

North Dakota Aircraft and Surface CCN Measurements during the Summers of 2010 and 2012 **Nicole Bart and David Delene**

Objective

The objective is to determine how Cloud Condensation Nuclei (CCN) concentration change from the surface to clouds base and from day to day. Understanding when surface measurements can be used to predict cloud base CCN concentrations would allow long term, continuous, surface-based measurements to be used in many aerosol-cloud interaction studies.



University of Wyoming's Cloud Condensation Nuclei Counter



Droplet Measurement Technologies Cloud Condensation Nuclei Counter



Aircraft flight paths during the 2010 POLCAST3 field project.



Aircraft flight paths during the 2012 POLCAST4 field project.









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flight time intervals for the 2010 POLCAST3 and 2012 POLCAST4 field projects.



Statistical distributions (30 s samples) made at cloud base and the surface in Grand Forks for 0.6% ambient supersaturation Cloud Condensation Nuclei (CCN) adjusted to standard temperature and pressure during the 2010 and 2012 POLCAST3 field project. The solid circle is the mean value, the horizontal is the 50th percentile, the top of the box is the 75th percentile, the bottom is the 25th percentile, and the top and bottom of the whiskers are 95th and 5th percentiles, respectively.



Comparison between the mean cloud condensation nuclei concentrations made at the surface in Grand Forks, ND and cloud-base concentrations for the 2010 and 2012 campaign.

Conclusions

Profiles show a well mixed CCN concentration layer between the surface and cloud base. This indicates that typically surface measurement can be used to infer cloud base properties. Day to day changes in CCN concentration are much larger than regional variations. The airborne CCN measurements indicate that the DMT CCN counter measures about 25% higher than the Uwyo CCN counter at 0.6% ambient supersaturation.

Future Work

Compare surface based DMT and UWyo CCN counter measurement made with two different counters to see how the DMT and UWyo CCN counter compare. Compare surface and cloud base DMT counter measurements.

Acknowledgement

The POLCAST projects are funded by the North Dakota Atmospheric Resource Board.