

Flight Scientist Report  
Wednesday 6/02/2021 ACTIVATE RF77

Flight Type: Process Study Flight

Flight Route: [KLF I ECG OXANA 33N73W OXANA ECG KLF I](#)

Special Notes: Focus on Type B clouds in a 50 nm radius circle.

### **King Air**

Pilot report (Sandeen):

Start: 06/02/21 13:24 Z Finish: 06/02/21 16:31 Z

Flight Time: 3.1 hours

Dual aircraft process study sampling flight. Route KLF I ECG DOUGS followed by entry into W-122 4,5,6,7 at FL280. After delay of approximately 1.5 hours, returned via same route. Encountered clouds during transit periods, multiple broken to overcast layers, but weather in the area was clear. Performed the process study sampling pattern for the UC-12 around a cloud formation, with legs as defined in the diagram. Due to the cloud moving Northwest 20 nm/hr (potentially more), encountered significant movement between legs, distorting the actual flight profile flown. Attempted to compensate by continuing to target the center of the cloud mass while still distributing dropsondes around the perimeter in an organized manner (all 12 dropsondes released, 2 at center). As with morning flight, winds were generally out of southwest 20-30 knots. All objectives were achieved with no aircraft discrepancies noted. Crew was Coldsnow, Sandeen, Shingler and Seaman.

Flight scientist report (Seaman):

**Flight number:** RF077

**Summary:** Sortie # 2 on 6/2/2021 on the UC12 was a process study joint flight with the HU25 Falcon.

**Flight plan:** [KLF I ECG OXANA 33N73W OXANA ECG KLF I](#). 50 nm radius circle about 33N73W.

Date: 6/2/2021

**Approx. takeoff:** 13:25 EST

**Approx. landing:** 16:29 EST

**QNC(s):** Shane Seaman was the operator for HSRL-2, RSP, and the cameras.

Taylor Shingler operated the sondes.

**Sondes:** A total of 12 sondes were dropped for the process study.

**RSP:** nominal operation.

**HSRL:** nominal operation.

**Cameras:** nominal operation.

### **Falcon**

Pilot report (Delaney):

Takeoff: 1322 / Land: 1642 EDT

Science flight for the HU-25 in support of ACTIVATE Campaign #4 (second flight of the day), conducted cooperatively with the UC-12. Departed Rwy8 with circuitous vectors to the west around 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 working within the layers. From ECG outbound to DOUGS the clouds were more defined with some convective elements, bottoms at ~1500 ft MSL and tops extended to around 7000 ft MSL. This became a scattered layer at ~2000 ft MSL with some cumulus buildups as W122 was entered for a process study in areas 4-7. The target formation was identified at N3416.68/W07448.76 and extended from ~2000 – 12,500 ft MSL. Process study commenced at 1430 (local) time in descending increments of 1000 ft until reaching 10,000 ft MSL, and then successive decrements of 2000 ft MSL, followed by a touch of minimum altitude (500 ft) and then a below cloud base run (remained within ~10 nmi of target throughout). This study terminated with a clear-air spiral climb at ~2000 FPM ~5 nmi northeast of the formation until reaching 12,500 ft MSL. The cloud formation was slowly moving northwest throughout the process study. RTB via DOUGS to ECG conducting cloud modules in transit (500 – 3500 ft MSL) with some convective activity present. Picked up an IFR clearance from ECG back to KLF1 due to weather (complex cloud layers) with no significant data collection available. Held south of the airfield for ~15 minutes due to traffic congestion in

terminal environment. Aircraft geolocation was within 20 nmi during transit out and generally under ~10 nmi throughout most of the flight. All objectives were achieved and with no discrepancies noted.

