

Arctic Observing Activities to Improve Process-Level Understanding Relevant to Simulation of the Surface Energy Budget

Gijs de Boer^{1,2}

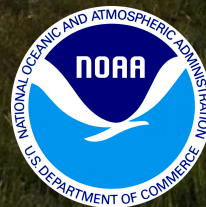
Christopher Cox^{1,2}, Jessie Creamean^{1,2}, Dale Lawrence¹,
Matthew Shupe^{1,2}, Amy Solomon^{1,2}

(1)

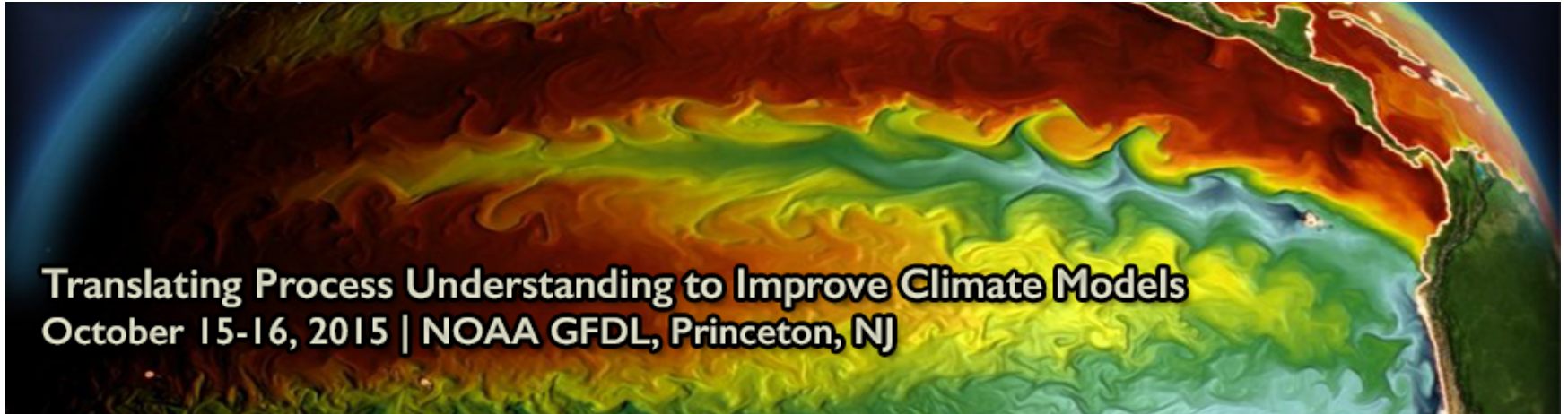


University of Colorado
Boulder

(2)



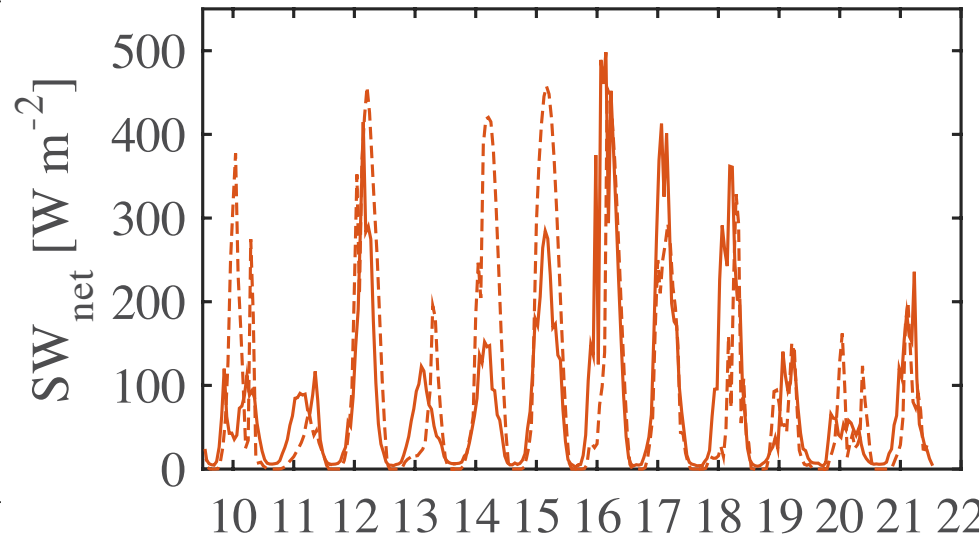
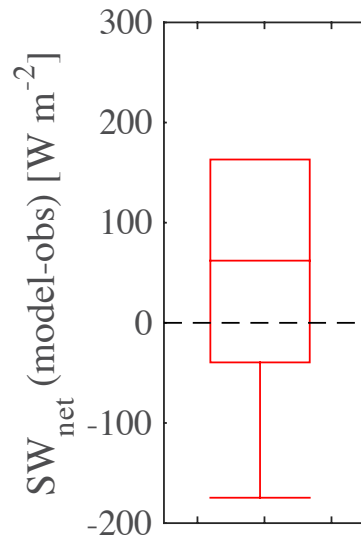
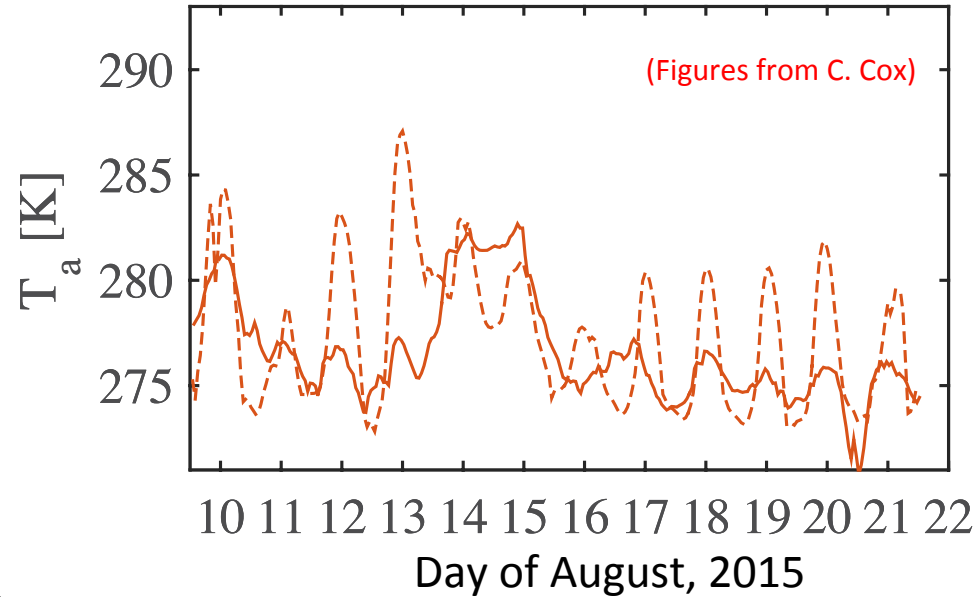
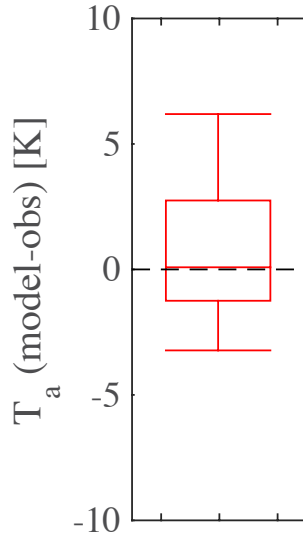
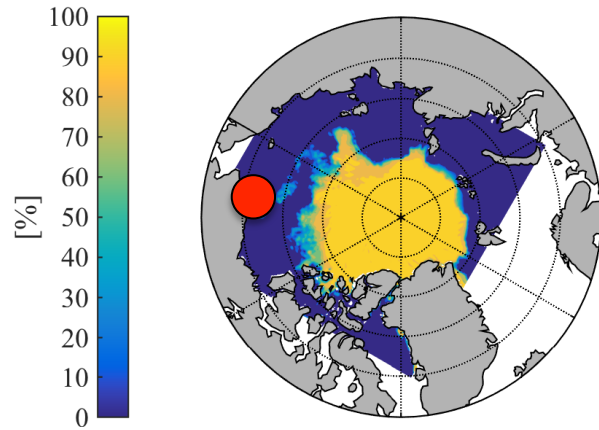
Introduction



