Flight Scientist Report
Wednesday 5/26/2021 ACTIVATE RF74

Flight Type: Statistical Survey Flight
Flight Route: ECG-OXANA-N3200/W07300-OXANA-ECG-KLFI
Special Notes:

King Air

Pilot report (Jamison):
Cooperative science flight with the HU-25. Two flight day. Departed Rwy 26, IFR departure with climb on course to ECG. Planned route ECG-OXANA-32N073W-OXANA-ECG. Washington center capped the climb and final cruise altitude at FL270. Winds were out of the northwest at ~10-20kts at altitude. Aircraft geolocation was initially behind the HU-25 by about 40nm, slowly catching up until on-top approximately half way down the outbound leg from OXANA. HU-25 truncated the leg early, approximately 30nm prior to turn point. Descended out of FL 270 approximately 20 nm southeast of ECG. 4x dropsondes deployed per mission brief. All objectives were achieved with no aircraft discrepancies noted. Crew was Jamison, Sandeen, and Shingler.

Flight scientist report (Shingler):

Hazy in the boundary layer over land during takeoff and landing. There were multiple interesting layers seen along the route today. There were shallow cu from the surface to 3 kft, a layer of high aerosol scattering (4-5ASR with low depol) between 4-6 kft and another layer between 6-8 kft of lower scattering (1 ASR) but higher depolarization (~10%). The run was cut short due to fuel concerns on the HU25. Minimal to no cirrus was seen above the aircraft.

Falcon

Pilot report (Baxley):
Science flight for the HU-25 in support of ACTIVATE, conducted cooperatively with the UC-12. Departed Rwy26 to ECG climbing to 9k ft MSL for initial transit. Research profiles conducted from ECG-OXANA-N3200/W07300-OXANA-ECG-KLFI, from 500’ to 8000’ MSL. Winds were moderate (<20 knots), and both cloud and clear air modules were completed throughout the flight as conditions warranted. Aircraft geolocation was within ~20 nmi throughout the flight, and generally within ~10 nmi during the return leg. Due to the high temperature at takeoff, approximately 200 pounds less fuel was added during refueling, requiring the HU-25 to turn approximately 25 nautical miles prior to the southernmost point. All objectives were achieved and no system discrepancies were noted.

Pilots: Baxley/Elder

QNCs: Ziemba/Winstead

Time (Z): 1715 takeoff, 2030 land, 3.3 hrs

Flight scientist report (Ziemba):
Route: OXANA to the SSE

Clouds:
Thin puffy cumulus throughout flight, generally CBH at 1200ft and CTH at 2000ft. Sometimes pretty sparse with large periods of clear air
Regions with another decoupled layer of thin, more stratus-like cloud at 4000-5000ft.
Aerosol:
Fairly typical MBL away from the coast
Lofted layer of high scattering and moderate number
Highest scattering seemed to be above the 5000ft cloud deck (i.e., ACT legs) with no obvious separation.
Hazy conditions at coast and over land, high scattering/mass but again only moderate number concentrations.

Flight notes:
Stayed at 9000ft after climb-out, then dropped to 5000ft to probe for aerosol and held there by controllers. Profiled down to MinAlt initially before starting cloud ensemble
Cloudy Ensemble #1 had both cloud layers, ACB/BCB were in the puffy Cu and ACT/BCT were for the 5000ft cloud layer.
Cloudy Ensemble #2 was just for the puffy Cu. Conditions in the MBL were much cleaner than for #1. Initial part of this ensemble was pretty cloud-free so fit in a leg at ~3000ft to sample lofted higher scattering (~18:35). ACT just barely getting into the higher scattering.
Cloudy Ensemble #3 was more similar to #1, sampling both the puffy Cu and 5000ft deck.
The last ACB/BCB pairs at 19:37-19:50 were not really successful, clouds were just too sparse or poorly timed.
Probed a few layers of aerosol during the coastal transition, stayed low over land (hazy and high scattering)
All instruments operated nominally.