Pilots: Elder/Delaney

QNCs: Crosbie/Winstead

Flight scientist report (Crosbie):

This was the process study flight. Like the earlier flight we had to pass through some weather on the way off the OBX. We resumed sampling the standard module once clear of the coast and managed to complete the BCB-ACB pair. Once turned to enter the warning area for the process study, we dipped to MIN and then ramped up to 12kft. The target was easily identified and we then commenced the standard pattern with an over pass at between 12-13kft. We conducted 7 legs in cloud (12kft, 11kft, 10kft, 8kft, 6kft, 4kft, 2kft) and then the extended BCB at 1700. A well-defined clearing was identified on the NE side of the cluster which we used for the clear spiral. Upon completion, we did an expedited descent to MINALT retracing briefly back under the convection before transiting to the NE exit point. We had sufficient time to delay in the "Type A" ShCu near the exit point such that we could get BCB-ACB-BCT approximately stacked. The BCT leg was not performed in the usual manner but instead we made course corrections and altitude corrections to specifically hit cloud tops. Once complete we resumed standard survey legs as far as possible. Near the coast, we had to make an orbit while we got ATC clearance since we were "due regard" and needed to pick up an IFR return because of weather. We also had a delay/orbit at Langley for base ops.

Eddie:

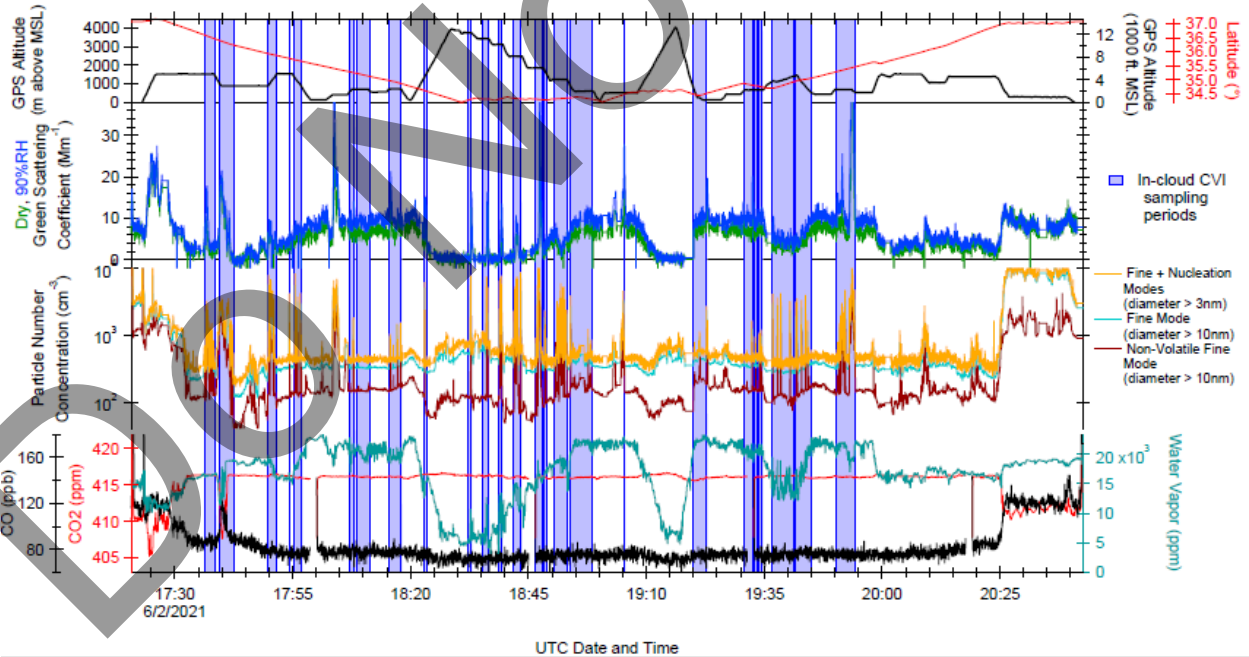
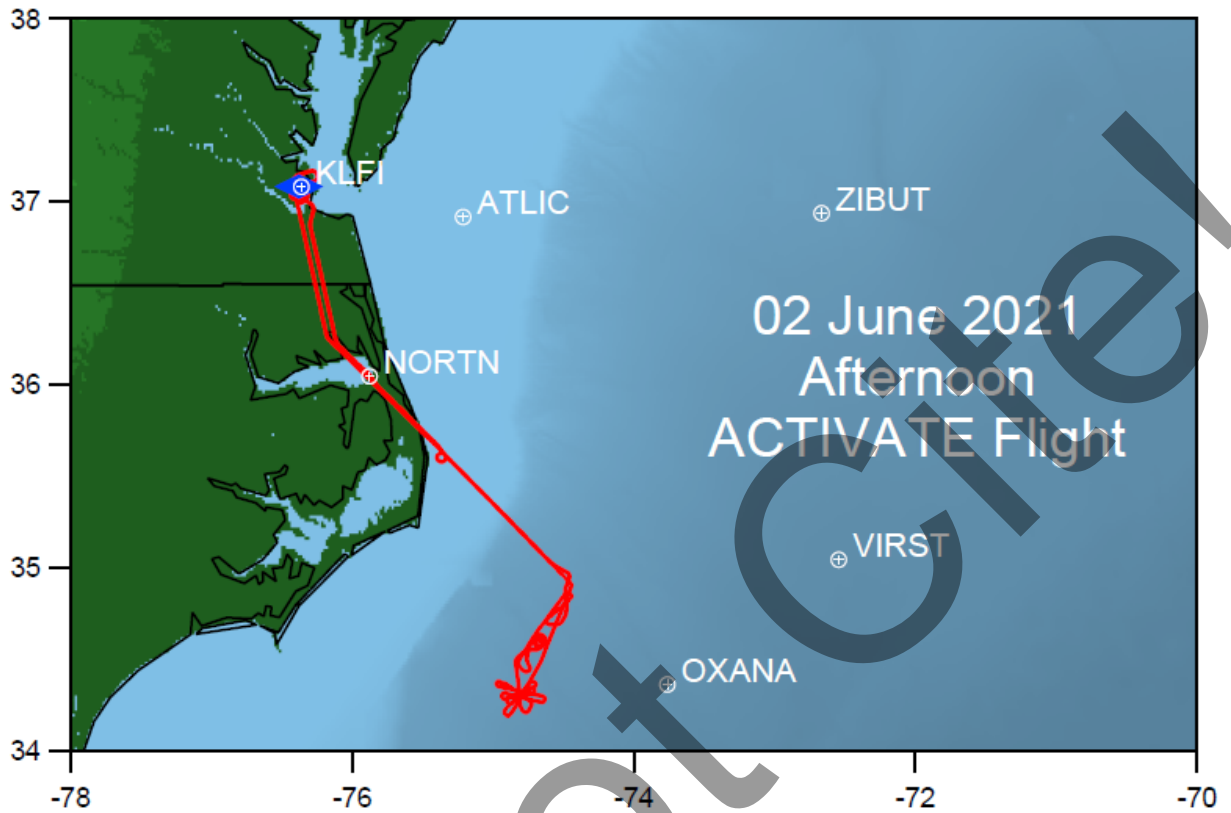
18:03:30 In rain @ 1500 ft

Wet neph humidification working OK now. Flow was maintained on wet neph in between flights to dry it out.

