

Introduction to Recent University of Colorado Boulder sUAS Activities

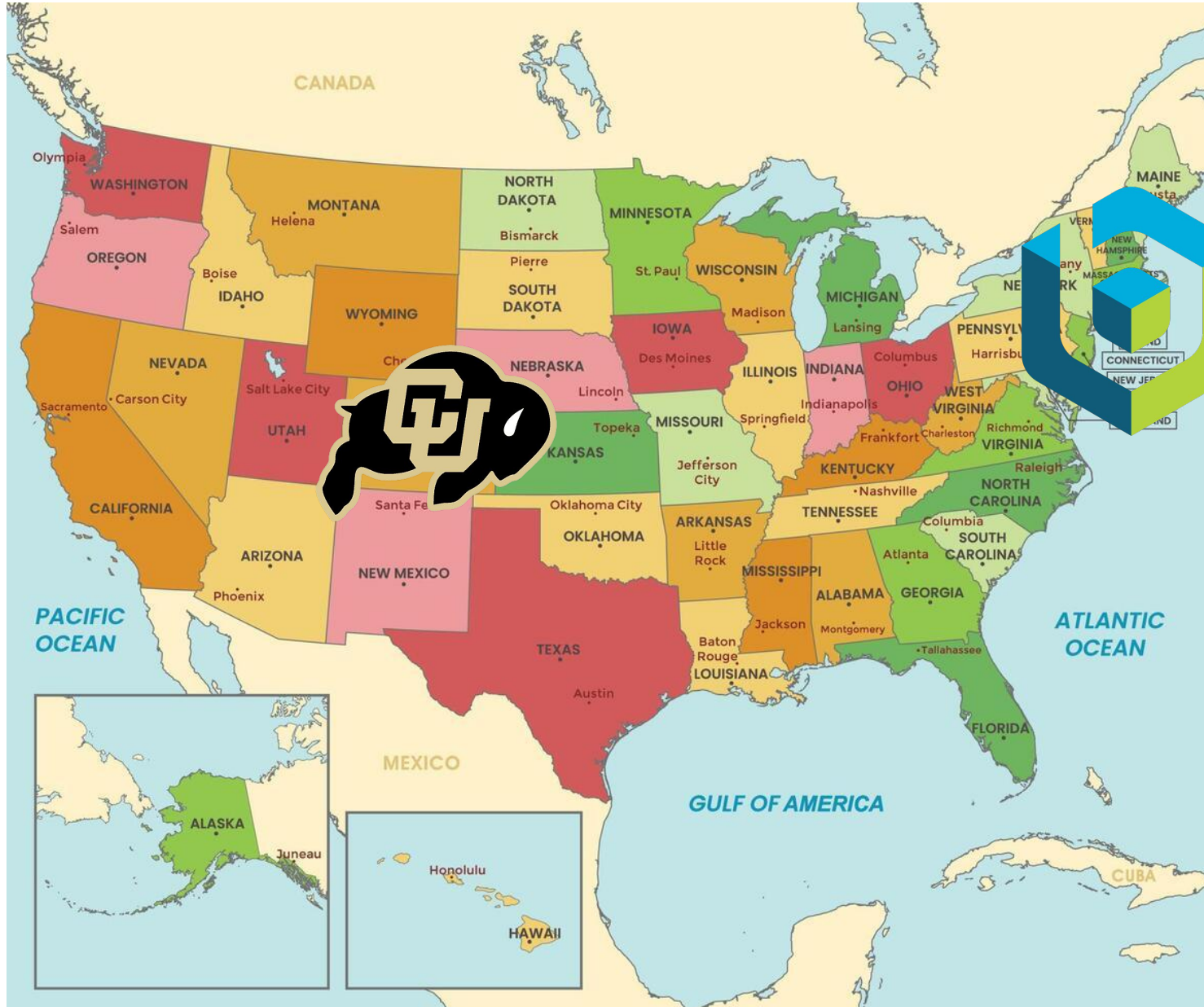


Gijs de Boer



Brookhaven
National Laboratory

Recent Transition



Current Position:

Chair

Environmental and Climate Sciences

Department

Brookhaven National Laboratory

Previous Position(s):

Senior Research Scientist

CIRES

Director for National Laboratory

Partnerships

RIO

Associate Director for Science

IRISS

University of Colorado Boulder

Boulder sUAS Community of Practice



B. Argow



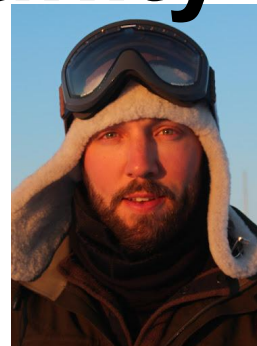
E. Frew



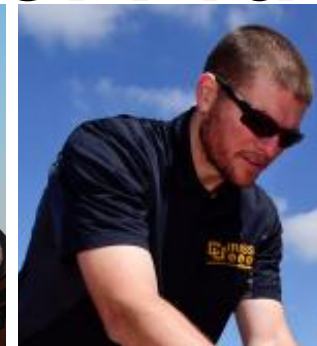
S. Borenstein



J. Intrieri



B. Butterworth



M. Rhodes



R.



J. Osborn



J. Cassano

G. Hamilton



J. Hamilton



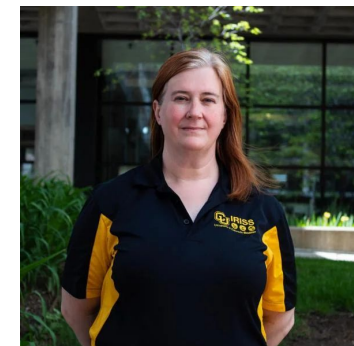
T. Thornberry



E. Asher



D. Lawrence



L. Clayton
Recent

Partnerships:



Brookhaven
National Laboratory

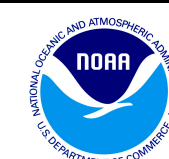


University of Wisconsin
Eau Claire



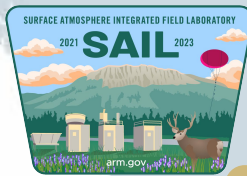
TU Delft

UNIVERSITY OF
Nebraska
Lincoln

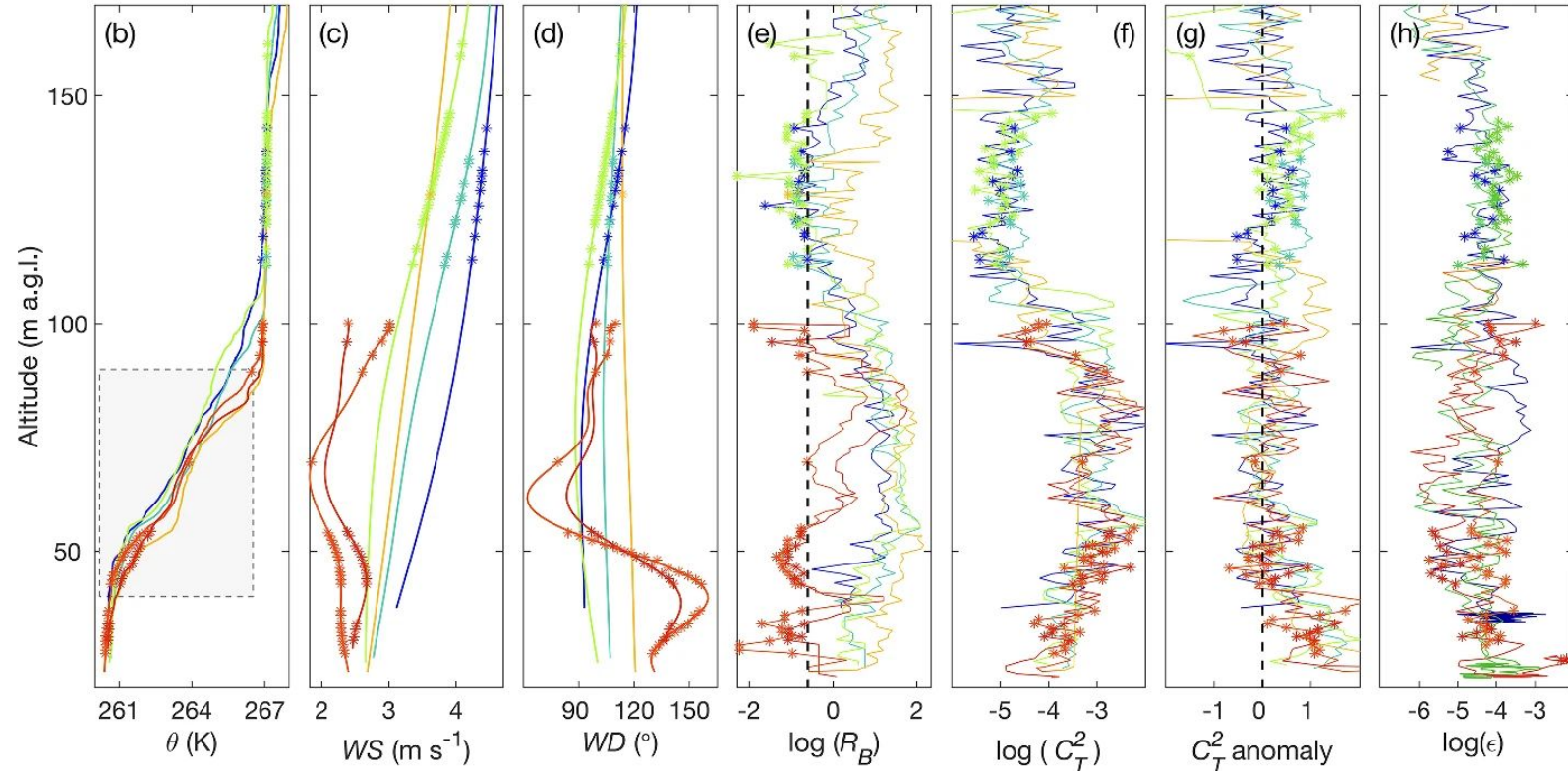
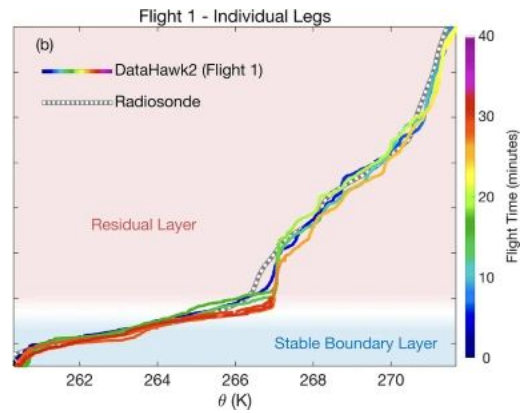
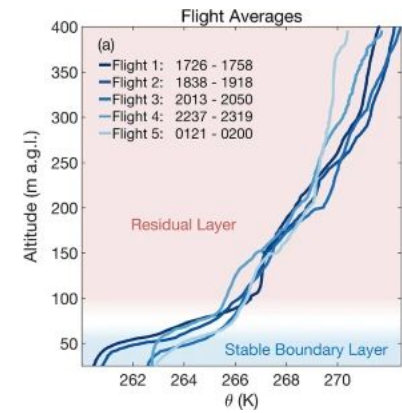
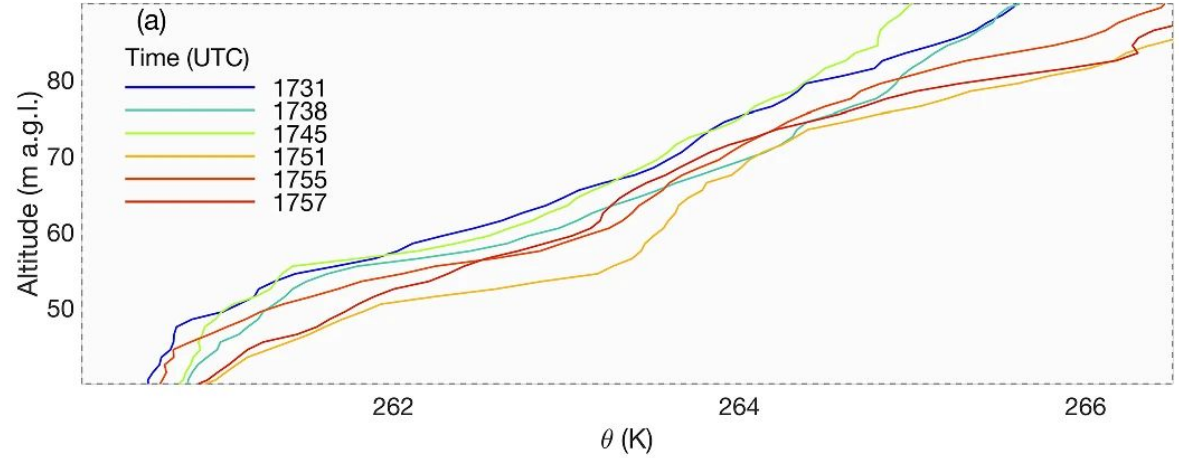
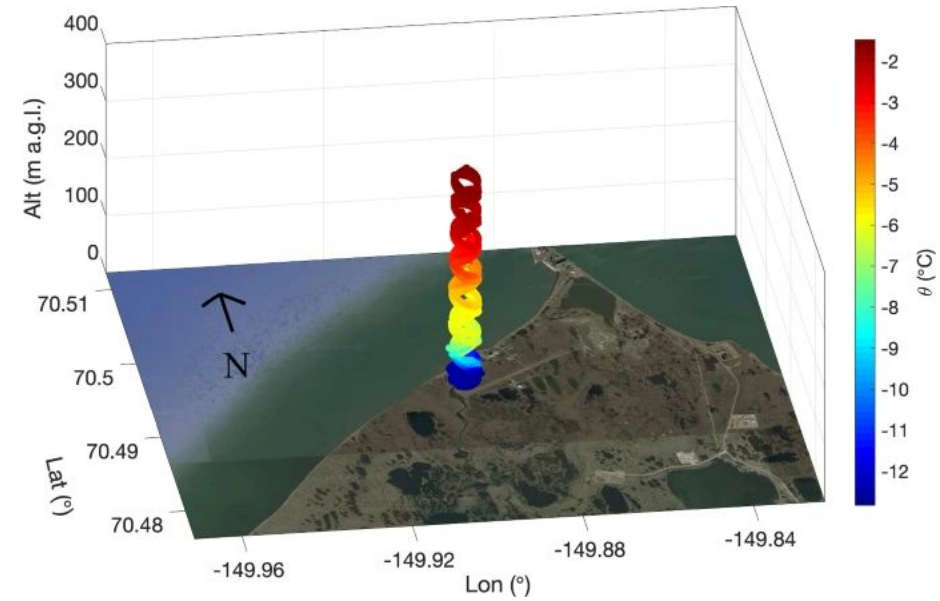


BlackSwift
TECHNOLOGIES

CU IRISS sUAS Flight Activities (Last 7 Years)



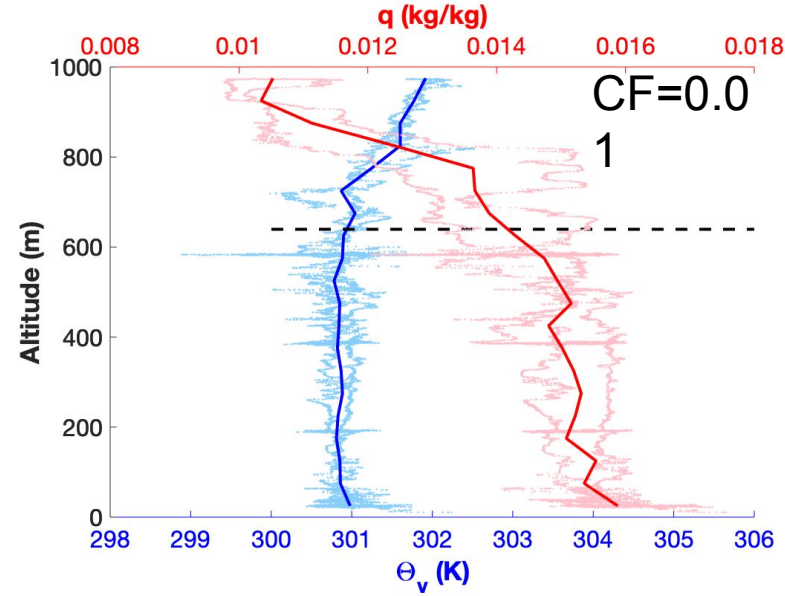
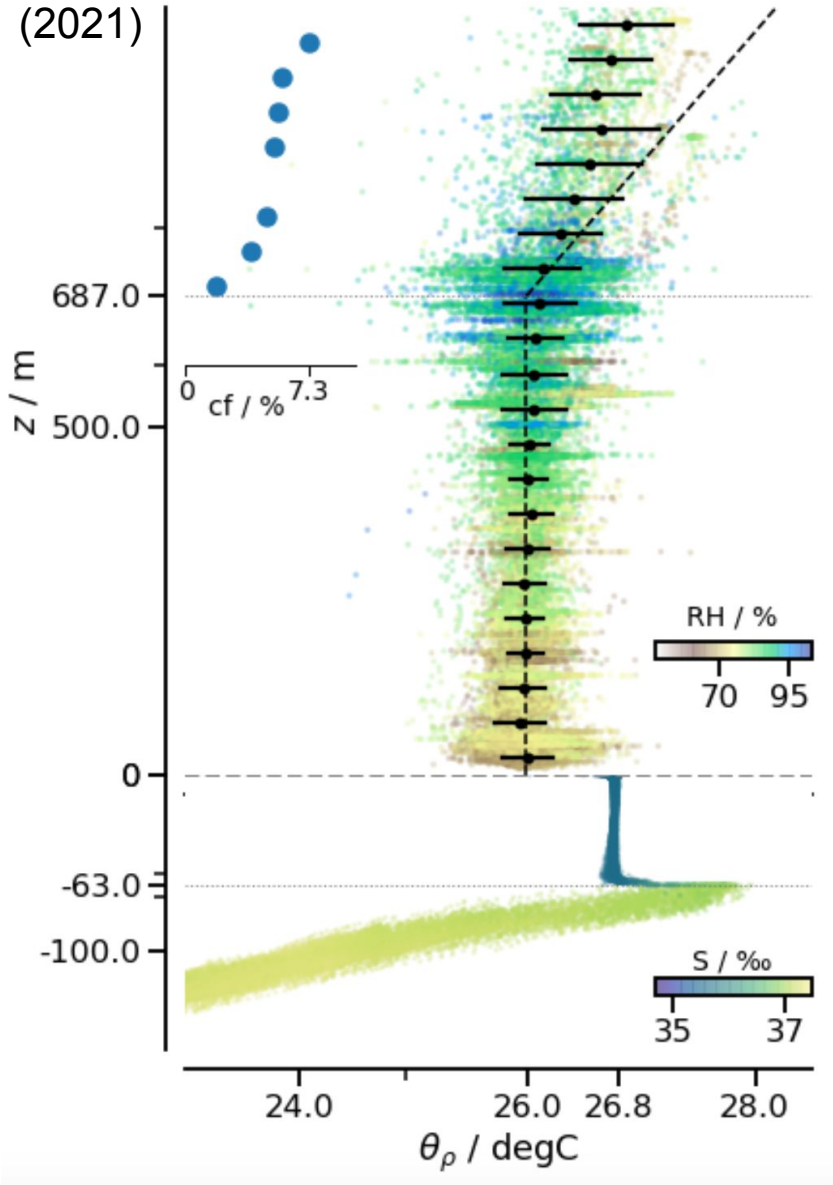
Boundary Layer Studies



