Flight Scientist Report
Sunday 03/13/2022 ACTIVATE RF137

Flight Type: Process Study Flight
Flight Route: KLFI - ATLIC - ZIBUT - N3530/W07004 - ZIBUT - ATLIC - KLFI
Special Notes: First of two flights today. Excellent cold air outbreak day with marine boundary layer winds westerly/northwesterly and a 'transition' (from solid to open cloud field) within reach. As a result we opted to do a 'process study flight' with 3 'mini-walls' positioned upwind, at, and downwind of the transition zone. On the way out, precipitation may have affected aerosol measurements on BCB legs. New particle formation observed on two ACT legs on the way back (strongest event closest to the transition zone). Third ACT leg on the way back was cut short because of icing issue. Icing affected ozone measurements, the isokinetic inlet, and cloud probes. Deicing circuit needed to be checked but would not impact the next days flight.

King Air
Pilot report (Wusk):
First flight of a two sortie day with HU25. Planned KLFI ATLIC ZIBUT 3516N06930W ZIBUT ATLIC KLFI with the HU doing three mini wall patterns on the leg from TP back to ZIBUT. Strong winds at altitude. UC12 take off first at 8:27. Good Climb out and conditions. Ahead of HU due to winds. Early turn at TP for winds and timing. Aiming for coincidence with the HU over middle mini wall. Researcher dropped ~7 sondes during this leg. Challenging with substantial headwinds. Continue route home significantly behind HU coming back inside ZIBUT to home. Visual approach Runway 26. Quick turn for second flight. Crew was Jamison, Wusk, Shingler.

Flight scientist report (Shingler):

KLFI ATLIC ZIBUT 3516N06939W ZIBUT ATLIC KLFI

Clouds stratified at 7kft most all flight. CTH down to 6kft on the return near mini wall 3. Descended down to about
Sondes at each end of mini wall (MW) and in between walls.

HU25 <1550
Camera is 155400 at 155345 gps

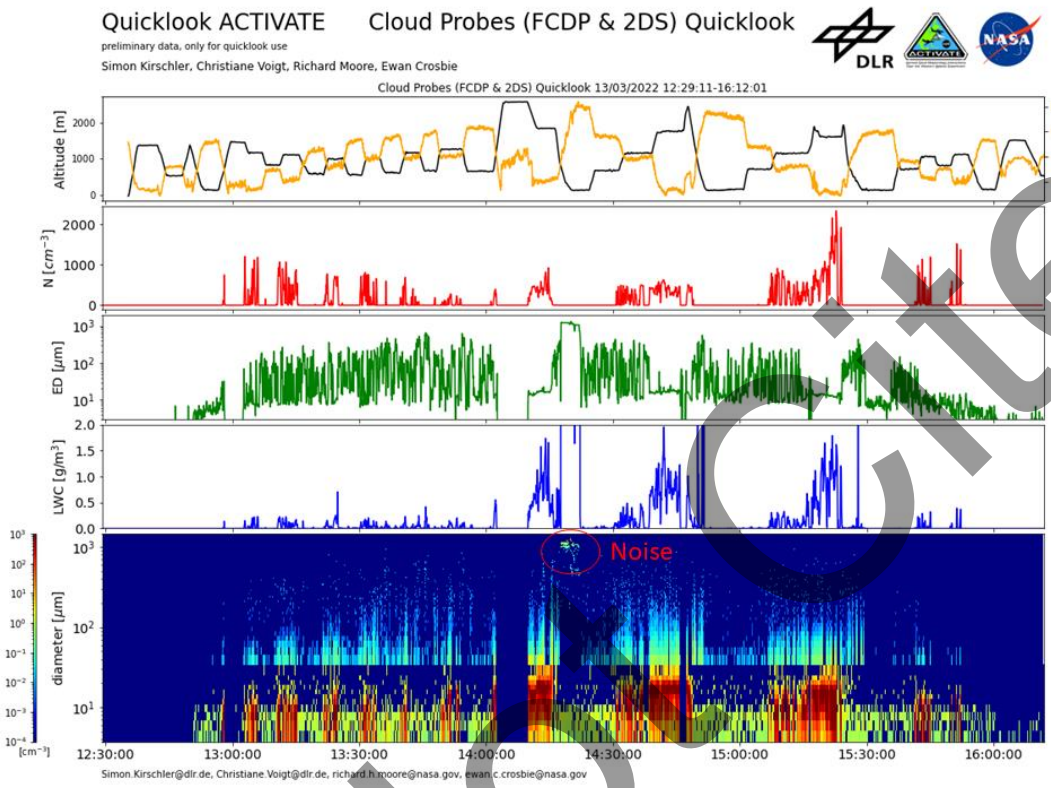
11 SONDES
ZIBUT
MW1START
MW1END
1/2 MW1END MW2 START
MW2START
MW2END
1/2 MW2END MW3START