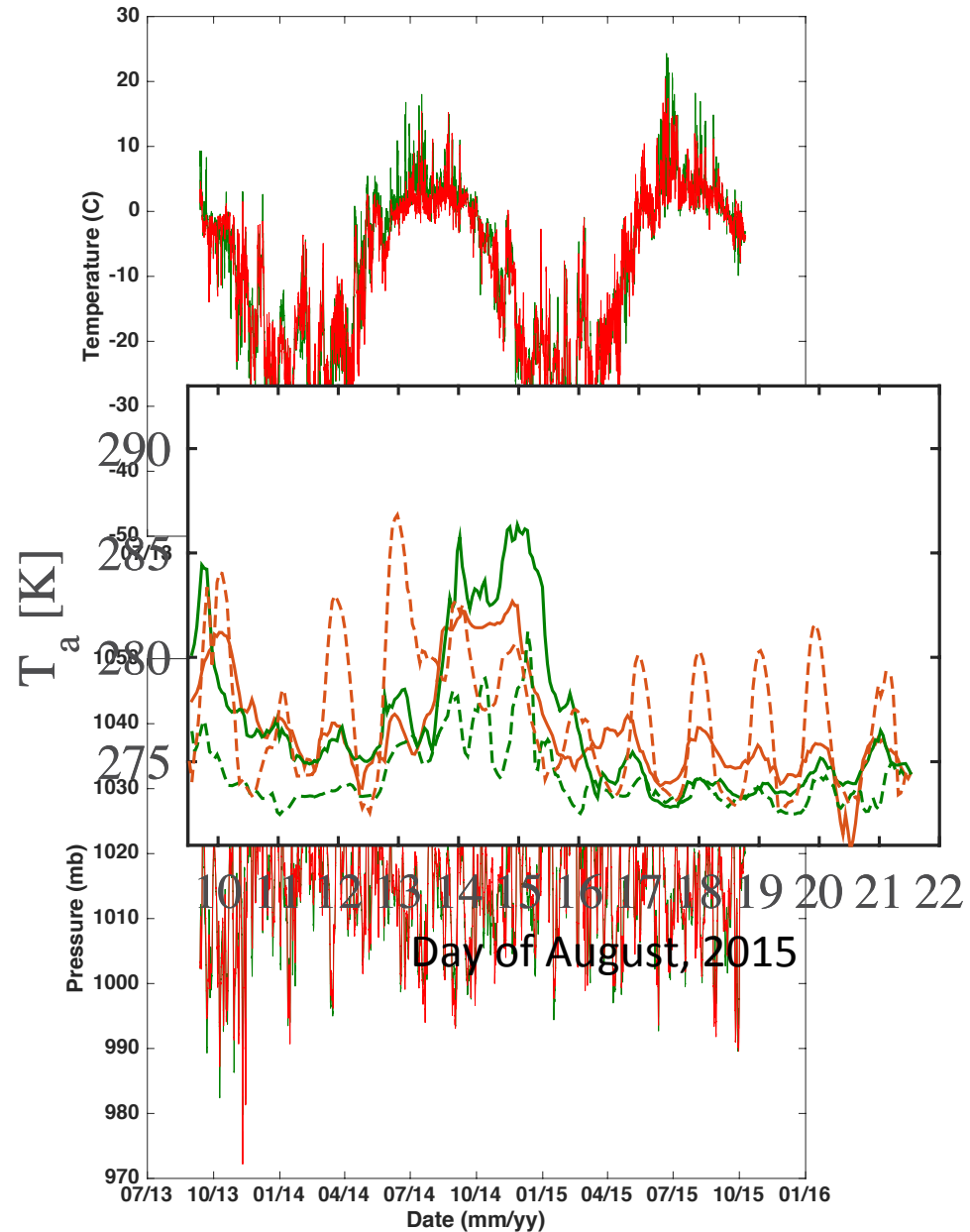
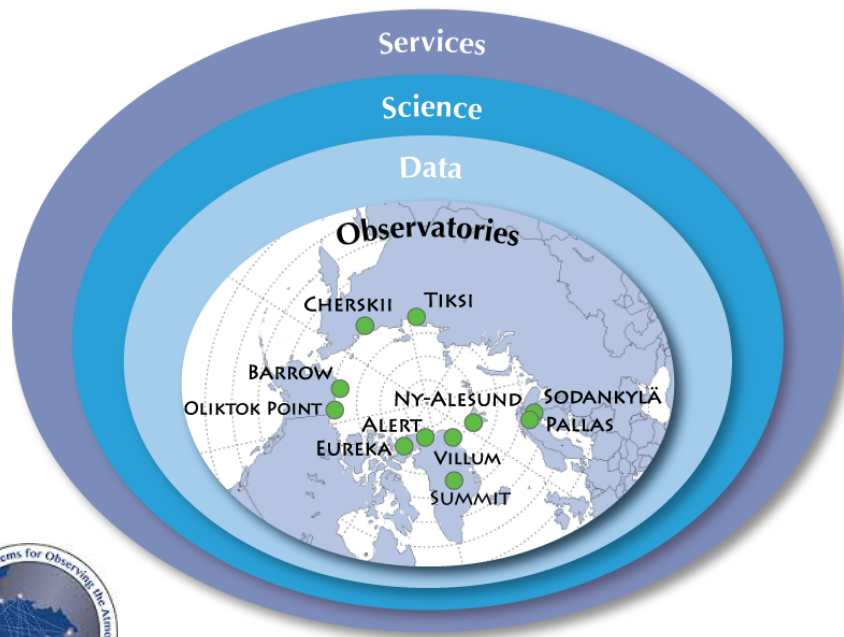
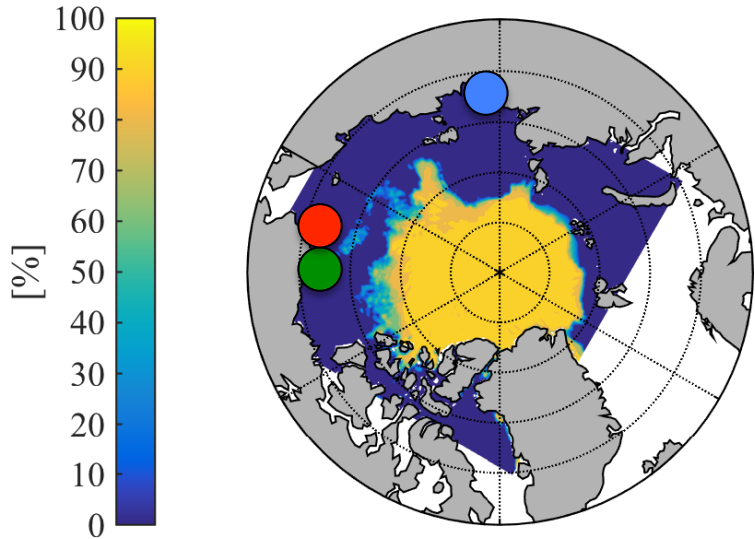
Some takeaways:

- Model evaluation and improvement requires multiple perspectives
- Models have a cloud “problem”
- Parameterization evaluation and development requires “sub-grid” statistics

Model Evaluation



The Value of "Supersite" Networks



The cloud “problem”

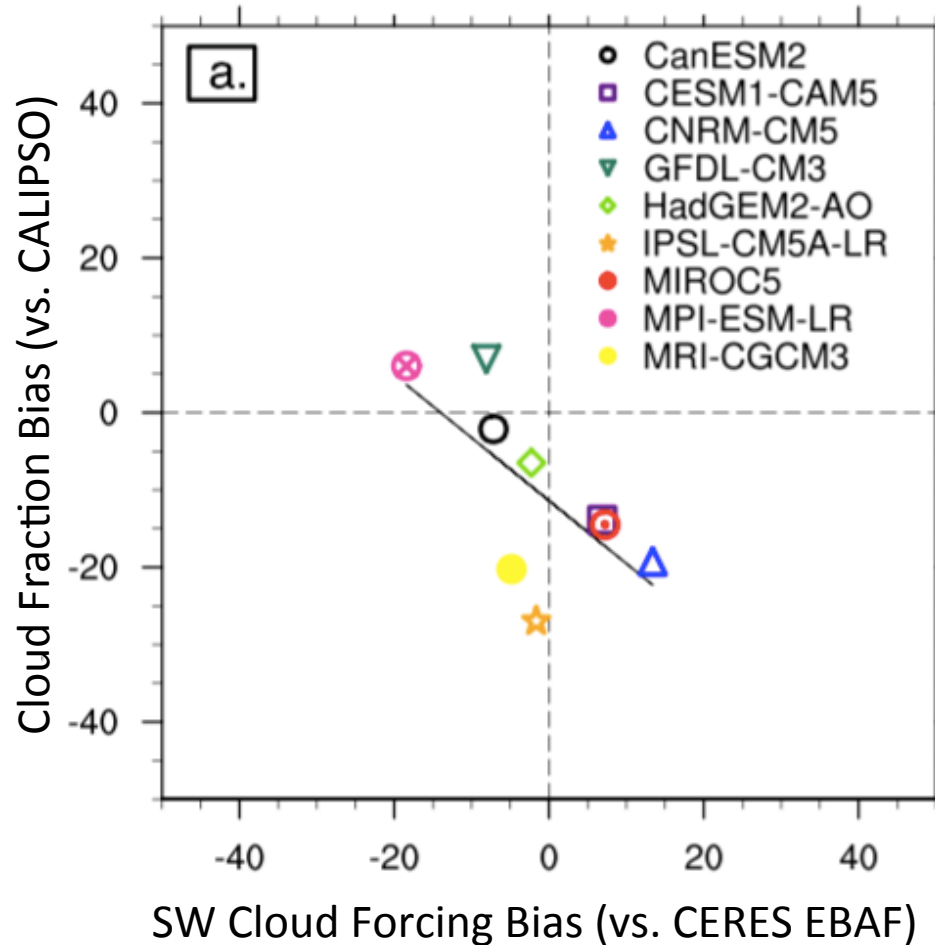


Figure from English et al. [2015]

