Flight Scientist Report
Tuesday 6/08/2021 ACTIVATE RF81

Flight Type: Statistical Survey Flight
Flight Route: KLFI ATLIC ZIBUT TILED ZIBUT ATLIC KLFI
Special Notes: From Simon ("Interesting features are that in there is a very quick transition from drizzle near coastline to precipitation over the ocean. Same behavior in both flights. I think that the FCDP measured a higher aerosol background on that day with a higher variability compared to other flights. Could be a hint to more big sea salt aerosol concentration on that day.") Interesting chemistry today.

King Air
Pilot report (Wusk):
3.3 hours
Morning UC-12 event for a scheduled 2-event day; cooperative flight with the HU-25. Planned route: KLFI ATLIC ZIBUT TILED ZIBUT ATLIC KLFI. Takeoff from runway 26 immediately following HU-25 takeoff. Uneventful departure with north turn out to a climb on course direct ATLIC. Final cruising altitude was FL280 for the entire flight back to ATLIC. Initial ATC vectors for climbout, combined with a headwind at high altitude and a tailwind at low altitude, resulted in the UC-12 falling behind the HU-25 and being unable to catch up. Coincidence was maintained within 10 minutes, but was not optimal during outbound tracks. Further complicating coincidence was a convective build up approximately 40nm east of ZIBUT along the planned track. The UC-12 deviated north of track to circumnavigate, with a maximum lateral separation of 13nm north of desired ground track; cloud tops were above the performance envelope of the UC-12, estimated at ~ FL340, with a distinct anvil extending to the south of track that prevented a south deviation. UC-12 regained ground track approx.. 2/3 the distance from ZIBUT to TILED. HU-25 executed turn point approx.. 20 nm short of TILED; researchers confirmed desire for UC-12 to continue to same turn point then reverse—sacrificing opportunity to regain coincidence for gathering data on the same ground track as HU-25. Executed 30-deg bank angle reversal at turn point. On return leg to TILED, was able to maintain planned track—towering cumulus build ups had shifted northwards enough to maintain track. UC-12 did penetrate extended portion of anvil formation to maintain track. Commenced descent 12nm east of ATLIC for uneventful recovery at KLFI to runway 26. 4x dropsondes deployed: ZIBUT/Turn Point/half-way point back to ZIBUT/12nm east of ATLIC. Crew was Jamison, Wusk, Harper

Flight scientist report (Harper):

UC12 takeoff: 12:31:52utc

Aircraft coordination: 5 to 6 min behind HU25 through ZIBUT. Delay increasing slowly as we headed west. Had to deviate north to avoid cumulonimbus anvil increasing or lag behind the HU25 to just over 10min.

Sonde 1: 13:29utc at ZIBUT.

Sonde 2: 14:16utc at outbound turn.

Sonde 3: 14:35utc at halfway point between outbound turn and ZIBUT.

Sonde 4: 15:27utc at 12 mile coastal boundary.

No instrument problems with HSRL or AVAPS. No problems with RSP during flight but the data was not in the expected folder. This issue is being investigated.

Falcon

Pilot report (Slover):
Takeoff: 0827L

Landing: 1154L

ACTIVATE statistical research flight flown as planned from KLFI - ATLIC - ZIBUT - TILED and reverse. Altitudes flown varied from 500' AGL to 5000' MSL. Turned just short of TILED due to fuel consumption.

Flight scientist report (Crosbie):
The set up for this flight was quite similar to RF79. We had to make a deviation for convection near ZIBUT with ShCu beyond. The cloud situation at the start of the first cloudy module was confusing with multiple stratiform layers. We sampled a lower and upper layer but it was not clear real time what was going on. East of the convection the cloud scene settled into the typical summertime ShCu pattern with lots of very small, vertically-constained clouds with a few clusters that penetrated up a few thousand ft. The fraction of these thicker clouds was quite low which makes it challenging to successfully conduct BCT legs. Another notable finding was that the scattering was quite a bit higher in the region west of the convection (i.e. on the coastal side) and even though SO4 and ORG were enhanced the ratios between the estimated total mass and scattering were not the same as other flights (qualitative, real-time estimate) and may warrant a bit of further investigation. The PILS real-time conductivity was also indicating a higher level of total ions, which might be caused by either sea salt or acidic (un-

neutralized) sulfate. It appeared that during sampling in the sub-cloud environment (BCB) and in ACB legs where there were few clouds, the wing probe number concentrations were higher than normal which may also indicate higher concentrations of coarse aerosol. (3 cloudy, 1 part cloudy, 3 clear)

Eddie:
Before flight, butanol was drained from CPC 3776 and replaced with fresh butanol.

