Evaluation of Two Ultrasonic Snow Depth Sensors for National Weather Service Automated Surface Observation System Sites

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Abstract. In the early 1990's the National Weather Service (NWS) deployed the Automated Surface Observing System (ASOS) at airport observing sites, eliminating the need for human observers. At the time there were no reliable sensors to measure snow depth and the traditional snow measurements of 6 hour snowfall and snow water equivalent (SWE) were abandoned at most locations. The National Weather Service is currently exploring the feasibility of installing ultrasonic snow depth sensors at ASOS sites to restore snowfall measurements to the historic data record. In the 2003-2004 snow season testing of the Judd Communications ultrasonic depth sensor began at three sites: Fort Collins, CO; Stove Prairie, CO; and New Brunswick, OH. Preliminary results show that due to scattering of the sound pulse the Judd sensor performs poorly under windy conditions and when low density snow is present on the snow surface. In addition to the automated data, 6 and 24 hour manual measurements of snowfall, snow depth, snow water equivalent and gauge precipitation were collected. For the 2004-2005 snow season, 15 sites across the U.S. will test both the Judd Communications and the Campbell Scientific sensors. This presentation will show three aspects of the project: i) the magnitude and characteristics of noise in the sensor data, ii) a comparison of the performance of the two sensors, and iii) the status of an algorithm that will convert continuous sensor snow depth to NWS traditionally measured 6 hour snowfall.

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