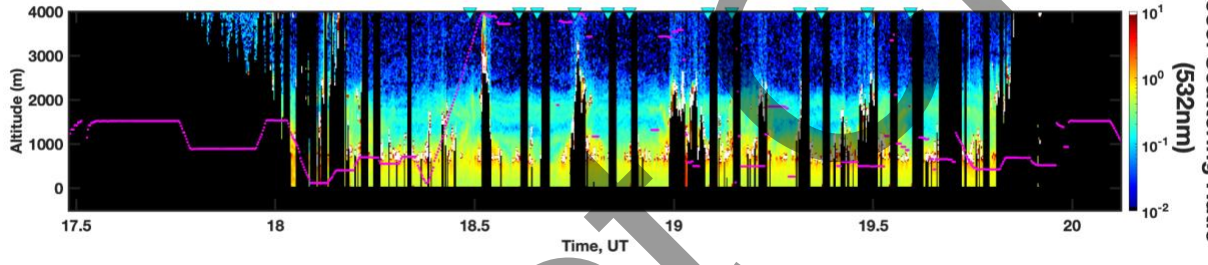
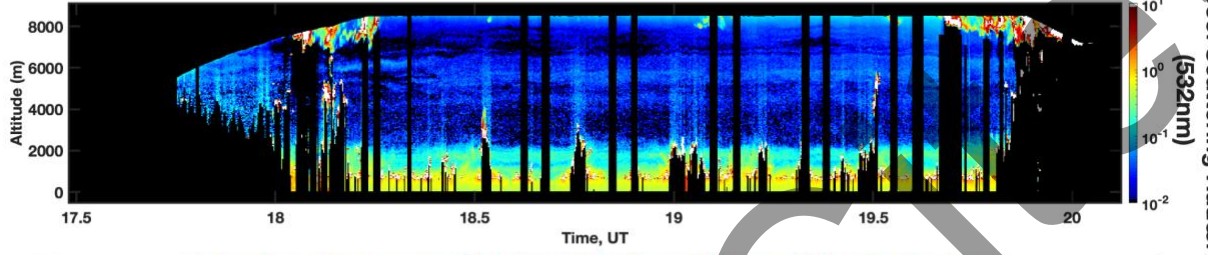
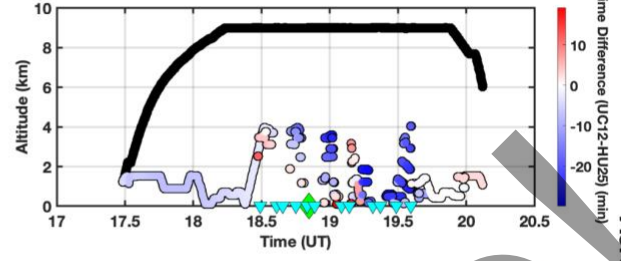
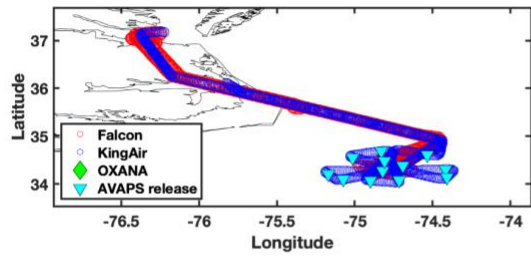
18:29 Over top of cloud to be used as center point for process study. 34.3 Lat -74.8 Lon