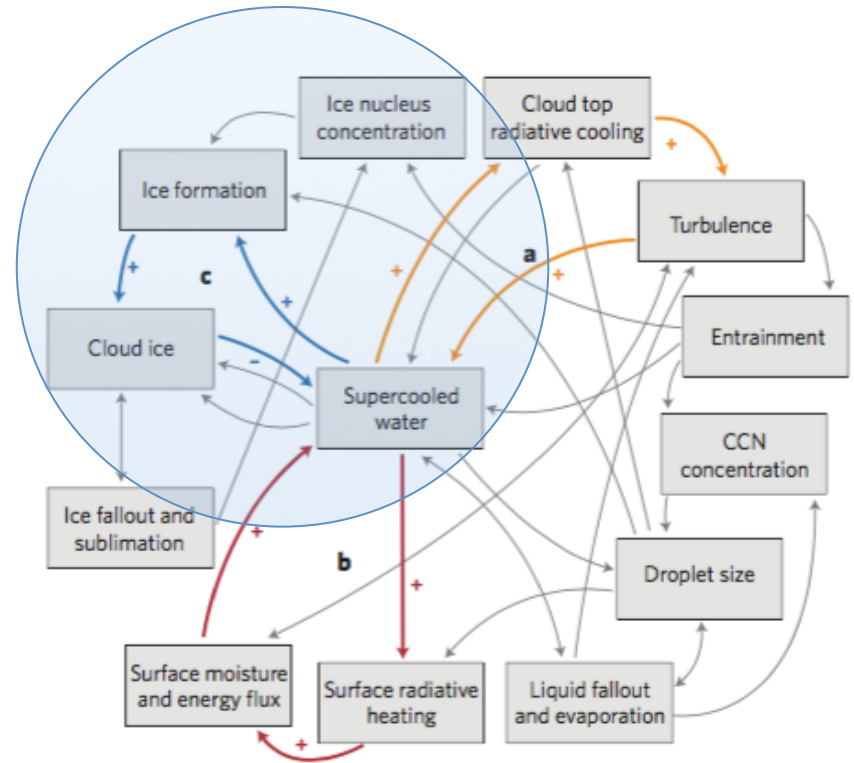
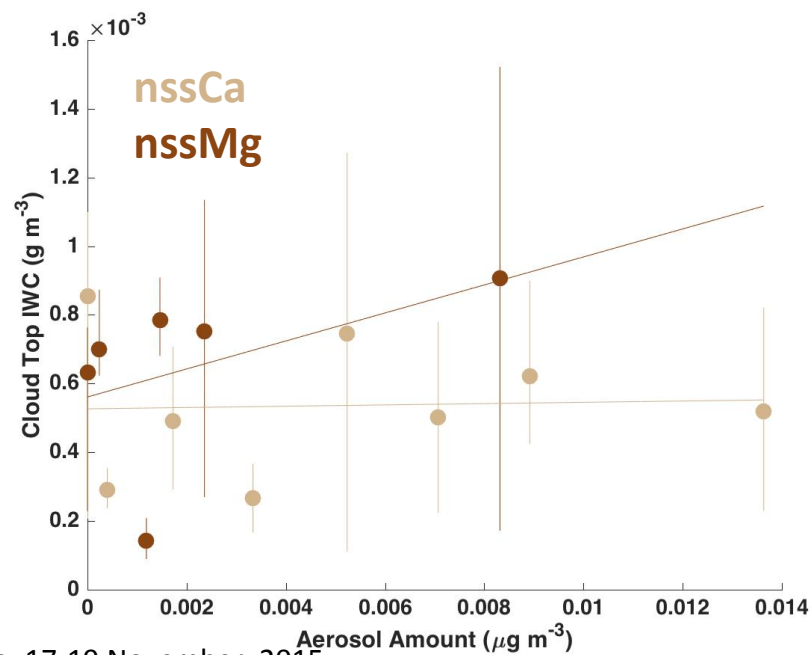
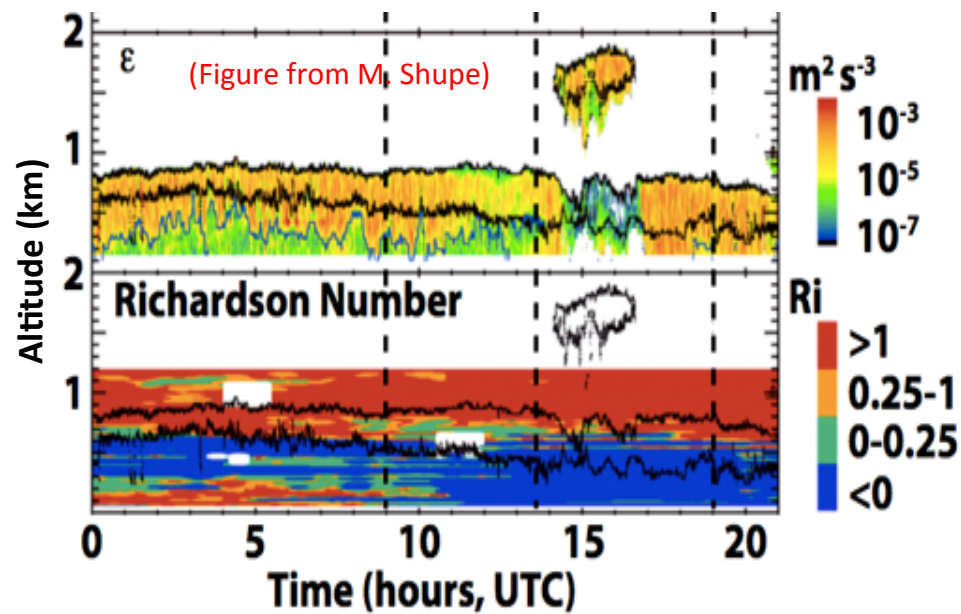
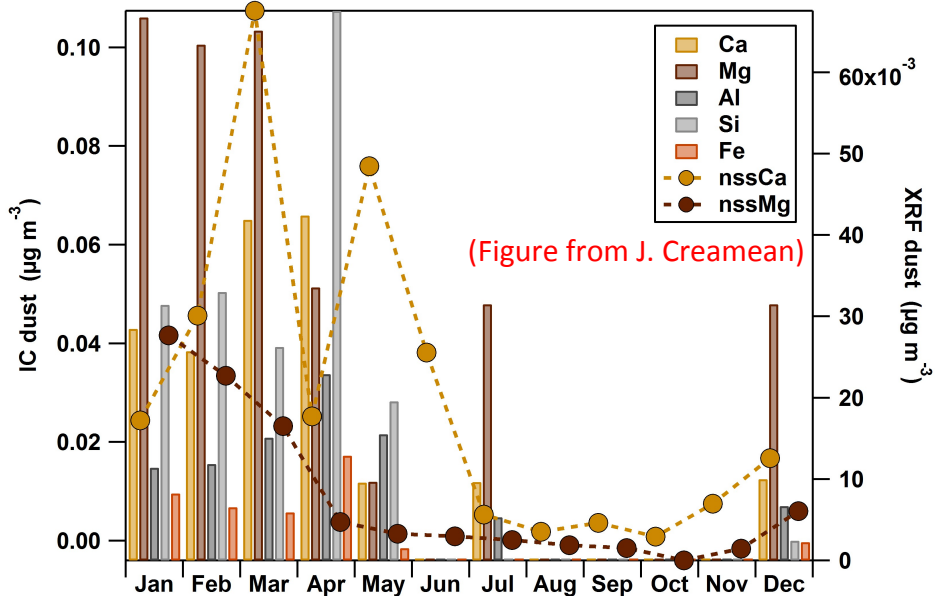
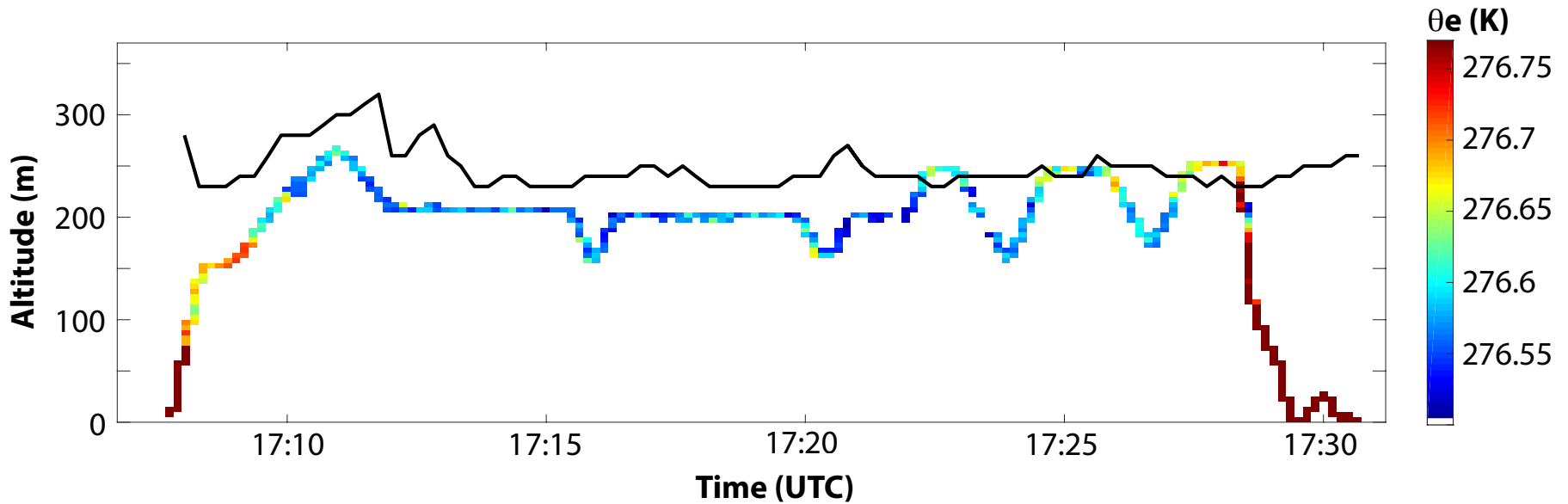


