Variability of Ice Supersaturation, Nucleation, and Cirrus in TTL Vertical Layers

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Introduction

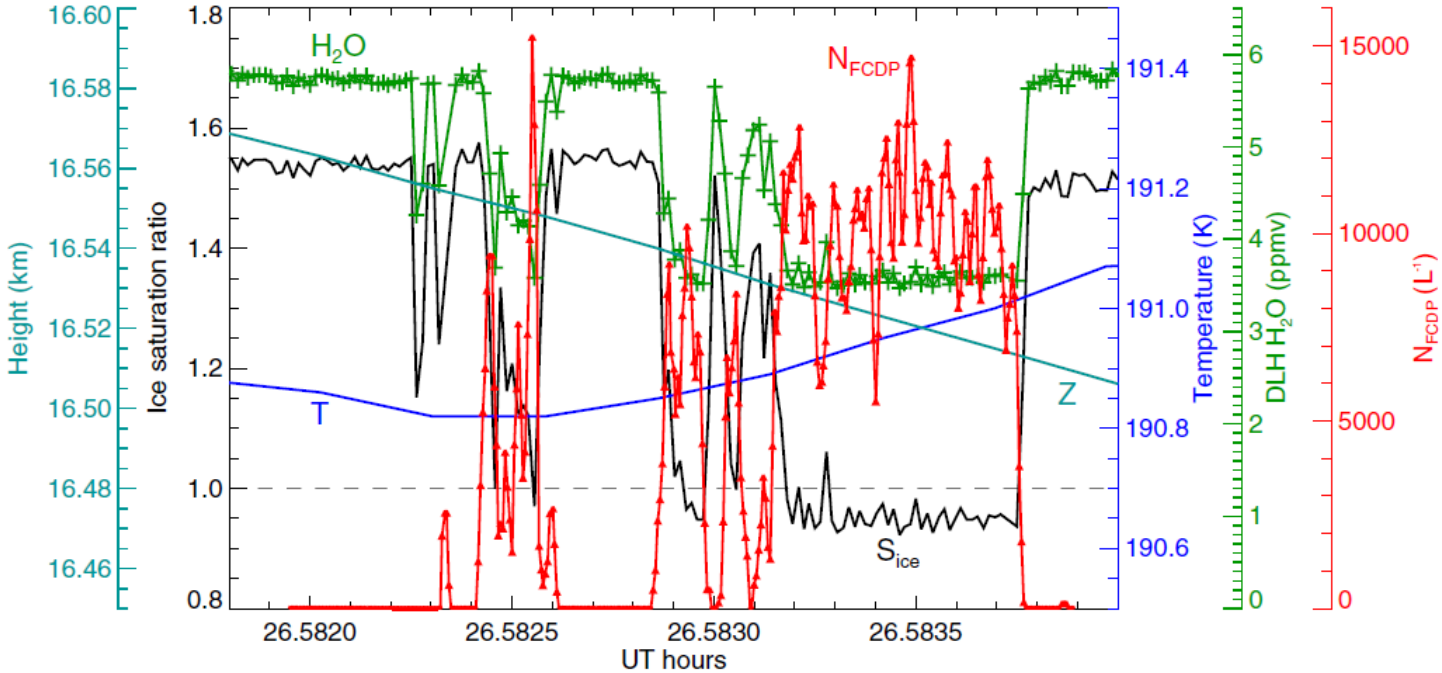
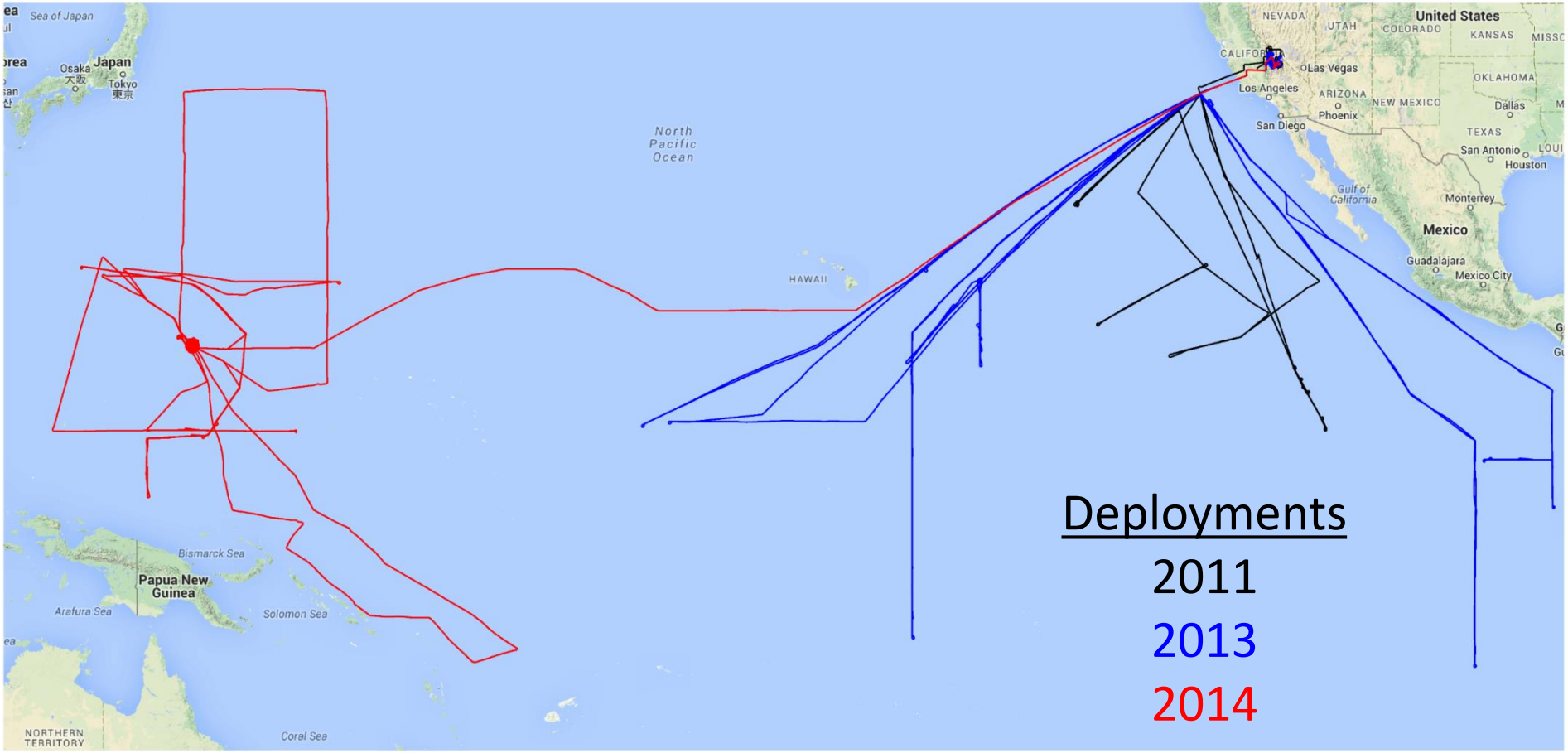


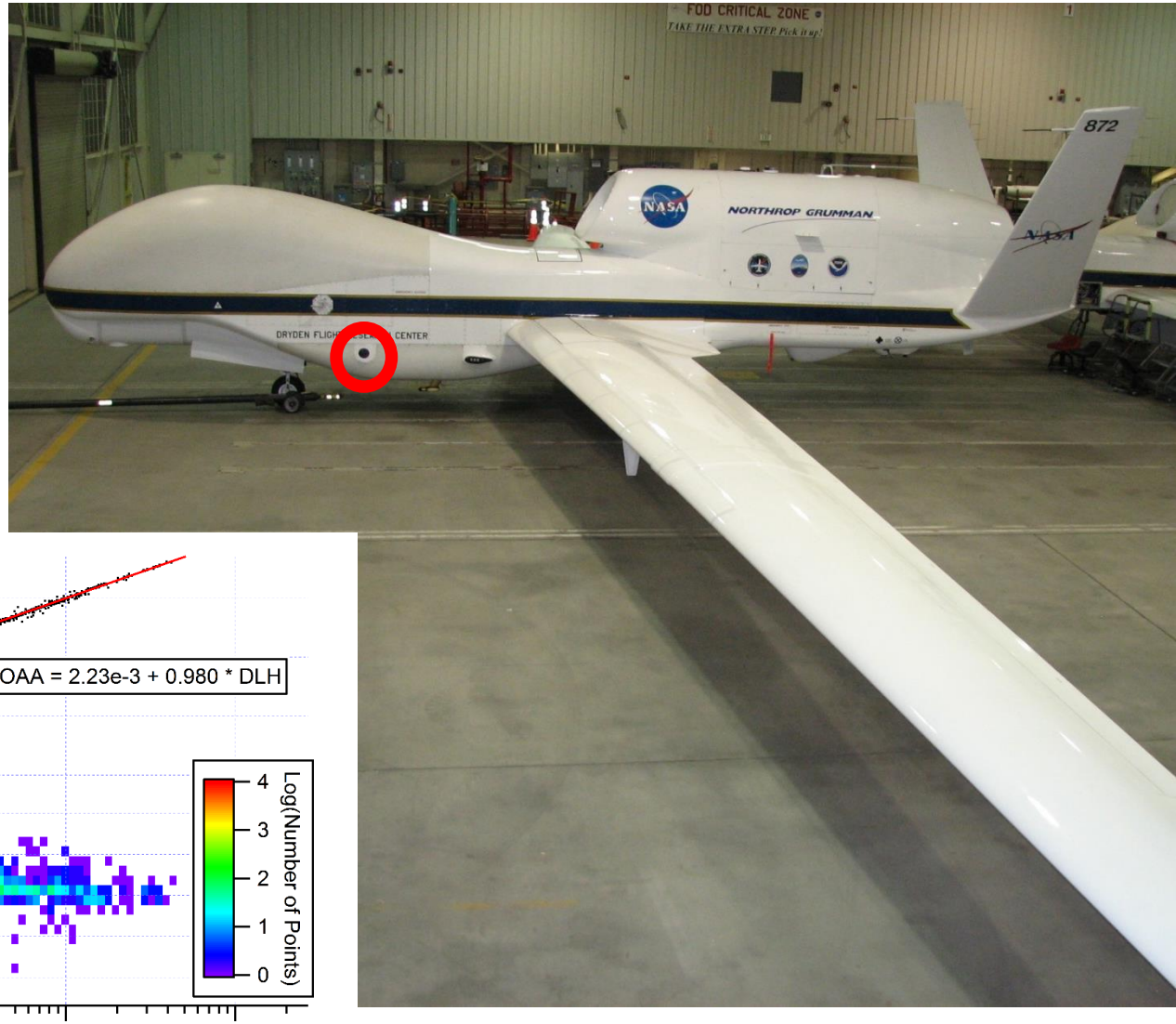
Figure from Jensen et al., PNAS, 2013.

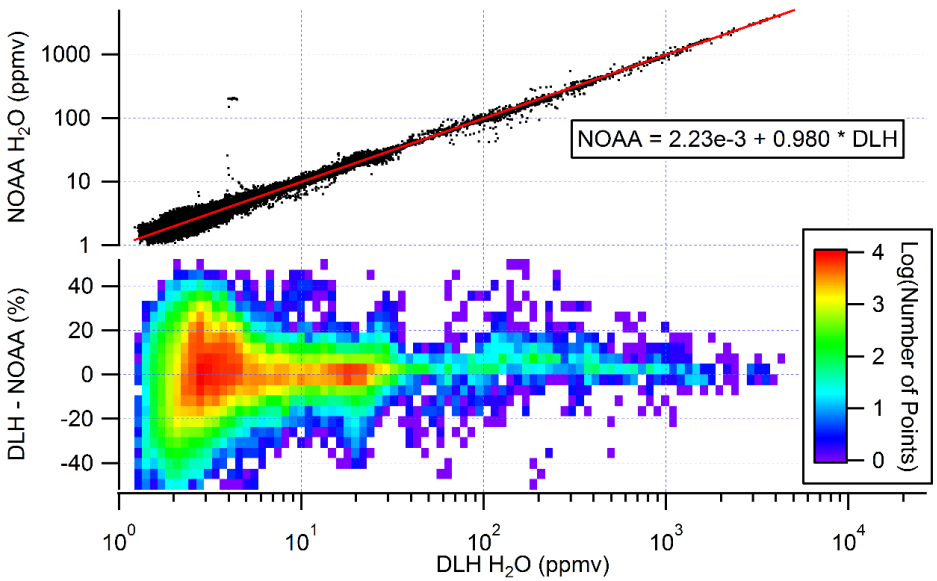
ATTREX


Sea of Japan
Osaka
Japan
Tokyo
North Pacific Ocean
HAWAII
NEVADA
UTAH
COLORADO
United States
KANSAS
CALIFORNIA
Las Vegas
Los Angeles
ARIZONA
NEW MEXICO
OKLAHOMA
Phoenix
San Diego
Dallas
TEXAS
San Antonio
Houston
Gulf of California
Monterrey
Mexico
Guadalajara
Mexico City
Bismarck Sea
Papua New Guinea
Arafura Sea
Solomon Sea
NORTHERN TERRITORY
Coral Sea
Deployments
2011
2013
2014

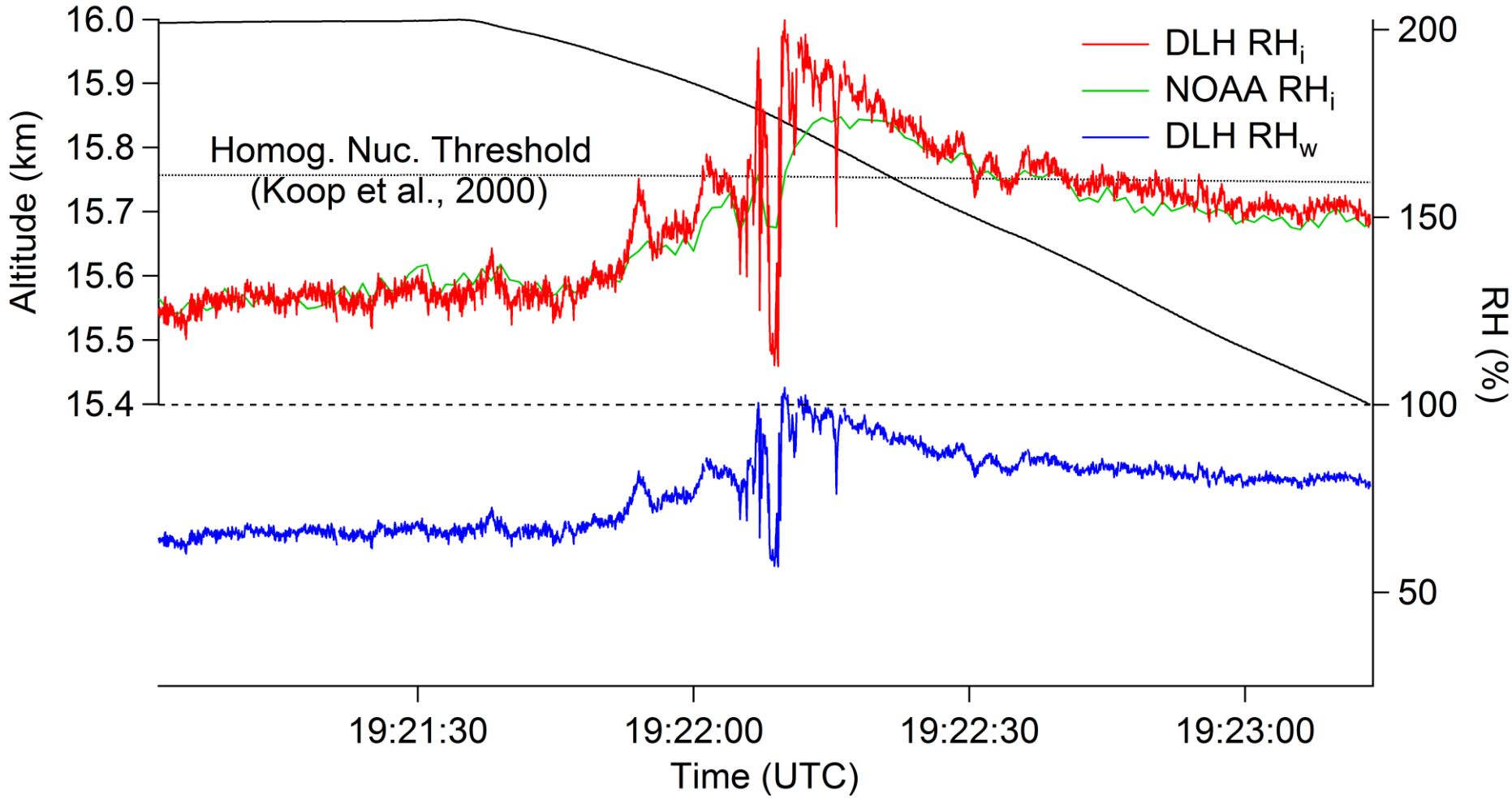
Diode Laser Hygrometer

- Particpated in ATTREX 1, 2, & 3
- Open-path measurement
- 100 Hz sampling
- 1-2 m vertical res.

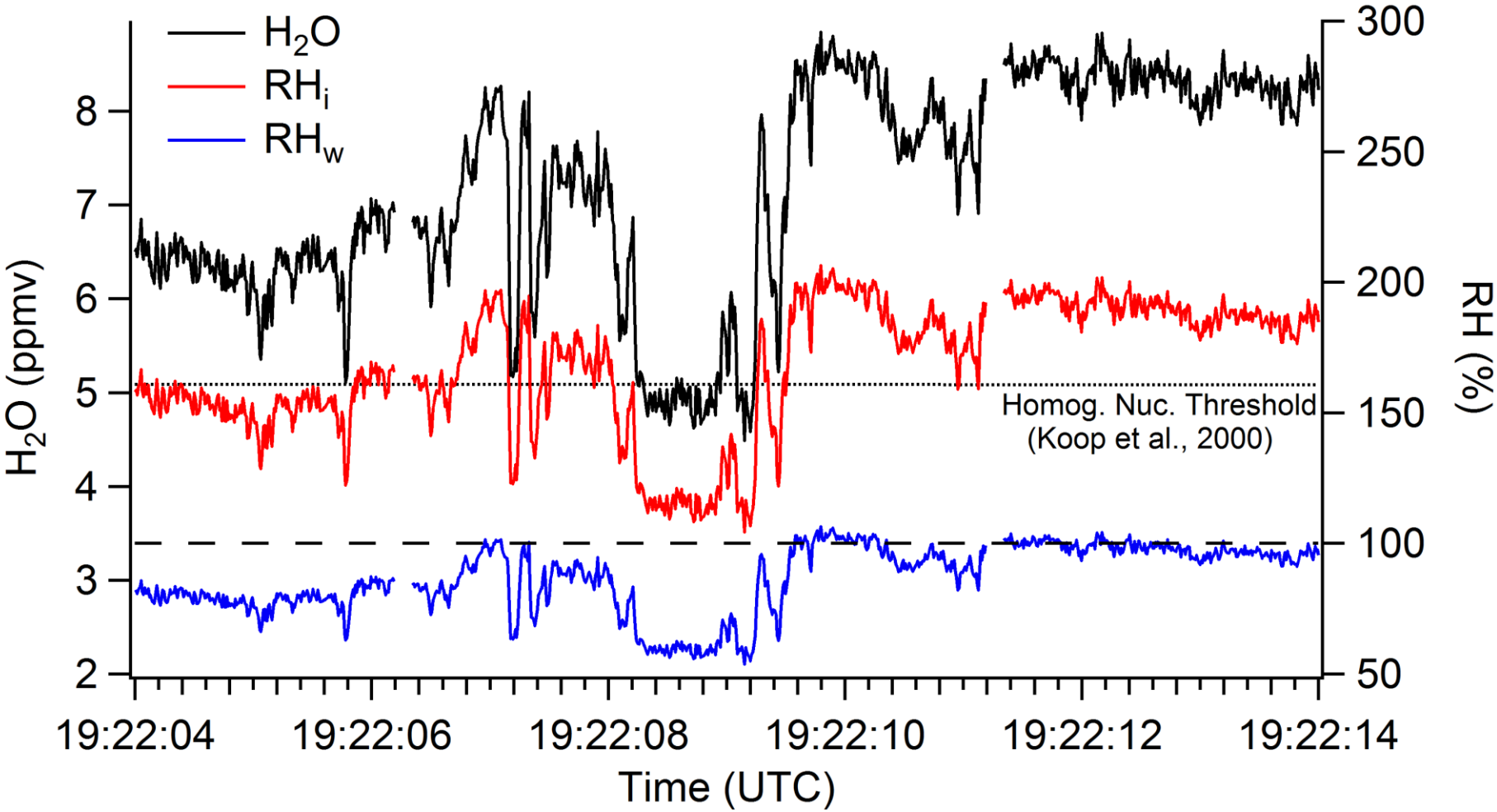




Thin Layer Event: 16 Feb 2014



Thin Layer Event: 16 Feb 2014



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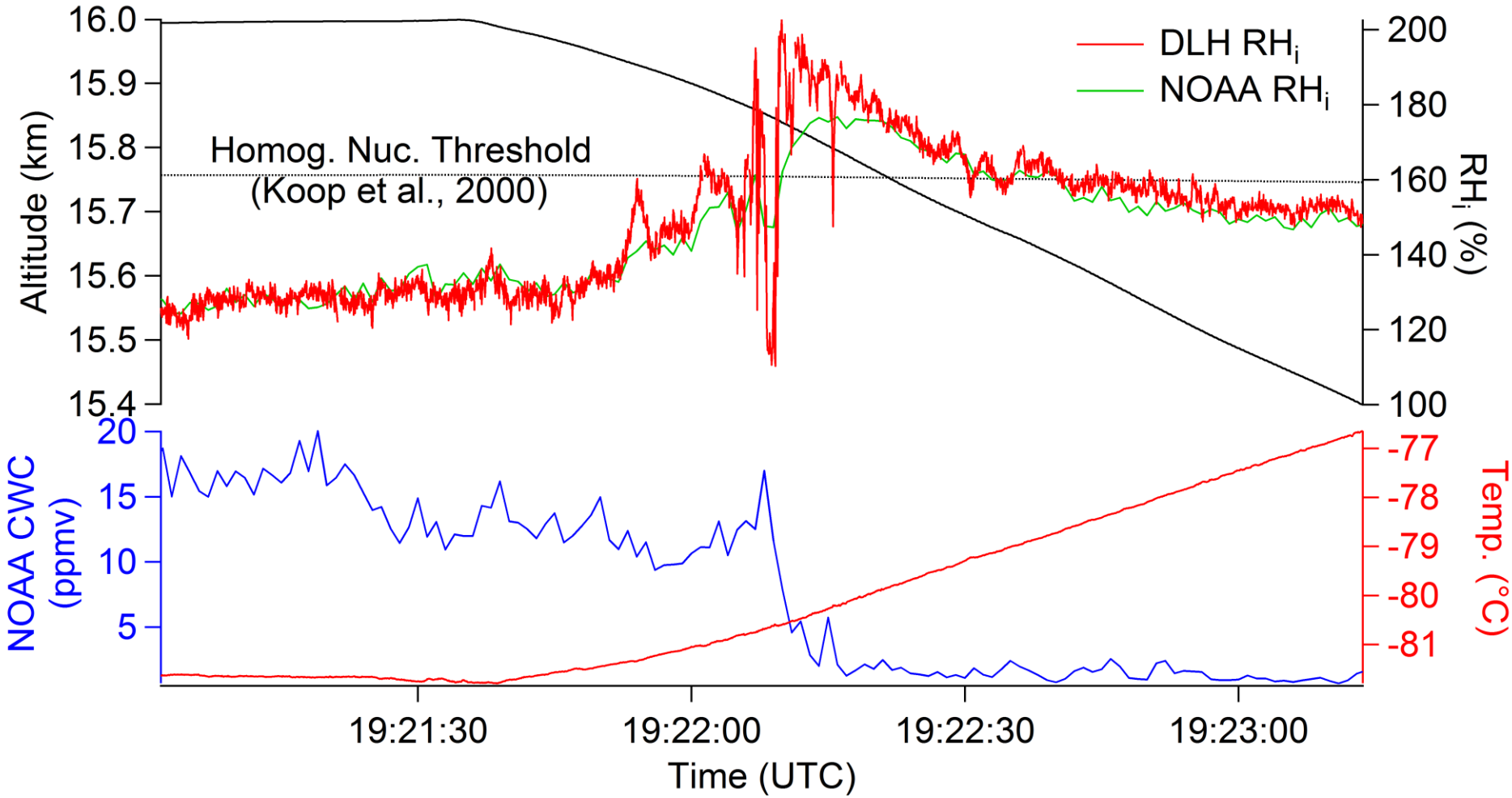

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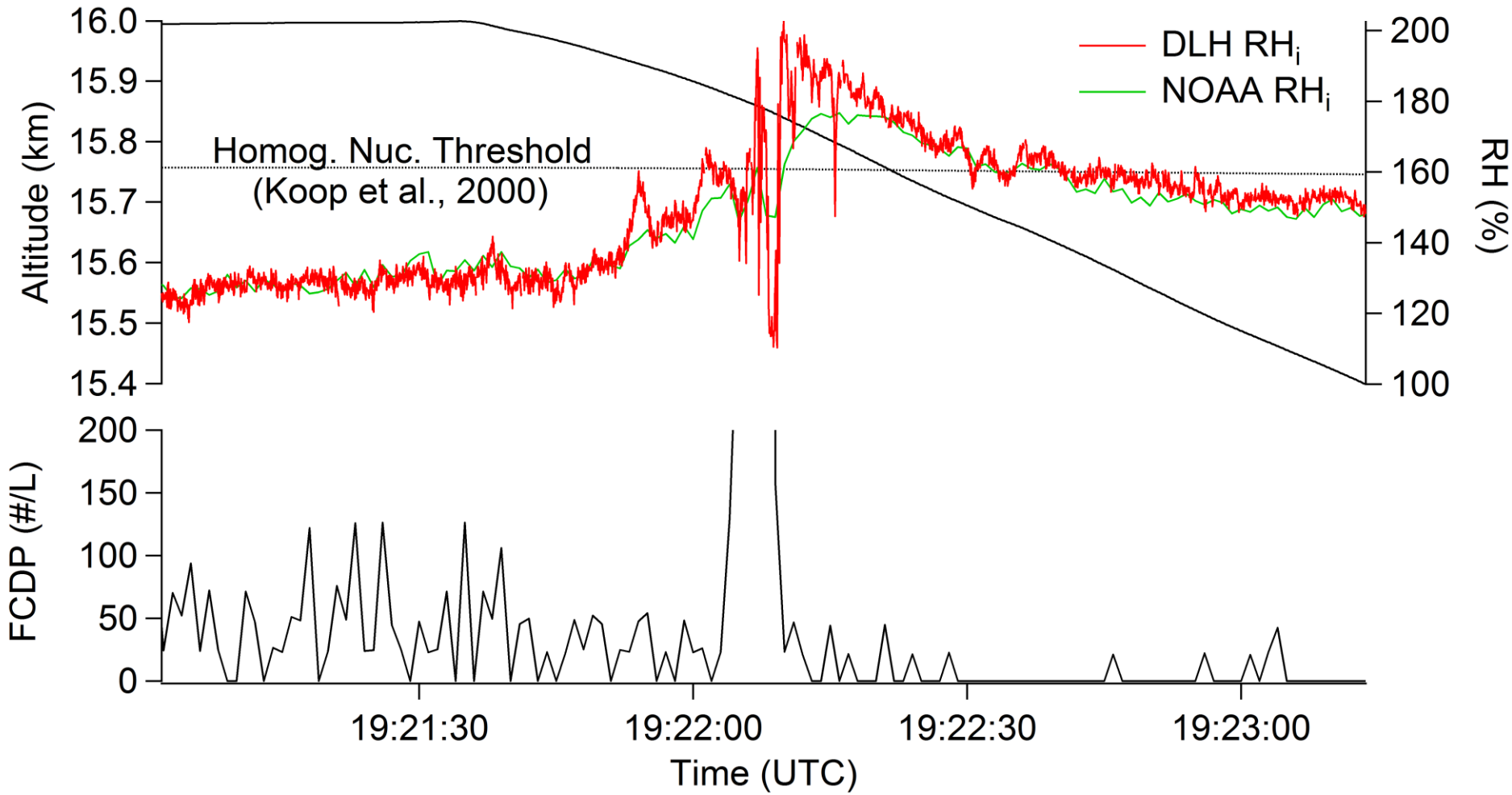

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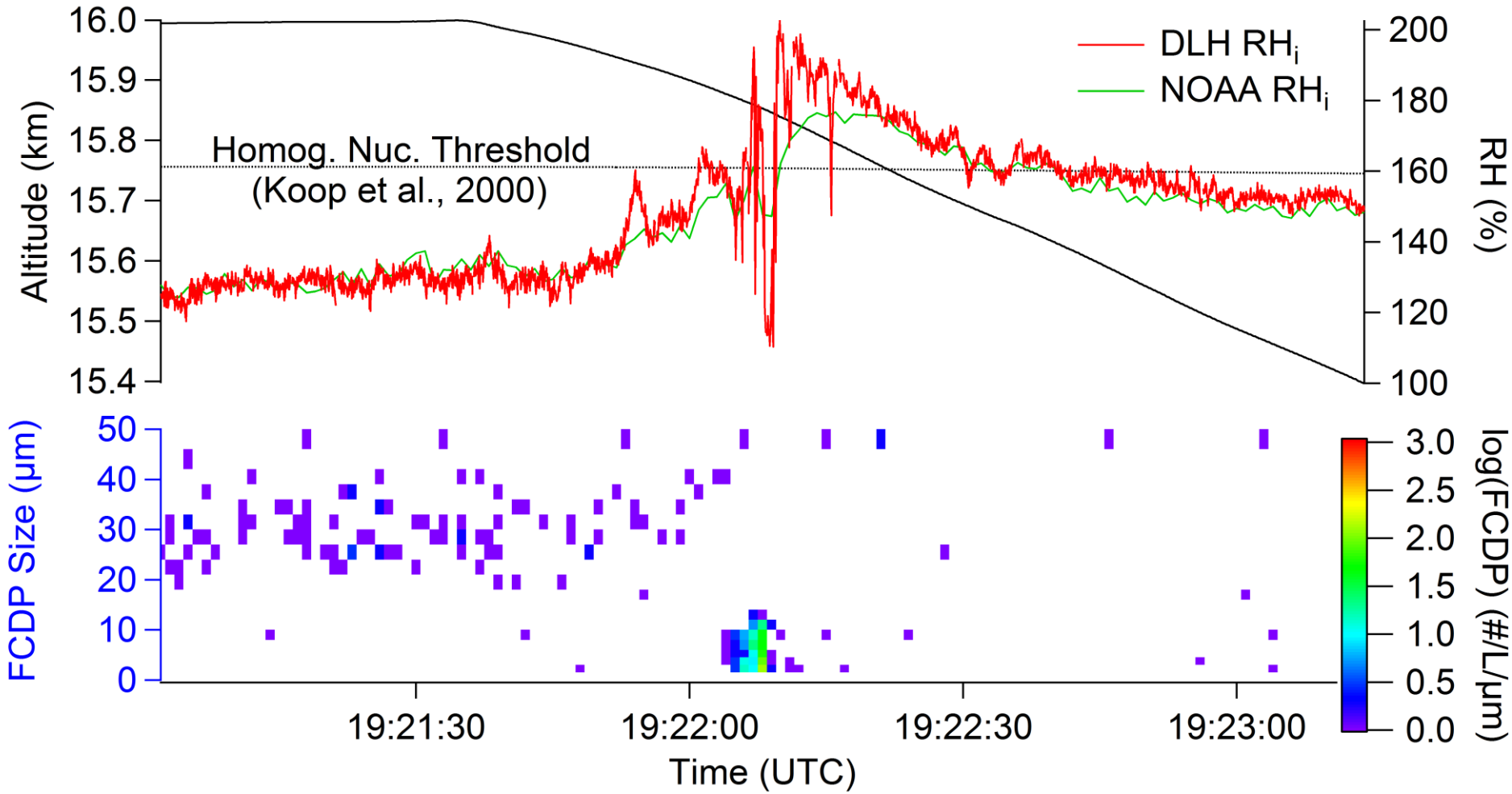


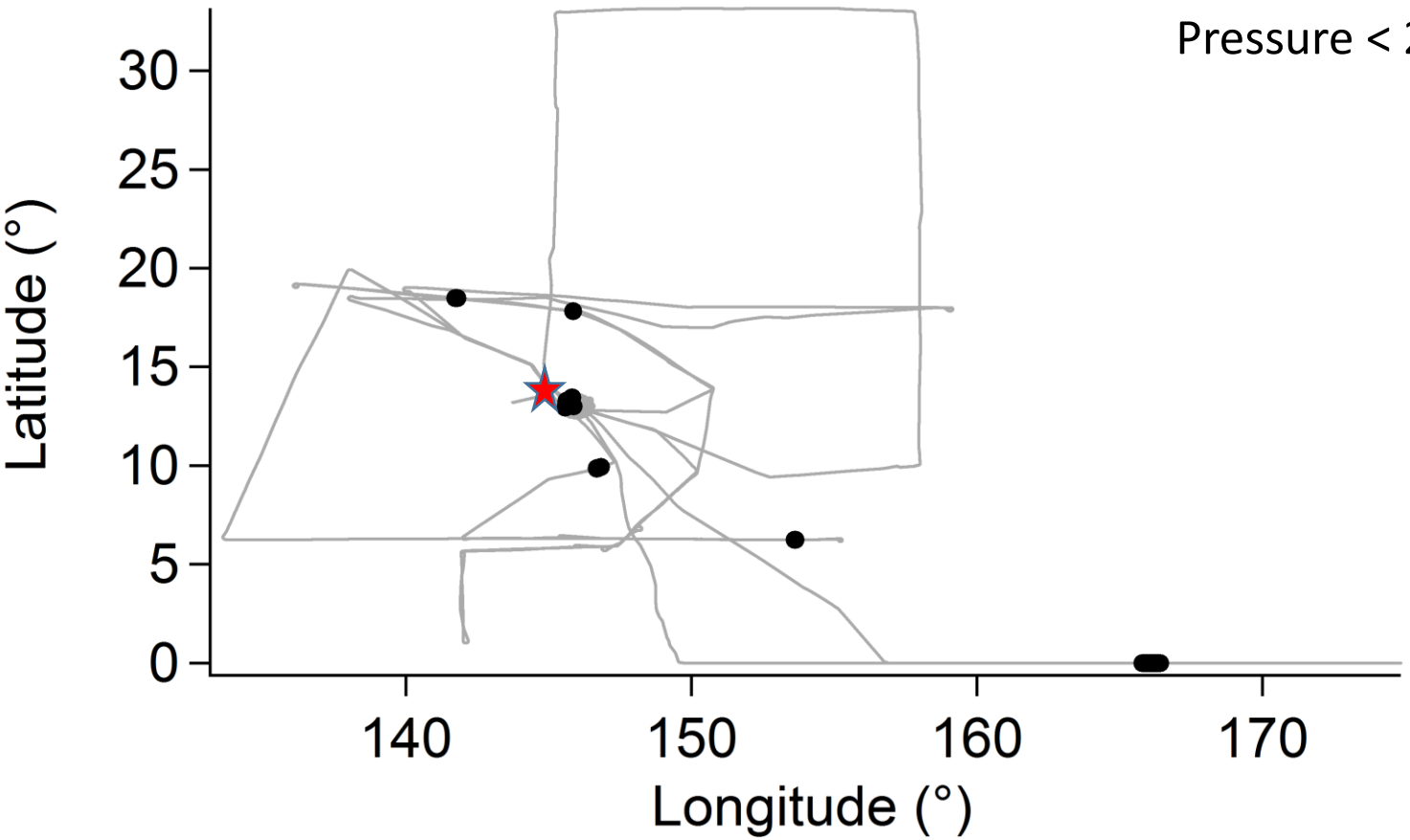
Layer Characteristics

<u>Filter Parameters</u>

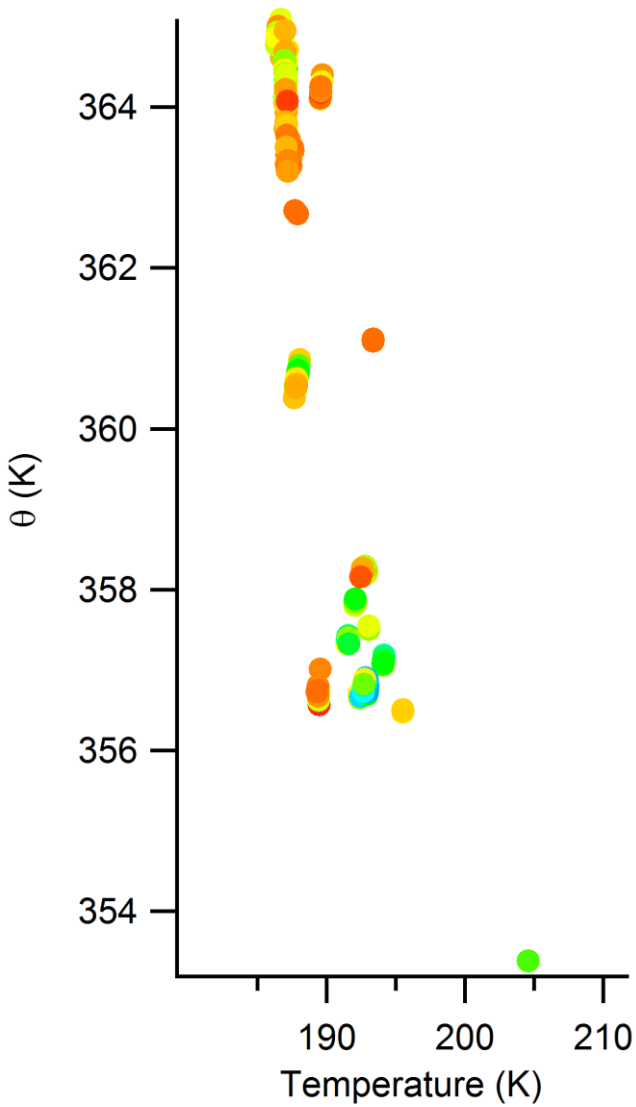
FCDP Total Conc. > 1000/L

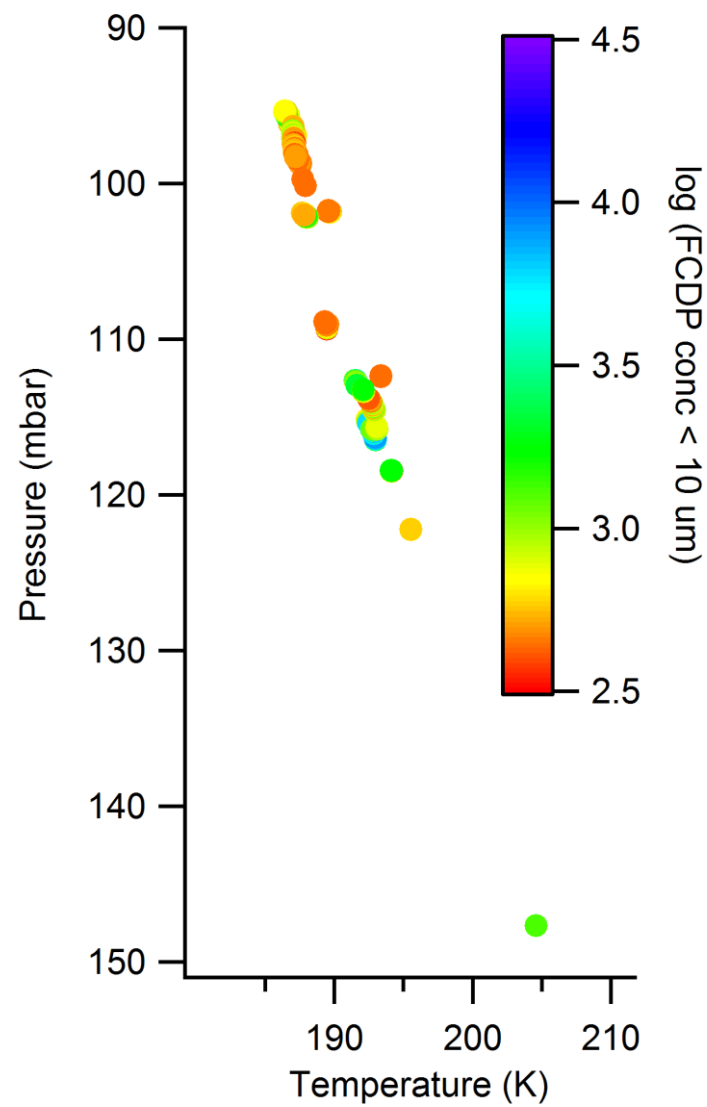
FCDP < 10 um Conc > 50% of Total Conc.

Pressure < 200 mb

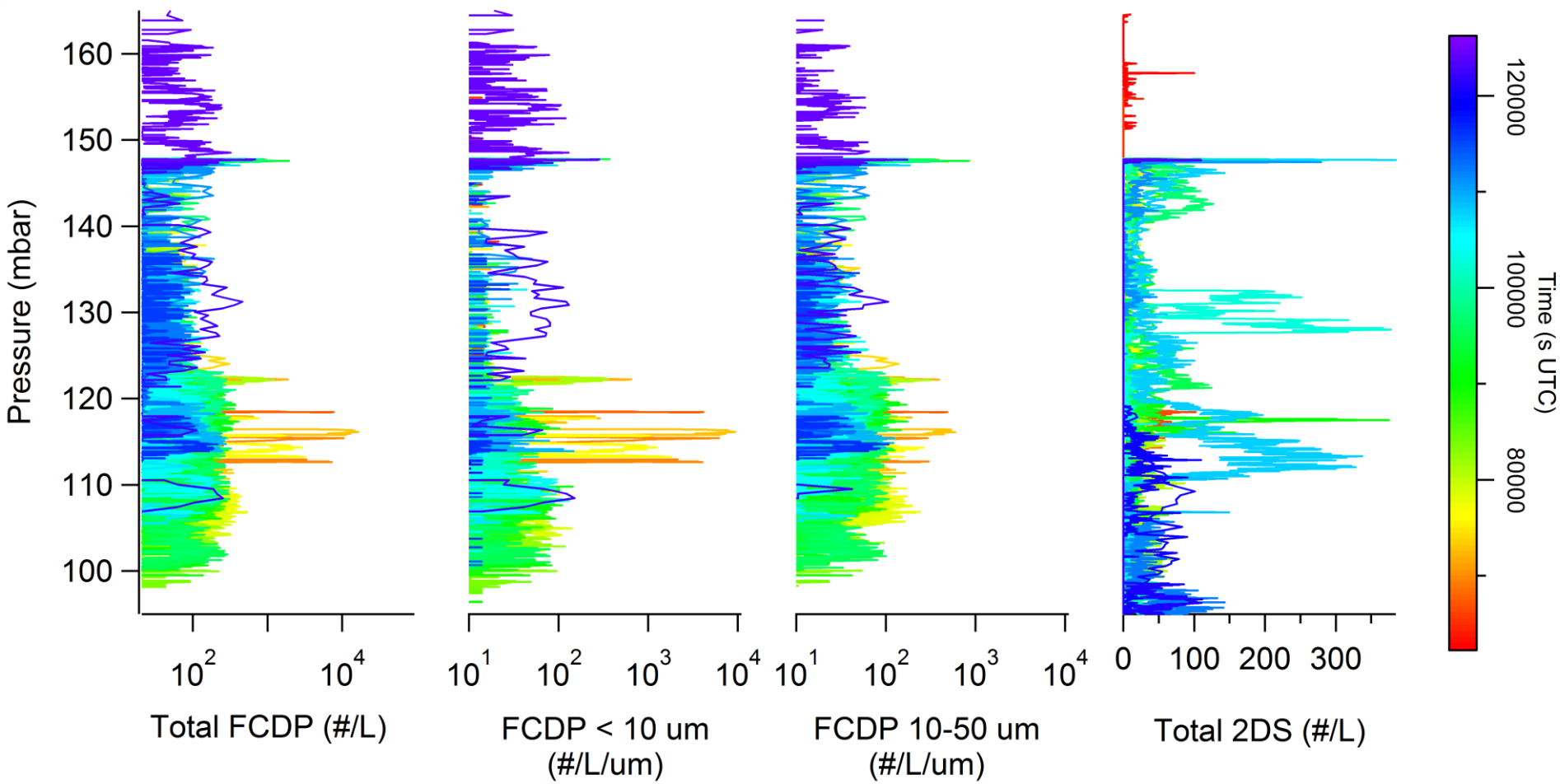


Layer Characteristics

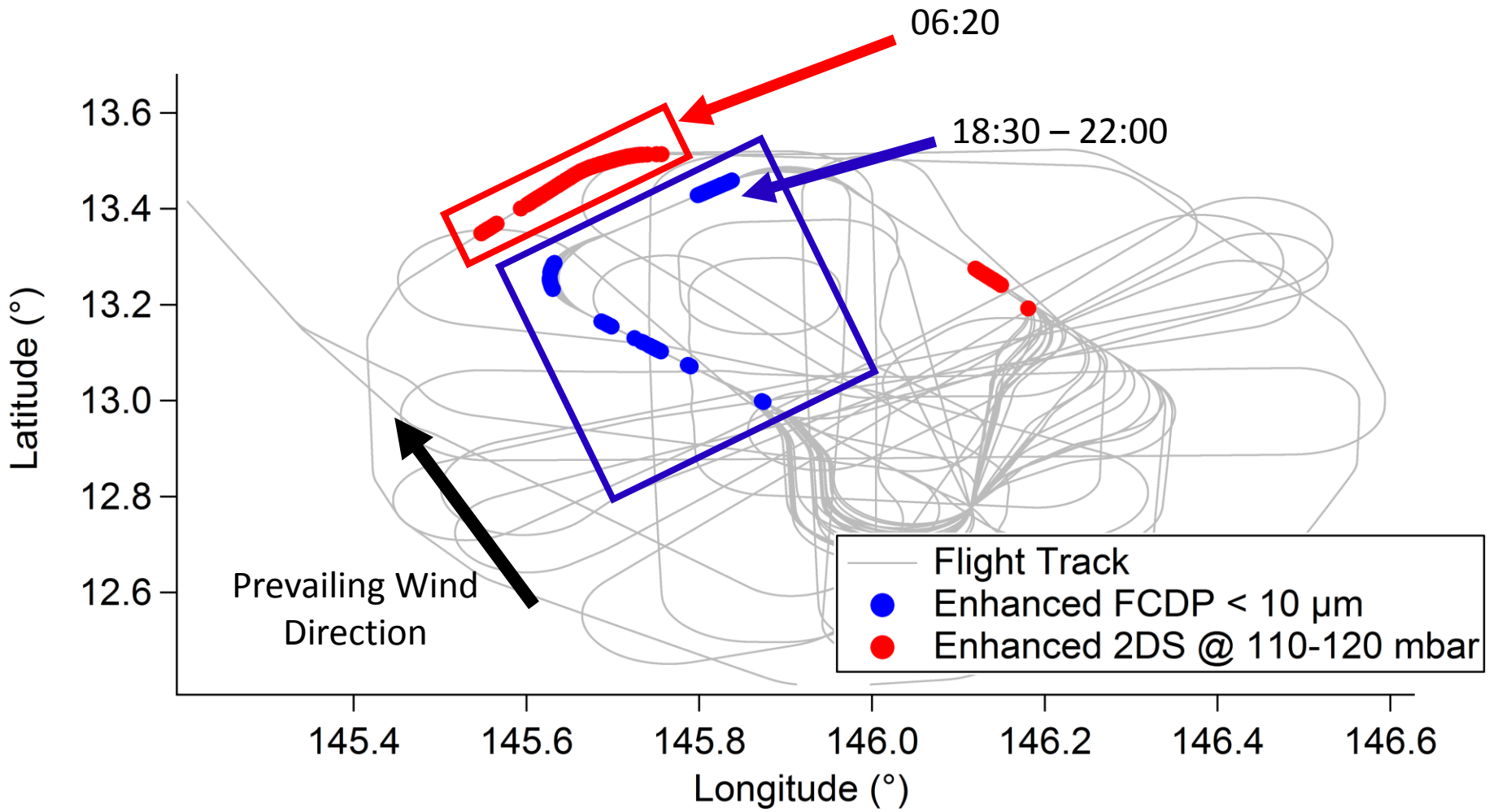




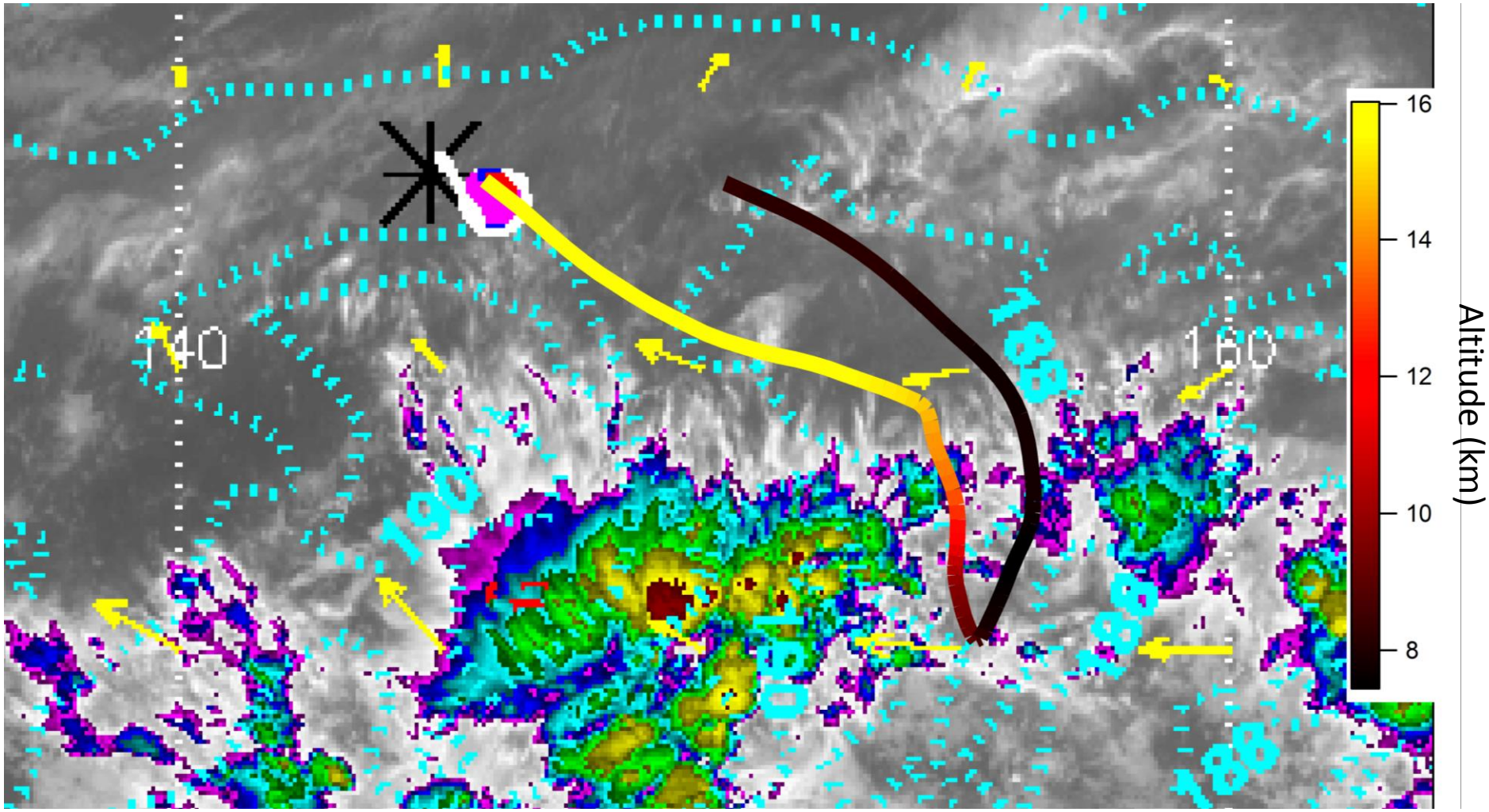
16 Feb 2014 Layers



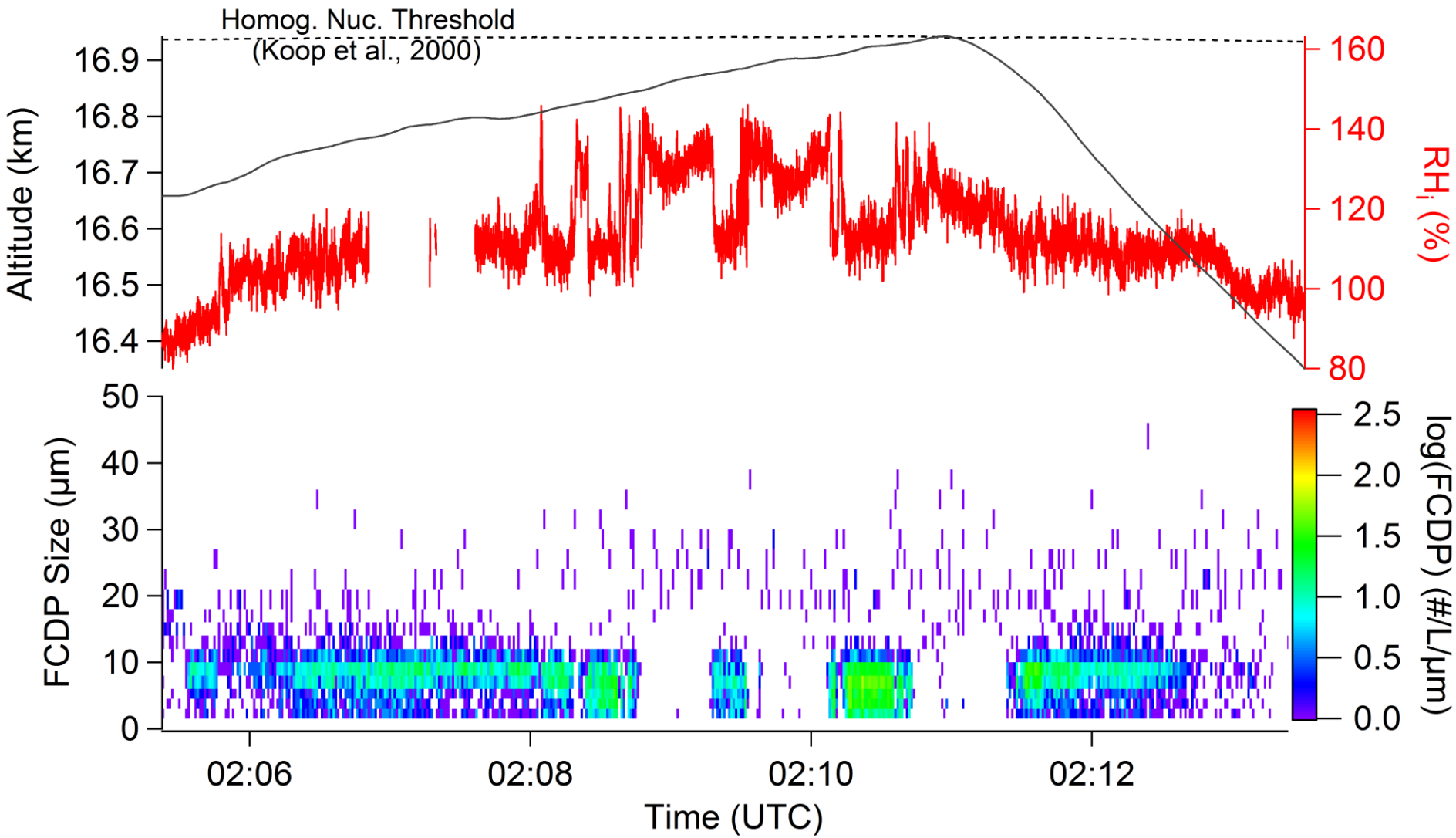
16 Feb 2014 Layers



16 Feb 2014 Layers



09 Mar 2014 Layers



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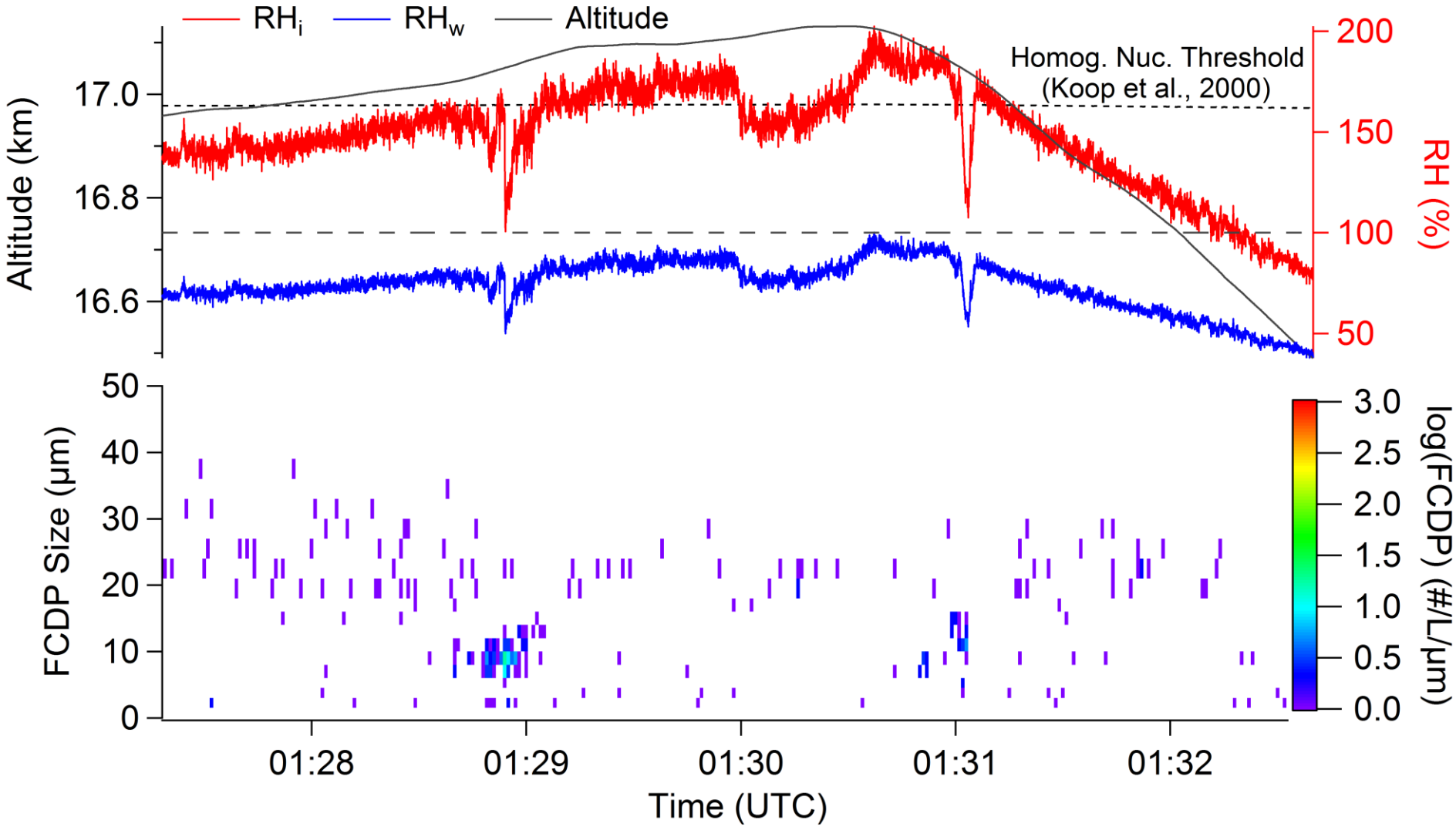

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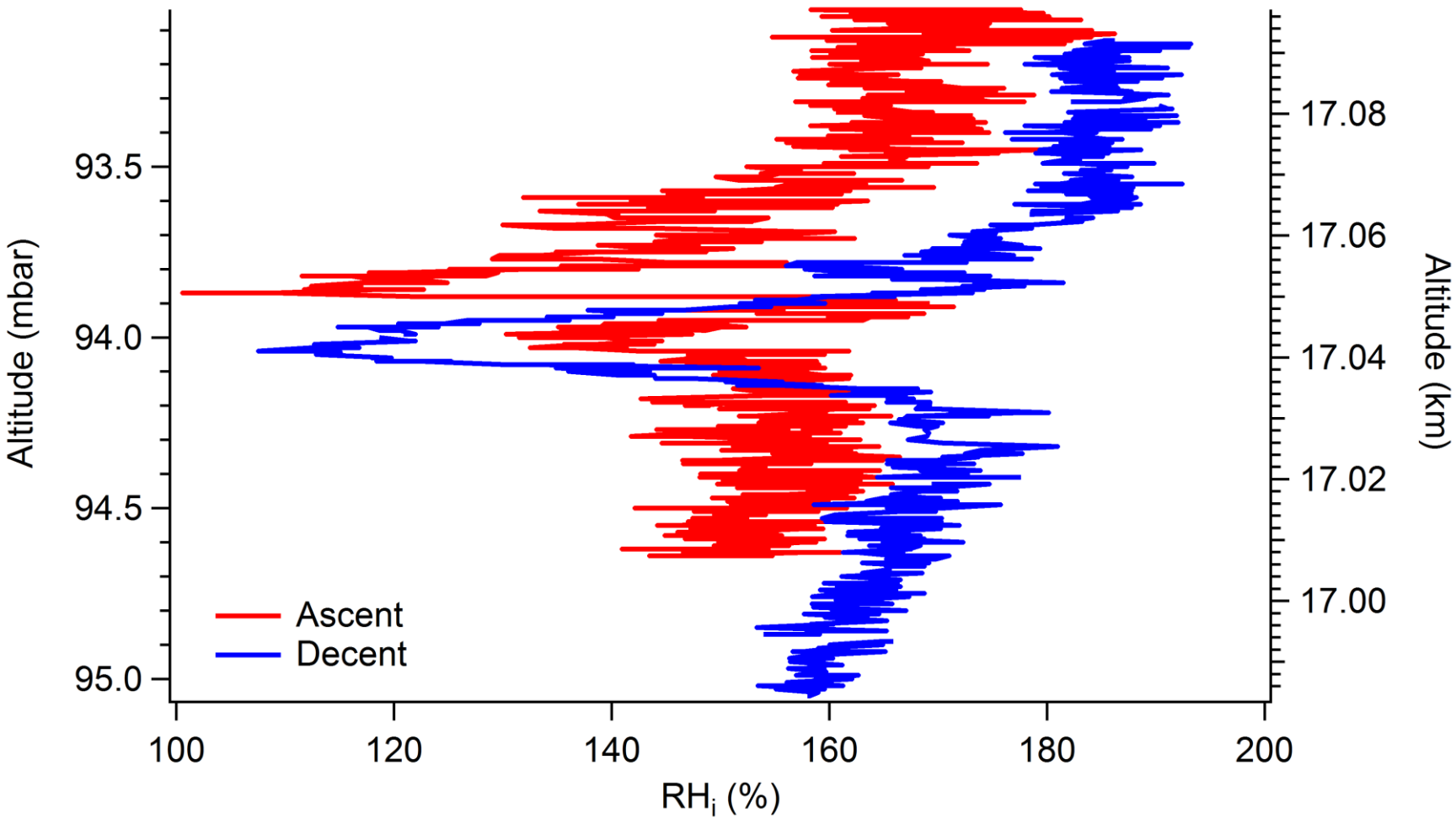

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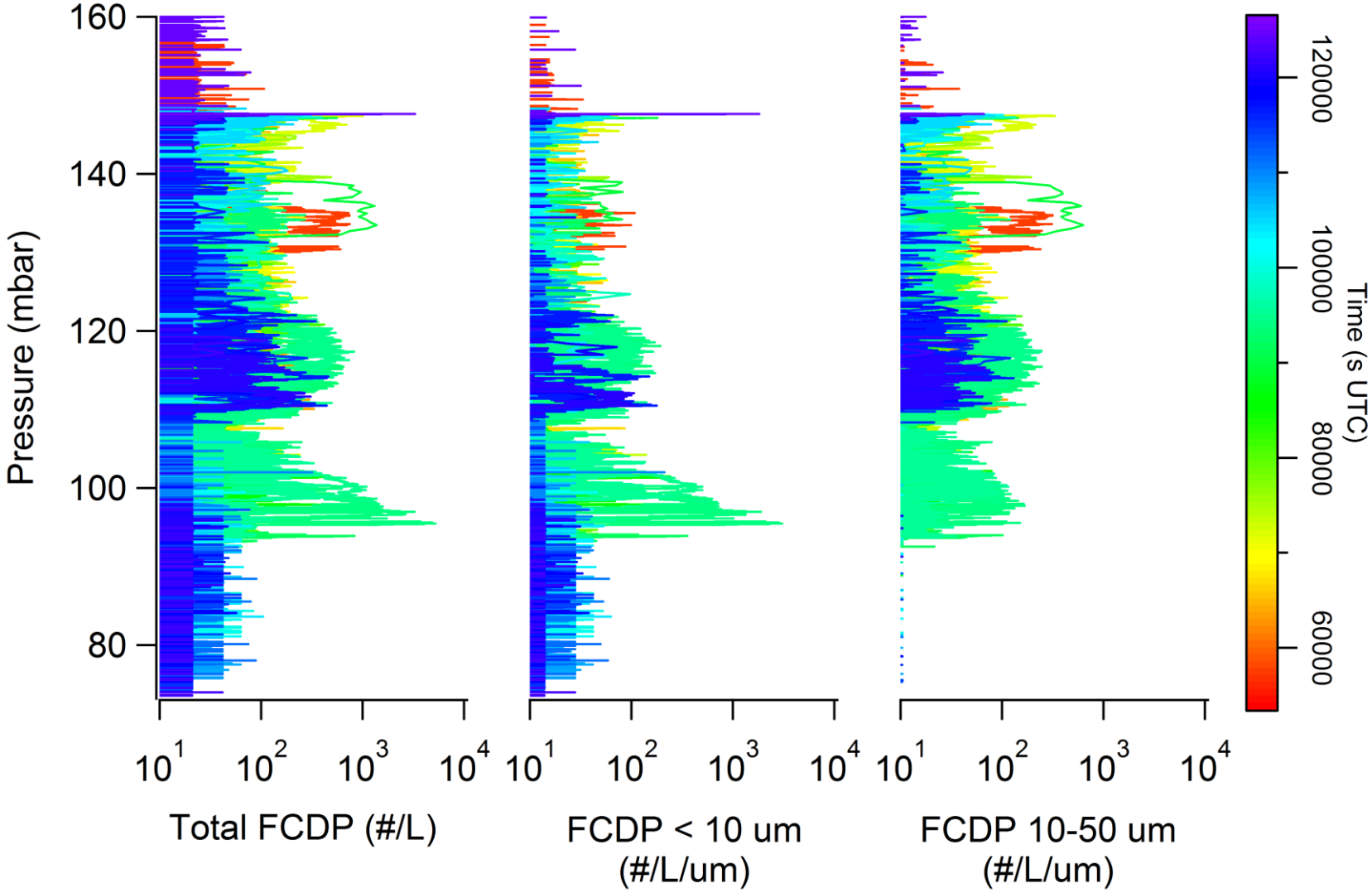

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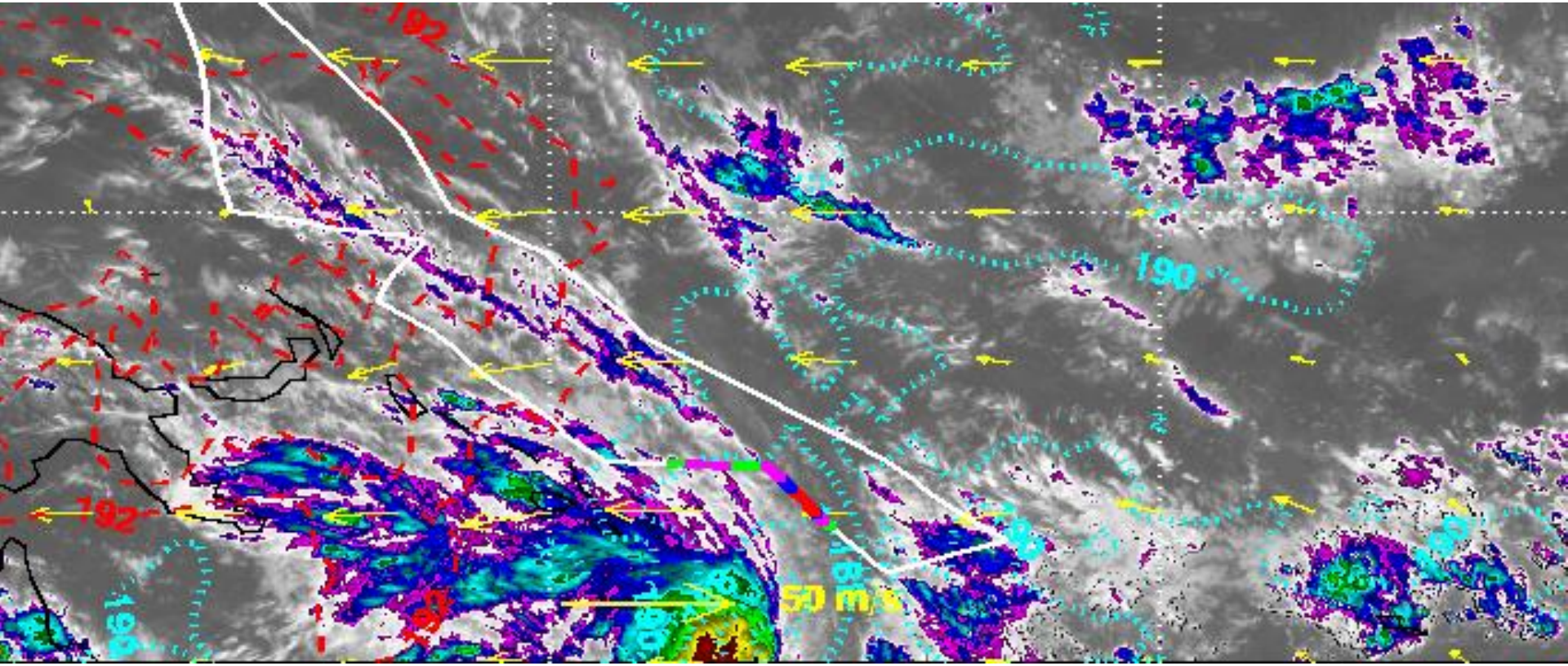

Summary

- Further evidence of thin dehydrated layers with large ice particle concentrations
  - Particle sizes typically < 10 um in these layers
- Evidence of persistence over
- Potential convection relationship identified, but more evidence needed

- Future Work
  - Investigate convection tracers to further explore source of thin layer airmasses
  - Repeat analysis with 2013 ATTREX deployment
  - Examine statistics of layer vertical thickness