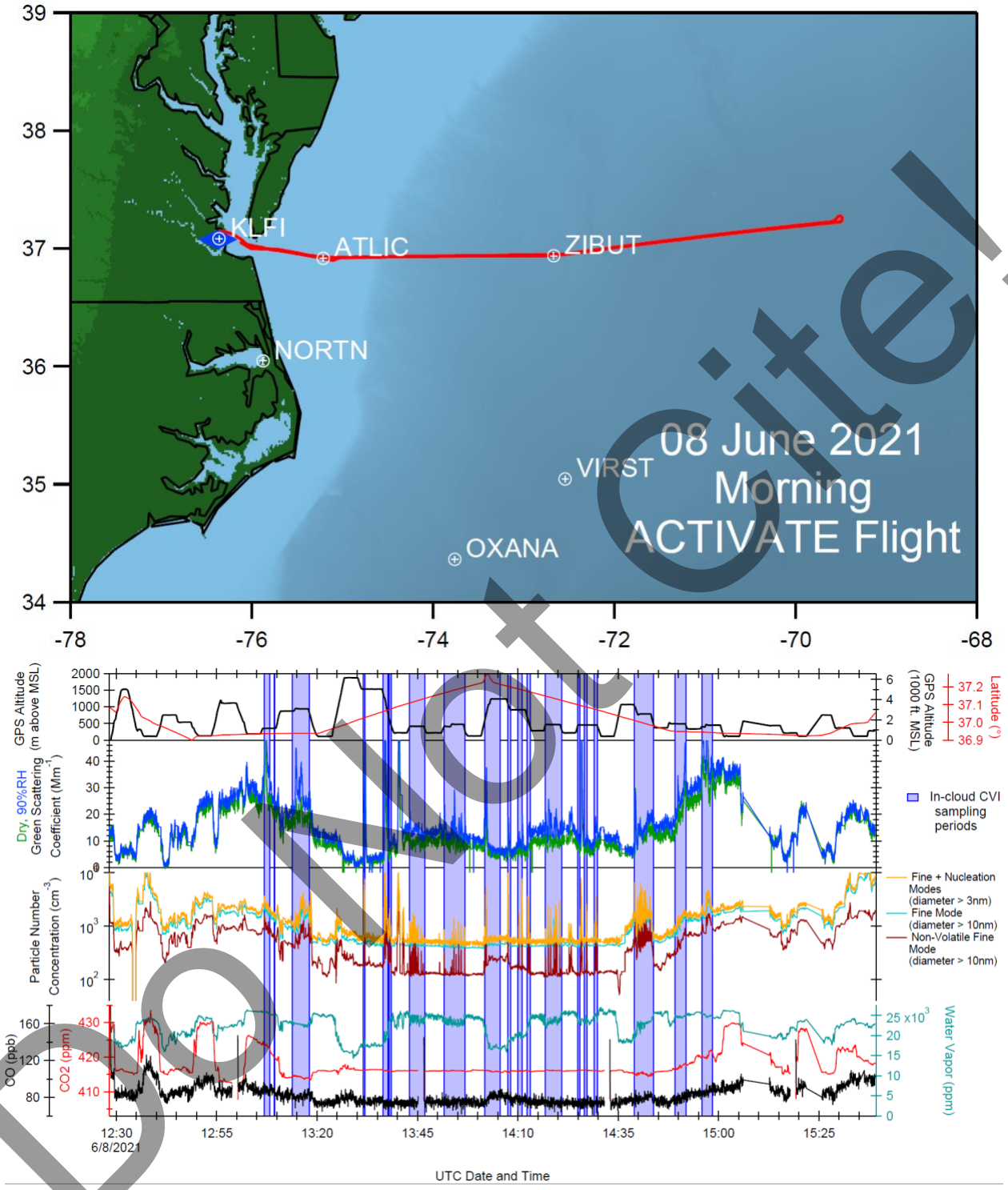
12:28:28 Takeoff