Eddie:
Takeoff: 17:17:16

Landing: 2030:03

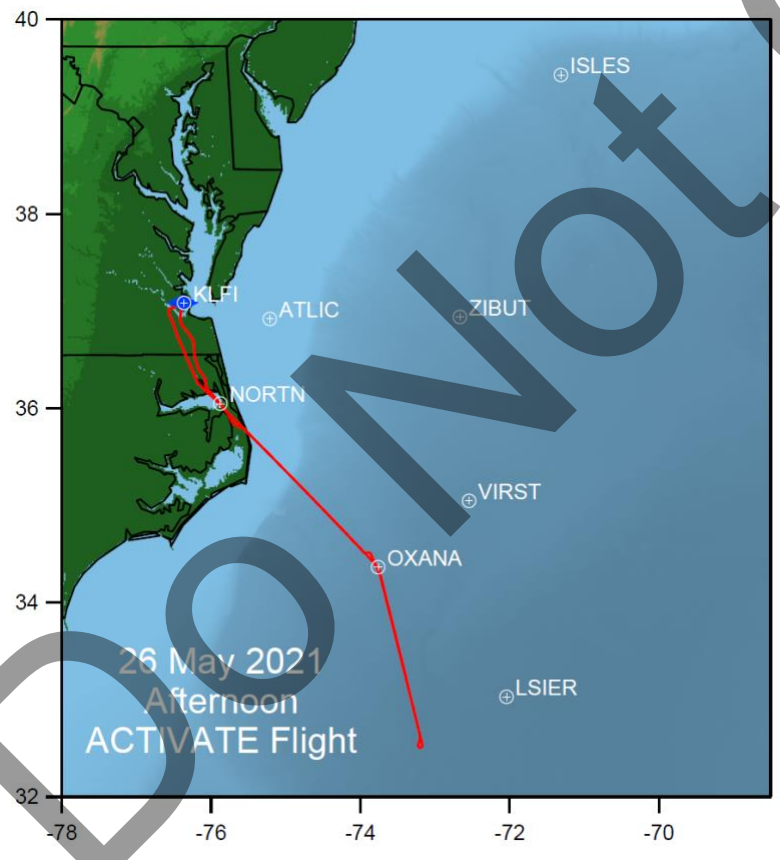
17:18 - Very hazy & high scattering on takeoff. Lots of aerosol conc variability

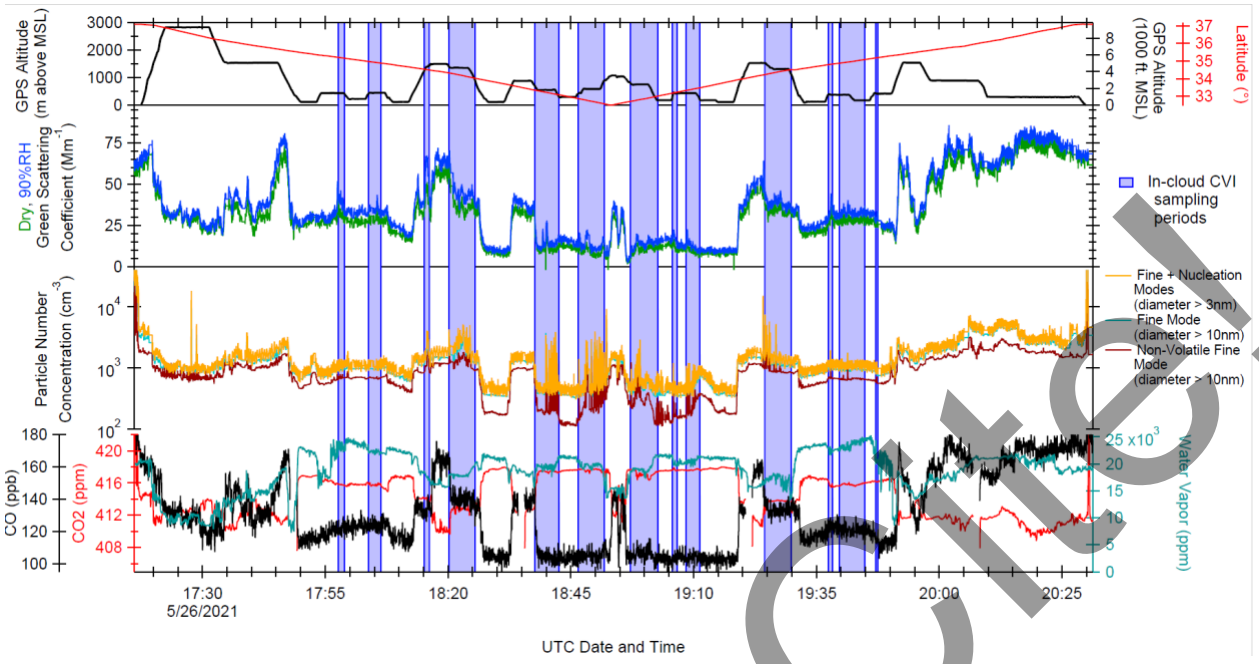
17:42 - 94 degrees F in cabin; CPC 3776 cabinet temperature is 46 C.; causing flow oscillations in instrument.

