

Snowfall/Blowing Snow Observations at CMDL/Barrow, 2002: Progress and Preliminary Result

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Systematic errors caused by wind-induced undercatch, wetting, and evaporation losses in precipitation measurements have long been recognized as affecting all types of precipitation gauges. The need to correct these biases, especially for solid precipitation measurements, has now been widely acknowledged. To assess the national methods of measuring solid precipitation, the World Meteorological Organization (WMO) initiated the Solid Precipitation Measurement Intercomparison Project in 1985. Thirteen countries participated in this project, and the experiments were conducted at selected midlatitude sites in these countries from 1986-1987 to 1992-1993.

The Arctic climate is characterized by low temperatures, generally low precipitation, and high winds. Arctic precipitation events generally produce small amounts, but they occur frequently, often with blowing snow. These conditions add to the systematic errors of gauge-measured precipitation. Factors such as wind-induced undercatch, evaporation, and wetting losses, underestimates caused by not accounting for trace amounts of precipitation, and over/under measurements, due to blowing snow, need special attention. It is recommended that an intercomparison experiment be conducted to further test the national precipitation gauges commonly used in Arctic regions and to evaluate the existing bias correction procedures.

Recognizing the importance of the precipitation data quality to cold-region hydrological and climate investigations, the Frontier Observational Research System for Global Change (FORSGC) and the Water and Environmental Research Center, University of Alaska Fairbanks (UAF) conducted a gauge intercomparison study at Barrow, Alaska. We installed several precipitation gauges for the comparisons. These include reference gauges and various national standard gauges commonly used in the Arctic regions: Double-Fence Intercomparison Reference (DFIR; WMO reference), Wyoming snow fence system (U.S. reference gauge for snowfall), Canadian Nipher gauge (Canadian standard gauge), Hellmann gauge (Greenland, Denmark, and Germany), NOAA-II gauge, Russian Tretyakov gauge (Russian standard gauge, also used in Mongolia and other countries), RT-4 (Japanese standard gauge), and U.S. 8 inch (U.S. standard gauge, widely used in other countries). A snow particle counter was introduced for investigating the blowing snow effect on the actual precipitation measurements. In addition, an automatic weather station was set up at the site to measure weather conditions such as wind speed and air temperature. This poster describes the progress and presents preliminary results of snowfall/blowing snow observations at the CMDL Barrow Observatory, 2002.