Figure from Morrison et al. [2011]

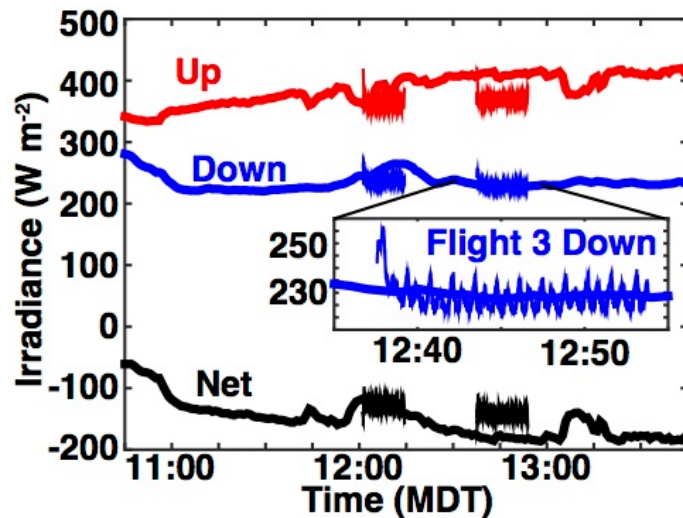
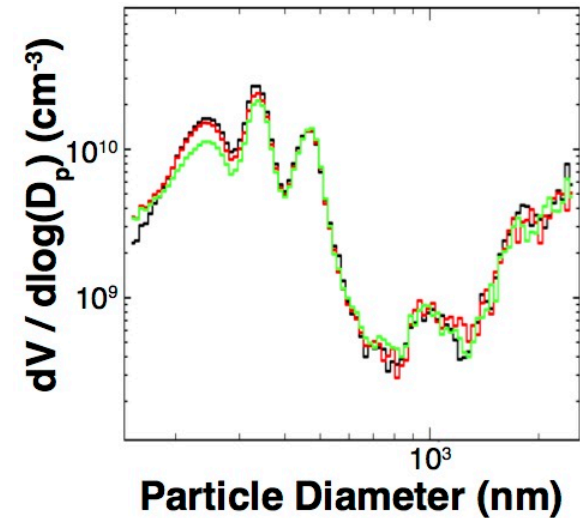
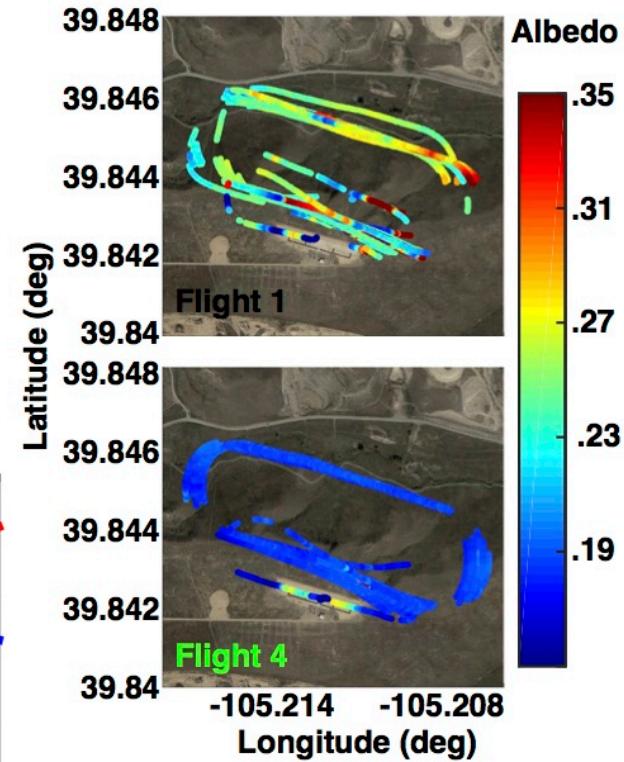
The cloud "problem"