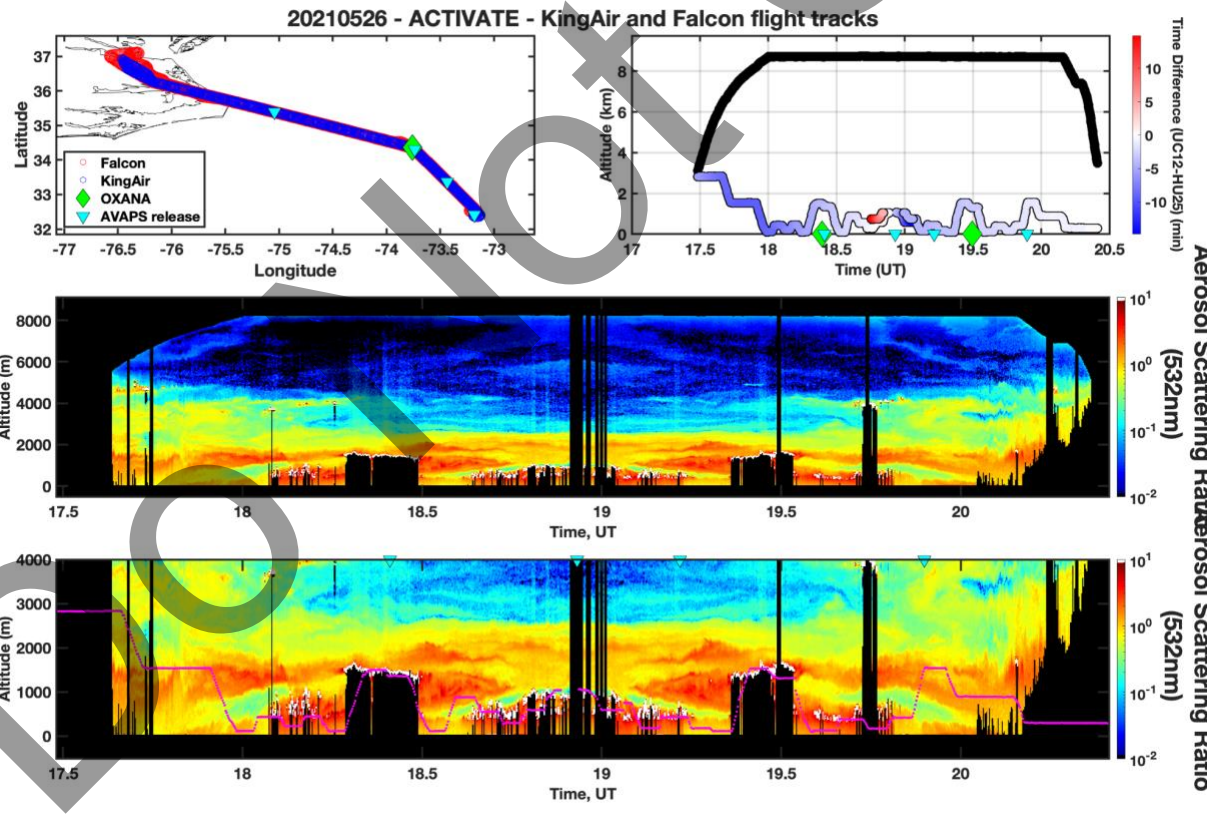
18:52:30 – Turning early for RTB because of fuel concerns