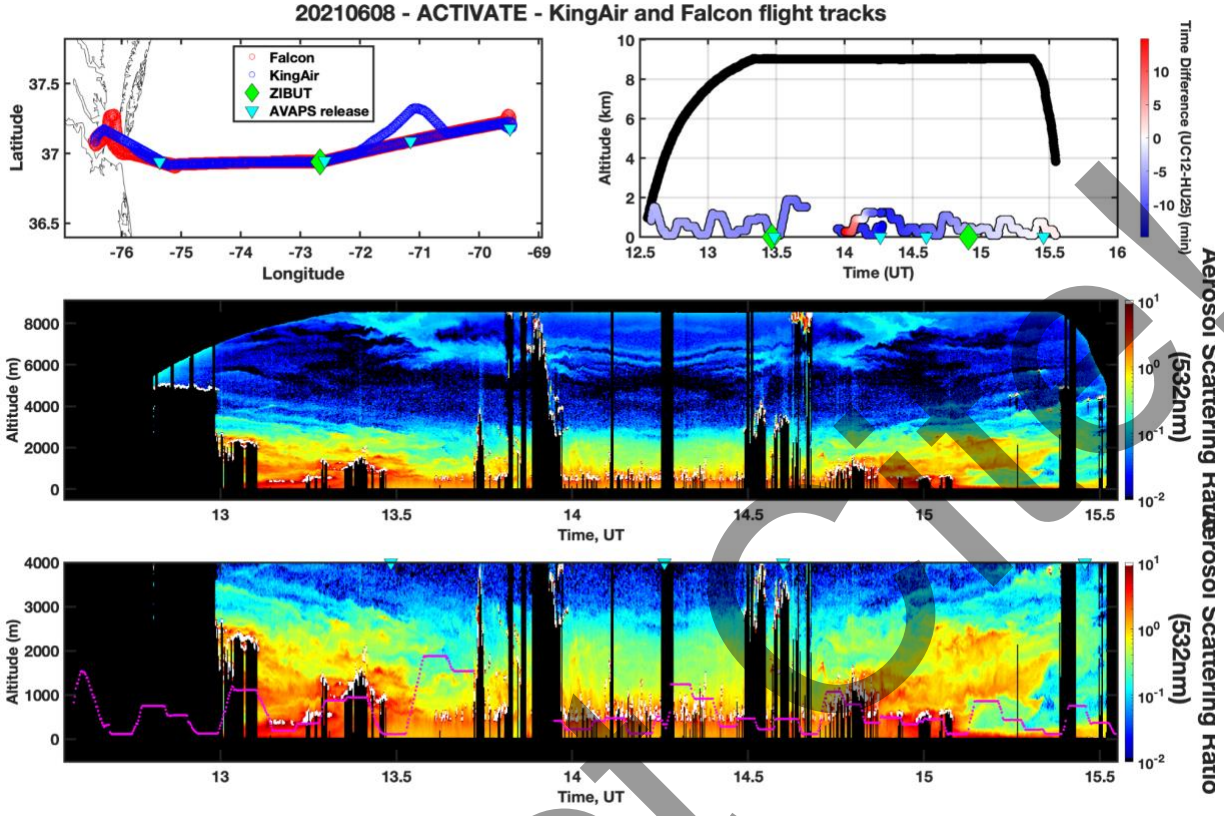
12:32 BL @1900 ft

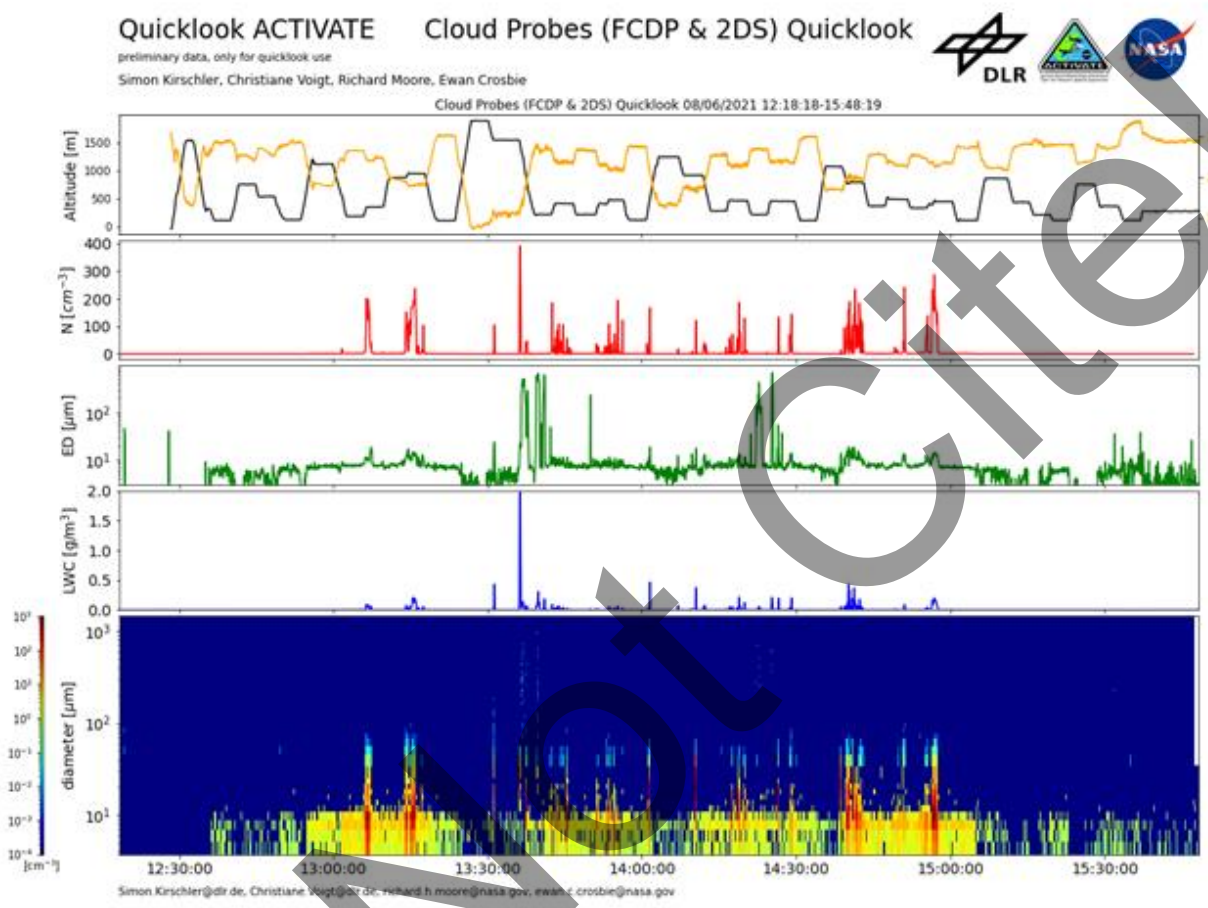
12:34:00 – 12:34:47 CPC's & SMPS on filter. All went to zero.

