# Most complete dataset ever collected helps scientists understand aerosols' impacts on clouds

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Measurements in Arctic mixed-phase clouds provide the most complete dataset designed to better understand the influence of aerosols on Arctic clouds and climate.

The Arctic is warming twice as fast as the rest of the Earth, and scientists now have more data to understand why. From Fairbanks to Barrow, Alaska, a team of researchers, including scientists from Pacific Northwest National Laboratory, found strong seasonal differences in the number of ice-forming particles in Arctic clouds. The results provide a more accurate picture of the number and types of aerosol particles on which cloud droplets and crystals form.

Arctic clouds and aerosols are thought to play important roles in the

Earth's energy balance and may influence the loss of sea ice. The persistence of these clouds near the Earth's surface has long been a puzzle. The field measurements collected in this study provide the most complete cloud and aerosol dataset ever collected over the North Slope of Alaska. This information can help explain the persistence of these clouds and the role aerosols play in their longevity.

The measurements of the number, size and composition of aerosol and cloud particles were collected over a span of 12 days during the month of April, by 41 state-of-the-art cloud and aerosol instruments on an aircraft. For more than 100 hours on a total of 27 aircraft flights, a variety of sampling patterns provided both vertical and horizontal distributions of the clouds and aerosols above Barrow, Alaska. These measurements during April complement aircraft data taken in a previous October. The team published the first scientific findings from this dataset in the December 2010 issue of the *Bulletin of the American Meteorological Society*. These findings will enhance climate change predictions and modeling.

The data will be used to improve understanding of the complex interactions between clouds, aerosols and other components of the Arctic. Further, the data will be used to represent that understanding in global climate models. Also, the data will be used to determine the extent to which surface measurements can be used to estimate aerosols, clouds, precipitation and radiative heating.

**More information:** McFarquhar GM, et al. 2011. "Indirect and Semi-Direct Aerosol Campaign (ISDAC): The Impact of Arctic Aerosols on Clouds." *Bulletin of the American Meteorological Society* 92(2):183-201. DOI:10.1175/2010BAMS2935.1

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