Flight Scientist Report
Tuesday 12/7/2021 ACTIVATE RF96

Flight Type: Statistical Survey Flight
Flight Route: ATLIC ZIBUT SHOKR ZIBUT ATLIC
Special Notes:

King Air

Pilot report (Jamison):
Cooperative flight with HU-25; KLFI-ATLIC-ZIBUT-SHOKR-ZIBUT-ATLIC-TURET-KLFI. Take off Runway 08 ~2 minutes after HU-25. Forward FOD door opened only with assist by researcher. Uninterrupted climb on course to ATLIC and fl280. 4x dropsondes deployed at ZIBUT, SHOKR (immediately prior to turn), 1/2 way between SHOKR & ZIBUT, and ~3 nm after ATLIC inbound. Maintained FL280 until final dropsonde inside of ATLIC. Uneventful recovery to KLFI runway 08. Initial problems with camera and SATCOM being inop; blue light was illuminated on NUC. Troubleshooting with ground researchers via relay through HU-25 identified issue; system performance was nominal for remainder of flight. Aircraft remained within 10-minute tolerances of hu-25 for entire profile from ATLIC outbound to ATLIC inbound.

Flight scientist report (Harper):

Takeoff: 16:58:09utc

Intermittent thin cirrus above throughout flight until sometime after ZIBUT on inbound leg. Virtually clear above afterwards thru landing.

Various low level cloud conditions throughout flight. See HSRL image for details.

Very clear atmosphere (little to no aerosols) between aircraft and low level cloud tops

B200/HU25 coordination: within 5min outbound

and ~2min inbound.

Sonde 1: 17:41:06 at ZIBUT

Sonde 2: 18:18:37utc ~2min before outbound turn point at SHOKR.

Sonde 3: 18:52:36utc at midpoint of inbound leg.

Sonde 4: 20:00:10utc at ATLIC.

Do Not Cite!

Landing: 20:29:27utc

HSRL2 instrument status: No issues except manual tuning of Interferometer due to known seed laser issue. Was able to maintain good contrast ratio throughout flight.

RSP status: No issues.

AVAPS status: No issues.

Satcom: HSRL2 computer IP address set incorrectly in beginning of flight. Good comm thru rest of flight.

Falcon

Pilot report (Slover):
ACTIVATE research flight statistical survey profile. Sortie flown as planned from KLFI - ATLIC - ZIBUT - SHOKR - ZIBUT - ATLIC - KLFI. Clouds were formed in two layers, and sampling consisted of mostly the upper layer to coincide with what HSRL might see from the B-200, but occasionally sampled the lower layer. Min ALT of 500' AGL was performed several times. Aircraft note that the autopilot was performing poorly and not used for most of the sampling legs. Cloud free west of ATLIC. Clouds near SHOKR began to thin out and no longer had two layers.

Flight scientist report (Crosbie):
5 Full Cloudy Modules (markup attached). 8 CW samples.

