Enabling Low Latency Snow Pit Data

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ABSTRACT

Current methods of monitoring snow water equivalent (SWE) from space, such as measuring the differential scatter darkening in the radio brightness at 19 and 37 GHz, rely on snow microphysical properties, such as grain size, in addition to the snow macroscopic properties like snow depth. The algorithms to invert the observations to SWE or snow depth are region-specific and require substantial ground truth.

The research addresses this concern by automating the collection of snow ground truth. We will do this by integrating two technologies that already exist: 1. the SoilSCAPE system enables the collection of low-latency soil moisture data from areas that are large enough to be representative of a passive microwave footprint. 2. The University of Michigan snow sensor is a small, easily replicated device that logs snow's temperature, density, and grain size, moisture and ambient light levels. The bulk of the effort is on implementing the software needed allow the two systems to communicate, and thereby turn the SoilSCAPE system into one that can also monitor snow over a wide area.

Advantages of merging the two systems include giving to the snow sensor the intelligence of the SoilSCAPE system. Power management of a device embedded in the snowpack is important to preserving the snowpack properties. Judicious alterations of the measurement schedule, possible with the SoilSCAPE system, will enable rapid measurements of the snowpack when the snow changes, and sparse sampling of the snowpack when excess power dissipation is undesired.

The recent work includes successful data transmission of snow data from one snow sensor to the SoilSCAPE's End Device (ED) over UART, and the ED sending the data to a Local Coordinator (LC) wirelessly in a lab setting. The near future work involves expanding the network by connecting four snow sensors to the ED. This will enable space-time sampling of snow.

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