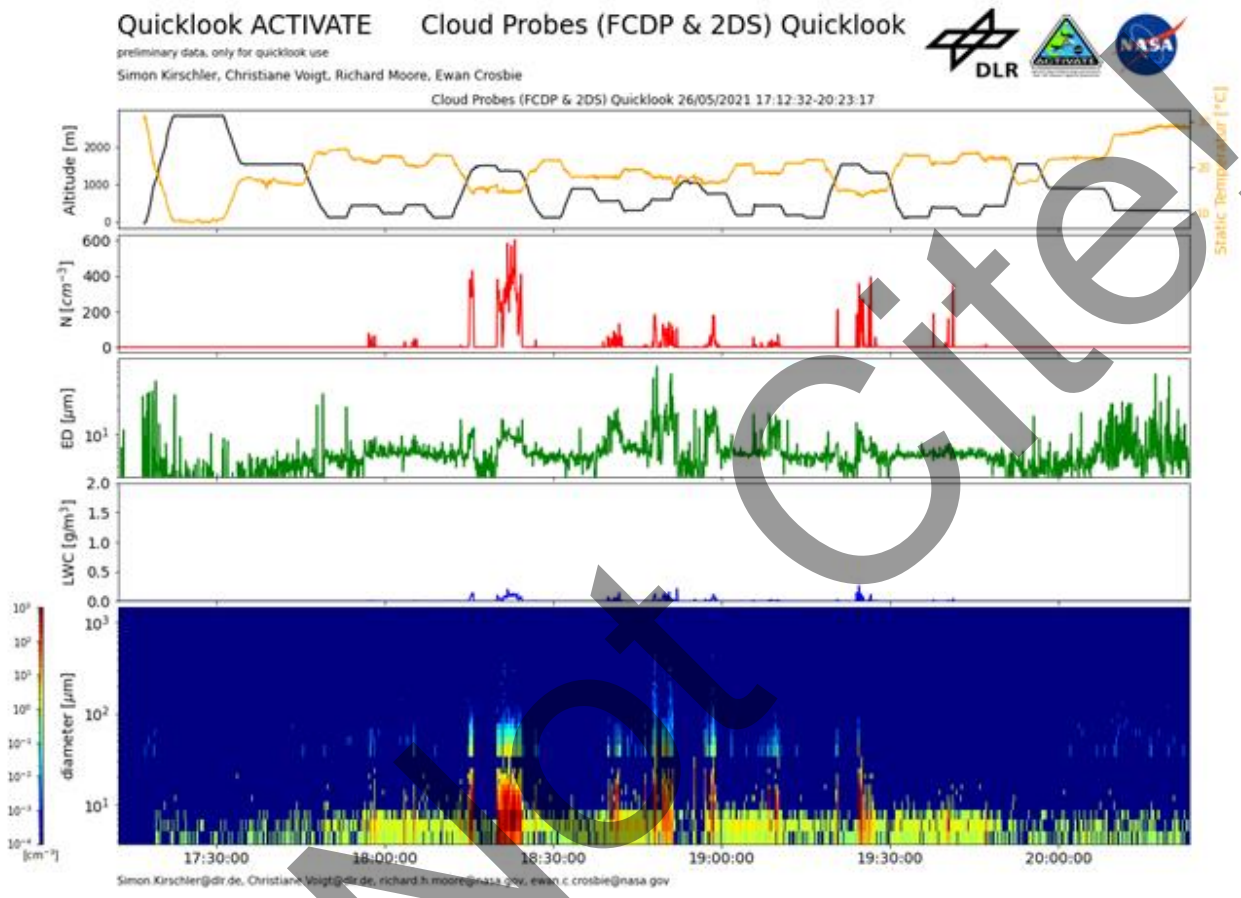
19:52:15 – Aerosol layer @ 5000 ft

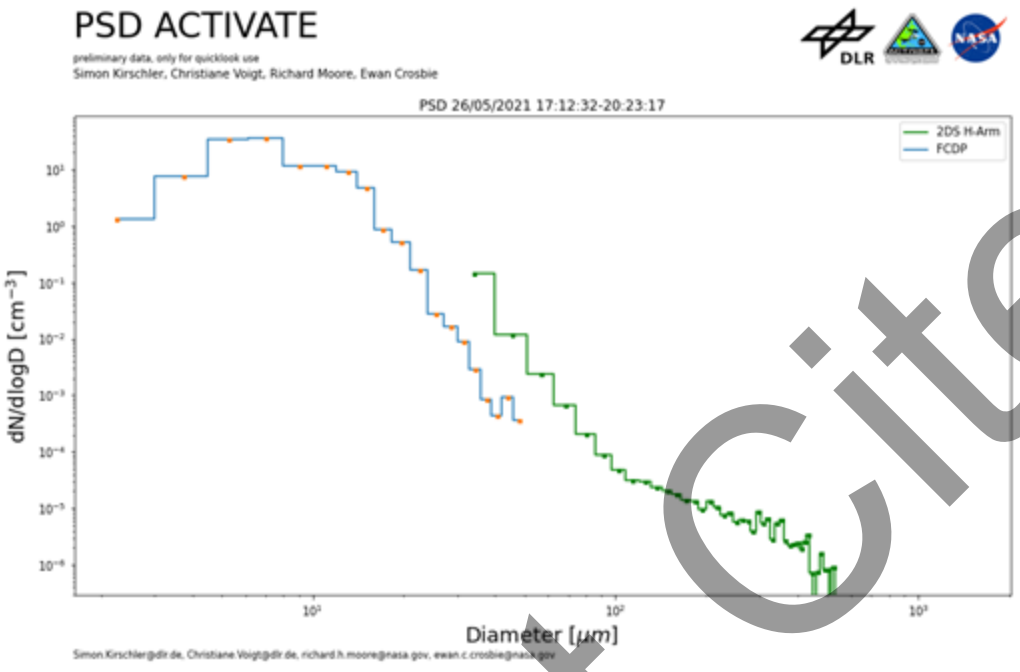
20:24:30 Humidifier & WCM turned off

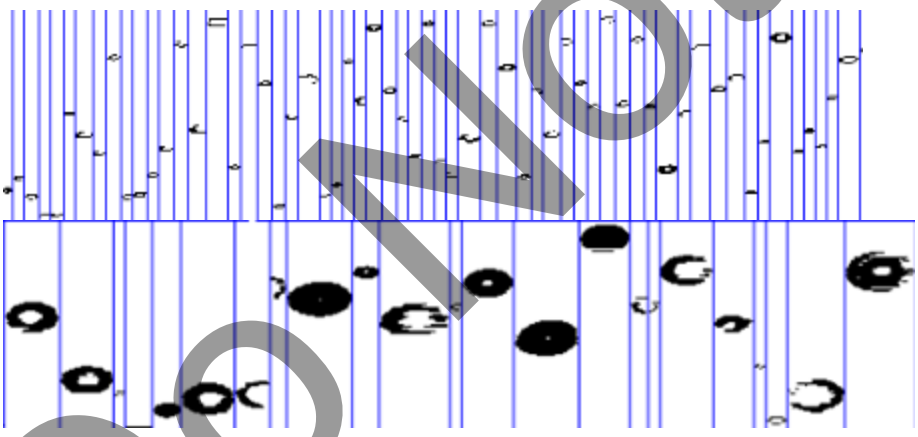



GPS Altitude (m above MSL)
GPS Altitude (1000 ft. MSL)
Latitude (°)
Dry, 90%RH Green Scattering Coefficient (Mm-1)
In-cloud CVI sampling periods
Particle Number Concentration (cm-3)
Fine + Nucleation Modes (diameter > 3nm)
Fine Mode (diameter > 10nm)
Non-Volatile Fine Mode (diameter > 10nm)
CO (ppb)
CO2 (ppm)
Water Vapor (ppm)
17:30
5/26/2021
17:55
18:20
18:45
19:10
19:35
20:00
20:25
UTC Date and Time


20210526 - 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)