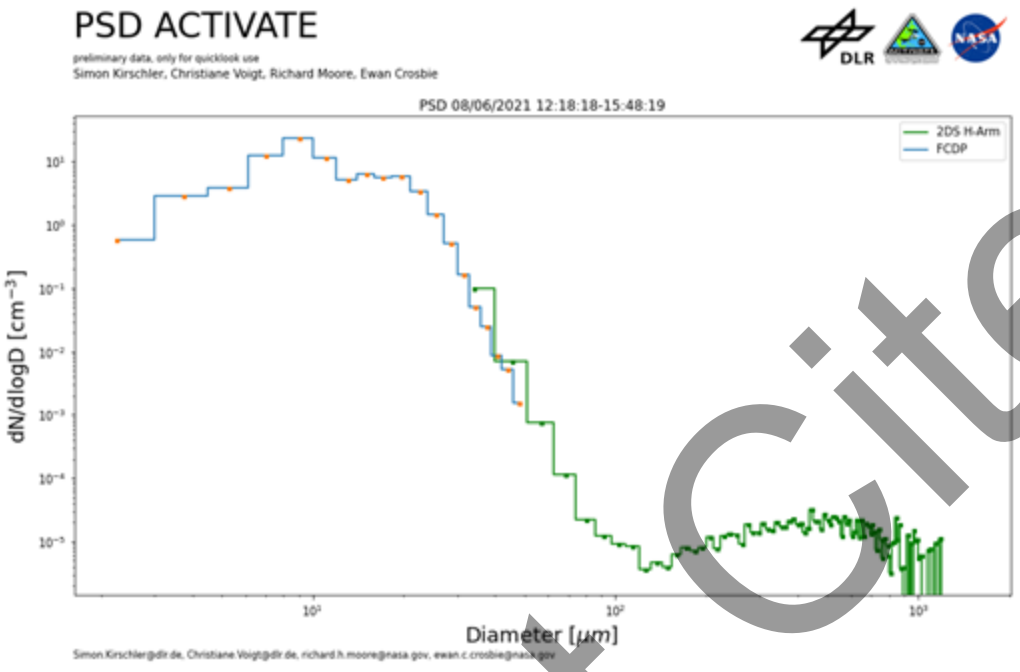
15:38:00 Humidifier & WCM turned off in preparation for landing

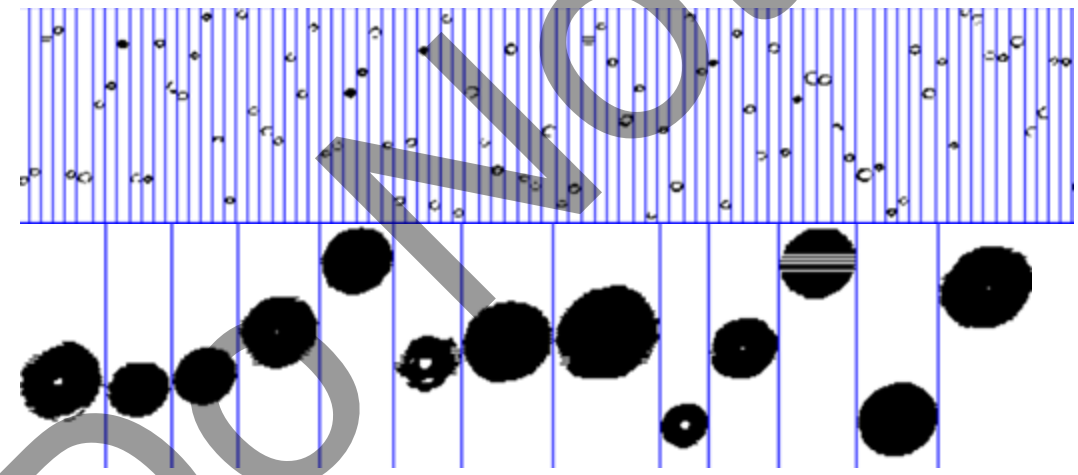
15:51:21 Landing


KLFI
ATLIC
ZIBUT
NORTN
VIRST
OXANA
08 June 2021
Morning
ACTIVATE Flight
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)
OO (ppb)
CO2 (ppm)
Water Vapor (ppm)
12:30
6/8/2021
UTC Date and Time


20210608 - 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)

