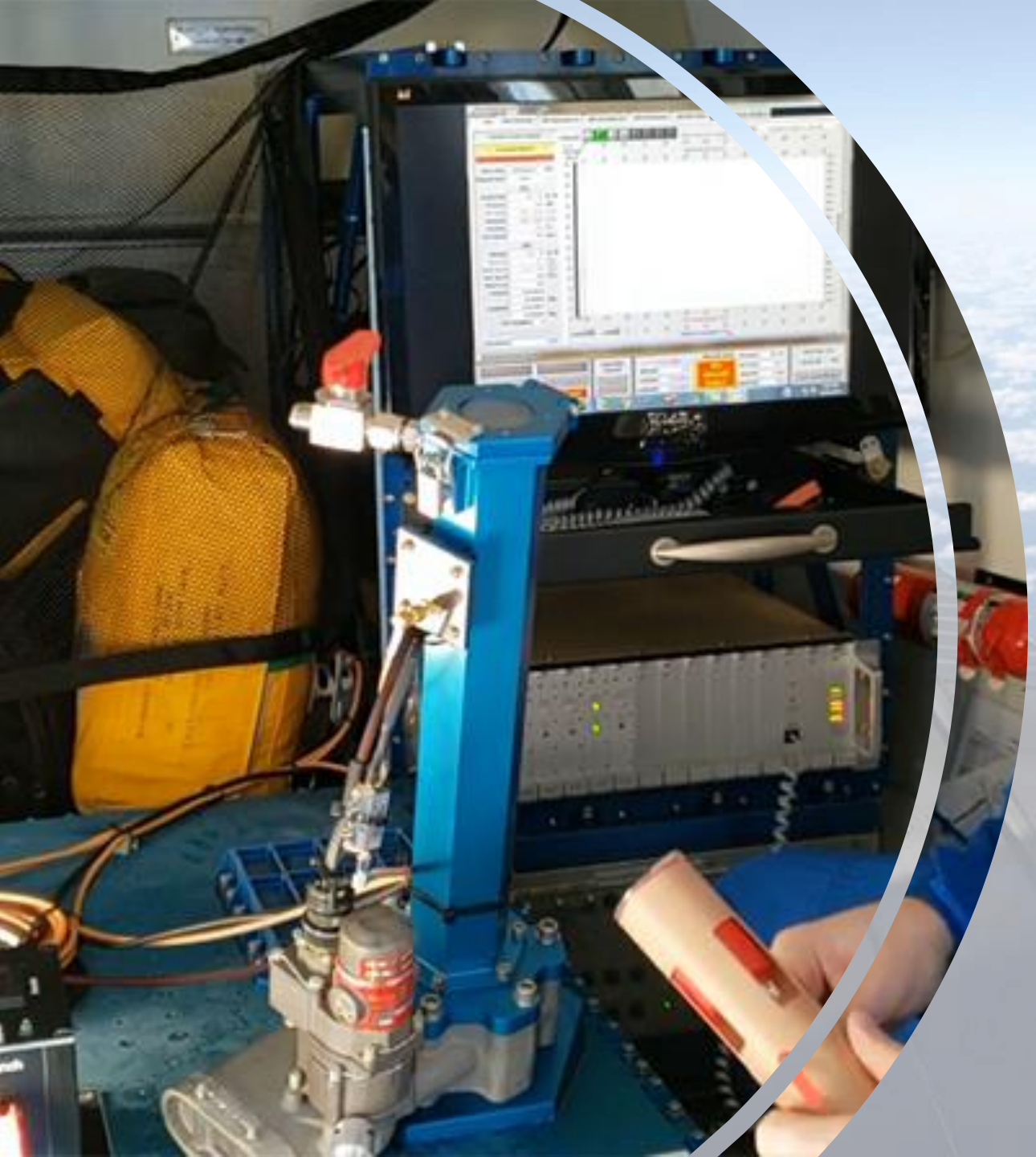

Sonde Measurements of Atmospheric Layers at Langley (SMALL)

AVAPS Dropsondes by NASA Langley, a subsidiary of the Langley Aerosol Research Group (LARGE)

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Data Analysts: Michael Shook, Claire Robinson

