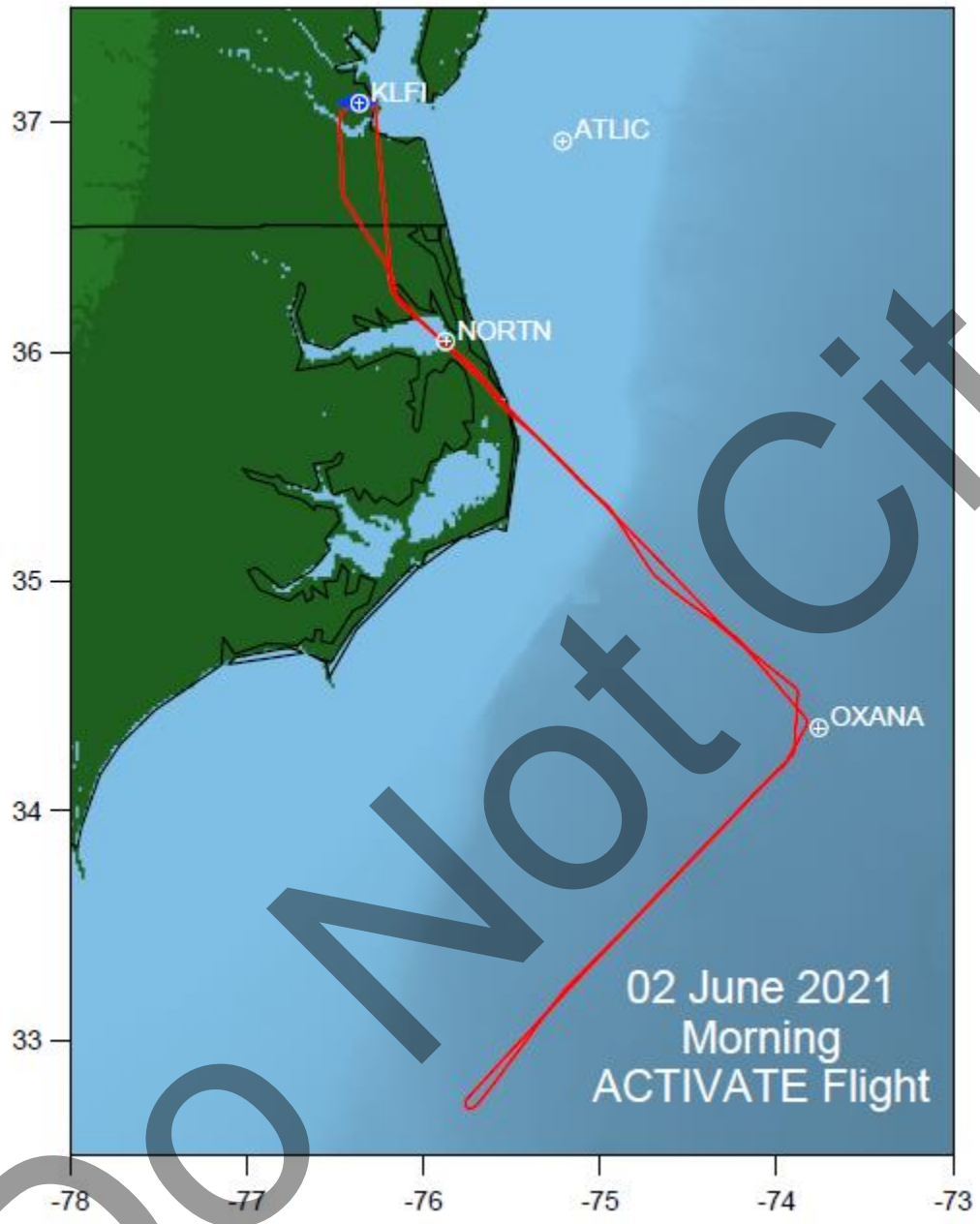
13:27 Humidifier turned off because wet neph RH still >93%; Still recovering from being saturated. Humidifier requiring a lot of manual adjustments to maintain proper wet neph RH.