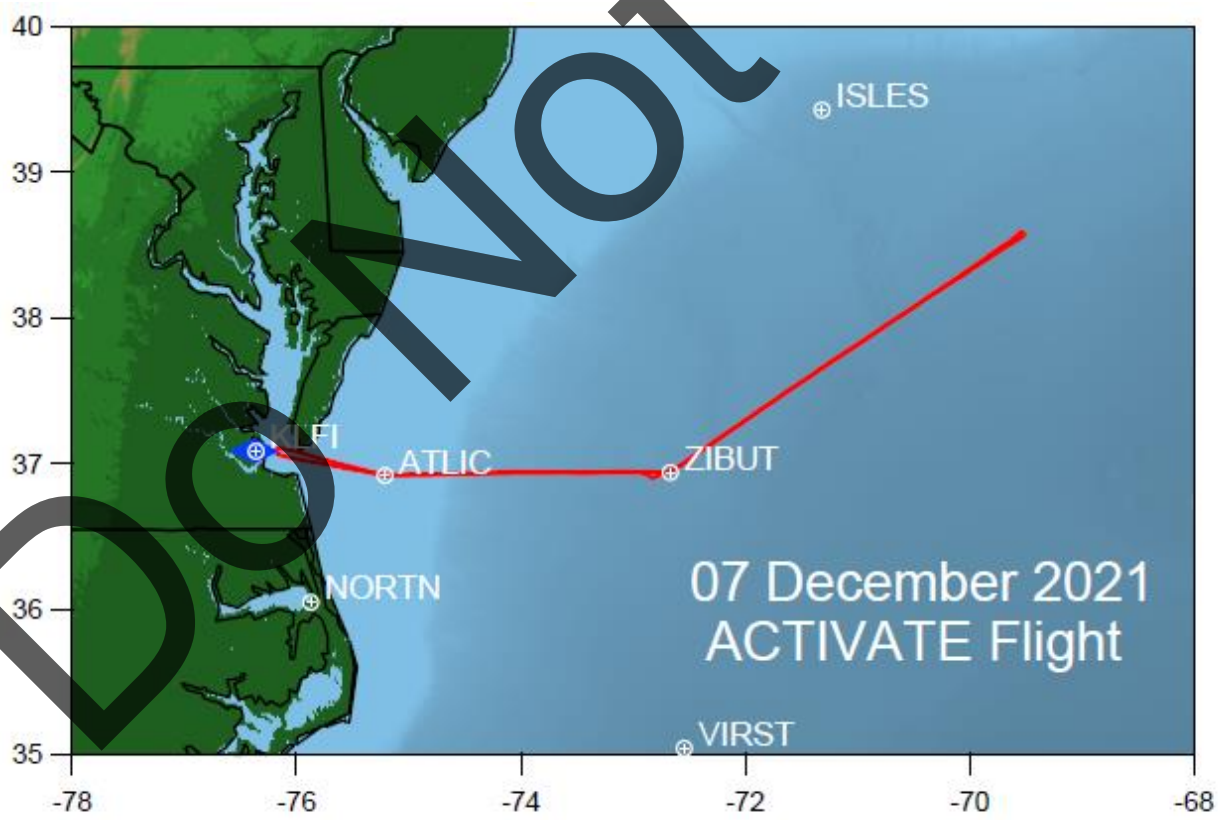
Notes: There was a stratiform cloud deck spanning approximately 4000-8000 ft with some variations in depth and position within that range of altitudes. In places the layer was thicker and drizzling and in other places it was more broken. At the eastern extent the stratiform layer was not present. Winds in this altitude range were westerly and as strong as 30kts. Below 4000 there was a distinct dry layer atop the marine boundary layer which was either cloud free or topped with ShCu. The ShCu was most extensive in coverage in the region close to ZIBUT where the tops were close to the base of the stratiform deck but everywhere else there was a

Do Not Cite!

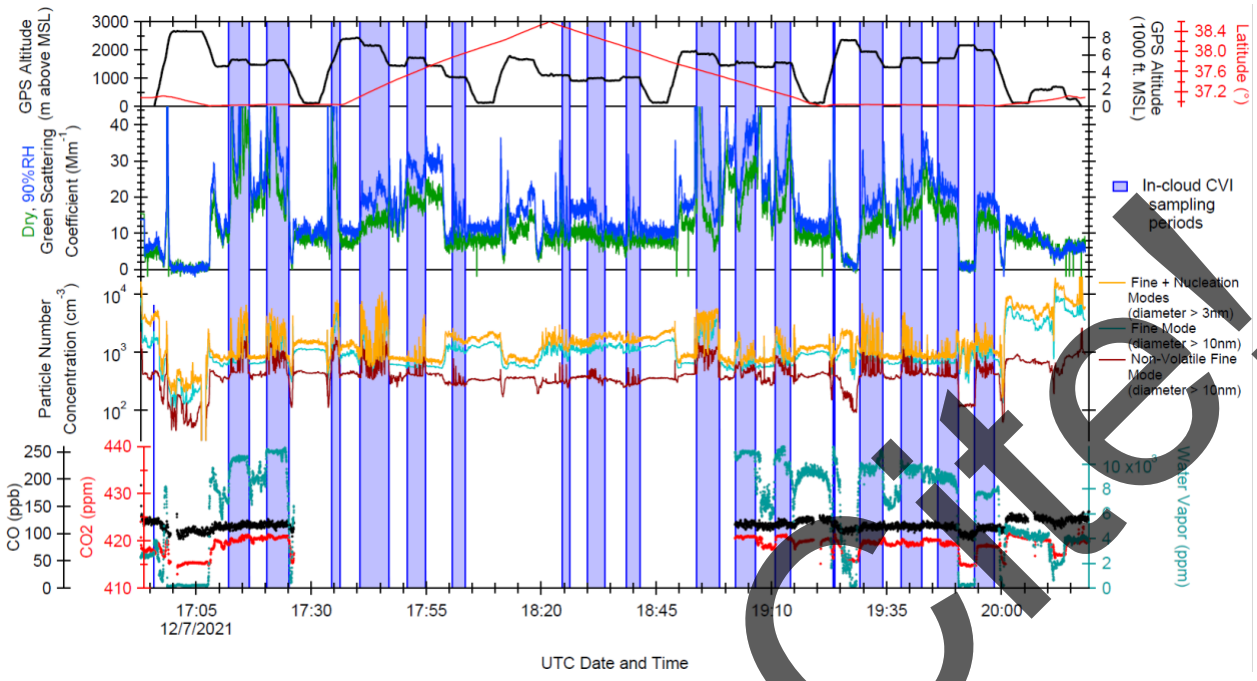
distinct gap and no evidence of exchange between the cloud layers. Winds in the marine layer were distinctly sheared from the stratiform with low level winds from the N and NE.