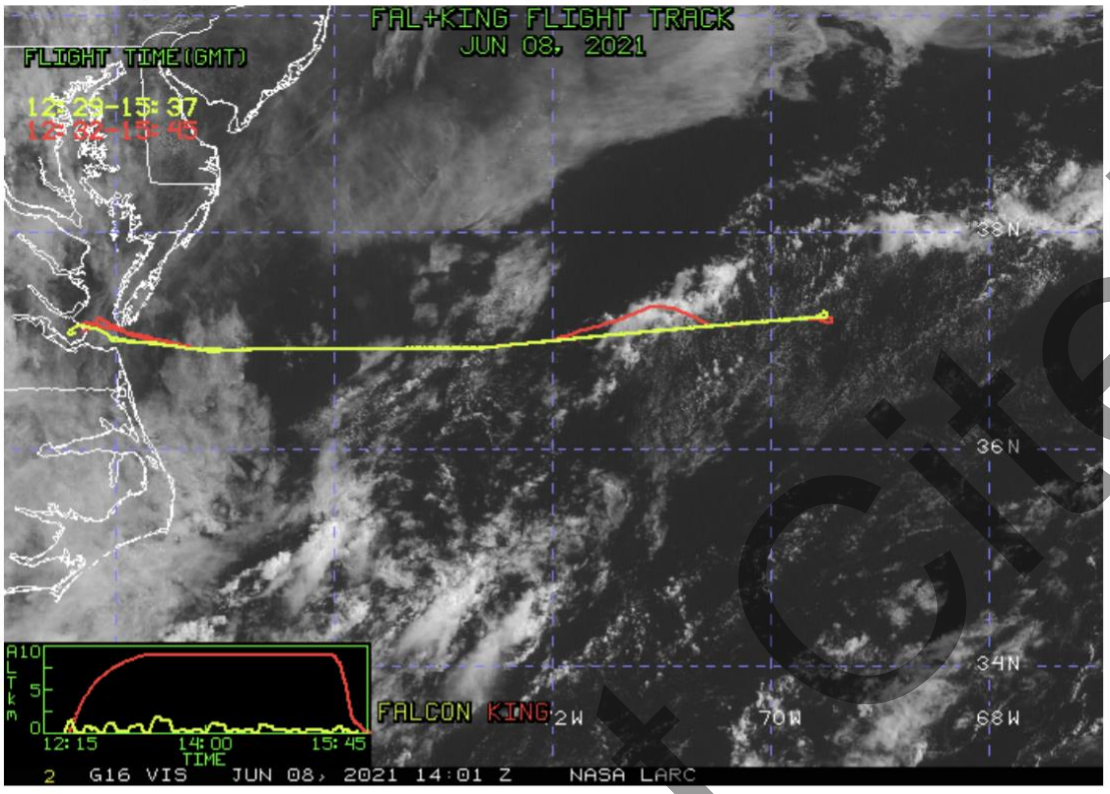

Quicklook ACTIVATE
Cloud Probes (FCDP & 2DS) Quicklook
preliminary data, only for quicklook use
Simon Kirschler, Christiane Voigt, Richard Moore, Ewan Crosbie
DLR
Cloud Probes (FCDP & 2DS) Quicklook 08/06/2021 12:18:18-15:48:19
Altitude [m]
N [cm⁻³]
ED [µm]
LWC [g/m³]
diameter [µm]
[cm⁻³]
12:30:00
13:00:00
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