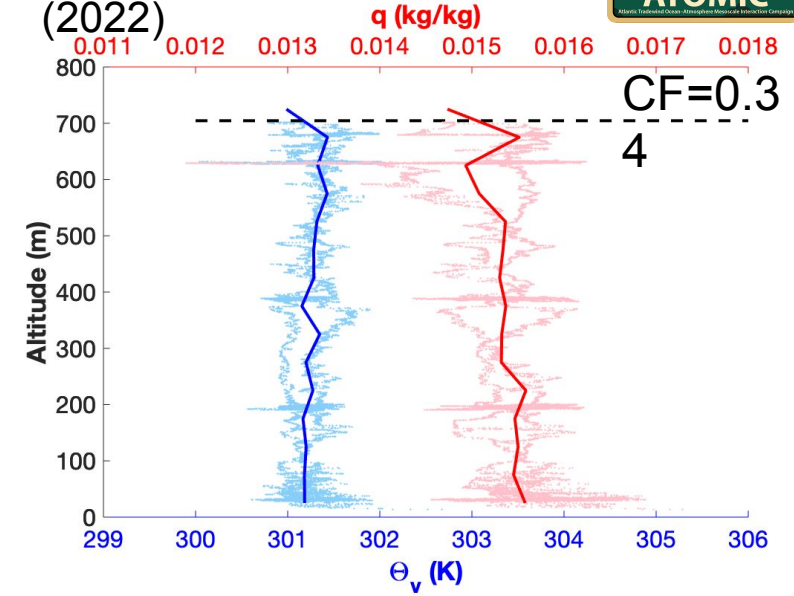
Boundary Layer Studies



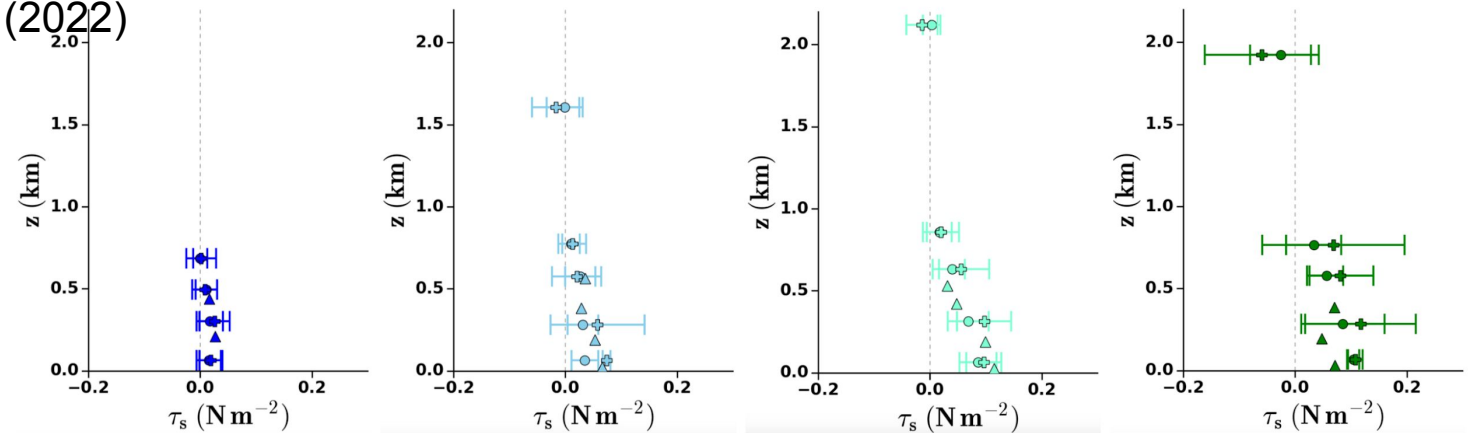
Stevens et al.
(2021)



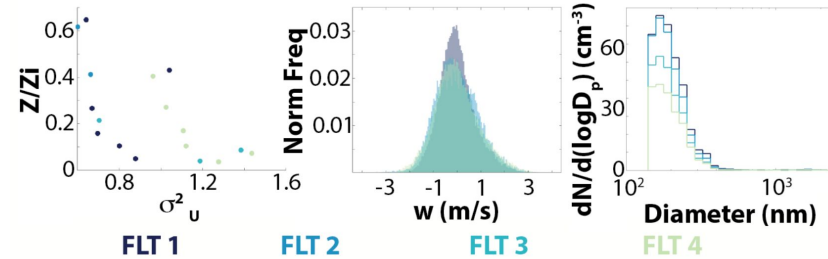
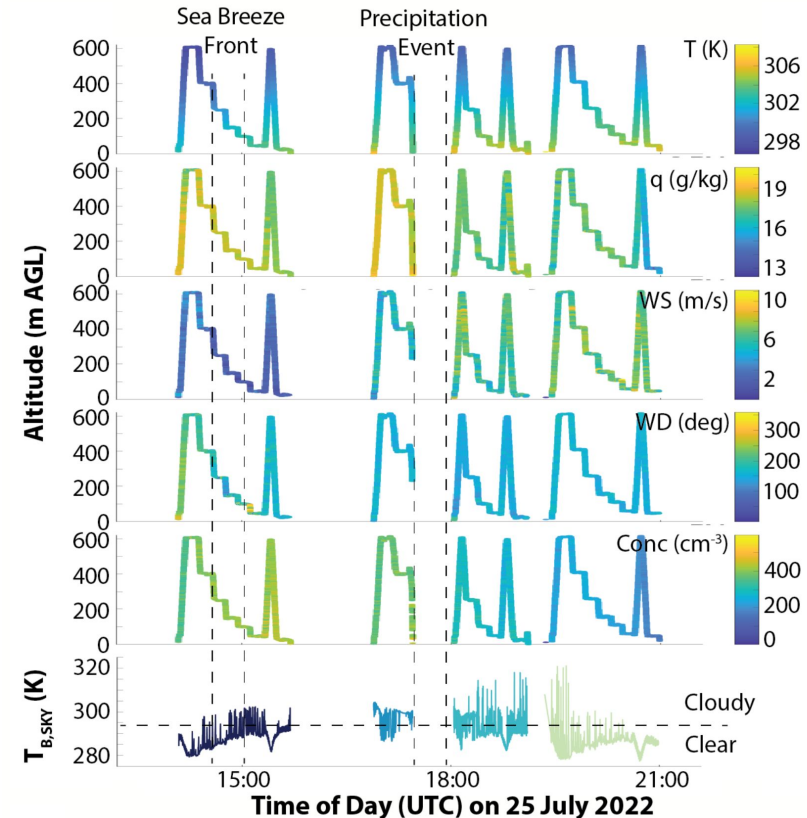
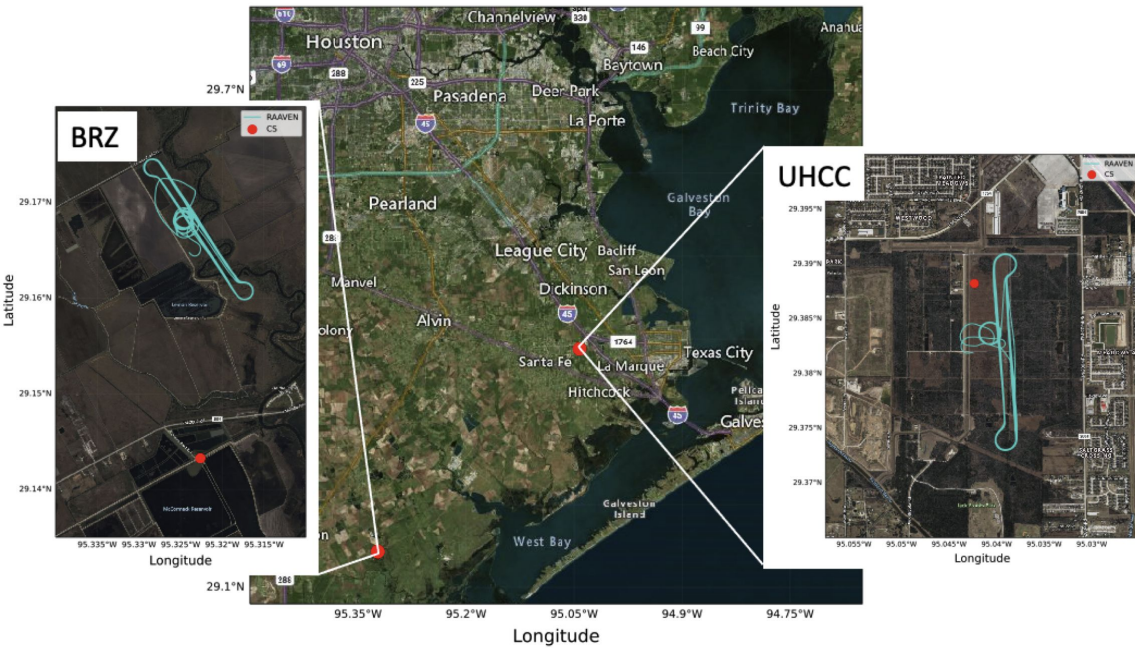
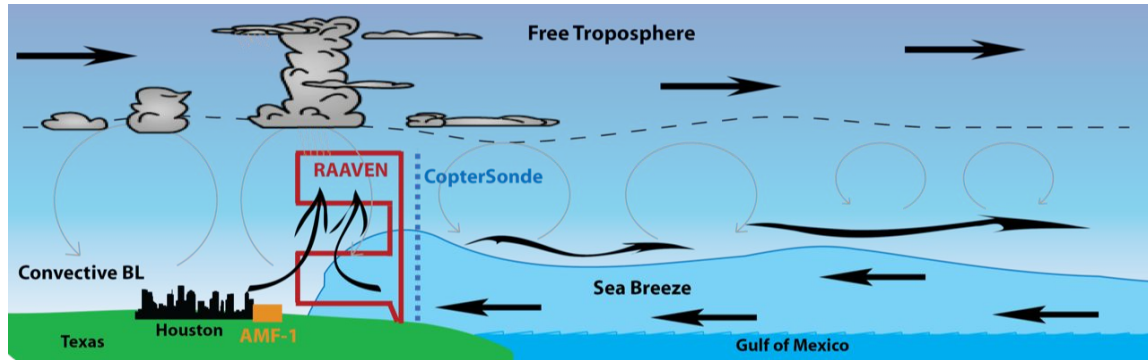
de Boer et al.
(2022)



