

Parameterization of snow albedo - an empirical analysis based on records from different environments

Alexandra Mittermeier,¹ Heidi Escher-Vetter,² Markus Weber,²

¹ *Meteorological Institute, University of Munich, Munich, Germany*

² *Commission for Glaciology, Bavarian Academy of Sciences and Humanities, Munich, Germany*

alex@meteo.physik.uni-muenchen.de

The most important parameter in the energy budget of a snow surface is the albedo. It defines how much of the incoming shortwave radiation is reflected at the surface.

As the snow surface ages, its micro- and macrophysical properties change, thus leading to a decrease in snow albedo. Typical values range from 0.85 for dry fresh snow to 0.4 for dirty wet old snow.

The decrease rate of the albedo of a snow surface is different at different locations, depending, among other things, on the accumulation of impurities at the surface and the speed of snow metamorphosis. As the shortwave radiation balance normally delivers the largest contribution for the ablation a realistic albedo parameterization is indispensable for modelling snow melt.

We investigated snow covers at different locations and elevations: Garching (close to Munich, Germany) at 474m a.s.l., Kühroint (Berchtesgaden National Park, Germany) at 1407m a.s.l., Vernagt gauging station (Ötztal Alps, Austria) at 2640m a.s.l. and the AWS at Morteratsch Glacier (Engadin, Switzerland) at 2116m a.s.l..

In order to look for additional criteria to parameterize snow albedo, we compared the records of the four stations to algorithms, which use independent variables like time (Rohrer [1]) or accumulated air temperature (Brock [2]). Some first results will be presented, which indicate that in some cases additional variables like humidity have to be taken into account.

[1] Rohrer, M. B.: Die Schneedecke im Schweizer Alpenraum und ihre Modellierung. *Zürcher Geographische Schriften*, Heft 49, ETH Zürich, 1992

[2] Brock, B.W.; Willis I.C.; Sharp, M.J.: Measurement and parameterisation of albedo variations at Haut Glacier d'Arolla, Switzerland; *Journal of Glaciology*, 46(155), 675-688, 2000