



NWB Sensors Snomonstor™

Snowpack (SWE) Monitoring

Project Background

This project grew out of our experience working with the SNOTEL network, and their expressed need to move from snow pillows to a reliable fluidless snowpack monitoring system. Their need is motivated by technical, environmental, and economical problems related to their reliance on snow pillows. In response to this need NWB Sensors is developing the Snomonstor™, a new fully electronic fluidless snowpack measurement technology targeting the replacement of antifreeze filled snow-pillows in snowpack measurement networks.

Contact Information

Website:

www.nwbsensors.com

Phone:

(406) 579-0510

Email:

info@nwbsensors.com

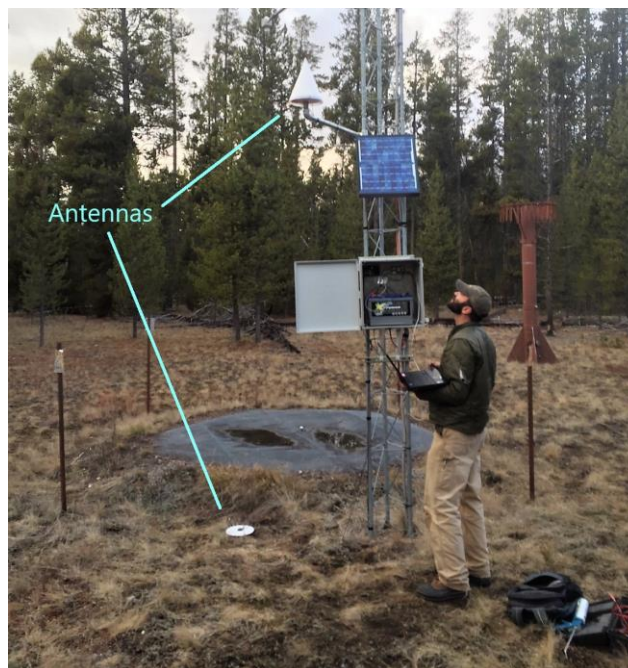


Figure 1. Prototype Snomonstor™ deployed at West Yellowstone SNOTEL site. The gray rubber bladder of the snow-pillow can be seen next to the Snomonstor™ antennas in the photo.

This system enables measurement of snow depth, density, liquid water content (LWC), and snow water equivalent (SWE).

This product will remotely and autonomously monitor water content stored in snowpack.

The system uses two Global Navigation Satellite System (GNSS) receivers, one buried under the snowpack and one above the snowpack, to observe the impact snow has on the GNSS signals.

Targeted Technical Specs

Measurement Range	1600 mm SWE and 100mm LWC
Accuracy	SWE within ± 7 mm and LWC within $\pm 0.1\%$
Operating Temp Range	-40° to +50°C
Operating Voltage	11 to 15 Vdc
Power: Full Data Rate	500 mW
Power: Low Power Burst	100 mW
Communication Protocol	RS-232 (1200 to 115200 bps), SDI-12
Total Weight	3 kg
Ground Sensor Size	200 mm Diameter



NWB Sensors Snomonstor™

Existing Sites and Notable Aspects

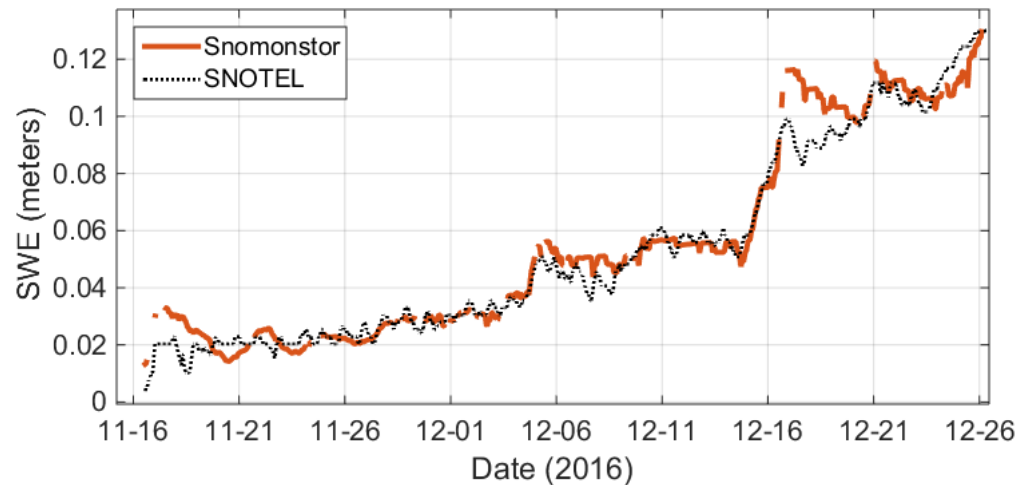


Figure 2. SWE data from the SNOTEL snow pillow and the Snomonstor™ deployed at West Yellowstone SNOTEL site.

Locations of Prototypes

- Black Bear SNOTEL
- West Yellowstone SNOTEL
- MacDonald Pass Montana Mesonet
- Hot Springs Montana Mesonet
- Churchill Montana Mesonet

Support and Funding

- SBIR grant no. 2018-33610-28729 from the USDA National Institute of Food and Agriculture
- Montana SBIR / STTR Matching Funds Program
- Montana Research and Commercialization of Technology grant 19-51-032

Expected Release Date

August 2020

Contact Information

Website:

www.nwbsensors.com

Phone:

(406) 579-0510

Email:

info@nwbsensors.com

Compared to snow pillows the Snomonstor™ will have significantly lower cost of ownership, a much smaller footprint, and provide a full set of snow parameters. This will reduce costs in automated snow monitoring networks by replacing snow pillows, snow scales, and manual sample sites. Our sensors have the potential to broadly enable snowpack measurement at weather installations, including prairie locations where snowpack currently goes largely un-quantified. The Snomonstor™ will increase snowpack data quality and quantity.

The Snomonstor™ is the solution to eliminating a fluid snow sensor and is an economical means for adding additional sites to networks. The Snomonstor™ requires no antifreeze, has no moving parts, does not require a level surface to operate, and measures a large set of snowpack parameters with a single sensor. At a comparable cost, the Snomonstor™ is more economically viable than the full sensor suite needed to measure depth, density, SWE, and LWC.