During the flight we focused on the stratiform layer (decoupled from the local boundary layer) until it dissipated at the eastern extent at which point we focused only on the ShCu capping the MBL. Note that in Cloudy Module 2, the second ACB is below the previous BCB – this was the point where the stratiform was no longer present. During the ACT in Cloudy Module 2, we climbed to an altitude that approximated the extent of the stratiform even though it was not present – the intention being to sample an airmass situated on the downwind flank of the stratiform that may have been previously cloudy. During the BCB sampling associated with the stratiform, the impression was that the immediate environment (~100m) was not part of circulations associated with the cloud and showed a marked reduction in water vapor.

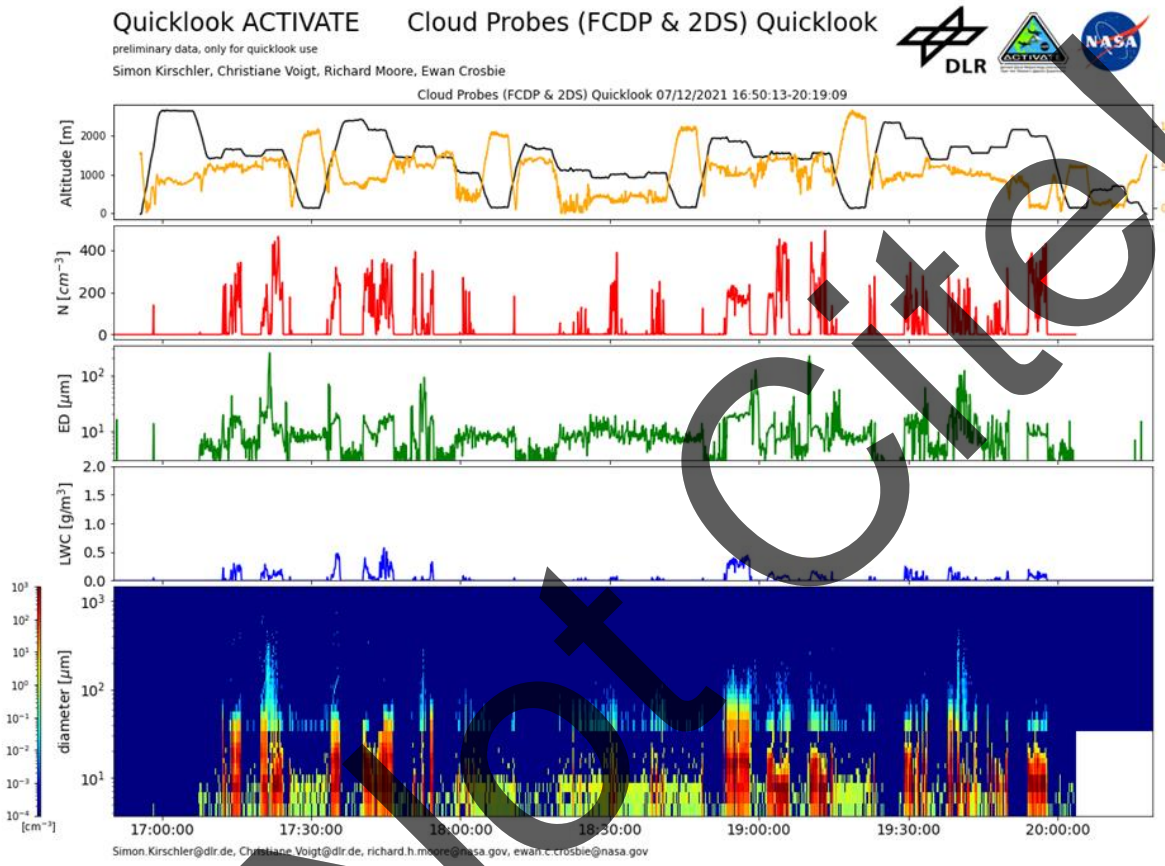
In Module 5, the MINALT leg was switched to the end of the module to better align with ATC coordination.