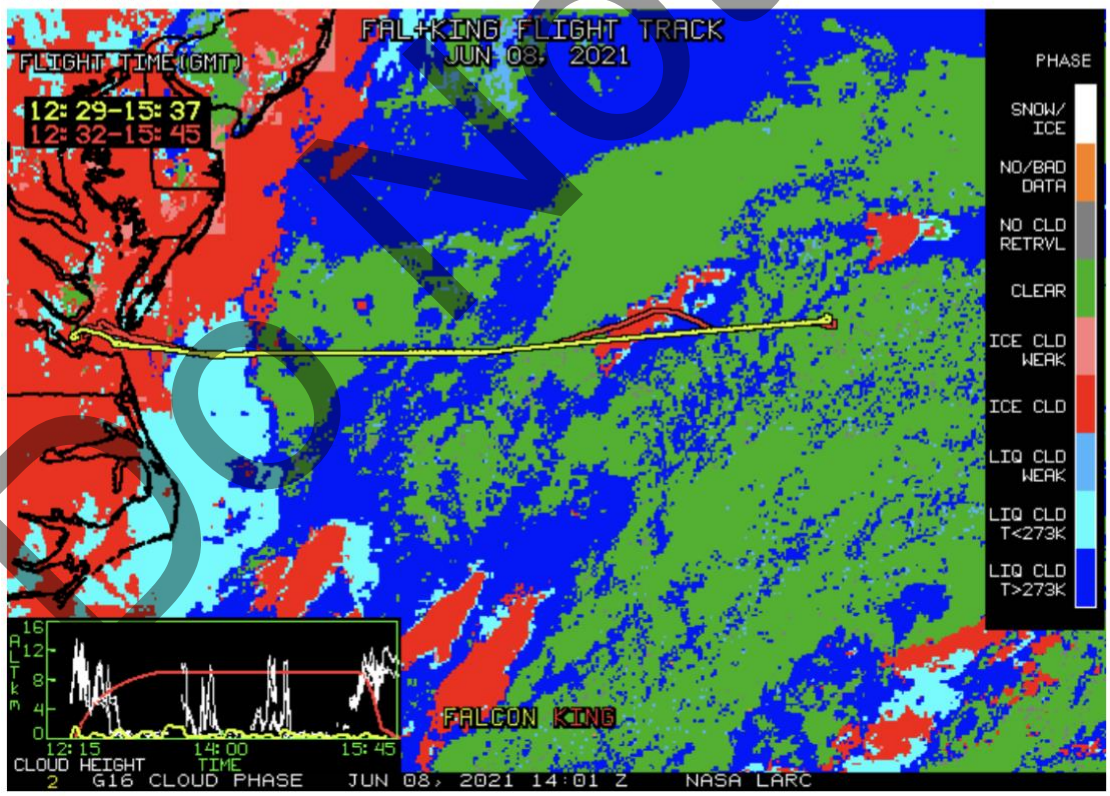


Pure liquid clouds with a lot precipitation.

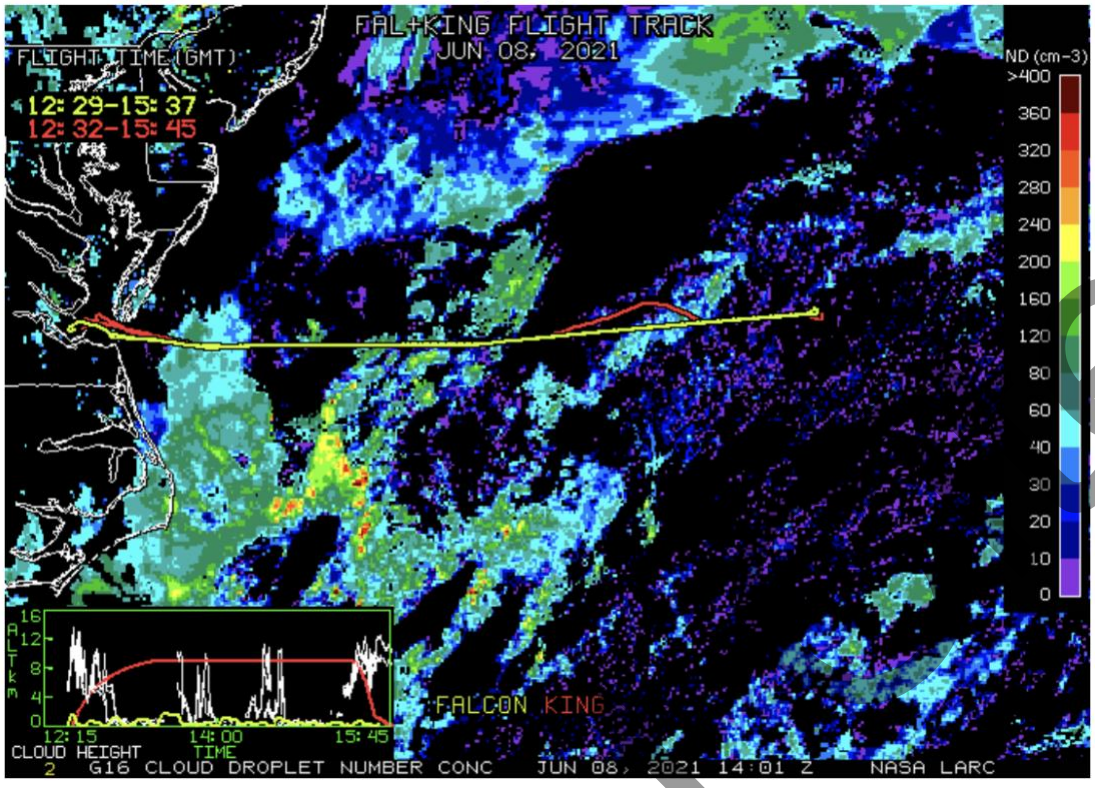
Visible Image



Cloud Phase



Cloud Droplet Number Concentration (cm-3)



Cloud-Top Height (Kft-ASL)