

Albedo and Snow Properties During Ablation in a Sub-Arctic Alpine Environment

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EXTENDED ABSTRACT

During the ablation of snow cover in open environments, radiation exchange is known to provide an important component of the snowmelt energy balance. In high latitudes where snowmelt occurs from April through June, net radiation over melting snow can receive a large contribution from net shortwave radiation, which itself is strongly influenced by the albedo of snow. The snow albedo varies greatly with environmental conditions and snow properties (wetness, grain size, snow age, etc.), but is generally high compared with that of bare ground and vegetation. As a consequence, net shortwave radiation contributes an even larger proportion to net radiation over snow-free than over snow surfaces. During snow-covered area depletion, areal albedo decreases in accordance with changing snow properties but also with the appearance of other surfaces (bare ground, vegetation, etc.). The distinction between areal albedo and snow albedo should therefore be clearly made in snowmelt energetics models.

The objective of this study is to compare measured point snow and areal albedos with measured snow properties during a snow ablation period at a high latitude site. These data have been taken in Wolf Creek Research Basin near Whitehorse, Yukon Territory, Canada. The results from two sets of measurement devices (areal and point albedometer) differ substantially. Point snow albedo shows a very small decay during melt while the areal albedo shows a much stronger decay. We explain these differences with reference to snow properties and to their variability over an alpine plateau and present an approach to improve the comparability of albedo estimates from the two methods. The results are discussed in relation to measurements made in other environments.

Key Words: Ablation, Albedo, Alpine environment, Snow cover

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