Recent cloud and aerosol observations from the NRC Convair-580 aircraft

Nichman, L.; Wolde, M.; Korolev, A.; Bastian, M.; Wheeler, M.; Bliankinshtein, N.; Nguyen, C.; Baibakov, K.

IUGG General Assembly - Cloud-Precipitation-Aerosol / Clouds and Circulations in Planetary Atmospheres Session, 2019-07-09

Abstract Details

Session title: M01/M24d - Cloud-Precipitation-Aerosol / Clouds and Circulations in Planetary Atmospheres

Session type: IAMAS (Meteorology)

Symposium: M01/M24

Presentation number: IUGG19-3158

Abstract title:

Recent Cloud and Aerosol Observations from the NRC Convair-580 Aircraft

L. Nichman[1], M. Wolde[1], A. Korolev[2], M. Bastian[1], M. Wheeler[3], N. Bliankinshtein[1], C. Nguyen[1], K. Baibakov[1].
[1]National Research Council Canada, Flight Research Laboratory, Ottawa, Canada.
[2]Environment and Climate Change Canada, Meteorological Research, Toronto, Canada.
[3]Environment and Climate Change Canada, Air Quality Research Division, Toronto, Canada.

In the last decade, there has been significant progress in in-situ characterization of cloud structures, microphysical properties, and aerosol content, as a result of new instrumentation and focused field studies. However, the difficulties with data collection in adverse conditions and limited number of aircraft campaigns as well as monitoring stations have resulted in significant observational gaps and high measurement uncertainties. These issues are most evident in remote regions.

This presentation focuses on recent field campaigns conducted using the National Research Council of Canada's (NRC) Convair-580 aircraft, instrumented jointly by NRC and Environment and Climate Change Canada (ECCC). This twin-engine aircraft with wing-mounted pylons, is equipped with an array of commonly used cloud microphysics probes and aerosol instruments to sample in-situ, at altitudes of up to 7 km. The sampling range is extended further from the aircraft with active and passive remote sensing systems (lidars, radars and radiometer), providing cloud and precipitation structures many kilometres away. In the past year alone, over 150 hours of cloud data were collected in diverse environments, including the arctic and mid-latitude weather systems, in a number of collaborative projects.

We present selected observations (e.g. aerosol, hydrometeor, and water content) from arctic and mid latitude clouds, which are complemented with the airborne remote-sensing for spatial characterization of the clouds. Lastly, we discuss the common uncertainties in such measurements. This overall characterization allows us to gain a better understanding of atmospheric processes, which will allow improved weather forecasting and increase safety and cost-effectiveness of air transportation worldwide.