Title

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Calculation procedure:

Experimental dates in 2011:

Feb. 13th, Feb. 23rd, Feb. 24th. Feb. 26th, Feb.27th.

Equipment for manual experiments:

|  |  |
| --- | --- |
| Parameters measured | Equipment |
| Snow depth | Snow depth probe |
| Snow water equivalent & snow density | Deluxe 12″ Kit |

Notes for parametric table:

Time: numbers 1 to 5 indicate the days of experiment, runs 1 to 5 refer to building 1, runs 6 to 10 refer to building 2. Buildings 4 and 5 did not have snow on first day of experiment.

The model inputs include wind speed (Uori), rooftop temperature (Tr), air temperature (Tori), relative humidity (RHori), snow density (ρsnow), shortwave radiation (Qori,sn), heat flux through roof assemblies (Qori,g), snow depth (l), relevant fractions for bulk volume of water in the snow (Vwater) and longwave radiation (Qlongwave). These inputs are daily averaged values from 9:00AM to 6:00PM. The raw data of the inputs are listed in the file named “input with average”.

In addition, the albedo was estimated based on the relationship between snow age and albedo (U.S. Army Corps of Engineers). The snow melting speeds were calculated based on the snow depth.

What we learned in the experiment beyond the published paper:

1. The Ksnow and the linear relationship between Ke and log\_theta are highly dependent on snow surface temperature, snow depth and decrease of snow depth per day.
2. Albedo is also an important factor that should be estimated as accurate as possible.
3. Other parameters that should be estimated more accurately: snow coverage, liquid water content of snow.
4. In the code, we calculated the absolute value to make sure that all the Ksnow are larger than 0. The originally calculated Ksnow may include negative values due to the positive sign of Qsnow, which is caused by overestimated Q (energy for snow melting). The Q may be overestimated because we could not accurately estimate the decrease of snow depth per day, as mentioned above. If future studies may accurately estimate the snow depth and decrease of snow depth per day, the problem should be fixed and the absolute calculation is not needed.