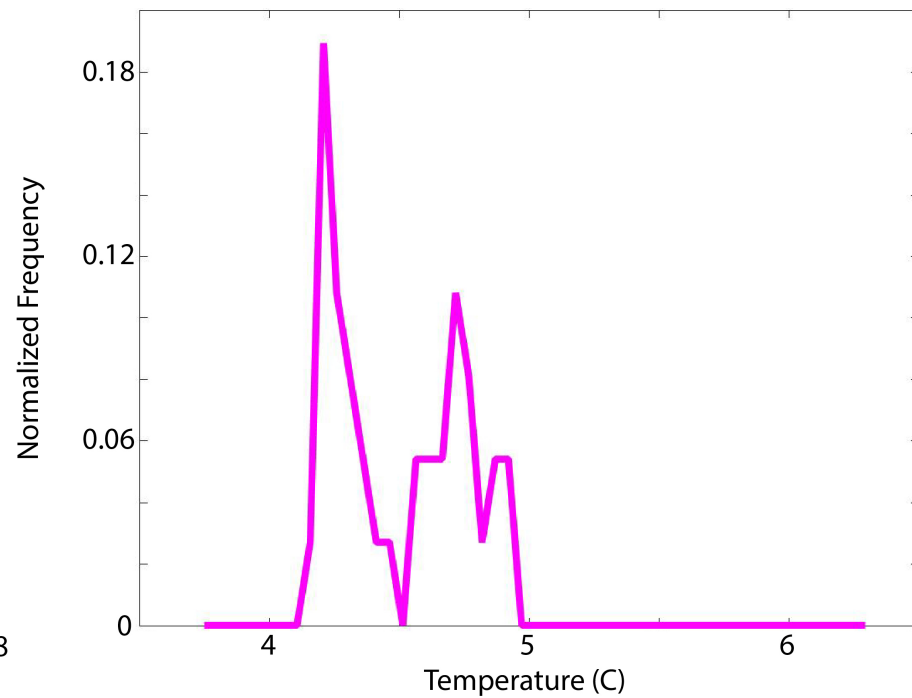
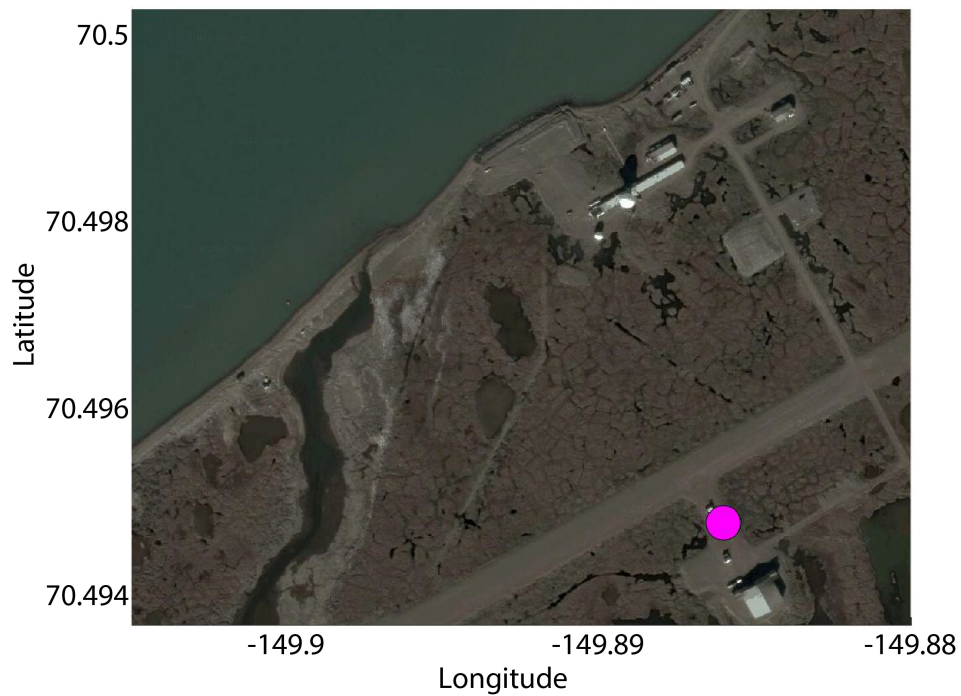
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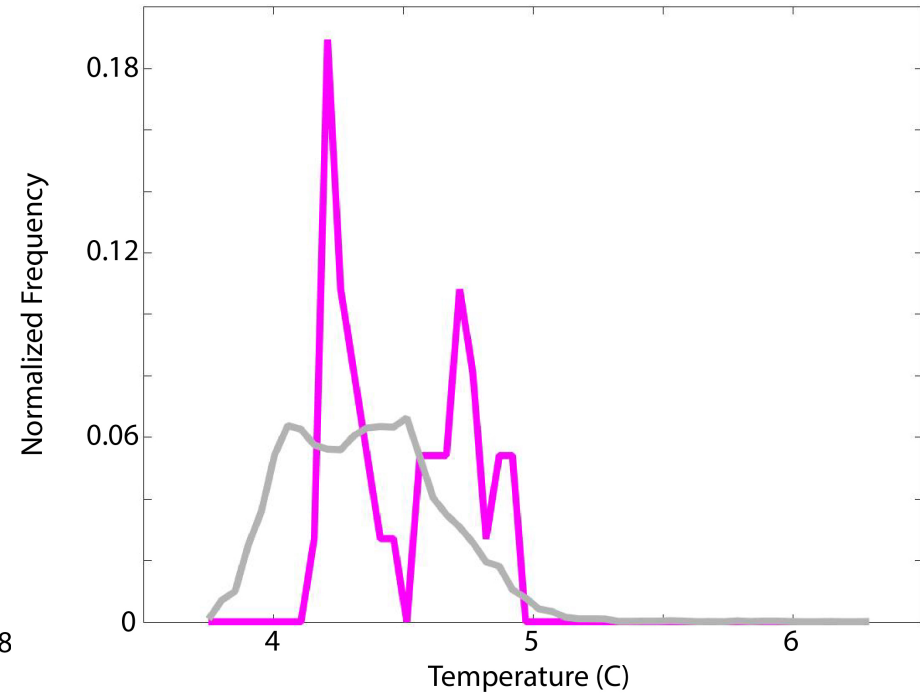
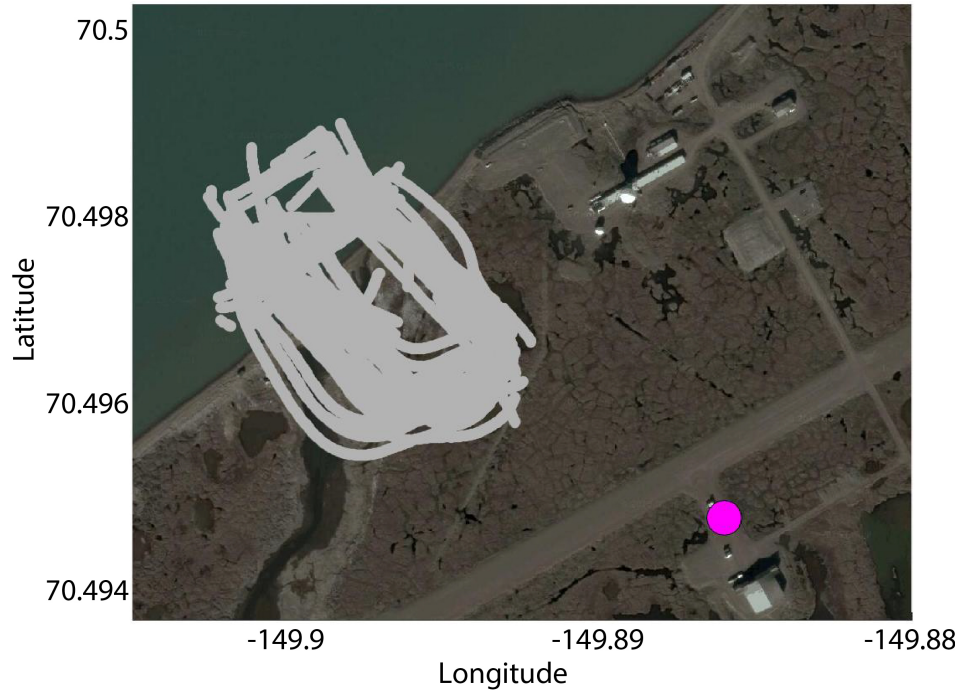
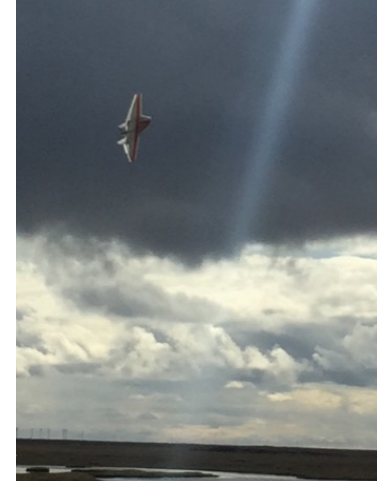
The cloud "problem"