Nuijens et al.
(2022)



Convection in Coastal Environments

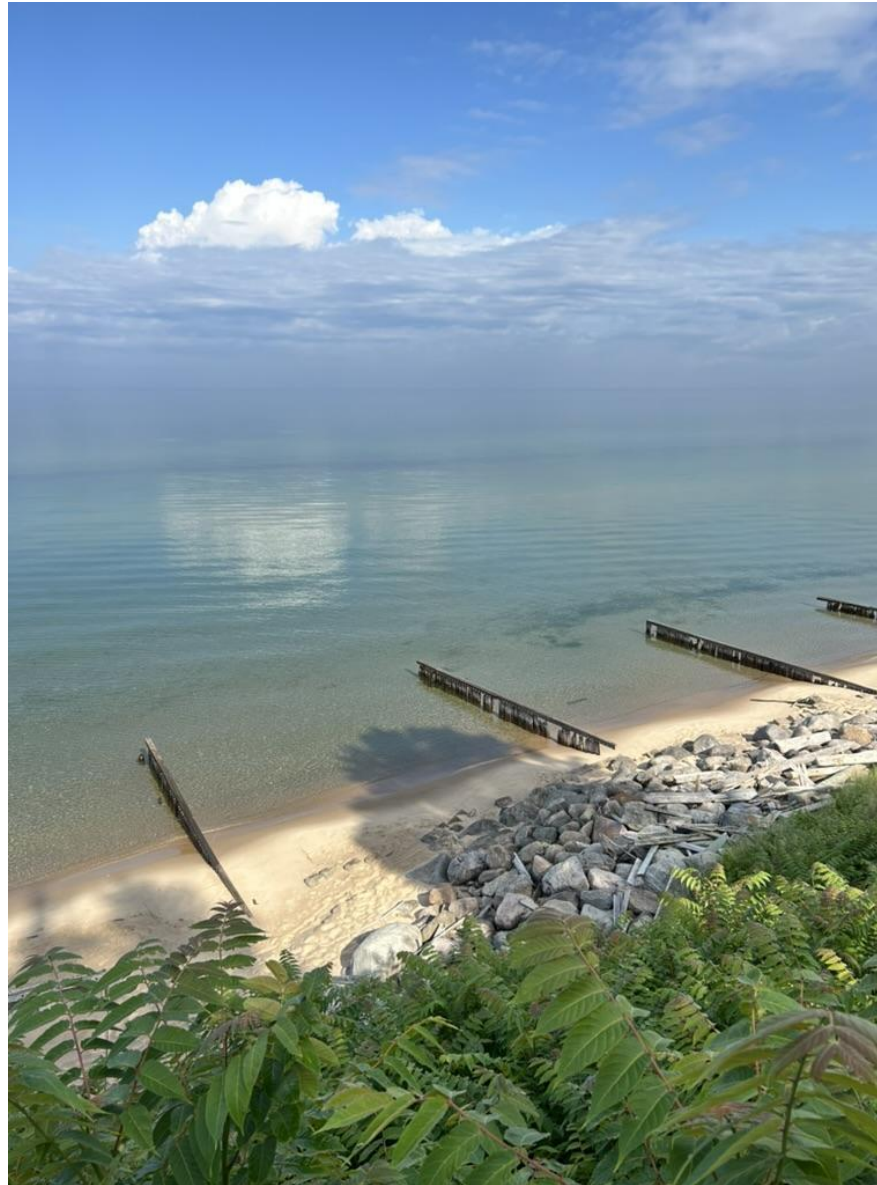


Convection in Coastal Environments

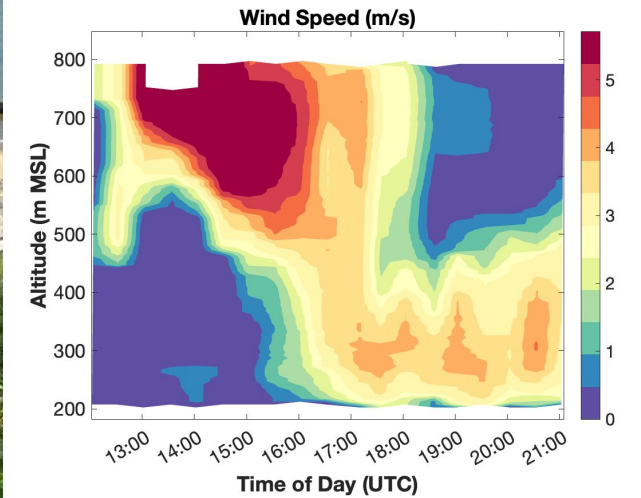
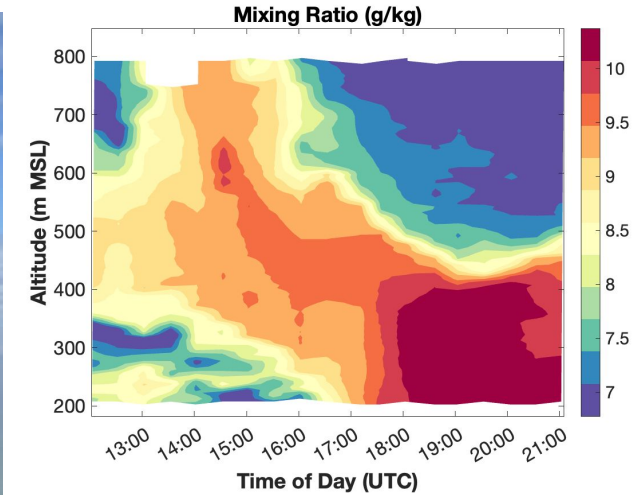
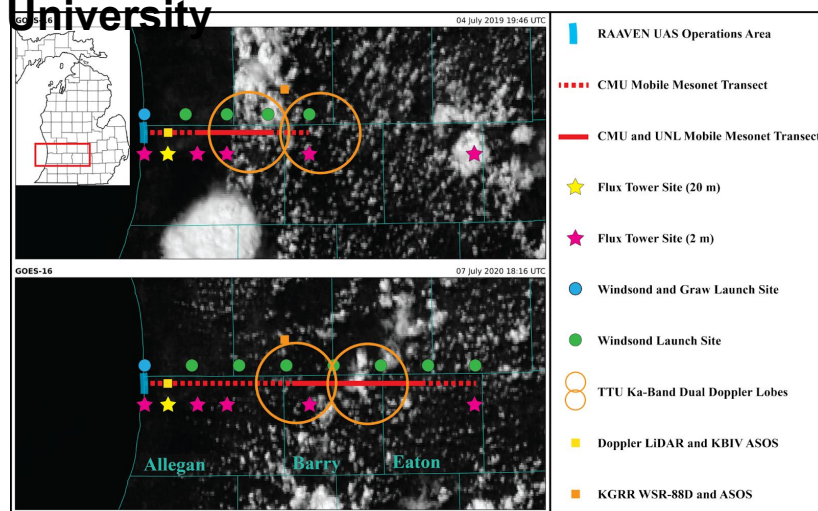
Maritime to Inland Transitions Towards ENvironments for Convection

Initiation 2024 field deployment to **Holland, MI** area.