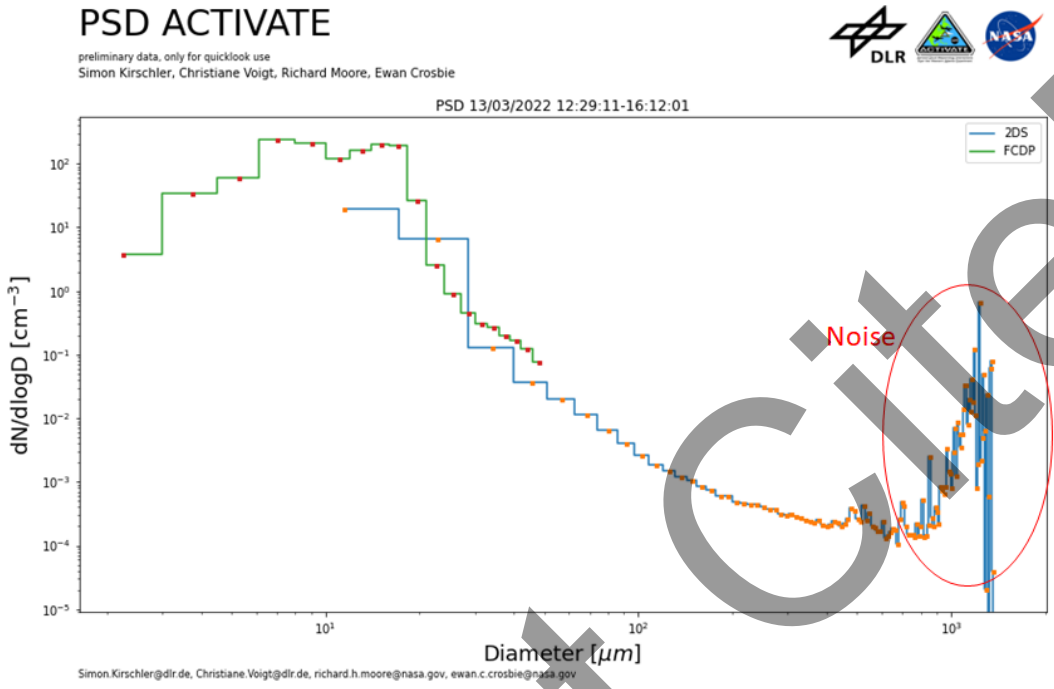
MW3START
MW3END
74W ON RETURN
COAST

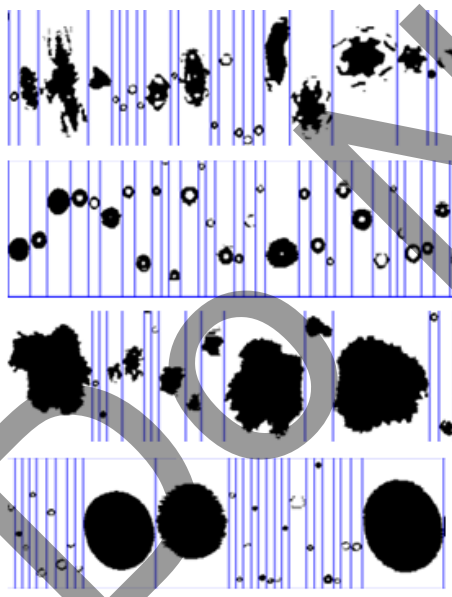
Falcon

Pilot report (Slover):
ACTIVATE Cold Air Outbreak research. Route was KLFI - ATLIC - ZIBUT - N3530/W07004 - ZIBUT - ATLIC - KLFI. Outbound was statistical survey while inbound was three "mini-walls" with 3 stacked 5-min legs of BCB, ACB and BCT with spirals at each turn around (really just one 90-270 to reverse course was all that was needed. Over gross weight sortie.

