



A new low-cost ultrasonic and meteorological sensor for observation of snow hydrological processes

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The high spatial and temporal dynamics of snow accumulation and melt is generally difficult to capture. Instrumental methods have been developed to capture snow height in combination with meteorological variables, however, these stations are usually quite expensive and only few locations can be instrumented. In order to capture the dynamics due to different elevations, aspects, vegetation cover, and snow redistribution, a low-cost station network is needed that focuses on snow processes and can be set up in rugged environments. We developed a digital-based sensor with low power consumption that can be easily deployed and can collect data up to 6 month. Data collected by the sensors include: snow height, air temperature and humidity, surface (snow) temperature, liquid precipitation, global radiation, and wind speed. In addition, the sensor can be upgraded to take a digital picture of the environment for time-lapse photography. The bus system of the sensor is built to allow GPSR modem access in future. We successfully compared the system with standard, high-cost meteorological measurements and already deployed over 50 stations in three watersheds in the Black Forest, Germany. We also successfully use the sensor for water level measurements in streams and other applications are certainly possible.