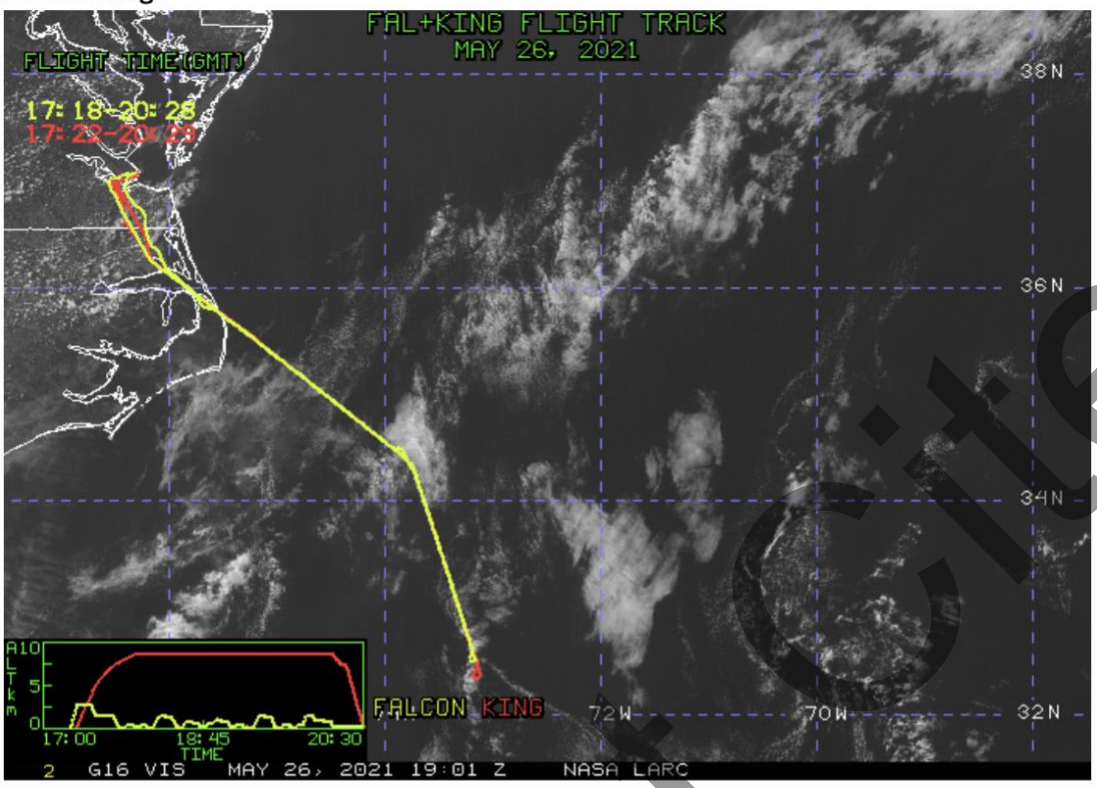

Quicklook ACTIVATE
Cloud Probes (FCDP & 2DS) Quicklook
preliminary data, only for quicklook use
Simon Kirschler, Christiane Voigt, Richard Moore, Ewan Crosbie
DLR
Cloud Probes (FCDP & 2DS) Quicklook 26/05/2021 17:12:32-20:23:17
Altitude [m]
2000
1000
0
N [cm⁻³]
600
400
200
0
ED [µm]
10¹
2.0
LWC [g/m³]
1.5
1.0
0.5
0.0
diameter [µm]
10³
10²
10¹
[cm⁻³]
17:30:00
18:00:00
18:30:00
19:00:00
19:30:00
20:00:00
Simon.Kirschler@dlr.de, Christiane.Voigt@dlr.de, richard.h.moore@nasa.gov, ewan.c.crosbie@nasa.gov