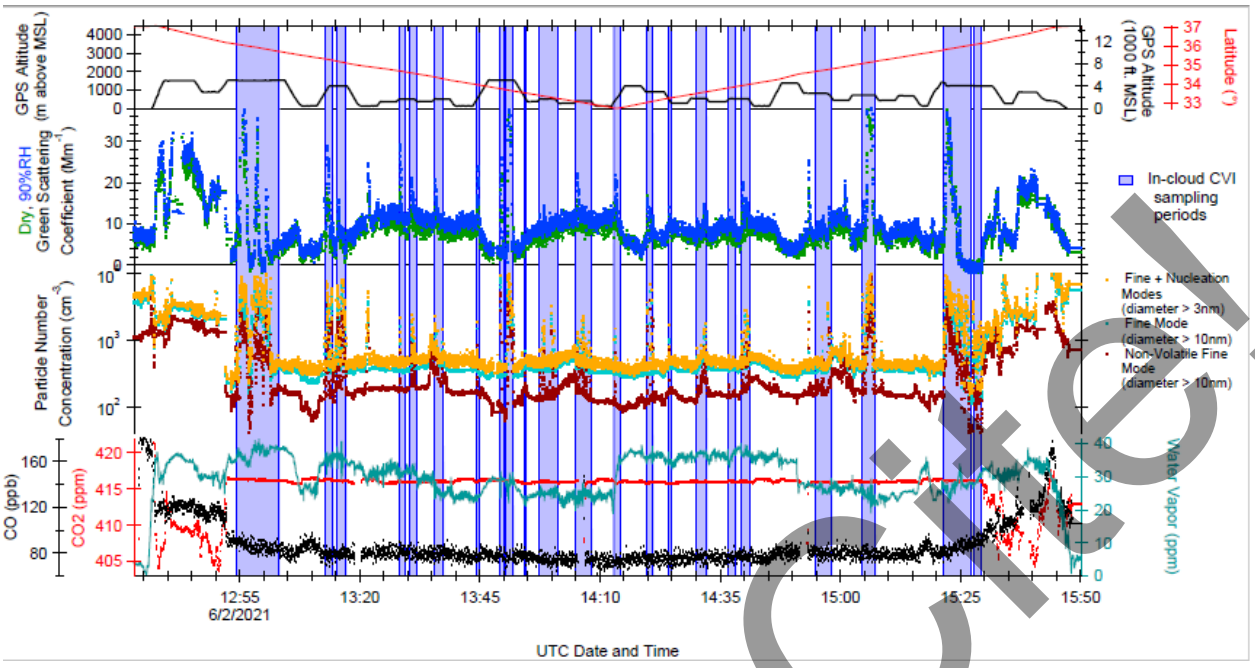
13:48 Lowered humidifier water temp lowered from 49 to 46.