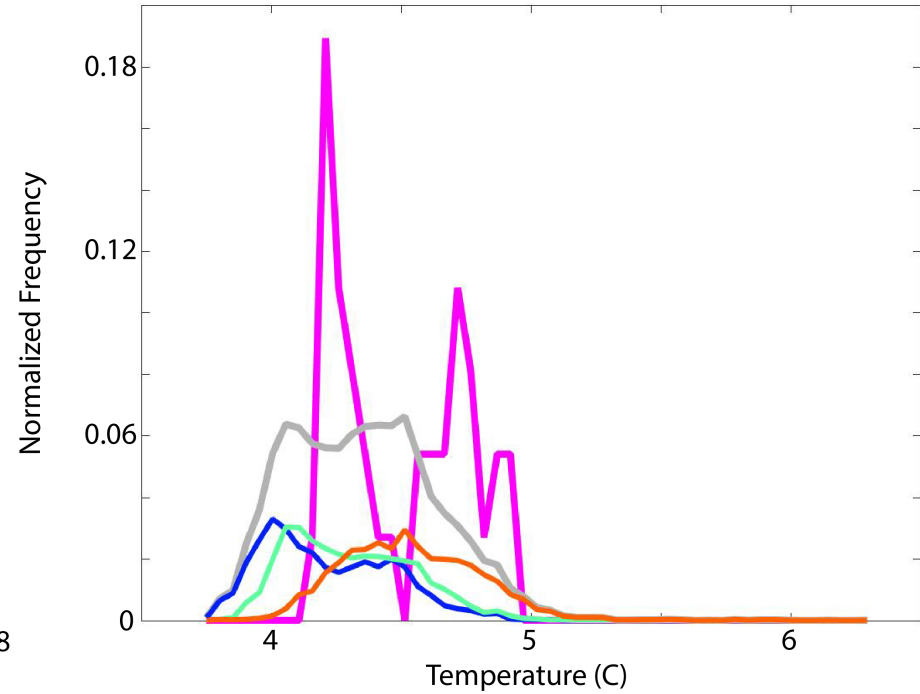
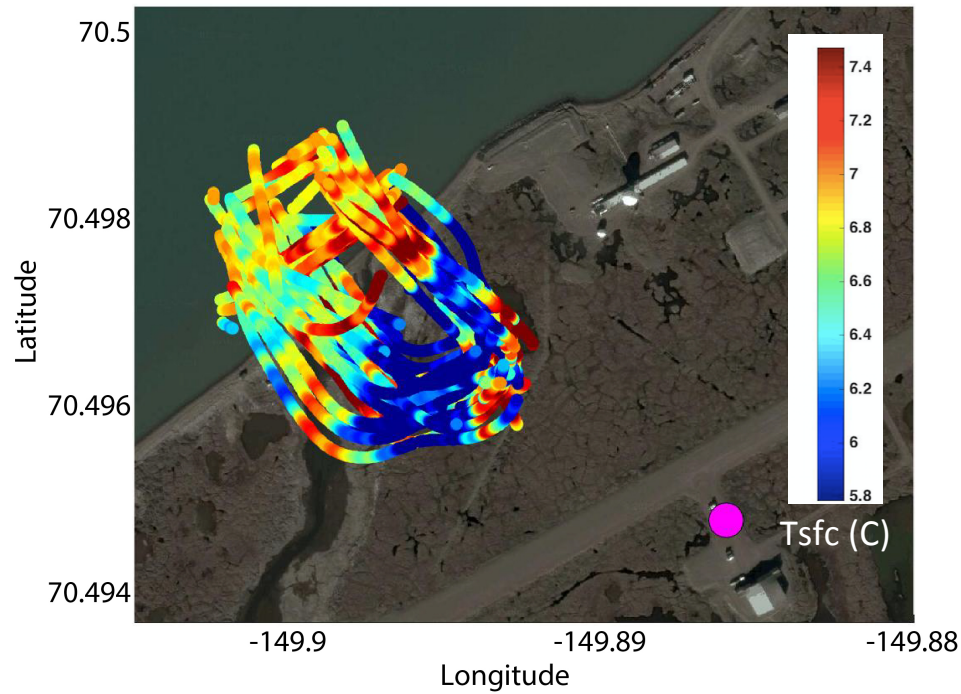
Observing the sub-grid scale