- Targets development of understanding of **convective initiation** over the lower peninsula of Michigan.
- RAAVEN to study **marine layer in near-coastal environment** and **evolution of lower atmospheric structure** as marine layer advects over land surface.
- Collaboration with **Central Michigan University, University of Nebraska, University of Illinois, and Texas Tech University**

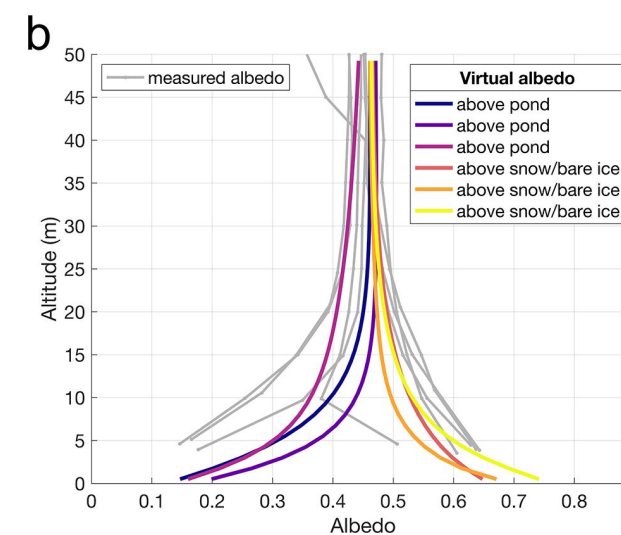
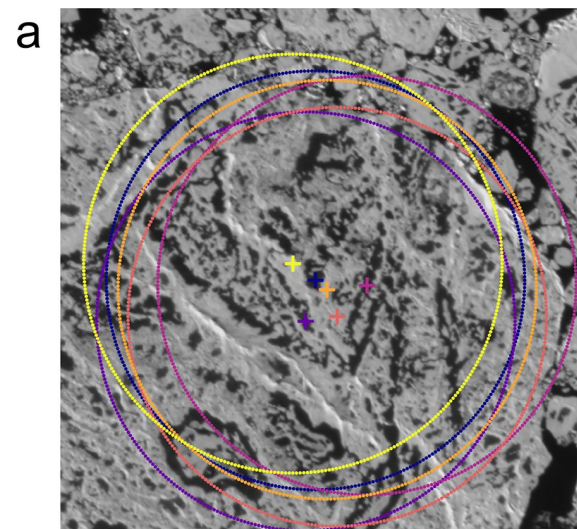
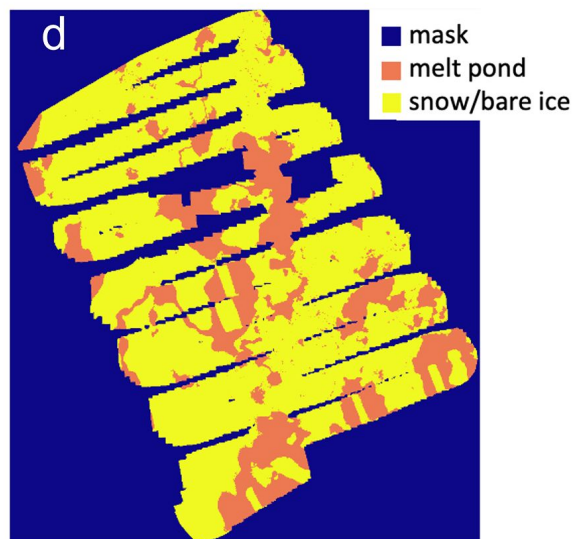
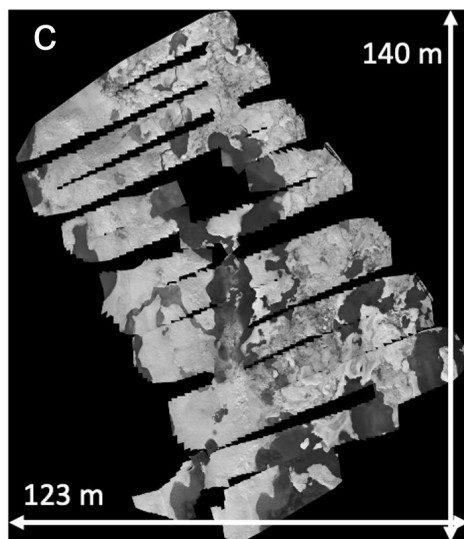
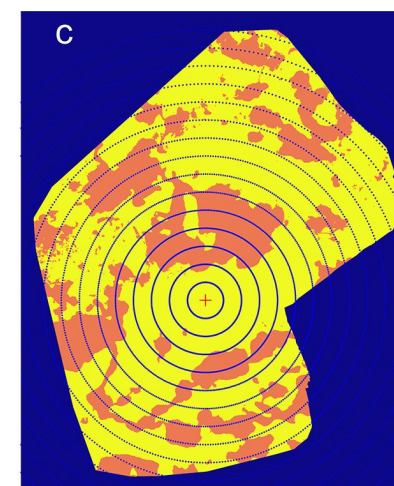
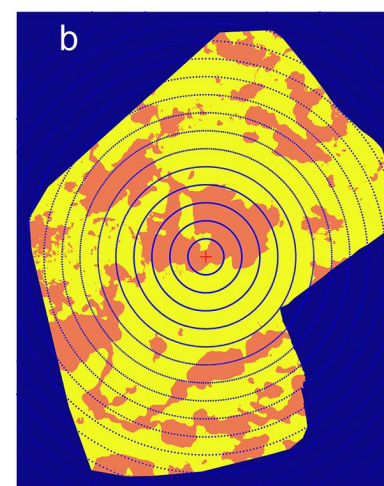
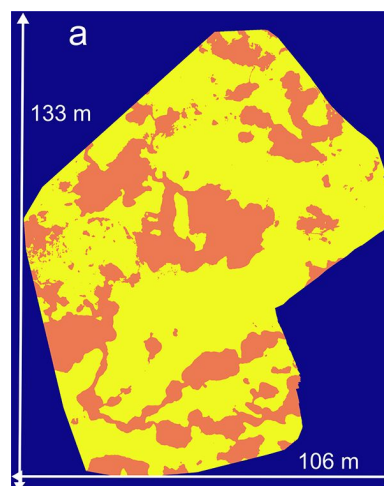
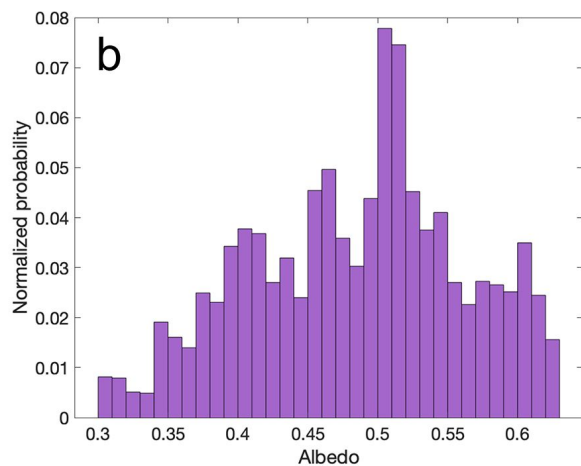
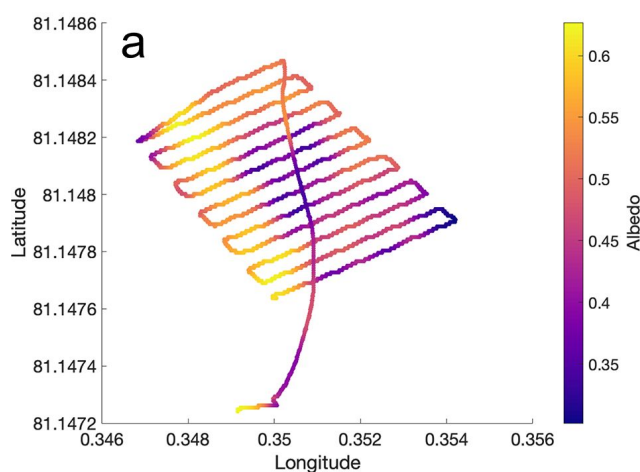


