Geophysical Research Abstracts
Vol. 21, EGU2019-343, 2019
EGU General Assembly 2019

Annual Mass Balance Reconstruction of Rikha Samba Glacier, Nepal Himalaya between 1979 and 2017

Tika Gurung (1), Rijan Kayastha (2), Koji Fujita (3), Anna Sinisalo (1), Sharad Joshi (1), Maxime Litt (1), and James Kirkham (1)

(1) International Centre for Integrated Mountain Development (ICIMOD), Water and Air, Kathmandu, Nepal (tikargrg@gmail.com), (2) Kathmandu University, Nepal, (3) Nagoya University, Japan

Glacier mass balance variability influences regional water resources and helps to understand the glacier response to climate change. Several mass balance studies have started in the Himalayan region since the 1970s, but a time series remains short or incomplete and spatial representatively remains poor. We ran an energy mass balance model in order to bridge the temporal gaps in a long-term mass balance series of the Rikha Samba Glacier (5383 – 6475 m a.s.l.), a benchmark glacier located in the Hidden Valley, Mustang, Nepal. We forced the model from 1979 to 2017 by linearly adjusted ERA-Interim reanalysis data (daily mean values of temperature, precipitation, relative humidity, wind speed and solar radiation) with available observed meteorological variables (2011-2015), near the glacier terminus the location of an automatic weather station (AWS). To validate the modeled mass balance we tried to find the best set of precipitation ratios relative to the adjusted precipitation based on the data from nearby Jomsom station and elevation gradient of the precipitation to yield the best estimate of glacier wide mass balance. Root mean square error (RMSE) was calculated between the observed mass balance of 1999, 2013, 2016 and 2017, and the modeled mass balance as a function of precipitation ratio (horizontal axis) against the adjusted precipitation at AWS location and elevation gradient of precipitation (vertical axis) for the same period. We adopted the 30% km^{-1} to 55 % km^{-1} as the elevation gradient of precipitation and 100 % to 140 % as the precipitation ratio to reconstruct the glacier mass balance from 1979 to 2017. Modeled results show the glacier has been shrinking moderately during the study period compare to other glaciers in the Himalayas. The sum of precipitation from January to November is the most influential climatic variables of an annual mass balance variability compare to other climatic variables of Rikha Samba Glacier.