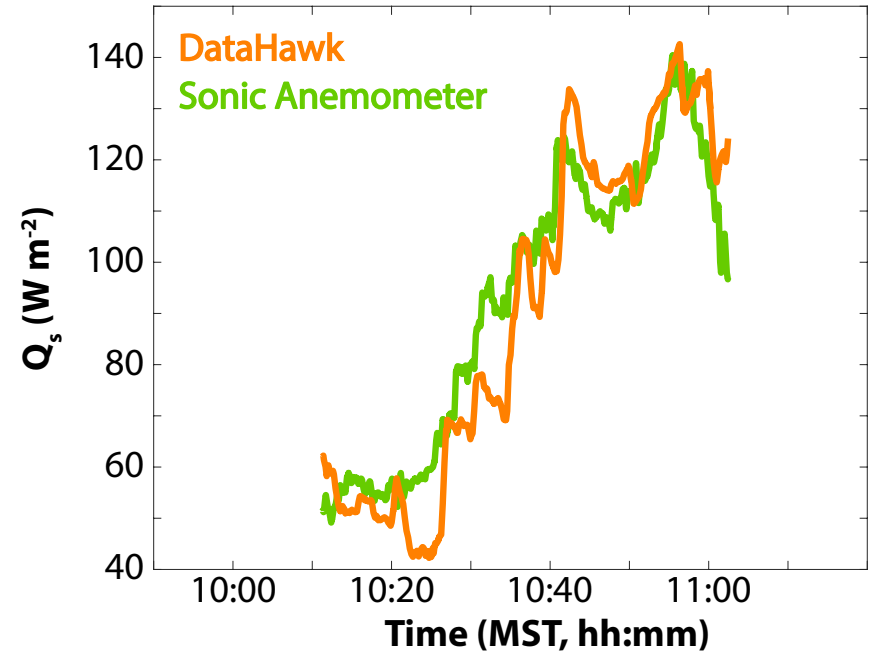
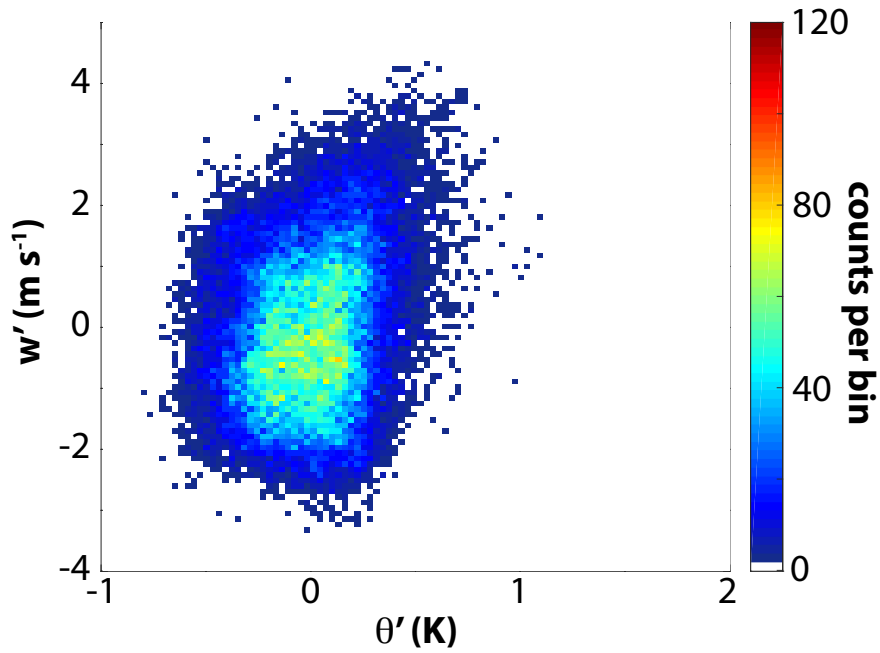
Observing the sub-grid scale



Observing the sub-grid scale



Observing the sub-grid scale



Summary and Acknowledgments

- The Polar Observations and Processes (POP) team, consisting of NOAA ESRL Physical Sciences Division and CIRES scientists, is using a variety of observational tools to improve process level understanding and evaluate and improve Arctic modeling tools.
- These efforts involve integration of measurements made at observing “supersites”, both within a given observatory and across observatories via IASOA-related efforts. This includes study of interactions between aerosol particles and clouds, cloud formation and environment dynamics/thermodynamics, and surface-atmosphere exchanges.
- In order to gain new perspectives, we are working to develop and deploy unmanned aircraft systems (UAS) to obtain three-dimensional insight into critical processes of interest, including those linked to thermodynamics, aerosols, radiation, and turbulent energy exchange.

Funding:

