Update on the Total Precipitation 'Hot Plate' Sensor in Alaska

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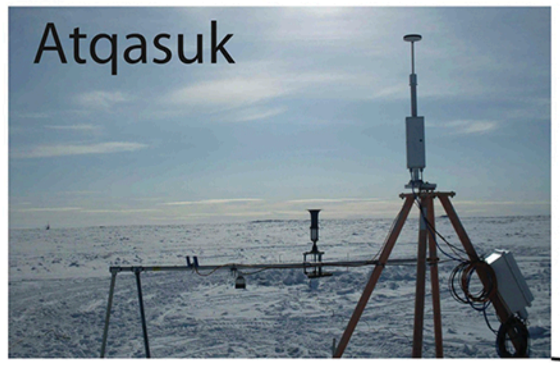
ABSTRACT

The authors provide an update on the Total Precipitation Sensor (TPS) installed at the Atmospheric Radiation Measurement (ARM) Climate Research Facility (ACRF), North Slope of Alaska (NSA) sites in Barrow and Atqasuk, as well as University of Alaska-managed sites. The TPS design is intended to avoid the undercatch biases of traditional gages, but may not detect smaller-sized snow particles. Output from the TPS is being routinely compared to that from the co-located NOAA's Climate Reference Network (CRN) sites, snow particle counters, and changes from snow depth sensors. Additional data from wind tunnel experiments suggest that not only may the sensor fail to detect trace precipitation, but the asymmetry caused by the 'gooseneck' design must also be accounted for in the wind pumping portion of the sensor algorithm. A new installation is planned for Oliktok in the summer of 2013.

DOE ARM Instrumentation

Present

Past

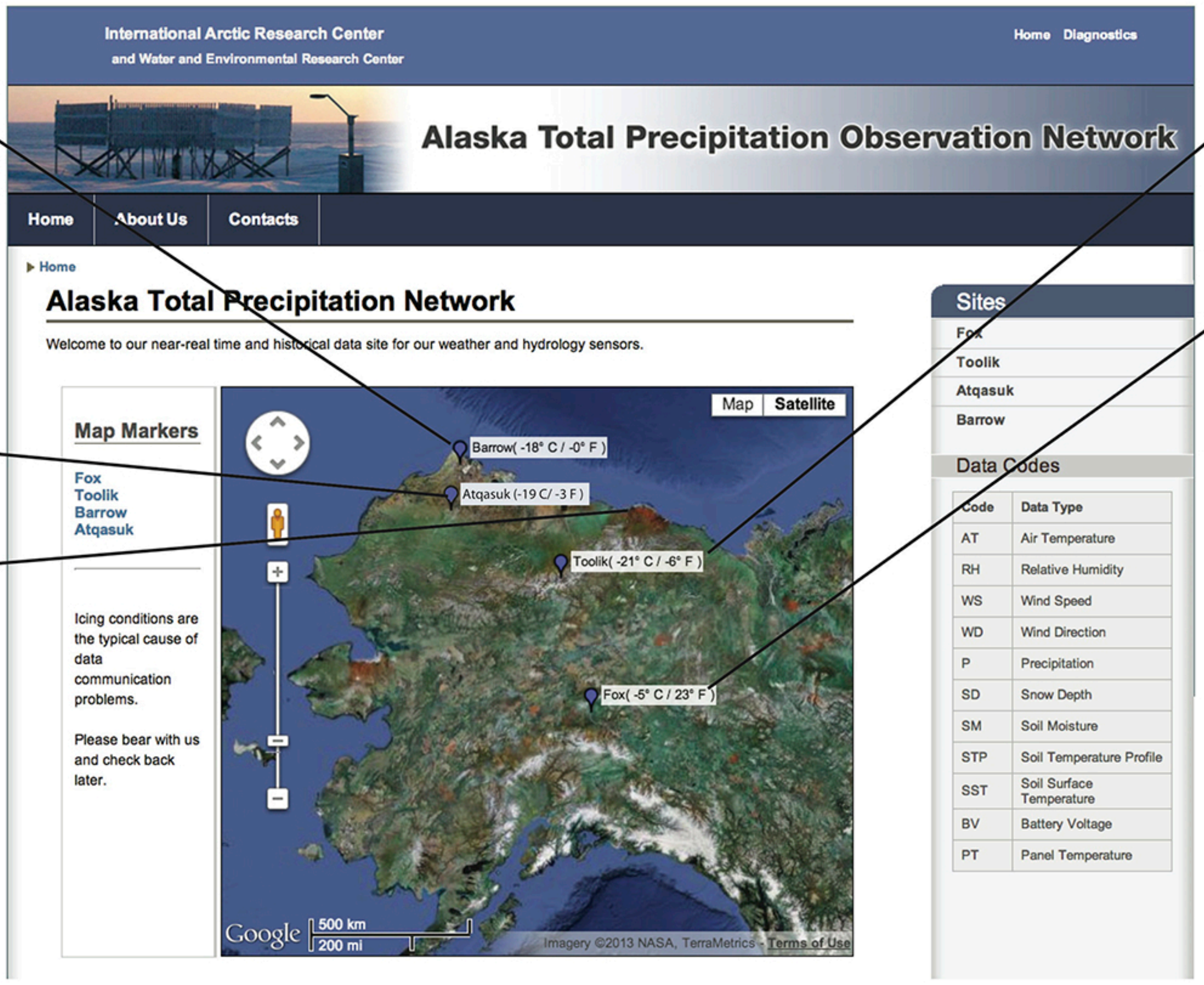


Future

Why Use the Hot Plate?

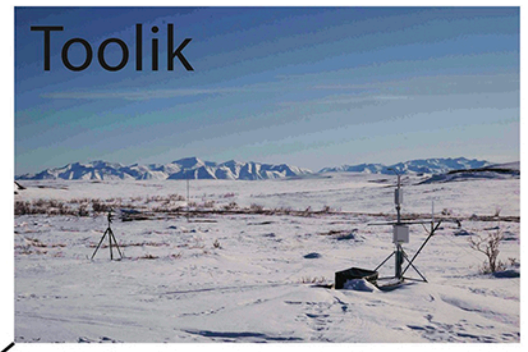
Problems with conventional gauges include:
- *Turbulence generated by gauge itself causes undercatch
- *Ice buildup and mechanical failures
- *Animals disturbances can easily destroy the sensor

Advantages of Total Precipitation Sensor (TPS) design:
- *'Hot plate' profile may be less biased, particularly for snow
- *No moving parts
- *Calculates precipitation rate by the amount of power needed to evaporate the moisture on the upper plate while maintaining a constant surface temperature. Lower plate measures wind and temperature for correcting evaporative effect and are also useful observations



Leveraged Cooperations

NSF



NOAA

REFERENCES AND ACKNOWLEDGMENTS

ARM logo is used courtesy of the U.S. Department of Energy's Atmospheric Radiation Measurement Program. Many thanks to Walter Brower, Jimmy Ivanof, Bob Busey, Jeff Zirzow, Martin Stueffer, Trent Doyle, Tim Grove, and Dick Eagan for their help with installations. Thanks to Sutanay Choudhury and Chaomei Lo for help with the data archive ingest.

References and Related work:

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