>> SYNTHESIZE MOUNTAINS OF KNOWLEDGE <<

Submitted Abstract

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First Author		
First Name	Karl (1)	
Last Name	Rittger	
Submitting Author		
First Name	Karl	
Last Name	Rittger	
Correspondence	karl.rittger@colorado.edu	
Co-Authors >> E-Mails will be not listed	Skiles, Mckenzie (2); Musselman, Keith (1); Serreze, Mark (3); Brodzik, Mary J. (3)	
Organisations	1: INSTAAR, University of Colorado, Boulder 2: Geography, University of Utah 3: NSIDC, University of Colorado, Boulder	
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Research Area Mountain Regions
Innrain 52f
6020 Innsbruck
Austria

WWW.IMC2022.INFO

imc2022@uibk.ac.at
+43 512 507 54442

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Abstract

Water managers need accurate observations of snow cover and albedo to make decisions for a diverse set of applications. Remotely sensed snow cover and albedo products that are currently available do not meet operational requirements for several reasons. First, the most widely available snow products from MODIS use an index algorithm developed in 1989 that employs two spectral bands, one in a visible wavelength and one in the shortwave-infrared, which together provide limited information to estimate fractional coverage or snow albedo. Second, cloud cover is difficult to discriminate from snow and causes data gaps that can be filled using techniques that rely on accurate cloud masking. Third, MODIS is an elderly system that continues to operate well beyond its design life, and the successor to MODIS, the Visible Infrared Imaging Radiometer Suite (VIIRS), do not gap-fill the snow cover product and there is no snow albedo product. Fourth, standard snow cover and snow albedo products do not account for off-nadir observations that introduce uncertainty and additional data gaps. Fifth, no widely distributed product accounts for the darkening of snow caused by light absorbing particles and their impact on snow albedo.

We have partnered with snow remote sensing end users who serve diverse needs of national and international water resource decision makers. With their guidance, we create and provide daily gap-filled snow cover and snow albedo, including impacts of light absorbing particles. The products account for off-nadir views, snow under the forest canopy, and use cloud filtering techniques not employed in existing products. Using algorithms shown to perform consistently across sensors—specifically Landsat 8/9, MODIS, and VIIRS—we will process the historical daily record and produce data in near real-time with a sub-daily latency period for both MODIS Terra and VIIRS Suomi. This project will complete the transition of the data processing, archiving, and distribution to the National Snow and Ice Data Center. The transition will ensure the continued production of snow cover and snow albedo products for the lifetime of these sensors.

Our partner organizations are decision makers poised to directly benefit from accurate and timely snow cover and snow albedo information. These collaborators are globally distributed in North America, New Zealand, the Andes, High-Mountain Asia, and the European Alps. The historical and near real-time snow and albedo products will enhance decision-making processes to better inform stakeholders in a range of applications, including streamflow forecasting, agriculture, and water futures planning.

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