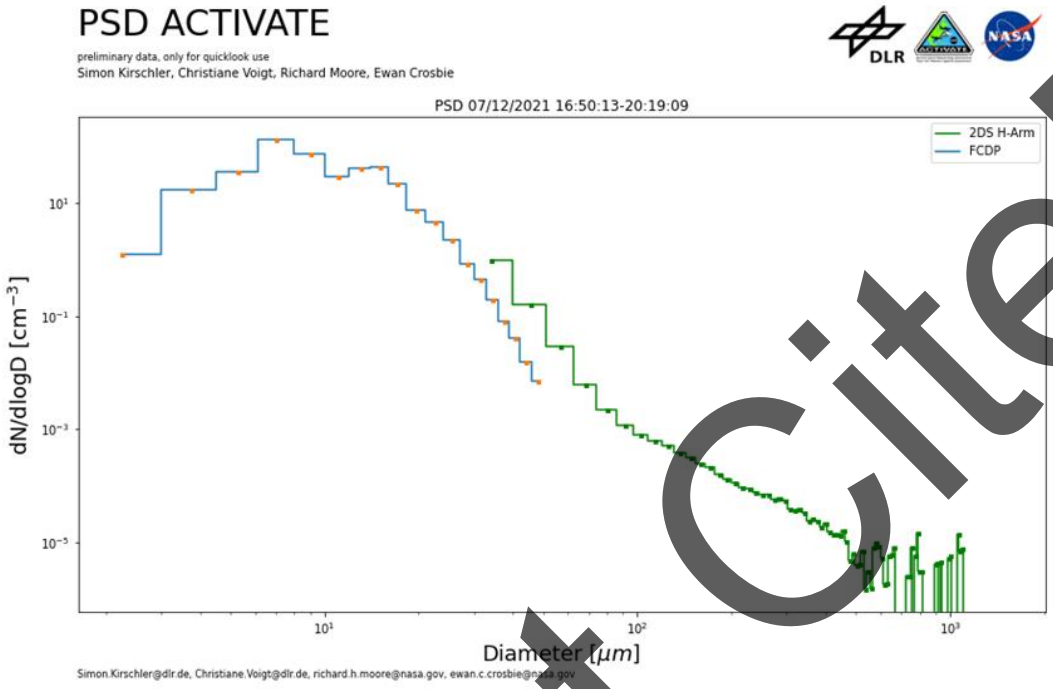
Do Not Cite!

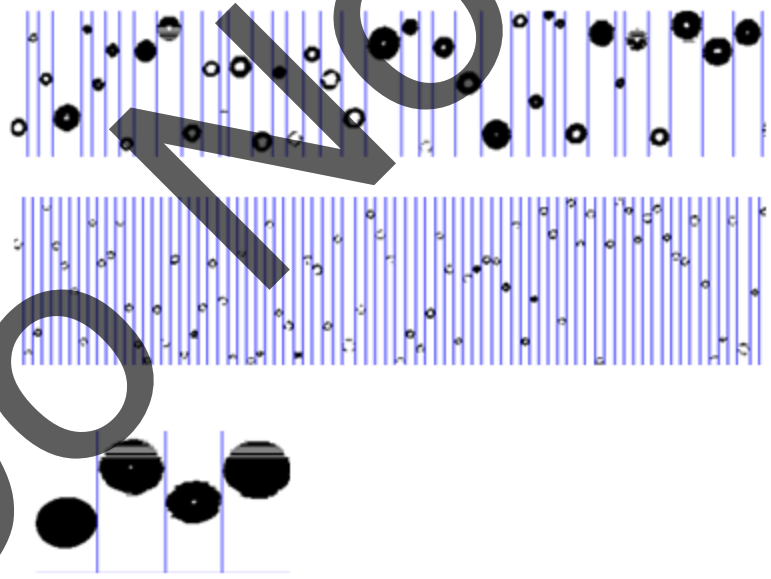

GPS Altitude (m above MSL)
3000
2000
1000
0
GPS Altitude (1000 ft. MSL)
8
6
4
2
0
Latitude (°)
38.4
38.0
37.6
37.2
Dry, 90%RH Green Scattering Coefficient (Mm-1)
40
30
20
10
0
In-cloud CVI sampling periods
Particle Number Concentration (cm-3)
10^4
10^3
10^2
Fine + Nucleation Modes (diameter > 3nm)
Fine Mode (diameter > 10nm)
Non-Volatile Fine Mode (diameter > 10nm)
CO (ppb)
250
200
150
100
50
0
CO2 (ppm)
440
430
420
410
10 x10^3
8
6
4
2
0
Water Vapor (ppm)
17:05
12/7/2021
17:30
17:55
18:20
18:45
19:10
19:35
20:00
UTC Date and Time

Do Not Cite!


Quicklook ACTIVATE
Cloud Probes (FCDP & 2DS) Quicklook
preliminary data, only for quicklook use
Simon Kirschler, Christiane Voigt, Richard Moore, Ewan Crosbie
Cloud Probes (FCDP & 2DS) Quicklook 07/12/2021 16:50:13-20:19:09
Altitude [m]
Static Temperatur [°C]
N [cm⁻³]
ED [µm]
LWC [g/m³]
diameter [µm]
[cm⁻³]
17:00:00
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

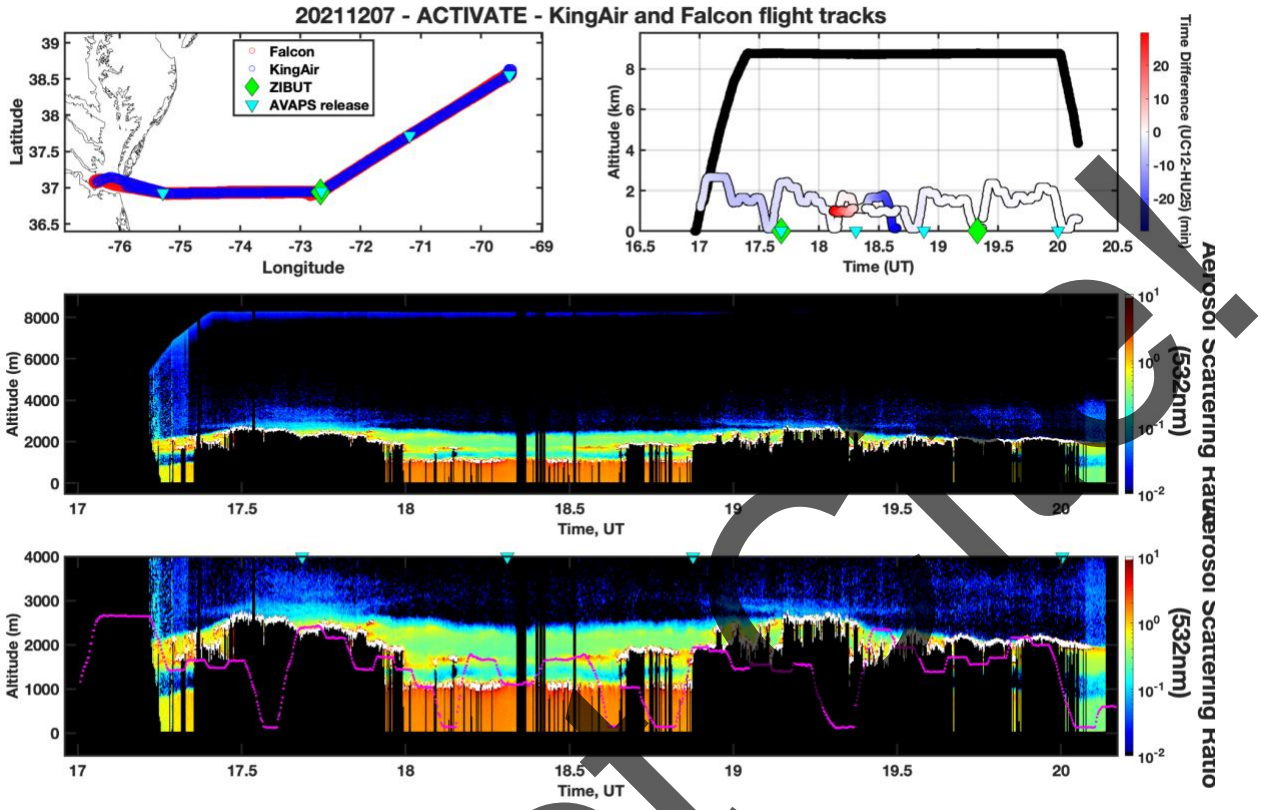
Do Not Cite!





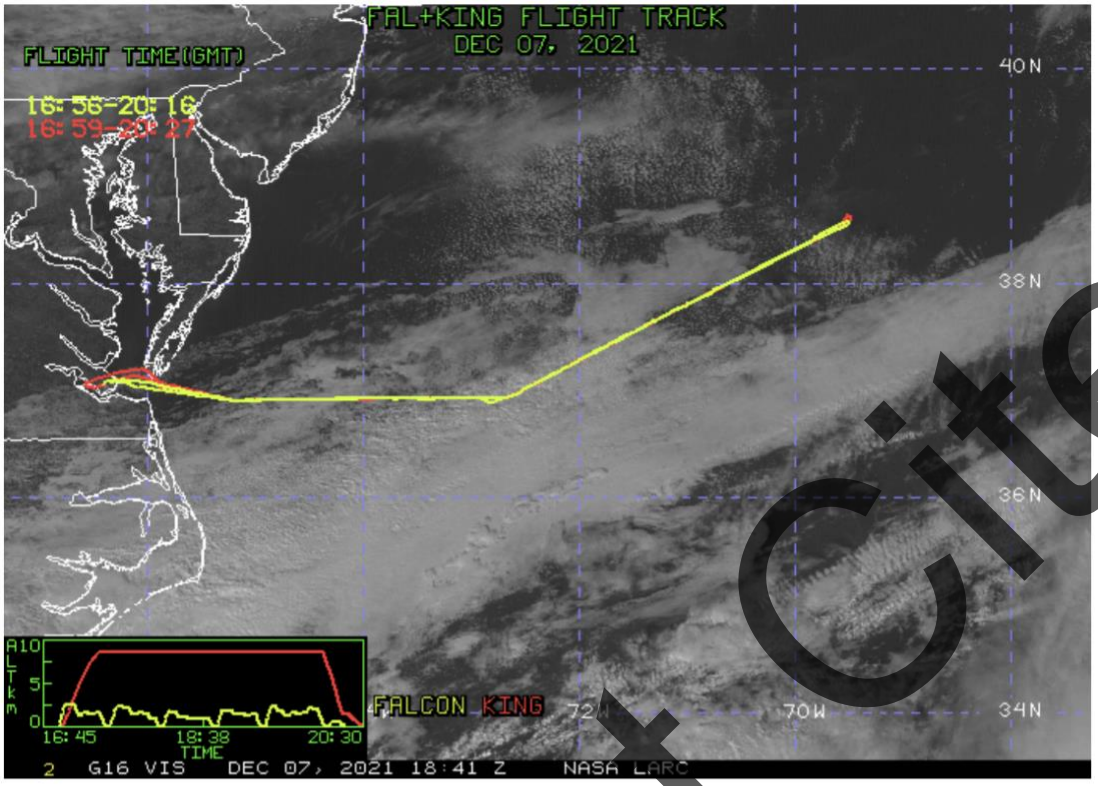
Do Not Cite!

- Liquid clouds and precip

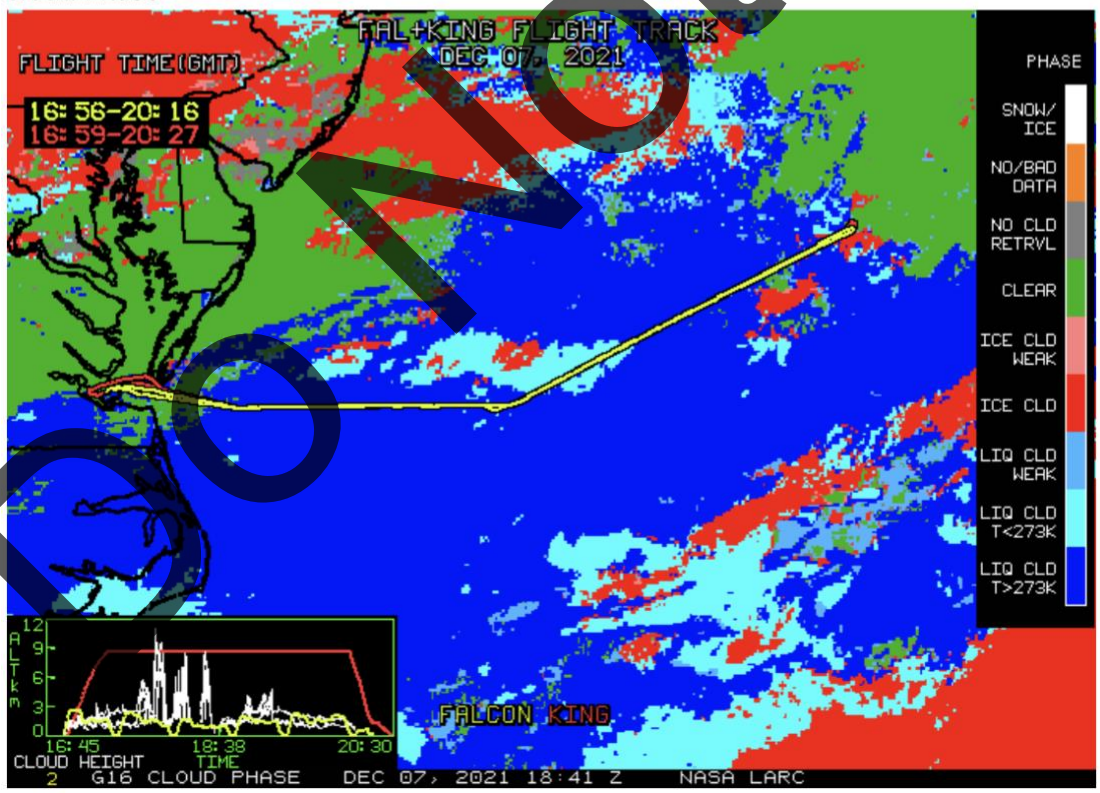

20211207 - ACTIVATE - KingAir and Falcon flight tracks
Falcon
KingAir
ZIBUT
AVAPS release
Latitude
Longitude
Altitude (km)
Time (UT)
Time Difference (UC12-HU25) (min)
Altitude (m)
Time, UT
Aerosol Scattering Ratio (532nm)

Do Not Cite

Visible Image

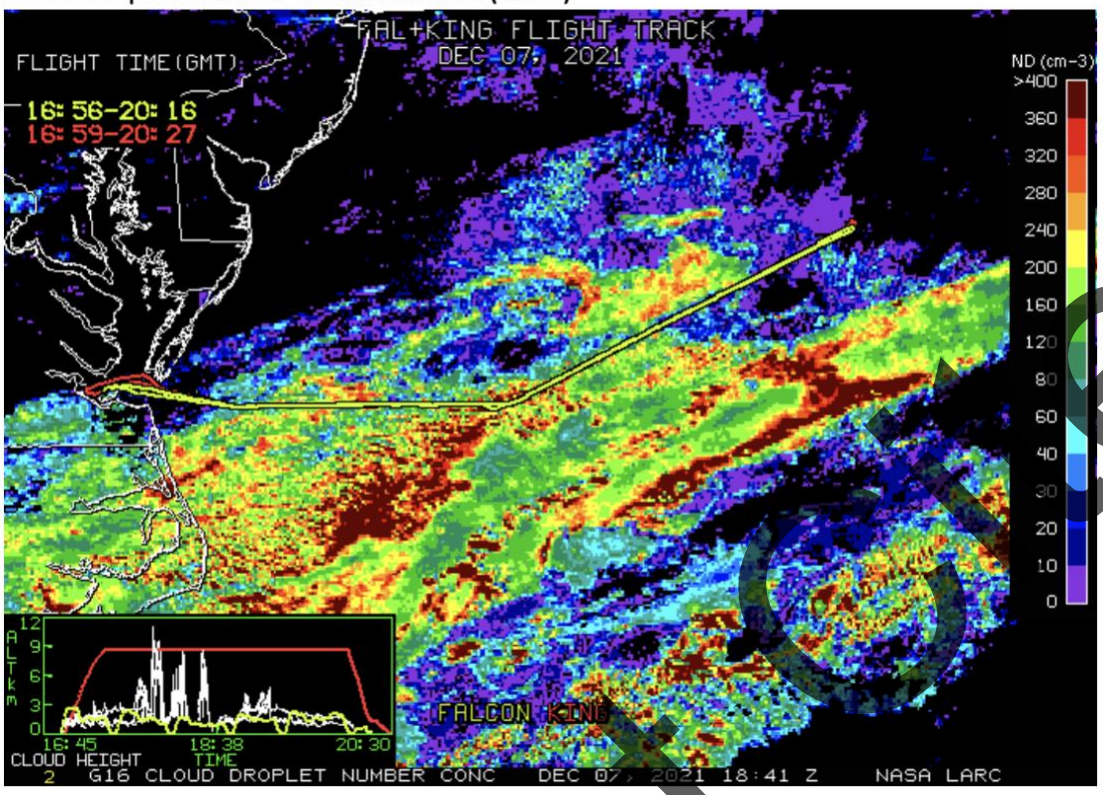


Cloud Phase

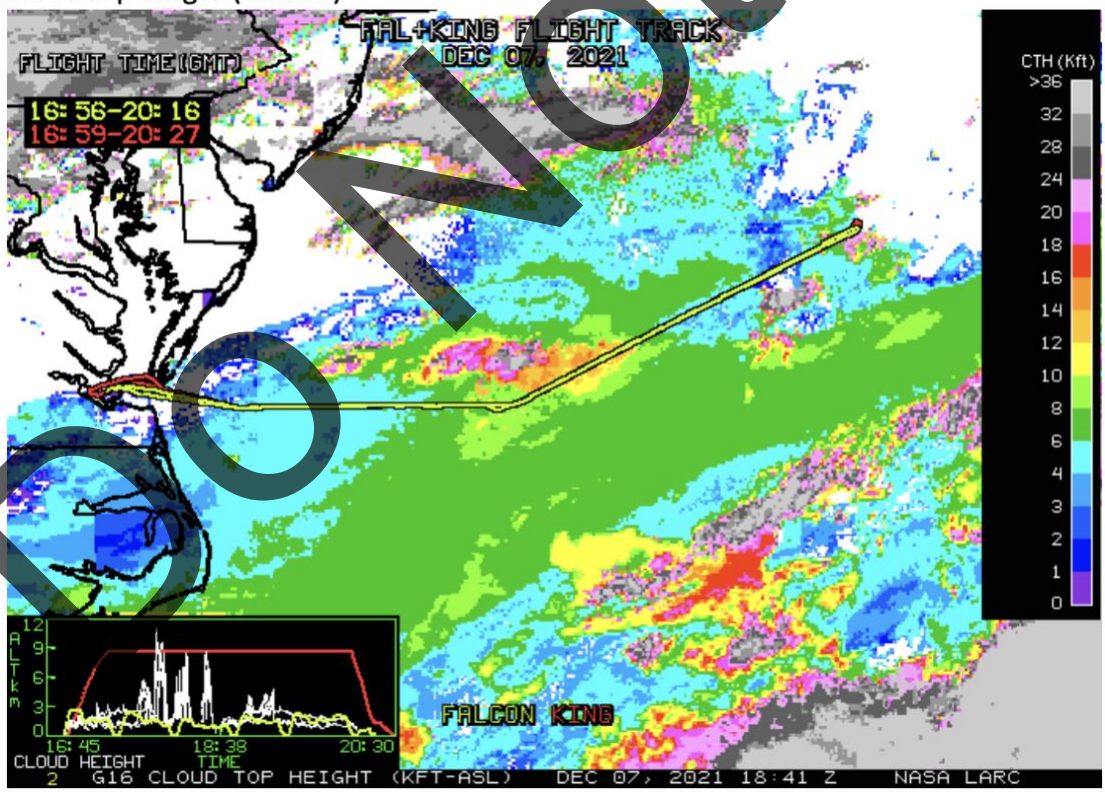


Do Not Cite!

Cloud Droplet Number Concentration (cm-3)



Cloud-Top Height (Kft-ASL)



DO NOT use!