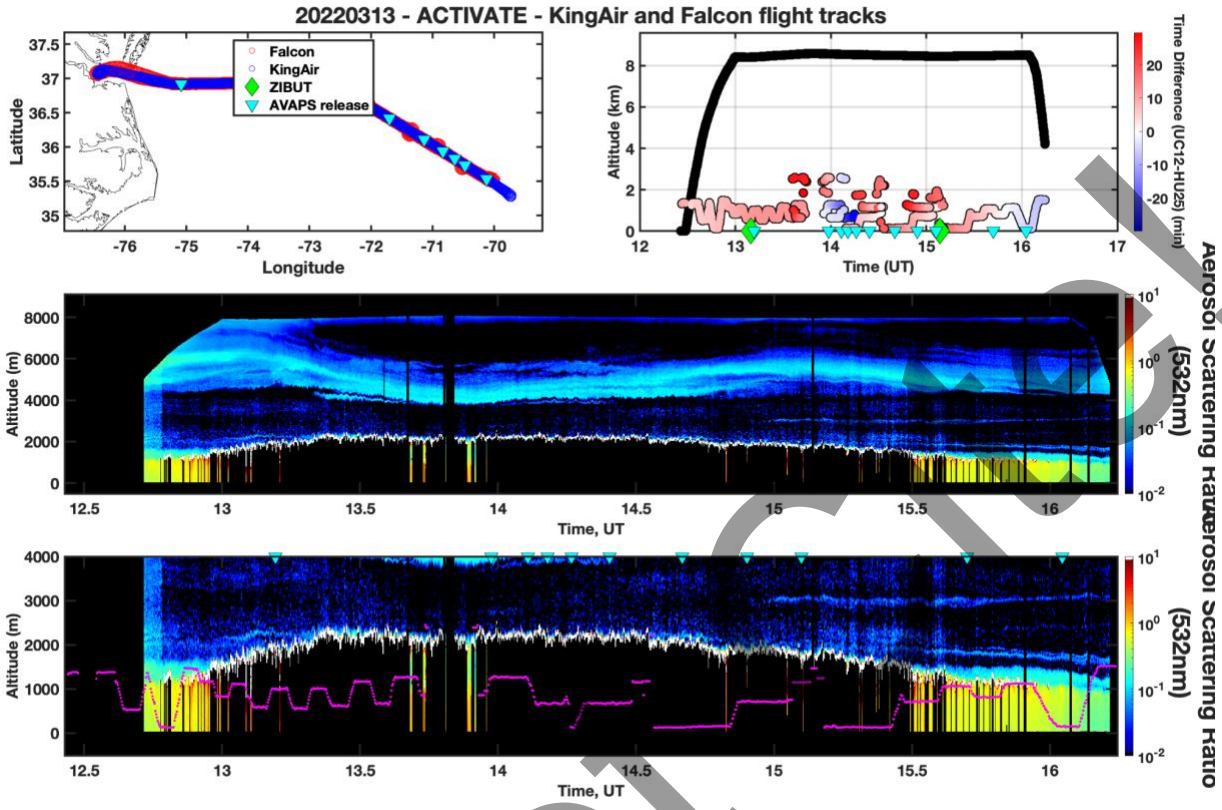
Flight scientist report (Crosbie):
Cold air outbreak process study. Clouds started forming around ATLIC on outbound. The clouds thickened and the coverage increased to near overcast by ZIBUT. Ocean waves were significant with a high white cap fraction. SE of ZIBUT the first signs of precip became evident with a few showers reaching the surface. The cloud structure took on a more decoupled appearance further downwind, although the cloud bases had been ragged almost throughout the cloudy region. Near ZIBUT, some steam fog was visible near the ocean surface. The flight was flown as a process study (mini-walls). The downwind wall was in a region where some evidence of cloud break up was starting although it was not to the extent seen in other cases where a dramatic change in morphology marked this transition. This case was more mild with only minor clustering of convective elements and less reduction in cloud fraction in surrounding regions. The upwind wall was positioned just east of ZIBUT where clouds were thick but with limited precip. The mid wall was positioned around an estimate of where the precip started to become significant enough to reach the surface (visually). The challenge with executing this flight was extensive icing. The cloud top temperature was <-10 across most of the flight. The cloud tops contained significant supercooled cloud water and ice precipitation. Cloud water collection was impossible. Aerosol measurements were challenged by the fact that there was a large coverage of weak precipitation near cloud base (typically ice).


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 13/03/2022 12:29:11-16:12:01
Altitude [m]
N [cm⁻³]
ED [µm]
LWC [g/m³]
diameter [µm]
Noise
12:30:00
13:00:00
13:30:00
14:00:00
14:30:00
15:00:00
15:30:00
16:00:00
Simon.Kirschler@dlr.de, Christiane.Voigt@dlr.de, richard.h.moore@nasa.gov, ewan.c.crosbie@nasa.gov



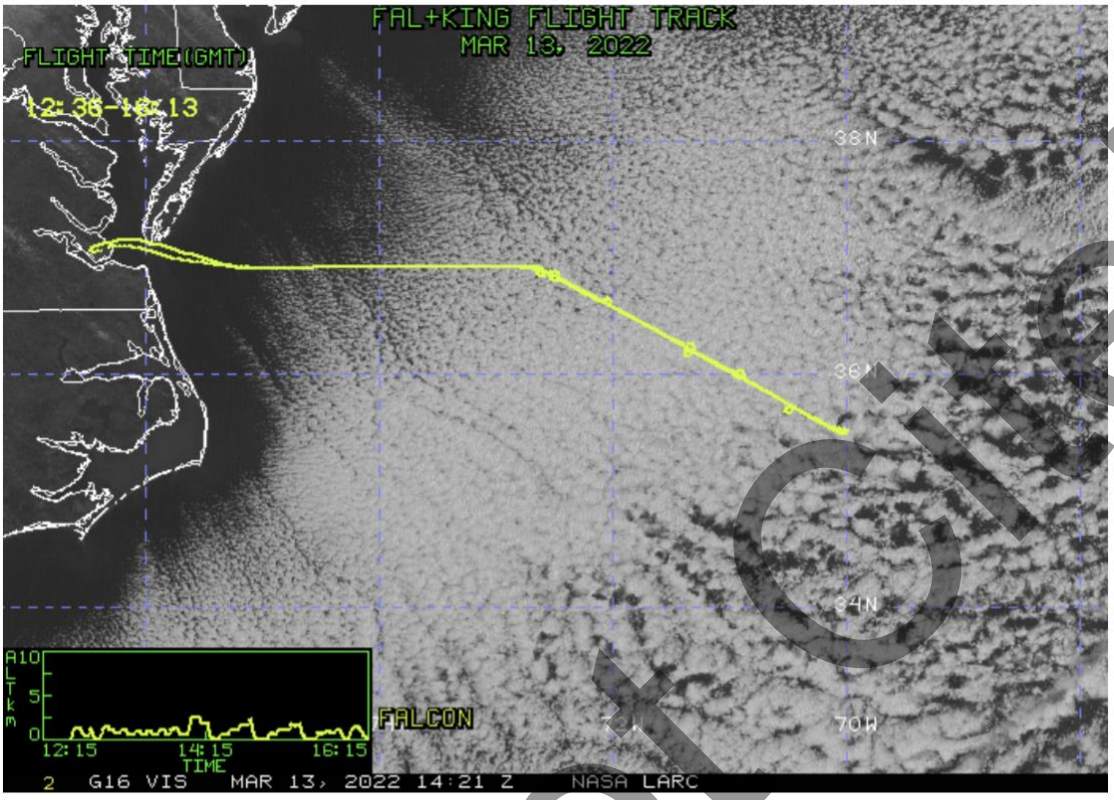


Mixed Phase clouds with dominantly ice Precip

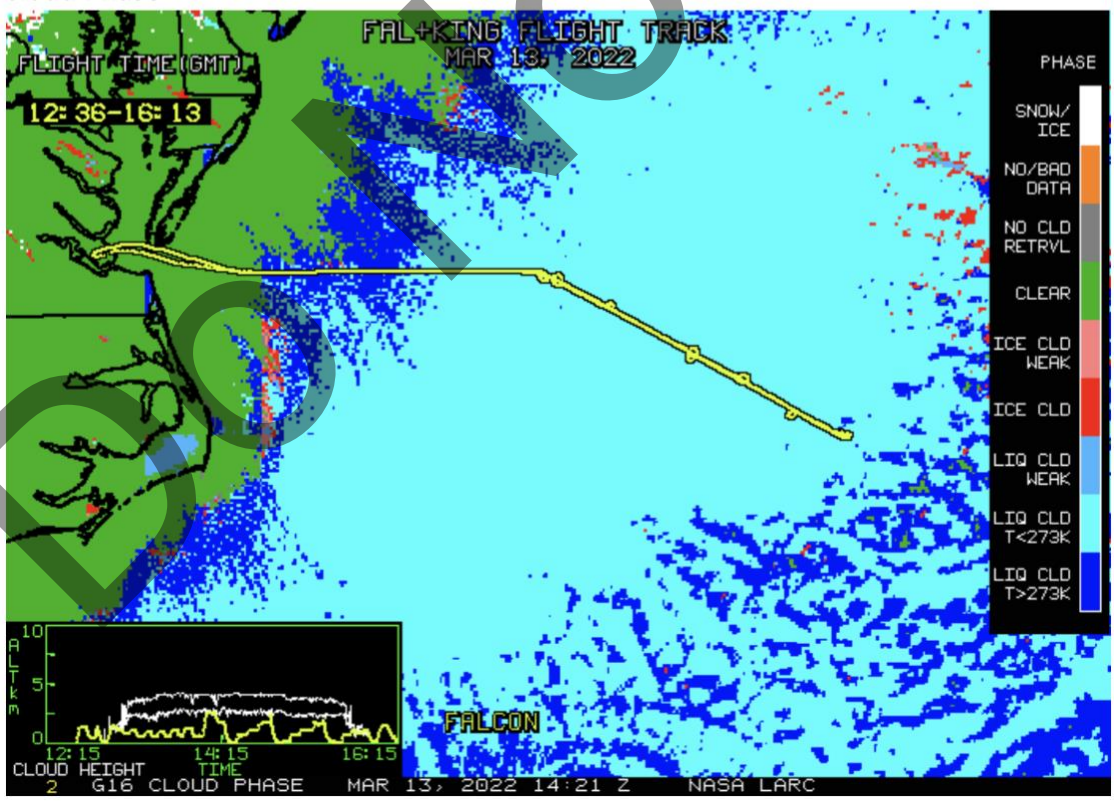