15:06:30 In cloud that is raining

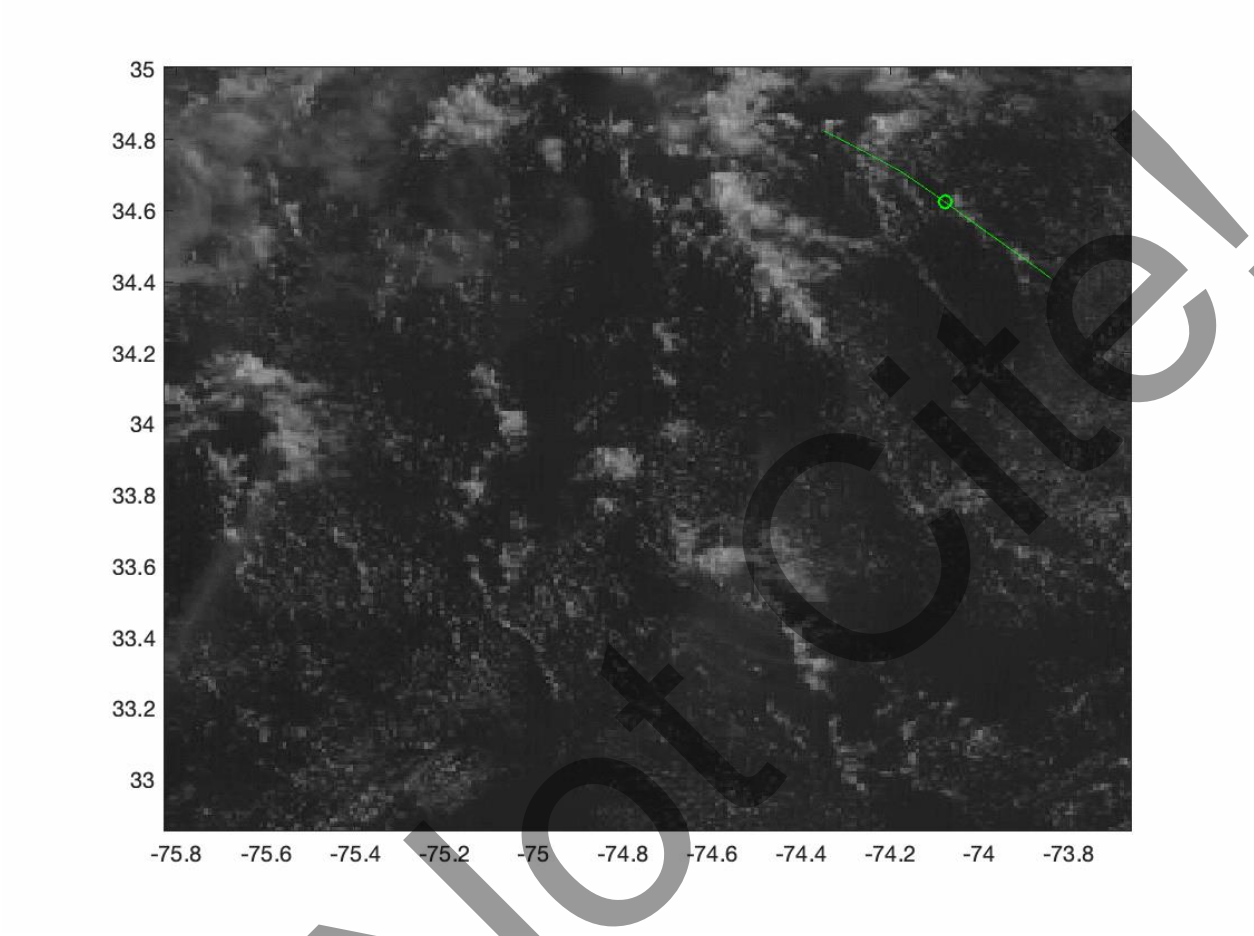
15:19:15 OBX; feet dry

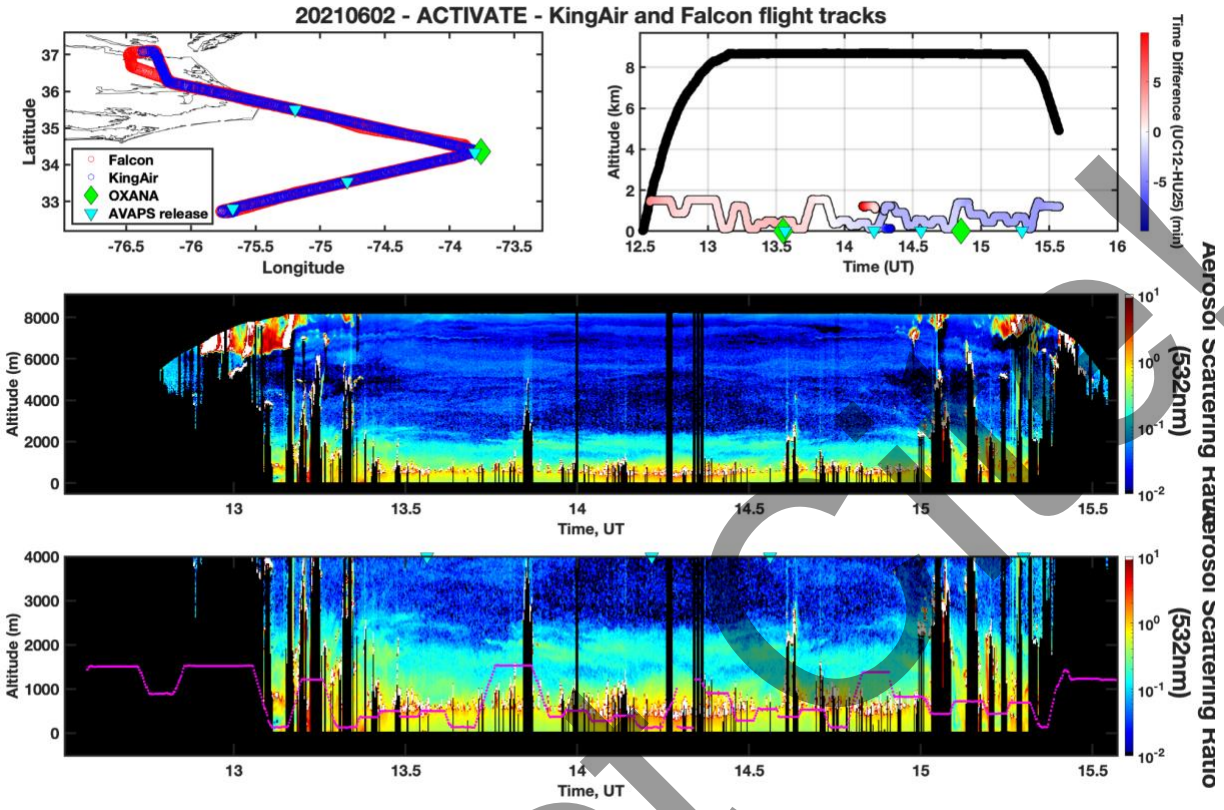
15:42 Humidifier & WCM turned off in preparation for landing

