Submitted Abstract

ID IMC22-FSAbstr- 421

First Author First Name Last Name	 Joachim (1) Meyer
Submitting Author First Name Last Name	 Joachim Meyer
Correspondence	j.meyer@utah.edu
Co-Authors **>> E-Mails will be not listed**	Skiles, Mckenzie (1); Kormos, Patrick (2); Hedrick, Andrew (3)
Organisations	1: Department of Geography, University of Utah, Salt Lake City, UT, USA 2: National Weather Service, Salt Lake City, UT, USA 3: USDA-ARS, Northwest Watershed Research Center, Boise, ID, USA
Country	United States of America
Region	North America
Title	Improvements To Snowmelt Timing Using Remotely Sensed Snow Albedo In A Spatially Distributed Process-Based Snow Model In The East River Watershed, Colorado, Usa.
Keywords	Hydrological Forecasting, Remote Sensing, Modeling, Snow Albedo
Type	List Of Focus Session
Focus Session ID	72

Abstract

The Western United States highly depends on freshwater supply from seasonal snowmelt. Mountain headwaters have a demonstrated decline in the extent and amount of snow, putting this previously consistent natural reservoir at risk. In most snow environments, the timing and magnitude of snowmelt are determined by absorbed (net) solar radiation, the difference between the incoming and reflected solar radiation, which is primarily controlled by the snow albedo. However, solar radiation and snow albedo are not commonly measured at instrumentation sites in the mountains, yet they maintain a high degree of spatial variability. With the sparsity of observations, process-based snow models commonly use a simplified time-decay function that can lead to errors in snowmelt rate and snow depletion timing. The errors are particularly seen in areas where light-absorbing particles darken snow, a common phenomenon in the Western US. One option to replace the simulated snow albedo is to use remote sensing products that previously had limited suitable spatial and temporal resolution products in the mountains. This gap was addressed by combining the MODIS Snow Covered Area and Grain Size (SCAG) products and Dust Radiative Forcing in Snow (DRFS) to produce an observed snow albedo. This study showcases the use of daily updated remotely sensed snow albedo from MODIS in a spatially distributed snow energy balance model in the East River Watershed, CO. Previous work established the model's ability to capture overall mass balance in terms of accumulation timing and amount, but snow often melts too slowly and disappears too late. The results with MODIS observed albedo are compared against in-situ and airborne snow extent and depth observations to assess model improvements in snowmelt rate and snow depletion timing. The option to use remotely sensed snow albedo has the potential to enable a faster adaptation to ongoing and upcoming regional changes and enhance the runoff predictions of water forecasters.