AVAPS – Airborne Vertical Atmospheric Profiling System

- Measures high resolution vertical profiles of temperature, dew point, altitude, humidity, wind speed and direction
- Utilizing the NCAR nRD41 (mini sondes) for the ACTIVATE Mission
- For more information, refer to the AVAPS Data Presentation

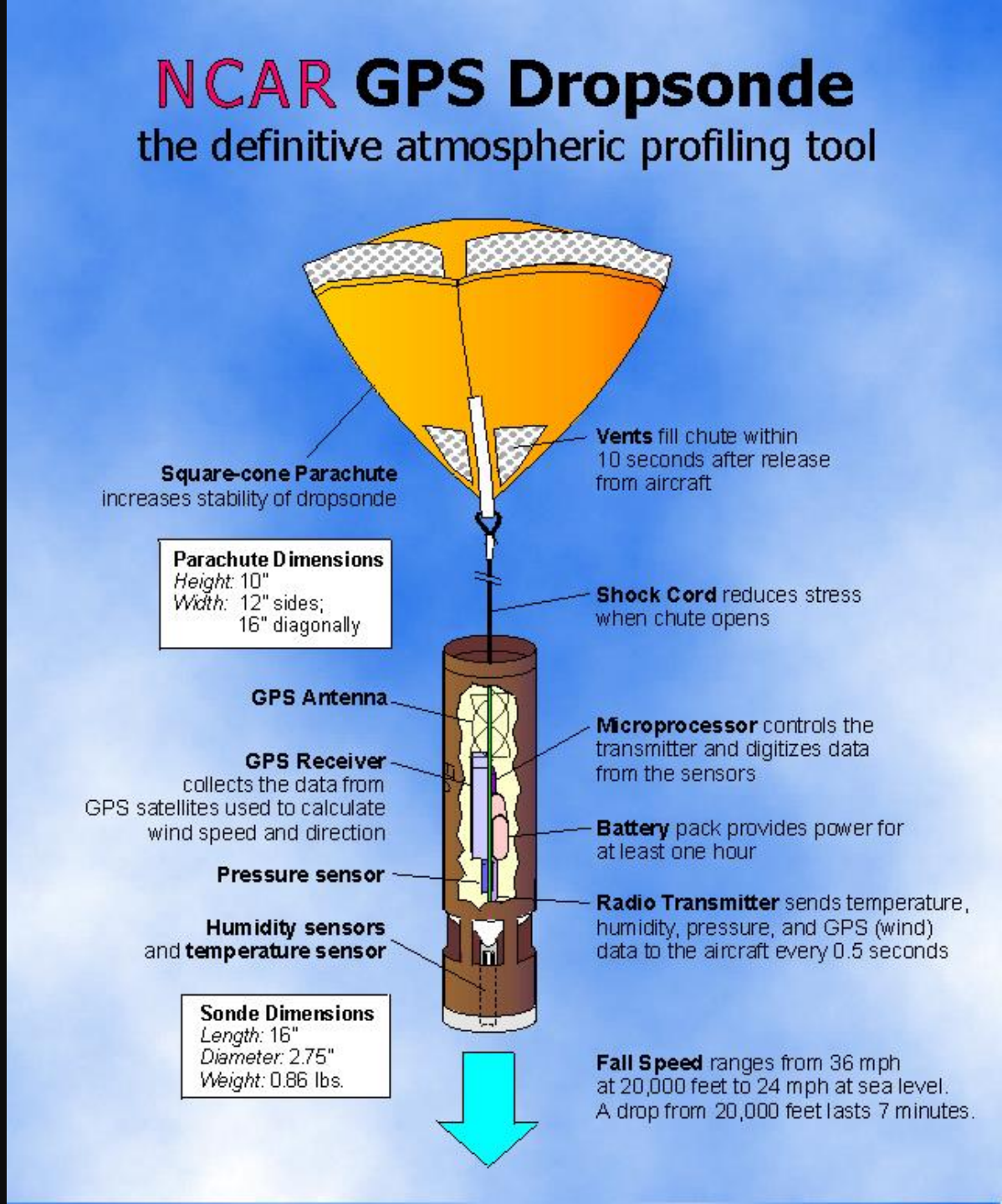


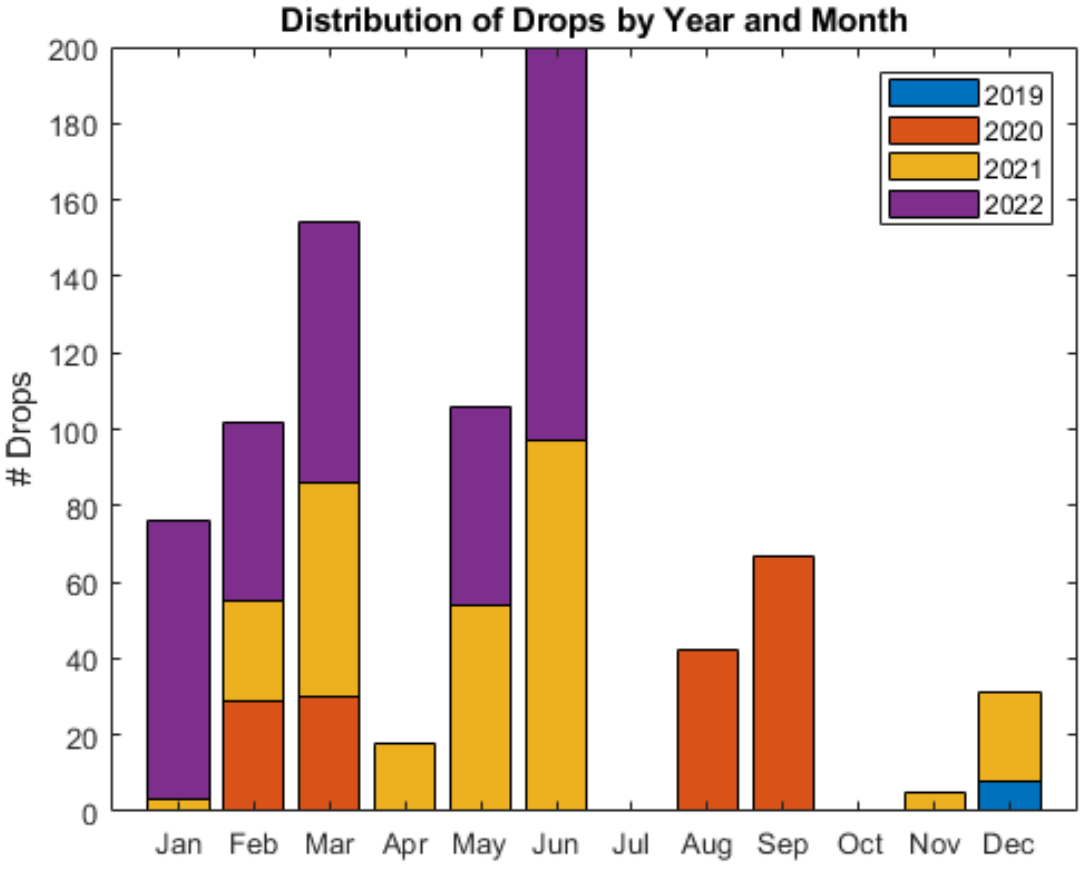
Image from the NCAR AVAPS website

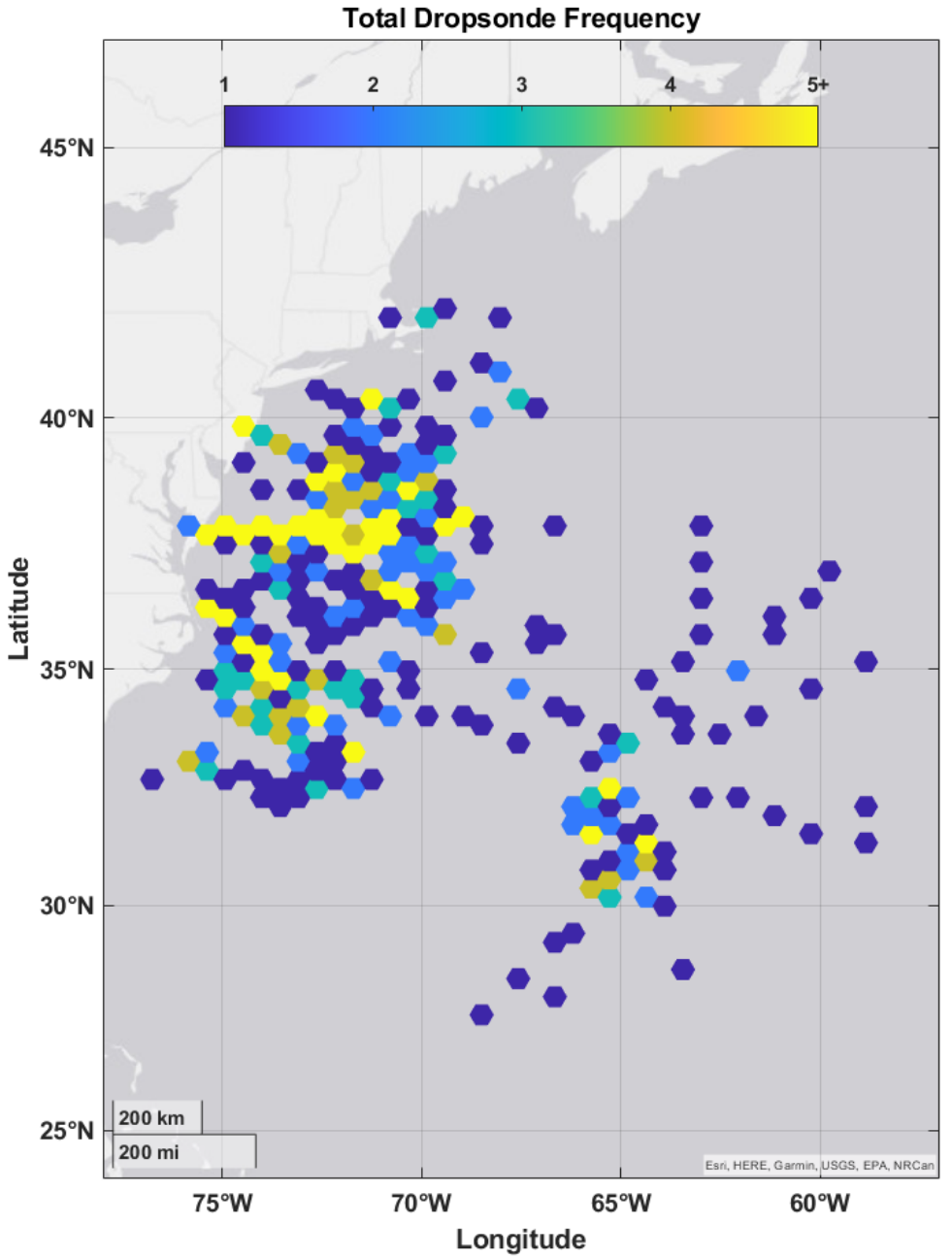
Current Data Status

- All sondes for the 2020, 2021, and 2022 ACTIVATE campaigns are available on the archive (R0)
  - The dropsonde reports are also on the archive for each deployment year (2020, 2021, and 2022). They contain information on all the sondes for that year
  - Further information about the sondes should also be present in the header of each sonde file
- Cold Air Outbreak Indices will be calculated after this meeting and should be available by the beginning of 2023
  - We can notify the team once they are available

SONDE STATISTICS

Sonde Type: nRD41 Aircraft: NASA UC-12, B200
Alt Range: 5200m-9000m (17kft-29.5kft)
Average Altitude: 8500m (28kft)





ACTIVATE STATISTICS

2020 Deployment

Sonde: nRD41 Aircraft: UC-12	Spring Deployment	Summer Deployment
Total Number of Sondes	59	108
Fast Falls	0	1
Ascent Issues	0	2
Time Sync Issues	6	2
Late Winds	0	1

2021 Deployment

Sonde: nRD41 Aircraft: UC-12	Spring Deployment	Summer Deployment
Total Number of Sondes	100	151
Fast Falls	1	2
Ascent Issues	0	1
Time Sync Issues	0	5
Lost Telemetry	1	2

2022 Deployment

Sonde: nRD41 Aircraft: B200/UC-12	Spring Deployment	Summer Deployment
Total Number of Sondes	215	155
Fast Falls	1	1
Time Sync Issues	4	0
Lost/Weak Telemetry	9	0
No Winds	4	0

Time Sync: The chassis time was not synced to the aircraft server, causing the chassis time to not match the sonde time. This interfered with the creation of the files utilized by ASPEN to QC the data.

Ascent Issues: The duration of the fall, the outputted ascent data was positive. This data was removed from archived sondes until it can be looked at in more detail.

IDENTIFICATION OF COLD AIR OUTBREAKS

Cold Air Outbreak Indices (CAOI) are utilized to identify if the conditions seen in a climate model fall into the definition of a cold air outbreak

There are a couple different methods used to calculate this value, the general equation is:

$$M = \theta_{SKT} - \theta_P$$

Where θ_{SKT} is the sea surface skin potential temp and θ_P is the dry potential temperature at "p" pressure

M > 0 defines an unstable lower troposphere, CAO conditions

Kolstead-Bracegirdle et al. 2008

$$\frac{\Delta\theta}{\Delta p} = \frac{\theta_{\mathrm{SKT}} - \theta_{700}}{\mathrm{SLP} - p_{700}}$$

Fletcher et al. 2016

$$\theta_{SKT} - \theta_{800}$$

Papritz et al 2015

$$\theta_{SKT} - \theta_{850}$$

Papritz et al 2019

$$\theta_{SKT} - \theta_{900}$$

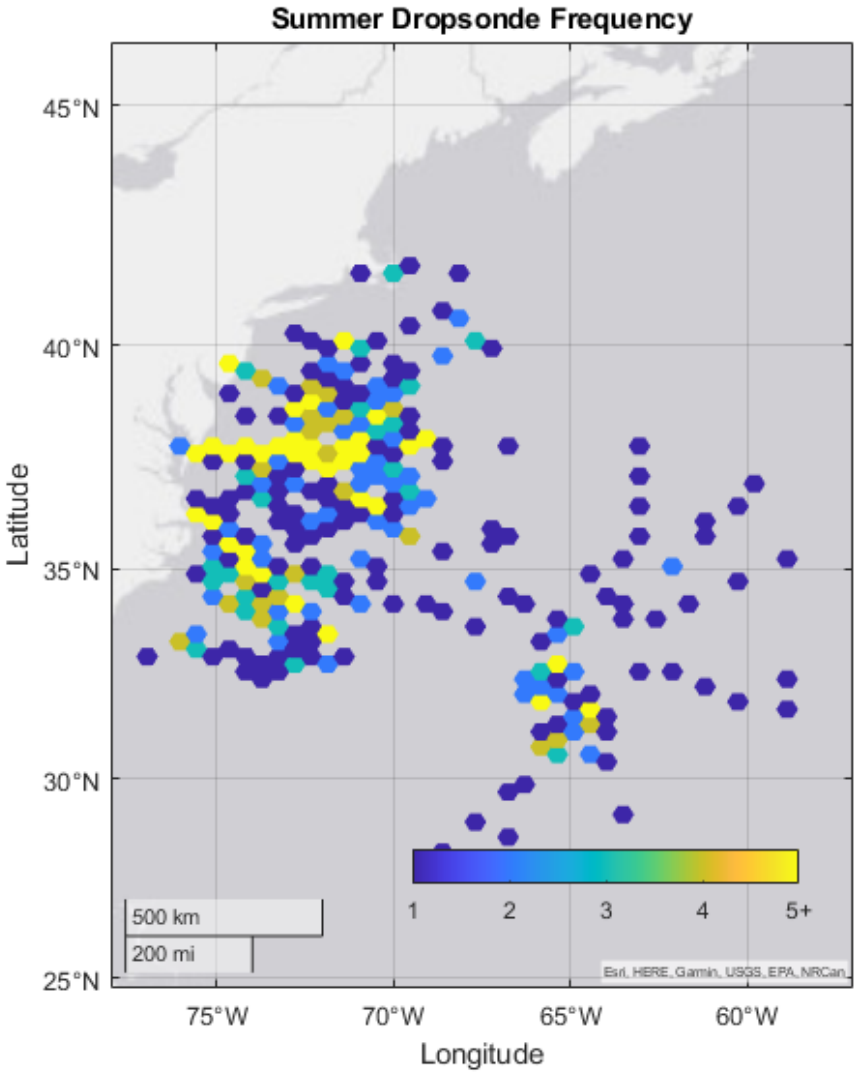
Work completed by Michael Shook

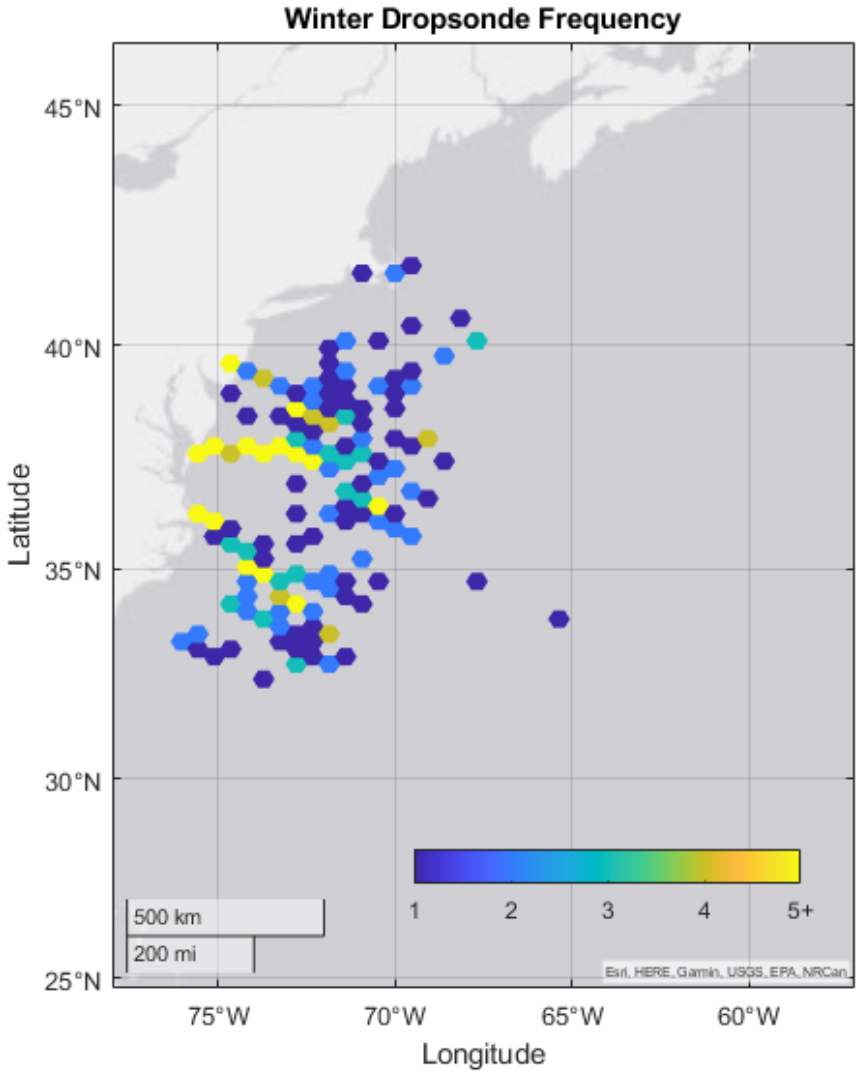
INCORPORATING THE DROPSONDE DATA

- Instead of utilizing models to obtain the potential temperature at the chosen pressure altitude, the dropsonde data was incorporated to get this value
- Sea Surface Skin temperature was obtained from Physical Oceanography Distributed Active Archive Center (podaac) GHRSST model
- Calculated M for each methodology used in the mentioned papers and created a excel file to easily visualize values
- Currently in the works, goal is to release the CAOI product by early 2023

Thank you to everyone involved with the Dropsondes!

Any Questions?





Extra Slides, Dropsondes per Season