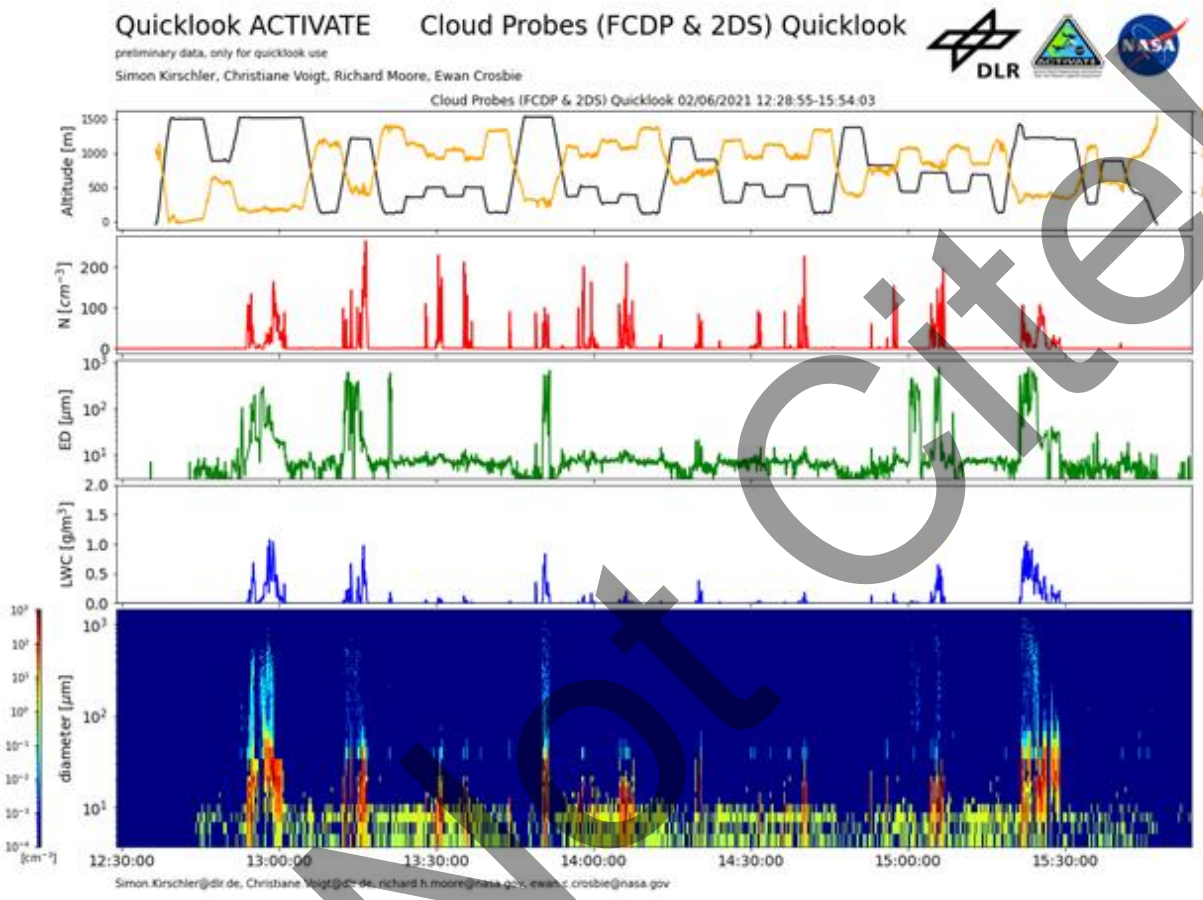


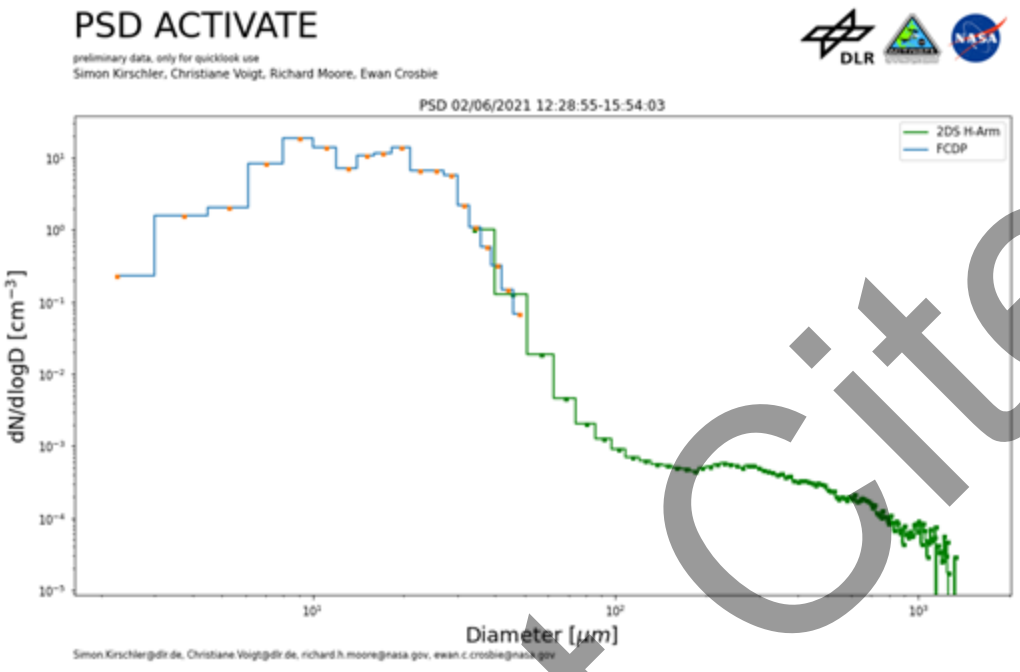

GPS Altitude (m above MSL)
Dry, 90%RH Green Scattering Coefficient (Mm-1)
Particle Number Concentration (cm-3)
CO (ppb)
CO2 (ppm)
GPS Altitude (1000 ft. MSL)
Latitude (°)
Water Vapor (ppm)
In-cloud CVI sampling periods
Fine + Nucleation Modes (diameter > 3nm)
Fine Mode (diameter > 10nm)
Non-Volatile Fine Mode (diameter > 10nm)
12:55
6/2/2021
13:20
13:45
14:10
14:35
15:00
15:25
15:50
UTC Date and Time