19:08 Starting spiral up in clear air northeast of cell; 34.6 Lat, -74.6 Lon

20:22:30 Humidifier & WCM turned off in preparation for landing



### 20210602 - ACTIVATE - KingAir and Falcon flight tracks

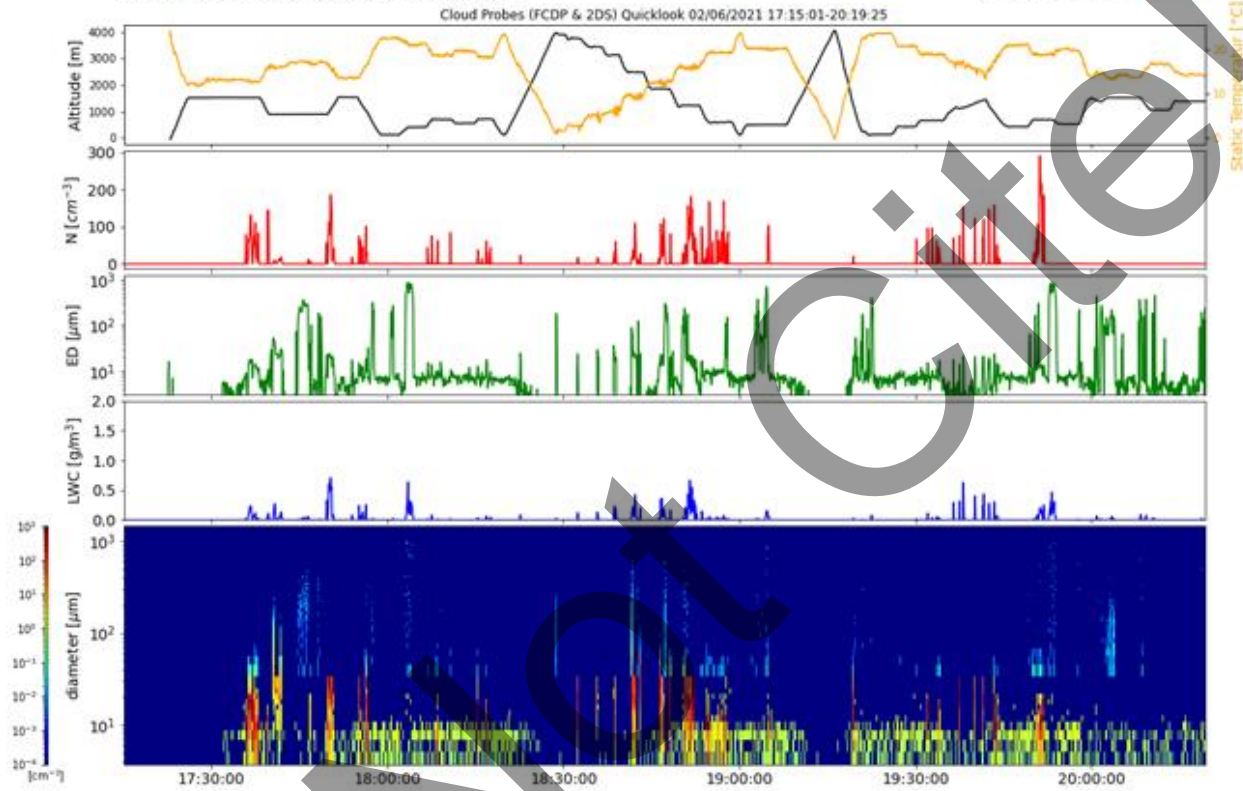


DO NOT

# Quicklook ACTIVATE Cloud Probes (FCDP & 2DS) Quicklook

preliminary data, only for quicklook use

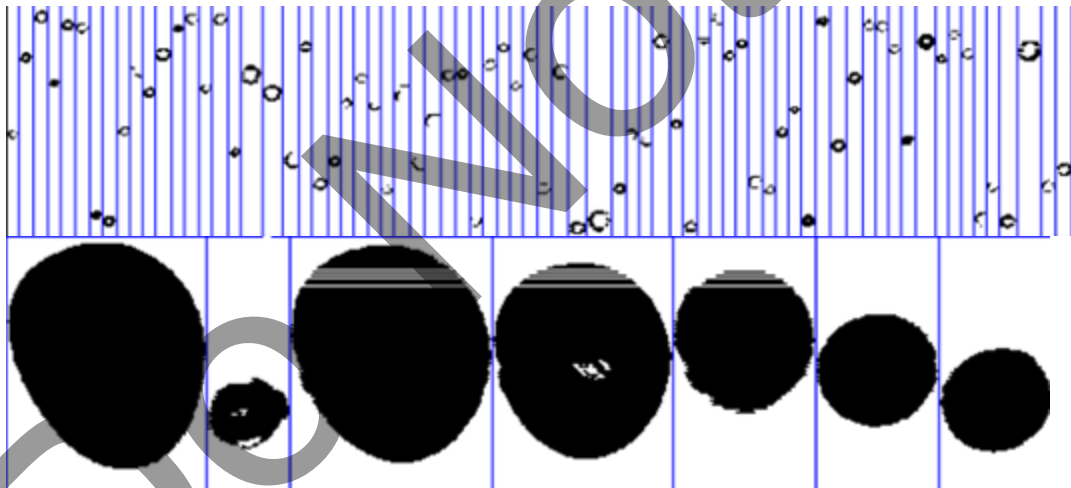
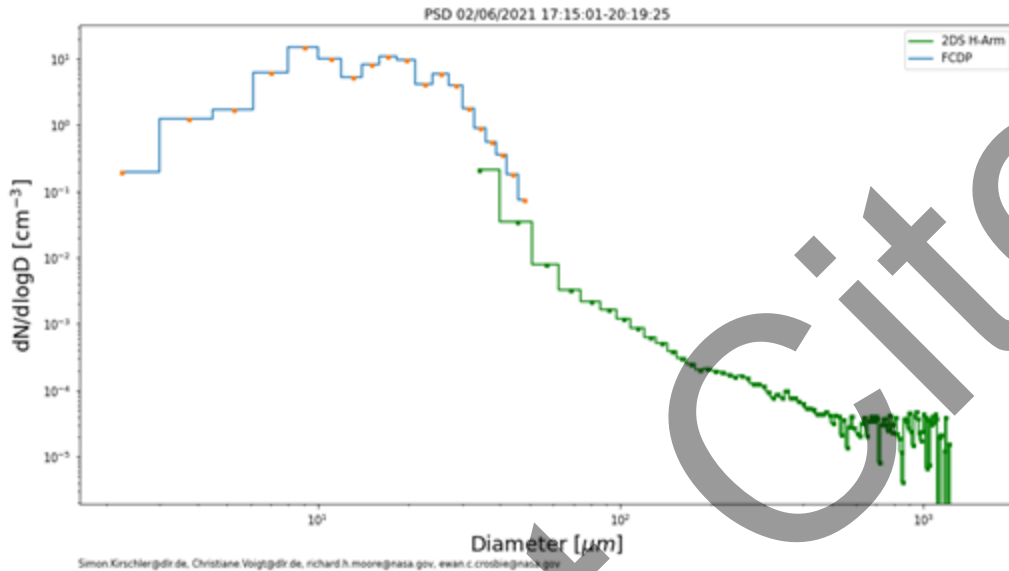
Simon Kirschler, Christiane Voigt, Richard Moore, Ewan Crosbie



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# PSD ACTIVATE

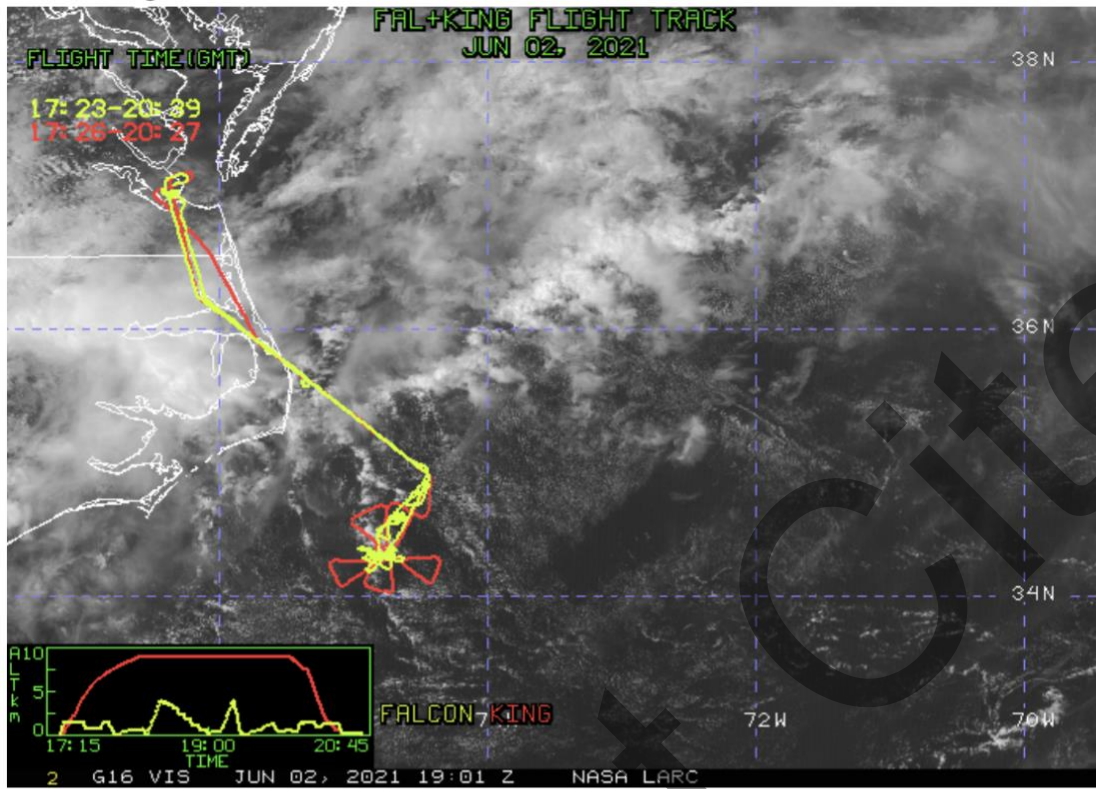
preliminary data, only for quicklook use  
Simon Kirschler, Christiane Voigt, Richard Moore, Ewan Crosbie



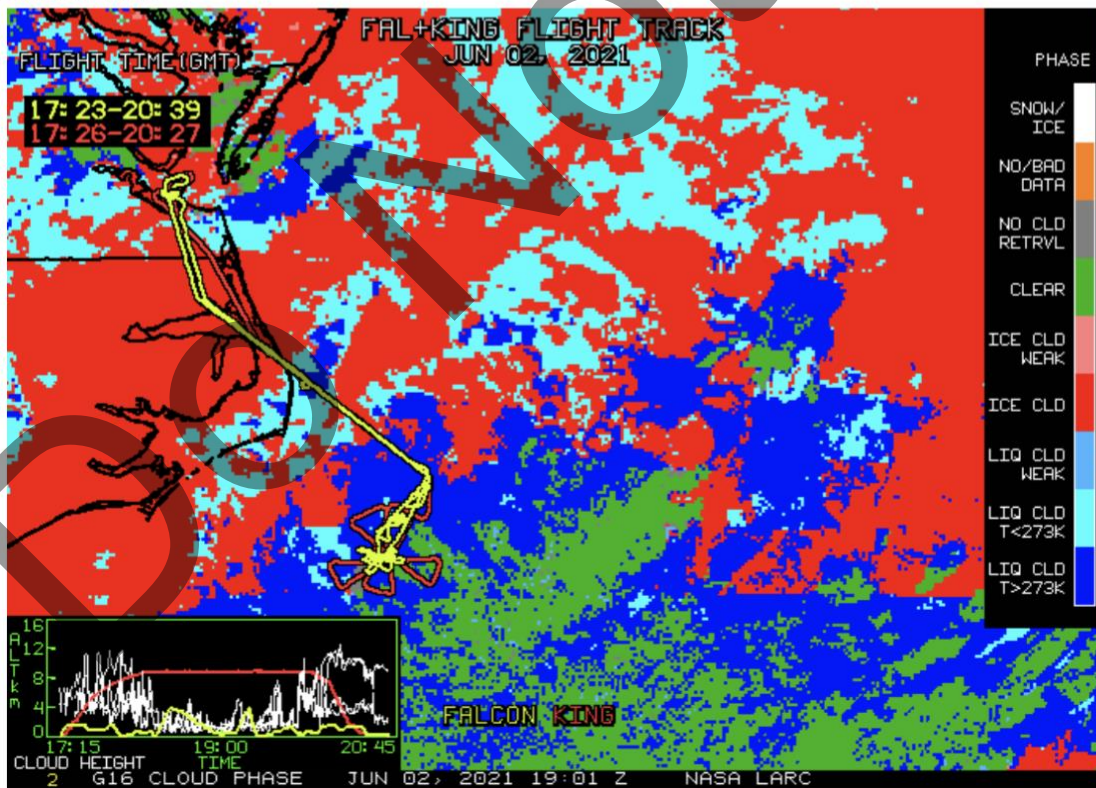
Pure liquid clouds with precipitation.

NASA-LaRC Clouds Group GOES-16 Quicklook Images for Flight 77, 19:01 UTC Jun 02, 2021

Visible Image

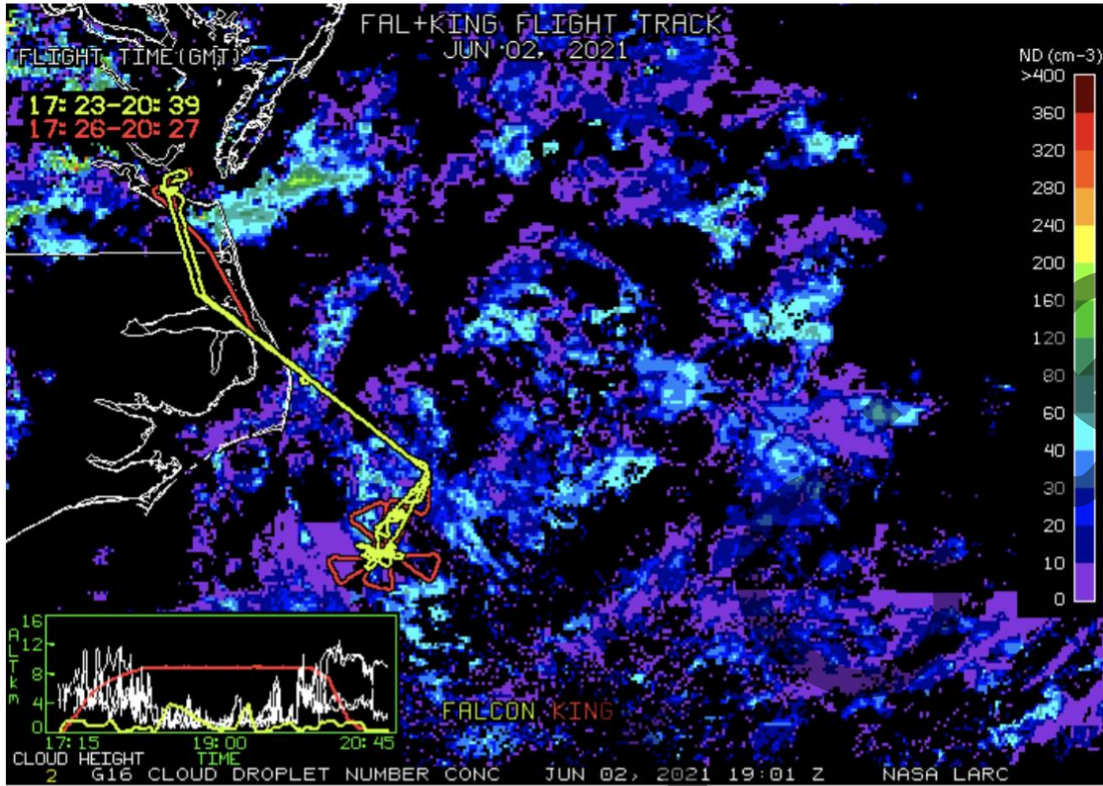


Cloud Phase





Cloud Droplet Number Concentration (cm-3)



Cloud-Top Height (Kft-ASL)