SCOAR 2025 Meeting, 27-28 February



Half-hourly (or greater) profiles of the lower atmosphere over Lake Michigan

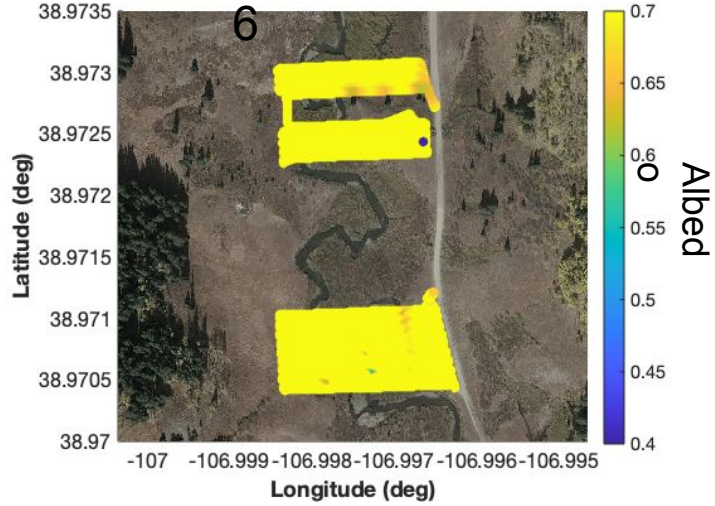
Surface Properties



Surface Properties

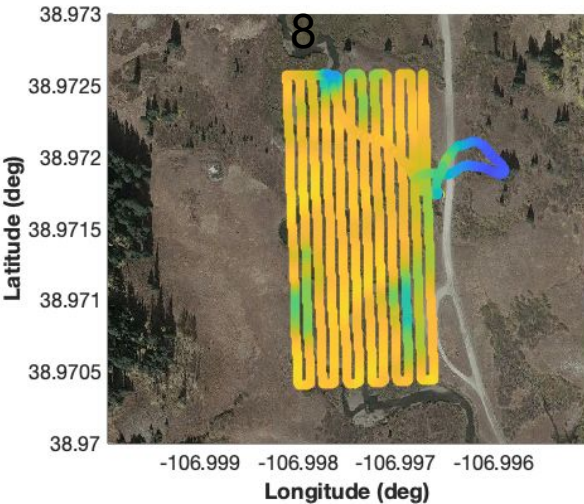


03/12-03/1

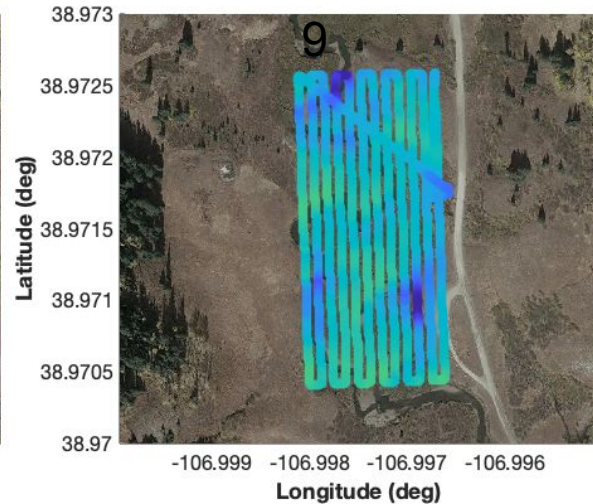


- April 2022
- Dust-in-snow related darkening of the surface
- Melt also enhanced snow wetness and grain aging, resulting in further albedo decreases
- March flights showed albedos in this area of around **0.8**, while the April albedos decreased from around **0.65** to **0.45** over the course of four days.
- Additionally, the river began to open up, resulting in even lower albedos values (**<0.4**).