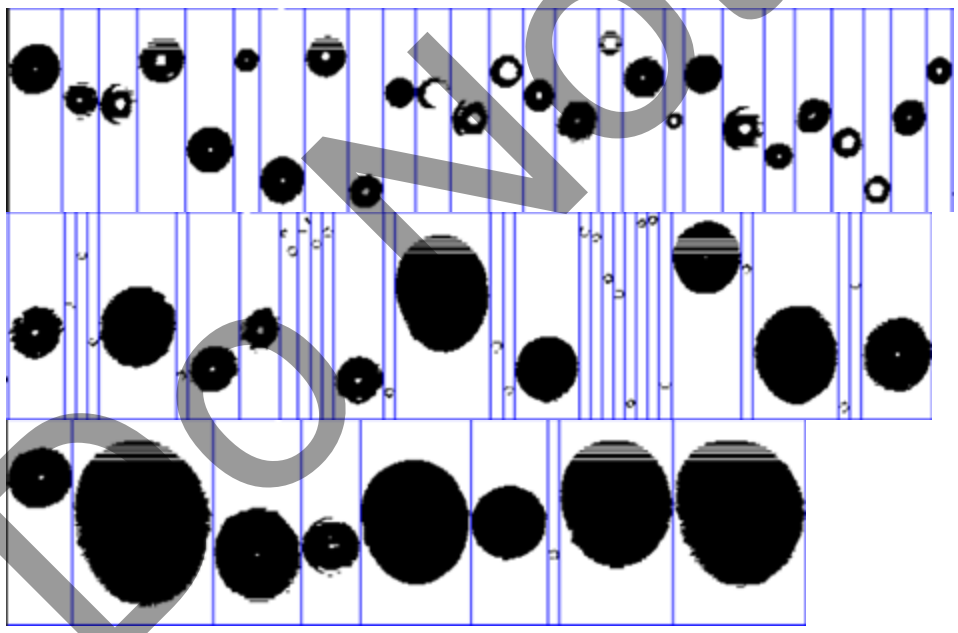
From Ewan: an animation of the 10min GOES-East with Falcon tracks overlaid for the process study. Green is the AM, Red PM.




20210602 - ACTIVATE - KingAir and Falcon flight tracks
Latitude
Longitude
Falcon
KingAir
OXANA
AVAPS release
Altitude (km)
Time (UT)
Time Difference (UC12-HU25) (min)
Altitude (m)
Time, UT
Aerosol Scattering Ratio (532nm)


Quicklook ACTIVATE
Cloud Probes (FCDP & 2DS) Quicklook
preliminary data, only for quicklook use
Simon Kirschler, Christiane Voigt, Richard Moore, Ewan Crosbie
DLR
Cloud Probes (FCDP & 2DS) Quicklook 02/06/2021 12:28:55-15:54:03
Altitude [m]
Static Temperature [°C]
N [cm⁻³]
ED [µm]
LWC [g/m³]
diameter [µm]
[km⁻³]
12:30:00
13:00:00
13:30:00
14:00:00
14:30:00
15:00:00
15:30:00
Simon.Kirschler@dlr.de, Christiane.Voigt@dlr.de, richard.h.moore@nasa.gov, ewan.c.crosbie@nasa.gov