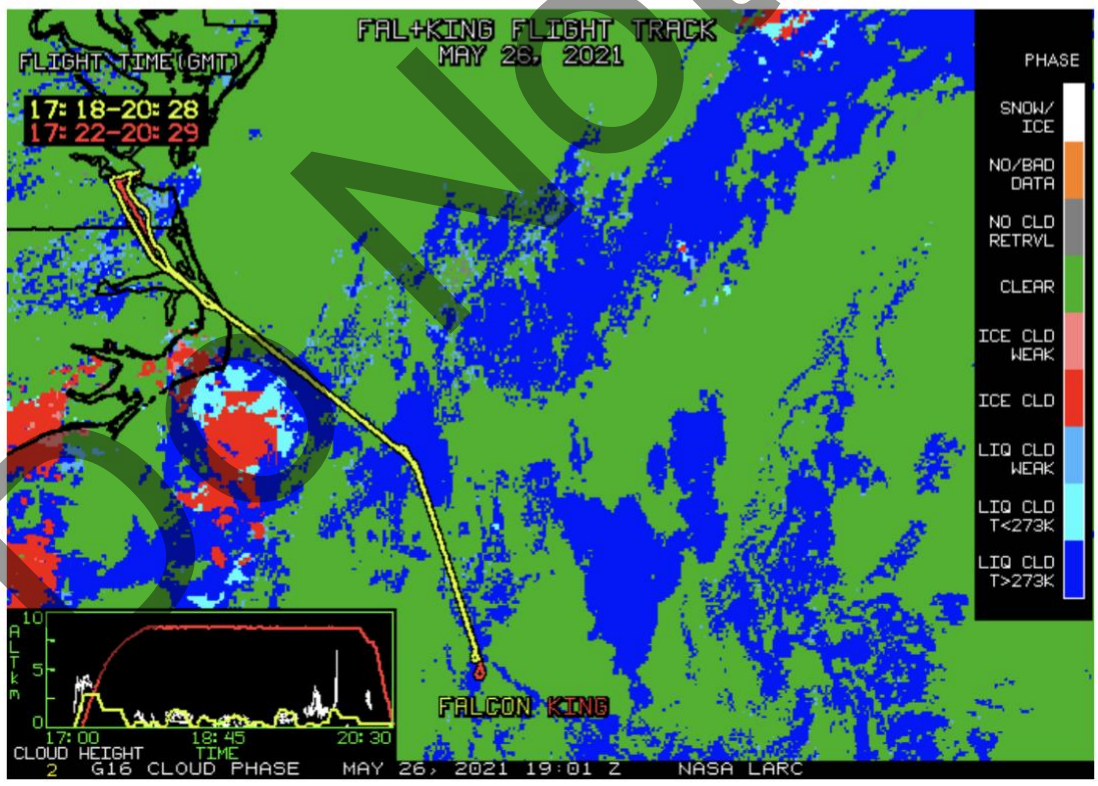


Only pure liquid clouds with precipitation at turn.

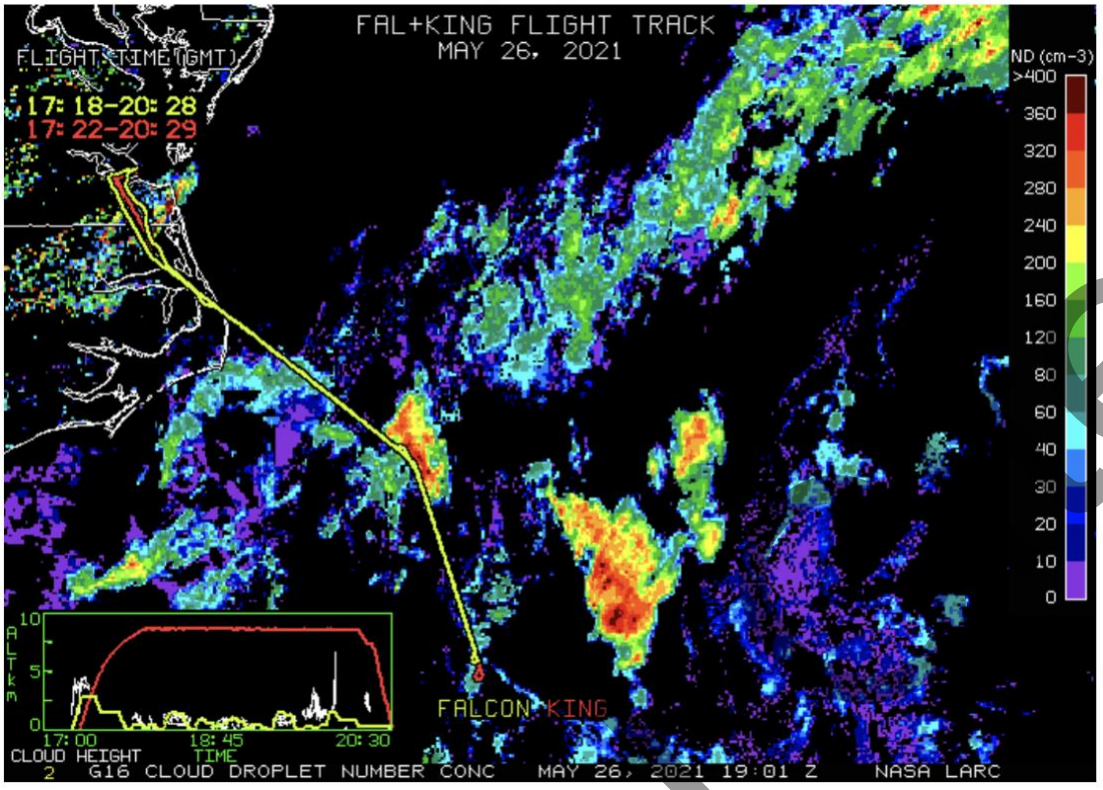
Visible Image



Cloud Phase



Cloud Droplet Number Concentration (cm-3)



Cloud-Top Height (Kft-ASL)