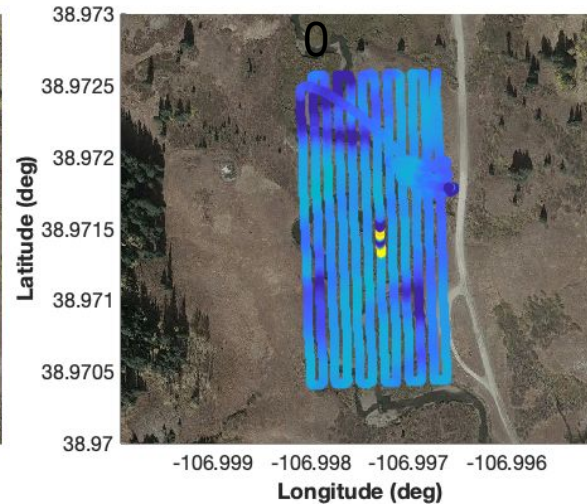
04/1



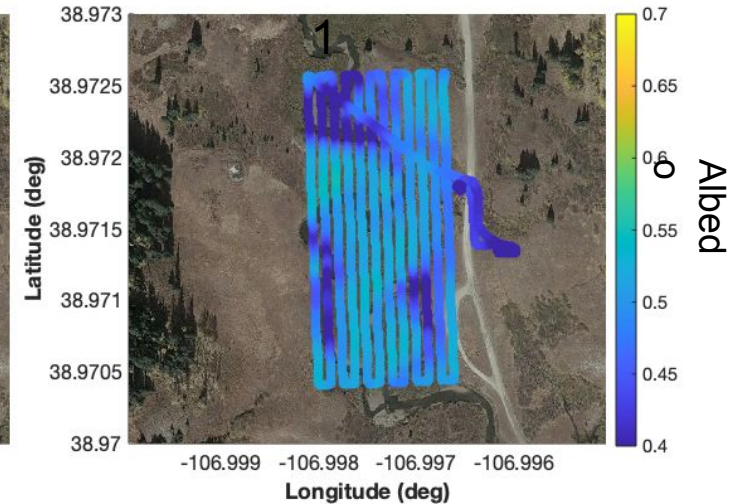
04/1



04/2



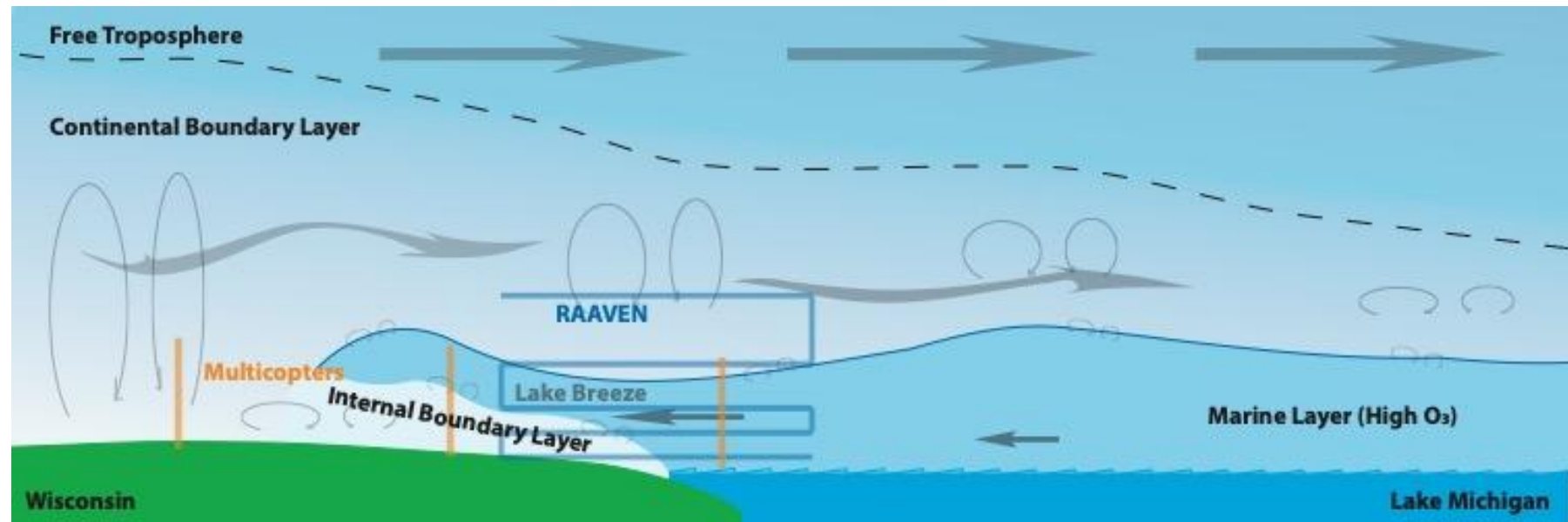
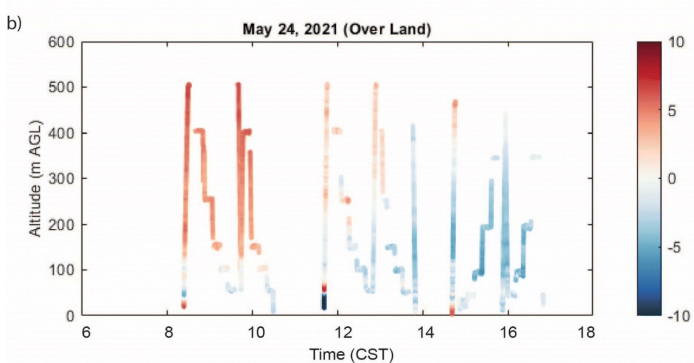
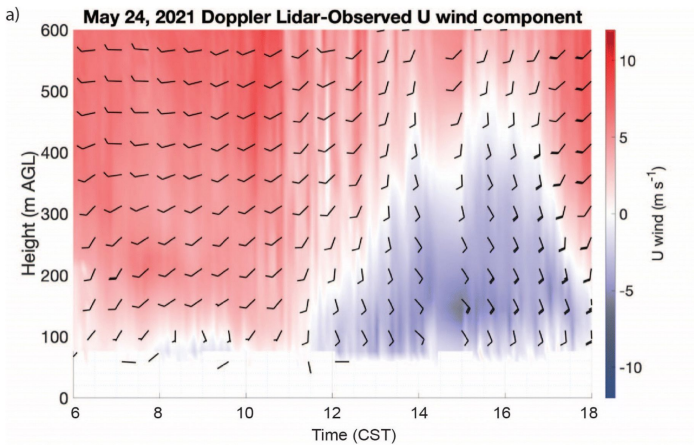
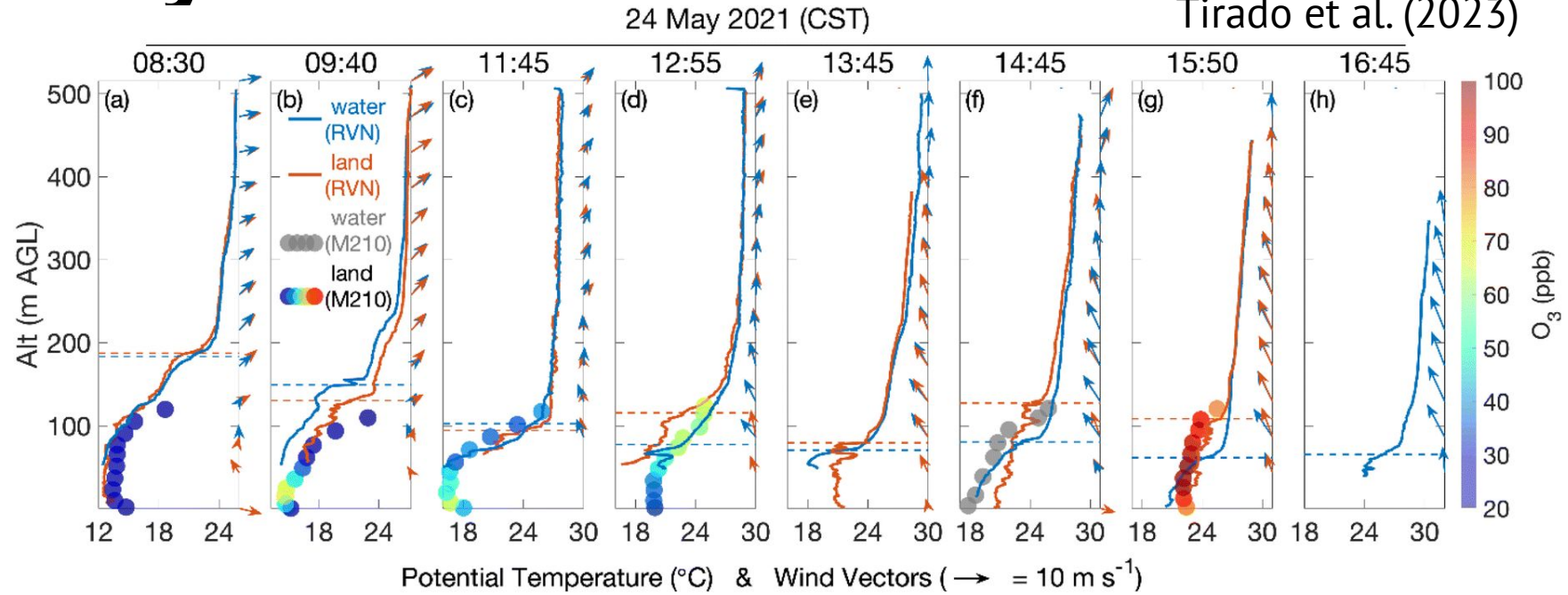
04/2



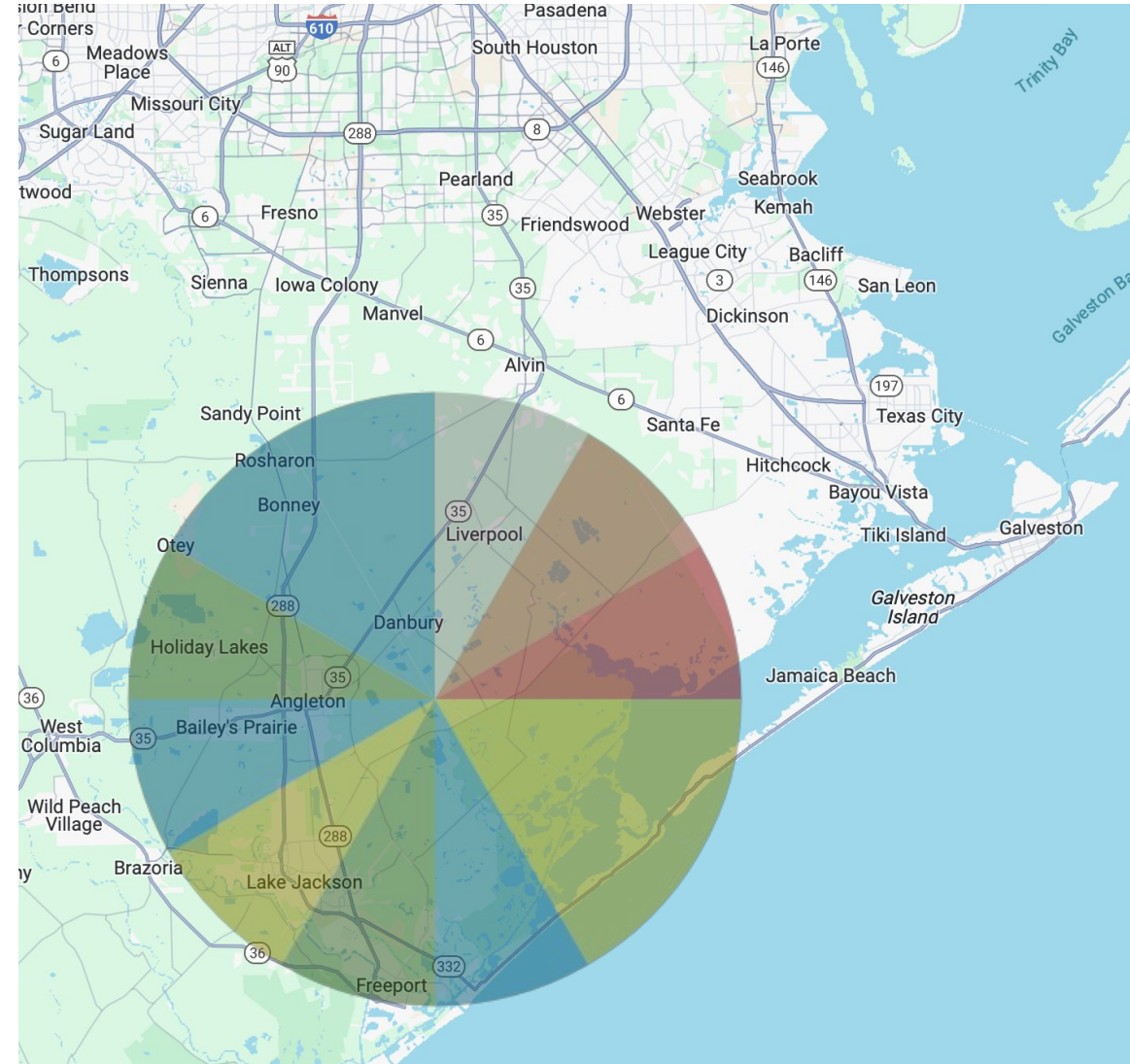
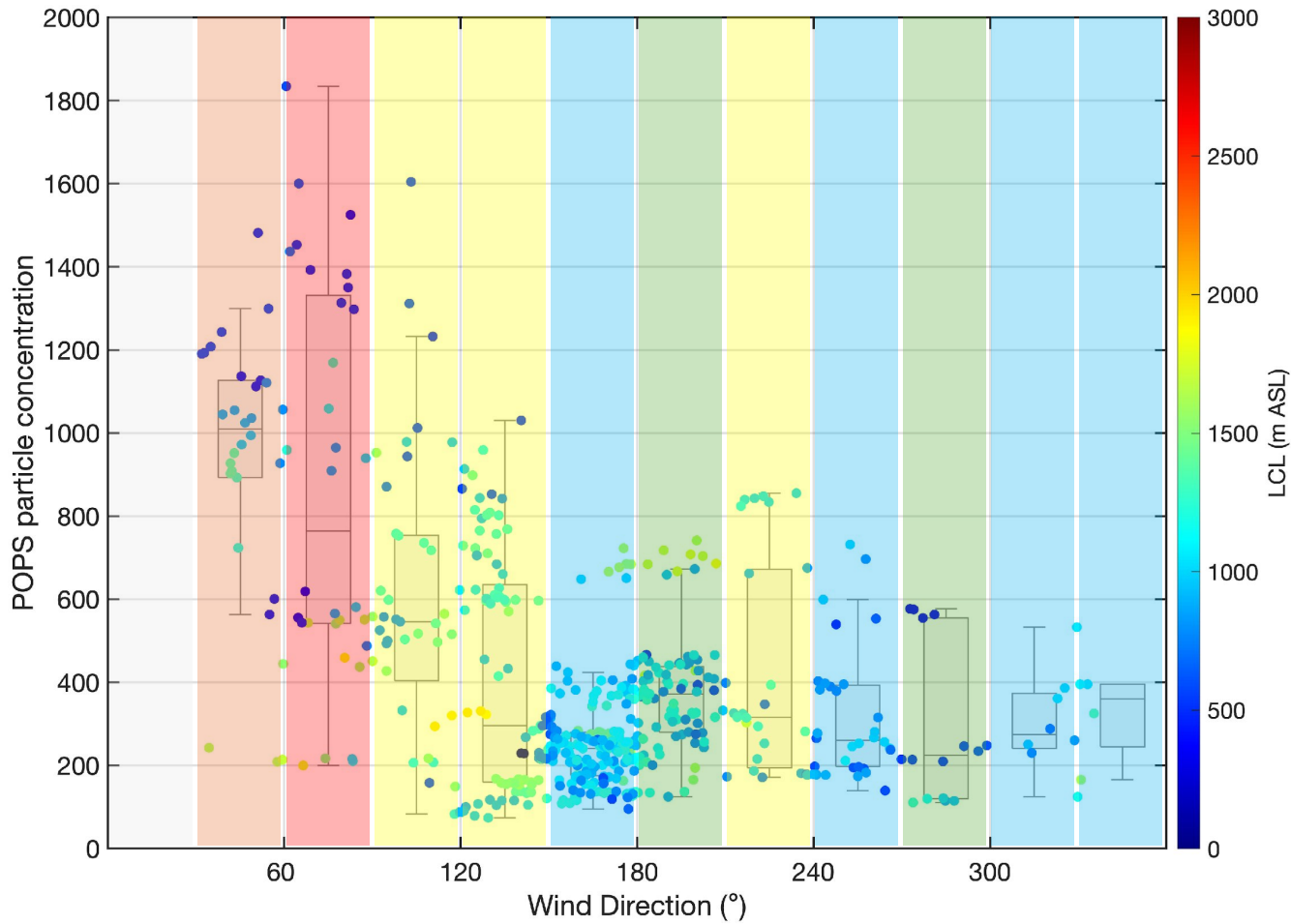
Air Quality and Aerosol Studies