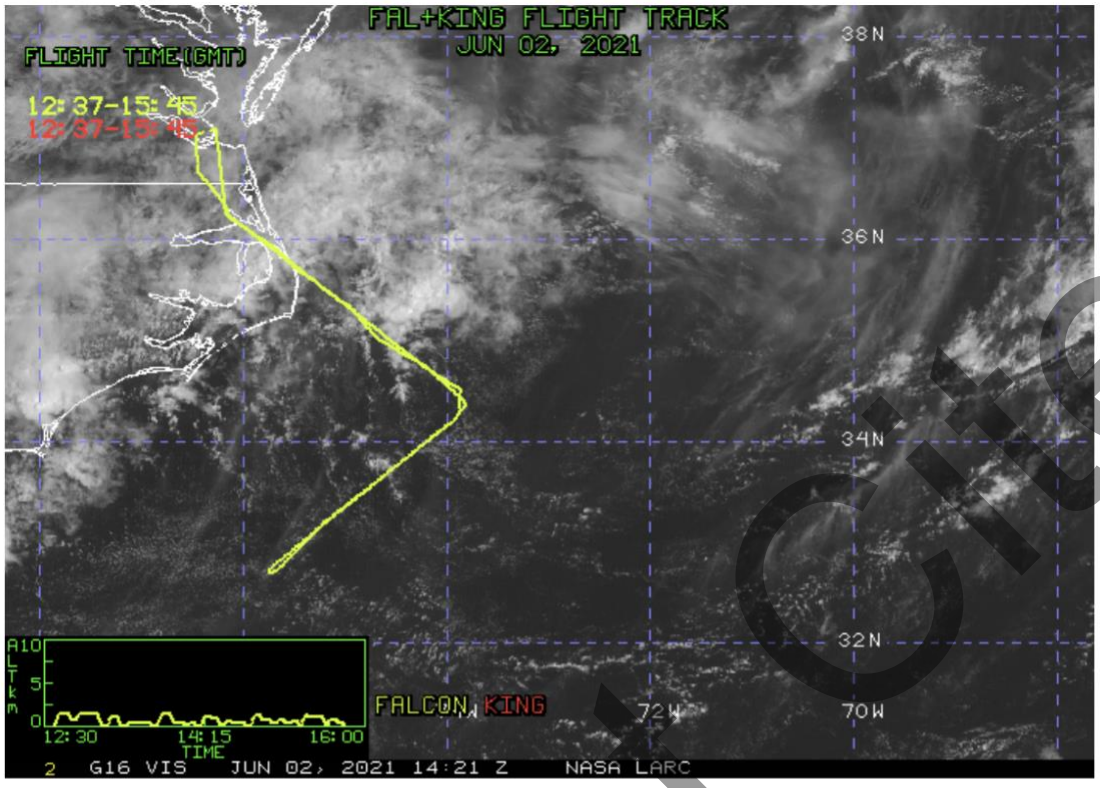




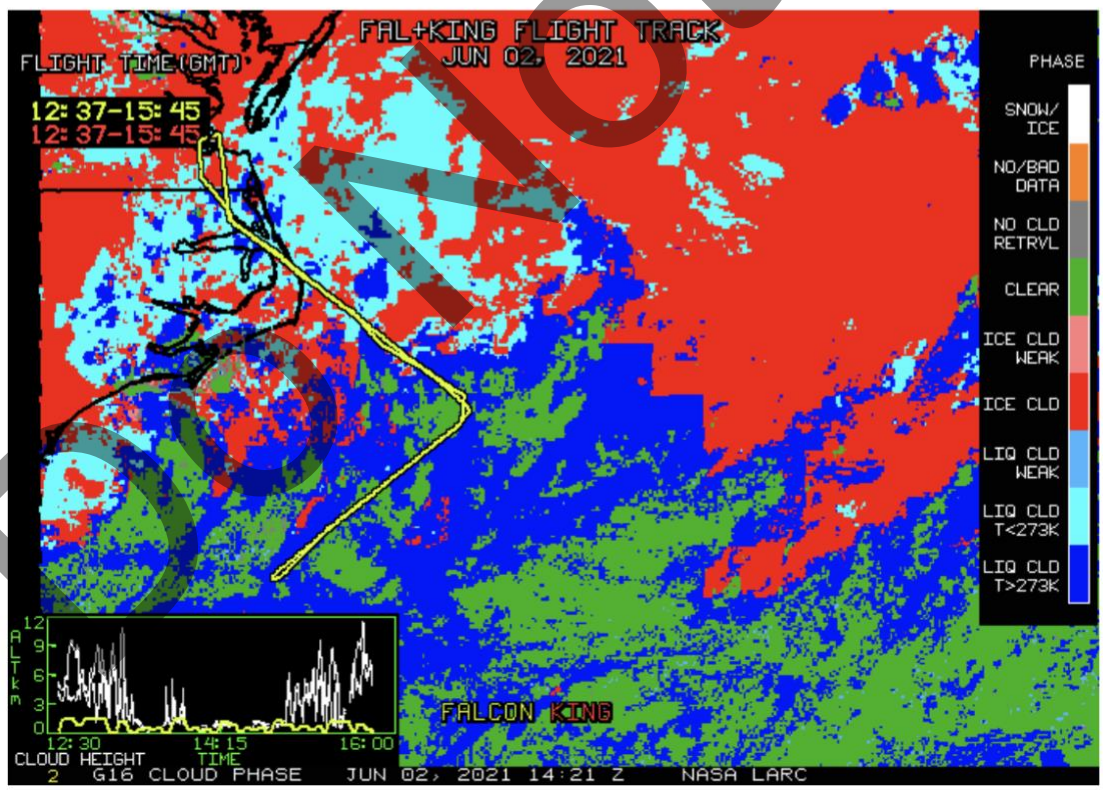
Pure liquid clouds with precipitation.

