

Plausibility check of a redesigned rain-on-snow simulator (RASA)

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Rain-on-snow events are fascinating but still not completely understood processes. Although, several studies and equations have been published since decades that describe past events and theoretical descriptions, empirical data of what is happening in the snow cover is far less available. A way to fill this gap of empirical data, rain-on-snow-simulators might be of help. In 2013, Juras et al. published their inspiring idea of a portable rain-on-snow simulator. The huge advantage of this device - in contrast to other purely field-based experiments - are their fixed, and mostly standardized conditions and the possibility to measure all required data to monitor the water fluxes and melting processes at a time. Mounted in a convenient location, a large number of experiments are relatively easy conductible.

We applied and further developed the original device and plausified the results of this redesigned version, called RASA. The principal design was borrowed from the original version being a frame with a sprinkler on top and a snow sample in a box at the bottom, from which the outflow is measured with a tipping gauge. We added a moving sprinkling plate to ensure a uniform distribution of raindrops on the snow, and – most importantly - we suspended the watered snow sampled on weighting cells. The latter enables to continuous measurement of the snow sample throughout the experiment and thus the indirect quantification of liquid water saturation, water holding capacity, and snowmelt amount via balance equations.

As it remains unclear if this device is capable to reproduce known processes, a hypothesis based plausibility check was accomplished. Thus, eight hypotheses were derived from literature and tested in 28 experiments with the RASA mounted at 2000 m elevation. In general, we were able to reproduce most of the hypotheses. The RASA proved to be a very valuable device that can generate suitable results and has the potential to extend the empirical-experimental data set on rain-on-snow events.

Juras R., et al. (2013): A portable simulator for investigating rain-on-snow events, *Zeitschrift für Geomorphologie*, 57, Suppl.1, 73-89.