20220313 - ACTIVATE - KingAir and Falcon flight tracks
Falcon
KingAir
ZIBUT
AVAPS release
Latitude
Longitude
Altitude (km)
Time (UT)
Time Difference (UC12-HU25) (min)
Altitude (m)
Time, UT
Aerosol Scattering Ratio (532nm)

NASA-LaRC Clouds Group GOES-16 Quicklook Images for Flight 137, 14:21 UTC Mar 13, 2022

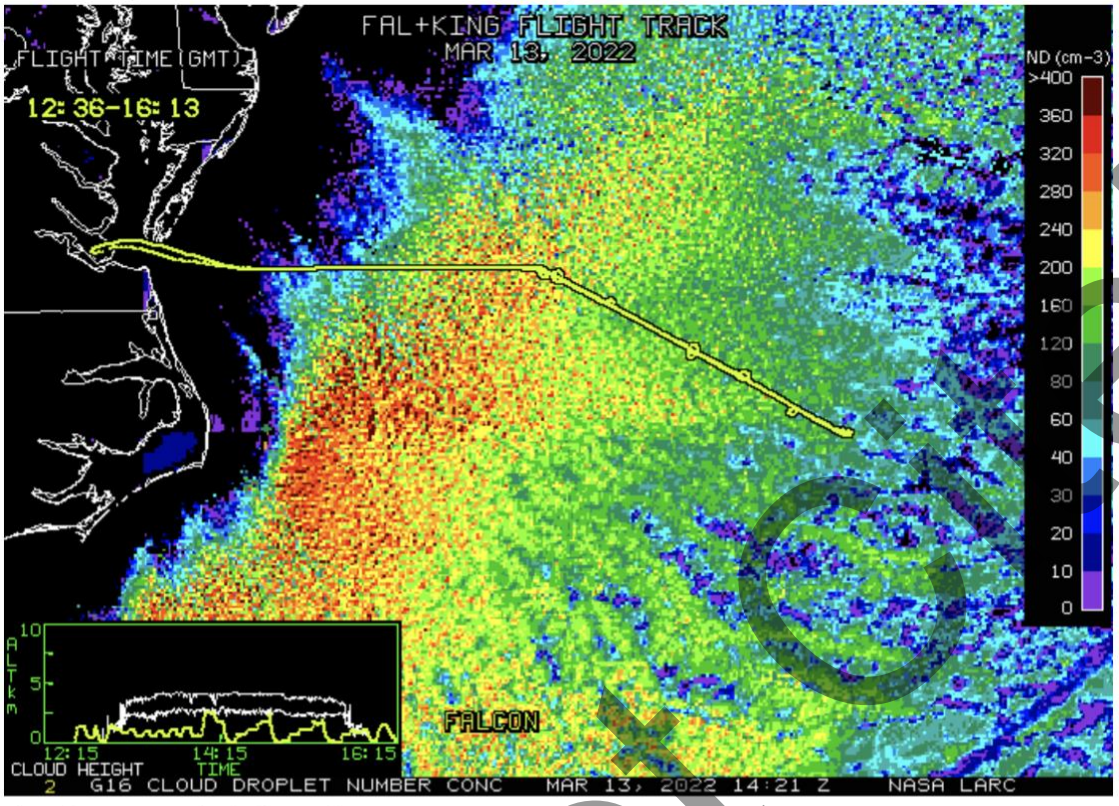
Visible Image



Cloud Phase



Cloud Droplet Number Concentration (cm-3)



Cloud-Top Height (Kft-ASL)