NASA-LaRC Clouds Group GOES-16 Quicklook Images for Flight 76, 14:21 UTC Jun 02, 2021

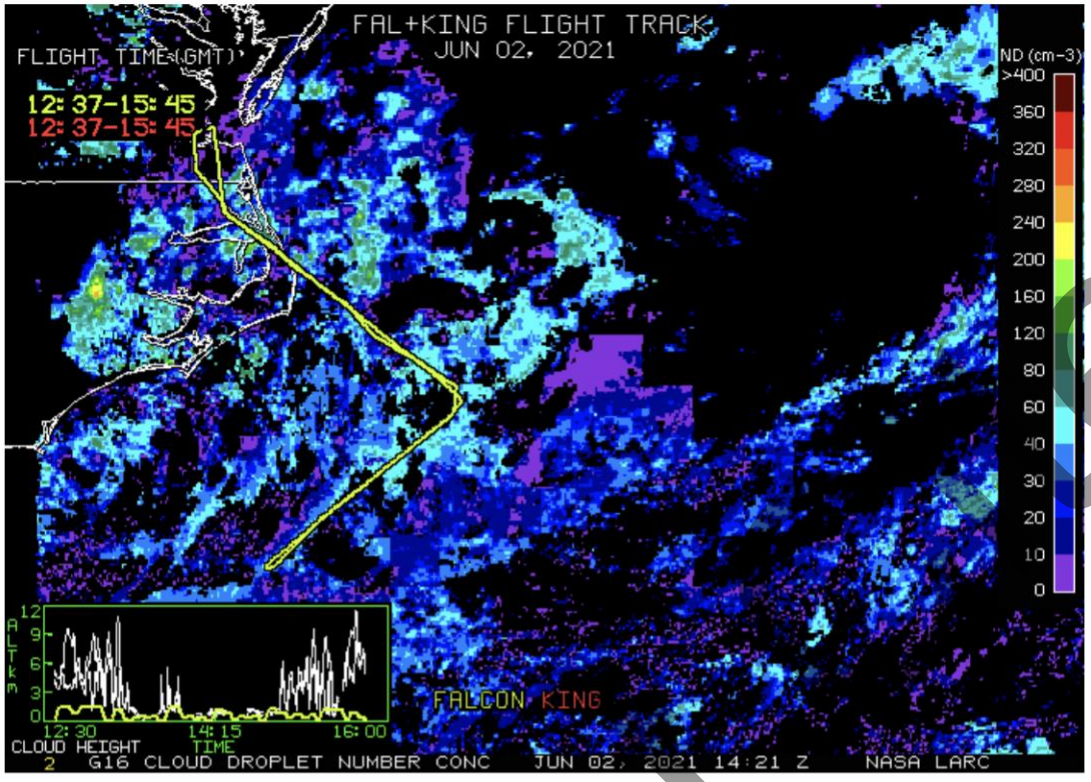
Visible Image



Cloud Phase



Cloud Droplet Number Concentration (cm-3)



Cloud-Top Height (Kft-ASL)