Cleary et al. (2022)

Tirado et al. (2023)



Air Quality and Aerosol Studies



References

- Butterworth, B., G. de Boer, and D. Lawrence: **A Study of Intermittent Turbulence in Stable Arctic Boundary Layers**, *Boundary Layer Meteorology*, 190, 2, <https://doi.org/10.1007/s10546-023-00847-5>
- Calmer, R., G. de Boer, J. Hamilton, D. Lawrence, M. Webster, N. Wright, M. Shupe, C. Cox, J. Cassano: **Relationships between summertime surface albedo and melt pond fraction in the central Arctic Ocean: The aggregate scale of albedo obtained on the MOSAiC floe**, *Elementa*, 11 (1), <https://doi.org/10.1525/elementa.2023.00001>
- Cleary, P.A., G. de Boer, J. Hupy, S. Borenstein, J. Hamilton, B. Kies, D. Lawrence, R.B. Pierce, J. Tirado, A. Voon, and T. Wagner: **Observations of the Lower Atmosphere From the 2021 WiscoDISCO Campaign**, *Earth Sys. Sci. Data*, 14, 2129-2145, <https://doi.org/10.5194/essd-14-2129-2022>.
- de Boer, G., S. Borenstein, R. Calmer, C. Cox, M. Rhodes, C. Choate, J. Hamilton, J. Osborn, D. Lawrence, B. Argrow and J. Intrieri (2022): **Measurements from the University of Colorado RAAVEN Uncrewed Aircraft System during ATOMIC**, *Earth Sys. Sci. Data*, 14, 19–31, <https://doi.org/10.5194/essd-14-19-2022>.
- de Boer, G., A. White, R. Cifelli, J. Intrieri, M. Hughes, K. Mahoney, T. Meyers, K. Lantz, J. Hamilton, W.R. Currier, J. Sedlar, C. Cox, E. Hulm, L.D. Riihimaki, B. Adler, L. Bianco, A. Morales, J. Wilczak, J. Elston, M. Stachura D. Jackson, S. Morris, V Chandrasekar, S. Biswas, B. Schmatz, F. Junyent, J. Reithel, E. Smith, K. Schloesser, J. Kochendorfer, M. Meyers, M. Gallagher, J. Longenecker, C. Olheiser, J. Bytheway, B. Moore, R. Calmer, M.D. Shupe, B. Butterworth, S. Heflin, R. Palladino, D. Feldman, K. Williams, J. Pinto, J. Osborn, D. Costa, E. Hall, C. Herrerab, G. Hodges, L. Soldo, S. Stierle, and R.S. Webb: **Supporting Advancement in Weather and Water Prediction in the Upper Colorado River Basin: The SPLASH Campaign**, *Bull. Amer. Meteor. Soc.*, 104, E1853–E1874, <https://doi.org/10.1175/BAMS-D-22-0147.1>
- Feldman, D.R., A.C. Aiken, W. R. Boos, R. Carroll, V. Chandrasekar, S. Collis, J. Creamean, G. de Boer, J. Deems, P. J. DeMott, J. Fan, A. N. Flores, D. Gochis, M. Grover, T. Hill, A. Hodshire, E. Hulm1, C. Hume, R. Jackson, F. Junyent, A. Kennedy, M. Kumjian, E. Levin, J. D. Lundquist, J. O'Brien, M. S. Raleigh, J. Reithel, A. Rhoades, K. Rittger, W. Rudisill1, Z. Sherman, E. Siirila-Woodburn, S. M. Skiles, J. N. Smith, R. C. Sullivan, A. Theisen, M. Tuftedal, A. C. Varble, A. Wiedlea, S. Wielandt, K. Williams, Z. Xu: **The Surface Atmosphere Integrated Field Laboratory (SAIL) Campaign**, *Bull. Amer. Meteor. Soc.*, 104, E2192–E2222, <https://doi.org/10.1175/BAMS-D-22-0049.1>
- Lappin, F., G. de Boer, P. Klein, J. Hamilton, M. Spencer, R. Calmer, A. Segales, M. Rhodes, T. Bell, J. Buchli, K. Britt, E. Asher, I. Medina, B. Butterworth, L. Otterstatter, M. Ritsch, B. Puxley, A. Miller, A. Jordan, C. Gomez-Faulk, E. Smith, S. Borenstein, T. Thornberry, B. Argrow, and E. Pillar-Little: **Data collected using small uncrewed aircraft system during the TRacking Aerosol Convection Interactions Experiment (TRACER)**, *Earth Sys. Sci. Data*, submitted
- Nuijens, L., A. Savazzi, G. de Boer, P.-E. Brilouet, G. George, M. Lothon, and D. Zhang: **The frictional layer in the observed momentum budget of the trades**, *Quart. J. Royal Meteor. Soc.*, 148, 3315– 3337, <https://doi.org/10.1002/qj.4364>.
- Stevens, B., S. Bony, D. Farrell, F. Ament, A. Blyth, C. Fairall, J. Karstensen, P.K. Quinn, S. Speich, C. Acquistapace, F. Aemisegger, A.L. Albright, E. Bodenschatz, K.-A. Caesar, R. Chewitt-Lucas, J. Delanoë, G. de Boer and co-authors (2021): **EUREC4A**, *Earth Sys. Sci. Data*, 13, 4067–4119, <https://doi.org/10.5194/essd-13-4067-2021>.
- Tirado, J., A. Torti, B. Butterworth, K. Wangen, A. Voon, J. Hupy, G. de Boer, R.B. Pierce, T. Wagner and P. Cleary: **Observations of Coastal Dynamics During Lake Breeze at a Shoreline Impacted by High Ozone**, *Env. Sci. Atmospheres*, 2023, <https://doi.org/10.1039/D2EA00101B>